ENVIRONMENTAL IMPACT ASSESSMENT – REVISION 1

HARBOUR EXPANSION AND AGGREGATE MINING PROJECT
FREEPORT, GRAND BAHAMA

Submitted to:
Bahama Rock Limited
Freeport, Grand Bahama

Prepared by:
Bron Ltd.

Date Submitted:
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TABLE OF CONTENTS

Table of Contents I
List of Tables IV
List of Figures V
1 Executive Summary 1
1.1 Project Details & Phases 1
1.2 Socioeconomic Impacts 1
1.3 Environmental Impacts 2
1.4 Mitigation and Environmental Management 3
2 Introduction 3
2.1 Purpose 3
2.2 Scope and Content 4
3 Site Location 4
3.1 Geographic Location 4
3.2 Site Description 6
3.3 Areas of Influence 6
4 Existing Land Use and Ownership 9
5 Project Description 12
5.1 Project Details 12
5.2 Project Schedule 13
5.3 Post Excavation Conceptual Layout 14
5.4 Utilities Description 15
5.4.1 Potable Water 15
5.4.2 Energy 15
5.4.3 Solid Waste 15
5.4.4 Wastewater 16
5.4.5 Roads 16
6 Alternatives 16
6.1 Other Considerations 16
6.2 Specify “No Action” Alternative 17
7 Physical and Biological Baseline 21

7.1 Climate 21
7.2 Hurricane History 22
7.3 Air and Noise Quality 24
7.4 Water Quality 27
7.4.1 Groundwater Resources 27
7.5 Topography 34
7.6 Terrestrial Resource Survey 38
7.6.1 Botanical Survey Methodology 38
7.7 Marine Resource Survey 45
7.7.1 Methodology 45
7.7.2 Habitat Description 46
7.7.3 Observed Species 47
7.8 Human Altered Habitat 53
7.9 Caves and Blue Holes 54
7.10 Species of Economic Importance 55
7.10.1 Terrestrial 55
7.10.2 Marine 56
7.11 Habitat Utilization and Food Sources for Native Fauna 56
7.11.1 Terrestrial 56
7.11.2 Marine 57
7.12 Protected and Threatened Species 57
7.12.1 Terrestrial 57
7.12.2 Marine 57
7.13 Invasive Species 58
7.14 Aesthetics 59
7.15 Protected Areas 59
7.16 Socio-economic Aspect 60
7.16.1 Human Uses of Biodiversity 60
7.16.2 Population/Demographics 60
7.17 Cultural Resources 61
7.17.1 Historical Overview 61
7.17.2 Historical, Archaeological and Paleontological Resources 61

7.17.3 Tourist and Recreational Areas 63
7.18 Transportation 64
8 Environmental Regulatory Bodies and Standards 64
8.1 Relevant Regulatory Bodies 64
8.2 National Laws and Regulations 66
8.3 International Conventions 70
9 Environmental Impact Analysis 71
9.1 Methodology 71
9.2 Land Use Impact 73
9.3 Aesthetic Impact 74
9.4 Air & Noise Impact 74
9.5 Groundwater Resource Impact 75
9.6 Geology Impact 75
9.6.1 Erosion 75
9.7 Terrestrial Resource Impact 76
9.8 Marine Resource Impact 76
9.9 Socioeconomic Impact 77
9.9.1 Social 77
9.9.2 Economic 77
9.10 Archaeological and Cultural Impact 78
9.11 Traffic and Transportation Impact 78
10 Summary Table of Potential Environmental Impacts 79
11 Public Consultation 81
11.1 Stakeholder Engagement 81
11.2 Grievance Response Mechanism 81
12 Environmental Management 81
12.1 Environmental Management Plan (EMP) Terms of Reference 82
12.2 Planned Environmental Monitoring 84
12.3 Responsibilities and Accountability 84
13 Recommendations and Mitigation Strategies 85
13.1 Methodology 85
13.2 Biological Resource Management 85

13.3 Air and Noise Management 86
13.4 Turbidity and Erosion Control 87
13.5 Waste Management (solid, liquid hazardous) 87
13.6 Spill Management 87
13.7 Health and Safety 90
13.8 Fire Management 90
13.9 Severe Weather / Hurricane Management 91
13.10 Marine/Vehicular Traffic Control 92
13.11 Outreach and Education 92
14 Conclusion 93
15 Appendices 94
Appendix A – Phase 1 Environmental Site Assessment 95
Appendix B – Post Excavation Conceptual Layout 221
Appendix C – Flood Potential Analysis 222
Appendix D – Geosonics Report - Noise Measurement and Evaluation 305
Appendix E – Geotechnical Site Evaluation Dock and Ship Loader 329
Appendix F – Water Resources Assessment 373
Appendix G – AMMC Historical Report 611
Appendix H – Flushing Study 615

LIST OF TABLES

Table 5.1 Tentative Project Schedule ____ 13
Table 5.2 Past electric use of existing quarry. ____ 15
Table 7.1 Average precipitation and temperatures in Freeport, Grand Bahama. ____ 22
Table 7.2 Summary of Hurricane History to Impact Grand Bahama (coast.noaa.gov) ____ 23
Table 7.3 Air Quality Measurements at the site during the environmental surveys. ____ 24
Table 7.4 Operational equipment used during noise measurement 2008-2023 (Appendix D). ____ 26
Table 7.5. Community Noise Levels 2008-2023 (Appendix D). ____ 27
Table 7.6. Monitoring well depths. ____ 31
Table 7.7. Piezometric Surface Elevations. ____ 31
Table 7.8 Habitat type and size. ____ 39
Table 7.9 Botanical species seen on the Bahama Rock Limited Site. * indicates protected a Protected Plant. ⊗ indicates invasive species. ____ 41
Table 7.10 Avian species observed on the Bahama Rock Limited Site. IUCN = International Union for Conservation of Nature, * = Species of Concern, ** = endemic species. ____ 43

Table 7.11 Non-avian faunal species seen on the proposed Project site. ⊗ indicated invasive species 44
Table 7.12 Marine species list. Single =1, Few = 2 to 11, Many = 11-100, Abundant = > 100 47
Table 9.1 Environmental aspects under consideration for Impact Analysis. 72
Table 9.2 Impact Significance Summary 72
Table 10.1 Summary Impact Table 79
Table 10.2 Impact Significance Key 80
Table 12.1 Environmental Monitoring Compliance System. 84
Table 13.1 Spill prevention measures 88
Table 13.2 Estimated fuel storage quantities. Fuel storage will be above ground. 90

LIST OF FIGURES

Figure 3.1 Project location relative to other islands in The Bahamas (Google Earth, 2022) 4
Figure 3.2 Project location on Grand Bahama Island relative to West End, East End Grand Bahama and the Grand Bahama International Airport. (Google Earth, 2022) 5
Figure 3.3 Project site is shown in the blue area. Buffer zone shown in yellow grid area. Areas outside of the yellow buffer zone and blue port expansion will not be included in project area or to be minded (Google Earth, 2023). 6
Figure 3.4 The Direct Area of Influence (AOI) is outlined in red and the Indirect AOI is shown in orange. 7
Figure 3.5 Eight Mile Rock Clinic, Bartlett Hill Primary School are included in the Indirect AOI. 8
Figure 4.1 Project map showing the location of each parcel. 9
Figure 4.2 Survey of project site 10
Figure 4.3 Legal descriptions for each parcel (enlarged). 11
Figure 4.4 Evidence of previous excavation on site. 12
Figure 5.1 Conceptual rendering following completion of harbor expansion and aggregate mining. This image is printed larger in Appendix B. 14
Figure 6.1 Current area of interest. 17
Figure 6.2 Projected limits of flooding based on a northern storm surge. The yellow circle shows the Lovers Beach area. 19
Figure 6.3 Protected limits of flooding based on a southern storm surge. The yellow circle shows the Lovers Beach area. 20
Figure 7.1 Köppen–Geiger climate classification map for The Bahamas 1980-2016 21
Figure 7.2 Illustration of Hurricane tracks to have passed through Grand Bahama in the past 22 years (coast.noaa.gov) 23
Figure 7.3 Magnified view of storm tracks through Grand Bahama in the past 22 years (coast.noaa.gov) 24
Figure 7.4 (Top) Ground water resources on Grand Bahama Island. (Bottom) Legend for the above Water Resources on Grand Bahama map. 28
Figure 7.5 Location of geotechnical investigations (imagine from Geotechnical Report included in Appendix E). 29
Figure 7.6.BCC property (purple) and active BRL Area 3 (green). 30

Figure 7.7. Private well survey area outlined in yellow within a 0.75 mile radius. 33
Figure 7.8 Google Earth Image of two reservoirs observed on site. 34
Figure 7.9 Water Reservoirs observed on site. 34
Figure 7.10 Topographic assessment (elevations) 36
Figure 7.11 Topographic Assessment (Elevations) 37
Figure 7.12 Coppice Forest and understory pine community in Bahama Rock Limited site. 38
Figure 7.13 Pineland community seen at the proposed Project site.. 39
Figure 7.14 Habitat map 40
Figure 7.15 Birds seen on the proposed Project site. Left- Spotted Sandpiper. Top right- White-crowned Pigeon, Center Right- Killdeer, Bottom Right -LaSagra's Flycatcher. 44
Figure 7.16 Marine survey area shown in yellow along the western boundary of the Freeport Harbour. 46
Figure 7.17 (Left) Stressed stony coral. (Right) Closer view of the same coral on the left. 47
Figure 7.18 (Left) Porites asteroides (Right) Pseudodiploria strigose 47
Figure 7.19 (Left) Porites asteroids (Right) Porites porites 48
Figure 7.20 (Left) Diadema antillarum (Right) Porites asteroides 49
Figure 7.21 (Left) Common Sea Fan, Padina algae (Right) Sabellastarte magnifica 49
Figure 7.22 (Left) Coral recruit (Right) Montastraea cavernosa 49
Figure 7.23 (Left) Orbicella annularis (Right) Sergeant Major 50
Figure 7.24 (Left) Millepora alcinornis (Right) Symmetrical Brain Coral 50
Figure 7.25 (Right) Knobby Brain Coral (Left) Feather duster 50
Figure 7.26 (Left) Finger coral and Branching Fire Coral (Right) Padina sp. Algae 51
Figure 7.27 (Left) Meandrina meandrities (Right) Plexaurella homomalla 51
Figure 7.28 (Left) Menidia menidia (Right) Spirobranchus giganteus 51
Figure 7.29 Sargassum floating near the opening of the marina. 52
Figure 7.30 (Left) Red algae covered with cyanobacteria (Right) Patches of Red algae 52
Figure 7.31 (Left) Rocky benthic zone near the opening of the marina. (Right) Damselfish 52
Figure 7.32 Rocky benthic zone near the opening of the marina. 53
Figure 7.33 Human altered habitat on the proposed Project site. Casuarina was a dominant invasive plant species in some sections of the site. 53
Figure 7.34 Location of "Boiling Hole in Hepburn Township 54
Figure 7.35. Close up of "Boiling Hole" in Hepburn Township 55
Figure 7.36 Casuarina, Jumbey, and Hawaiian Inkberry 58
Figure 7.37 Casuarina growing in the southeastern portion of the proposed Project site. 59
Figure 7.38 Map of Protected Areas on Grand Bahama 60
Figure 7.39. Observed rock wall location within the Project site boundary. 62
Figure 7.40 Observed rock structure / wall. 62
Figure 7.41 Lovers Beach Location 64
Figure 13.11 Example spill report form. 89

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1 EXECUTIVE SUMMARY

Bahama Rock Limited (BRL) (hereafter, the Developer) proposes to expand the Freeport Harbour (the Project) located on Freeport, Grand Bahama Island in The Bahamas. The Developer has entered into a purchase agreement to acquire Bahamas Cement Company (BCC) which is the owner of a former cement plant on Grand Bahama along with the ~ 515-acre site on which the former cement plant is situated on ~ 252 acres (the BCC Property). The harbor expansion would consist of ~ 269.39 acres of the total BCC property in Freeport, Grand Bahama. Approximately 136 acres of the BCC property contains abandoned infrastructure and is dominated by invasive species. Once excavation of aggregates at the site is complete, the site will result in an expanded Freeport Harbor, which is due east of the BCC Property. For the purposes of this document, excavation refers to the process of removing earth, soil, rock, or other materials from the ground above and below the sea level, to create a void or cavity. This Harbour expansion will create additional turning basins and deep-water berths in the Harbour. The closing of the acquisition is conditioned upon the Developer's receipt of certain approvals, including (among others) receipt of approvals of related permits.

1.1 PROJECT DETAILS & PHASES

The scope of this Environment Impact Assessment (EIA) is focused on the excavation of the site to expand the existing harbour and allow for aggregate removal, which will expand the existing Freeport Harbour. Predominant project activities will include land clearing, excavation, and aggregate extraction. The Project will be completed in four (4) phases based on the current condition of the site and the planned land use after decommissioning. The phases, some of which will occur concurrently, are as follows:

- Phase 1 – Demolition and Debris Removal
- Phase 2 – Protected Tree Relocation and Land Clearing
- Phase 3 – Harbour Expansion and Aggregate Mining
- Phase 4 – Post Harbour Expansion and Aggregate Mining / Decommissioning

1.2 SOCIOECONOMIC IMPACTS

Grand Bahama is the most diversified economy in The Bahamas as it depends less on tourism and more on nontraditional sectors.[1] Businesses such as BRL help maintain the Grand Bahamian economy. The proposed Project will enable BRL to retain employees as BRL's current mining activities are reduced. Retaining 84 employees is important to the Grand Bahamian economy, as unemployment is estimated at 20% to 25% as of December 2019. It is estimated that BRL contributes $25 million to the Bahamian economy annually through employment of 82 Bahamian citizens and through direct and indirect contracts and support services at its existing operations. These socioeconomic benefits can be expected to continue with BCC acquisition and the continued harbour expansion.

[1] Bahamas - Market Overview (trade.gov) Accessed February 15, 2023.

Once aggregate mining is completed, the Freeport Harbour will be expanded to accommodate more vessels and widen the turning basin. This expansion could lead to additional commerce through the Container Port or other job-creating businesses. During decommissioning, additional construction jobs will be created as the site is landscaped and graded. The Project will greatly benefit Grand Bahama as well as the wider Bahamas by:

- Increasing recreational opportunities for locals and expand tourism on the island
- Increasing access to shipping goods and supplies, as well as providing a naturally sourced product for sale locally
- Aggregate mining will provide a reliable supplier in The Bahamas that can meet the demand for the Bahamian construction community
- Invasive species removal and replanting of native plant species
- Beach replenishment, dune refurbishment, and long-term stabilization of this important ecosystem will assist with flood resistance in low lying areas
- Improvement of the groyne and moorings

1.3 Environmental Impacts

The Project will have impacts ranging from moderate to adverse negative, and beneficial environmental impacts on the biodiversity of the site and adjacent areas. These adverse impacts will be mitigated as guided by the Department of Environmental Planning and Protection (DEPP), the Department of Marine Resources (DMR), The Forestry Unit, and the Grand Bahama Port Authority (GBPA). Positive environmental impacts include the eradication of invasive species from the site, which is located within the coastal zone. Invasive species identified on site included the *Casuarina equisetifolia* (Casuarina) and *Schinus terebinthifolia* (Brazilian Pepper). Invasive species growing within the coastal area can potentially impact other neighboring sites encouraging coastal erosion in areas adjacent to the site. This can also lead to a reduction in native biodiversity not only on the Project site, but also at other sites on Grand Bahama. Actions will be taken to demolish dilapidated structures and clear refuse from the BCC property to create a cleaner and more aesthetically pleasing environment. Improving the groyne is expected to enhance the sandy beach habitat at Lovers Beach. Sandy Beaches provide critical habitat for shorebirds and sea turtles. A vegetative screen will be planted in the buffer zone between the excavation site and the main road and Lovers Beach, which will act as an ecological corridor in an area that was previously dominated by invasive species. Additionally, the Project will improve upon unregulated land use practices, such as uncontrolled hunting and dumping.

Anticipated negative environmental impacts include land clearing and the removal of ecologically important terrestrial habitats like the pinelands. The West Grand Bahama area represents the last remaining intact pinelands on the island, with a sizable portion of this ecosystem found on the site. Native avian species such as Hairy Woodpeckers, Bahama Yellowthroats, Red-legged Thrush, and rare species like the Short-eared Owl have been observed north of the current area of impact. Blasting, which will be incorporated as a part of the aggregate excavation methodology, could impact the biodiversity in the adjacent areas and produce some additional noise and air impacts for neighboring communities. Project related activities will remove the observed hard

coral species currently affixed to the quarry wall along the western boundary of the Freeport Harbour, which is located east of the excavation site. Also, the removal of geological material may impact nearby groundwater sources.

1.4 Mitigation and Environmental Management

Mitigation of the potential environmental impacts will include:

- The collection of pine seedlings, and seeds from other protected / native trees, within the area of impact for donation to local organizations interested in populating a native plant nursery.
- The Developer will also contribute to an on-island native plant nursery to help mitigate the impact of removing terrestrial habitat from the site.
- While invasive species will be removed from the site during land clearing, the Developer will also collaborate with local organizations to replace invasive species on the Lovers Beach south of the site with native dune stabilizing plants.
- Beach replenishment at Lovers Beach.
- Mitigation measures for coral impacts include the relocation of healthy hard corals to suitable habitats outside the area of interest. A coral relocation plan must be submitted and approved by the Department of Marine Resources and Department of Environmental Planning and Protection prior to the commencement of any relocation efforts.
- The Developer will follow the best environmental practices as it relates to possible air and noise pollution, such as site watering for dust suppression and site fencing inclusive of acoustic screens.

2 Introduction

2.1 Purpose

Bahama Rock Limited (BRL) (hereafter, the Developer) proposed the western expansion of the Freeport Harbour by way of aggregate mining (the Project) located in Freeport, Grand Bahama. The objective of this Environmental Impact Assessment (EIA) is to provide an accurate assessment of the potential environmental impacts of the proposed Project in Freeport, Grand Bahama. For the purposes of this EIA, the assessment of the environment is inclusive of biological, physical, and socio-economic resources, as well as the processes that have the potential to be directly and/or indirectly impacted by the proposed Project. Mitigation measures for potentially adverse environmental impacts during the construction and operations phases of the Project will be discussed to ensure that the Project adheres to the best environmental practices. The evaluation of potential impacts on environmental resources is a critical step in the environmental compliance process in The Bahamas, as well as successful project planning and execution.

An Environmental Management Plan (EMP) will be produced upon the approval of the EIA, which includes the draft EMP Terms of Reference in section 12. The EMP will outline mitigation measures for the prevention and/or minimization of environmental impacts during and post construction.

2.2 Scope and Content

The scope of this EIA covers the biological and physical footprint of the site, extending up to one (1) kilometer from the excavation site boundary. The assessment will evaluate and discuss potential impacts associated with the proposed Project within the Area of Influence (AOI), along with proposed mitigation strategies to avoid or minimize negative effects.

3 Site Location

3.1 Geographic Location

The site is located in the southwest area of Freeport, Grand Bahama at 26°31'46.02"N, 78°46'50.58"W and 26°32'2.98"N, 78°46'43.43"W. Grand Bahama Island is one of the two (2) major islands found on the Little Bahama Bank in the Lucayan Archipelago. The capital city of Freeport lies 210 kilometers north of Nassau, New Providence, and 154 kilometers west of Marsh Harbour, Abaco. The Bahamas Cement Company (BCC) property spans 515-acres, with a proposed harbour expansion through aggregate mining planned for approximately 269.39 acres. Situated within the major industrial area of Freeport, it is positioned south of the existing BRL quarry and west of Freeport Harbour. It lies north of Wild Goose Town and southwest of the Freeport Container Port. The following figures show the location of the site relative to other features in The Bahamas and on Grand Bahama.

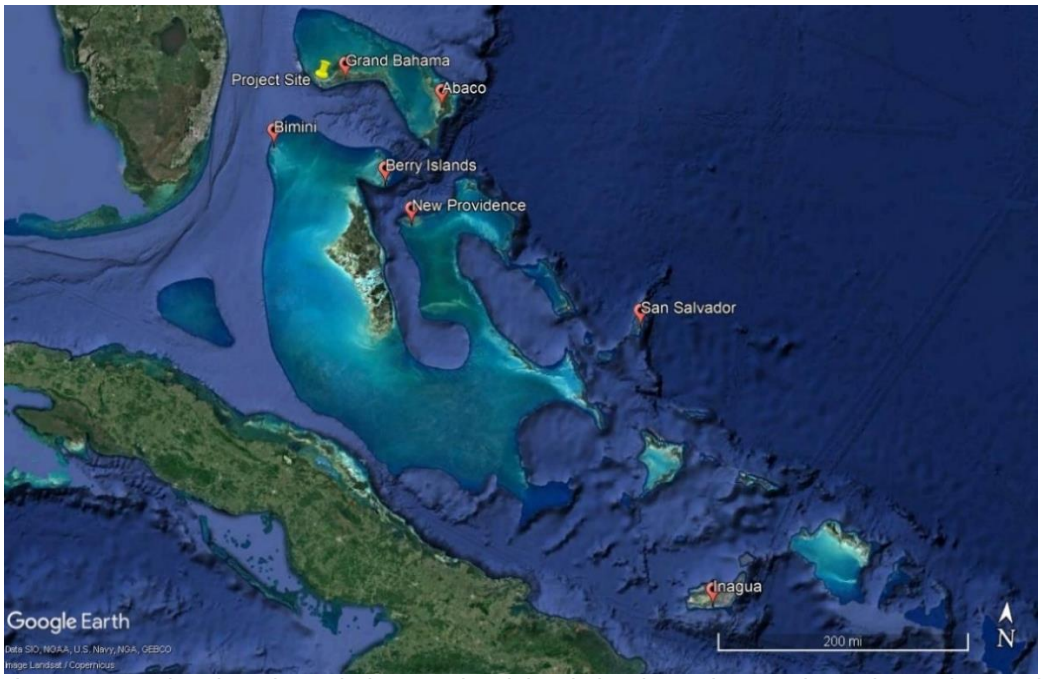


Figure 3.1 Project location relative to other islands in The Bahamas (Google Earth, 2022)

Figure 3.2 Project location on Grand Bahama Island relative to West End, East End Grand Bahama and the Grand Bahama International Airport. (Google Earth, 2022)

Figure 3.3 Project site is shown in the blue area. Buffer zone shown in yellow grid area. Areas outside of the yellow buffer zone and blue port expansion will not be included in the project area or to be minded (Google Earth, 2023).

3.2 Site Description

The Project site consists of three (3) major habitat types: pineland, coppice forest, and disturbed areas. The northern section is predominantly pineland, transitioning to disturbed and invasive vegetation along Freeport Container Port Road to the southeast. The northwest and southern sections are bordered by the Eight Mile Rock community, Warren J. Levarity Road, and Queen's Highway. The southeastern section is characterized by heavily disturbed and invasive species, bordered by the established BRL site to the northeast and Freeport Container Road to the west. The northwestern section features pineland and coppice forest.

3.3 Areas of Influence

There are direct and indirect areas of influence (AOI) related to the Project[2] as a result of the scope of works, the site's proximity to the coast, Wild Goose Town, and the Eight Mile Rock Community. The direct AOI is the "geographic area where environmental and socio-cultural

[2] Cited in Sambito Soluciones Ambientales Totales. December 2020. Environmental and Social Impact Assessment Puerto Bolívar Project Phase 1 – Areas of Influence and Sensitive Areas TABLA DE CONTENIDOS (dfc.gov)

impacts will be apparent." The indirect AOI is defined as locations "where a change in environmental conditions occur at a different site from where the action causing the environmental impact occurs and or where changes take place at a different time compared with the time when the action causing the environmental impact occurred." Figure 3.4 shows the direct AOI outlined in red and the indirect AOI in orange. The Eight Mile Rock settlement and Lovers Beach are adjacent to the direct AOI. As a result, they are included as a part of the indirect AOI. The Eight Mile Rock Settlement includes the following towns or sub settlements.

- Hepburn Town
- Bartlett Hill
- Hanna Hill
- Pine Dale
- Martin Town
- Russell Town
- Jones Town
- Sea Grape
- Holmes Rock
- Deadman's Reef
- Bootle Bay

Businesses that may be impacted by the Project, which are included in the indirect AOI, are those within 1 km of the direct AOI. The AOI was determined based on the size of the aggregate mining site, the type of mining, the topography of the area, the nearby receptors such as residential areas, schools, hospitals, and other sensitive land uses that may be impacted by noise and vibration from the mining operation. The following figures (Figures 3.4 and 3.5) show the indirect AOI.

Figure 3.4 The Direct Area of Influence (AOI) is outlined in red and the Indirect AOI is shown in orange.

Figure 3.5 Eight Mile Rock Clinic, Bartlett Hill Primary School are included in the Indirect AOI.

4 EXISTING LAND USE AND OWNERSHIP

The Developer has entered into a purchase agreement to acquire BCC, which is the owner of a former cement plant on Grand Bahama, along with approximately 515 acres on which the former cement plant is situated on approximately 252 acres (the BCC Property). The harbor expansion would consist of approximately 269.39 acres as illustrated in Figure 3.3 (100 ft. buffer zone excluded from total Project acreage) of the total BCC property in Freeport, Grand Bahama. The sale will close pending the satisfaction of certain conditions including receipt of required approvals for the harbor expansion and aggregate mining. Figures 4.1 – 4.3 identify the parcel location and survey plan.

The existing land use of the site is a combination of previously disturbed land and partially undeveloped land. The terrestrial areas of the site include various plants and wildlife species that encompass the entire site. No ongoing residential, commercial, or industrial operations occur within the boundaries of the parcels.

There are residential properties south of the site and business operations near Freeport Harbour. Evidence of dumping and abandoned and dilapidated buildings were observed on site during the Phase 1 Environmental Site Assessment (Appendix A). There was also evidence of previous excavation on site (Figure 4.4). The marine environment south of the site is used for recreational activities by locals. Boating, swimming, fishing, diving, kayaking, and snorkeling activities are known to occur near the site area. The sandy beach known as Lovers Beach adjacent to the site is commonly used by the general public for recreational activities.

Figure 4.1 Project map showing the location of each parcel.

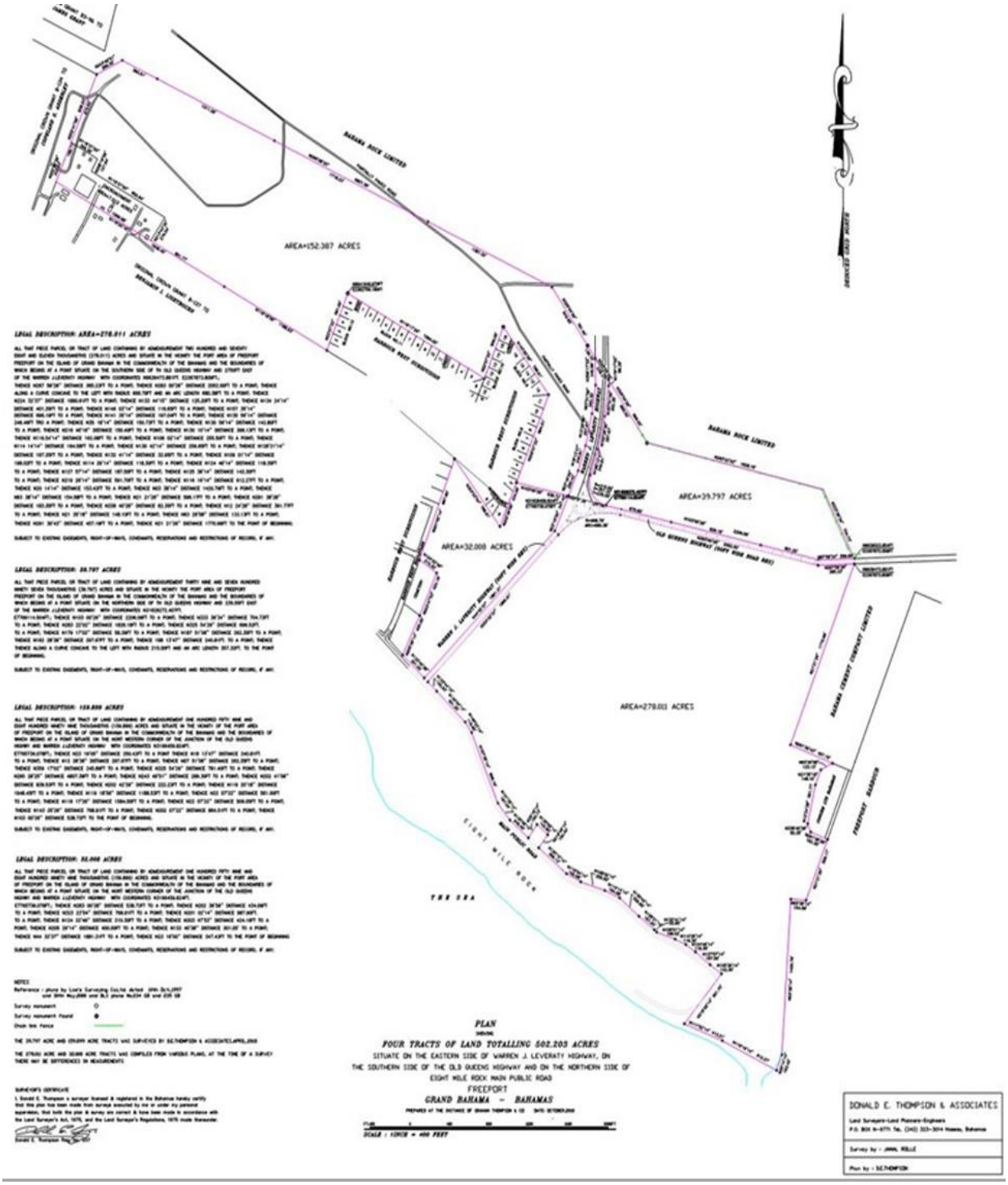


Figure 4.2 Survey of project site

LEGAL DESCRIPTION: AREA=278.011 ACRES

ALL THAT PIECE PARCEL OR TRACT OF LAND CONTAINING BY ADMEASUREMENT TWO HUNDRED AND SEVENTY EIGHT AND ELEVEN THOUSANDTHS (278.011) ACRES AND SITUATE IN THE VICINITY THE PORT AREA OF FREEPORT FREEPORT ON THE ISLAND OF GRAND BAHAMA IN THE COMMONWEALTH OF THE BAHAMAS AND THE BOUNDARIES OF WHICH BEGINS AT A POINT SITUATE ON THE SOUTHERN SIDE OF TH OLD QUEENS HIGHWAY AND 2750FT EAST OF THE WARREN J.LEVERATY HIGHWAY WITH COORDINATES N9639473.881FT. E2367873.809FT.; THENCE N267 59'26" DISTANCE 365.23FT TO A POINT; THENCE N283 00'26" DISTANCE 2052.00FT TO A POINT; THENCE ALONG A CURVE CONCAVE TO THE LEFT WITH RADIUS 666.79FT AND AN ARC LENGTH 680.38FT TO A POINT; THENCE N224 32'37" DISTANCE 1880.61FT TO A POINT; THENCE N133 44'15" DISTANCE 125.20FT TO A POINT; THENCE N134 24'14" DISTANCE 401.35FT TO A POINT; THENCE N146 03'14" DISTANCE 116.65FT TO A POINT; THENCE N157 35'14" DISTANCE 696.19FT TO A POINT; THENCE N141 35'14" DISTANCE 197.04FT TO A POINT; THENCE N130 56'14" DISTANCE 246.46FT TRO A POINT; THENCE N35 18'14" DISTANCE 150.73FT TO A POINT; THENCE N130 56'14" DISTANCE 142.80FT TO A POINT; THENCE N216 46'16" DISTANCE 150.40FT TO A POINT; THENCE N130 10'14" DISTANCE 366.13FT TO A POINT; THENCE N116.54'14" DISTANCE 162.08FT TO A POINT; THENCE N108 02'14" DISTANCE 255.50FT TO A POINT; THENCE N114 14'14" DISTANCE 164.58FT TO A POINT; THENCE N130 42'14" DISTANCE 256.65FT TO A POINT; THENCE N128'21'14" DISTANCE 197.25FT TO A POINT; THENCE N132 41'14" DISTANCE 32.95FT TO A POINT; THENCE N109 01'14" DISTANCE 198.02FT TO A POINT; THENCE N114 29'14" DISTANCE 118.30FT TO A POINT; THENCE N124 46'14" DISTANCE 118.35FT TO A POINT; THENCE N127 57'14" DISTANCE 187.50FT TO A POINT; THENCE N125 36'14" DISTANCE 142.30FT TO A POINT; THENCE N219 26'14" DISTANCE 591.70FT TO A POINT; THENCE N116 16'14" DISTANCE 612.27FT TO A POINT; THENCE N20 14'14" DISTANCE 153.42FT TO A POINT; THENCE N03 38'14" DISTANCE 1420.76FT TO A POINT; THENCE N93 38'14" DISTANCE 154.58FT TO A POINT; THENCE N21 21'26" DISTANCE 596.17FT TO A POINT; THENCE N291 38'28" DISTANCE 183.35FT TO A POINT; THENCE N338 40'28" DISTANCE 82.35FT TO A POINT; THENCE N12 24'28" DISTANCE 361.77FT TO A POINT; THENCE N21 35'18" DISTANCE 148.10FT TO A POINT; THENCE N63 26'58" DISTANCE 133.13FT TO A POINT; THENCE N291 30'43" DISTANCE 457.19FT TO A POINT; THENCE N21 21'26" DISTANCE 1770.96FT TO THE POINT OF BEGINNING.

SUBJECT TO EXISTING EASEMENTS, RIGHT-OF-WAYS, COVENANTS, RESERVATIONS AND RESTRICTIONS OF RECORD, IF ANY.

LEGAL DESCRIPTION: 39.797 ACRES

ALL THAT PIECE PARCEL OR TRACT OF LAND CONTAINING BY ADMEASUREMENT THIRTY NINE AND SEVEN HUNDRED NINETY SEVEN THOUSANDTHS (39.797) ACRES AND SITUATE IN THE VICINITY THE PORT AREA OF FREEPORT FREEPORT ON THE ISLAND OF GRAND BAHAMA IN THE COMMONWEALTH OF THE BAHAMAS AND THE BOUNDARIES OF WHICH BEGINS AT A POINT SITUATE ON THE NORTHERN SIDE OF TH OLD QUEENS HIGHWAY AND 235.55FT EAST OF THE WARREN J.LEVERATY HIGHWAY WITH COORDINATES N31626272.407FT. E7766114.504FT.; THENCE N103 00'26" DISTANCE 2206.06FT TO A POINT; THENCE N333 36'34" DISTANCE 704.73FT TO A POINT; THENCE N283 22'02" DISTANCE 1828.18FT TO A POINT; THENCE N325 54'29" DISTANCE 696.52FT. TO A POINT; THENCE N179 17'02" DISTANCE 58.29FT TO A POINT; THENCE N187 51'06" DISTANCE 262.35FT TO A POINT; THENCE N192 28'36" DISTANCE 297.67FT TO A POINT; THENCE 198 13'47" DISTANCE 240.81FT. TO A POINT; THENCE THENCE ALONG A CURVE CONCAVE TO THE LEFT WITH RADIUS 215.00FT AND AN ARC LENGTH 357.32FT. TO THE POINT OF BEGINNING.

SUBJECT TO EXISTING EASEMENTS, RIGHT-OF-WAYS, COVENANTS, RESERVATIONS AND RESTRICTIONS OF RECORD, IF ANY.

LEGAL DESCRIPTION: 159.899 ACRES

ALL THAT PIECE PARCEL OR TRACT OF LAND CONTAINING BY ADMEASUREMENT ONE HUNDRED FIFTY NINE AND EIGHT HUNDRED NINETY NINE THOUSANDTHS (159.899) ACRES AND SITUATE IN THE VICINITY OF THE PORT AREA OF FREEPORT ON THE ISLAND OF GRAND BAHAMA IN THE COMMONWEALTH OF THE BAHAMAS AND THE BOUNDARIES OF WHICH BEGINS AT A POINT SITUATE ON THE NORT WESTERN CORNER OF THE JUNCTION OF THE OLD QUEENS HIGHWY AND WARREN J.LEVERATY HIGHWAY WITH COORDINATES N3166459.824FT. E7765736.078FT.; THENCE N23 19'05" DISTANCE 250.42FT TO A POINT THENCE N18 13'47" DISTANCE 240.81FT. TO A POINT; THENCE N12 28'36" DISTANCE 297.67FT TO A POINT; THENCE N07 51'06" DISTANCE 262.35FT TO A POINT; THENCE N359 17'02" DISTANCE 245.89FT TO A POINT; THENCE N325 54'29" DISTANCE 781.40FT TO A POINT; THENCE N295 28'25" DISTANCE 4807.39FT TO A POINT; THENCE N243 49'51" DISTANCE 289.30FT TO A POINT; THENCE N202 41'08" DISTANCE 839.53FT TO A POINT; THENCE N202 42'29" DISTANCE 222.23FT TO A POINT; THENCE N119 20'18" DISTANCE 1948.45FT TO A POINT; THENCE N119 18'56" DISTANCE 1188.53FT TO A POINT; THENCE N22 07'22" DISTANCE 561.00FT TO A POINT; THENCE N119 17'26" DISTANCE 1584.00FT TO A POINT; THENCE N22 07'22" DISTANCE 506.05FT TO A POINT; THENCE N143 25'26" DISTANCE 768.91FT TO A POINT; THENCE N202 07'22" DISTANCE 864.51FT TO A POINT; THENCE N103 00'26" DISTANCE 538.72FT TO THE POINT OF BEGINNING.

SUBJECT TO EXISTING EASEMENTS, RIGHT-OF-WAYS, COVENANTS, RESERVATIONS AND RESTRICTIONS OF RECORD, IF ANY.

LEGAL DESCRIPTION: 32.008 ACRES

ALL THAT PIECE PARCEL OR TRACT OF LAND CONTAINING BY ADMEASUREMENT ONE HUNDRED FIFTY NINE AND EIGHT HUNDRED NINETY NINE THOUSANDTHS (159.899) ACRES AND SITUATE IN THE VICINITY OF THE PORT AREA OF FREEPORT ON THE ISLAND OF GRAND BAHAMA IN THE COMMONWEALTH OF THE BAHAMAS AND THE BOUNDARIES OF WHICH BEGINS AT A POINT SITUATE ON THE NORT WESTERN CORNER OF THE JUNCTION OF THE OLD QUEENS HIGHWY AND WARREN J.LEVERATY HIGHWAY WITH COORDINATES N3166459.824FT. E7765736.078FT.; THENCE N283 00'28" DISTANCE 538.72FT TO A POINT; THENCE N202 36'56" DISTANCE 434.06FT TO A POINT; THENCE N323 23'54" DISTANCE 768.91FT TO A POINT; THENCE N201 02'14" DISTANCE 987.90FT. TO A POINT; THENCE N124 22'49" DISTANCE 210.30FT TO A POINT; THENCE N203 47'53" DISTANCE 424.16FT TO A POINT; THENCE N205 29'14" DISTANCE 400.00FT TO A POINT; THENCE N133 40'38" DISTANCE 301.05' TO A POINT; THENCE N44 32'37" DISTANCE 1881.31FT TO A POINT; THENCE N23 16'00" DISTANCE 347.43FT TO THE POINT OF BEGINNING

SUBJECT TO EXISTING EASEMENTS, RIGHT-OF-WAYS, COVENANTS, RESERVATIONS AND RESTRICTIONS OF RECORD, IF ANY.

Figure 4.3 Legal descriptions for each parcel (enlarged).

Figure 4.4 Evidence of previous excavation on site.

5 PROJECT DESCRIPTION

5.1 PROJECT DETAILS

The proposed Project details consist of the western expansion of the Freeport Harbour and Aggregate Mining, including blasting (use of explosives), and dredging operation. Of the total 515 acres, approximately 269.39 acres are designated for the immediate Project area.

The proposed Project details will also include the creation of additional turning basins and deep-water berth for future expansion of the Freeport Harbour after mining operations have occurred (quarry decommissioning). Additionally, dune improvement and beach replenishment at Lovers Beach will be incorporated in the Project details.

5.2 PROJECT SCHEDULE

Both Phase 1 and 2 will commence once permits have been obtained.

Table 5.1 Tentative Project Schedule

Task	Duration	Start	Finish	Year 1												Year 2 +		
				1	2	3	4	5	6	7	8	9	10	11	12	1	2	
				A	M	J	J	A	S	O	N	D	J	F	M	A	M	J
Phase 1: Demolition & Removal Dilapidated buildings and structures; cleanup and removal of trash and other debris	6 (months)	**1-Apr 2024**	28-Sep 2024															
Phase 2: Protected Tree Relocation & Commencement of Land Clearing	6 to 9 (months)	1-Jun 2024	28-Nov 2024															
Phase 3: Active Extraction (Quarry established)	15-20 (years)	28-Nov 2024	26-Jun (2025)															
Phase 4: Project Complete (Decommissioning of Quarry and Freeport Harbour expansion is operational)																		

5.3 POST EXCAVATION CONCEPTUAL LAYOUT

Figure 5.1 Conceptual rendering following completion of harbor expansion and aggregate mining. This image is printed larger in Appendix B.

5.4 UTILITIES DESCRIPTION

5.4.1 Potable Water

Public utilities (potable) water is not currently used to supply fresh water to BRL's existing processing wash plant. BRL intends to continue utilizing a closed loop system for the BCC Property Development, wherein process water is captured, recycled in an onsite impoundment, and then reused in its processing operations. The impoundment is recharged only from rainwater or existing process water, and public utility water will not be utilized for the Project.

Potable water from public utilities would continue to be used for BCC Development at the same rate BRL currently utilizes for its adjacent operation, which includes filling its water trucks (utilized for dust suppression), the sprinkler system, and meeting normal employee demand such as the bathrooms and offices. BRL's current rate of utilization, anticipated to be the same for the BCC Project, is approximately 29,000 gallons per month.

5.4.2 Energy

BRL currently pays approximately $5.5 million a year for electricity in Freeport, greatly underwriting the cost of the power plant while helping make electricity less expensive for local homeowners. Based on the current energy demand of the existing quarry BRL operation at the adjacent site over a 1 -year period, the anticipated energy demand is expected to average 33,632.64KwH per day. It is anticipated that the energy demand for the Project on the BCC Property would be substantially similar to BRL's current utilization as reflected in Table 5.2 below.

Table 5.2 Past electric use of existing quarry.

Month	Total Consumption (kWh)	No. Of Days	kWh per Day
1 (Jan '24)	940,628	31	30,342.83
2 (Dec '23)	1,189,923	30	39,664.10
3 (Nov '23)	1,134,308	30	37,810.26
4 (Oct '23)	840,152	32	26,254.75
5 (Sep '23)	928,674	31	29,957.22
6 (Aug '23)	1,073,716	31	34,636.00
7 (Jul '23)	1,069,981	30	35,666.03
8 (Jun '23)	1,182,994	31	38,161.09
9 (May '23)	895,483	30	29,846.10
10 (Apr '23)	895,867	31	28,898.93
11 (Mar '23)	1,051,483	28	37,552.96
12 (Feb '23)	941,369	31	30,366.74
13 (Jan '23)	1,150,086	31	38,067.29

5.4.3 Solid Waste

Quarry office waste generated during operations and demolition waste from the metal structures on site will be disposed of in accordance with the Grand Bahama Port Authority and Department of Environmental Health Services (DEHS) regulation and guidelines. Office waste is characterized

as paper, electronics, food, and plastic waste which can generate on average an estimated 730kg (~0.73 metric tons) per year.

The current mining operation generates solid waste material at approximately ~29.3 tons per month. This material consists of used steel, scrap metal, used oil, grease barrels, wood pallets, tires, old conveyor belting, etc. The dragline and off-road vehicles used in the operation generate the majority of this waste stream, including regular maintenance of the processing plant. All solid waste products are located (and temporarily stored before proper disposal) adjacent to the existing shop, which is located on the BRL property. No material of this kind will be stored or accumulated on the proposed BCC property nor is it expected that this volume will increase due to the proposed expansion and use of the BCC property. All solid waste products are transported and disposed of at the local landfill by Sanitation Services.

Bulk storage of petroleum products is currently stored in Above Ground Storage Tanks (AST's) and is located south of the existing shop, within a concrete containment structure. The concrete containment structure will remain in use as part of the BRL operation and will contain any potential leaks. Used oil and other solid waste products described above will be disposed of at the local landfill by Sanitation Services. A chain-linked fence is provided to protect and secure the structure from vandalism. No bulk storage of petroleum products will take place on the BCC property.

All solid and hazardous waste generated will be managed by a local sanitization service.

5.4.4 Wastewater

The Developer intends to continue utilizing a closed loop system similar to what is used at BRL Property. Wherein, processed water is captured and recycled in an onsite impoundment and reused in its processing operations. In addition to not utilizing public utilities for such processes, recycling and reusing process water reduces or eliminates the amount of wastewater sent to treatment facilities. BRL's wastewater usage is not separately metered. The volume anticipated for the Project would be similar to BRL's current utilization, which would be estimated to be an insignificant amount.

5.4.5 Roads

The proposed Development will not intersect the existing Warren J. Levarity Highway. Thus, leaving this major thoroughfare intact. The Developer will maintain a 100-foot buffer between the Highway and the Reserve areas which will be excavated on the BCC Property. The 100-foot buffer is shown in Figure 3.3. Access will be provided to the site via the Freeport Container Port Road.

6 ALTERNATIVES

6.1 OTHER CONSIDERATIONS

The Developer previously considered a larger excavation plan, inclusive of the 515-acre parcels, which included areas to the north and northwest of the current proposed site which intersected the Warren J. Levarity Highway as outlined in Section 4. Once Terrestrial Resource Surveys (TRS) were conducted, the Developer modified the excavation plan to reduce the environmental and social impact of expanding the BCC property, such that of the total 515 acres of BCC property

to be acquired, only an estimated 269.39 acres will be utilized for harbor expansion through aggregate mining. For example, healthy pineland and wetland habitat northwest of the Highway and the current proposed quarry site was observed in this area. The Short-eared Owl, a rare observation on the island, was documented in this habitat. To maintain this habitat and reduce the impact of sound on wildlife, the Developer reduced the size of the excavation plan (see Figure below). Social impacts, which were also considered prior to modifying the plan, include the nuisance sound impact that blasting would have had on the adjacent communities and the impact of rerouting the highway. Each of these considerations led to the Developer ultimately seeking approval on a reduced portion of the BCC property.

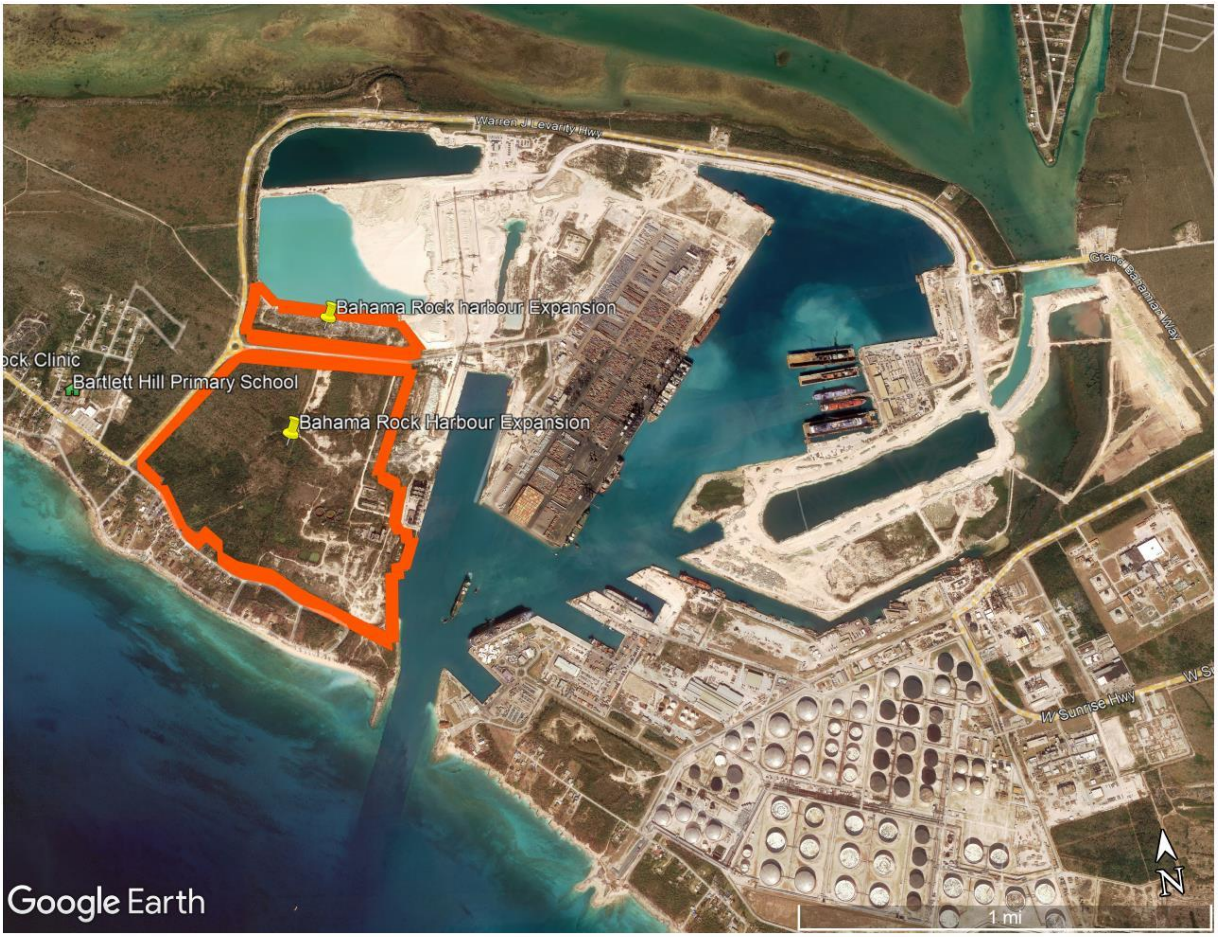


Figure 6.1 Current area of interest.

6.2 Specify "No Action" Alternative

If no development occurs at the Project site, the BCC Property will retain the current existing environmental conditions within the AOI. The existing conditions along the western boundary of

the Freeport Harbour may continue to deteriorate. Erosion was observed along the western boundary of the Harbour and invasive species will continue to thrive and spread in the area. Additionally, the Project will provide additional economic and recreational stimulus by providing job opportunities during its construction and operation phases.

Concerns have been expressed that excavation projects around the Port can aggravate flooding on surrounding properties. Flood maps produced in 2007 show during 100-year storm events, the Lovers Beach area is likely to flood whether the storm is approaching the southern coast of Grand Bahama from the north or south (Figure 6.2 and 6.3). However, as with the existing Port, deep areas act like a sink (for a short period of time) to collect flood water after a storm surge - the drain being the Port's channel entrance. Flood water from lands surrounding the port will run into the deep water which is drained by the tide. The Project will also include replacing invasive coastal plants on the beach adjacent to the site with native species suitable for sand dune habitat. Additionally, best management practices will be used to manage stormwater and prevent flooding sustainably. These practices include source control and engineered structures for runoff treatment as outlined in the Flood Potential Analysis included in Appendix C.

The Project will also incorporate rebuilding the dune in the area as a part of the mitigation activities. With “no action” the beach will continue to erode. Research shows a healthy dune system can protect the coastline from erosion and offer significant protection from severe coastal storms.[3] & [4] An invasive species removal guideline will be included in the Environmental Management Plan and will be guided by DEPP.

[3] New Jersey Sea Grant Consortium, Stevens Institute of Technology, U. S. Department of Agriculture - National Resources Conservation Service, Cape May Plant Materials Center, Georgian Court University, and William Paterson University. 2016. New Jersey Sea Grant Consortium Dune Manual. Dune Manual And Sign - Sea Grant Sea Grant (njseagrant.org)
[4] Department of Conservation (NZ) *Te Papa Atawhai.* “Coastal Sand Dunes Form and Function” In the “Pingao (or Pikao) the Foldern Sand Sedge” Coastal sand dunes form and function: Pikao (or Pingao) the Golden Sand Sedge (doc.govt.nz)

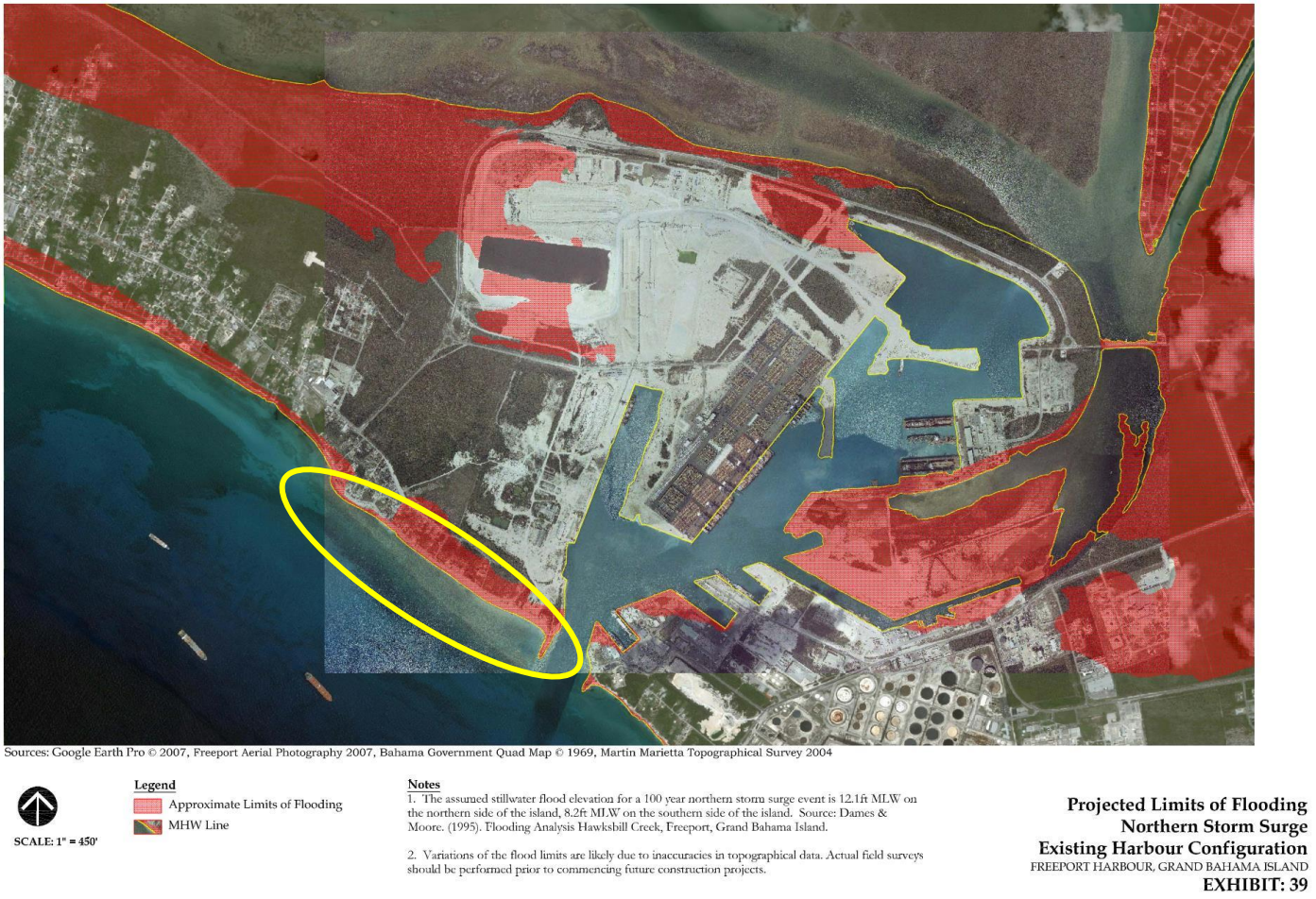


Figure 6.2 Projected limits of flooding based on a northern storm surge. The yellow circle shows the Lovers Beach area.

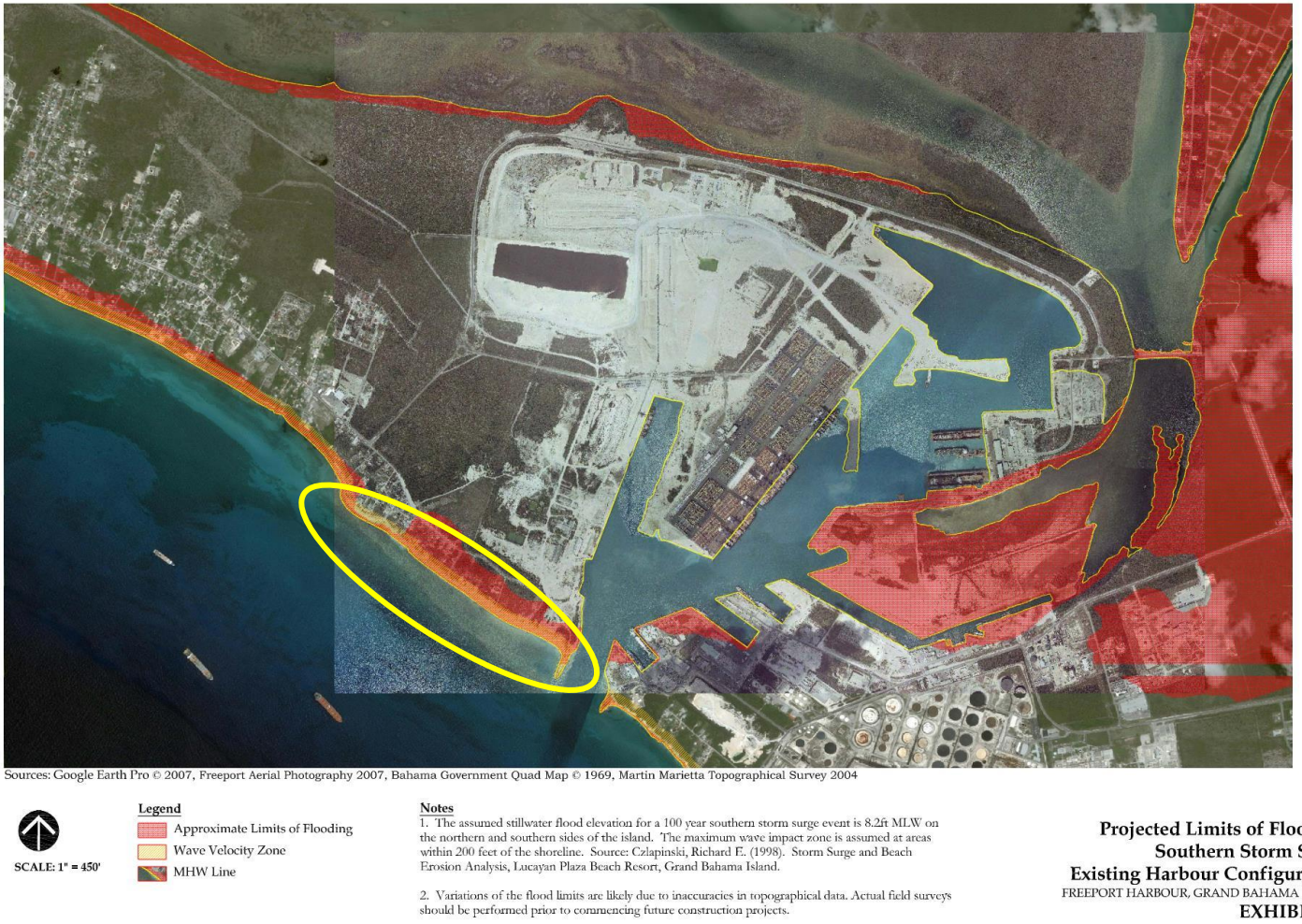


Figure 6.3 Protected limits of flooding based on a southern storm surge. The yellow circle shows the Lovers Beach area.

7 PHYSICAL AND BIOLOGICAL BASELINE

7.1 CLIMATE

The general climate of The Bahamas is classified as Aw – tropical savannah on the Köppen and Geiger classification scale. However, Grand Bahama is classified as Af -Tropical, rainforest. Figure 7.1 shows the Köppen and Geiger classification of The Bahamas. The tropical rainforest designation is characterized by average monthly temperatures greater than 64°F (18°C) and rainfall that is evenly distributed throughout the year[5]. Rainfall patterns across the archipelago are dependent on island size, proximity to other islands, and relative position within the archipelago. The northernmost islands (Grand Bahama, Abaco, New Providence, Andros) tend to receive more rainfall and have a larger freshwater lens when compared to the southernmost islands (Inagua, Ragged Island, Mayaguana, San Salvador). Winter temperatures are influenced by trade winds ranging from mid-70's to mid-80's°F. The northernmost islands tend to be colder than the remaining islands during the winter, and the southernmost islands up to 5° hotter in the summer months. Table 7.1 shows the average precipitation and temperatures for Freeport, Grand Bahama.

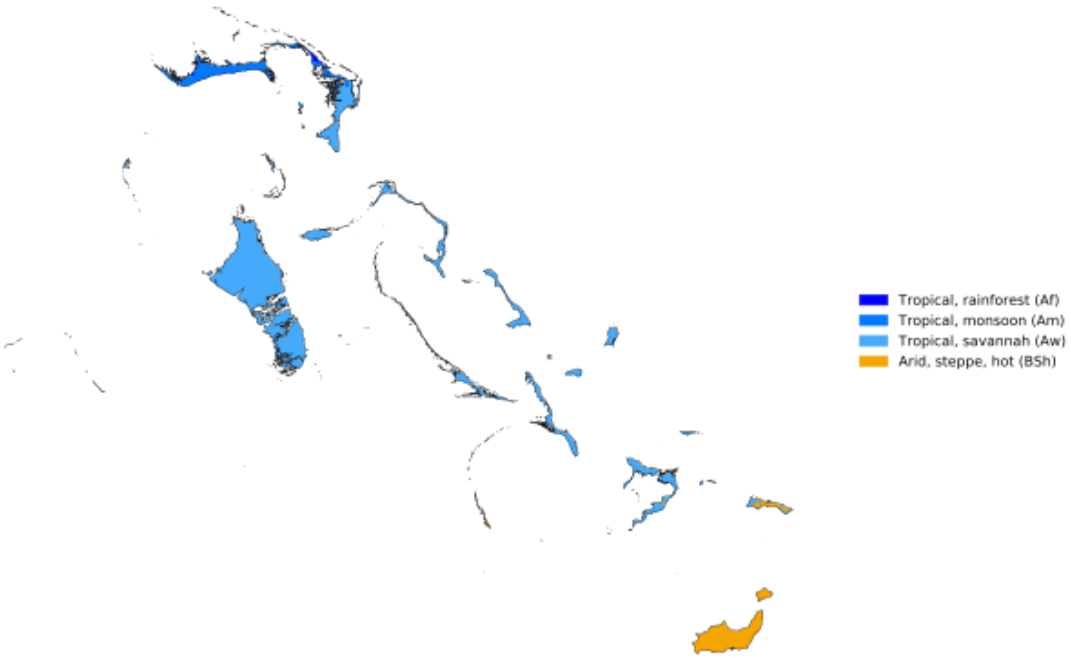


Figure 7.1 Köppen–Geiger climate classification map for The Bahamas 1980-2016[6]

[5] Af_Tropical Rainforest – CLIMATE SCOUT (callisonrtkl.com)
[6] Beck, H.E., Zimmermann, N. E., McVicar, T. R., Vergopolan, N., Berg, A., & Wood, E. F. November 2018. "Present and future Köppen-Geiger climate classification maps at 1-km resolution". *Nature Scientific Data*. DOI:10.1038/sdata.2018.214.

Table 7.1 Average precipitation and temperatures in Freeport, Grand Bahama[7].

Freeport - Average precipitation				Average temperatures (1991-2020)		
Month	**Millimeters**	**Inches**	**Days**	**Min (°C)**	**Max (°C)**	**Mean (°C)**
January	85	3.3	9	16.7	24.7	20.7
February	75	3	8	17.3	25.3	21.3
March	95	3.7	8	18	26.1	22.1
April	65	2.6	7	19.8	27.8	23.8
May	105	4.1	11	21.7	29.5	25.6
June	175	6.9	14	24	31.4	27.7
July	165	6.5	16	24.9	32.4	28.6
August	210	8.3	19	24.8	32.6	28.7
September	215	8.5	18	24.1	31.8	27.9
October	145	5.7	11	22.5	30	26.2
November	95	3.7	10	19.9	27.3	23.6
December	75	3	9	18.2	25.8	22
Year	1495	58.9	14	21	28.7	24.8

7.2 HURRICANE HISTORY

The months of June-November are considered active hurricane months and are known as ‘Hurricane Season’ in The Bahamas. During hurricane season, it is expected that a tropical storm and/or hurricane will occur, on average, every two years. This is due to the country’s location within the warmer waters of the Atlantic Ocean, which creates an area of low pressure- an essential factor in the formation of hurricanes. Category 5 Hurricane Dorian was the most recent hurricane to impact Grand Bahama in 2019. Hurricane Dorian caused major destruction with extreme winds and flooding. A large majority of the island was destroyed due to the slow moving to stagnant nature of the hurricane. A summary of the hurricanes from 2000 to 2022 to impact the island of Grand Bahama is presented in the table below.

[7] Bahamas climate: average weather, temperature, precipitation, when to go (climatestotravel.com)

Table 7.2 Summary of Hurricane History to Impact Grand Bahama (coast.noaa.gov)

STORM NAME	DATE RANGE	MAX WIND SPEED	MIN PRESSURE	MAX CATEGORY
DORIAN 2019	Aug 24, 2019, to Sep 9, 2019	160	910	H5
MATTHEW 2016	Sep 28, 2016, to Oct 10, 2016	145	934	H5
OPHELIA 2005	Sep 06, 2005, to Sep 23, 2005	75	976	H1
JEANNA 2004	Sep 13, 2004, to Sep 29, 2004	105	950	H3
FRANCES 2004	Aug 25, 2004, to Sep 10, 2004	125	935	H4

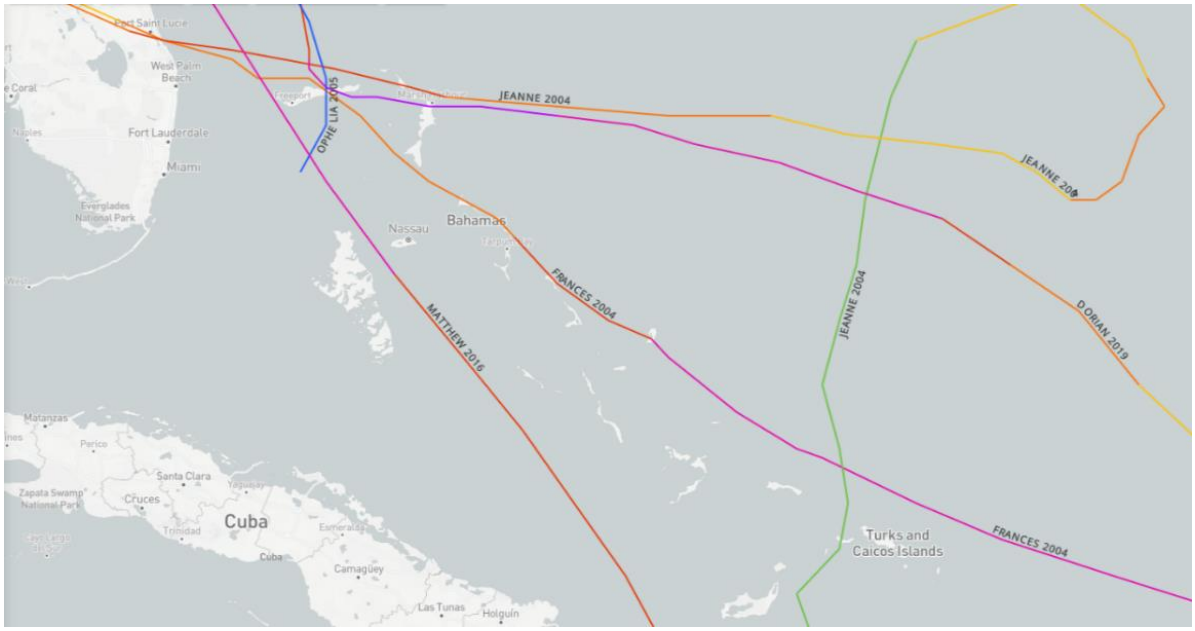


Figure 7.2 Illustration of Hurricane tracks to have passed through Grand Bahama in the past 22 years (coast.noaa.gov)

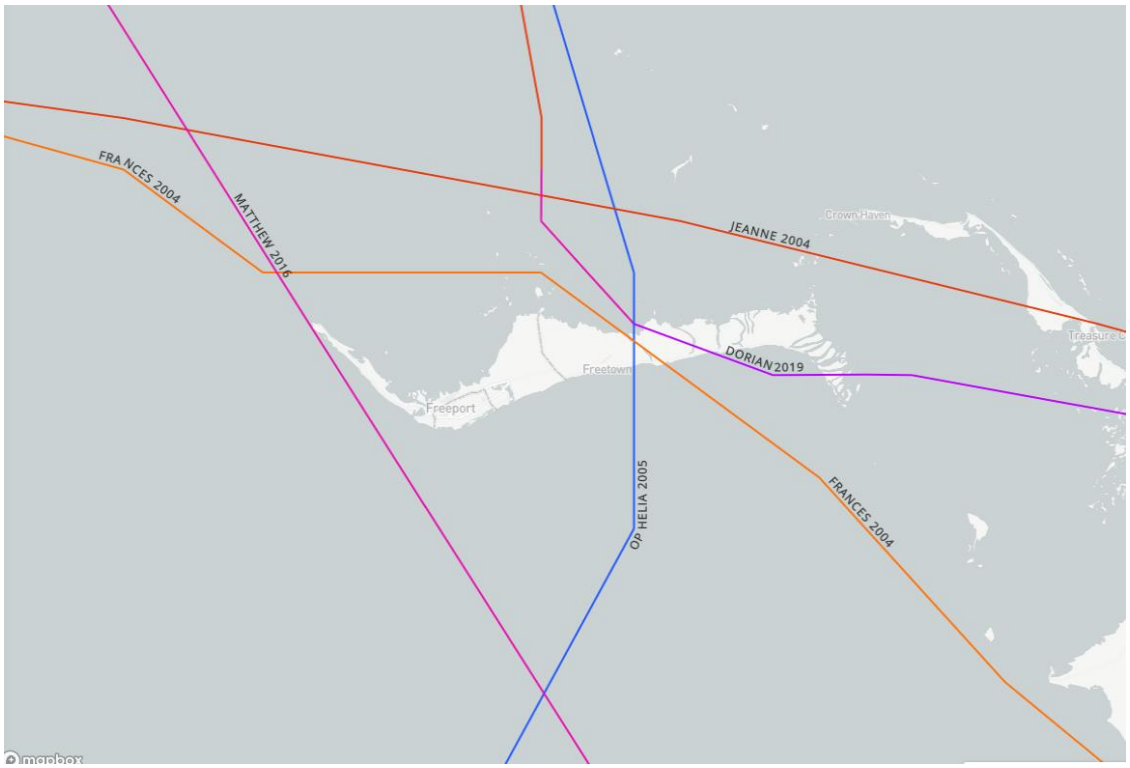


Figure 7.3 Magnified view of storm tracks through Grand Bahama in the past 22 years (coast.noaa.gov)

7.3 Air and Noise Quality

Air quality was measured using the Formaldehyde Detector to determine baseline air quality readings. The following table shows the air quality parameters at the site was considered "Fresh" at the time of the environmental surveys.

Table 7.3 Air Quality Measurements at the site during the environmental surveys.

Parameter	Measurement
Air Pollution Level	001 (Fresh)
Formaldehyde (HCHO)	0.015 (mg/m^3)
Total Volatile Organic Compounds (TVOC)	0.064 (mg/m^3)
Particles less than 1.0 µg in diameter (PM 1.0)	002 (µg/m^3)
Particles less than 2.5 µg in diameter (PM 2.5)	003 (µg/m^3)
Particles less than 10 µg in diameter (PM 10)	003 (µg/m^3)
Temperature (˚C)	30
Humidity (%)	54

The average humidity on Grand Bahama in May is 71%[8] which is higher than the humidity measured on site in May. A comfortable humidity or the ideal humidity ranges from 30% to 50%, which is 40% less than the measurement taken on site.

The temperature measured on site is higher than the average air temperature for Grand Bahama, which is 26˚C[9]. However, 30˚C has been recorded as the high temperature observed in May on the island.

Particle pollution can impact human health and is classified based on the diameter of the particle size[10]. Fine particles that contribute to smoke or haze in the air are ≤ 2.5 micrometers in diameter. Coarse particles contribute to dust and range from 2.5 to 10 micrometers in diameter. However, due to the location of the site, wet material can reduce these air impacts. The removal of the wet geological material aids in dust control which reduces the chance of air pollution within the immediate area.

Additionally, noise measurements were collected from 2008 to April 2023 for the operating equipment to be used within the project expansion area (i.e., loading equipment, plant site, equipment, dragline operations, etc.). Noise levels were tested by GeoSonics using the Integrating Sound Level Meters (ISLM). Equipment noise levels were compared to the existing noise within occupied areas adjacent to the BRL property. Considerations for the starting distance of excavation from residential homes and future buffer zones were assessed.

Noise levels of ambient conditions were established to compare baseline measurements of equipment operations completed in 2008 and 2023. Additional studies were conducted in 2023 to determine whether community or equipment levels have changed.

Baseline noise levels were also recorded within the residential areas adjacent to the Project site. The residential areas measured at a threshold of 47dB - 70 dB from day to night and include ambient levels. Noise levels increased to 65-70 decibels in commercial areas (i.e., City Market and clinic roadways). The monitoring locations included the following areas.

Community Monitoring Locations (September 2008, 2013, and 2023):

- Lindy Russell Residence,
- City Market Parking Lot,
- Eight Mile Rock Clinic Parking Lot,
- Queens Cove,
- Fishing Hole Road,
- Bahamas Shipyard,
- VForce Distributor

[8] Climate & Weather Averages in Grand Bahama Island, Bahamas. Based on weather reports collected during 1985-2015. Climate & Weather Averages in Grand Bahama Island, Bahamas (timeanddate.com)
[9] Climate & Weather Averages in Grand Bahama Island, Bahamas. Based on weather reports collected during 1985-2015. Climate & Weather Averages in Grand Bahama Island, Bahamas (timeanddate.com)
[10] United States Environmental Protection Agency, Office of Air and Radiation. September 2003. Particle Pollution and Your Health. pmBrochureFINAL.qxd (epa.gov)

- Polymer Factory,
- South side of Queen's Highway east of the road turn from East/ West to North / South
- West side of the road to Eight Mile Rock Residences
- North side of Queen's Highway within Hepburn Town area,
- Annie Swan Residence, and
- Pony Residence.

Excavation Equipment (December 2007, 2008, 2013 and 2023):

- Dragline,
- Excavation Haul Units,
- Haulers and Loaders,
- Process Plant / Primary Crushers,
- Ship Loader and Conveyors,
- Larson Davis System 824.

Excerpts of the equipment and community noise levels from the Geosonics report are provided in the Tables below. The ambient noise quality for both residential and commercial areas is recorded at ~47-70 dB. On site noise range is recorded at approximately 48-87dB. The berm installation will serve to aid in noise reduction. Thus, mitigating the noise impacts of ongoing quarry works. The complete Geosonics Report is included in Appendix D.

Table 7.4 Operational equipment used during noise measurement 2008-2023 (Appendix D).

Equipment	Distance (ft. away from the source)	Noise Range dB(A)	Comment
Dragline	250'	72-76	Dragline-Hoist, Swing, Dump & Return
Dragline	500'	65-72	Dragline-Hoist, Swing, Dump & Return
Haul Trucks	50'	81-87	Drive-by, Dump, Return
Haul Trucks	100'	68-70	Drive-by, Dump, Return
Loader/Haul Units	500'	60-68	Loading
Loader/Haul Units	1,000'	50-67	Loading
Loader/Haul Units	2,000'	50-60	Loading
Ship Loader	250'	60-65	
Ship Loader	500'	50-57	

Ship Loader	1,000’	48-52	>1,000’ Ship Loader not audible-conveyor louder noise
Conveyor	150’	72	Ship Loader Conveyor with Material
Conveyor	100’	65	Primary Crusher Conveyor Empty

Table 7.5. Community Noise Levels 2008-2023 (Appendix D).

Monitoring Location	L_{Aeq} Daytime	L_{Aeq} Afternoon	L_{Aeq} Nightime
Queen’s Cove	52.1	-	-
Conch Bridge	67.6	-	67.3
Polymer Factory	65.4	65.5	57.8
Shipyard	64.6	59.6	64.8
VForce Distributors	67.9	-	-
Eight Mile Rock	54.3	52.1	-
Eight Mile Rock	50.0		60.0
Hepburn Town	49.9	-	-
Lover’s Beach	-	47.4	-

7.4 WATER QUALITY

7.4.1 Groundwater Resources

Expected surface groundwater resources on and near the Project site are shown in the following figure from the US Army Corps of Engineers report[11]. The surface water is classified as predominantly scarce or lacking. This was confirmed during the ecological surveys as no natural surface water bodies were identified within the site boundary.

[11] US Army Corps of Engineers. 2004. Water Resources Assessment of the Bahamas. Accessed 17 February 2022. https://www.sam.usace.army.mil/Portals/46/docs/military/engineering/docs/WRA/Bahamas/BAHAMAS1WRA.pdf

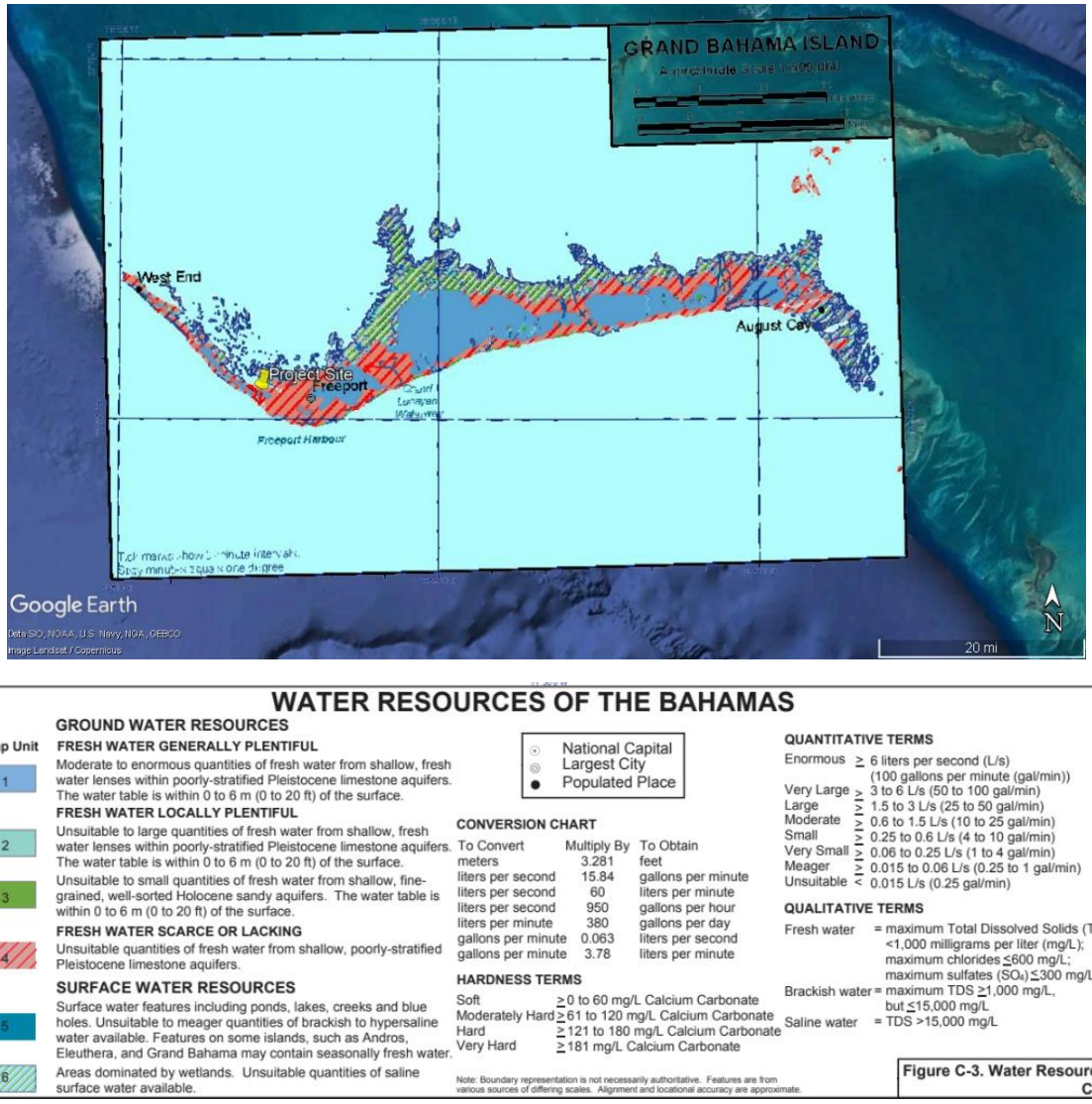


Figure 7.4 (Top) Ground water resources on Grand Bahama Island. (Bottom) Legend for the above Water Resources on Grand Bahama map.

The primary source of freshwater at the BCC Property is rainwater. Grand Bahama experiences higher average rainfall during the wet season (May to October) than during the dry season (November to April). Table 7.1 illustrates the average annual rainfall in Freeport. August and September average the highest showing over 200mm and January and February average the lowest showing less than 100mm.

As no natural surface water bodies were observed on the site, precipitation percolates through the limestone to the water table. Previous geotechnical investigations confirmed the presence of groundwater resources on the site. The accompanying figure depicts the general location of the geotechnical study. Groundwater below the surface was measured between 14 and 22 feet below

ground level at the time of drilling. The Geotechnical Investigation Report discusses the groundwater on page 6 (Appendix E). These water levels represented water surface elevations around +2ft MLW. The tidal fluctuation in the area is about 3ft. The water table was measured at 15ft. at Boreholes 1, 23ft. at Borehole 2, and 17ft. at Borehole 3.

Figure 7.5 Location of geotechnical investigations (imagine from Geotechnical Report included in Appendix E).

The Water Resources Assessment report prepared by R. C. Minning & Associates, Inc. (Appendix F) indicates the presence of a freshwater lens to the northwest of the Bahama Cement Company property. This lens was identified in a Water Resources Assessment conducted in the area in 2007 and 2008. The report indicates that the current size and shape of the lens are virtually the same as they were in 2007 and 2008. This condition exists even with the full development of Bahama Rock Ltd.'s Area 3 (shown below in Figure 7.6). The development of the BCC property will not result in a decrease in the configuration (size and shape) of the existing freshwater lens. However, some of the private wells within the settlements in the southeastern portion of the Eight Mile Rock community are expected to continue their experiences with naturally fluctuating salinity concentrations in their groundwater supplies due to frequency, duration, and intensity of precipitation and climatic events". This data supports the lack of any useable freshwater lens in and around the BCC property. For simplicity, the BRL's mining activities in proximity to the freshwater lens on adjacent parcels has had no impact on the lens.

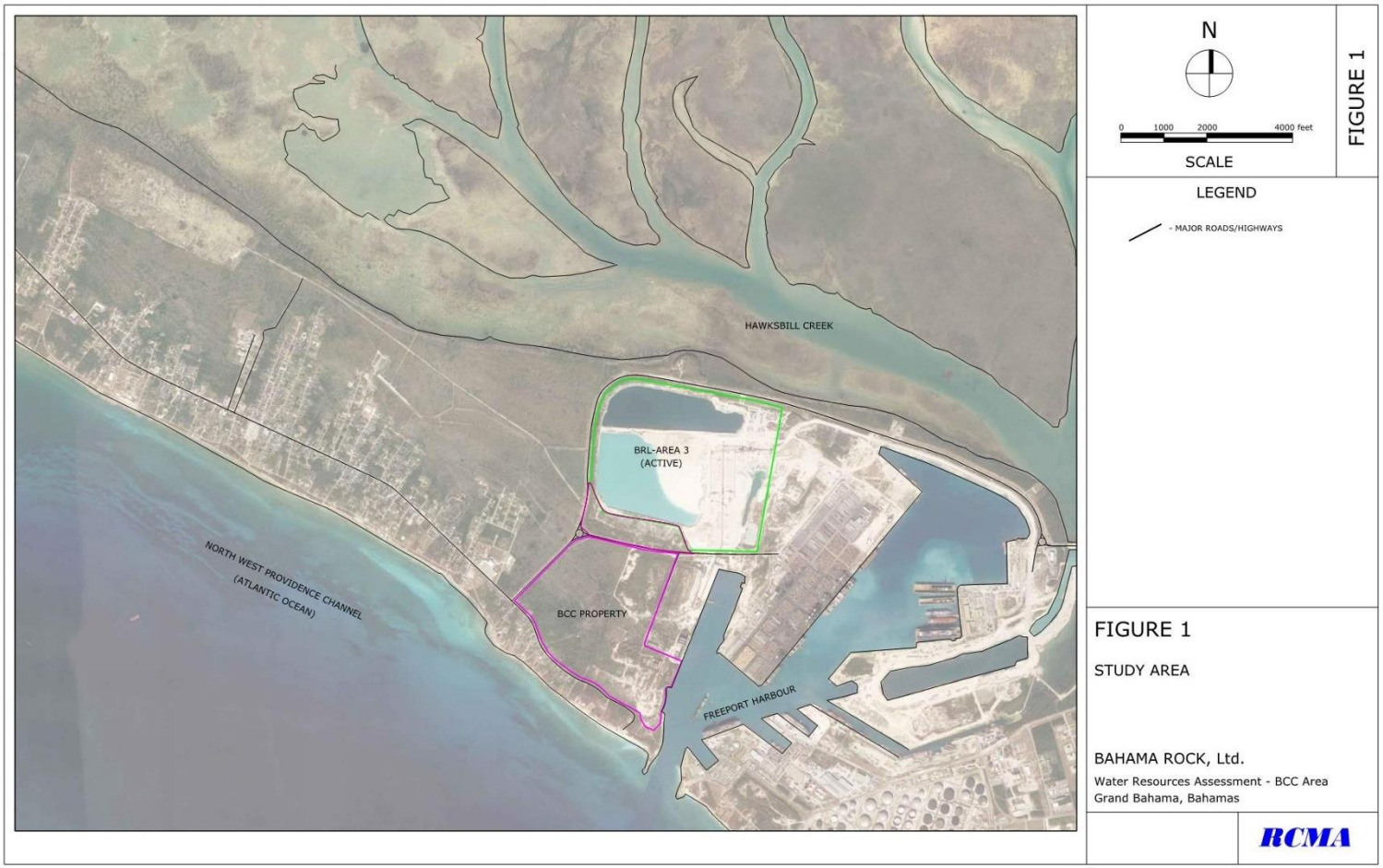


Figure 7.6.BCC property (purple) and active BRL Area 3 (green).

Two (2) monitor wells MW – 1 (100) and MW – 2 (101) were installed in December of 2023 and a third monitor well (MW – 3R) in Area 4 was redrilled in December 2023. In addition, monitor wells MW-1, MW-2, MW-4 and MW-10 (Motel – 8 well) were located from the investigation of Area 4 in 2007 and 2008, and were verified as being in usable condition. MW – 3 was redrilled to a total depth of -65 f bgl as MW – 3R due to it being plugged. MW – 1 (100) and MW – 2 (101) were each drilled to a total depth of -100 f bgl. It is worthwhile noting that the driller reported that a "cave", defined as a sudden drop in the drill string, was encountered during the drilling of MW-2 (101) between the depths of -35 f bgl to -45 f bgl and reported a "cavern" between the depths of -90 f to -100 f bgl. There were no reported "caves" or "caverns" during the drilling of MW – 1 (100) and MW – 3R.

Table 7.6. Monitoring well depths.

Monitor Well	Depth
MW-1	73.3
MW-2	74.4
MW-3R	65.0
MW-4	70.2
MW-Motel 8	NM
MW-100 (1)	100
MW-101 (2)	100

Baseline groundwater quality in the area around the BCC property was determined by measuring static water levels and salinity profiles in the available monitor wells during October, November and December 2023. Static water level measurements made on December 7, 2023, were converted to piezometric surface elevation and are presented in Table 7.7 below.

Table 7.7. Piezometric Surface Elevations.
Note: Top of Casing (TOC); Depth to Water (DTW) measurements were made on 12/7/2023.

Monitor Well	TOC Elevation	Well Depth	DTW	Water Elevation
MW - 1	15.03	73.3	14.48	0.55
MW - 2	15.92	74.4	14.6	1.32
MW - 3R	14.43	75.9	15	-0.47
MW - 4	17.66	70.2	16.48	1.18
MW - 100	10.56	100	9.33	1.23
MW - 101	23.16	100	22.33	0.83
MOTEL8	17.66	68.3	15.55	2.11

A survey indicates that residents within the area (settlements within the Eight Mile Rock community) use the freshwater resources via private wells. Twenty-seven (27) out of thirty-one (31) residents who responded to a private well survey conducted in the Water Resources Assessment study revealed that they had a well on their property. Three (3) properties out of the

thirty-one (31) surveyed stated that they were dependent upon a private well for their water supply. An additional thirteen (13) properties were connected to the Grand Bahama Utility Company municipal water supply system and also had private wells that were utilized for irrigation, washing, cleaning, bathing and emergencies only.

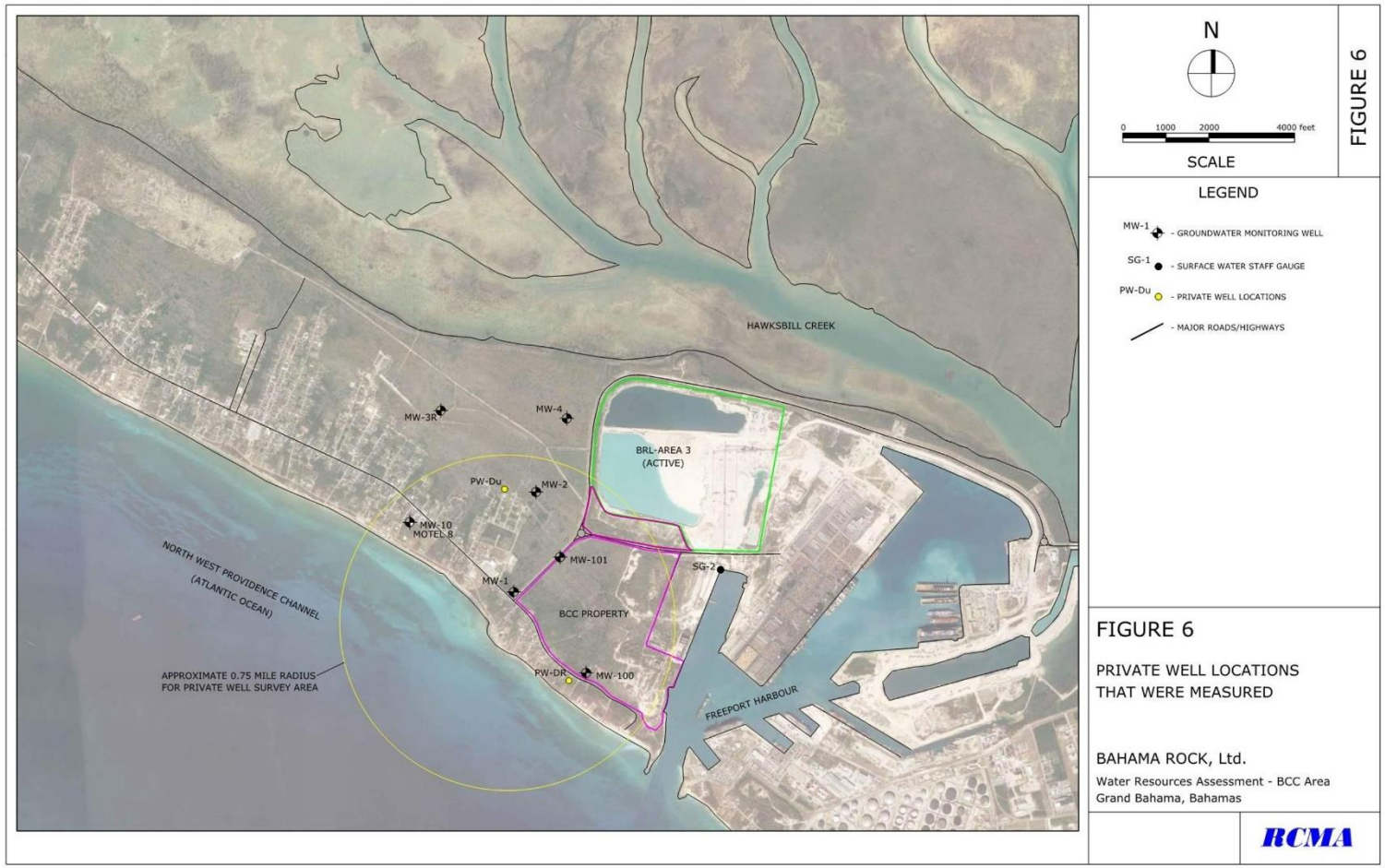


Figure 7.7. Private well survey area outlined in yellow within a 0.75-mile radius.

Some rainwater is collected and stored on the site in water reservoirs, as depicted in the following figures. Additionally, a wetland is emerging in a previously excavated area on the site, which is likely to absorb and collect rainwater as well.

Figure 7.8 Google Earth Image of two reservoirs observed on site.

Figure 7.9 Water Reservoirs observed on site.

7.5 TOPOGRAPHY

During the environmental surveys, the topography of the proposed site appeared to be generally flat, with gentle rolling hills in the southwestern section. Numerous karst formations, especially in the pineland areas, were observed. The site has elevations of ~10ft.to 15ft, but some areas within

the south-eastern boundary of the parcel show slight inclines with elevations ranging from ~20ft. to35ft.

A Topographic Assessment conducted in 2022 by BRON revealed that the highest elevation is over 38 ft, and the lowest is less than 9 ft. The area south of the site has a measured slope ranging from less than 1.7 to 13 degrees, while areas in the center and northeast of the site measured a slope higher than 90 degrees. The higher elevations appear to be correlated with the steeper slope areas. The slopes and elevations on site are representative of excavated materials over the years, creating mounds on site.

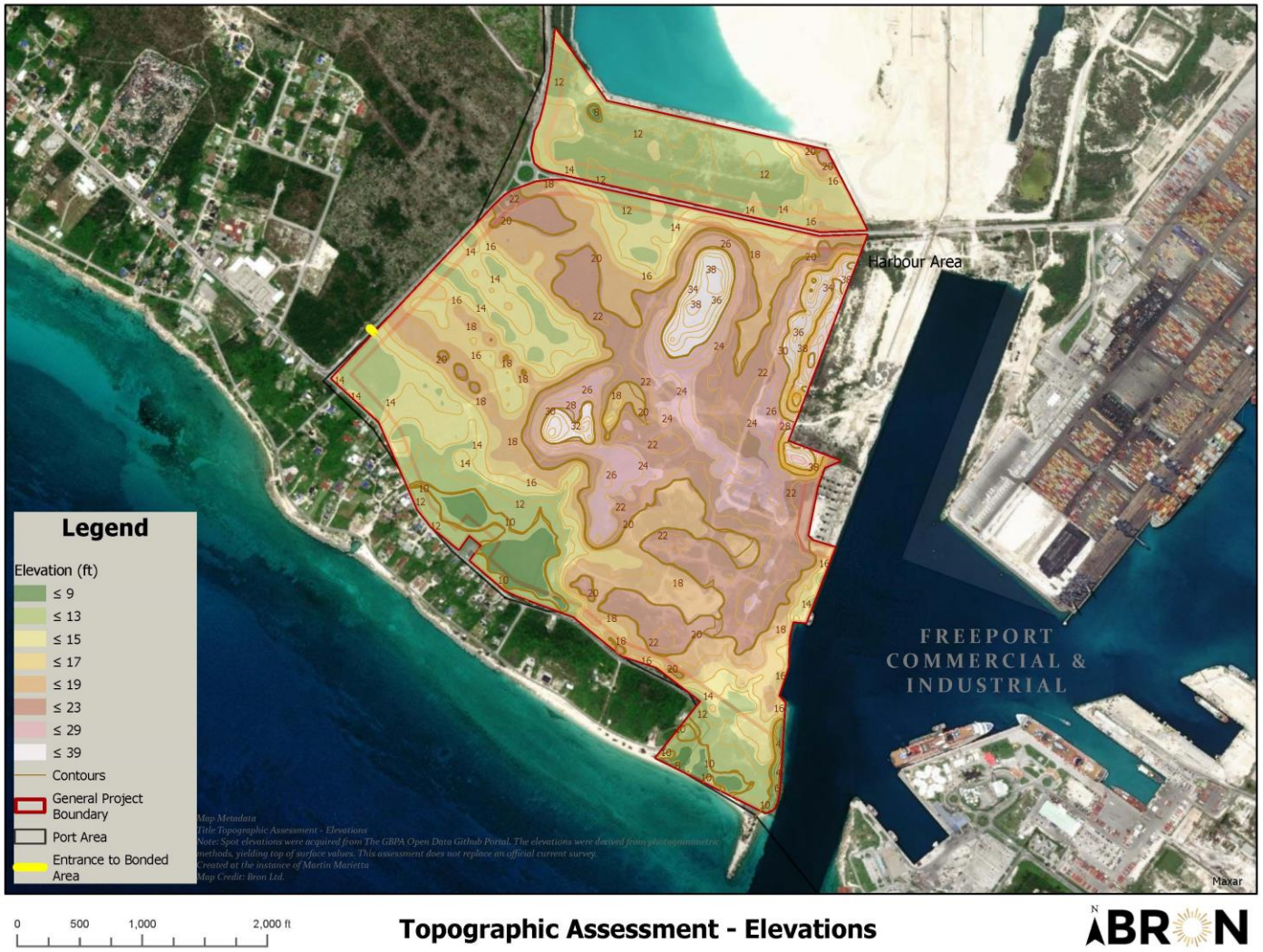


Figure 7.10 Topographic assessment (elevations)

Figure 7.11 Topographic Assessment (Elevations)

7.6 TERRESTRIAL RESOURCE SURVEY

7.6.1 Botanical Survey Methodology

Relevé surveys were done to determine botanical diversity throughout the site. All species seen were recorded. Vegetation sampling was used to estimate the number of protected plant species on the site. The sampling methodology involved the use of eleven (12) 66ft^2 x 66ft^2 (area =4356ft^2 or 0.1 acres) vegetation plots randomly placed throughout the site. All protected plant species and numbers of individuals seen within each plot were recorded. The average number of individuals of each protected plant in all plots was calculated and multiplied by 10 to determine the number of protected plants per acre. This number was then multiplied by the total acreage of the site to estimate the number of protected plants seen throughout the entire area.

7.6.1.1 Habitat Type

There were four major plant communities located on the site: Pineland, Coppice, Mixed Disturbed and Reclaimed Disturbed. The Pine with coppice understory had a denser pine community with a low to mid understory. Bracken fern was a dominant understory species and was of considerable height (>2m) in some areas. Botanical species seen in this area include *Agave braceana*, *Bursera simaruba*, *Swietenia mahogany*, *Sabal palmetto, Metopium toxifurem, Ernodea littoralis* and others. The coppice habitat was found in the southwestern part of the site and consisted of species such as *Coccoloba diversifolia*, *Eugenia auxilaris*, *Randia acuelata, Guetarda elliptica*, *Guapira obtustata*, *G. discolor*, *Lysiloma latisiliquum* and others. The Mixed Disturbed habitat was dominated by Brazilian Pepper along with native species. The reclaimed Disturbed habitat was dominated by Casuarina and Brazilian Pepper that capitalized on the dredged sediment that was stored on the site.

Figure 7.12 Coppice Forest and understory pine community in Bahama Rock Limited site.

Figure 7.13 Pineland community seen at the proposed Project site.

Over 40 species of plants have been recorded on site. Although most species are native, large sections of the site, namely the south and eastern sections was dominated by invasive Casuarina and Brazilian Pepper. Coppice forest was in the southwest area of the property and pinelands are the primary ecosystem in the northwest and southwest. The following table and figure show the habitat location and general estimated size.

Table 7.8 Habitat type and size.

Habitat Type	Size (acres)
Coppice	53
Mixed disturbed vegetation	10
Pineland	54
Reclaimed invasive	181

Figure 7.14 Habitat map

7.6.1.2 Observed Species

*Table 7.9 Botanical species seen on the Bahama Rock Limited Site. * Indicates Protected Plant. ⊗ indicates invasive species.*

Common Name	Scientific Name
Agave*	*Agave braceana*
Wax myrtle	*Myrica cerifera*
Poisonwood	*Metopium toxifurem*
Thatch Palm*	*Cocothrinax argentata*
Brier	*Smilax havanensis*
White Stopper	*Eugenia auxilarris*
Smooth-leafed velvetseed	*Guettarda elliptica*
Indigoberry	*Randia acuelata*
Five Finger	*Tabebuia bahamensis*
Ernodea	*Ernodea littoralis*
Wild Tamarind*	*Lysiloma latisiliquum*
Strongback	*Bourreria succulenta*
Cassia lineata	*Chamaecrista lineata*
Rough-leafed velvetseed	*Guettarda scabra*
Galactia	*Galactia spiciformes*
Pine Snowberry	*Chiococca parviflora*
Narrow-leafed Blolly*	*Guapira discolor*
Wild Cherry	*Crossopetalum rhacoma*
Guanaberry	*Byrsonima lucida*
Cat's Tongue*	*Varronia bahamensis*
Brazilian Pepper ⊗	*Shinus terebinthifolia*
Wild Coffee	*Psychotria legistrafolia*
Caribbean Pine*	*Pinus caribaea bahamensis*
Devil's potato	*Echites maculata*
Wild noni	*Morinda royoc*
Sabal Palm*	*Sabal palmetto*
Wild Cherry	*Crosspetalum rhacoma*
Bastard Stopper	*Petitia domingensis*
Golden Dewdrop	*Duranta erecta*
Jackmadaw	*Koanophyllon villosum*
Ardisia	*Ardisia elliptica*
Short-leafed fig	*Ficus citrifolia*

Casuarina ⊗	*Casuarina equestifolia*
West Indian Almond	*Terminalia catappa*
Dogwood	*Piscidium pispula*
Sweet Margaret	*Psidium longipes*
Love vine	*Cassytha filiformis*
Gum Elemi*	*Bursera simaruba*
West Indian Mahogany*	*Swietenia mahagoni*
Waltheria*	*Waltheria bahamensis*
Bracken Fern	*Pteridium aquilinum*
Bahama Pigeon Plum	*Coccoloba tenuifolia*
Hawaiian Inkberry ⊗	*Scaevola taccada*
Jumbey ⊗	*Leuceana leucocephala*

7.6.1.3 Protected Plant Survey Results

7.6.1.4 The total number of protected plants was extrapolated from twelve (12), 0.1-acre plots randomly distributed within 269.4 acres of vegetation on site. The estimates show that 132,483 protected trees and shrubs within the site. This number consists of 45**,**506 **Gum Elemi (***Bursera simaruba***)**, *448* ***Silver Thatch (****Cocothrinax argentata***)**, *224* ***Sabal Palm (****Sabal palmetto***)**, *54,697* ***Caribbean Pine (****Pinus caribaea bahamensis* ***[****1,657 adults, 21744 juveniles, 21296 saplings****]*), *15**,**916* ***Wild Tamarind (****Lysiloma latisiliquum***)**, *7**,**846* ***Brace's Agave (****Agave braceana***)**, *and 7**,**846* ***West Indian Mahogany (****Swietenia* ***mahogany)***.**_Faunal Survey Methodology**

Avian surveys were conducted from May 10th to May 14th, 2022, and began at sunrise and ended at 3:00 p.m. Walking transects were done throughout the site and along trails where available. Birds were observed using Bushnell Fusion 10 x 42 mm and Vortex Diamondback 8x42mm binoculars. All avian species seen or heard were recorded. Special attention was given for Northern Bahama pineland species such as the Olive-capped Warbler and the Green-backed Spindalis, Bahamian endemic species such as the Bahama Warbler, Bahama Yellowthroat, Bahama Swallow, and other important pineland species such as the Hairy Woodpecker. Non-avian fauna was also recorded during the survey period to determine the fauna composition on the site.

7.6.1.5 Faunal Survey Results

Thirty species of birds were observed on the site including seven species of concern and one Bahamian endemic. It is important to note that this list does not include many of the North American migratory birds that may have also used the site that have left the country to breed in North America. Follow-up surveys during the Fall migration (September-November) would be conducted if deemed necessary by DEPP to better understand avian diversity at the site. Most of the native pineland avifauna for the Northern Bahamas such as the Bahama Warbler, Olive-capped Warbler, Green-backed Spindalis, Black-faced Grassquit, Blue-grey Gnatcatcher, Cuban

Pewee and Cuban Emerald were absent despite careful searching throughout the proposed Project site (269.4 acres) and with breeding season in full swing.

*Table 7.10 Avian species observed on the Bahama Rock Limited Site. IUCN = International Union for Conservation of Nature, * = Species of Concern, ** = endemic species.*

Common	*Scientific epithet*	IUCN	Habitat
Cape May Warbler*	*Setophaga tigrina*	LC	Pineland/Disturbed
Smooth-billed Ani	*Crotophaga ani*	LC	Pineland/Disturbed
La'Sagras Flycatcher	*Myiarchus sagrae lucaysiensis*	LC	Disturbed/Pineland
Laughing Gull	*Leucophaeus atricilla*	LC	Disturbed/Wetland
Semipalmated Plover	*Charadrius semipalmatus*	LC	Disturbed/Wetland
Black-necked Stilt	*Himantopus mexicanus*	LC	Disturbed/Wetland
Spotted Sandpiper	*Actitis macularius*	LC	Disturbed/Wetland
Grey Kingbird	*Tyrannus dominicensis*	LC	Disturbed/Wetland
Lesser Yellowlegs*	*Tringa flavipes*	LC	Disturbed/Pineland
Killdeer	*Charadrius vociferous*	LC	Disturbed/Wetland
Northern Mockingbird	*Mimus polyglottus*	LC	Disturbed/Pineland
Limpkin	*Aramus guarauna*	LC	Disturbed Wetland
Common ground Dove	*Columbina passerina*	LC	Disturbed
Red winged- Blackbird	*Agelaius phoeniceus*	LC	Disturbed
American Redstart	*Setophaga ruticilla*	LC	Pineland/Disturbed
Antillean Nighthawk	*Chordeiles gundlachii*	LC	Pineland/Disturbed
Yellowthroat sp.	*Geothylpis sp.*	LC	Pineland
Yellow-billed Cuckoo*	*Coccyzus americanus*	LC	Disturbed
American Herring Gull	*Larus argentatus smithsonianus*	LC	Disturbed
Turkey Vulture	*Cathartes aura*	LC	Flying
American Kestrel	*Falco sparverius spaveroides*	LC	Pineland/Disturbed
Bahama Yellowthroat**	*Geothylpis rostrata tanneri*	LC	Pineland/Disturbed
Blackpoll Warbler*	*Setophaga striata*	NT	Pineland/Disturbed
Hairy Woodpecker	*Dryobates villosus*	LC	Pineland/Residential
White-crowned Pigeon*	*Patagioenas leucocephala*	NT	Pineland/Disturbed
Semipalmated Sandpiper*	*Calidris pusilla*	NT	Disturbed/Wetland
Red-legged Thrush	*Turdus plumbeus plumbeus*	LC	Pineland/Disturbed
European Starling	*Sturnus vulgaris*	LC	Residential/Disturbed
Rock Dove	*Columbia livia*	LC	Residential/Disturbed
Least Tern	*Sternula antillarum*	LC	Coastal
Belted Kingfisher	*Megaceryle alcyon*	LC	Coastal

Thick-billed Vireo	*Vireo crassirostris crassirostris*	LC	Disturbed/Coppice

Figure 7.15 Birds seen on the proposed Project site. Left- Spotted Sandpiper. Top right- White-crowned Pigeon, Center Right- Killdeer, Bottom Right -LaSagra's Flycatcher.

Several species of animals were observed on the proposed Project site including four species of reptiles (1 endemic), one amphibian, several species of arthropods and two invasive species of invasive mammals. Reptiles such as the Brown Anole and the Bark Anole are native to The Bahamas but are believed to have been introduced onto the islands of the Little Bahama Bank.

Table 7.11 Non-avian faunal species seen on the proposed Project site. ⊗ indicated invasive species

Common	***Scientific***	**Status**
Zebra longwings	*Heliconius charithonia*	Native
European honeybees ⊗	*Apis mellifera*	Exotic/Invasive
Brown Anole	*Norops sagrei ordinatus*	Native/Introduced
Bark Anole	*Anolis distichus*	Native/Introduced
Saw-scaled Curlytail Lizard	*Leiocephalus carinatus*	Native
Cuban Whiptail	*Pholidoscelis auberi*	Native

Raccoon⊗	*Procyon lotor*	Invasive
Shiny leaf Chafer	*Rutella formosa*	Native
Cuban flat-headed Frog	*Eleutherodactylus planirostris*	Native
Feral Hog ⊗	*Sus scrofa*	Invasive
Halloween Pennant	*Celithemis eponina*	Native
Eastern Pondhawk	*Erythemis simplicicollis*	Native
Bahama Green Anole	*Anolis smaragdinus*	Endemic
American Grasshopper	*Schistocerca americana*	Native

Of the four pineland endemics observed on Grand Bahama, only one species, the Bahama Yellowthroat, was seen on the site, despite extensive survey effort and searches. The Bahama Yellowthroat is a secretive, skulking species that frequents the thick underbrush of the pinelands and coppice areas, a behavior that is different from the other pineland endemics which are often seen in the canopy and midstory of trees within the pinelands. The pinelands on the site represents some of the last intact pineland sites on the island and the loss of this habitat will be a considerable loss to the terrestrial biodiversity of Grand Bahama which is still in the early process of recovery and regeneration from Hurricane Dorian. Therefore, the relocation of Caribbean Pine is recommended to aid in the forestry recovery efforts in Grand Bahama.

The absence of key endemic, native and specialist pineland species in the area may be the result of extensive industrial development activity in West Grand Bahama. Many native bird species are sensitive to anthropogenic disturbance and may leave the area or go extinct under stressful conditions. The presence of humans also allows for the introduction of non-native and invasive predators that have acclimated themselves to anthropogenic disturbance and human presence. Feral hog trails and fresh dung have been observed throughout the site and indicate a feral population residing in the area. Raccoons, an invasive and opportunistic predator and invasive European honeybees have been seen on the proposed Project site as well.

7.7 Marine Resource Survey

7.7.1 Methodology

An S-shaped snorkel survey was conducted along 0.3 miles of the western boundary of the Freeport Harbour shown in the following figure. The visibility was less than 3ft. Species growing along the side of the western boundary were documented during the survey and included in Section 7.7.3. Species were identified using the Atlantic and Gulf Rapid Reef Assessment (AGRRA) species identification code and verified using The Reef Set 3rd Edition by Paul Humann and Ned Deloach.

Figure 7.16 Marine survey area shown in yellow along the western boundary of the Freeport Harbour.

7.7.2 Habitat Description

A combination of stony corals, gorgonians, and algae was observed growing on the western boundary of the Freeport Harbour, which is located east of the excavation site. Ten (10) stony corals were documented > 5cm in diameter. Three (3) corals showed signs of stress as shown in the following figures. A few of the White Encrusting Zoanthid (*Palythoa caribaeorum)* observed were bleached. The benthic zone near the mouth of the marina was predominantly rocky. Small corals < 5cm in diameter were observed in this area. A large school of bonefish (*Albula vulpes*) was observed in the mouth of the marina. The following figures show the coral displaying signs of stress.

Figure 7.17 (Left) Stressed stony coral. (Right) Closer view of the same coral on the left.

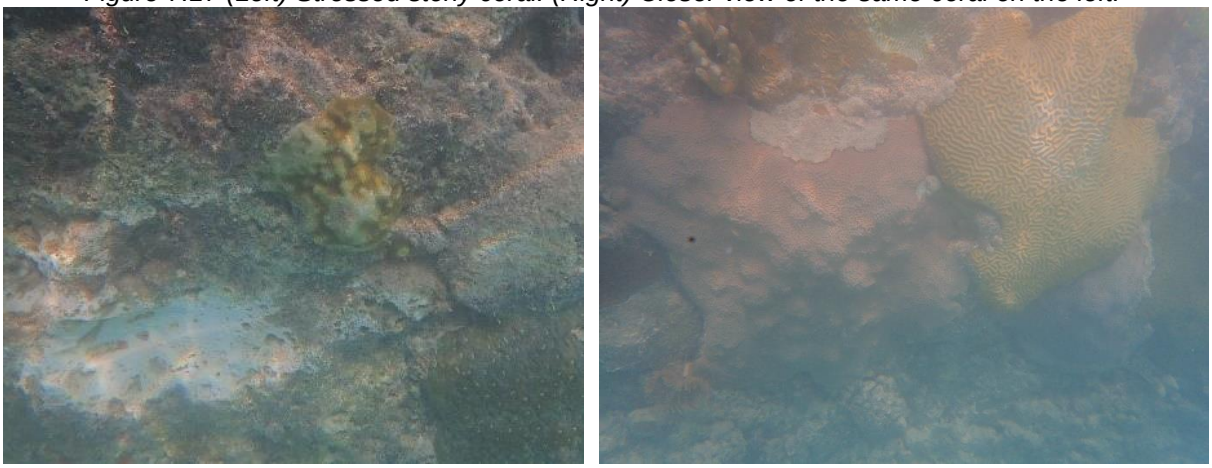


Figure 7.18 (Left) Porites asteroides (Right) Pseudodiploria strigose

7.7.3 Observed Species

Table 7.12 Marine species list. Single =1, Few = 2 to 11, Many = 11-100, Abundant = > 100

Common Name	Scientific Name	Abundance
Boulder Brain Coral	*Colpophyllia natans*	Few
Clubtip Finger Coral	*Porites porites*	Few
Mustard Hill Coral	*Porites asteroides*	Few
Massive Starlet Coral	*Siderastrea siderea*	Few
Lesser Starlet Coral	*Siderastrea radians*	Few
Lobed Star Coral	Orbicella annularis	Few
Symmetrical Brain Coral	Pseudodiploria strigosa	Few
Knobby Brain Coral	Pseudodiploria clivosa	Few
White Encrusting Zoanthid	*Palythoa caribaeorum*	Few
Branching Fire Coral	Millepora alcicornis	Few
Maze Coral	Meandrina meandrities	Few

Long-Spined Sea Urchin	*Diadema antillarum*	Few
Magnificent Feather Duster	*Sabellastarte magnifica*	Few
Three Rowed Sea Cucumber	*Isostichopus badionotus*	Single
White Scroll algae	*Padina sanctae-crucis*	Abundant
Bonefish	*Albula vulpes*	Many
Sergeant Major	*Abudefduf saxatilis*	Many
Stinker Sponge	*Ircinia felix*	Few
Christmas Tree Worm	*Spirobranchus giganteus*	Few
Sargassum	*Sargassum fluitans*	Few
Fuzzy Tip	*Neomeris sp.*	Many
Tubular Thicket	*Galaxaura sp.*	Few
Common Sea Fan	*Gorgonia ventalina*	Few
Great Star Coral	*Montastraea cavernosa*	Few
Blushing Star Coral	*Stephanocoenia intersepts*	Few
Slit Pore Sea Rod	*Plexaurella spp.*	Few
Black Sea Rod	Plexaurella homomalla	Few
Spiny Flower Coral	*Mussa angulosa*	Few
Slippery Dick	*Halichoeres bivittatus*	Many
Atlantic Silverside	*Menidia menidia*	Many
Bluehead Wrasse	*Thalassoma bifasciatum*	Few
French Grunt	*Haemulon flavolineatum*	Few
White Grunt	*Haemulon plumierii*	Few
Beaugregory Damsel	*Stegastes leucostictus*	Few
Flagfin Mojarra	*Eucinostomus melanopterus*	Single

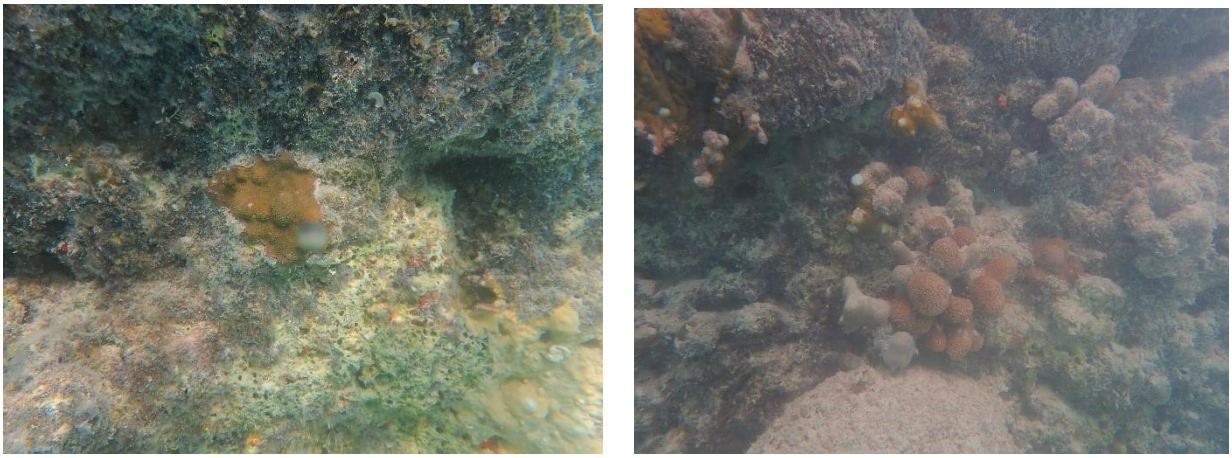


Figure 7.19 (Left) Porites asteroids (Right) Porites porites

Figure 7.20 (Left) Diadema antillarum (Right) Porites asteroides

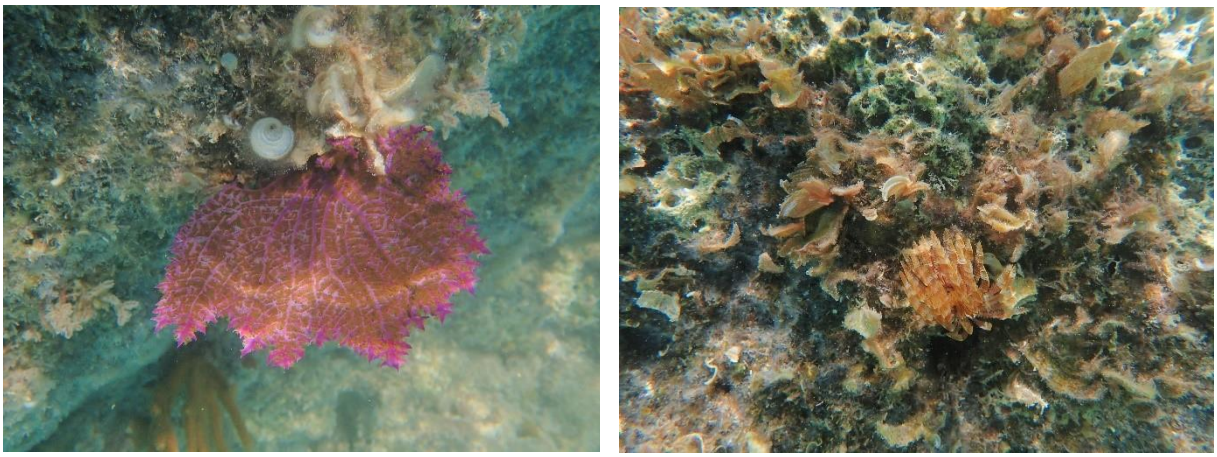


Figure 7.21 (Left) Common Sea Fan, Padina algae (Right) Sabellastarte magnifica

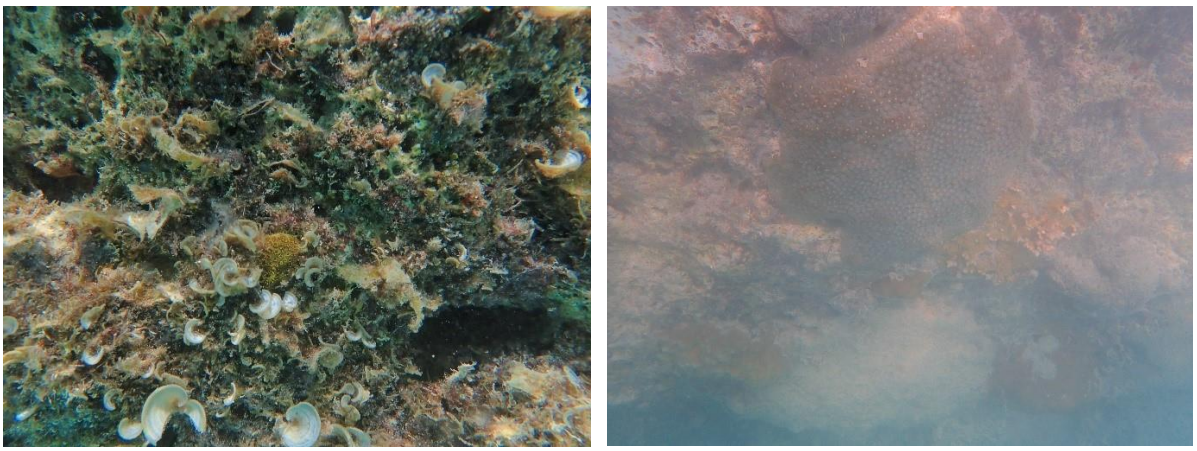


Figure 7.22 (Left) Coral recruit (Right) Montastraea cavernosa

Figure 7.23 (Left) Orbicella annularis (Right) Sergeant Major

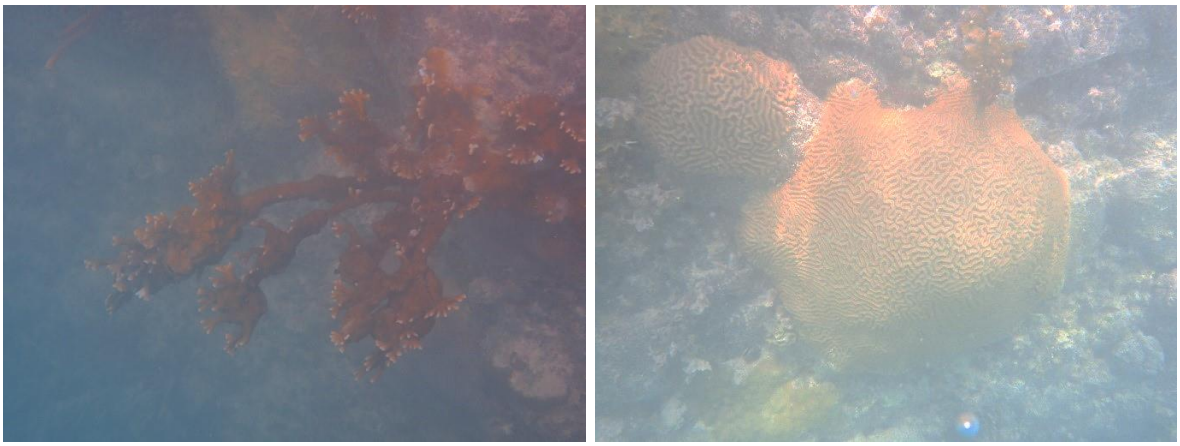


Figure 7.24 (Left) Millepora alcinornis (Right) Symmetrical Brain Coral

Figure 7.25 (Right) Knobby Brain Coral (Left) Feather duster

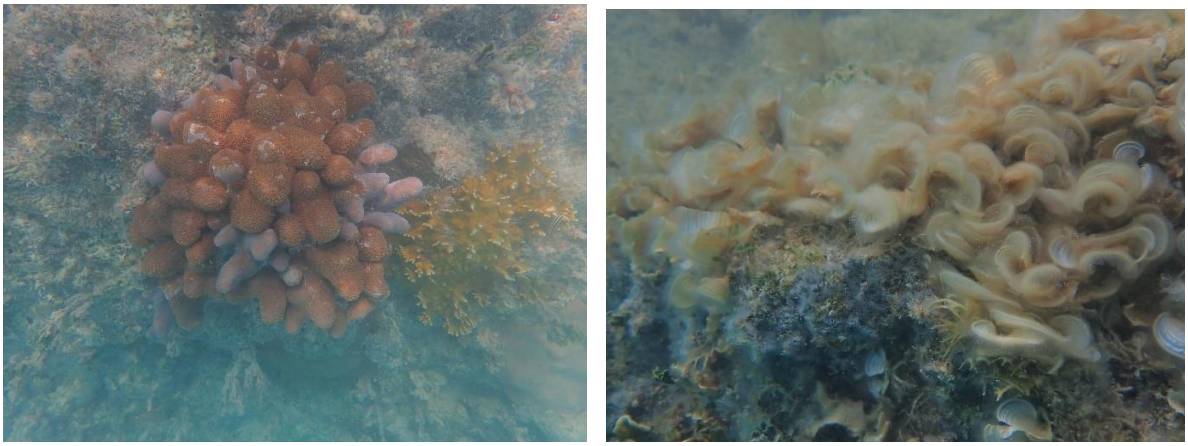


Figure 7.26 (Left) Finger coral and Branching Fire Coral (Right) Padina sp. Algae

Figure 7.27 (Left) Meandrina meandrities (Right) Plexaurella homomalla

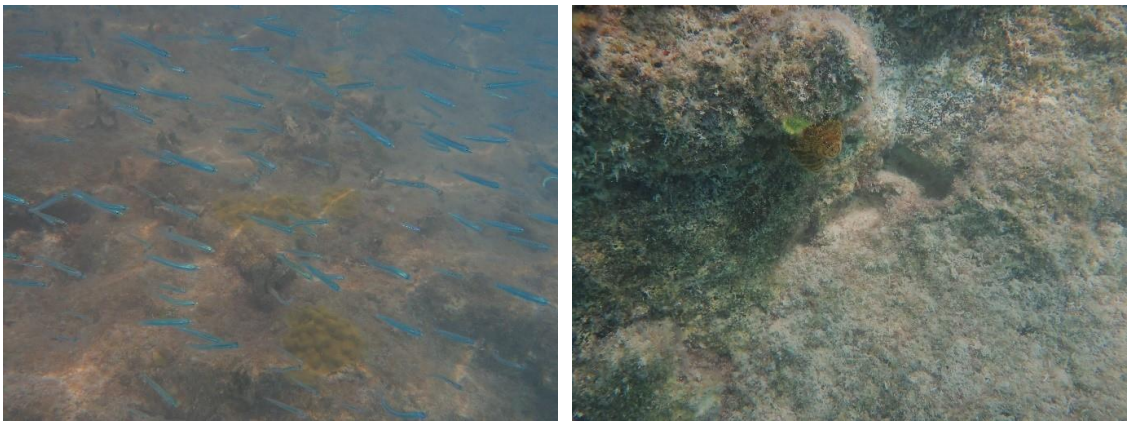


Figure 7.28 (Left) Menidia menidia (Right) Spirobranchus giganteus

Figure 7.29 Sargassum floating near the opening of the marina.

Figure 7.30 (Left) Red algae covered with cyanobacteria (Right) Patches of Red algae

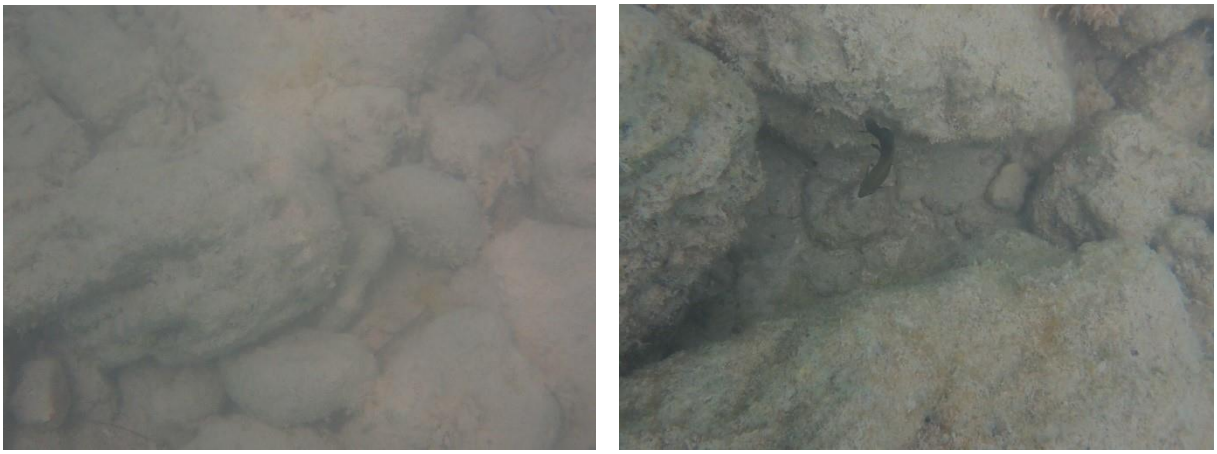


Figure 7.31 (Left) Rocky benthic zone near the opening of the marina. (Right) Damselfish

Figure 7.32 Rocky benthic zone near the opening of the marina.

7.8 HUMAN ALTERED HABITAT

Approximately 180 acres of the proposed Project site has been previously altered by anthropogenic disturbance. The eastern sections of the property were dominated by opportunistic invasive species that capitalized on the area that was covered with clean dredged fill from a previous excavation decades past.

Figure 7.33 Human altered habitat on the proposed Project site. Casuarina was a dominant invasive plant species in some sections of the site.

7.9 CAVES AND BLUE HOLES

No caves or blue holes were observed on the site during the survey period. The site does consist of uneven, undulating, and hilly terrain with lots of karst formations, making navigation through the site challenging. However, it is noted that a cave or cavern was detected during the geotechnical investigation in December 2023 as discussed in Section 7.4.1.

The “Boiling Hole” in Hepburn Township is a popular tourist site that is located along the western shoreline, 0.17km from the site. It is a large, tidal blue hole that was formed thousands of years ago during times of lowered sea level.

Figure 7.34 Location of “Boiling Hole in Hepburn Township

Figure 7.355 Close up of "Boiling Hole" in Hepburn Township

7.10 SPECIES OF ECONOMIC IMPORTANCE

7.10.1 Terrestrial

Historically, Caribbean/ Bahamian pine trees, Wild Tamarind, and West Indian Mahogany were economically important plant species that were harvested for lumber and pulpwood. In the 1940's the Abaco Lumber mill moved its logging operations to Grand Bahama for pine tree harvesting. In the 1950's over 50,000 acres of pine trees were harvested in and around the current project site and Freeport.

All wild birds in The Bahamas are protected by Bahamian law. In 2014, approximately, 39,000 people (3% of 2014's international tourist visitors) came to The Bahamas for birding and bird related activities, contributing to 39 million dollars into The Bahamian economy that year[12]. Birding and eco–tourism is a growing activity in Grand Bahama and employs dozens of local Bahamians. White-crowned Pigeons, one of the most important gamebirds in The Bahamas, were observed foraging on the property. The pine habitat is also home to the Short-eared Owl. Avoidance of this species is recommended as it is known as a rear species in The Bahamas.

[12] https://www.responsibletravel.org/wp-content/uploads/sites/213/2021/03/bird-tourism-market-bahamas-fact-sheet.pdf

7.10.2 Marine

Bonefish (*Albula vulpes*) are economically important species in The Bahamas as it provides substantial income for fishermen and tour guides. It is the preferred flats fishing species, and this type of fishing takes place on several islands, with the islands of Abaco, Andros, Bimini, and Grand Bahama as the top four (4).

It is estimated that 37,000 persons visit The Bahamas annually to participate in recreational fishing, contributing to an expenditure of approximately $527 Million per year on various activities such as restaurants, local transportation, lodging, fishing, and recreational activities. Additionally, an estimated 18,000 jobs (direct and indirect) are derived from recreational fishing[13].

Research in 1984 and data collected in 1992 show grunts have been a historically important target fishery in The Bahamas. In 1984, grunts were included in the list of most important fisheries by number and by biomass. Total landings data for The Bahamas show grunts were an important target fishery with a value of $21,796 USD in the first half of 1992[14]. The French Grunt *(Haemulon flavolineatum)* and White Grunt *(Haemulon plumierii)* were observed on site during marine surveys. While the 1992 data does not appear to include the French Grunt in the landings calculations, French Grunts are a target species by fishers.

7.11 Habitat Utilization and Food Sources for Native Fauna

7.11.1 Terrestrial

Various species of birds utilize the pinelands as a foraging and nesting ground, contributing to the rich biodiversity of the region. Notable avian species include the Hairy Woodpecker (*Leuconotopicus villosus*), Red-legged Thrush (*Turdus plumbeus plumbeus*), Bahama Yellowthroat (*Geothlypis rostrata tanneri*), American Redstart (*Setophaga ruticilla*), Blackpoll Warbler (*Setophaga striata*), and others.

In addition to these species, birds such as Cape May Warblers (*Setophaga tigrina*), White-crowned Pigeons (*Patagioenas leucocephala*), Yellow-billed Cuckoo (*Coccyzus americanus*), and Common Ground Doves (*Columbina passerina*) have been observed in the heavily disturbed areas of the site indicating that many species of resident and migratory birds can and have adapted to areas heavily altered by human activity. In the disturbed reclaimed habitat, wetland birds and shorebirds, including the Black-necked Stilt (*Himantopus mexicanus*), Limpkin (*Aramus guarauna*), Spotted Sandpiper (*Actitis macularius),* Semipalmated and Western Sandpipers (*Calidris pusilla* and *Calidris mauri*, respectively), and American Herring Gull (*Larus smithsonianus*), which were observed utilizing the manmade wetlands on the property.

Among the other wildlife species documented on the property are the Cuban Whiptail (*Pholidoscelis auberi*), Saw-scaled Curlytail (*Leiocephalus carinatus*), Cuban flat-headed Frog

[13] *Department of Marine Resources and Food and Aquaculture Organization of the United Nations. (2016). Fisheries and aquaculture in The Bahamas: A review.*
[14] Moultrie, S., Deleveaux, E., Bethel, G., Maycock, V., Moss-Hackett, S., Anrooy, R. and Laurent, Y. 2016. FINAL Bahamas Fisheries & Aquaculture Sector Review 17Nov16.pdf Accessed February 17, 2023

(*Eleutherodactylus planirostris*), Bark Anoles (*Anolis distichus*), Bahama Brown Anoles (Norops (Anolis) *sagrei ordinatus*), and various other native species.

7.11.2 Marine

Healthy corals were observed growing along the harbor walls and appear to function as a patch reef system. Coral reefs are crucial ecosystems that support marine biodiversity by providing habitats for numerous species. They act as protective barriers, mitigating coastal erosion. Additionally, coral reefs contribute to the global economy through fisheries, tourism, and pharmaceutical discoveries, while playing a vital role in carbon sequestration and climate regulation.. Furthermore, these can be used for breeding purposes, which include reproduction and nursery habitats.

7.12 Protected and Threatened Species

7.12.1 Terrestrial

Protected flora and fauna identified on site included over ten (10) species of protected plant species (seven recorded in vegetation plots) and over thirty (30) avian species. These protected plants include Gum Elemi *(Bursera simaruba)*, Thatch Palm (*Cocothrinax argentata)*, Waltheria (*Waltheria bahamensis)*, Narrow-leafed Blolly (*Guapira discolor)*, Sabal Palm (*Sabal palmetto)*, Caribbean Pine (*Pinus caribaea bahamensis,* Wild Tamarind (*Lysiloma latisiliquum)*, Brace's Agave (*Agave braceana)* and West Indian Mahogany (*Swietenia mahogani).* All avian species are protected under the Wild Bird Protection Act.

Endemic species seen on site included the Bahama Green Anole (*Anolis smaragdinus*) and the Bahama Yellowthroat (*Geothylpis rostrata tanneri).* The avian species of concern are Cape May Warbler (*Setophaga tigrina),* Lesser Yellowlegs (*Tringa flavipes),* Yellow-billed Cuckoo (*Coccyzus americanus),* White-crowned Pigeon (*Patagioenas leucocephala),* Blackpoll Warbler (*Setophaga striata*), and the Semipalmated Sandpiper (*Calidris pusilla).*

7.12.2 Marine

The IUCN lists Bonefish (*Albula vulpes*) as near threatened due to threats of unsustainable fishing practices and habitat loss (Adams et al., 2012). Bonefish typically spawn in deeper waters between November and December. Although there is no official closed season for Bonefish in The Bahamas, there is a voluntary closed season by locals from August to October[15].

Threatened marine species identified on site include the Maze Coral (*Meandrina meandrities*) and the Long-Spined Sea Urchin (*Diadema antillarum*). All stony corals are threatened by the Stony Coral Tissue Loss Disease (SCTLD), an infectious disease that causes tissue death. It was first identified in The Bahamas in Freeport, Grand Bahama[16]. Marine surveys show 80 to 90% mortality of several coral species, *Meandrina meandrites, Dichocoenia stokesi, Eusmilia fastigiate*[14]. The Long-Spined Sea Urchin is an important herbivore on coral reefs which experienced a die off in the 1980's Since then, the species began to recover throughout the Caribbean, but recent

[15] *Department of Marine Resources and Food and Aquaculture Organization of the United Nations. (2016). Fisheries and aquaculture in The Bahamas: A review.*
[16] Fast Facts: Stony Coral Tissue Loss Disease in The Bahamas - Blue Project Atlantis Accessed February 17, 2023

observations throughout the Caribbean indicate the species is at risk again as large numbers of sick urchins are dying[17].

7.13 INVASIVE SPECIES

Invasive flora and fauna were observed in abundance on site during the surveys in the terrestrial environment. Invasive plant species observed included Casuarina (*Casuarina equisetifolia),* Brazilian Pepper *(Shinus terebinthifolia)*, Jumbey (*Leucena leucocephala)*, and Hawaiian inkberry (*Scaevola taccada*). The Casuarina, Brazilian Pepper, and Jumbey plants were the dominant species in the northeastern and southeastern sections of the property where fill from previous excavation and other anthropogenic disturbance occurred. Casuarina, Jumbey and Hawaiian inkberry were also observed growing along the coast of the property and along the western boundary of the marina. Invasive fauna included Rock Doves (*Columbia livia)*, European Starlings (*Stumus vulgaris*), Raccoon (*Procyon lotor),* Feral Hog (*Sus scrofa),* and the European Honeybee (*Apis mellifera).* The following figures show the invasive plants species along the western boundary of the marina and in the southeastern portion of the property. An Invasive Species Management Strategy will be provided in the Environmental Management Plan (EMP).

Figure 7.36 Casuarina, Jumbey, and Hawaiian Inkberry

[17] Towle, E.K., 2022. How Can the National Coral Reef Monitoring Program Help Understand Long-Spined Sea Urchin Die-Offs? (noaa.gov) Accessed February 17, 2023

Figure 7.37 Casuarina growing in the southeastern portion of the proposed Project site.

7.14 AESTHETICS

The BCC Property is in an aesthetically poor condition. The site consists of overgrown invasive vegetation, such as Casuarina and Brazilian Pepper which dominated the southwestern section of the property. Human debris, dilapidated structures, abandoned buildings, and areas of limestone that were previously mined are also prominent features of the area. To the west of the heavily disturbed area was pineland with and mixed coppice understory. Coppice forest was the dominant plant community in the extreme northwestern section of the site. The northern section consisted of pineland and pineland savanna with low vegetation (< 2.5m). Debris was also seen along the road bisecting the northern section of the site.

7.15 PROTECTED AREAS

There are six (6) protected areas located on Grand Bahama. The Bahamas National Trust manages the Rand Nature Center (RNC), Peterson Cay National Park, and the Lucayan National Park (LNP). The management authority for the West End Marine Protected Area, Northshore (Gap) Protected Area, and the East Grand Bahama National Park (EGBNP) have not been assigned to date. The RNC was established in 2002 and is the nearest protected area to the Project site. It is 1,000 acres of pine and coppice forest. A native plant arboretum is located on site. The following figure shows the location of the protected areas.

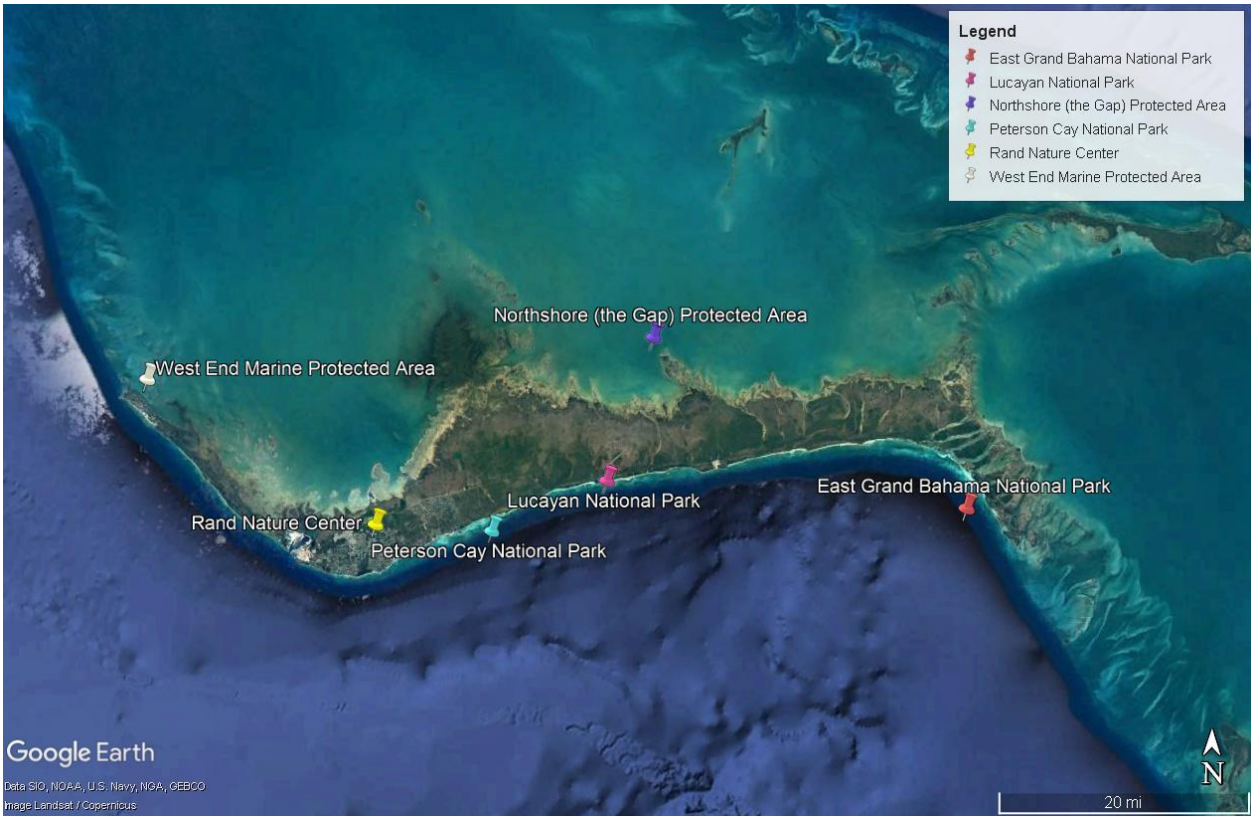


Figure 7.38 Map of Protected Areas on Grand Bahama

7.16 SOCIO-ECONOMIC ASPECT

7.16.1 Human Uses of Biodiversity

Debris was observed throughout the site indicating the area is used as a dumping ground. Also, Lovers Beach is a popular public beach located south of the proposed project site which is used for recreational and fishing activities. The coral growth observed during the marine survey may attract marine resources which influence fishing activities at an area easily accessible by locals (Lovers Beach).

Medicinal plants have been observed on the BCC Property. Gum Elemi contains anti-inflammatory compounds that help to alleviate the itching effects of Poisonwood rashes. Waltheria is used as a treatment for respiratory ailments. Pine trees, Wild Tamarind, and West Indian Mahogany have been used as important sources of lumber for homes, wood works, and boat building.

7.16.2 Population/Demographics

The proposed Project site is located closest to the Eight Mile rock community on Grand Bahama. The last official census in 2010 showed a population of 9,640 people with 4,899 being women and 4,741 being men. There are also a total of 2,704 households within the community. The

population of The Bahamas at the last census was 351,461[18]. The employment rate in Grand Bahama is 29,235 people employed and 3,590 unemployed as of May 2019 as recorded by the Department of Statistics.[19]

7.17 CULTURAL RESOURCES

7.17.1 Historical Overview

Historical information from the Grand Bahama Museum asserts that West Grand Bahama has a rich history. In the mid- 1940's, The Abaco Lumber Company was purchased by Wallace Groves and large areas of pine forest on Grand Bahama (inclusive of the current property) were harvested for lumber and other wood products. In August 1955, the Hawksbill Creek Agreement was signed. This contract between The Bahamas government and a private corporation owned by the Groves family helped pave the way for the Grand Bahama Port Authority. Under the Hawksbill Creek Agreement, the Port Authority was granted “conditional purchase leases” for 50,000 acres of land surrounding Hawksbill Creek. To make the port Authority enclave an attractive venture to international investors, the Port Authority, its residents, and employees were exempted from all taxes on capital gains, real and personal property, custom duties and all exports out of Grand Bahama for 30 years (as subsequently extended). The Port Authority, in return, created a new harbour and channel at the mouth of Hawksbill Creek to accommodate large vessels. The Port Authority was also to promote industry and the creation of factories.

Wallace Groves and the Port Authority named the area “Freeport” and began looking for investors to construct the Harbour and additional facilities. Billionaire Daniel K. Ludwig of National Bulk Carriers was recruited for the construction of the harbour. In exchange for his investment of $2 million dollars USD to dredge the harbour, he received 2,000 acres of Port Authority land, which he later sold to the US Steel Corporation. In 1962, The US Steel Corporation established a subsidiary called Bahama Cement Ltd. and dredged the harbour to 42 feet.

7.17.2 Historical, Archaeological and Paleontological Resources

During terrestrial resource surveys, rock walls were identified in the site's southern and central sections which may have historical significance. The following Figures show the rock walls and their locations on the site.

[18] Dorsett, K. June 2014. Department of Statistics. Socio-Economic Report. 2008-2012 Social and Economic Indicators.pub (bahamas.gov.bs)
[19] https://www.bahamas.gov.bs/wps/wcm/connect/819a4a40-602b-47a3-9da7-c90eeae0f679/Labour+Force+Report+May_2019.pdf?MOD=AJPERES

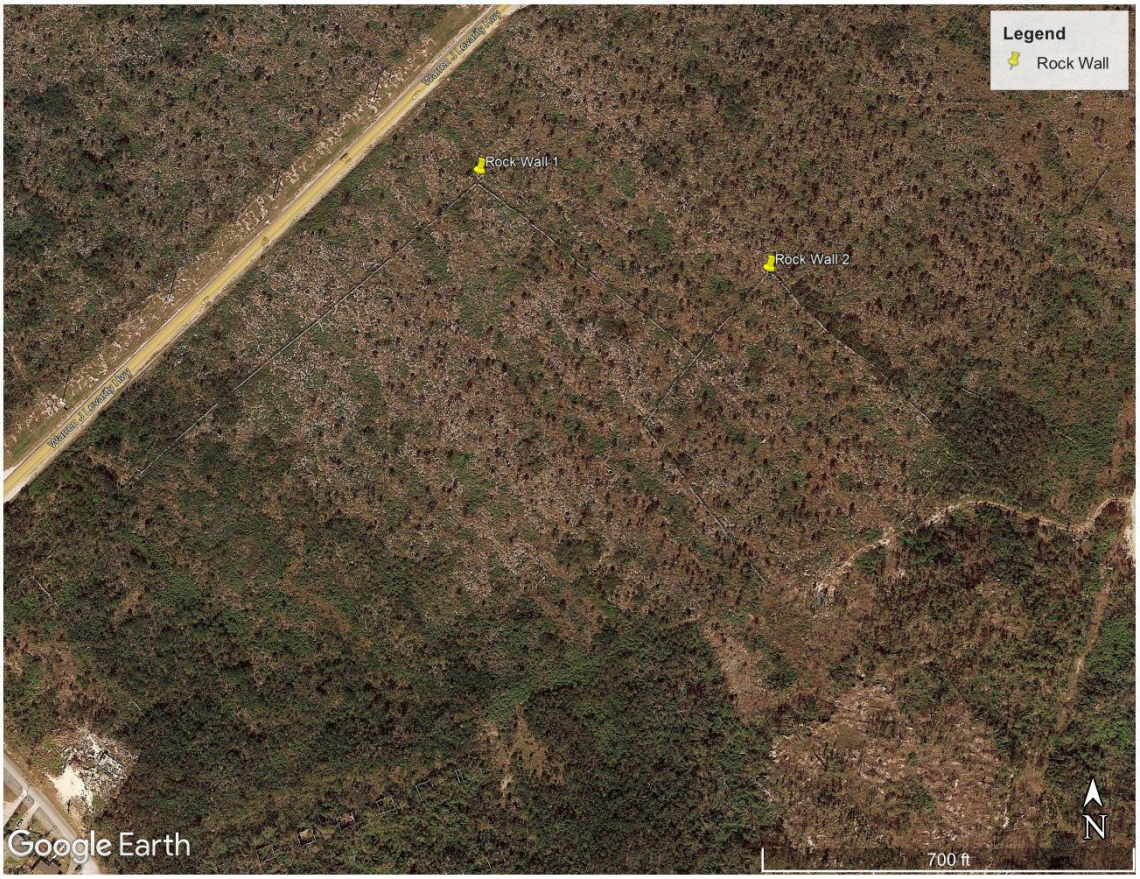


Figure 7.39. Observed rock wall location within the Project site boundary.

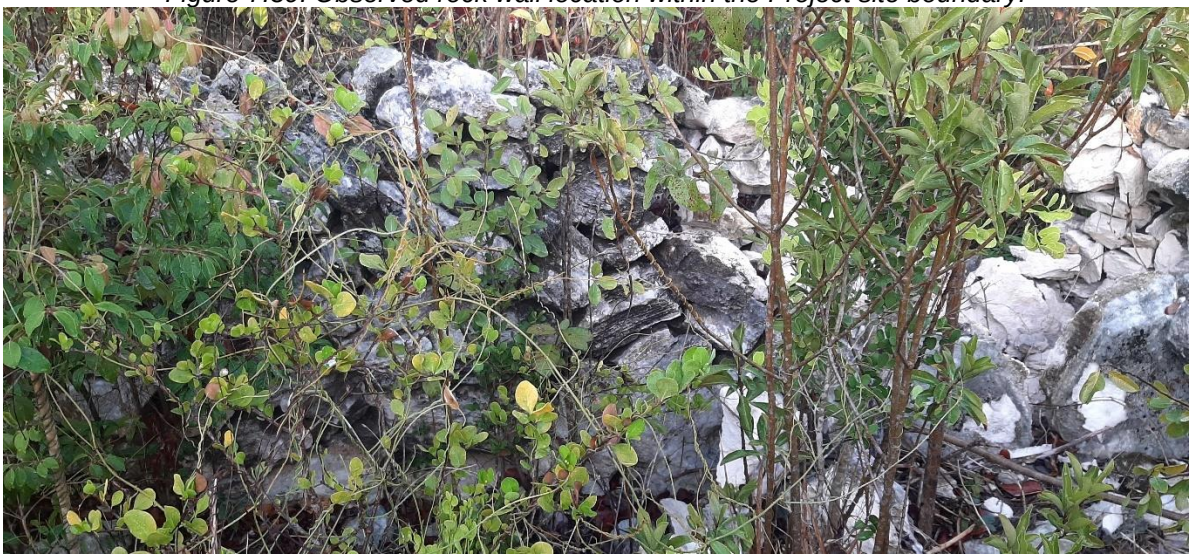


Figure 7.40 Observed rock structure / wall.

Antiquities, Monuments & Museum Corporation (AMMC) conducted a site visit on July 6 and 7, 2023, to investigate the observations of the rock wall. The historical report prepared by Dr. Grace Turner of AMMC (included in Appendix G) indicates that the wall sections assessed are surrounded by native vegetation indicating that the area has not been cleared in at least 100 years. Dry stone walls (historically known as “fences”) were commonly constructed throughout The Bahama Islands since at least the 1780s when loyalists from Britain’s former American colonies migrated to The Bahamas and established cotton plantations. These walls, or fences served to separate agricultural areas, keep out wandering animals, and delineate property boundaries.

Property owners within the current BCC property likely engaged in some level of lumber production as Grand Bahama lumber production was the main industry during this period (the late 19th and early 20th century). The assessment is that the dry stone walls were originally associated with lumber production. The traditional construction of this type of stone wall, without the use of any lime or concrete mortar, would have become less common by the 1940s when new technologies and different industries became more prevalent in Grand Bahama. However, in August of 2023, AMMC determined that it is difficult to associate these walls with a specific property owner and associated commercial activity. This makes it challenging to make a strong argument to preserve such structures when there is new development.

7.17.3 Tourist and Recreational Areas

To the southwest of the Project site lies Wild Goose Town, featuring a few recreational spaces such as Lovers Beach, the sole sandy beach accessible to local residents. This is adjacent to the BCC Property. Drexel Gomez Community Park provides a communal space for both tourists and locals to unwind or engage in physical activities. The town also has a natural attraction called the boiling hole, an intertidal pool where people swim and fish along the coast. Additionally, there are several restaurants scattered throughout the town.

Figure 7.41 Lovers Beach Location

7.18 TRANSPORTATION

The BCC Property is accessible via marine vessel from the Freeport Harbour and through five (5) thoroughfares: Warren J. Levarity Highway, Queen's Highway, West Sunrise Highway, Grand Bahamian Way and Grand Bahama Highway. Grand Bahama Highway facilitates east-to-west travel across the island, while West Sunrise Highway links to Queen's Highway, leading to Grand Bahamian Way, which further connects to Warren J. Levarity Highway. This highway runs parallel to the project site and connects to Queen's Highway, extending to the northwestern end of Grand Bahama.

8 ENVIRONMENTAL REGULATORY BODIES AND STANDARDS

8.1 RELEVANT REGULATORY BODIES

Office of the Prime Minister (OPM) - Office of the Prime Minister coordinates ministries, government, and parliamentary business. Specific related departments and agencies are listed below.

Grand Bahama Port Authority (GBPA) - Responsibility for the Project, administration and management, and provision of services within the "Port Area". The Hawksbill Creek Agreement (HCA) gave GBPA responsibility for the Project, administration and management, and provision of services within an area called the 'Port Area' (230 sq. miles). GBPA was mandated by this Agreement to build a deep-water harbour, an industrial community and required infrastructure for

the City. GBPA is responsible for nurturing and regulating all commercial and residential development within the 'Port Area' of Grand Bahama[20].

Department of Lands and Surveys - This department is responsible for planning, mapping, and monitoring of crown land (i.e., where beaches begin and end, high water marks, etc.).

National Emergency Management Agency (NEMA) - NEMA aims to reduce life and property loss in the event of a natural disaster.

Antiquities Monuments and Museum Corporation (AMMC) - The mission of AMMC is "to protect, preserve, and promote the Historic Cultural Resources of The Bahamas, and to be the number one conservation Agency in the world. We will do this while protecting our environment, encouraging research and archaeology, and by protecting, preserving, and promoting our Historical Sites."

Ministry of Agriculture, Marine Resources and Family Island Affairs - The Ministry of Agriculture Marine Resources and Local Government is responsible for the implementation, monitoring and evaluation of policies related to agricultural lands and marine resources. The Ministry serves as the Management and Scientific Authority for the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) in The Bahamas.

Department of Marine Resources (DMR) - DMR is primarily responsible for the administration, management, and development of fisheries in The Bahamas. The department was created to administer, manage, and develop the fisheries sector as stipulated by the Fisheries Resources (Jurisdiction and Conservation) Act. The department is also tasked with enforcement of Fisheries Regulations, Marine Mammal Regulations and the Seafood Processing and Inspection Regulations.

Ministry of Public Works and Utilities - The Ministry of Public Works maintains the physical infrastructure and natural environment of The Bahamas by providing quality services to its client agencies.

Department of Public Works - The Department of Public Works maintains public infrastructure inclusive of government buildings, roads, docks, bridges, and cemeteries.

Department of Physical Planning - The Department of Physical Planning manages town, physical, country and land use planning, zoning, private roads and subdivisions for New Providence and the Family Islands.

Water and Sewerage Corporation - The Water and Sewerage Corporation is entrusted with managing, maintaining, distributing, and developing the water resources of The Bahamas.

Ministry of Environment and Natural Resources - The Ministry of Environment and Natural Resources serves to protect, conserve, and manage the environment of The Bahamas. This

[20] https://gbpa.com/company/

ministry focuses on environmental control, solid waste management, public sanitation, and the beautification of public areas such as parks and beaches.

Department of Environmental Planning & Protection (DEPP) - The functions of the Department are to provide for and ensure the integrated protection of the environment of The Bahamas and ensure the sustainable management of its natural resources." DEPP is responsible for the evaluation of EIAs and EMPs and managing international environmental conventions.

Department of Environmental Health Services (DEHS) - DEHS manages the disposal of all wastes and management of environmental pollution (on land or in water). This department also promotes planning and approves various measures designed to ensure wise use of the environment.

Forestry Unit - The Forestry Unit's mandate is "to develop the forest resources of The Bahamas to their maximum potential by applying sound, scientific and sustained yield forest management principles and concepts."

Bahamas National Trust (BNT) - The mission of the BNT is "Conserving and protecting the natural resources of The Bahamas, through stewardship and education, for present and future generations."

Ministry of Labour - The Ministry of Labour oversees and regulates labour relations within The Bahamas.

Department of Labour - The Mission of the Department of Labour promotes good industrial relations between employer and employee, while promoting a high level of employment.

8.2 National Laws and Regulations

Agriculture and Fisheries Act, 1963 (Ch.242) - "An Act to provide for the supervision and development of agriculture and fisheries in The Bahamas," where Section 4 explains that "The Minister may make rules for all or any of the following purposes, (a) to define area hereinafter called 'protected areas' within which it shall be unlawful for any person except a licensee especially licensed in that behalf to plant, propagate, take, uproot or destroy any species of plant…".

Antiquities, Monuments and Museum Act, 1998 (Ch. 51) - "An Act to provide for the preservation, conservation, restoration, documentation, study and presentation of sites and objects of historical, anthropological, archaeological and paleontological interest, to establish a National Museum, and for matters ancillary thereto or connected therewith", where, section 3 speaks to the declaration of a monument by reason of its historical, anthropological, archaeological or paleontological significance.

Bahamas National Wetlands Policy[21] – see Ramsar Convention.

[21] http://www.best.gov.bs/Documents/Bahamas_national_wetlands_policy.pdf

Bahamas Public Parks and Public Beaches Authority Act, 2014 – An Act to establish the public parks and public beaches authority, to provide for the property rights and liabilities of the public parks and public beaches authority and to identify, regulate, maintain, develop, and conserve public parks and public beaches and for connected purposes, Where section 5 speaks to functions of the Authority.

Buildings Regulation, 1971 (Ch. 200) - "An Act to regulate the construction, alteration and repair of buildings, to provide for the re- instatement or removal of dangerous or dilapidated buildings, to authorize the publication of a building code and for purposes connected therewith." Where, Section 2. (c) speaks to the interpretation of 'building' including "any dock, bulkhead, pier and any works for the protection of land against encroachment by, or for the recovery of land from, fresh or salt water;" and Section 17 speaks to the Building Code.

Buildings Regulation (General) Rules, 1971 - (further to Section 19 of Ch. 200) and Section 9 speaks to the execution of permitted works.

Coast Protection Act, 1968 (Ch. 204) - "An Act to make provision for the protection of the coast against erosion and encroachment by the sea and for purposes connected therewith", where section 8 speaks to approval for coastal protection work and section 9 speaks to the prohibition of excavation or removal of materials that compose of the seashore.

Conservation and Protection of the Physical Landscape of The Bahamas Act, 1997 (Ch. 260) - "An Act to make provision for the conservation and protection of the physical landscape of The Bahamas. The Act contains parts regarding administration, regulation of excavation and landfill operations, provisions governing dangerous excavations, landfill operations, quarries or mines, zoning of The Bahamas for the purposes of quarrying and mining operations, protected trees, and general entries," where Section 27 speaks to applications, permits, and licenses, appeals, fees, offences, and penalties.

Disaster Preparedness and Response Act, 2006 (Ch. 34A) - "An Act to provide for a more effective organization of the mitigation of, preparedness for, response to and recovery from emergencies and disasters." This Act contains parts regarding Director of NEMA, Advisory Committee, policy review and plan; emergency operation centers and shelters; obligations of other public officers; specifically, vulnerable areas; disaster alerts and emergencies; and miscellaneous entries.

Environmental Health Service Act, 1987 (Ch. 232)- "An Act to promote the conservation and maintenance of the environment in the interest of health, for proper sanitation in matters of food and drinks and generally, for the provision and control of services, activities and other matters connected therewith or incidental thereto", where section 5 speaks to functions of the Department of Environmental Health.

Environmental Health Services (Collection and Disposal of Waste) Regulations, 2004 (Ch. 232) - "These Regulations may be cited as the Environmental Health Services (Collection and Disposal of Waste) Regulations, 2004", where section 18 speaks to removal of construction waste and section 19 speaks to industrial waste disposal.

Environmental Impact Assessment Regulations, 2020 – An extension of the Environmental Planning and Protection Act that outlines the Environmental Impact Assessment Regulations which apply throughout the territory of The Bahamas including every island and cay; "The Minister, in exercise of the powers conferred by section 12 of the Environmental Planning and Protection Act, 2019 (No. 40 of 2019)".

Environmental Planning and Protection, 2019 – An Act to establish the Department of Environmental Planning and protection; to provide for the prevention or control of pollution, the regulation of activities, and the administration, conservation, and sustainable use of the environment; and for connected purposes.

Forestry Act, 2010 – An Act to provide the conservation and control of forests and for matter related thereto.

Forestry (Declaration of Protected Trees) Order, 2021 – The declaration of protected trees for the purpose of this Act are specified in Part I (Endemic or Endangered or Threatened Protected Trees) and II (Cultural or Historical and Economic Protected Trees).

Forestry (Amendment) Regulations, 2021 – "The Minister, in excise of the powers conferred by section 34 of the Forestry Act, 2010, makes the following Regulations." Where the amendment speaks to Regulation 36 subsection 3A "The Minister, acting on the advice of the Director of Forestry, may where a hurricane, tornado, or any other natural disaster has occurred in any island, islet or cay throughout The Bahamas which causes grave damage to any forest, forest estate, forest reserve, conservation forest or protected forest to be payable as specified in the Second Schedule, for royalties, permits and licenses for the purpose of these regulations."

Forestry Regulations, 2014 – "5. Application for Permit to harvest protected tree. An application for the grant of a permit under section 12 of the Act to harvest a protected tree, shall be made to the Director and shall contain all the relevant particulars set out in Form No. 3 (A) in the First Schedule including the payment of the prescribed fee as set out in the Second Schedule." and

"6. Permit to harvest protected tree. A permit granted under section 11 of the Act to harvest a protected tree shall be made in the manner set out in Form No. 3 (B) in the First Schedule, shall be accompanied by the payment of the prescribed fee as specified in the Second Schedule and shall be valid for six months from the date of the grant unless otherwise prescribed in the permit." and

"Construction or modification of road in a forest estate. A person shall not construct or modify a road or trail in a forest estate unless the construction or modification has been authorized by the Director of Forestry in writing, and the road, - a) or trail has been identified in an approved forest management plan; and b) layout has been approved by the Director of Forestry."

Fisheries Resources Jurisdiction and Conservation Act Regulations, 1986 which prohibits the removal of Sea Oats, *Uniola paniculata*. "13. No person shall cut, harvest, or remove from any

beach or shore or from any area immediately adjacent thereto any Sea Oats except with the written permission of the Minister.[22]"

Health and Safety Work Act, 2002 (Ch. 321C) - *"*An Act to make provisions relating to health and safety at work and for connected purposes." where, Section 4 speaks to general duties of employers to their employees and where, Section 7 speaks to general duties of employees at work.

Health and Safety at Work (Amendment) Act, 2015 - (repeal and replacement of Section 17 of Ch. 321C) Contains parts regarding applications, permits and licenses, appeals, fees, offences, and penalties.

Marine Mammal Protection Act, 2005 (Ch. 244A) – "An Act to make provision for the protection of marine mammals".

Marine Mammal (General) Regulations, 2005 (Ch. 244A) – "These Regulations may be cited as the Marine Mammal Protection (General) Regulations and shall come into force on the first day of May 2006", where Section 18 speaks to Marine Mammal Protection (General) Regulations and Section 19 speaks to Marine Mammal (Captive Dolphin Facilities) Regulations.

Town Planning Act, 1961 (Ch. 255) - "An Act relating to town planning", where section 7 speaks to committee sanctioned development activities.

Water and Sewerage Corporation Act, 1976 - "An Act to establish a Water and Sewerage Corporation for the grant and control of water rights, the protection of water resources, regulating the extraction, use and supply of water, the disposal of sewage and for connected purposes." where section 3 speaks to government control of the production, extraction, and use of water in the public interest.

Wild Birds Protection Act, 1952 (Ch. 249) – "An Act to make provision for the protection of wild birds."

Wild Animal Protection Act, 1968 (Ch. 248) – "An Act to make provisions for the control of the taking and export of wild animals."

Hawksbill Creek, Grand Bahama (Deep Water Harbour and Industrial Area) Act, 1955 (Ch.261) - "An Act to authorise the entering into of an agreement with a company to be incorporated in the Colony by Wallace Groves for the dredging of a deep-water harbour and the establishment of an industrial area at and in the vicinity of Hawksbill Creek, Grand Bahama."

Hawksbill Creek, Grand Bahama (Deep Water Harbour and Industrial Area) (Amendment Agreement) Act,1960 (Ch.262) – "An Act to authorize the entering into of an agreement with the Grand Bahama Port Authority, Limited, amending and extending the existing agreement with that company, dated the 4th date of August, A.D. 1955."

[22] laws.bahamas.gov.bs/cms/images/LEGISLATION/SUBORDINATE/1986/1986-0010/FisheriesResourcesJurisdictionandConservationRegulations_1.pdf

Hawksbill Creek, Grand Bahama (Deep Water Harbour and Industrial Area) (Amendment of Agreement) (No. 2) Act, 1965 (Ch.263) – "An Act to authorize the entering into of an agreement with The Grand Bahama Port Authority Limited, further amending and extending the existing agreements with that company dated the 4th day of August, A.D., 1955 and the 11th day of July, A.D., 1960 respectively."

Hawksbill Creek, Grand Bahama (Deep Water Harbour and Industrial Area) (Interpretation of Agreement) Act, 1965 (Ch.264) – "An Act for the removal of doubts as to the interpretation of certain provisions of an agreement made with the Grand Bahama Port Authority, Limited, dated the 4th day of August 1955, and subsequent amendments thereto."

Hawksbill Creek, Grand Bahama (Deep Water Harbour and Industrial Area) (Extension of Tax Exemption Period) Act, 1993 (Ch.265)- "An Act to further extend for the life of the agreement known as the Hawksbill Creek Agreement certain tax exemptions granted under that agreement and which are about to expire."

Freeport, Grand Bahama Act, 1993 (Ch.30) - "An Act to authorize the entering into of an agreement with the Grand Bahama Port Authority Limited and the Grand Bahama Development Company Limited for the carrying out by them of certain developmental works in the Freeport area and to continue in that area the exemption from real property tax for a period of twenty-two years."

Freeport Bye-laws Act, 1993 (Ch.29) - "An Act to provide for the making and enforcement of byelaws for the purpose of maintaining proper standards of building construction, sanitation and hygiene within the area of the Island of Grand Bahama known as the port area and for other purposes connected with the orderly development of the said area."

8.3 INTERNATIONAL CONVENTIONS

Stockholm Convention on Persistent Organic Pollutants, 2001 – "As set out in Article 1, the objective of the Stockholm Convention is to protect human health and the environment from persistent organic pollutants[23]."

Commission on Sustainable Development – "The United Nations Commission on Sustainable Development (CSD) was established by the UN General Assembly in December 1992 to ensure effective follow-up of United Nations Conference on Environment and Development (UNCED), also known as the Earth Summit[24]."

Kyoto Protocol – The Kyoto Protocol is an international agreement linked to the United Nations Framework Convention on Climate Change, which commits its Parties by setting internationally binding emission reduction targets. The Kyoto Protocol was adopted in Kyoto, Japan, on 11 December 1997 and entered into force on 16 February 2005[25].

[23] http://www.pops.int/TheConvention/Overview/tabid/3351/Default.aspx
[24] https://sustainabledevelopment.un.org/intergovernmental/csd
[25] http://unfccc.int/kyoto_protocol/items/2830.php

Basel Convention on the Control of Transboundary Movement of Hazardous Wastes – "The Basel Convention is a global agreement between countries to protect human health and the environment against the adverse effects of hazardous wastes." [26]

Ramsar Convention on Wetlands – "the intergovernmental treaty that provides the framework for the conservation and wise use of wetlands and their resources. The Convention was adopted in the Iranian city of Ramsar in 1971 and came into force in 1975."[27]

Minamata Convention - "The Minamata Convention was agreed at the fifth session of the Intergovernmental Negotiating Committee on mercury in Geneva, Switzerland January 19, 2013, and adopted later that year on 10 October 2013. It is focused on Mercury products and is a global treaty to protect human health and the environment from the adverse effects of mercury. The Convention draws attention to a global and ubiquitous metal that, while naturally occurring, has broad uses in everyday objects and is released to the atmosphere, soil, and water from a variety of sources. The Convention also addresses interim storage of mercury and its disposal once it becomes waste, sites contaminated by mercury as well as health issues and includes a ban on new mercury mines, the phase-out of existing ones, the phase out and phase down of mercury use in a number of products and processes, control measures on emissions to air and on releases to land and water, and the regulation of the informal sector of artisanal and small-scale gold mining". [28]

9 Environmental Impact Analysis

9.1 Methodology

The impact analysis is a critical component of the EIA process as it evaluates the potential impacts resulting from the interaction between project related activities and the surrounding environment during construction and operations phases of the Project. Impacts are described as changes brought about to the surrounding environment as a result of project-related activities. The surrounding environment for this EIA is inclusive of the physical, biological, and socioeconomic environment within the Project's area of influence. Environmental aspects considered in this analysis are listed below.

[26] http://www.basel.int/
[27] Ramsar Convention Secretariat. 2014. https://www.ramsar.org/
[28] https://www.mercuryconvention.org/en/about

Table 9.1 Environmental aspects under consideration for Impact Analysis.

Environmental Aspects	
Physical	Erosion
	Air Quality
	Noise Quality
	Hydrogeology
Biological	Terrestrial Habitat
	Terrestrial Flora
	Terrestrial Fauna
	Marine Fauna
Socioeconomics	Neighboring Communities
	Relocation
	Economics
Cultural	Archaeological, Historic & Paleontological Resources

Project-related activities during construction and operations have the potential to impact the surrounding environment, and the nature of these impacts can be Negative or Positive, and Direct or Indirect. Negative impacts result in adverse changes or degradation from the environmental baseline, while positive impacts lead to beneficial changes or improvements. Direct impacts stem from the immediate interaction between Project-related activities and the surrounding environment, whereas indirect impacts manifest on a broader time and distance scale. Additional parameters such as Significance, Duration, and Intensity are employed to assess the scale of environmental impact.

In this assessment, significance refers to the degree of importance assigned to an environmental impact resulting from project-related activities. An impact's significance is evaluated in terms of its magnitude and likelihood. Magnitude is determined by the impact's extent, duration, and intensity. The following table summarizes the impact significance.

Table 9.2 Impact Significance Summary

SIGNIFICANCE			
MAGNITUDE			LIKELIHOOD
Extent	**Duration**	**Intensity**	
On Site (O)	Temporary (T)	Negligible (N)	Unlikely (U)
Local (L)	Short-Term (ST)	Low (LW)	Likely (LK)
Regional (R)	Long-Term (LT)	Medium (M)	Definite (D)
National (N)	Permanent (P)	High (H)	

The extent refers to whether the impact is restricted on site, to the immediate project area, locally within a 10-mile radius, regionally to include the island of Grand Bahama and the Northern Bahamas, and nationally to include the extent of the Bahamian archipelago.

The impact's duration relates to the temporal scale required for changes in the host environment to return to baseline conditions or undetectable levels. Temporary impacts persist for a short duration and occur occasionally and/or intermittently. Short term Impacts are expected to persist for the duration of the project activities related to the construction phase of the Project. Long term impacts extend beyond the duration of the construction period and exist throughout the life of the Project. Permanent impacts persist far beyond the life of the Project and are irreversible changes to the host environment due to project related activities.

The intensity of an impact can be considered as Negligible, Low, Medium, or High. A Negligible impact is one which has no detectable change on the host environment. A low-intensity impact does not affect the host environment as altering natural flows and processes. Medium intensity impacts alter the natural flows and processes of the host environment, while allowing the flows and process to retain their natural functions. High intensity impacts alter natural flows and processes to the extent where natural functions are totally inhibited for a temporary or permanent time period.

An impact’s likelihood is a rating which evaluates the likely potential for an impact to occur, with typical rating categories being unlikely to occur, Likely to occur under most conditions, and definitely will occur.

Cumulative impacts are the compounding effects of Project related activities when combined with past, current, or future actions related to this or another Project in the nearby environment. Cumulative impacts represent the interaction of impacting factors originating from different sources with the same host environment. The result is typically an exacerbation of the impact on the environmental aspect and is considered in this assessment. The following sections discuss these impacts and section 10 provides the summary impact table.

9.2 Land Use Impact

The Project site is within an industrial area with other marinas and shipping that are active. The Project would be compatible with the current land use of the area. Currently, the Project site is overgrown and previously developed but has been unused for decades resulting in the occurrence of invasive species as well as general blight on the BCC Property. There was bullet shells found on site which suggests that people use the site for hunting. The unofficial land use for unregulated hunting will be stopped once the Project starts construction and during operation.

The land area in the site will be permanently altered due to excavation and dredging. This will transform portions of Western Grand Bahama. However, the subterranean freshwater lens on the Project site is not expected to be permanently removed by the Project. According to the Water Resources Assessment report, the thickness of the current freshwater lens will continue to be in

a constant state of change as opposed to a steady state, due to the frequency, duration and intensity of precipitation and climatic events.

Intact forests such as pineland and coppice will be destroyed, depleting a valuable terrestrial resource.

9.3 Aesthetic Impact

The Project will have a temporary negative impact in the West Grand Bahama area during the demolition/debris removal, land clearing and harbor expansion/aggregate mining phases. However, it will significantly enhance the west Grand Bahama aesthetic once completed. The Developer is dedicated to removing invasive species, dilapidated structures, and refuse strewn on the BCC Property, ensuring a cleaner environment. The Lover's Beach area itself would be improved by the work done on the sand dunes as well as the removal of invasive species of plants and replacement with plants indigenous to The Bahamas. With an attractive deep-water marina and eco-friendly landscaping, this Project will offer a pleasing environment to the Western Grand Bahama area. The Project may also increase property value in the western area.

9.4 Air & Noise Impact

Air quality will be temporarily impacted during the demolition/debris removal and land clearing phases. During land clearing, site grading and excavation dust will be dispersed within the air. To the west of the Project there is Wild Goose Town and to the east is an industrial area. The air quality resulting from this activity could temporarily affect the surrounding community on particularly windy days. Emissions from machinery on site can also contribute to reduced air quality. Fugitive dust control measures will be implemented throughout the Project to reduce the likelihood of dust leaving the Project site. Dust, if not contained, can cover plant and animal life disrupting photosynthesis and affect animal behavior. A description of the dust suppression activities will be provided in the Environmental Management Plan.

Blasting operations during the harbour expansion/aggregate mining phase are not anticipated to generate large quantities of dust due to the location of the site. Wet material will reduce air pollutant impacts. The removal of the wet geological material aids in dust control which reduces the chance of air pollution within the immediate area. In addition, blasting currently occurs on the adjacent BRL Property approximately once per week and from start of the blast to finish is less than ten minutes. Dust associated with blasting is raised for only a few minutes and the dust settles in and around the mining area and some of it is dispersed before settling down. With consideration of meteorological conditions, it is unlikely that dust associated with blasting would travel beyond the boundaries of the BCC Property. The impacts of blasting operations on the air quality depend on the nature and concentrations of the emissions, meteorological conditions, the site proximity to humans, flora, fauna, or materials. It is anticipated that blasting on the BCC Property will generally take and last for the same amount of time as currently done on the BRL Property. Additionally, the material that will be drilled, blasted, and excavated has a high moisture content and fugitive dust emissions from these processes are inherently low.

Noise quality will be temporarily negatively impacted during excavation, blasting, demolition, and excavation activities. The Project site is located to the east of an industrial area which is an

established level of background noise. During construction hours machinery and the actions of excavation and land clearing will increase noise levels. However, the Geosonics Report, found in Appendix D, states that “existing noise, the projections for the excavation locations are less or generally equal to the recommended limits suggested”. This will also affect the wildlife within the area such as birds who will be forced to relocate if they are not willing to withstand the sound.

9.5 Groundwater Resource Impact

According to the Water Resource Assessment Report by RCMA, the development of the Bahama Cement Company property will not result in a decrease in the configuration (size and shape) of the existing freshwater lens. However, some of the private wells within the settlements in the southeastern portion of the Eight Mile Rock community are expected to continue their experiences with naturally fluctuating salinity concentrations in their groundwater supplies due to frequency, duration and intensity of precipitation and climatic events. Additionally, the development of the Bahama Cement Company property will not result in an increase in the use of freshwater from the Grand Bahama Utility Company municipal water supply system by Bahama Rock Limited.

9.6 Geology Impact

The geological impact of the Project will be negative because of the large amount of limestone substrate that will be removed as part of the harbor expansion and aggregate mining process. The loss of land mass also facilitates the infiltration of saltwater into terrestrial environments, potentially leading to the contamination of the surrounding areas. Over time, this intrusion may result in alterations to the plant community beyond the boundaries of the excavation site. Also, because the ocean is closer to the interior of the western section of the island, it increases the possibility of plant community mortality by saltwater inundation during major storms.

The loss of organic protocol, the shallow topsoil layer, consistent presence and movement of heavy equipment, and rock removal will transform the habitat, making the site less suitable for native terrestrial vegetation, and more suitable for invasive species. Land clearing will be phased in to reduce the disturbance on the site during excavation. Additionally, the Project site and the island at large will benefit from the Project by removing the invasive plant community currently established on site.

9.6.1 Erosion

Mineral resources are vital to economic development as they serve as raw materials for building material. However, landscape degradation, land clearing, and quarry activity are factors that can contribute to increased soil erosion. Quarrying exhibits a higher percentage of soil erosion compared to other land use practices. Movement of quarry vehicles, steep slopes, and mining debris can also contribute to erosion[29]. Among the various types of soil erosion, gully erosion represents the severest and has significant on-site and off-site effects. This is known as the

[29] Moibi. N.M. (2007). Effects of quarrying on the environment: A case study of Tala, Machakos District, Kenya.

erosion process, in which deep channels are created by runoff water that remove topsoil to a certain depth (removal of soil along drainage lines by surface water runoff) [30].

9.7 TERRESTRIAL RESOURCE IMPACT

Development on the BCC Property could have a negative impact on terrestrial flora and fauna, reducing biodiversity. This site contains some of the last intact pineland in the western side of the island and several avian species such as the Hairy Woodpecker, Red-legged Thrush, Yellow-billed Cuckoo, and others, including the endemic Bahama Yellowthroat. Interestingly, the heavily disturbed areas of the site, namely the southeastern section, dominated by Casuarina and other invasive plants had a higher bird diversity than the less disturbed areas. The disturbed area contained man-made wetlands and two reservoirs with large open sections which was attractive to wetland birds such as Limpkins, gulls, sandpipers, and warblers. These species are adaptable, and several species have acclimated themselves to anthropogenic habitats.

9.8 MARINE RESOURCE IMPACT

Species growing on the western boundary of the Harbour could be negatively impacted by the Project during harbor expansion and aggregate mining phase when the Harbour wall is removed. While some stony corals observed were > 5cm in diameter, coral relocation is not recommended at the time of this report due to the suspected presence of Stony Coral Tissue Loss Disease (SCTLD). The Developer will communicate with the relevant authority to determine suitable mitigation for the coral growing on the Harbour wall.

Decreased water quality during harbour expansion and aggregate mining phase will impact the marine environment in the immediate vicinity of the BCC Property. Construction excavation can lead to increased sedimentation in the nearshore marine environment via land based run off from spoils. When sediment is disturbed, and turbidity increases, it reduces light availability for primary producing organisms and their consumers. Discharges of grey or black water, petroleum-based products, solvents, and other hazardous chemicals during excavation has the potential to alter water quality in the immediate areas of the marina basin, which will adversely impact marine resources. Any such discharges would be immediately addressed and controlled to minimize impacts. During future operation increased marine traffic in the expanded and deepened marina can lead to increased pollution in the form of solid and liquid waste and nutrient run off. Increased nutrient concentration in the marine environment can cause eutrophication. Added nutrients increase pH levels, lowers dissolved oxygen, affect the energy movement throughout trophic levels, affect public health, and creates an overall toxic marine environment for organisms.

The Developer will ensure that all surface water runoff will be controlled through adequately designed erosion control measures. Discharges for these structures will be adequately treated to acceptable water quality standards prior to release. This is evidenced by the fact that similar mining operations are currently taken place west of the Bahamas Cement Company property

[30] Carabassa, V.; Montero, P.; Alcañiz, J.M. and Padró, J.-C. (2021) Soil erosion monitoring in quarry restoration using drones. Minerals, 11, 949. <https://doi.org/10.3390/min11090949>

without any water quality impacts. All petroleum products are stored in above ground secondary containment structures and are properly managed.

9.9 SOCIOECONOMIC IMPACT

9.9.1 Social

Excavation activities may cause some minor disturbances in the area. Some stakeholders in the area may express concern over the excavation process and noise that may occur during the procedure. However, proper blasting techniques employed by the Developer and consultants such as GeoSonics will mitigate these concerns. According to the noise evaluation report by GeoSonics, excavation projections align with or are below recommended limits. Additional buffering, such as the construction of a berm, will be implemented near adjacent communities. While initial excavation noise may be audible, it will be maintained within suggested limits due to the presence of the berm and will reduce noise propagation offsite. Subsequently, as equipment moves away from the closest point, noise levels will diminish, eventually being overshadowed by general community noises. The Project details allow for future economic growth through mining and harbour expansion, which can positively impact the quality of life for stakeholders. Local involvement of replanting and reestablishing the pine population will aid in increasing biodiversity. Also, debris found within the site boundaries will be removed and further dumping prevented within the area, greatly improving the overall aesthetic.

BRL currently pays approximately $5.5 million a year for electricity in Freeport, greatly underwriting the cost of the power plant while helping make electricity less expensive for local homeowners.

9.9.2 Economic

The Project will greatly benefit the Grand Bahamian economy as well as the wider Bahamas. This is possible due to the Project benefits which include expanding tourism, allowing greater access to shipping goods and supplies, as well as providing a naturally sourced product for sale locally. Aggregate mining will provide a reliable supplier in The Bahamas that can meet the demand for the Bahamian construction community. Retaining 84 employees is important to the Grand Bahamian economy, as unemployment is estimated at 20% to 25% as of December 2019. It is estimated that BRL contributes $25 million to the Bahamian economy annually through employment of 82 Bahamian citizens and through direct and indirect contracts and support services at its existing operations.

While it is difficult to estimate the value of the increased potential economic activity that will result from this Project, such activity will almost certainly include significant benefits including:

1. An expanded deep-water Freeport Harbour which will have the ability to accommodate more vessels and widen the turning basin.
2. Potential for a larger container port/economic trade zone.
3. Increased commercial/banking activity to support the above.

4. Continued long-term employment and benefits of BRL's current Bahamian employees and increased employment opportunities should market conditions improve.

5. BRL's continued customer presence for the Bahamian companies that presently supply BRL's Freeport facility, the absence of which would likely make stone for construction in The Bahamas more expensive and less available, especially when economic conditions tighten the supply.

Other expected positive impacts include the removal of invasive species currently invading the BCC Property, beach replenishment, and the replanting of identified native plants species for dune refurbishment all of which will assist in long-term stabilization of this important ecosystem. In addition to dune refurbishment, the relocation and replanting of native vegetation in areas destroyed by Hurricane Dorian will greatly benefit biodiversity across the island and assist eco-tourism sectors such as hiking, biking, kayaking and birding.

Once the quarry is decommissioned, the Freeport Harbour will be expanded to accommodate more vessels and widen the turning basin. During decommissioning additional construction jobs will be created as the site is landscaped and graded. The project will benefit Grand Bahamians in by increasing recreational opportunities for locals and expand tourism on the island.

9.10 Archaeological and Cultural Impact

The presence of rock walls was observed within the project boundary. According to the AMMC report, though these walls are historic and were likely constructed more than 100 years ago, it is difficult to associate them with a specific property owner and associated commercial activity. This makes it challenging to make a strong argument to preserve such structures when there is new development.

Lovers Beach is considered the only sandy beach within the west Grand Bahama area. It is culturally significant to stakeholders. Therefore, dredging activities may impact the beach by sand displacement over time. It is recommended that the dune restoration occurs as a mitigation measure to prevent excessive movement of sand.

9.11 Traffic and Transportation Impact

The Project boundary will not have major impacts on the Warren J. Levarity Highway and Queen's Highway as the harbour expansion will not intersect these major roadways. Blasting may delay or deter traffic during blasts, but as previously mentioned, blasts are infrequent in occurrence generally once each week and short in duration. Although the actual blast lasts less than a few seconds, traffic may be impacted for less than ten minutes as a precautionary safety measure. This will only occur if the blast area is in close proximity to roadways. Alternative access for employees will be provided.

Also, blasting may delay or deter traffic flow during hours of activity. A 100-foot buffer zone will be implemented near the Freeport Container Port Road, Queen's Highway, and Warren J. Levarity Highway.

10 SUMMARY TABLE OF POTENTIAL ENVIRONMENTAL IMPACTS

Table 10.1 Summary Impact Table

IMPACTING FACTOR	ASPECT														
	PHYSICAL				BIOLOGICAL				SOCIOECONOMICS				CULTURAL		
	Erosion	Air Quality	Noise Quality	Hydrogeology & Groundwater Resources	Terrestrial Habitats	Terrestrial Fauna	Terrestrial Flora	Marine Habitat	Neighboring Communities	Relocation	Traffic	Economic	Archaeological, Historic & Paleontological	Hunting	Fishing
CONSTRUCTION: Freeport Harbour West Expansion															
Debris Removal															
Blasting															
Demolition															
Land Clearing															
Excavation															
Spoil Stockpile															
Service Yard															
A C C I D E N T A L															
Fuel, Oil, Hydraulic Fluid Spills															
OPERATION: Expanded Harbour will be operational once the Quarry activities are complete.															
Aggregate Mining (Quarry Operation)															
Freeport Harbour															

Table 10.2 Impact Significance Key

Negligible / None / Not Applicable	Minor	Moderate	Severe	Beneficial

- Negligible/No Impact (White) – Negligible impacts have no detectable change on the host environment.
- Minor Impact (Yellow) – Minor/low intensity impact does not affect the host environment in such a manner as to alter natural flows and processes.
- Moderate Impact (Orange) – Moderate/high intensity impacts alter natural flows and processes to the extent where natural functions are totally inhibited temporarily.
- Severe Impact (Red) – Negative/ adverse impacts to the immediate and or extended environment and stakeholders. Natural functions are totally inhibited permanently. These activities will be mitigated during construction to reduce their impact. Mitigation strategies will be described in detail in the Environmental Management Plan.
- Beneficial Impact (Green) – Positive/favorable impacts on the surrounding environment and/or stakeholders.

11 PUBLIC CONSULTATION

11.1 STAKEHOLDER ENGAGEMENT

The public consultation process will be guided by the 'Environmental Impact Assessment Regulations, 2020', which states, "the mode and procedure of a consultative process shall be determined by the Department (DEPP)". As a result, the following process is proposed and will be finalized through consultation with and approval by the DEPP and the Port Authority.

A project website will be developed to provide the community and interested parties a link to the Project EIA document, information related to the public hearing and related documents and /or approvals previously issued by the DEPP and the GBPA. A copy of the notice that will be published in both newspapers in Nassau and Grand Bahama Island, detailing the public consultation announcement will also be provided on the website. The notices in each newspaper will be provided twice per week (ensuring one of those days is a Thursday) and within the first 14 business days prior to the scheduled public meeting. The date and time of a live and/or virtual public consultation meeting will be included in the public notification. During the meeting, the Developer will provide detailed information concerning the proposed project, including the potential environmental, social, economic, and cultural affects, including adverse effects of the project on the immediate project site, and the adjacent properties and communities. Documentation of the number of people attending the meeting in-person (names), and all of the comments received at the meeting will be recorded in the meeting minutes. The Developer will address concerns raised during the meeting and during the remainder of the public consultation period. The public consultation period will be open for 21 working days after the date of the public meeting. A summary of the public consultation process will be included in a comprehensive Public Consultation Report, which will be submitted to DEPP and the Port Authority for approval. The report will be made electronically available to the general public via the Project website, after the DEPP and the Port Authority has had an opportunity to review and approve the report.

11.2 GRIEVANCE RESPONSE MECHANISM

Complaints or grievances will be addressed through the established Grievance Response Mechanism (GRM) online via the Project website. Any grievances stakeholders may have can be sent to the Bahama Rock public inquiries corporate link (https://www.martinmarietta.com/contact-us/corporate). Grievances will be addressed within an estimated 3-week time period. All grievances expressed and the resolutions will be shared with DEPP and the Port Authority in the monthly environmental reports. There will be signage posted near the site informing the public of the GRM. The following form is an example of the type of form that will be used to record Public Grievances.

12 ENVIRONMENTAL MANAGEMENT

Environmental management will be guided by the Environmental Management Plan (EMP). The objective of the EMP is to provide strategies for the Developer to avoid and mitigate negative impacts to the surrounding environment. The EMP is a living document, which is updated throughout the duration of the Project every 3 to 5 years after the initial EMP is complete. An EMP

Terms of Reference (ToR) must be prepared prior to the submission of the EMP to the Department of Environmental Planning and Protection (DEPP). Once DEPP approves the ToR, the EMP will be submitted to DEPP and the Port Authority. Typical sections of the EMP ToR are provided in the following section.

12.1 Environmental Management Plan (EMP) Terms of Reference

1. EXECUTIVE SUMMARY
1.1 Introduction
1.2 Purpose of the EMP
1.3 Key Environmental Objectives
1.4 Summary of Key Actions and Mitigation Methods
2. INTRODUCTION
2.1 Purpose
2.2 Scope and Content
3. PROJECT DESCRIPTION
3.1 Geographic Location
3.2 Proposed Development
3.3 Project Scheduling and Phasing
4. ENVIRONMENTAL REGULATORY BODIES AND STANDARDS
4.1 Relevant Regulatory Bodies
4.2 National Laws and Regulations
4.3 International Conventions
5. ENVIRONMENTAL MANAGEMENT ORGANIZATION STRUCTURE
5.1 Organization and Responsibilities Chart
5.2 Environmental Health and Safety Training
5.2.1 Environmental Training
5.2.2 Health and Safety Training
6. ENVIRONMENTAL IMPACTS SUMMARY TABLE
6.1 Methodology
6.2 Summary Table
7. MANAGEMENT PLANS AND MITIGATION STRATEGIES
7.1 Geological Management
7.1.1 Excavation Plan
7.1.2 Erosion Control Strategy
7.1.3 Dredge Plan
7.1.4 Flood Management
7.2 Coastal Zone Management
7.2.1 Beach Erosion Control
7.3 Terrestrial Resource Management
7.3.1 Botanical Species Management
7.3.1.1 Invasive Species Management
7.3.1.2 Invasive Species Removal Methodology

7.3.2 Wildlife Species Management
7.3.2.1 Avian Species Management
7.4 Marine Resource Management
7.4.1 Coral Management
7.5 Management of Ambient Environmental Conditions
7.5.1 Air Quality Management
7.5.2 Noise Quality Management
7.5.3 Water Quality Management
7.5.3.1 Freshwater Resource Management
7.5.3.2 Turbidity Assessment
7.5.3.3 Turbidity Control
7.6 Energy Management
7.7 Spill Management
7.7.1 Spill Protection
7.7.2 Spill Reporting
7.7.3 Spill Clean Up
7.8 Waste Management
7.8.1 Wastewater Management
7.8.2 Solid Waste Management
7.8.3 Hazardous Waste Management
7.9 Transportation Management
7.10 Climate Adaptation Strategy
8. EMERGENCY, HEALTH AND SAFETY
8.1 Training
8.2 Hurricane and Storm Management
8.2.1 Emergency Supply List
8.2.2 Recovery Plan
8.3 Safety Hazards
8.4 Fire Explosion Risk
8.5 Accident and Emergencies
8.5.1 Accident and Emergency Action Plan
8.5.2 Evacuation Plan
8.5.3 Emergency Communication Plan
8.6 Malfunctions
9. PUBLIC CONSULTATION
9.1 Grievance Response Mechanism
10. MONITORING AND REPORTING
10.1 Planned Environmental Monitoring
10.2 Responsibility and Accountability
11. CONCLUSION
12. APPENDICIES

12.2 Planned Environmental Monitoring

Monthly Environmental Monitoring site visits will be conducted by the Environmental Monitor. In addition, the Developer will designate internal personnel to conduct daily site inspections each day the plant is operational. Any adverse conditions identified will be reported to and addressed with the Environmental Monitor.

The Environmental Monitor will complete Environmental Monitoring Checklists (EMC) during each site visit. All EMCs will be submitted to DEPP and the Grand Bahama Port Authority monthly. The following compliance code will be applied to the site as shown at the end of the EMC and at the end of each reporting period. The EMC will be provided in the EMP.

Table 12.1 Environmental Monitoring Compliance System.

Site Code	Compliance Code Description	Action
Fully Compliant (Green)	The site is fully compliant with the EMP and reporting requirements.	No Action Required.
Partially Compliant (Orange)	The site is partially compliant with the EMP and reporting requirements. The Environmental Monitor will inform the Environmental Manager and the Site Manager of the areas of noncompliance. The Site Manager will have the opportunity to address the area of noncompliance before the directive is given to cease work.	The required corrective action will be provided to the Site Manager to address. DEPP & GBPA will be informed of the area of noncompliance and the appropriate corrective action taken.
Non-Complaint (Red)pe	The site is not compliant with the EMP and reporting requirements. The site will also be classified as red if the site has 2 consecutive orange classifications.	The Environmental Manager notifies the Project Manager/ Site Manager to cease all works based on material violations until the appropriate action is taken to make the site compliant with the EMP. This will change the site code from red to green. DEPP will be informed of the site status.

12.3 Responsibilities and Accountability

An Environmental Monitor will document relevant activities in the project area by taking notes and photographs of possible environmental issues and mitigation on the construction site. The

Environmental Monitor will conduct site visits to record accurate on-site data during the demolition/debris removal, land clearing and excavation phases. These activities include:

- Air Quality Management – dust, emissions, etc.
- Sound Management
- Waste management – solid and liquid waste
- Spill Control
- Hazardous Waste Management
- Stormwater Management
- Erosion Control
- Health and Safety Management
- Other noteworthy activities

An electronic file sharing system with DEPP, the GBPA, and the Forestry Unit will be established prior to commencing project activities on the ground. All EMC forms will be shared using the established system.

13 RECOMMENDATIONS AND MITIGATION STRATEGIES

13.1 METHODOLOGY

Once the Project impacts were determined, best management practices and mitigation strategies were developed based on desktop research, review of the Developer's existing management practices at its BRL Property which is adjacent to the BCC Property and communication with the Developer. The following tables and sections summarize the proposed mitigation strategies for the Project. The Environmental Management Plan (EMP) will further detail each strategy. In accordance with standards of DEPP, the Port Authority, and the Forestry Unit, the Project will include an Environmental Monitor on site during demolition/debris removal and land clearing phases to ensure mitigation measures outlined in the EMP are adhered to. Following demolition/debris removal and land clearing phases, these practices should be taken on by a resident Environmental Health and Safety Manager.

13.2 BIOLOGICAL RESOURCE MANAGEMENT

Important native terrestrial habitats such as Coppice Forest and Pinelands will be removed from the site as a direct adverse impact resulting from the Project. The Project site is estimated to contain approximately *54,697 Caribbean Pine*, 21,296 of which are saplings, on its grounds. The following measures will be implemented to reduce habitat fragmentation and decrease in biodiversity on Grand Bahama:

- Saplings and seeds from the site will be relocated to East Grand Bahama to help expedite the post Hurricane Dorian recovery process of the area. Organizations like the Bahamas National Trust, the Forestry Unit and other non-government organizations will be offered the opportunity to collect specimens from the site prior to land clearing to assist with the relocation, rearing and replanting process.

- The Developer will designate property located northwest of the BCC property and will collaborate with a local horticultural / landscape architect to establish a nursery to house and maintain seedlings of native species removed from the site. Additional Protected Tree mitigation activities will be explained in depth in the Environmental Management Plan. .
- Invasive Alian Species (IAS) removed from the excavation zone will be completed by mulching Casuarina trees on-site.
- IAS removal will also occur along the Lover's Beach area.
- The Developer will plant native and protected trees on the perimeter berm surrounding the proposed expansion area.
- The Developer will collaboration with local schools and the community to replant native and protected species within the reforestation zone.
- The Developer will support a native plant nursery to house the plants slated for donation to the East Grand Bahama replating effort. The Developer will also support participation of locals, both students and adults, interested in helping the environment by organizing planting efforts in collaboration with organizations currently engaged in habitat restoration work in East Grand Bahama.

Dune stabilization is recommended for the adjacent Lovers Beach. Dune management will consist of planting native dune /coastal plant species which can retain sand and establish a healthy coastal habitat which can withstand flooding, high wave energy and other storm effects. Dune refurbishment will assist in long-term stabilization of this important ecosystem. The EMP will describe the proposed activities that will be taken to enhance the dunes along Lovers Beach.

Mitigation measures for coral impacts include the relocation of healthy hard corals to suitable habitats outside the area of interest. A coral relocation plan must be submitted and approved by the Department of Marine Resources and Department of Environmental Planning and Protection prior to the commencement of any relocation efforts. Due to the suspected presence of Stony Coral Tissue Loss Disease (SCTLD) during the baseline survey, testing is recommended for confirmation of SCTLD. If determined, other mitigation methods include coral treatment by qualified and experienced organizations / individuals. The Developer will communicate with the relevant authority to determine suitable mitigation for the coral growing on the Harbour wall. Furthermore, the Developer intends to support coral restoration activities on Grand Bahama in consultation with the Department of Marine Resources, DEPP, and the Grand Bahama Port Authority.

13.3 Air and Noise Management

Wet suppression (the application of water) is the predominate method of suppressing fugitive dust at aggregate facilities. By increasing the moisture content of the exposed land -clearing disturbed areas and/or haul roads, finer materials adhere to each other to form larger particles by weight, thus causing the particles to reduce dispersion when traveled upon. The increase in moisture content can occur naturally or mechanically. Rainfall serves the important function of naturally increasing the moisture content of unpaved road surfaces and disturbed areas. Moisture content can also be increased through the mechanical application of water by way of a 4,000-gallon water

truck. In hot, dry conditions, active roads will be watered at least once every three hours. Further, the Developer will water more frequently if there is visible evidence of fugitive dust emissions at the BCC Property boundary. Watering will occur less frequently if meteorological conditions (e.g., rain) are adequate to suppress dust to a degree that is equivalent to 3-hour periodic watering. Blast mitigation will be included in the Project's EMP.

To help further minimize noise pollution, berms, acoustic screens or baffle mounds can be erected to help dampen any excess sounds resonating from the site. The Developer proposes to construct a 15' tall berm around the perimeter of the excavation area and include a 100' buffer along the perimeter as well. This berm will aid in reducing noise and potential dust from leaving the excavation area. Staff should wear full PPE to avoid hearing loss or damage. Noise mitigation will be included in the Project's EMP.

13.4 Turbidity and Erosion Control

The EMP will include a turbidity monitoring plan, outline the related impact mitigation, and detail environmental oversight. In particular, the excavation extent, equipment, methodology, material handling and stockpile management, safety and environmental protection measures, responsible personnel, as well as turbidity monitoring and reporting protocols.

An appropriate site would be selected for the stockpile of excavated resources. The excavated material will serve as a resource for quarry mining facility. This stockpile storage site should not impact the surrounding community, inclusive of nearby public access and businesses. Best management practices for stockpile position and management will be outlined in the EMP.

It is recommended that best mining practices are followed to monitor geotechnical risks, slope instabilities and soil losses, where action occurs in order to control key aspects, such as slope erosion[31]. These will be described further in the EMP.

13.5 Waste Management (solid, liquid hazardous)

Waste collection and containment will follow standards provided by the Department of Environmental Health Services (DEHS) and the Grand Bahama Port Authority. Waste Management will be described in the EMP after consultation with both agencies. Solid waste will be removed daily from the site by a local contractor. The current service provider is Sanitation Services Co Ltd. Additionally, berms will be placed along the site boundaries to minimize storm water and wastewater runoff into the nearby marine environment.

13.6 Spill Management

Spill Management will primarily focus on spill prevention measures and secondarily focus on clean up and mitigation. To prevent spills during construction the guidelines described in the following table below will be followed on site. The Environmental Monitor will ensure the guidelines are

[31] Carabassa, V.; Montero, P.; Alcañiz, J.M.; Padró, J.-C. Soil Erosion Monitoring in Quarry Restoration Using Drones. *Minerals* 2021, *11,* 949.

followed. In the event of a spill, the spill will be monitored and reported using a form similar to the one shown in the figure following Table 13.1.

Table 13.1 Spill prevention measures

Spill Prevention	Required Equipment
Place drip trays beneath taps and valves and use overflow and drop containment measures at connection points or at other possible overflow points.	Drip trays
Secure the fuel and chemical storage area to prevent vandalism and damage to storage containers. An impermeable liner will be placed under storage containers and a secondary spill containment will be used.	Impermeable liner Spill berm
Use caution during hand transfer of fuel from storage containers to refuel equipment. Use a funnel to reduce the chance of leaks or spills.	Fuel storage containers Funnels
Fuel will be stored and transported in designated fuel storage containers. The containers will be covered until the fuel is needed for refueling.	Fuel storage containers Funnels
Do not store fuel or oil in damaged, unsealed containers. If a container is damaged, place the damaged container in an overdrum to prevent spills or leaks.	Overdrum
Use spill pallets and safety storage platforms when fuel / chemicals are transported around the site.	Spill pallets Safety Storage platform
Equipment will be maintained and serviced regularly by a local contractor to prevent leaks.	N/A
Safety Data Sheets (SDS) will be available on site in two locations. SDS will be available in the site office and near the respective storage areas for the fuel and chemicals.	Relevant Safety Data Sheets

Date **Weather Conditions:** _____

Staff on Duty _____

Contact Information _____

Spill Details _____

Type of Spill _____

Description of Spill

Location _____

_____

_____

_____

_____

Estimated Spill Quantity _____

Remediation Method

Disposal Method

Cause of Spill
Prevention Method Employed

Identify the spill location on the map provided below.

Notes

Please attach photos of spill and remediation activities.

Signed: _____ _____

Please Print **Signature**

Title: _____

Figure 13.11 Example spill report form.

13.7 Health and Safety

Workers would be trained in proper tool operation and safety, handling of materials, driver safety and knowledge of first aid and safety response. All employees will be trained by requiring attendance of the "All Employee" training course. New hires will complete the course for "All Employees" and any other appropriate segments of training required for their specific duty assignments within 30 days of starting work. The "All Employee" training course will include the following elements:

- Spill prevention, response, and reporting procedures
- Discussion of good housekeeping practices
- Site Orientation & Personal Protective Equipment (PPE) Requirements
- Proper use of PPE
- Identification of the Pollution Prevention and Spill Response Team members and their respective responsibilities
- Emergency Exits and Procedures; and
- Environmental Requirements.

13.8 Fire Management

Fire Management will consist of Prevention and Control on the site during construction and operation of the BRL Quarry. Prevention will be crucial to operation because petroleum products for the mobile fleet and fluids/oil for regular maintenance will be stored on-site. Volumes stored on site will be similar to the volumes currently used at the BRL operational quarry. The volume estimates are shown below in the following table.

Table 13.2 Estimated fuel storage quantities. Fuel storage will be above ground.

TANK #	VOLUME (Gallons)	CONTENTS	TANK CONSTRUCTION	Secondary Containment
1	3,000	30W Oil	Steel	Concrete
3	4,000	15W40	Steel	Concrete
4	4,000	10W Hyd.	Steel	Concrete
6	20,000	Diesel	Steel	Concrete
7	20,000	Diesel	Steel	Concrete
8	1,000	Gasoline	Steel	Concrete
9	3,000	Used Oil	Steel	Concrete
Drums	Varies	Bulk Oils	Steel drums	Concrete
	55,000			

To prevent accidental fire/explosion the blasting materials used in each blast, will continue be stored at a secure BRL facility (not located on the BCC Property) and will only be delivered to the BCC Property on the day of which a blast is scheduled. The drill holes are loaded with Ammonium Nitrate the morning of the blast event and the blast will be conducted by early to mid-afternoon.

As previously indicated, blasting occurs with relative infrequency and is generally expected to only take place one time per week at the BCC Property. Additional prevention measures are as follows.

- Project personnel will be trained in fire/explosion prevention and response.
- No burning or smoking will be allowed on site except in designated areas.
- Fire extinguishers will always be accessible at designated muster stations on site. Muster stations will be clearly identified on site.
- No burning, welding, or other source of ignition shall be applied to any enclosed tank or vessel, even if there are some openings, until it has first been determined that no possibility of explosion exists and authority for the work is obtained from the foreman or Supervisor.
- Employees should be aware of the locations of fire extinguishers and know how to use them. A five-pound ABC rated fire extinguisher must be readily available while welding, burning, cutting, or using flammable gases or liquids.
- Smoking is not permitted around gasoline or other flammable liquids or gases.
- Equipment must be turned off before refueling.
- Gasoline must be stored and transported only in approved safety containers and gasoline must not be used for cleaning purposes.
- Compressed gas cylinders must be kept secured, upright, capped and separated when not in use.
- Empty gas cylinders should be marked and returned to the storage area for pickup.

13.9 Severe Weather / Hurricane Management

The Site Manager will assign the person in charge who will be responsible for implementation of the Hurricane Plan. The Hurricane Plan is a series of checklists to make preparing for and recovering from the storm as straightforward as possible. There will be weekly check-in meetings place during the Hurricane season (June 1 to November 20), to discuss the Hurricane Plan and the team members' roles and responsibilities.

Before the storm checklist:

- Make a list of names, addresses and phone numbers for vendors and contractors who can provide recovery services or supplies.
- Keep evacuation routes open for all vehicles to the extent possible.
- Fully charge all devices and batteries.
- Remove loose jobsite materials and debris that could become projectiles and clean the Project site daily.
- Have garbage in dumpsters and other containers consolidated and properly disposed and remove dumpsters from the site.
- Move materials that cannot be relocated or secured otherwise to shipping containers/storage boxes. Cover all materials that cannot be relocated and elevate them to at least 4 inches above the floor to reduce water damage exposure.

- Ensure that construction trailers and shipping containers/storage boxes are properly anchored and tied down. If anchors are not available, use concrete filled drums with embedded reinforcing steel loops and tether at least three locations for each trailer or storage container.
- Stop all material deliveries.
- All construction equipment mats should be tied together and anchored.
- Make a video/photographic record of the jobsite and surrounding properties to document the project condition and status prior to the storm.
- Fuel all vehicles and emergency equipment (such as generators)
- Once the site is secure, instruct subcontractors and employees to vacate the jobsite and not to return until the danger has passed.
- Establish a meeting place, if possible, for key recovery members.

13.10 Marine/Vehicular Traffic Control

Appropriate signage should be placed along the major thoroughfares (Queen's Highway and Warren J. Levarity Highway) and near Freeport Harbour for public notification of future and ongoing works. Traffic signage will be provided on public roadways to ensure emergency access is always available. A 100-foot road buffer zone will be established that boarders the project site to prevent sediment from falling into the road and to buffer sound during excavation activities.

Excavation, mining, and dredge activity may affect marine traffic. Therefore, suggested passage routes should be outlined and communicated to boaters within the community as well as major freight carriers. Furthermore, appropriate signage should be placed in visible areas for mariners to be made aware of dredging activities and diverted routes. Communication can be made via VHF radio frequency to alert mariners of dredge activities. During operation, the increased marine traffic within the area may cause disruptions. Therefore, appropriate signage should be placed in visible areas to alert local mariners of impending traffic. Detailed traffic mitigation will be outlined in the Project's EMP.

13.11 Outreach and Education

BRL stives to be a partner within the local community and our past efforts reflect this commitment. Communities in and around the impacted site stand to benefit from educational programs focused on environmental and ecological restoration, sustainability, and wildlife. Non -government Organizations (NGOs) such as ReEarth, The Bahamas National Trust (BNT), Waterkeepers Bahamas, and others have led the charge to instruct students and the public at large about the importance of terrestrial and aquatic ecosystems. Collaborating with these groups to support ongoing public education would be ideal. By supporting the operation of a pine tree nursery, students and adult participants can receive hands-on training in habitat restoration activities.

BRL has actively participated in various community –building initiatives including sponsoring a local baseball league, donating food and supplies to the Grand Bahama Children's Home, distributing over 200 toys to various primary schools on the island, and presenting at the UB Career Fair to highlight job opportunities available at Bahama Rock.

14 CONCLUSION

The Project has the potential to stimulate the Grand Bahamian economy. The Developer is committed to minimizing the negative environmental impacts of the Project, while maximizing the environmental and social benefits through mitigation measures, summarized below. Detailed mitigation measures and best management practices will be described in the Project's EMP.

1. The existing site has been abandoned for several decades, has become a hazardous site with mounds of debris, abandoned buildings, and other structures on the site. The Project will enhance the surrounding environment by removing debris and enforcing a security presence to the area and cleaning up a blighted site. Thus, enhancing the west Grand Bahama aesthetic by ensuring a cleaner environment once completed. Additionally, removal of invasive species and replacement with plants indigenous to The Bahamas aids in mitigation of adverse environmental impacts of the site.
2. The Project will include a sand dune remediation project, focusing on invasive species removal and planting native dune species on the beach south of the site.
3. To the extent possible, protected plants will be incorporated in the final landscaping design of the site. All plants incorporated in the landscaping plan will be native plants sourced from local nurseries.
4. To further mitigate the Project impact on pineland, coppice forest, and corals growing on the western Harbour wall, the Developer proposes a partnership with local organizations conducting habitat restoration on Grand Bahama. These can include but may not be limited to the Bahamas National Trust and the Forestry Unit.
5. Engage schools in the nearby community to develop programs to study pineland and coppice forest.

15 APPENDICES

APPENDIX A – PHASE 1 ENVIRONMENTAL SITE ASSESSMENT

Contents

Acronyms 2
Terminology 2
Summary 4
Introduction 4
Property Location and Legal Description 4
Purpose of Phase I ESA 5
Scope of Work 5
Records Review 6
Physical Setting Sources 6
Standard and Additional Environmental Records Sources 8
Site Reconnaissance 8
Uses and Conditions of the Property and Adjoining Properties 8
Methodology 9
Interviews 9
Evaluation 9
Interior and Exterior Observations 9
Findings and Opinions 10
Conclusions 13
Additional Investigations 13
Data Gaps 13
Appendix A – Other Personnel 13
Appendix B – Photo Log 14

Figures

Figure 1 Martin Marietta Phase I ESA Map Reference 5
Figure 2 Freshwater Lens Thickness Near Northern Boundary of Property (highlighted in yellow) 6
Figure 3 Projected Limits of Flooding from Northern Storm Surge without and with Northwestern Harbour Expansion 7
Figure 4 Bahama Cement Property 8

Acronyms

AST	Above ground Storage Tank
EP	Environmental Professional
ESA	Environmental Site Assessment
HS	Hazardous Substances
N/A	Not Applicable
PP	Petroleum Products
REC	Recognized Environmental Condition[1]
TBC	To Be Confirmed

Terminology

***De Minimis* Condition**

- Does not present a threat to human health of the environment
- Would not be subject of an enforcement action

Judging if a release is a *de minimus* condition is highly subjective and ultimately up to the EP's interpretation. e.g. Poor housekeeping is not a REC if spills remain contained inside a building, and are not released to the environment.

Environment

- Surface water
- Groundwater
- Soil
- Sub-surface strata (vapor)
- Ambient air

Environmental Professional (EP)

- PE or PG and 3 years relevant experience,
- Other government issued license or certification to perform ESAs and 3 years relevant experience,
- Baccalaureate or higher in engineering or science and 5 years of relevant experience; or
- 10 years relevant experience.

Limiting conditions

Typically a condition imposed on or beyond the EP's control; includes data failures, data gaps, and other constraints.

[1] Identifying RECs incorporates EP's opinion regarding impact, general national practice, EP's discretion and judgement, and local professional practice.

Material Threat

- Physically observeable or obvious threat
- Likely to lead to a future release
- Result in impact to public health or the environment

Obvious: "That which is plain or evident"

Property

The real property that is the subject of the ESA.

"Offsite RECS" do not exist.

Recognized Environmental Condition (REC)

Presence or likely presence of HS or PP in, on, or at a property

- due to any release to the environment
- under conditions indicative of a release
- a material threat of a future release

De minimus conditions are not RECs.

Release

- Intentional (pumping, pouring, injecting, etc)
- Unintentional (leaking, escaping, leaching, etc)
- Abandoned drums (inside or outside building)

Summary

A Phase I Environmental Site Assessment (ESA) for the Martin Marietta property was conducted by an Environmental Professional (EP) at BRON on Monday, 9th May 2022 and Tuesday, 10th May 2022. "The purpose of the Phase I ESA is to identify, to the extent feasible pursuant to the process described herein, recognized environmental conditions (RECs) in connection with the property"[2].

The ESA has revealed evidence of two (3) Recognized Environmental Conditions (RECs) in connection with the property relating to unlabeled drums and a variety of other solid waste items discarded about the project area, including two unexplained lagoons.

Soil and water sampling and testing is recommended to confirm how to properly dispose stained soil and reservoir contents. Should the presence of HS or PP be confirmed, a comprehensive remediation strategy should be planned and executed as a priority in order to eliminate these RECs and comply with regulatory requirements.

Introduction

Property Location and Legal Description

This ESA was conducted within the limitations of the property located at:

Bahama Rock Ltd. (Bahama Rock)
Warren J. Levarity Highway
Freeport, Grand Bahama
The Bahamas

An aerial image from Google Earth is provided in Figure 1 below.

[2] ASTM International. "ASTM E2247-16 Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process for Forestland or Rural Property". https://www.astm.org/e2247-16.html. Accessed 20 December 2022.

Figure 1 Martin Marietta Phase I ESA Map Reference

Purpose of Phase I ESA

An ESA is commonly conducted as a measure of environmental due diligence in commercial real estate transactions, as the ESA can be used as a tool to identity environmental risks associated with a property. The ESA therefore provides a preliminary analysis of potential environmental risks, which may prompt further testing and sampling outside the scope of this preliminary ESA. Environmental conditions to be noted during this ESA include:

- Suspicion of Mold
- Spill residue
- Hazardous material usage and/or storage
- Noxious Vapors

Scope of Work

This scope of work included a site reconnaissance, assessment, and report for the client. The objective of the site reconnaissance was for BRON team members to gain a better understanding of the project site conditions and associated existing infrastructure and environmental conditions. The initial assessment enabled BRON team members to assess the current project site conditions and will assist in the preparation of future detailed site-specific surveys and investigations, studies, and engineering designs. An ESA was conducted to identify RECs in the terrestrial boundaries of the Martin Marietta property known as Bahama Rock in Freeport, Grand Bahama.

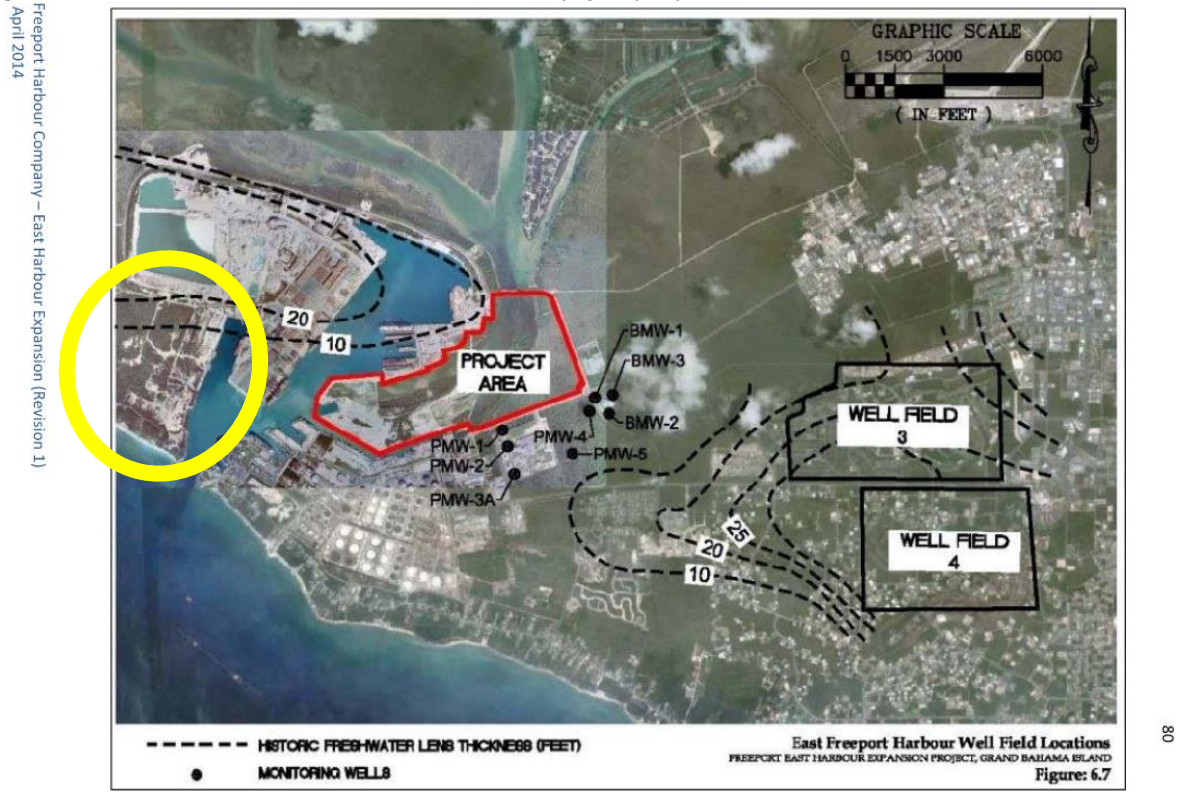
Records Review

Physical Setting Sources

The client shared some physical setting sources from neighbouring properties that provided some hydrogeologic and topographic information for the property of interest, which is highlighted in yellow in the images that follow. Two deductions were made from this information:

1. The thickness of the freshwater lens increased further inland, up to 20 feet near the northern boundary of the property (see Figure 2 below)[3].
2. Projected limits of storm surge flooding along the northeastern boundary of the property appeared to be reduced with northwestern expansion of the Freeport Harbour (see Figure 3 below)[4].

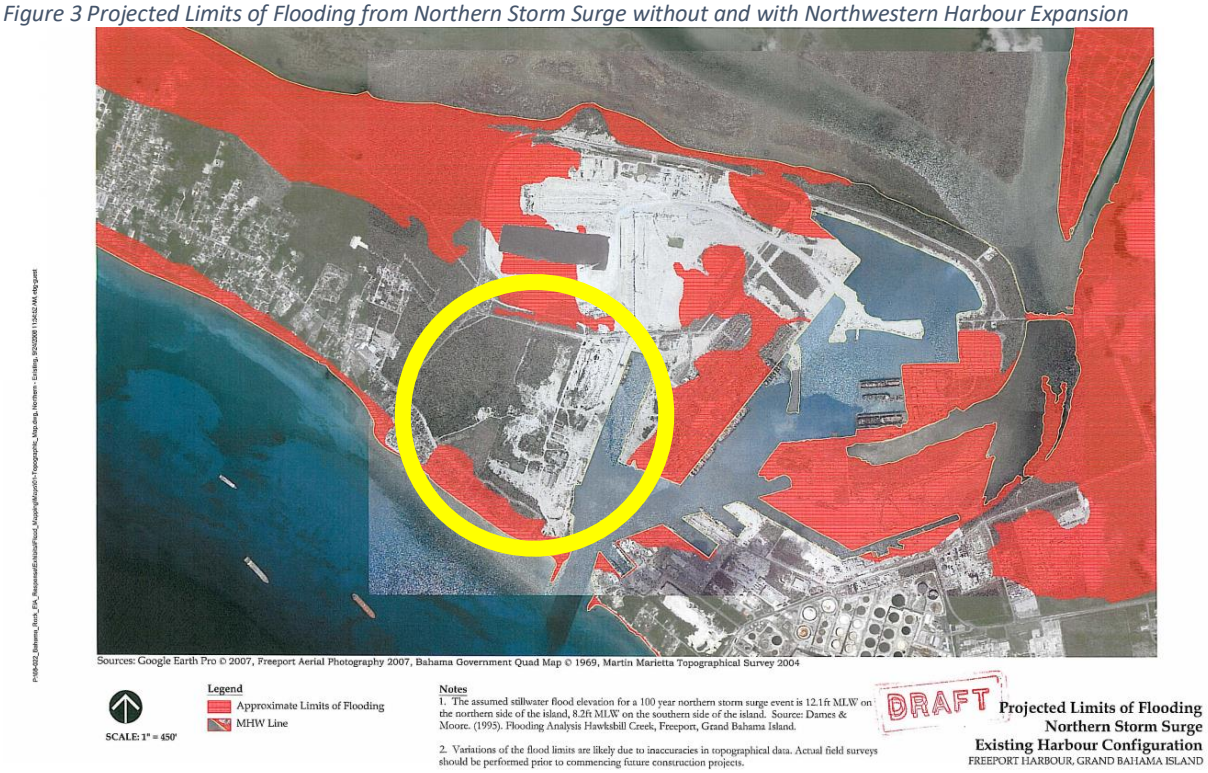
Figure 2 Freshwater Lens Thickness Near Northern Boundary of Property



[3] Envirologic International Ltd. "East Freeport Harbour Well Field Locations Freeport East Harbour Expansion Project, Grand Bahama Island Figure: 6.7". *Environmental Impact Assessment Revision 1 Freeport Harbour Company East Harbour Expansion Freeport, Grand Bahama Island*. April 2014. https://www.dropbox.com/home/Martin%20Marietta%20-%20Shared%20Folder/Bahama%20Rock/Billy%20Cay%20property?preview=2014-04-Finalized-EIA-submitted-GBPA.pdf. Accessed 20 December 2022.

[4] "Projected Limits of Flooding Northern Storm Surge". *Flood Maps*. 24 August 2008. https://www.dropbox.com/home/Martin%20Marietta%20-%20Shared%20Folder/Bahama%20Rock/Other%20Studies%20and%20Important%20Documents?preview=2008-08-24-flood-maps.pdf. Accessed 20 December 2022.

Figure 3 Projected Limits of Flooding from Northern Storm Surge without and with Northwestern Harbour Expansion

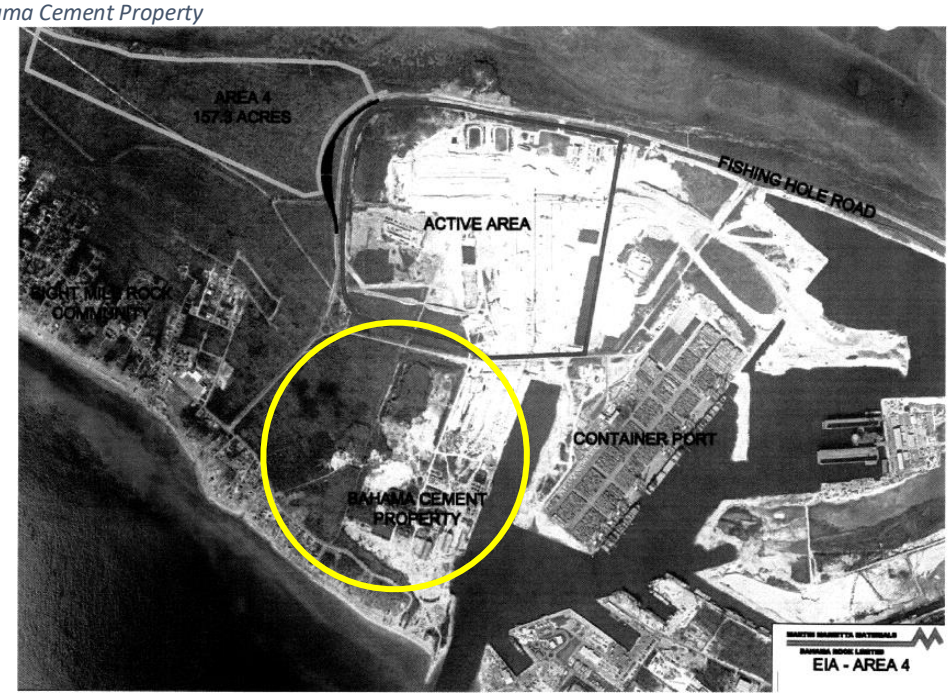


Standard and Additional Environmental Records Sources

The client shared some environmental records including previous Environmental Impact Assessments (EIAs) for neighbouring properties, however these had limited information for the property of interest[5].

CEMEX Bahamas was identified in Google Earth and Google Maps as the closest neighbouring property[6]. It appears that prior to the arrival of CEMEX Bahamas, Bahama Cement Company appears to have previously owned the property of interest circa 1962 (see Figure 4 below)[7][8].

Figure 4 Bahama Cement Property



Site Reconnaissance

Uses and Conditions of the Property and Adjoining Properties

The property is not currently being used. Existing infrastructure is derelict.

Adjoining properties include forested areas and residential communities of Eight Mile Rock to the south- and northwest; Bahama Rock to the north; CEMEX Bahamas and Freeport Container Port (in the

[5] "Martin Marietta - Shared Folder". https://www.dropbox.com/home/Martin%20Marietta%20-%20Shared%20Folder. Accessed April 2022.
[6] "CEMEX – Freeport". *Google Maps.* https://goo.gl/maps/HLY8REX8hCvx68J99. Accessed 21 December 2022.
[7] EnviroLogic, International Ltd. "Active Area 3 & Proposed Area 4 Bahama Rock Area 4 EIA Bahama Rock Ltd. Grand Bahama Island Figure: 3". *Environmental Impact Assessment Terms of Reference for Martin Marietta Materials Bahama Rock Ltd. Proposed Area 4 Mining Project Freeport, Grand Bahama Island*. August 2007. https://www.dropbox.com/home/Martin%20Marietta%20-%20Shared%20Folder/Bahama%20Rock/Area%204?preview=2007-08-EIA-Area-4-TOR.pdf. Accessed 20 December 2022.
[8] "Bahama Cement Company (Confirmation of Title) Act". *Statute Law of The Bahamas*. 1962. http://laws.bahamas.gov.bs/cms/images/LEGISLATION/PRINCIPAL/1962/1962-0005/BahamaCementCompanyConfirmationofTitleAct_1.pdf. Accessed 20 December 2022.

Freeport Harbour) to the east; and Buckeye Bahamas jetties off the coast (in the Atlantic Ocean) to the south.

Eight Mile Rock is the largest settlement in Grand Bahama. Bahama Rock, CEMEX Bahamas, Freeport Container Port, Freeport Harbour, and Buckeye Bahamas are all industrial companies that acquired and expanded older facilities that are still in operation today. Bahama Rock is an aggregates plant and ship-loading facility that has been in operation since 2001[9]. CEMEX Bahamas is a cement, ready-mix concrete, aggregates, and urbanization solutions company[10]. Freeport Container Port is a container transshipment terminal that has been in operation since 1997. Buckeye Bahamas is a petroleum product storage and blending facility that has been in operation since 2011, though the facility existed since 1965[11][12].

Methodology

During the site reconnaissance, the EP investigated the site by car and foot along with other BRON team members. Observations by sight and smell were documented using photographs and notations provided in this report. Derelict buildings and other abandoned areas of the site overgrown by vegetation were not entered into as a matter of safety. Following the site reconnaissance, the EP further analysed the observations documented to determine findings and opinions, conclusions, and recommendations.

Interviews

No formal interviews were conducted for this assessment. However, open communication was maintained between the client's team and BRON in preparation for, during, and following the site reconnaissance. The client's team responded to all questions asked.

Evaluation

Interior and Exterior Observations

There was one building on the property with safely accessible interior space for observation. This building was located southwest of CEMEX Bahamas on the main path through the property, and appeared to be part of a compound. The derelict concrete building had holes in its walls, exposed steel frame, and concrete rubble on the floor. The floor was also notably overgrown with moss and small ferns. Further investigation into available records of the property did not yield any indications about the specific use of this building or any other infrastructure in the project area.

The main path throughout the property was denuded and unpaved but wide and smooth enough for vehicles to drive along it. Pools of storm water were observed on the ground surface in the open area near the southern boundary of the property are believed to be due to collection of rain water. Two industrial sized lagoons were also observed just west of these stormwater pools, overgrown with algae and Cattails. The purpose of these lagoons remain undetermined but are believed to be for the purpose of waste disposal or waste treatment. Different species of birds were observed bathing in the pools and

[9] Martin Marietta. "Company History". https://www.martinmarietta.com/about-us/company-history. Accessed 21 December 2022.
[10] CEMEX. "Company Profile". https://www.cemex.com/about-us/company-profile. Accessed 21 December 2022.
[11] Buckeye Global Marine Terminals. "About GMT". https://buckeyeglobalmarine.com/about-us/. Accessed 21 December 2022.
[12] Offshore Technology. "Freeport I Liquids Storage Terminal, Bahamas". 27 October 2021. https://www.offshore-technology.com/marketdata/freeport-i-liquids-storage-terminal-bahamas/#:~:text=Bahamas%20Oil%20Refining%20Company%20International,is%20owned%20by%20Buckeye%20Partners.&text=The%20terminal%2C%20which%20is%20accessible,crude%20oil%20and%20petroleum%20products. Accessed 21 December 2022.

the lagoons. The remaining areas of the property that were observed along the main path were sparsely vegetated but littered with piles of discarded materials including furniture and construction materials (shelves, buckets, tarp, roof tiles, copper wires, scaffolding, plywood, etc), heavy equipment and car parts (mufflers, tires, bumpers, hoses, etc), and various home appliances (dryer machines, stoves, refrigerators, heaters, etc). Several corroded drums with unknown contents and no labels were observed ranging in size from 5-gallon to 55-gallons. Two 55-gallon drums were also observed floating in the aforementioned lagoons. Brown stains observed on soil believed to be due to percolation of rain water through corroded metals.

Findings and Opinions

Findings and opinions on areas of environmental interest, including property and structure observations as well as additional issues, are reported in Table 1 below.

Table 1. Findings and Opinions

Areas of Environmental Interest	Observed	Not Observed	EP Opinion	Notes	Photo Log Reference
Property and Structure Observations					
HS or PP in Connection with Identified Uses		X	N/A	No HS or PP observed.	
Liquid Storage Systems		X	N/A	No liquid storage systems observed.	
Odours		X	N/A	No noxious vapours observed.	
Pools of Liquid		X	N/A	No pools of liquid observed other than storm water (refer to notes on "Waste Water" below).	
Drums	X		**REC**	Several corroded drums observed ranging in size from 5-gallon to 55-gallons. No labels observed. Contents unknown.	99, 103, 108-109, 116
HS or PP Containers (not necessarily in connection with identified uses)		X	N/A	No HS or PP Containers observed (refer to notes on "Drums" above).	
Unidentified Substance Containers		X	N/A	No unidentified substance containers observed (refer to notes on "Drums" above).	
Poly-Chlorinated Biphenyls		X	N/A	No electrical or hydraulic equipment containing Poly-Chlorinated Biphenyls (PCBs) observed.	
Heating / Cooling		X	N/A	No heating/cooling of buildings or groups of buildings observed.	
Stains or Corrosion		X	N/A	No stains or corrosion observed other than staining from water (refer to notes on "Stained Soil" below).	
Drains and Sumps		X	N/A	No drains or sumps observed.	
Pits, Ponds, Ditches, Streams, or Lagoons	X		**REC**	Purpose of lagoons undetermined but believed to be for the purpose of waste disposal or waste treatment. Drums observed floating in lagoons are not RECs but *De Minimus* due to containment within lagoons.	104, 105
Stained Soil or Pavement	X		De Minimus	Brown stain observed on soil believed to be due to water stains from corroded materials. No spill residues observed.	95, 106
Stressed Vegetation		X		No stressed vegetation observed from something other than insufficient water.	
Solid Waste	X		**REC**	Piles of discarded materials throughout site include furniture and construction materials (shelves, buckets, tarp, roof tiles, copper wires, scaffolding, plywood, etc), heavy equipment and car parts (mufflers, tires, bumpers, hoses, etc), and various home appliances (dryer machines, stoves, refrigerators, heaters, etc).	84-89, 92-103, 106-116
Waste Water	X		De Minimus	Pools of storm water observed at surface level believed to be due to collection of rain water.	88-92
Wells		X	N/A	No wells observed.	
Septic Systems		X	N/A	No septic systems observed.	

Areas of Environmental Interest	Observed	Not Observed	EP Opinion	Notes	Photo Log Reference
Additional Issues					
Suspicion of Asbestos-Containing Building Materials (ACM)		X	N/A	Not determined.	
Biological Agents	X		N/A	Various species of birds were observed in the harbour, and on property in ponds and lagoons. Mitigation for habitat fragmentation and loss to be discussed in the EIA by other personnel.	64, 88-92, 105, 105
Cultural and Historic Resources	X		N/A	Value and proper disposal of derelict infrastructure about the property to be discussed in the EIA by other personnel.	74-83
Ecological Resources	X		N/A	Forestry resources observed. Protected status to be discussed in the EIA by other personnel.	
Threatened and Endangered Species		X	N/A	Observations of threatened and endangered species to be discussed in the EIA by other personnel.	
Health and Safety	X		N/A	Safety hazards were observed on property. These can be improved by removing or repairing derelict infrastructure, removing waste and debris, securing the site perimeter, and installing ladders on the quay wall of the harbour for emergency egress.	13-68, 84-89, 92-103, 106-116
Indoor Air Quality		X	N/A	Not determined.	
Industrial Hygiene	X		N/A	All waste and debris to be removed from site by licensed contractor prior to commencement of works.	84-89, 92-103, 106-116
Lead-based Paint		X	N/A	Demolition survey and permit required prior to commencement of works, inclusive of soft stripping, to determine presence and best management practices.	
Lead in Drinking Water		X	N/A	Not determined.	
Suspicion of Mold		X	N/A	Not determined.	
Regulatory Compliance	X		N/A	Requirements will be determined by The Department of Environmental Planning & Protection (DEPP) and the Grand Bahama Port Authority (GBPA), who may also request a site visit to independently confirm environmental conditions on property. A Certificate of Environmental Clearance (CEC) application should be filed with DEPP, and copied to GBPA, to initiate review of environmental management requirements for the proposed project.	
Silviculture Best Management Practices		X	N/A	Requirements will be determined by The Forestry Unit (TFU) under DEPP. A Permit to Harvest a Protected Trees (PHPT) application should be filed with TFU, and copied to GBPA, to initiate review of forestry management requirements for the proposed project. Transplanting and other mitigation potential for forestry resources can be evaluated by TFU.	
Wetlands		X	N/A	Not determined.	

Conclusions

This ESA has revealed no evidence of RECs in connection with the *property* except for the following:

- Drums
- Solid Waste
- Lagoons

Additional Investigations

Soil and water sampling and testing is recommended to confirm how to properly dispose stained soil and lagoon contents. Should the presence of HS or PP be confirmed, a comprehensive remediation strategy should be planned and executed as a priority in order to eliminate these RECs and comply with regulatory requirements prior to the commencement of works.

Data Gaps

Previous environmental reports for neighbouring properties were made available by the client for review at the time of this assessment, but very little information was produced in connection with the property. Observations were also limited as derelict buildings and other abandoned areas overgrown by vegetation were not entered into as a matter of safety. Nonetheless, it is anticipated that a more recent and comprehensive Environmental Impact Assessment (EIA) will be required for regulatory compliance, providing an opportunity for more environmental and social information to be collected. As a result, more risks and impacts can be identified, documented, and managed for the site, and therefore, the client's proposed project.

Appendix A – Other Personnel

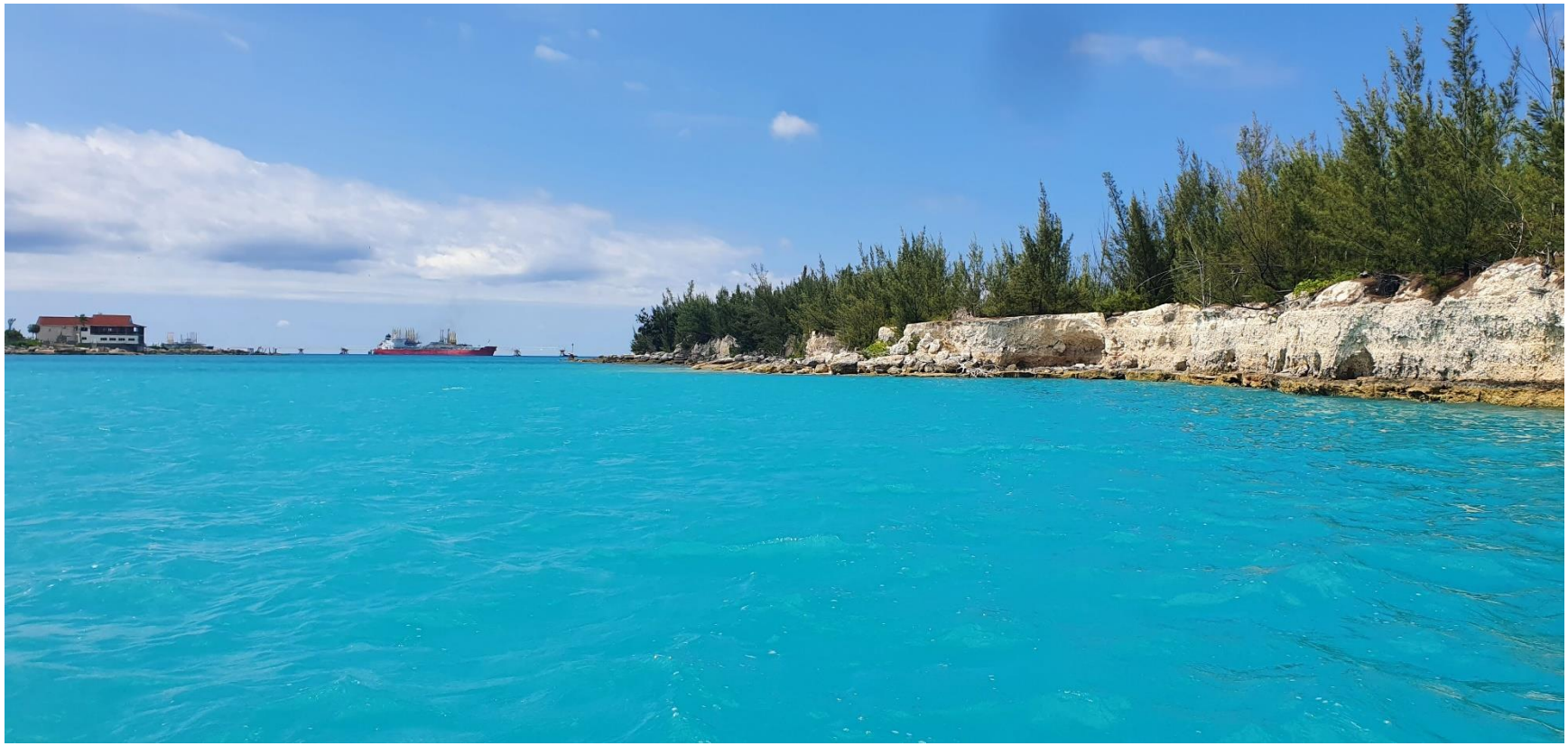
The EP was accompanied on the site visit to the client's property by other team members from BRON, who also led site assessments for their respective disciplines. Table 2 below lists names, titles and assessment types of personnel.

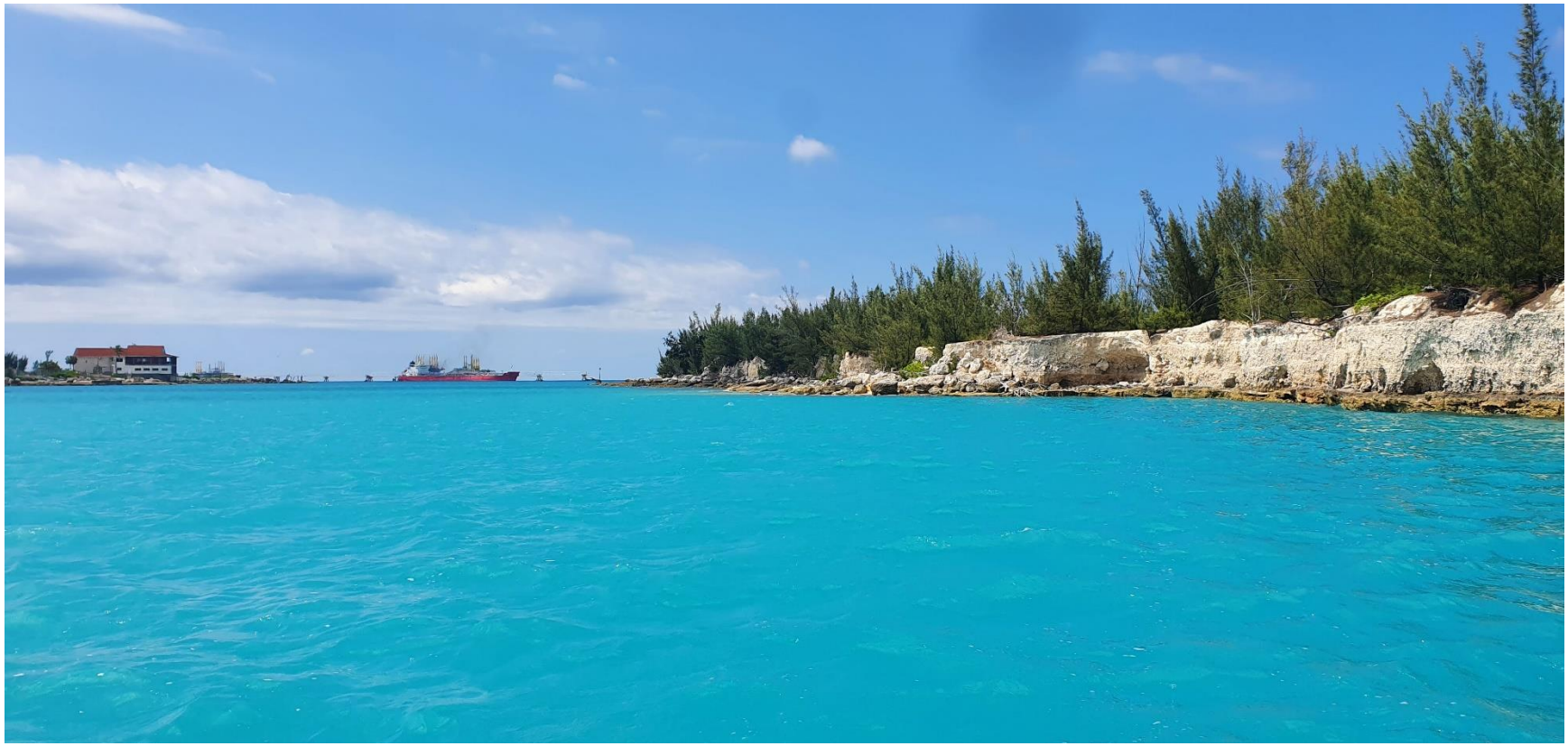
Table 2. Martin Marietta Phase I ESA Team Members

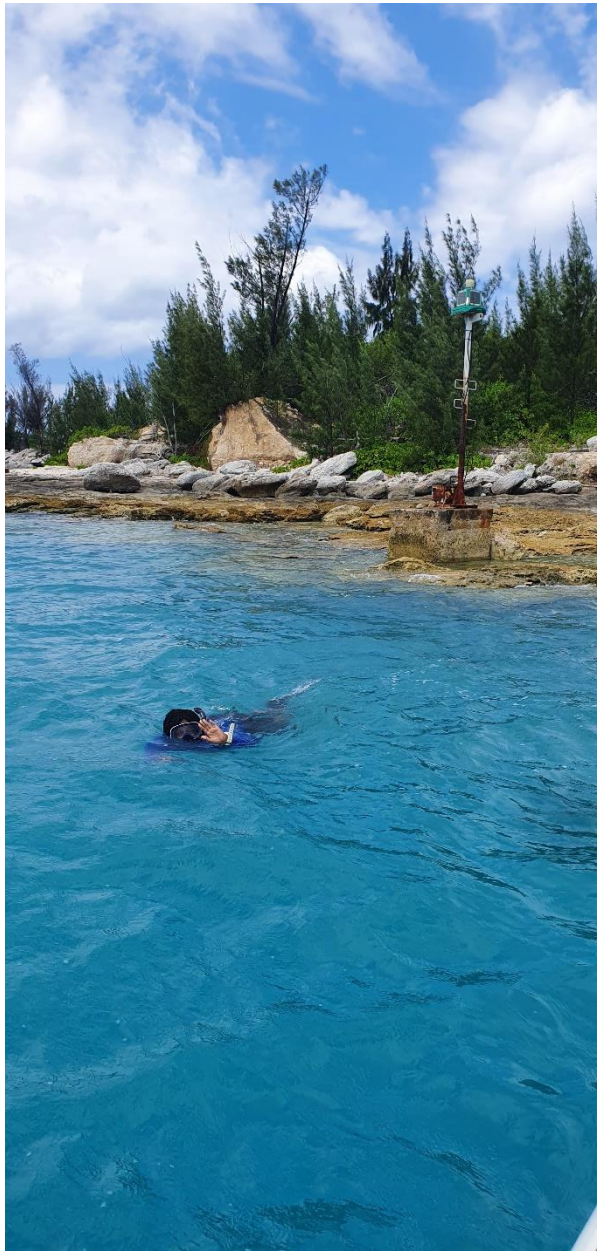
Name	Title	Assessment Type
Kelli Armstrong	Project Manager (Environmental Professional)	Phase I ESA
Agnessa Lundy	Senior Environmental Scientist	Marine Benthic Survey
Scott Johnson	Environmental Scientist	Terrestrial Survey
Nicholas Archer	Field Assistant	Terrestrial Survey

Appendix B – Photo Log

The following photos were taken by the EP during the site visit.







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APPENDIX B – POST EXCAVATION CONCEPTUAL LAYOUT

Post Excavation Conceptual Layout

APPENDIX C – FLOOD POTENTIAL ANALYSIS

BRON
POSSIBILITIES UNLIMITED

MARTIN MARIETTA
FLOOD POTENTIAL ASSESSMENT

Date Draft 1 | November 24, 2023
Date Draft 2 | November 27, 2023
Date Draft 3 | December 20, 2023

BRON Ltd. | 57 Raphia Close East | PO Box CB-11524 | Nassau, The Bahamas bebron.com

CONTENTS

1 Introduction 1
1.1 Project Background 1
1.2 Past Flooding Events 3
1.3 Objectives 6
1.4 Scope of Work 6
1.5 Report Structure 6
2 Project Area 6
2.1 General 6
2.2 Topography 7
2.3 Cross-Sectional Profile 9
2.4 Regional Drainage 10
2.5 Slope 11
2.6 Aspect 12
2.7 Climate 14
2.8 Intensity Duration Curve 16
2.9 Water Resources 19
- Surface Source: 19
- Groundwater Source: 19
2.10 Soil 20
2.11 Borehole Report – Soil Parameters 22
2.12 Geology & Geomorphology 23
2.13 Landuse/Landcover 24
2.14 Site Analysis 25
3 Approach and Methodology 26
3.1 General 26
3.2 Preliminary Stage 27
3.3 Data and Tools Used 29
3.4 Secondary Stage 31
3.5 Final Stage 32
4 Model Preparation and Setup 32

4.1 General 32
4.2 Hydrological Analysis – HEC-HMS 34
4.3 Hydraulic Analysis – HEC-RAS 44
5 Model Calibration and Validation 55
5.1 Model Calibration 55
5.2 Model Validation 59
5.3 Assumptions and Limitations 60
6 Results 60
6.1 Cause and Effect of Harbour Expansion 60
6.2 Hydrographs of various Return Periods 64
6.3 Flood Inundation Analysis 65
6.4 Flood Inundation due to storm surge 70
6.5 Water Table and Groundwater Dynamics 70
6.6 Mitigation Measures - Best Management Practices 70
7 Discussions 73
8 Conclusion 74
9 References 76

LIST OF FIGURES

Figure 1. Overview of Grand Bahama Island, highlighting the location of the Freeport Harbour. 1
Figure 2. Aerial View of the Freeport Harbour and Surrounding Area 2
Figure 3. Proposed Dredge Area for the West Harbour Expansion (~270 acres highlighted yellow) 2
Figure 4. Path of Hurricane Dorian [24] 4
Figure 5. Pre and Post Storm images of Hurrican Dorian ESA Sentinel Data 5
Figure 6. Digital Elevation Model of the Catchment (GBPA Photogrammetric DEM) [20m] 8
Figure 7. Digital Elevation Model of the Catchment (Lidar Surveying) [5m] 8
Figure 8. Cross-Sectional Profile of the harbour and nearby area 10
Figure 9. Regional Drainage of the study area 11
Figure 10. Slope Map 12
Figure 11. Aspect Map Source: GBPA Photogrammetric DEM – 20m resolution 14
Figure 12. Annual Rainfall (1971-2021) 15
Figure 13. Monthly rainfall 15
Figure 14. Season-wise distribution 16
Figure 15. IDF Curve for Grand Bahama Island 19

Figure 16.Grand Bahama Island Groundwater Resources Map (Source: Water resources of the Bahamas) 20
Figure 17. Soil Map Source: ISRIC — World Soil Information 22
Figure 18. Drill Report – Soil Parameters 23
Figure 19. Geology & Geomorphology Map 24
Figure 20. Land Use Land Cover Map (GBPA LULC) 25
Figure 21. Field Photos around the Harbour Area (provided by the client) 26
Figure 22. Overall Approach and Methodology 28
Figure 23. Softwares and Tools Used 30
Figure 24. HEC-HMs & RAS Methodology 33
Figure 25. Hydrological Cycle in the Urban Area 34
Figure 26. HEC-HMS Model 35
Figure 27. Basin Model of Hydrological Study Area (HEC-HMS) 36
Figure 28. HEC-HMS Model Parameters 38
Figure 29. Representation for Timing of Runoff and Response (Open source) 40
Figure 30. HEC-RAS Window Depicting Model Details (HEC-RAS) 45
Figure 31. Sample Boundary Conditions (HEC-RAS) 51
Figure 32. Storm Surge data given as downstream boundary condition 52
Figure 33. Water Surface Time Series Plot 52
Figure 34. Unsteady flow simulation (HEC-RAS) 54
Figure 35. Timeline and impact of Hurricane Dorian [5] 56
Figure 36. Return Period with respect to Wind speed [1] 56
Figure 37. Flood Inundation location within Grand Bahama 57
Figure 38. Calibrated Model with respect to 2019 event 58
Figure 39. Flood Inundation level in m at various location 59
Figure 40. Flood Inundation level in m as per HEC-RAS model – Validation 59
Figure 41. Land use pattern of Harbour area 61
Figure 42. Sectional profile of Harbour area – Pre dredging 62
Figure 43. Sectional profile of Harbour area – Post dredging 63
Figure 44. Flow Hydrograph 64
Figure 45. Water Spread area - 5-Year Return Period (Pre and Post Dredging Scenario) 66
Figure 46. Water Spread area - 50-Year Return Period (Pre and Post Dredging Scenario) 67
Figure 47. Water Spread area - 100-Year Return Period (Pre and Post Dredging Scenario) 68
Figure 48. Water Spread area due to Storm Surge from North and South direction 69
Figure 49. Type of Structural Measures 71
Figure 50. Sustainable Urban Drainage 71

LIST OF TABLES

Table 1. IDF Value (Grand Bahama Raingauge station) 18
Table 2 Data used and review 29
Table 3. Sub-basin Area 36
Table 4. Transform parameters (HEC-HMS) 41

Table 5. Sub-basin Details (CN number, Initial loss, Imperviousness).....43
Table 6. Muskingum K and X Value 44
Table 7. Cause and Effect of Harbour dredging 63
Table 8. Peak Flow for Return Period 64

1 INTRODUCTION

1.1 PROJECT BACKGROUND

The Freeport Harbour, located on Grand Bahama Island in the Bahamas, stands as a cornerstone of maritime activity in the region. This harbour has been in continuous expansion since its inception in 1956, following the signing of the Hawksbill Creek Agreement. The harbour's strategic location along major shipping lanes to the U.S. and other global destinations has cemented its importance in international trade and logistics. Operated by the Freeport Harbour Company, a joint venture between the Grand Bahama Port Authority (GBPA) and Hutchison Port Holdings, the harbour has become a key trans-shipment hub capable of accommodating large container ships and cruise liners. Figure 1 shows an overall view of Grand Bahama Island.

Figure 1. Overview of Grand Bahama Island, highlighting the location of the Freeport Harbour.

Figure 2. Aerial View of the Freeport Harbour and Surrounding Area

Figure 3. Proposed Dredge Area for the West Harbour Expansion (~270 acres highlighted yellow)

Figure 2 shows an aerial view of the Freeport Harbour and surrounding area. The latest development, which involves dredging an additional 270 acres west of the current harbour, aims to enhance the harbour's capacity and operational efficiency. Due to the inherent flooding in the surrounding area, this study focuses on assessing the potential impact that the expansion might have. Figure 3 shows the dredging area in the harbour. The total area set aside for the works is approximately 282 acres, with 270 acres of dredge area and a 100-foot buffer zone surrounding the dredged area. The proposed depth of excavation is 80 feet below the Freeport Harbour-Mean Low Water Level datum [2].

This report has been prepared to assess the potential flood impact of the harbour expansion. It will analyze the potential influence on flood risks within an approximate 25 km radius of the site. This assessment is crucial for planning and implementing appropriate flood mitigation measures.

1.2 Past Flooding Events

Hurricane Erin

Hurricane Erin passed over Grand Bahama on August 1, 1995 [1]. The storm was a Category 1 hurricane with sustained winds of 78 mph. The eye of the hurricane passed over northern Freeport at about 5:45 pm on the evening of August 1. The high waters reportedly flooded about 20 homes on the island community of Queen's Cove. The passage of the eye of the hurricane caused a reversal of the winds to the south, and water levels dropped quickly.

The survey of the high water marks on several homes established a flood elevation of about 7.8 feet above Mean Low Water (MLW) in the Hawksbill Creek. The Grand Bahama International Airport is directly exposed to the waters of the Little Bahama Bank. Flooding to approximately the same elevation occurred at the airport. Based upon all of the information available, it appears that water levels on the open coast of the Bank and within the Hawksbill Creek north of the causeway experienced approximately the same flood elevation.

Hurricane Dorian

Grand Bahama Island has experienced several significant flooding events, often associated with hurricanes and tropical storms. These events have highlighted the island's vulnerability,

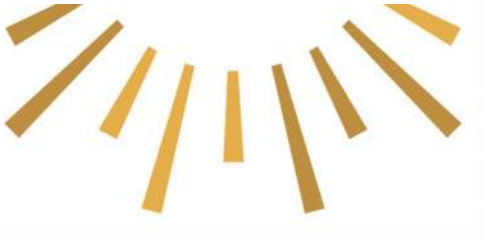
particularly in areas that border the coast. The topography of the island, coupled with its climatic conditions, exacerbates this vulnerability, making comprehensive flood risk assessments essential for any major developmental project, such as the harbour expansion. Understanding the history and impacts of these past events is vital for predicting and preparing for potential future scenarios.

Figure 4. Path of Hurricane Dorian [24]

Figure 5. Pre and Post Storm images of Hurrican Dorian ESA Sentinel Data

Source: Storm path is from the National Hurricane Center. Maps use data from Open Street Map and ESA Sentinel.

Hurricane Dorian pummeled the northwest Bahamas like no other storm on record on September 2, 2019. Figure 4 shows the path of Hurricane Dorian. The storm struck as a Category 5 hurricane with 185-mph winds, and it sat and spun over Grand Bahama Island for 40 hours as a major hurricane [24]. This may have been the most prolonged siege of violent, destructive weather ever unleashed on a single location in The Bahamas. An analysis of radar data captured Wednesday by Descartes Labs revealed widespread flooding across several more islands, including Grand Bahama. The flooding damaged homes and other infrastructure, including the airport, hindering rescue and recovery efforts. Figure 5 shows before and after Synthetic Aperture Radar (SAR) satellite images of Freeport. The Harbour Area did not report considerable damage. Most of the touristic infrastructure is in Freeport and the West End, where the impact of Hurricane Dorian was less considerable. [5]. Damage in Grand Bahama was catastrophic due to the prolonged and intense storm conditions, including heavy rainfall, high winds, and storm surge. [3]. SAR instruments use radio waves to pierce cloudy skies, clearly showing flooding on the island. Freeport is home to about 27,000 people and is the main city on Grand Bahama. Images taken after the storm show the airport underwater.



1.3 OBJECTIVES

The primary objective of this report is to assess the potential impact of the Freeport Harbour expansion on flood risks in the surrounding area. This involves:

I. Analyzing historical and current data to predict possible changes in flood patterns as a result of the Harbour Expansion Project.
II. Determining any flood impacts directly due to the Harbour Expansion Project.
III. Providing recommendations for possible flood risk management options, should there prove to be any impacts as a result of the expansion.

1.4 SCOPE OF WORK

The scope of this assessment encompasses a thorough analysis of various data sets, including topographical, hydrological, and climatic data. The report will leverage tide data, bathymetric surveys, land cover, and historical rainfall patterns. Field observations further supplement these data, providing a practical perspective on the area's current condition and potential vulnerabilities.

1.5 REPORT STRUCTURE

The report is structured to provide a comprehensive overview of the project, beginning with this introduction, which outlines the project's background, past flooding events, objectives, and scope of work. The subsequent sections will delve into the detailed analysis of the project area, covering aspects such as topography, climate, water resources, soil, geology, geomorphology, land use, and land cover. The approach and methodology used for the assessment will be detailed, followed by the impact analysis, assumptions and limitations, mitigation options, discussions, and conclusions drawn from the study.

2 PROJECT AREA

2.1 GENERAL

The Harbour Area consists of approximately nine square kilometers to the southwest of the island of Grand Bahama and falls within the boundary of Freeport. The project site, the harbour expansion area, sits to the west of the existing harbour and consists of approximately 280 acres.

The completion of this project would have the harbour extended further west, neighboring Eight Mile Rock and various western settlements.

2.2 TOPOGRAPHY

The topography surrounding Freeport Harbour on Grand Bahama Island is characterized by relatively flat terrain, with gentle slopes and subtle elevation changes crucial in understanding water flow and potential flood paths. The elevation data, particularly the high-resolution raster at 0.3-meter resolution and medium-resolution raster at 20-meter resolution, utilized in assessing the immediate Harbour Area and surrounding comprehensive study area, provides an in-depth look at the surface contours and features. This data is instrumental in identifying low-lying areas more susceptible to flooding, especially in the context of the proposed harbour expansion. Figure 6 and Figure 7 show the catchment area at the terrain and dredging scale levels. The elevation ranges from -6.4m – 18m in the sea. As the study area's catchment is surrounded by the sea, the highest elevation we can observe is between 10 m towards the southeast, and the lowest elevation is towards the sea, i.e., 0m. Hence, it is understood that the runoff will flow from the southwest to the northeast. The elevation difference between the southwest and northeast is around 5-10m. it should also be noted that the higher elevations of 7-10m that occur directly within the dredge area and just north on the Bahama Rock sites are likely not the natural terrain but are a result of manmade surface items, such as stockpiles.

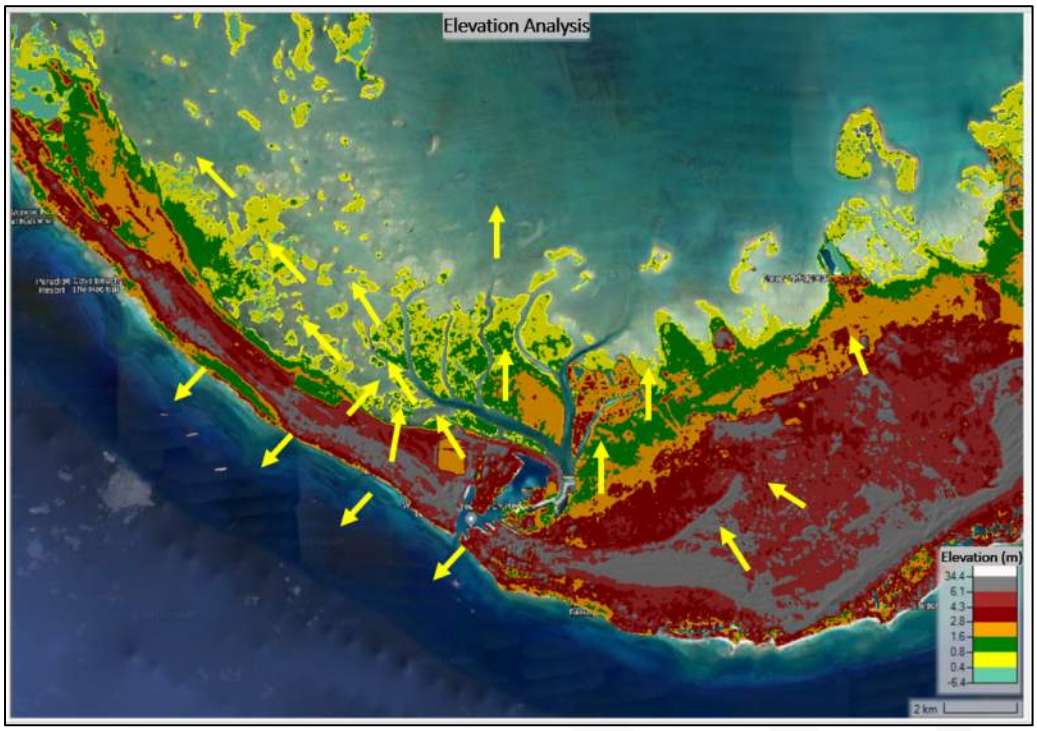


Figure 6. Digital Elevation Model of the Catchment (GBPA Photogrammetric DEM) [20m]

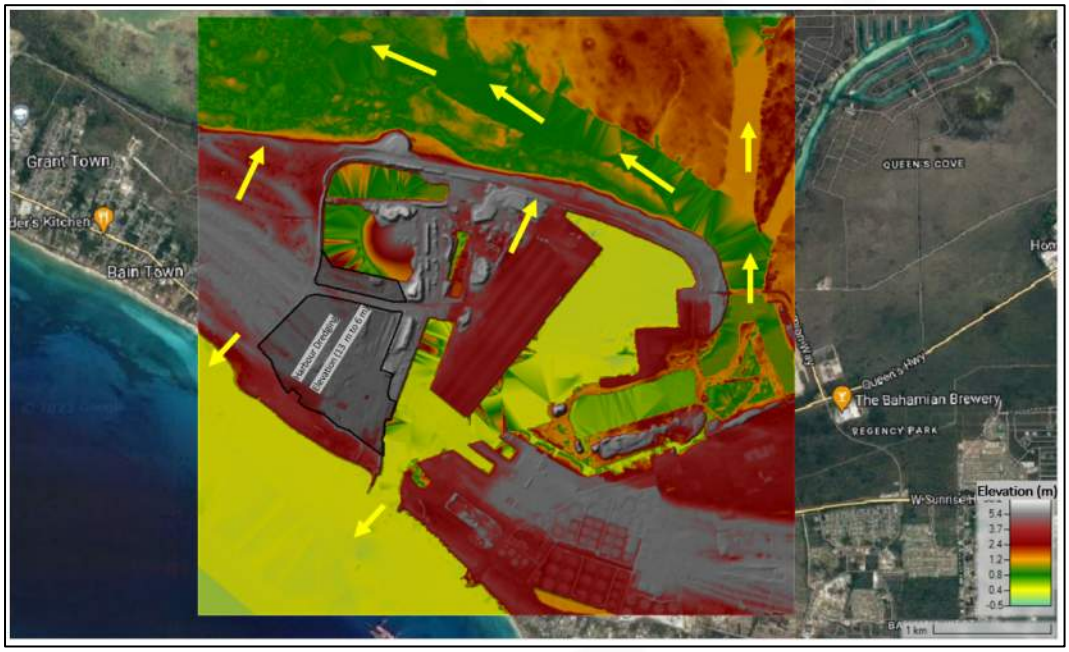


Figure 7. Digital Elevation Model of the Catchment (Lidar Surveying) [5m]

2.3 CROSS-SECTIONAL PROFILE

The simulations of flood inundation extent and maximum flow depth variation are influenced by the cross-sectional orientation of floodplains in river reaches characterized by broad floodplains with complex local topographical variations [6]. The cross-sectional profiles (Figure 8) show a ridge formation in the middle of the land area with an elevation of up to 14m. The elevation drops to 0m towards the sea on either side of the land area.

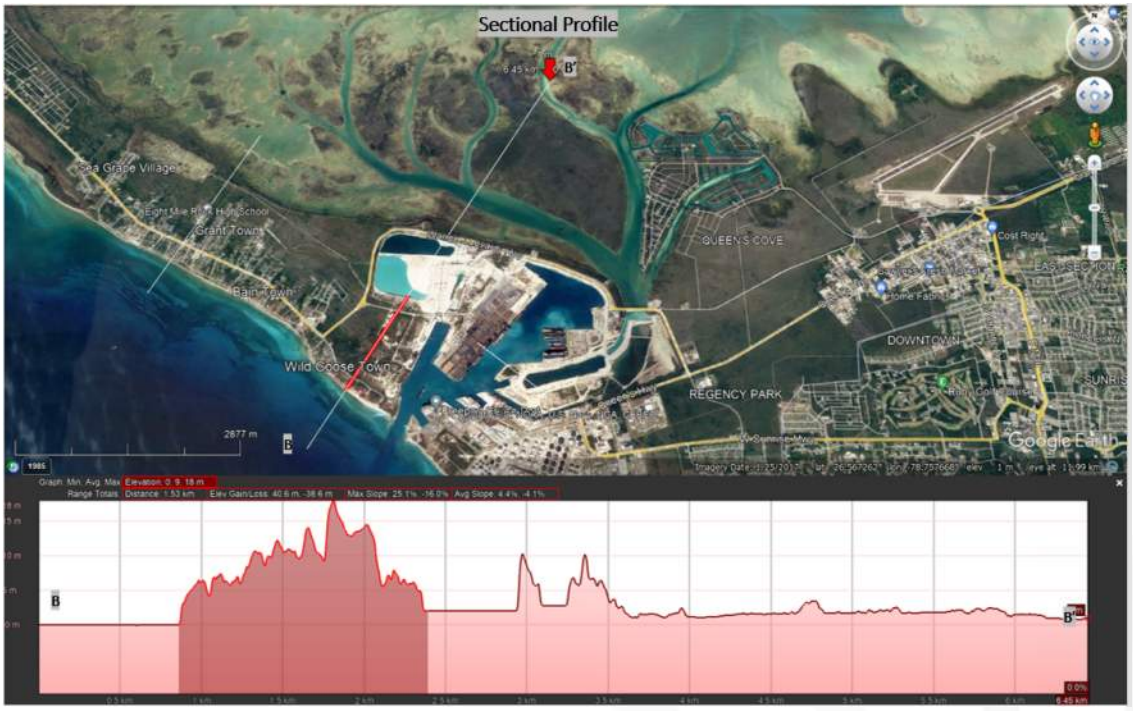


Figure 8. Cross-Sectional Profile of the harbour and nearby area

2.4 REGIONAL DRAINAGE

Watershed analysis is a geographic information system (GIS) based technique designed to model how surface water flows on the Earth's surface [7]. Drainage patterns (Figure 9) of streams reflect multiple factors such as lithology, underlying bedrock structure or fracture patterns, slope or gradient, and sediment availability. The drainage pattern typically depicts the flow of the runoff generated from rainfall. The runoff flows directly into the ocean from the ridge formation in the center. The flow arrows show the runoff flow in the study area.

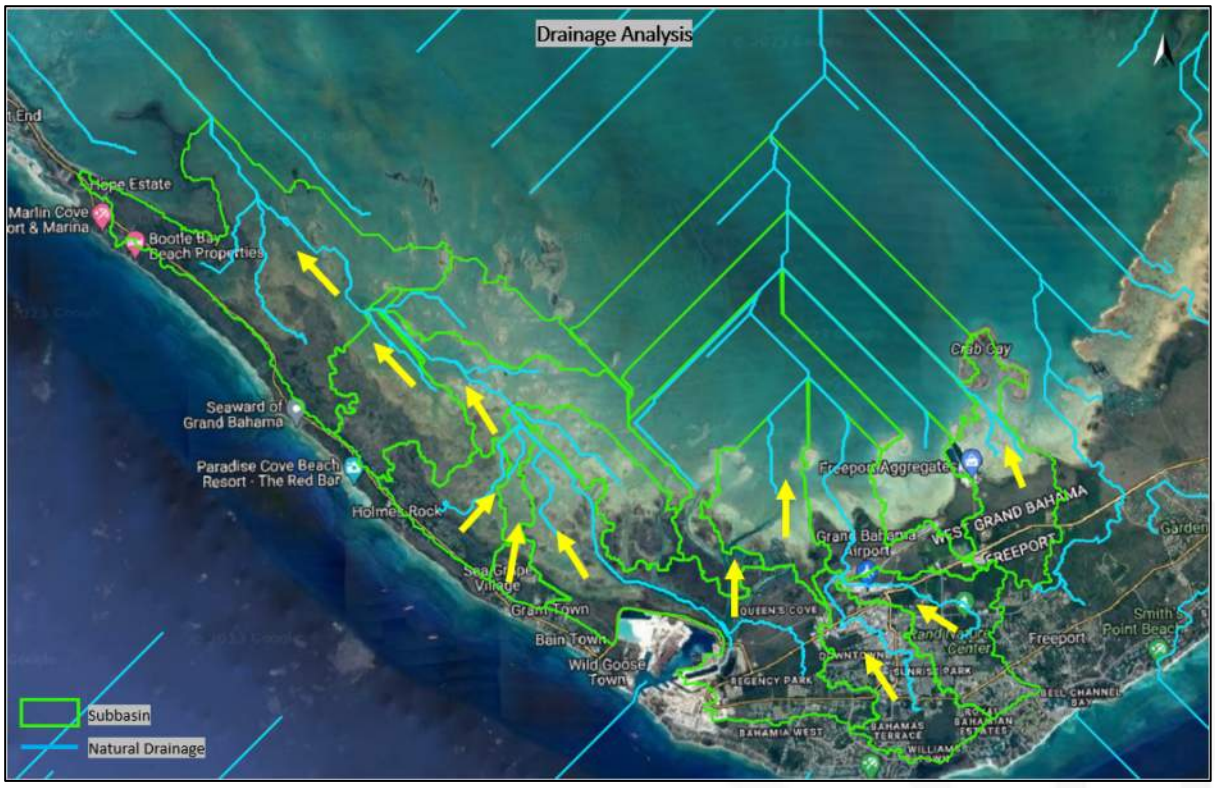


Figure 9. Regional Drainage of the study area

2.5 SLOPE

The slope map provides a geographical area's angle, steepness, or gradient. It is often used to describe or illustrate the steepness of the ground's surface. It provides an understanding of how water moves across the landscape. This data is crucial for flood modelling, land-use planning, and water resource management. Steeper slopes generally contribute to faster runoff. Figure 10 shows that the land is mainly flat, which causes the runoff potential to be low, thereby contributing to the risk of soil erosion. Based on the low-lying terrain of the area and the majority of the area with gentle to flat sloping, it can be seen that the area is susceptible to flooding.

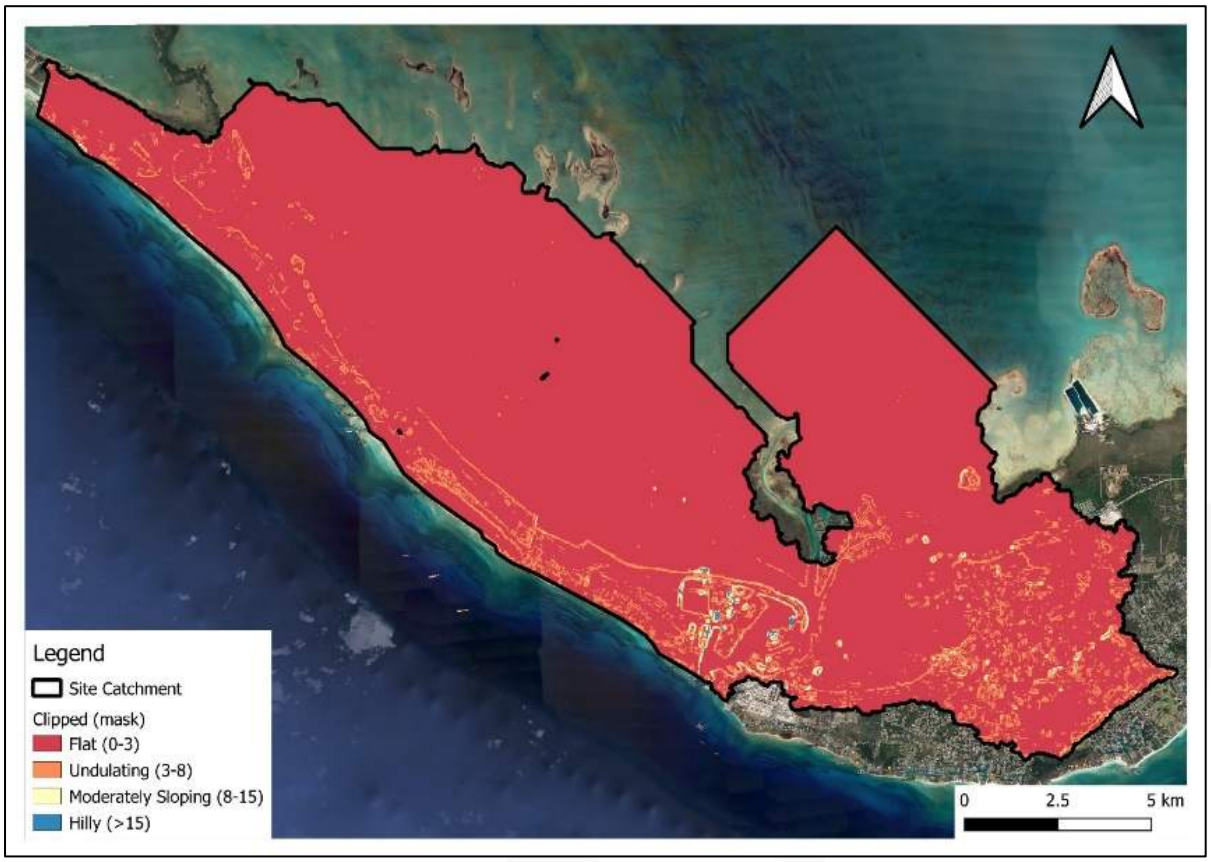


Figure 10. Slope Map

2.6 ASPECT

An aspect map shows the aspect (directions) of a terrain. Aspect categories are symbolized using colour ramps (e.g., pink, white, green, etc.). The values in the map's legend indicate the directions

the physical slopes face.

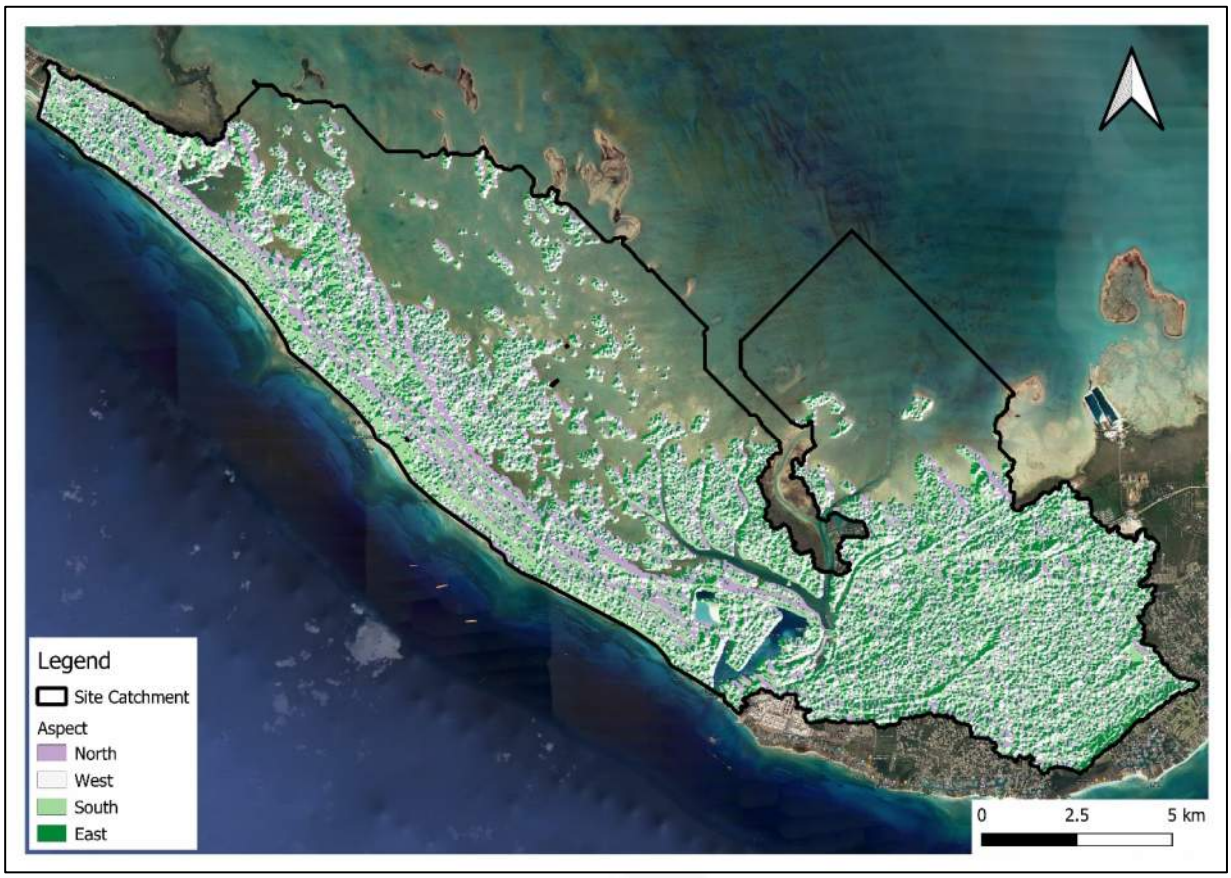


Figure 11 is from a south point of view. Aspect directions can be classified based on the slope angle with a descriptive direction. The runoff patterns within the catchment can be understood by

observing that the slope is facing toward the north (from the south).

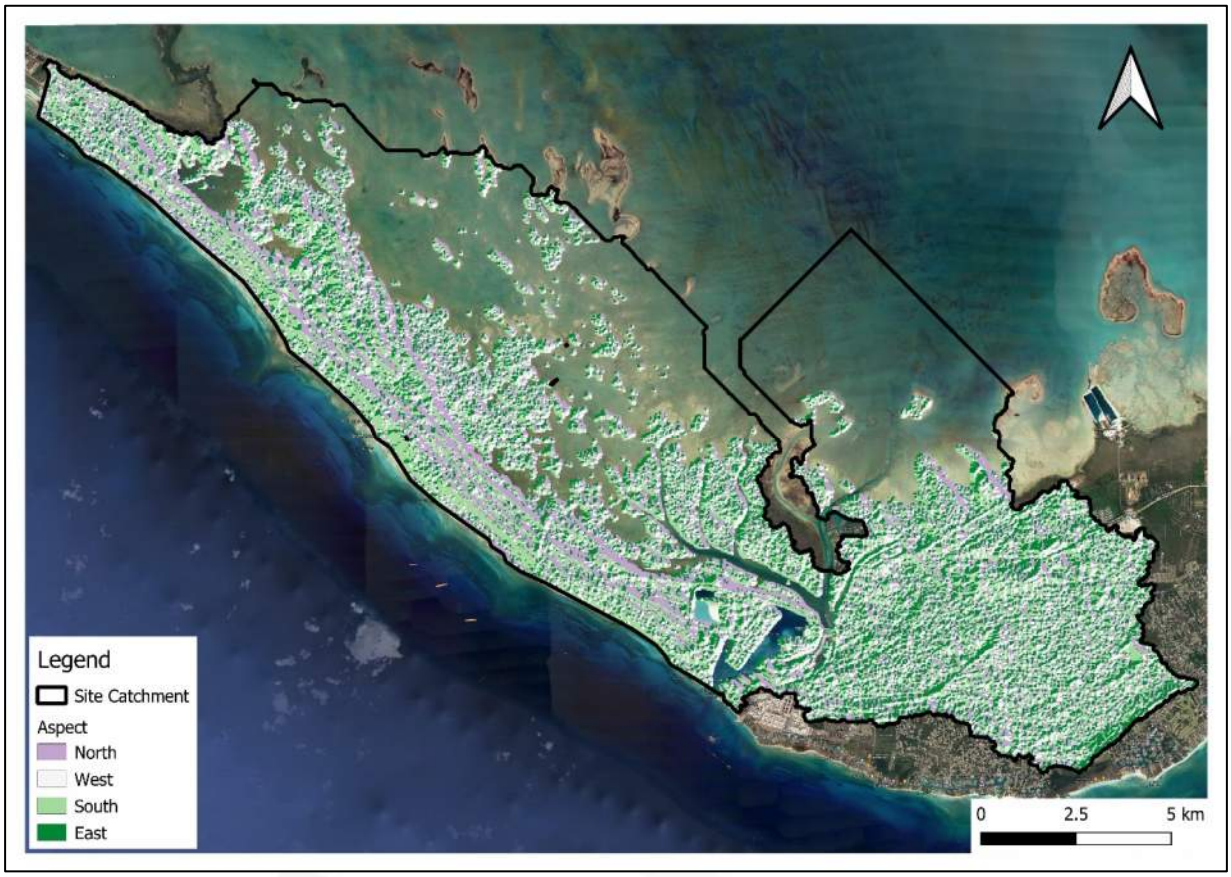


Figure 11. Aspect Map Source: GBPA Photogrammetric DEM – 20m resolution

2.7 CLIMATE

The climate of Grand Bahama Island is tropical maritime, marked by warm temperatures, high humidity, and significant rainfall, particularly during the hurricane season from June to November [8]. The rainfall data spanning over 50 years is invaluable for understanding long-term climatic trends and patterns. This historical perspective is crucial for modeling potential flood scenarios, as it helps predict how similar weather patterns could impact the area post-expansion.

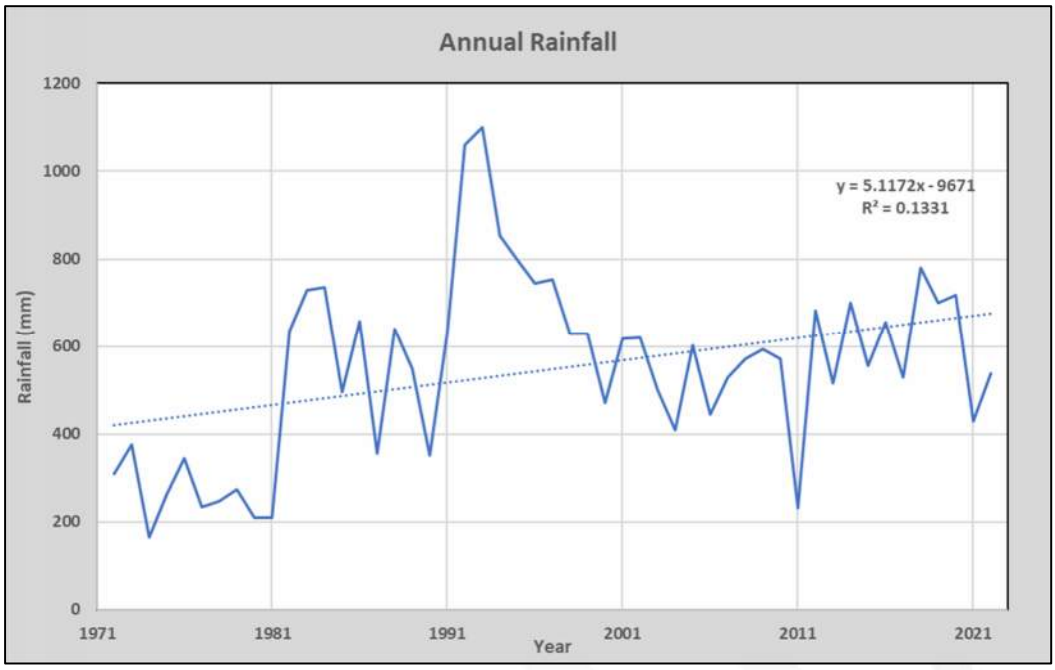


Figure 12. Annual Rainfall (1971-2021)

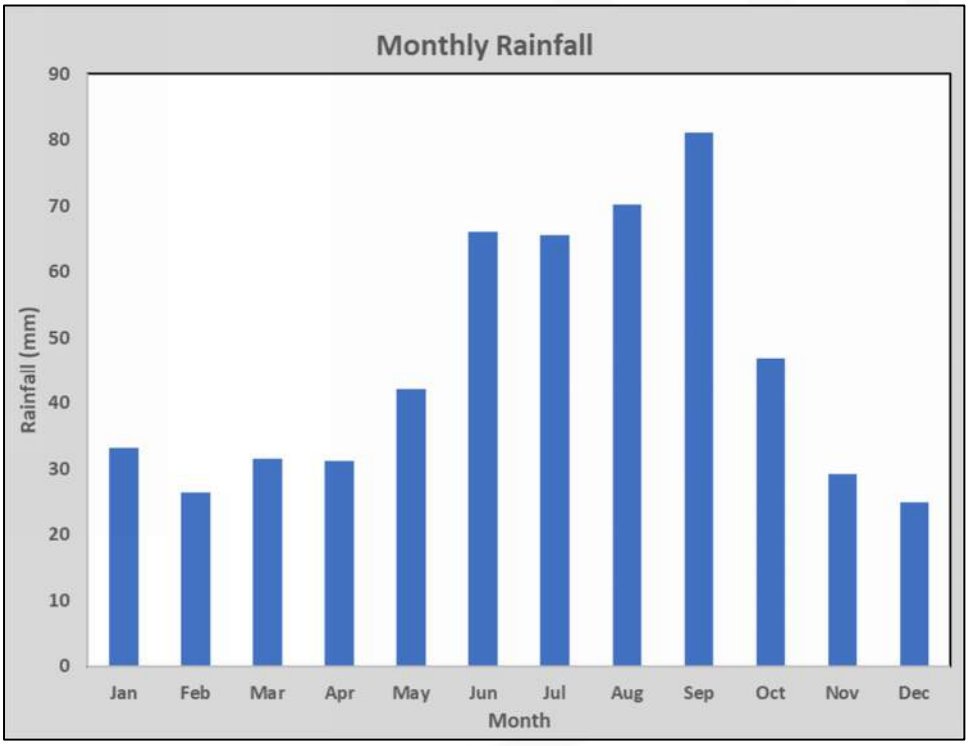


Figure 13. Monthly rainfall

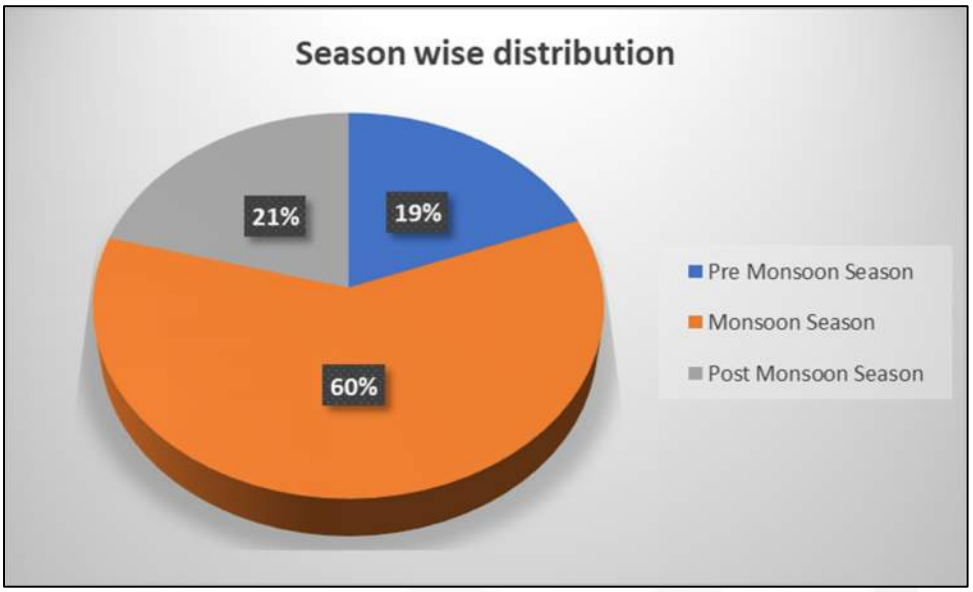


Figure 14. Season-wise distribution

Grand Bahama features a tropical rainforest climate similar to South Florida's. According to Köppen Climate Classification (Af), more specifically, with hot, humid conditions that vary only a little throughout the year. Temperatures rarely drop below 16 °C (60 °F). Average temperatures are around 27 °C (80 °F), with water temperature varying between 22 and 26 °C (72 and 78 °F). The winters are usually mild and dry (with the exception of some rainfall due to cold fronts), while the summers are typically hot and wet. Although a freeze has never been reported in the Bahamas, snow was reported to have mixed with rain in Freeport in January 1977, the same time that it snowed in the Miami area. The temperature was about 4.5 °C (40.1 °F) at the time. The temperature of 4.5 °C (40.1 °F) was tied on January 30, 2022.

The Annual rainfall pattern (Figure 12) shows an increasing trend in rainfall. The maximum rainfall event happened in the year 1992 to 1994. The monthly rainfall pattern (Figure 13) shows that September is more prone to maximum rainfall, followed by June and August. The rainfall contribution (Figure 14) from the monsoon season is more compared to the other two seasons of the year.

2.8 INTENSITY DURATION CURVE

The standard method for estimating rainfall for different return periods is to fit a theoretical

frequency distribution to the annual maximum rainfall data series and estimate parameters using statistical methods. Gumbel's Extreme Value Distribution method was adopted since it is the most suitable as compared to other distribution methods.

A return period, also known as a recurrence interval or repeat interval, is an average time or an estimated average time between flood events. In other words, the 1 in 5-year return period corresponds to a nominal rainfall event, while the 1 in 100-year return period corresponds to a very high-intensity rainfall event. The intensity, effect, and quantity increase as the return period increases.

The rain gauge station with data for more than 50 years between 1971 and 2023 has been analyzed to generate the IDF curve used further in the study. The maximum daily rainfall for each year is taken as input. This series is subjected to Gumbel's extreme value distribution, and the corresponding intensities are derived to obtain the resulting Intensity-Duration-Frequency Curve.

Gumbel's Extreme Value Distribution

Intensity-Duration-Frequency (IDF) curves describe the relationship between rainfall intensity, rainfall duration, and return period (or its inverse, probability of exceedance). IDF curves are commonly used in the design of hydrologic, hydraulic, and water resource systems. IDF curves are obtained through frequency analysis of rainfall observations shown in Figure 15.

Gumbel distribution methodology was selected to perform the flood probability analysis. The Gumbel theory of distribution is the most widely used distribution for IDF analysis owing to its suitability for modeling maxima. It is relatively simple and uses only extreme events (maximum values or peak rainfalls). The Gumbel method calculates the 2, 5, 10-, 25-, 50- and 100-year return intervals for each duration period and requires several calculations.

The Gumbel equation is given as

$$X_T = u + \alpha y_T$$

Where, X_T is T-year return period value, u is the mode of distribution, α is sample moments and y_T is a reduced variate.

Given by the following equation

$$u = \bar{X} - 0.5772\alpha$$

$$\alpha = \frac{\sqrt{6}}{\pi} S_x$$

$$y_T = -ln\left[ln\left(\frac{T}{T-1}\right)\right]$$

Where, $\bar{X}$ = Mean of N observations

S_x = Standard deviation of N observations = $\sqrt{\frac{(x-\bar{x})^2}{N-1}}$

X = Rainfall event

T = Recurrence interval (Storm Return Period), N = Sample size

Table 1. IDF Value (Grand Bahama Raingauge station)

Minutes	2-Yr	5-Yr	25-Yr	50-Yr	100-Yr
5	108.65	139.23	215.21	259.61	313.17
15	52.22	66.91	103.43	124.76	150.50
60	20.71	26.54	41.03	49.49	59.70
120	13.04	16.72	25.84	31.17	37.60
180	9.95	12.75	19.72	23.78	28.69
360	6.27	8.03	12.42	14.98	18.07
720	3.95	5.06	7.82	9.43	11.38
1440	2.49	3.19	4.93	5.94	7.17

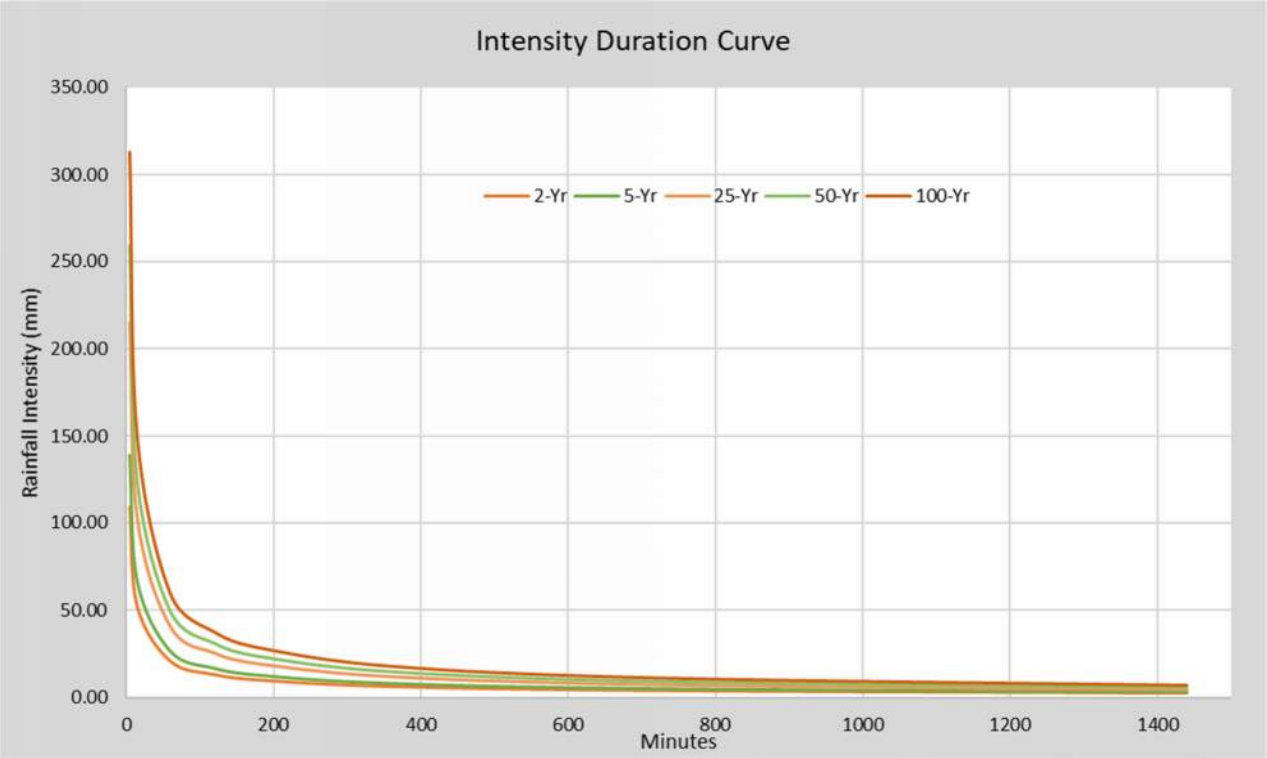


Figure 15. IDF Curve for Grand Bahama Island

2.9 WATER RESOURCES

- **Surface Source:** The surface water resources near the harbour include creeks and streams that can be directly affected by the harbour expansion. Changes in the hydrodynamic environment due to dredging could alter the flow patterns of these surface water bodies, impacting the surrounding areas.

- **Groundwater Source:** The groundwater sources in the area play a vital role in the overall hydrological cycle. Understanding the interaction between groundwater and surface water is essential in assessing how the harbour expansion might affect the water table, and, consequently, flood risks.

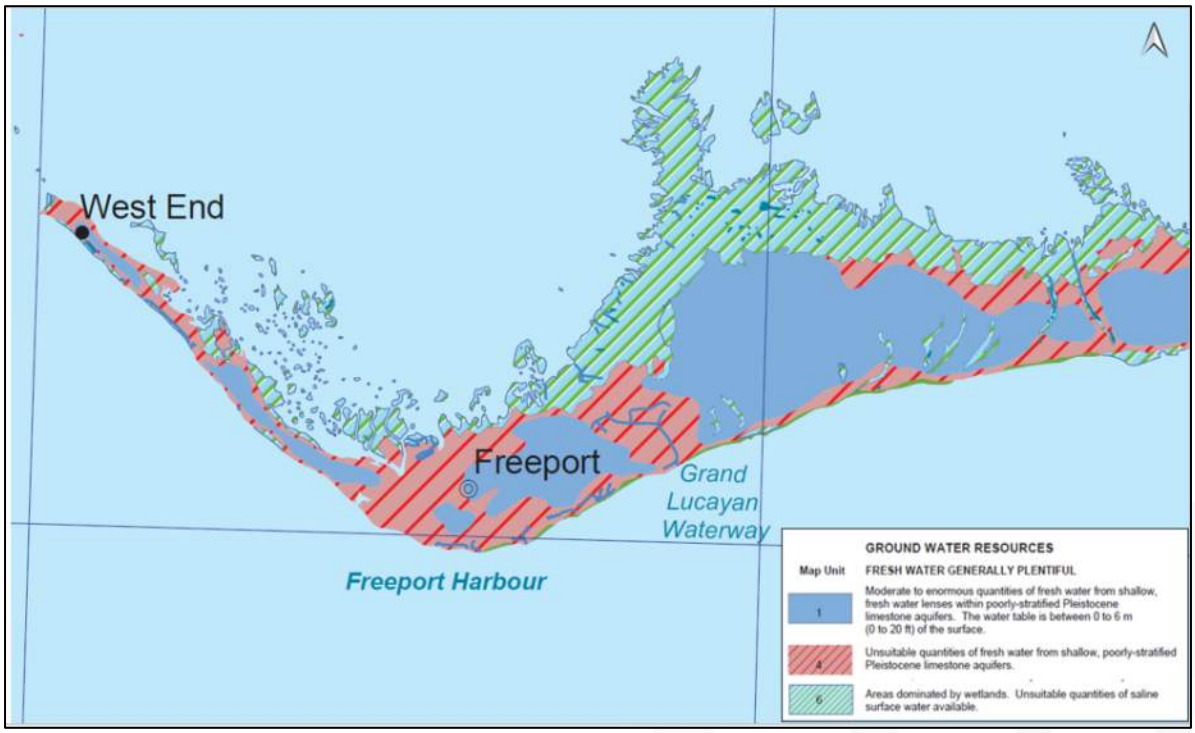


Figure 16.Grand Bahama Island Groundwater Resources Map (Source: Water resources of the Bahamas)

Figure 16 illustrates the groundwater table of the study area. Observations indicate that the southern coastline has limited fresh water and is underlain by poorly stratified limestone aquifers. The water table ranges from 0 to 6 meters (0 to 20 feet) in depth. The harbour area is situated within these limestone aquifers, which have low permeability and generally prevent the easy seepage of groundwater to the surface. Ongoing dredging activities may compromise this natural barrier, increasing the likelihood of water inundation. Additionally, alterations to the cone of depression due to dredging could impact the water table.

2.10 SOIL

The soil data, encompassing texture, porosity, and permeability, are key factors in determining how water infiltrates and flows through the ground. Different soil types respond differently to water saturation, which can significantly influence flooding patterns. The soil characteristics will be considered in conjunction with topographical and hydrological data to predict areas that may become prone to flooding [23].

The soil map (Figure 17) is generally used for spatial planning, environmental protection, and similar projects. The study area shows a high percentage of Cambisols and Vertisols compared to the rest, having values of 32.3% and 23.4%, respectively. Cambisols soils have low base saturation within 100cm depth, high porosity, good water-holding capacity, and good internal discharge. Vertisols typically have a high clay content, which can affect water infiltration and drainage; also, cracking in Vertisols can influence soil erosion during high rainfall. The runoff is generally very high since these soils are predominantly present along the shoreline.

Rainfall in the area averages approximately 60 inches per year (1524 mm/year), of which about 30 inches (762 mm/year) infiltrate the subsurface, and 18 inches returns to the atmosphere as evapotranspiration. The freshwater lens receives an average of 10 - 12 inches of annual recharge at a steady state. While the hydraulic conductivity was expected to be high in the Lucayan, especially at depth, these values appear unrealistic. This may be due to the fact that the wells were constructed as open holes from the ground surface down to approximately 70 feet (there is no distinct screen interval) [4].

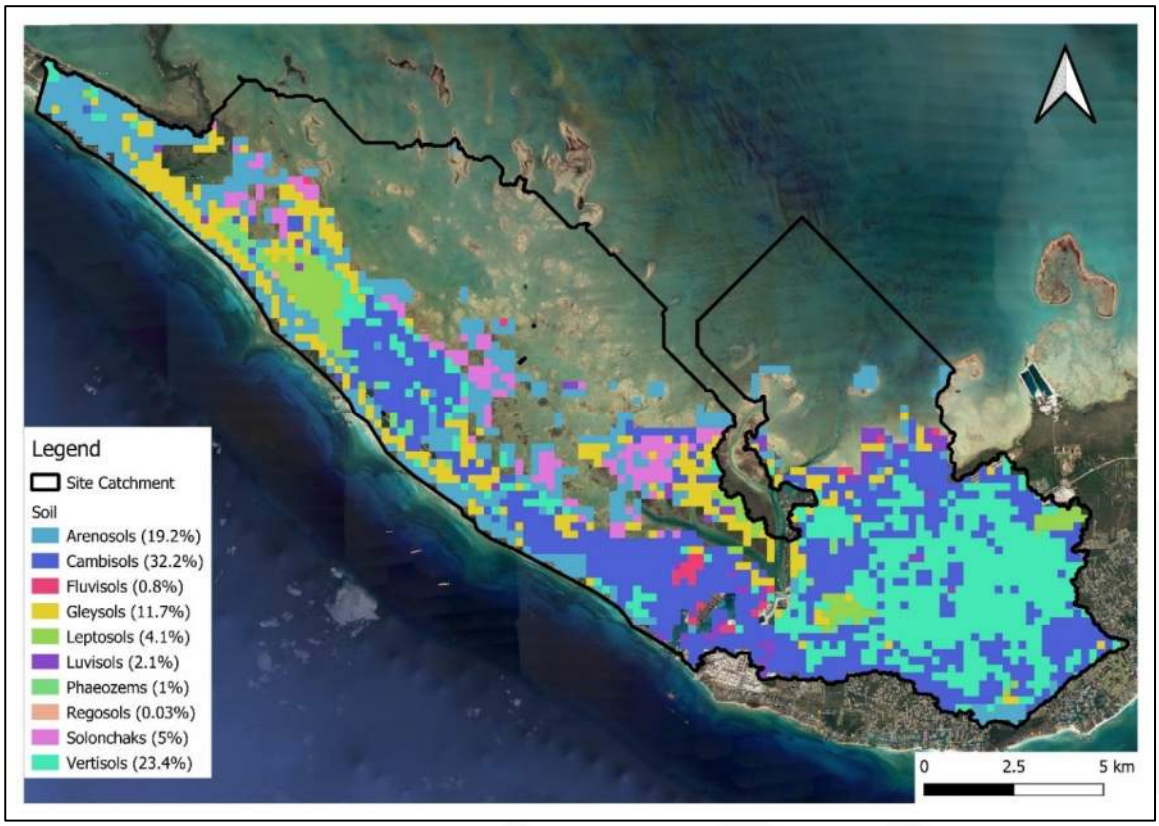
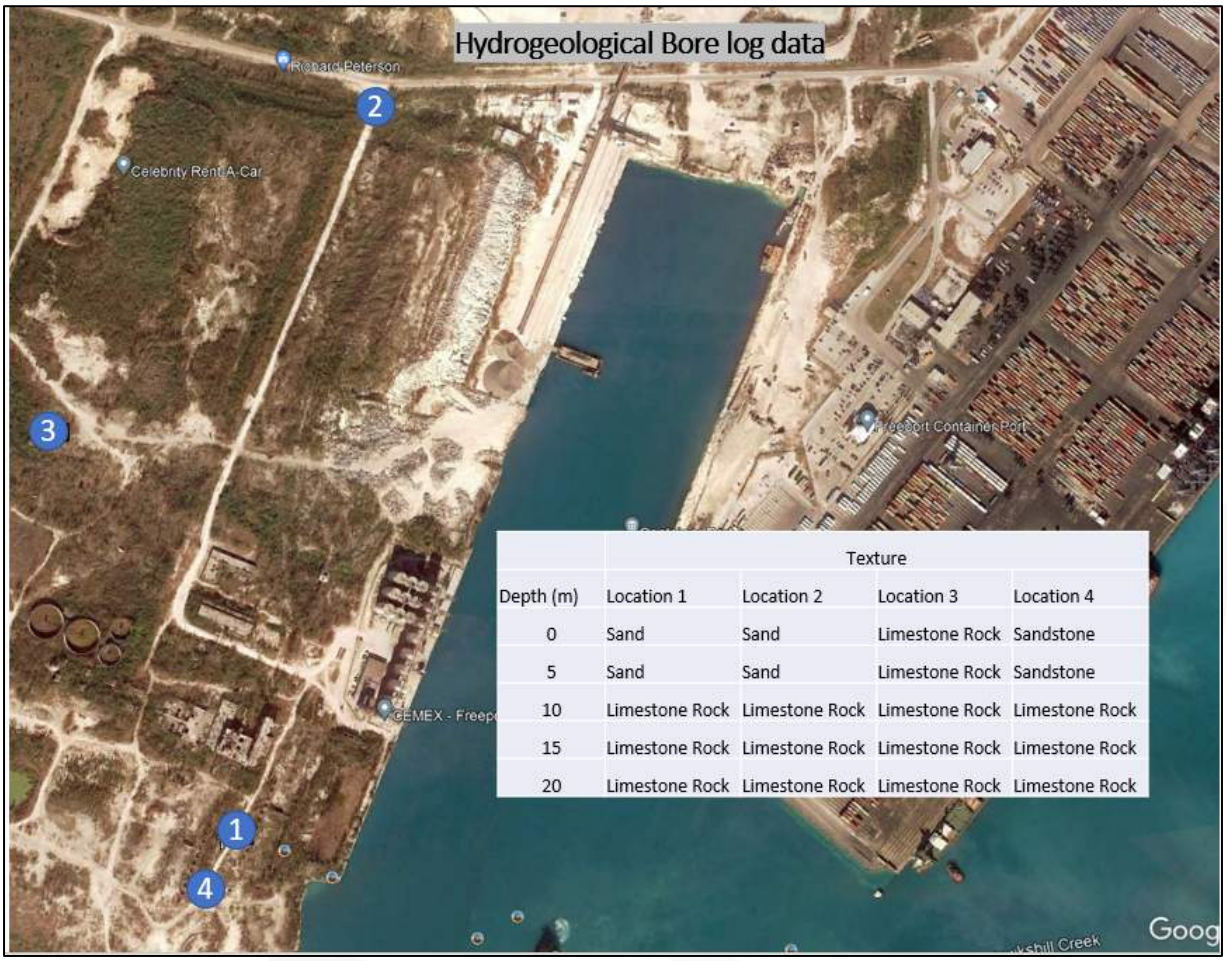


Figure 17. Soil Map Source: ISRIC — World Soil Information

2.11 Borehole Report – Soil Parameters

The soil parameters for the dredging location have been derived from borehole testing. The borehole testing was carried out in four locations in the dredging area (Figure 18). The dredging depth was up to 20m at an interval of 5m. The borehole report shows that below 10m, the formation is limestone rock. The porosity and permeability are 15% and 0.00030005 (cm/hr). They are more impervious, i.e., less groundwater and surface water interaction will occur. As groundwater flows between rocks, it carries the limestone minerals with it. This can enlarge cracks in the rock and can even hollow out large caverns underground. The groundwater can also become saturated with minerals, causing some of them to precipitate out of the water and leave a limestone deposit.



	Texture			
Depth (m)	Location 1	Location 2	Location 3	Location 4
0	Sand	Sand	Limestone Rock	Sandstone
5	Sand	Sand	Limestone Rock	Sandstone
10	Limestone Rock	Limestone Rock	Limestone Rock	Limestone Rock
15	Limestone Rock	Limestone Rock	Limestone Rock	Limestone Rock
20	Limestone Rock	Limestone Rock	Limestone Rock	Limestone Rock

Figure 18. Drill Report – Soil Parameters

2.12 GEOLOGY & GEOMORPHOLOGY

The area's geological structure and geomorphological features provide insights into the natural processes shaping the land and its susceptibility to flooding. Understanding these features is crucial for assessing how the harbour expansion might affect the landscape and natural water flow patterns.

Figure 19 shows the deposition of Alluvial deposits, typically consisting of well-sorted to semi-sorted clay, silt, sand, and gravel. The geology type is Quaternary alluvium, which typically occurs along rivers/coasts. The Quaternary is the most recent and the shortest geological period, extending from about 1.6 million years ago to the present day.

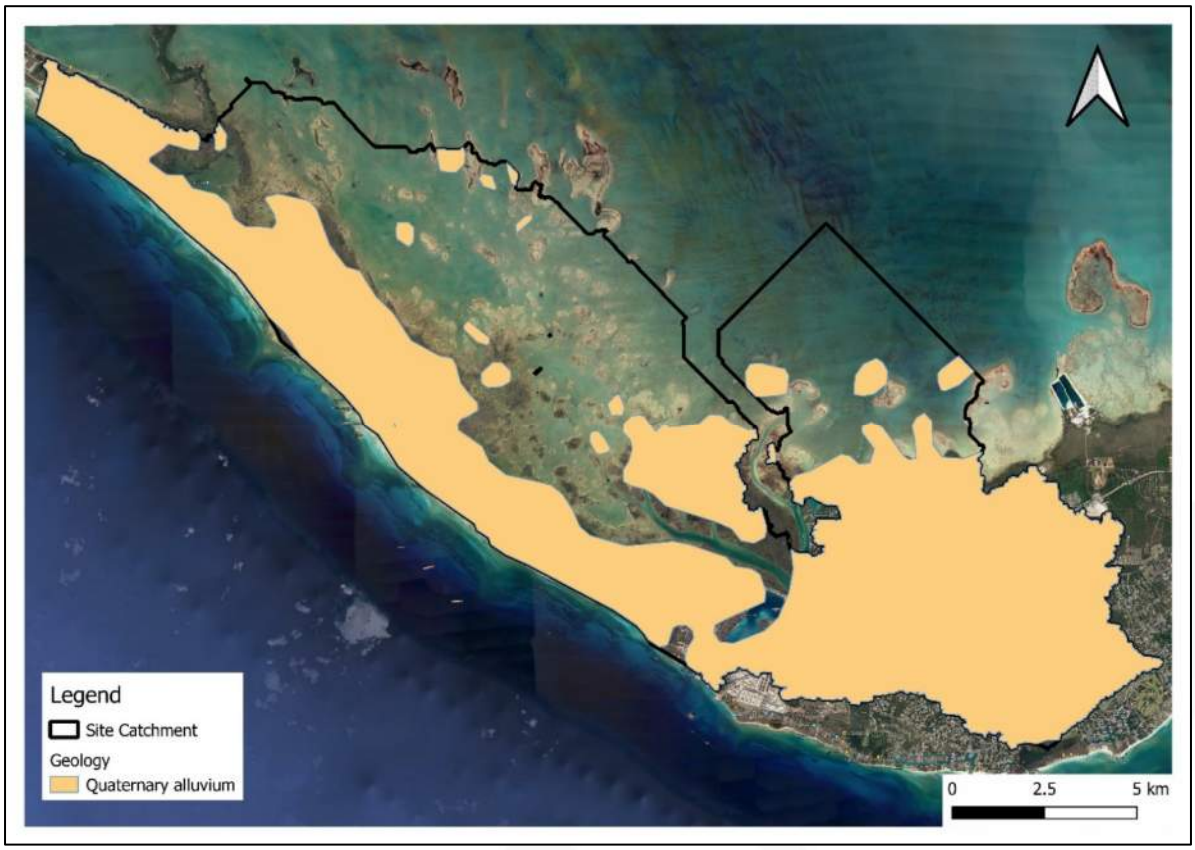


Figure 19. Geology & Geomorphology Map

2.13 LANDUSE/LANDCOVER

The land cover data, illustrated through a raster in TIFF format, provides a detailed overview of the current land use. Understanding how the built environment, vegetation cover, and other surface types might interact with and be impacted by flooding is crucial. This information is vital for planning flood mitigation strategies that align with the existing land use [22].

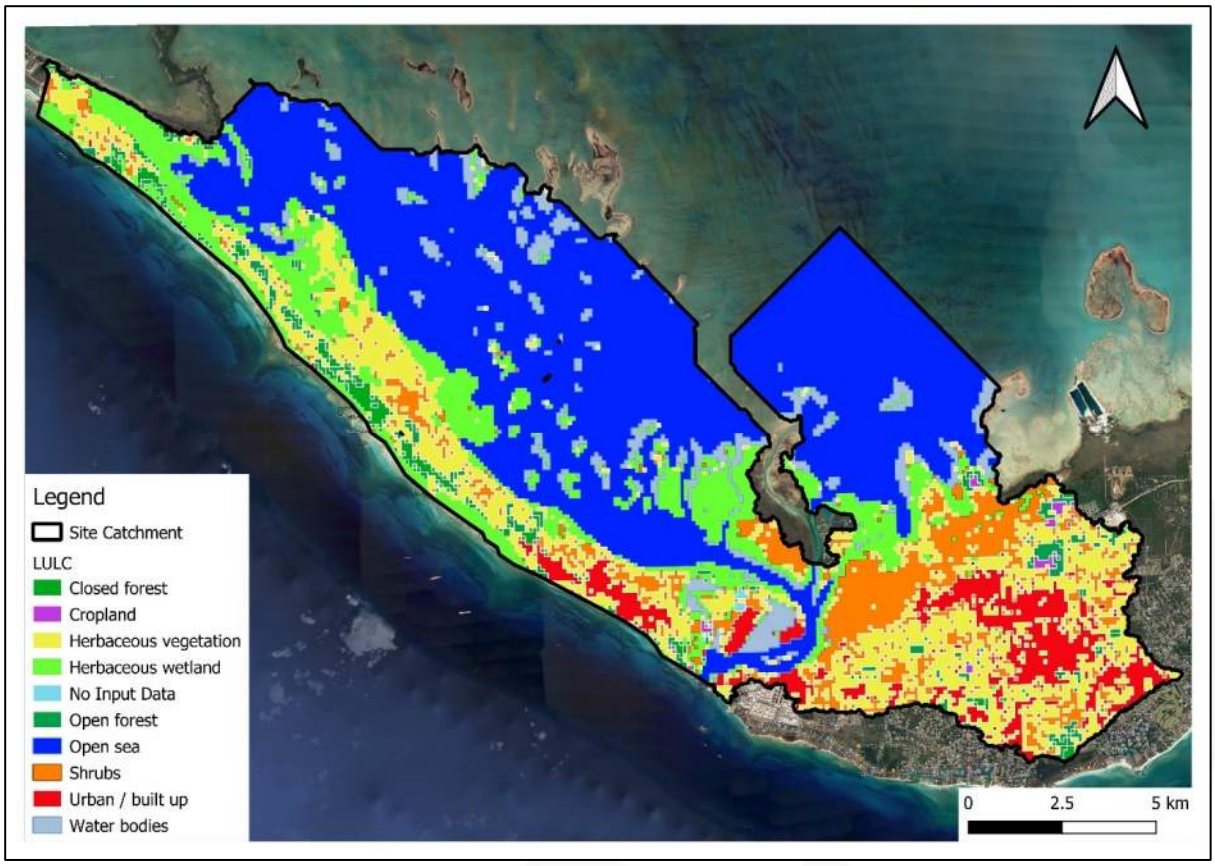


Figure 20. Land Use Land Cover Map (GBPA LULC)

Land cover refers to the surface cover on the ground, like vegetation, urban infrastructure, water, etc. Identification of land cover establishes the baseline information for activities like thematic mapping and change detection analysis. Land use refers to the purpose the land serves, for example, wildlife habitat or agriculture.

The study area's LULC map (Figure 20) is generated using data from Global Copernicus land cover at a resolution of 100m. The catchment mainly has high percentages of open sea (45%), herbaceous vegetation (16.3%) and wetland (12.5%). This indicates that the runoff potential is low due to the land being almost flat and the high water absorption rate.

2.14 SITE ANALYSIS

Field photos and observations (Figure 21) from media provided give a practical, on-the-ground perspective of the project area. They offer valuable insights into current conditions and potential

vulnerabilities that may not be evident from the data alone. These observations are integral to a comprehensive understanding of the area and will inform the assessment of the flood impact of the harbour expansion.

Figure 21. Field Photos around the Harbour Area (provided by the client)

3 APPROACH AND METHODOLOGY

3.1 GENERAL

A comprehensive approach combining various data sources and analytical techniques has been adopted to assess the flood impact of the Freeport Harbor expansion. The methodology integrates topographical, hydrological, climatic, and land use data to understand the current conditions and predict potential changes due to the harbour expansion.

As the Flood Risk Assessment (FRA) study aims to assess whether there will be adverse flood impacts due to the expansion, the analysis is carried out in three stages.

3.2 PRELIMINARY STAGE

As a first step, a data catalogue was prepared to obtain the necessary information for each step. The client's representative provided data collection in the form of images and videos of the site. Discussions on preliminary understandings and topographical-level data were added to the assessment in conjunction with this data. The study relies on various datasets, each contributing unique insights into the area's flood risk profile.

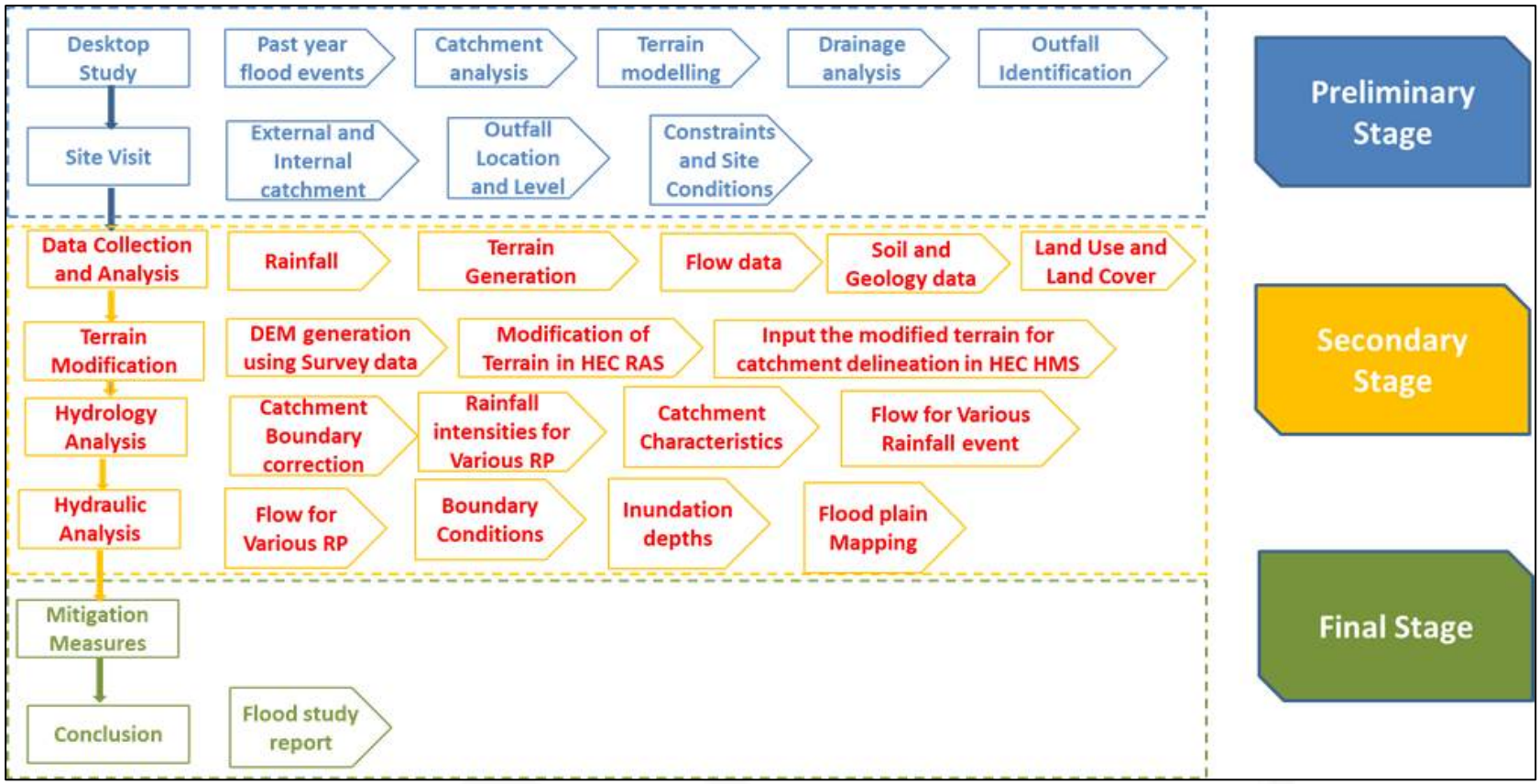


Figure 22. Overall Approach and Methodology

3.3 DATA AND TOOLS USED

Table 2 summarizes these datasets' type, source, spatial and temporal resolutions, and data review. Figure 22 shows the overall methodology.

Table 2 Data used and review

S.No	Data description	Source	Data review and comments
1	Rainfall data	Raingauge station (26.5356-78.697	Daily rainfall data from 1971 to 2023.
2	Topography	Lidar survey data (Primary source)	5 m resolution survey of the area in and around the dredging location.
		GBPA DEM (Secondary source)	For the areas other than the Lidar survey, 30 m resolution DEM has been used.
3	Shapefiles	Surveying and Google Earth marking	The various shapefiles of the river, buildings, roads, etc., have been digitized for modelling purposes.
4	Tidal data	Tidal data for every 5 minutes from 23-08-2023 to 06-10-2023	Will be used as the downstream boundary condition for the model.
5	Soil data	Borehole testing	The borehole testing was carried out in four locations in the dredging area. The dredging depth was up to 20 m at an interval of 5 m.
6	Flood History	Reports and Websites	
7	LULC	GBPA LULC	For the entire catchment area, open-source LULC has been used.
8	All other secondary data	Open sources	

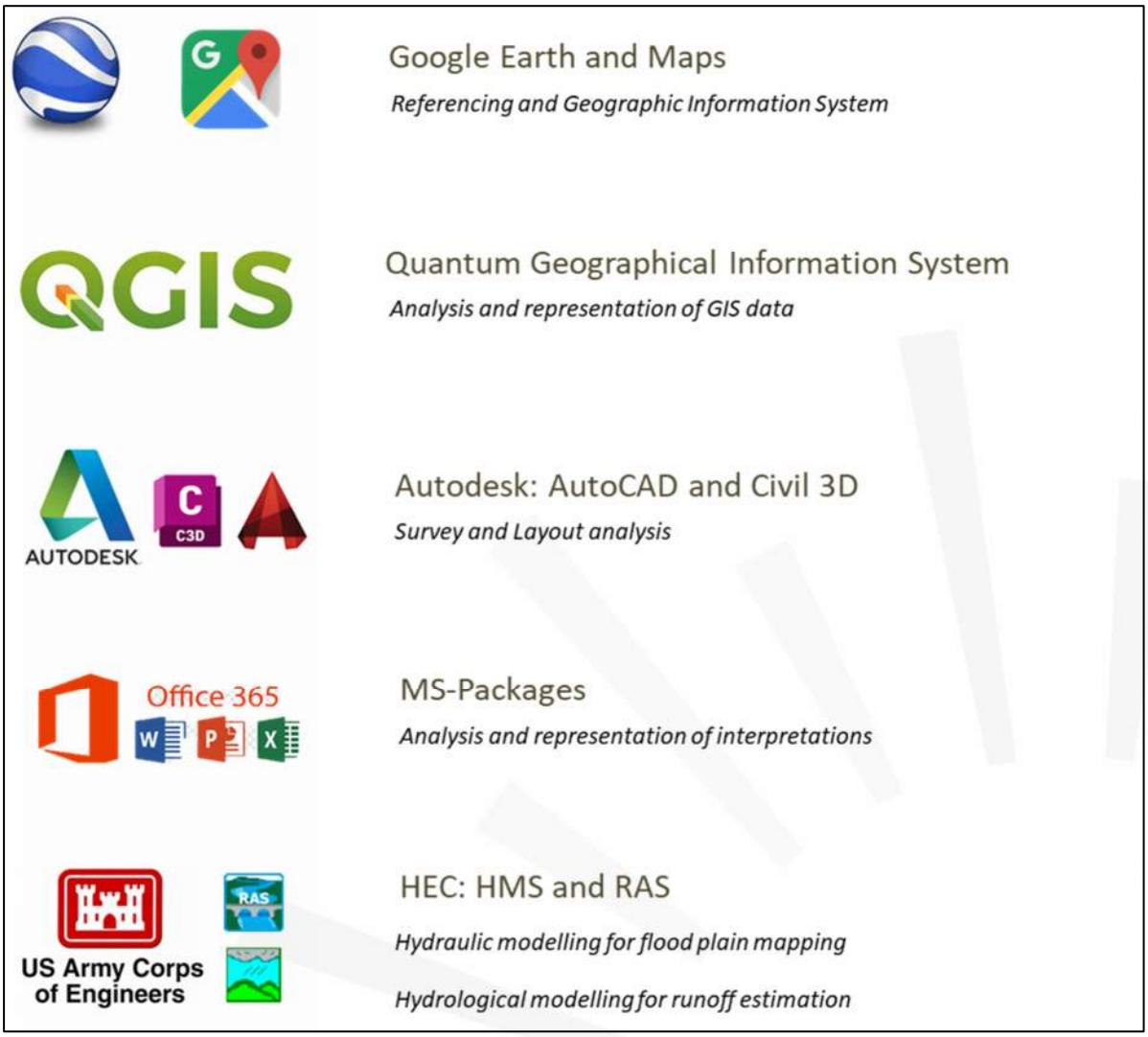


Figure 23. Softwares and Tools Used

Figure 22 and Figure 23 represent the data and the tools used. After collecting the data sets, the analysis was started with an initial focus on topography. Using HEC-HMS, the terrain was set up and analyzed by delineating the catchment to understand the boundary of influence with respect to the outfall point considered.

3.4 SECONDARY STAGE

The open-source DEM data, DEM generated from the survey data, DEM generated for the Creek cross-sections, demarcated creek boundaries, and DEM data generated using open-source data for various components of the urban area are imported into the RAS mapper of the HEC-RAS module. These DEMs are sandwiched into a single terrain reflecting a real scenario. The sandwiched DEM is resampled into 1 m resolution DEM. This resampled DEM is again imported into the HEC-HMS model for delineating the catchment and reaches, etc. With this modified terrain as a base, the hydrology parameters are developed for calculating the HMS parameters.

Utilizing the rainfall data, meteorological scenarios have been developed in HEC-HMS for five return periods i.e., for 5-year, 10-year, 25-year, 50-year, and 100-year. The aforementioned events have been used for hydrological analysis in the software, and outcomes as hydrographs of runoff for the respective designed return periods have been obtained.

The output of the HEC-HMS model (Hydrologic Engineering Center - Hydrologic Modeling System) has been used in the HEC-RAS Model (Hydrologic Engineering Centre of U.S. Army Corps of Engineers – River Analysis System) via a Data Storage System (DSS) as a link. It is known as the coupling of two software models. HEC-RAS models and analyzes the hydraulic structures, including natural drain formation (streams), engineered drains, and regulatory structures such as bridges, culverts, sluice gates, and storage areas. The terrain setup is subject to replicating the surface features in the catchment using topography level and open-source GBPA DEM data. The terrain is resampled from 20m to 1m to have more accuracy. The basic scenarios to be simulated are the specified return periods from 5-year to 100-year. The terrain behaviour is observed under specific scenarios provided, and with modelled features. Return period scenarios are modelled, and calibrated with the observed maximum water level at the site. The model is validated using other observed flood marked values at different locations.

Using HEC-HMS, the GBPA DEM is used to derive the catchment characteristics. The DEM is filled to remove any local sink, which is further used for defining and segmenting the existing streams and the catchment grid. The discharge point is considered on the delineated surface drainage, and the catchment boundary is masked. The other channels follow the natural slope.

This is used to develop a terrain in HEC-RAS Model (Hydrologic Engineering Centre of U.S. Army Corps of Engineers – River Analysis System). It is used to model terrain development and simulate various scenarios regarding extreme rainfall events. For the boundary conditions, flow hydrology is followed for upstream, and Tide data (depth of runoff) is followed for downstream conditions.

3.5 FINAL STAGE

The final stage deals with the mitigation measures and options for flood-resilient management practices. The Best Management Practices for the flood resilience suitable for the site has been proposed.

4 MODEL PREPARATION AND SETUP

4.1 GENERAL

The floodplain mapping has been completed using the following tools and methodology. The brief of the flow chart is shown Figure 24.

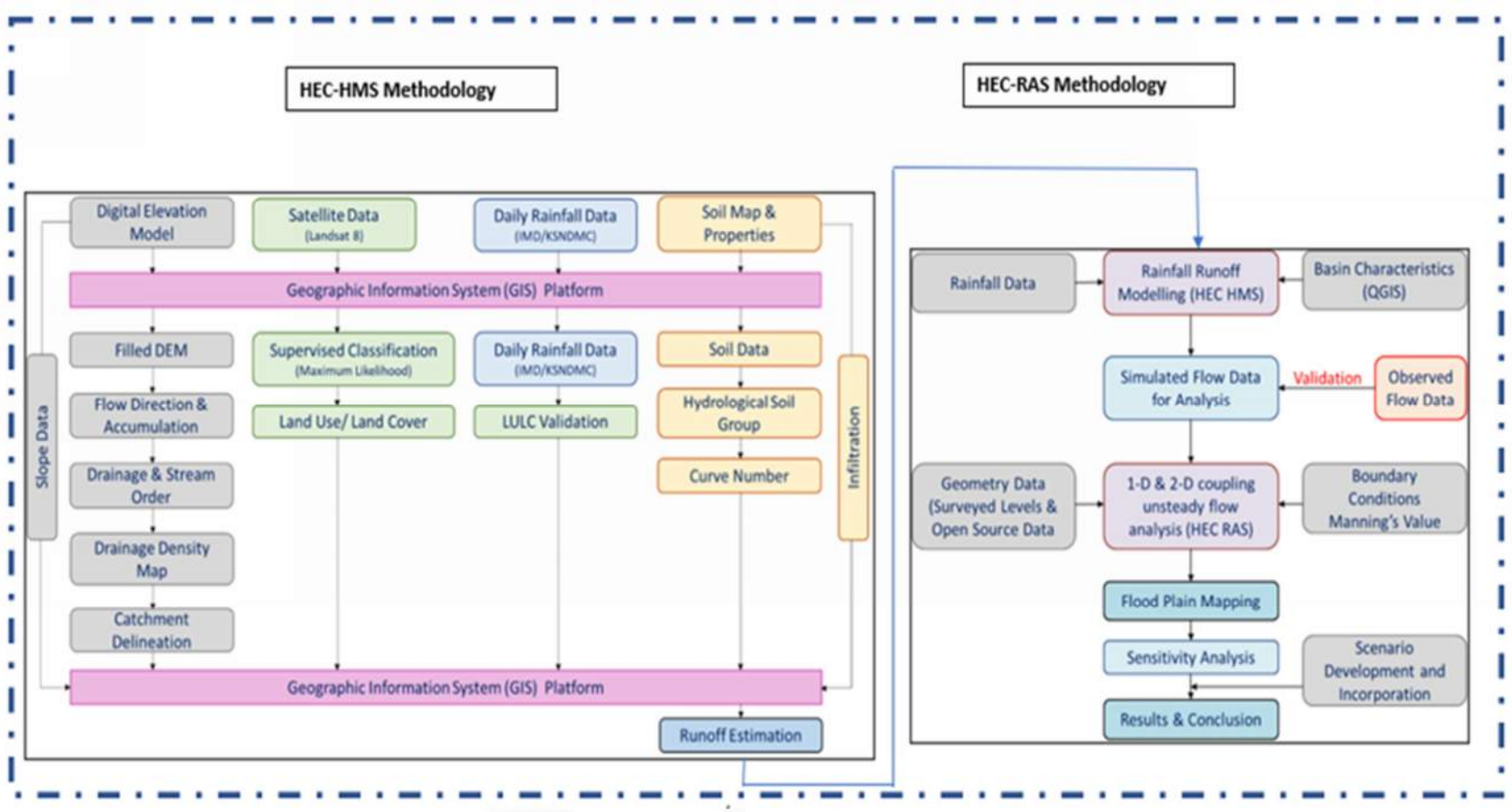


Figure 24. HEC-HMs & RAS Methodology

4.2 HYDROLOGICAL ANALYSIS – HEC-HMS

The HEC-HMS program works on the principle of the watershed runoff process, which begins with precipitation falling onto the vegetation, land surface, and water bodies, only to be returned to the atmosphere through evaporation and transpiration, as shown in Figure 25. Some precipitation from the vegetation falls onto the land surface, joining the precipitation that had directly fallen onto the surface. A part of it infiltrates, and the rest enters the stream. The infiltrated precipitation is stored in the upper/partially saturated soil layer. This water further gets carried to the surface by capillary action, flows horizontally as interflow, or further percolates vertically to join the aquifers as groundwater. All the water mentioned above eventually flows towards the stream to join in. The model mimics this process and simulates the flow, considering all the losses, transformations, and attenuation.

The model HEC-HMS comprises three basic model components: basin model, meteorological model, and control specifications.

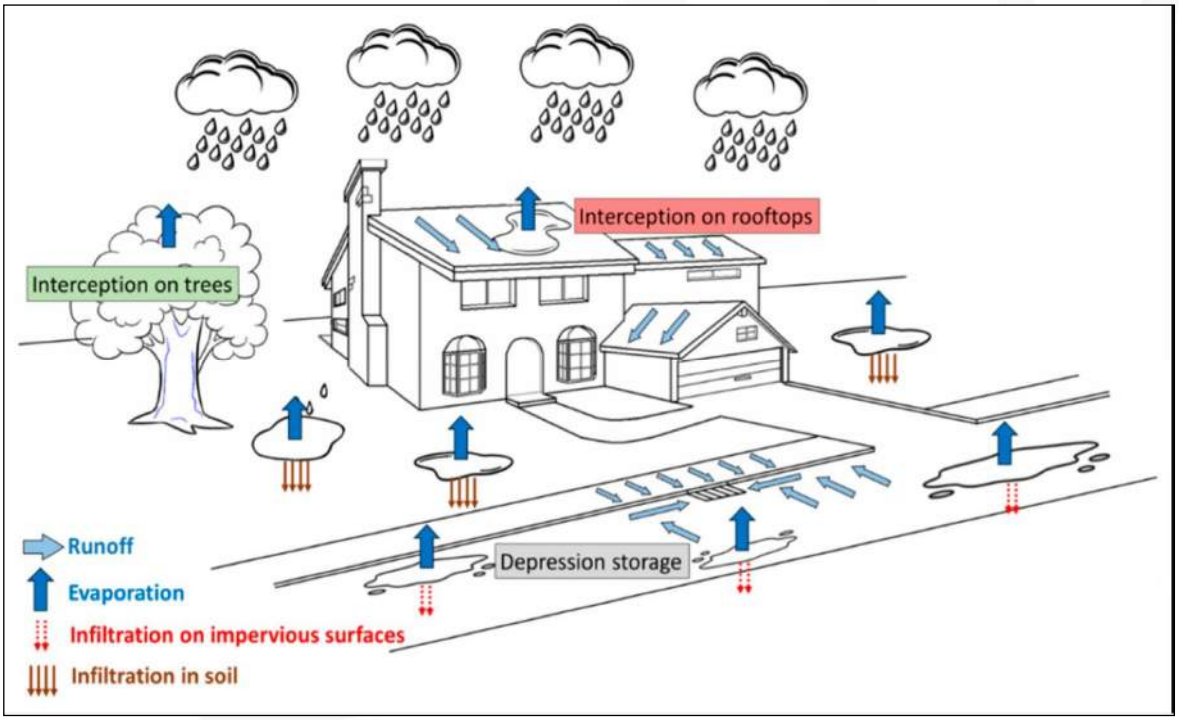


Figure 25. Hydrological Cycle in the Urban Area

Figure 26 depicts the basin model of the study area in HEC-HMS. The basin model consists of

twenty-two sub-basins connected through thirteen reaches. The final runoff hydrographs are estimated at reach point 1. All the reaches of the catchment are connected to reach point 1 (sink). The sink is an element with one or more inflows and no outflow.

The HEC-HMS main window consists of different tools. Among these, the component tool is most used for hydrologic analysis. The component tool consists of a series of model management tools. Basin model management, Meteorological model management, and Control specifications are essential for hydrologic simulation.

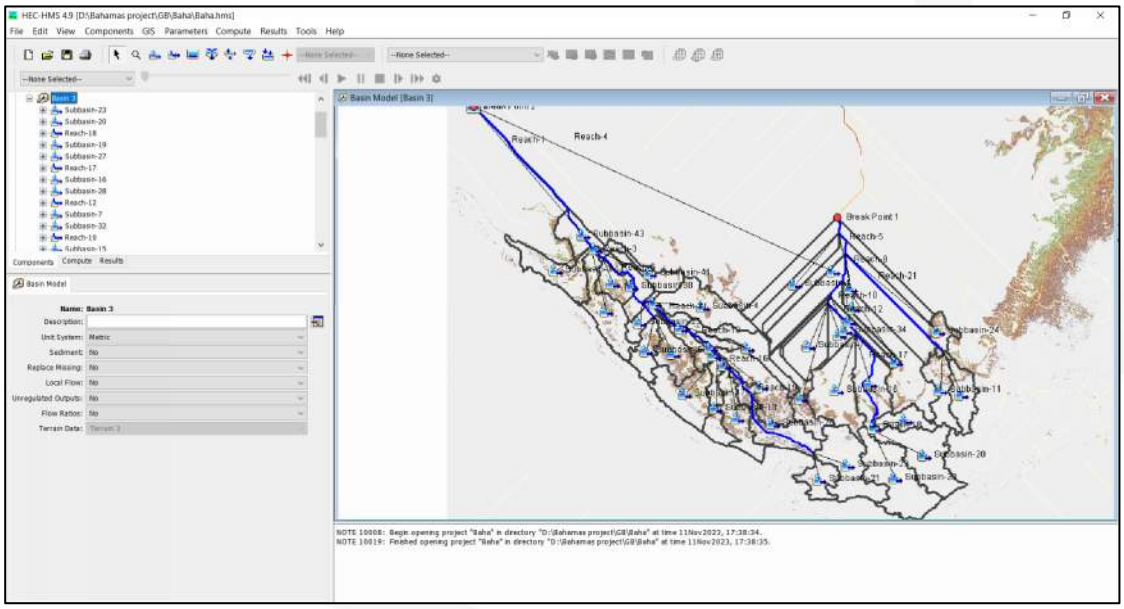


Figure 26. HEC-HMS Model

The delineated twenty-two subbasins with areas are shown in Table 3.

Table 3. Sub-basin Area

Subbasin	Area(sq.km)	Subbasin	Area(sq.km)
Subbasin-1	8.41	Subbasin-2	9.82
Subbasin-10	34.58	Subbasin-20	0.17
Subbasin-11	15.37	Subbasin-21	0.12
Subbasin-12	8.03	Subbasin-22	305.23
Subbasin-13	14.22	Subbasin-3	11.16
Subbasin-14	5.68	Subbasin-4	8.53
Subbasin-15	4.28	Subbasin-5	13.98
Subbasin-16	14.02	Subbasin-6	10.83
Subbasin-17	0.24	Subbasin-7	13.67
Subbasin-18	0.51	Subbasin-8	10.18
Subbasin-19	13.25	Subbasin-9	13.10

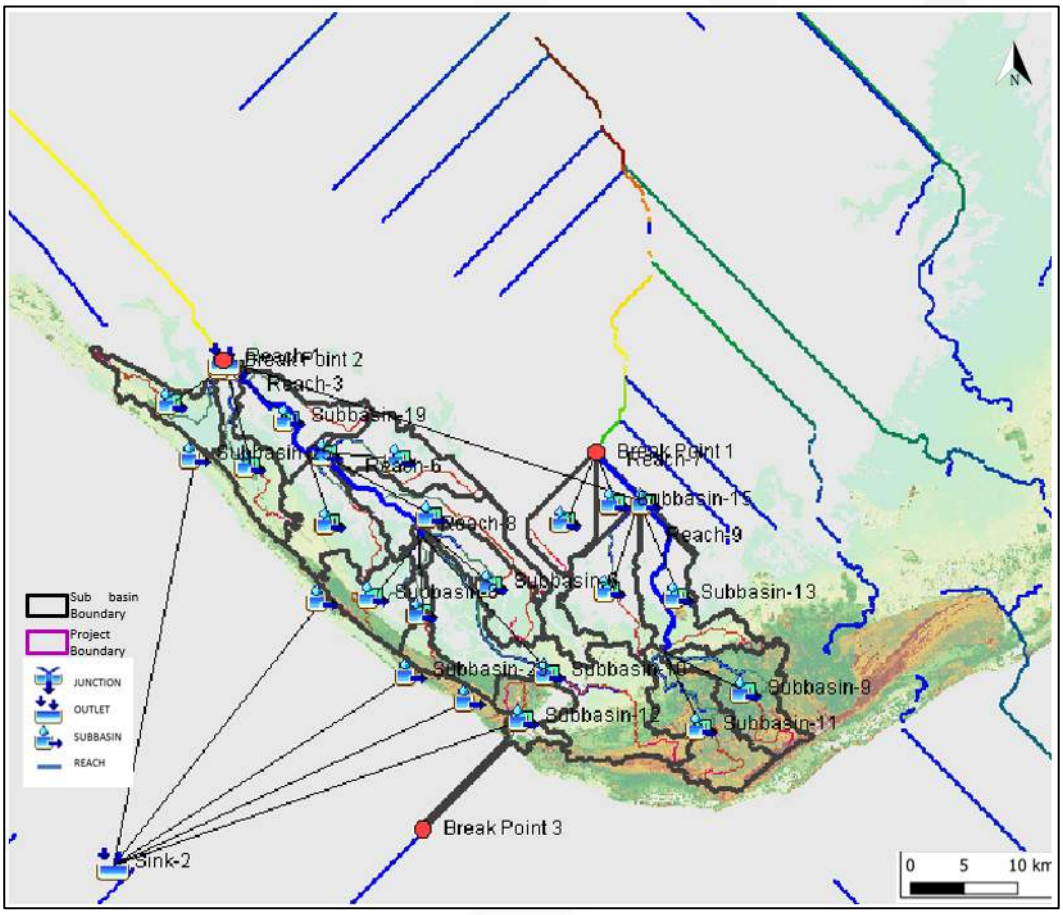


Figure 27. Basin Model of Hydrological Study Area (HEC-HMS)

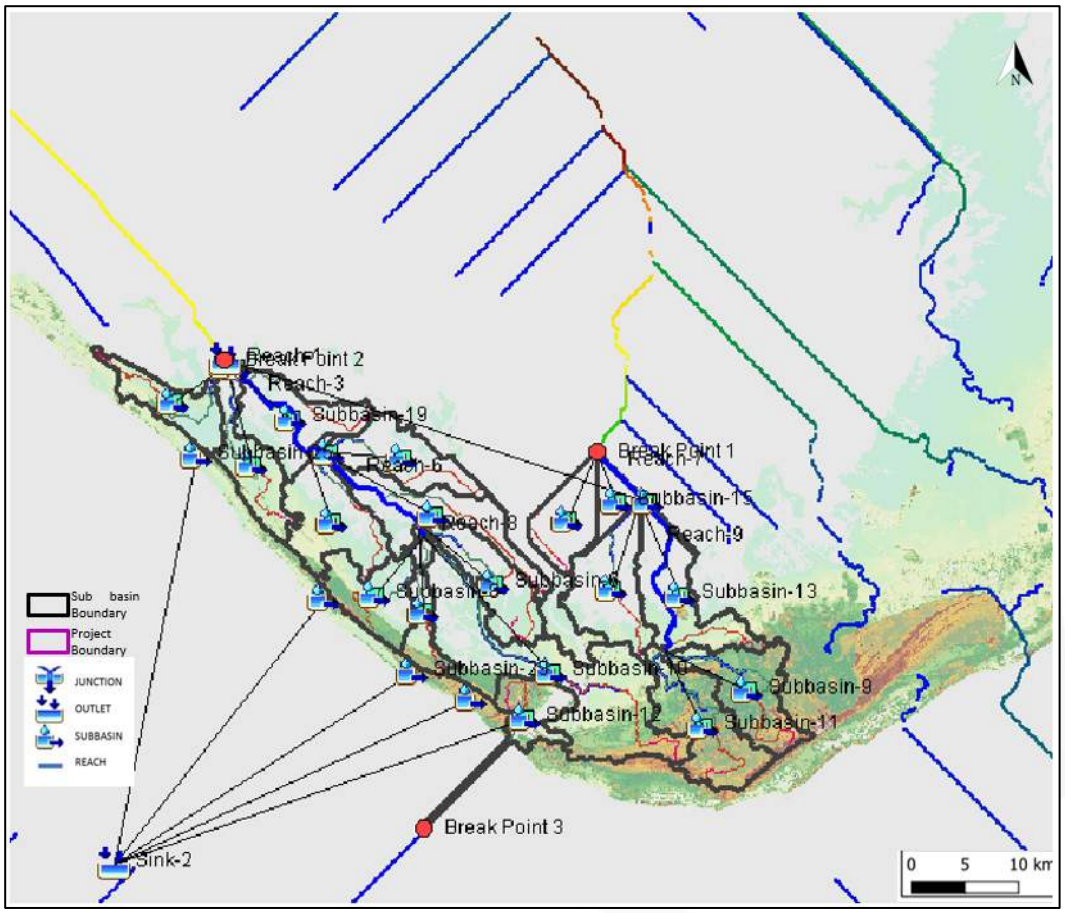


Figure 27 shows the delineated catchments. The physical properties (Figure 28) of the basin and the topography of the stream network are described using the basin model. The main principle of the basin model is to convert atmospheric conditions into stream flow, and hydrologic elements do this. These hydrologic elements break down the basin into manageable pieces. All these pieces are further connected in a dendric network to form a stream system.

A sub-basin is a hydrologic element in the basin model with no inflow and only one outflow. The outflow is derived after subtracting all the losses from the precipitation, then transforming the excess precipitation and adding the baseflow.

Different hydrologic elements, such as sub-basins, reaches, and junctions, are used to break the watershed into manageable pieces. They are connected in a dendritic network to form a representation of the stream system. Once the basin model is created, all the sub-basins and reaches can be added to the model using the sub-basin and reach creation tools. The downstream

option connects all the elements to form a hydrologic network. Once the hydrologic network is created, all the parameters related to the study are entered. In this study, Muskinghum K and X routing method is used. At the end of the delineation process, the entire study area is divided into 27 sub-basins, drained into a common outlet.

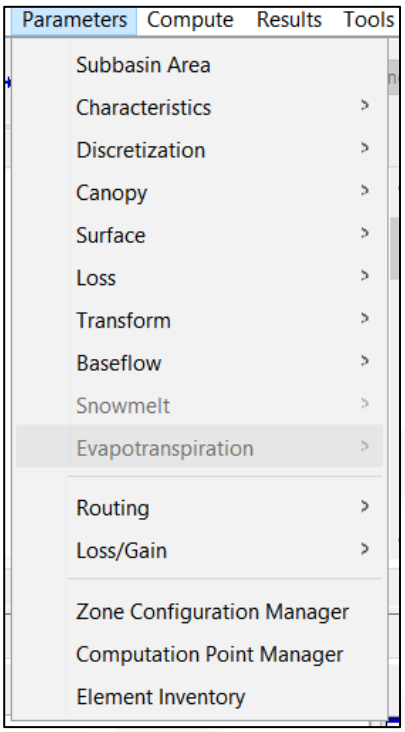


Figure 28. HEC-HMS Model Parameters

I.Canopy

According to the program, the basin's land and water can be categorized as direct-connected impervious surfaces or pervious surfaces. The area of the basin where all the precipitation falling onto it runs off without being subjected to any kind of loss are said to be a direct-connected impervious surface. The area where precipitation goes through losses is called the pervious surface. Here, the land and basin are pervious surfaces that undergo losses before reaching the stream. The first loss the basin undergoes is the loss from the vegetation (canopy).

II.Surface Loss Parameters

The surface is one of the components that is included in the sub-basin element. It represents the ground surface where water may accumulate in surface depression storage. The depression storage of an impervious surface, such as a parking lot, is generally near zero. However, the

depression storage for an agricultural field can be quite large if conservation tillage practices are used. Conservation tillage is any method of soil cultivation that leaves the previous year's crop residue (such as corn stalks or wheat stubble) on fields before and after planting the next crop to reduce soil erosion and runoff, as well as other benefits such as carbon sequestration. The net precipitation accumulates in the depression storage and infiltrates as the soil has the capacity to accept water. Surface runoff begins when the precipitation exceeds the infiltration rate and the surface storage is filled. Precipitation residing in the surface storage can infiltrate after precipitation stops and is subject to potential evapotranspiration.

III. Transform – Clark Unit Hydrograph

The Clark Unit Hydrograph method uses a linear channel model to represent the time the water takes to reach the basin outlet without attenuation. This time or delay by water is represented by time-area histogram, which defines the watershed area that produces discharge at the basin outlet as a function of time. Within HEC-HMS program, a time-area relationship is built to obtain a temporal distribution adequate enough to obtain a unit hydrograph for the basin. Figure 29 shows the representation of the timing of runoff and response.

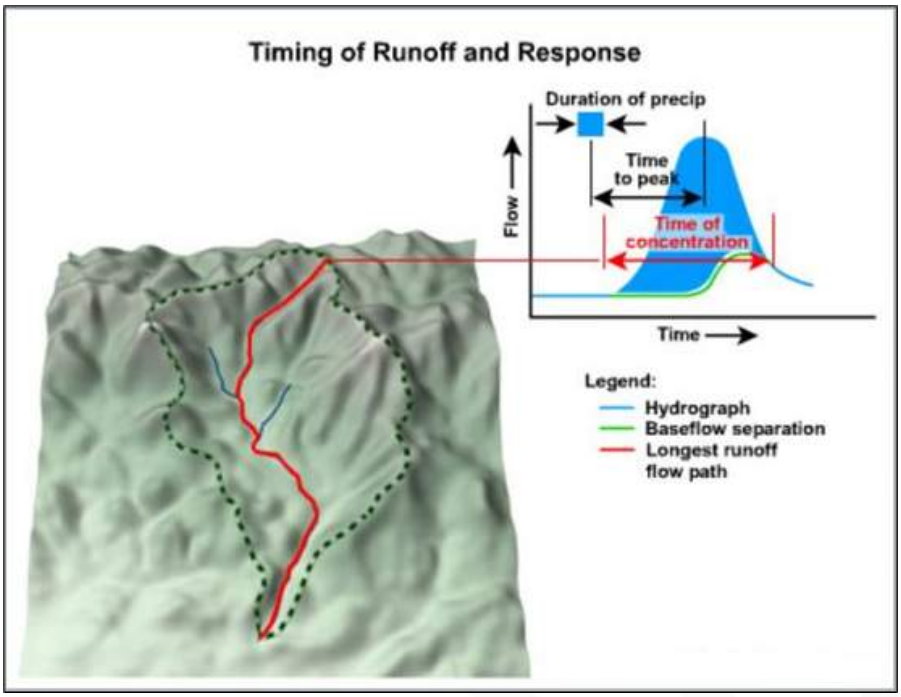


Figure 29. Representation for Timing of Runoff and Response (Open source)

The factors affecting Time of Concentration are surface roughness, channel shape, and slope. The catchment parameters were derived, and the Time of concentration was computed for each catchment (Table 4) using Kirpich's formula as given below.

$$t_c = 0.01947 * L^{0.77} * S^{-0.385}$$

Where t_c is the Time of concentration in min

L is the maximum length of water travel in m

S is the slope of catchment, and it is calculated using formula of $\frac{\Delta H}{L}$

ΔH is the elevation difference between the starting and ending point of maximum length of water pathway.

$$K = \frac{t_c}{1.46 - 0.0867\left(\frac{L^2}{A}\right)}$$

Table 4. Transform parameters (HEC-HMS)

Subbasin	TC, hrs	SC, HR	Subbasin	TC, hrs	SC, HR
Subbasin-1	2.20	6.23	Subbasin-2	2.35	5.19
Subbasin-10	3.39	6.56	Subbasin-20	2.77	2.88
Subbasin-11	1.90	3.43	Subbasin-21	1.92	2.27
Subbasin-12	1.55	5.50	Subbasin-22	7.33	5.29
Subbasin-13	3.54	11.91	Subbasin-3	5.13	7.77
Subbasin-14	2.13	5.67	Subbasin-4	8.31	8.77
Subbasin-15	10.56	14.71	Subbasin-5	2.31	2.19
Subbasin-16	5.96	16.28	Subbasin-6	3.42	6.73
Subbasin-17	9.15	0.79	Subbasin-7	3.12	3.36
Subbasin-18	3.26	20.70	Subbasin-8	2.09	3.20
Subbasin-19	3.41	3.46	Subbasin-9	1.91	3.94

IV.SCS-Curve Number Method for Loss Method

As per IRC: SP:42-2014, the SCS (Soil Conservation Services) Method (or Runoff Curve Number Method) for estimating direct runoff from storm rainfall is based on a method developed by U.S Soil Conservation Services hydrologists. The principal application of the method is in estimating quantities of runoff in flood hydrographs or in relation to flood peak rates. These quantities consist of one or more channel runoff, surface runoff, subsurface flow, or base flow. All types do not regularly appear on all catchments.

In drainage design, the SCS method can be effectively used to estimate direct runoff by means of Runoff Curve Number (CN) shown in Table 5. The formula is expressed as

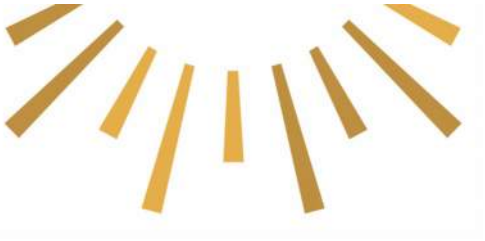
$$Q = \frac{(P - Ia)^2}{((P - Ia) + S)}$$

Where, Q is storm runoff in mm

P is storm rainfall in 'mm'

Ia is Initial abstraction. Considered as Ia=0.2S, empirically.

S Potential maximum retention in 'mm'



The above formula is framed as,

$$Q = \frac{(P - 0.2S)^2}{((P + 0.8S)}$$

Where S = $\frac{25400}{CN} - 254$

Based on the land cover type, the curve number is assigned as in Table 5 for each catchment. It is assigned based on the type of hydrological soil group and the type of soil present in the site.

Peak runoff is calculated using following equation,

$$Qp =, q_u * A * Q * Fp$$

Where, Qp is peak discharge in cumecs

q_u is unit peak discharge in cumec/km2/mm

A is the catchment area in km2

Q is Runoff volume in mm

Fp is the Pond and Swamp adjustment factor based on the percentage of waterbodies in the catchment.

Unit peak discharge can be calculated using the following equation.

$$q_u = 0.000431 * 10^{C_0 + C1 \log(T_c) + C_2 (\log(T_c))^2}$$

Where, q_u is unit peak discharge in cumec/km2/mm

Tc is Time of concentration in hours

C_0, C_1 and C_2 are constants given for various Ia/P ratios and different rainfall distribution types.

Table 5. Sub-basin Details (CN number, Initial loss, Imperviousness)

Sub-basin	CN number	Retention	Intitial Loss, mm	Sub-basin	CN number	Retention	Intitial Loss, mm
Subbasin-1	92.81	19.67	3.93	Subbasin-20	99.00	2.57	0.51
Subbasin-10	88.00	34.63	6.93	Subbasin-21	99.00	2.57	0.51
Subbasin-11	81.30	58.43	11.69	Subbasin 22	99.00	2.57	0.51
Subbasin-12	89.12	31.01	6.20	Subbasin-2	91.04	24.98	5.00
Subbasin-13	90.17	27.71	5.54	Subbasin-3	99.00	2.57	0.51
Subbasin-14	92.61	20.26	4.05	Subbasin-4	99.00	2.57	0.51
Subbasin-15	99.00	2.57	0.51	Subbasin-5	93.05	18.97	3.79
Subbasin-16	99.00	2.57	0.51	Subbasin-6	98.92	2.78	0.56
Subbasin-17	99.00	2.57	0.51	Subbasin-7	98.48	3.93	0.79
Subbasin-18	99.00	2.57	0.51	Subbasin-8	88.81	31.99	6.40
Subbasin-19	99.00	2.57	0.51	Subbasin-9	80.37	62.04	12.41

V.Baseflow

Two methods can specify the initial baseflow used at the beginning of the simulation: initial discharge and initial discharge per area. The initial discharge represents initial baseflow as discharge expressed as units of volume per time, whereas initial discharge per area represents the initial baseflow as volume per area per Time.

VI.Muskingum routing

Stream flow routing is a process of deriving the shape of a downstream hydrograph by using an upstream hydrograph as a boundary condition. One of the common methods of determining stream flow routing is the Muskingum routing model, which is based on finite difference approximation of the continuity equation.

$$S_t = KO_t + KX(I_t - O_t) = K[XI_t + (1 - X)O_t]$$

Where K and X are called Muskingum coefficients, K is storage constant with the dimension of Time, and X is a dimensionless weight given as $0 \leq X \leq 0.5$ in Table 6. Further, the wedge storage is considered positive

during the rising stage of the flood and negative during the falling stages. The value of X is 0.0 if the downstream condition is such that the storage and outflow are highly correlated, and it is 0.5 if equal weights is given to outflow and inflow, which will lead to uniform progressive wave with no attenuation across the reach.

Table 6. Muskingum K and X Value

Reach No	Rive Length (Km)	Slope	Muskingum K, hrs	Muskingum x
Reach-1	8.14768	0.007	9.43	0.2

4.3 HYDRAULIC ANALYSIS – HEC-RAS

HEC-RAS "The U.S. Army Corps of Engineers' River Analysis System" is modelling software used for conducting one-dimension steady and unsteady hydraulic calculations for river flows, sediment transport, water temperature analysis, and water quality analysis [16]. This software is developed at the Hydrological Engineering Department Centre (HEC) at the U.S. Army Corps of Engineers. This is an integrated system of software designed for multitasking purposes. The software can be used for all networks of natural and constructed channels with bridges and dams. The main advantage of HEC-RAS is that it uses one common geometric data representation and hydraulic computation for studying steady flow analysis, unsteady flow analysis, sediment analysis, and water quality analysis. HEC-RAS maintains its user-friendly behavior, providing a Graphical User Interface (GUI). People can easily accommodate its easy-to-use behavior. It is a convenient one-dimensional model that allows for detailed river flow simulations with a friendly user interface.

The modelling system has three main components:

a) River analysis component
b) Data input component
c) Post-processing component (graphics and reporting)

In the present study, hydraulic analysis is carried out for both internal and external surface-level drainage networks. It is carried out to assess the capacity of the drain and its behaviour towards considered rainfall

events.

HEC-RAS is hydraulic analysis software for performing 1D steady flow, 1D and 2D unsteady flow calculations, and coupled 1D/2D modelling. The software's main window allows users to access tools like geometry data editor, steady and unsteady flow data editor, GIS tool, steady and unsteady flow data simulation tool, and different result visualization tools, as shown in Figure 30. The RAS mapper under GIS tools is one of the essential tools for 2D modelling (Figure 30).

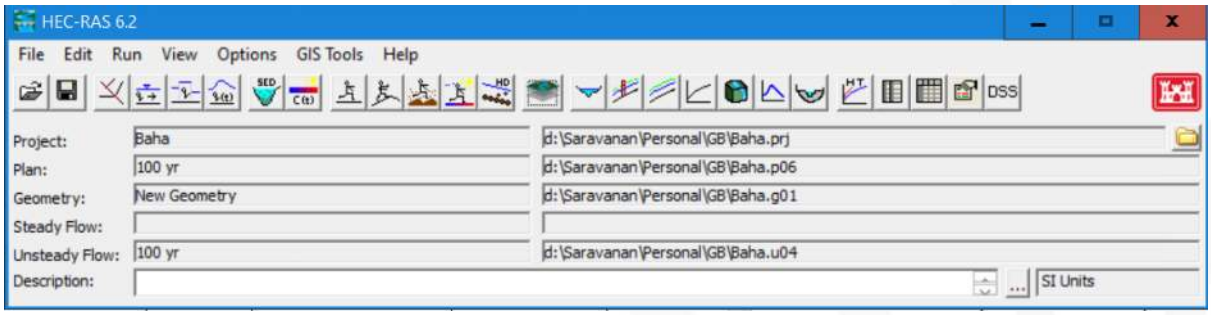


Figure 30. HEC-RAS Window Depicting Model Details (HEC-RAS)

River analysis component

The river analysis component can perform various hydraulic calculations, such as:

1. Steady-state water surface profiles
2. Unsteady flow simulation
3. Sediment transport/movable boundary computations
4. Water quality analysis

A. Terrain modelling and Preparation

A topographic study is carried out to understand the terrain formation of pre-development and post-development scenarios, explaining the effect of topographical modifications and the flow changes in the stormwater flow behavior accordingly. It is significant for hydrological and hydraulic analysis. The study involves collecting primary data such as lidar topographical survey data from the GBPA, secondary data such as elevation from GBPA DEM 20m photogrammetric data and processing the image in HEC-HMS platform for its catchment delineation. It provides a natural

catchment influencing boundary over the area of interest. The topographic analyses were completed in QGIS software in terms of representation.

B. Digital Elevation Model

The Digital Elevation Model (DEM) is the digital representation of the land surface elevation with respect to any reference datum. For the present study, a DEM is generated from the GBPA data, which is augmented in the region of interest (Freeport) using the lidar survey. The open-source DEM and site survey data benchmark has been matched by performing multiple iterations. More than 20 level points were compared between the site survey and open-source DEM. The difference is matched accordingly. After the generation of the base DEM, different features, such as buildings, roads, drainage networks etc. are incorporated with the DEM by creating different shape files using QGIS.

C. Catchment Delineation

The filled DEM forms the fundamental terrain for catchment delineation wherein channel networks are derived with respect to elevation. The drain catchments were also derived from the DEM. The catchment parameters were derived, and the Time of concentration was computed for each catchment. There are 22 sub-catchments influencing the area of interest both externally and internally.

The 2D study area of the model are indicated in the Geometry tool. However, a detailed terrain model, including vertical elevations, are generated in the RAS Mapper tool of HEC-RAS. The regional topography of the basin is obtained from lidar DEM. The lidar DEM was also used to create a Digital Surface Model (DSM) that represents the surface of the Earth, including buildings, infrastructure, and vegetation.

D. Model Parameters

In addition to these data, the roughness coefficient (n) value and the slope will be assessed based on the field survey and study. The "n" roughness coefficient plays a vital role in obtaining a complete and accurate water profile. If the profile information is well known, the value of "n" must

be adjusted more precisely. If there is no specific case, then the near "n" values obtained from the experiments can be used. Many reference values are available to the user for many different channel types. The survey's Digital Elevation Model (DEM) will be imported into HEC-RAS software. Now, from the Tools menu in RAS-Mapper, create terrain from the selected Digital Elevation Model (DEM), which is then used in RAS-Mapper to work on the hydrodynamic properties and build up the geometry of the 2-D flow region of the study area. Now, we utilize the geometric pre-processing tools in Ras-Mapper to create hydraulic properties of each cell of the reach. Manning's roughness coefficient is allocated for the 2D area, considered for the research area in RAS-mapper. The allocated land cover value and corresponding Manning's n value are based on the field survey. For the unsteady flow simulation in RAS-mapper, upstream and downstream boundary conditions of the area of the river are required. For the upstream, the flow hydrograph will be used for simulation, and the slope will be used as the boundary condition in the downstream normal depth of the channel.

E. Model Principle

1D unsteady flow hydrodynamics

The governing equations of 1D unsteady flow hydrodynamics are based on the conservation of mass (continuity) and the conservation of momentum. These equations are expressed as partial differential equations, referred to as the continuity and momentum equations.

Continuity equation

$$\frac{\partial A_T}{\partial t} + \frac{\partial Q}{\partial x} - q_l = 0$$

Where, A_T = total flow area

x = distance measured along the channel

t = time

Q = flow

q_l = lateral inflow per unit length

Momentum equation

$$\frac{\partial Q}{\partial t} + \frac{\partial (VQ)}{\partial x} + gA\left(\frac{\partial z}{\partial x} + S_f\right) = 0$$

Where, Q = discharge

A = cross sectional flow area

V = velocity

z = water surface elevation

g = acceleration due to gravity

S_o = bed slope

S_f = Friction slope

HEC-RAS uses an implicit finite difference scheme for solving 1D unsteady flow equations in a four-point implicit scheme or box scheme. One of the factors that affect the numerical stability of the scheme is the weighting parameter theta (θ). For 0.5 < θ < 1 it is unconditionally stable, conditionally stable for θ = 0.5, and unstable for θ < 0.5.

2D unsteady flow hydrodynamics

The program has two options to solve 2D unsteady flow: 1) 2D Saint Venant equations, often referred to as the shallow water equations (with optional momentum additions for turbulence and Coriolis effects), 2) 2D Diffusion Wave equations. The shallow water equations are

$$\frac{\partial u}{\partial t} + u\frac{\partial u}{\partial x} + v\frac{\partial u}{\partial y} = -g\frac{\partial H}{\partial x} + v_t\left(\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2}\right) - c_f u + fv$$

$$\frac{\partial v}{\partial t} + u\frac{\partial v}{\partial x} + v\frac{\partial v}{\partial y} = -g\frac{\partial H}{\partial y} + v_t\left(\frac{\partial^2 v}{\partial x^2} + \frac{\partial^2 v}{\partial y^2}\right) - c_f v + fu$$

Where u and v = velocities in the Cartesian directions,

g = gravitational acceleration

v_t = horizontal eddy viscosity coefficient

c_f = bottom friction coefficient

H = water surface elevation

f = Coriolis parameter

The unsteady differential form of continuity equation is

$$\frac{\partial H}{\partial t} + \frac{\partial (hu)}{\partial x} + \frac{\partial (hv)}{\partial y} + q = 0$$

Where, H = water surface elevation

t = time

u and v = velocity components in x- and y-direction

q = source/sink flux term

The Diffusion Wave Approximation of the Shallow Water equations is

$$\frac{\partial H}{\partial t} - \nabla \cdot \beta \nabla H + q = 0$$

Where $\beta = \frac{(R(H))^{5/3}}{n|\nabla H|^{1/2}}$

Where, H = water surface elevation

∇H = surface elevation gradient

t = time

R = hydraulic radius

n = Manning's n

The 2D unsteady flow equations solver uses an Implicit Finite Volume algorithm. Improved stability and robustness can be observed in the Finite Volume Method over traditional finite difference and finite element methods. This implicit scheme allows for more significant computational time steps than the explicit methods. Robustness can be observed in the wetting and drying of 2D cells.

The 2D flow area defines the boundary for which 2D computations will occur. For this simulation, the complete 2D flow area is discretized into meshes. In general, HEC-RAS has 3-sided, 4-sided, 5-sided, etc., computational cells. The meshes are created by bringing up the 2D Flow Area Editor, entering a base point spacing (DX and DY), and generating cell points. A base point spacing of 50 m in X and Y is adopted for the present study. Four meshed sides are generated after creating a set of cell points for a 2D flow area. Further, the meshes are refined to meet the requirements of the study.

F. Boundary conditions

The conditions defining inflow and outflow are represented by upstream and downstream boundary conditions (Figure 31). In the 1D-2D model, flow hydrographs for drains resulting from the hydrological analysis were considered as the upstream boundary.

The detailed description of generating 2D geometry of the study area and generation of meshes were described in the previous section. In order to simulate flooding scenarios at the site, input hydrographs generated from HEC-HMS need to be coupled with HEC-RAS. The flood hydrographs estimated from HEC-HMS for each sub-basins are added to HEC-RAS as boundary

conditions through *.DSS files.

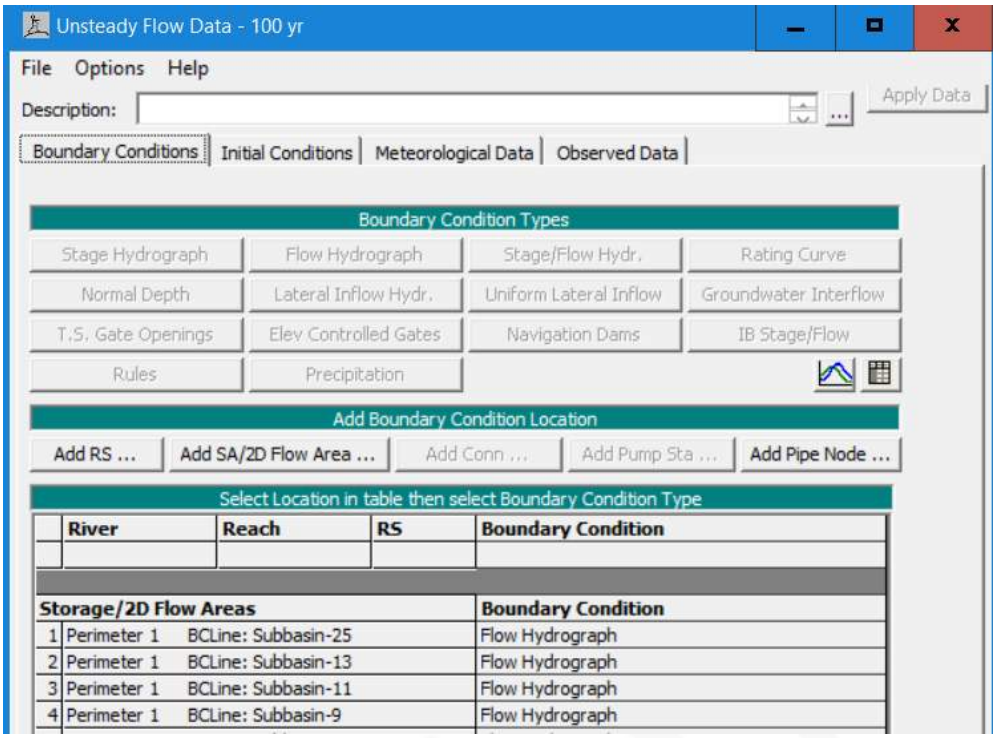


Figure 31. Sample Boundary Conditions (HEC-RAS)

G. Storm Surge – Downstream Boundary Condition

Storm surge is the abnormal rise in seawater level during a storm, measured as the height of the water above the normal predicted astronomical tide. The surge is caused primarily by a storm's winds pushing water onshore. The amplitude of the storm surge at any given location depends on the orientation of the coastline with the storm track; the storm's intensity, size, and speed; and the local bathymetry.

Hurricane Dorian brought a 7-meter (23-foot) storm surge, which inundated most of the infrastructure. In the HEC-RAS model, the storm surge can be given as input data as the downstream boundary condition. The stage hydrograph of 7 m is given as a downstream condition to recreate the storm surge in the model (Figure 32).

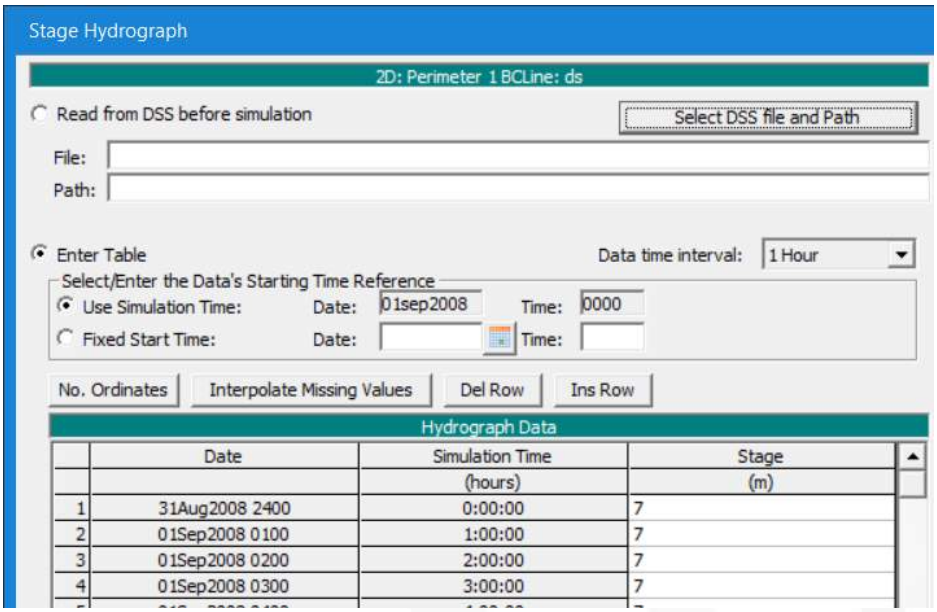


Figure 32. Storm Surge data given as downstream boundary condition

Tidal waves modulated over a range of timescales, from inter-daily to inter-annual variations, are responsible for coastal flooding, which is enhanced in tide-river environments. The downstream boundary conditions considered in the unsteady flow data are stage hydrographs (Figure 33).

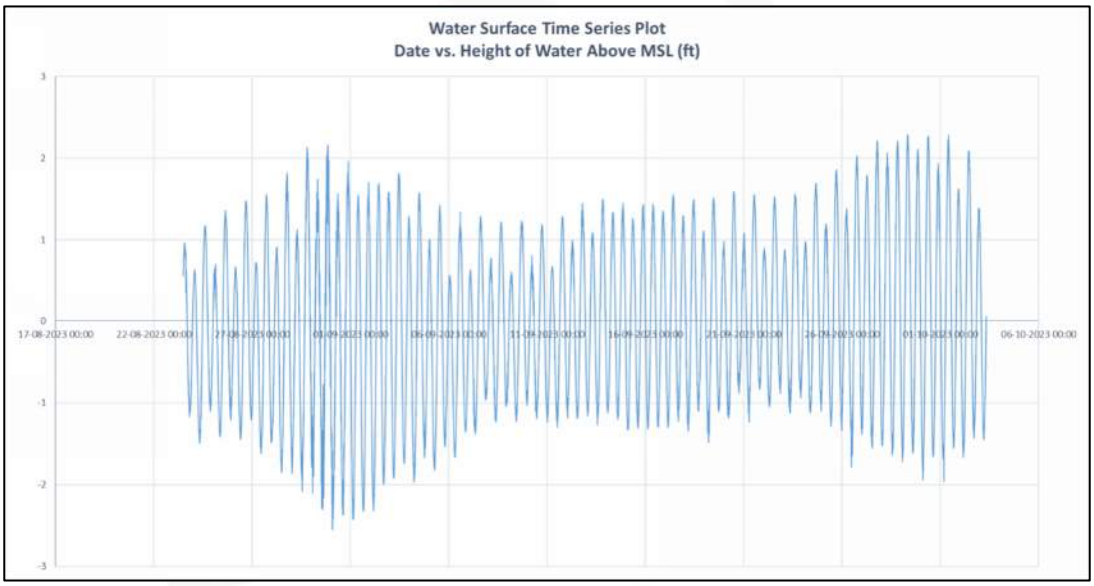


Figure 33. Water Surface Time Series Plot

H. 1D-2D Unsteady flow analysis

The HEC-RAS model was simulated using the desired inputs for the existing river systems to compute the variations of the river water quality parameters. The desired simulation time for which the study is being completed was provided. An output time interval of 15 minutes was provided so that the simulation results provided variations of the water quality parameters every 15 minutes. The simulation results provided the water quality parameters' longitudinal and time series variation plots.

The 1D/2D coupled simulation was carried out for a period starting from 20 July, 2019, to 20 September, 2019. This period is commensurate with the period of actual events where heavy rainfall was observed. A computation interval (or time step) of 15 minutes were adopted for this simulation. A sample window of unsteady flow computation settings is shown in Figure 34.

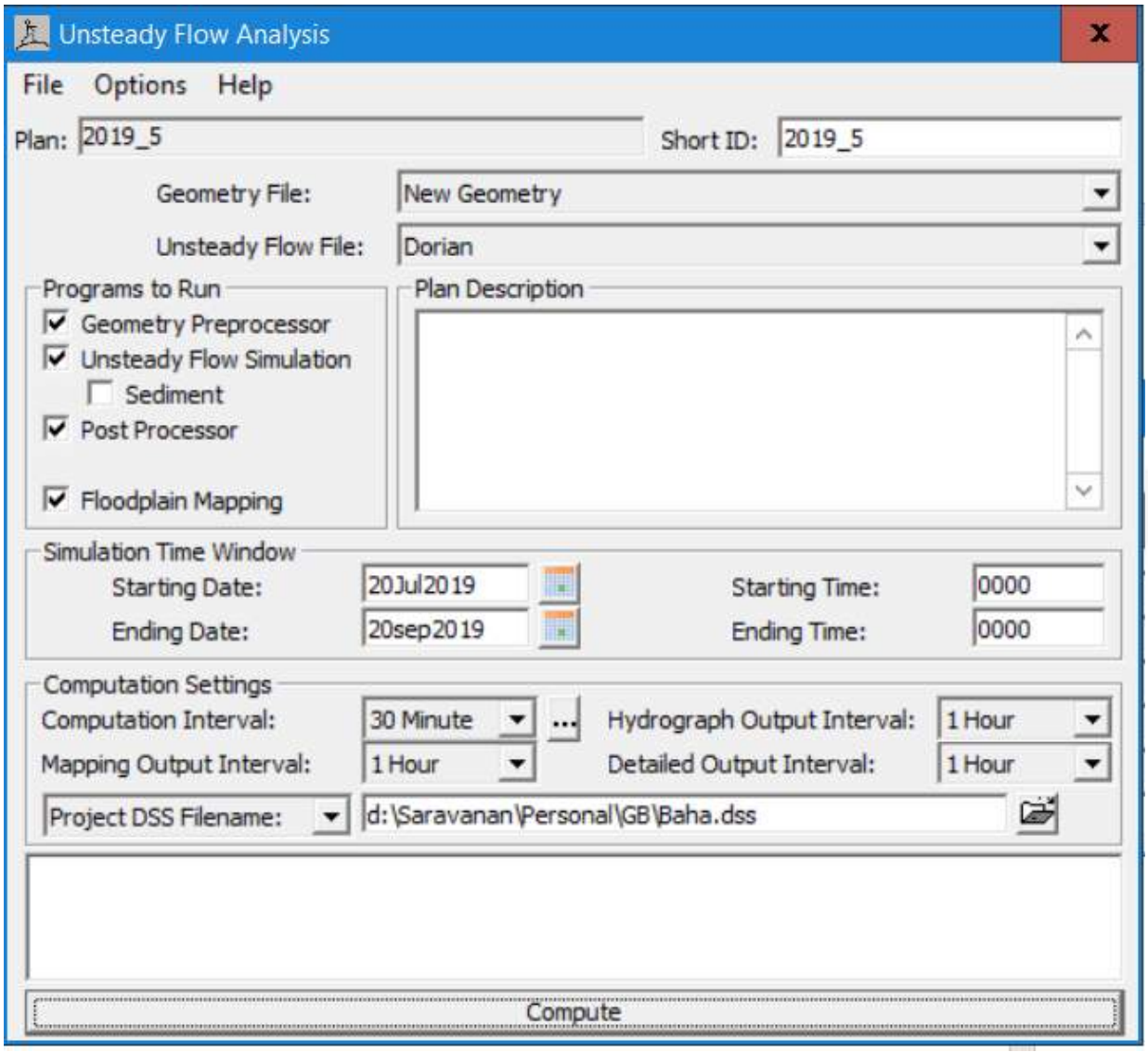


Figure 34. Unsteady flow simulation (HEC-RAS)

I. Manning's Formula

Hydraulic capacity is calculated using Manning's formula, given by

$$Q = \frac{1}{n} A R^{\frac{2}{3}} S^{\frac{1}{2}}$$

Where, Q = Discharge in m^3/s

n = Manning's coefficient

A = Area of drain in m2

R = Hydraulic mean depth, m

$$R = \frac{\text{c/s area of drain}}{\text{wetted perimeter}}$$

S = slope along drain length

5 MODEL CALIBRATION AND VALIDATION

5.1 MODEL CALIBRATION

Calibration is the adjustment of a model's parameters, such as roughness and hydraulic structure coefficients, so that it reproduces observed data to an acceptable accuracy. Common challenges include observed hydrological data, the geometry of each layer incorporated, and factors such as roughness coefficients, storage, hydraulic structures, and parameters to consider when calibrating an unsteady flow model. For the model calibration, Hurricane Dorian's extreme rainfall event has been used [17]. For calibration purposes, previous reports were reviewed on the assessment related to the harbour expansion. The analyses are based on assumptions and references from previous documents or thumb rule numbers. Therefore, it was decided that the report should not be used as a calibration standard.

Calibration event – Hurricane Dorian

The timeline of Hurricane Dorian and its impact are discussed in this section (Figure 35). Hurricane Dorian was an extremely powerful and catastrophic Category 5 Atlantic hurricane, which became the most intense tropical cyclone on record to strike the Bahamas. The 2019 cyclone is regarded as the worst natural disaster in the Bahamas' recorded history. With winds peaking at 185 mph (295 km/h), it was also one of the most powerful hurricanes recorded in the Atlantic Ocean in terms of 1-minute sustained winds and the strongest since Wilma in 2005 [14].

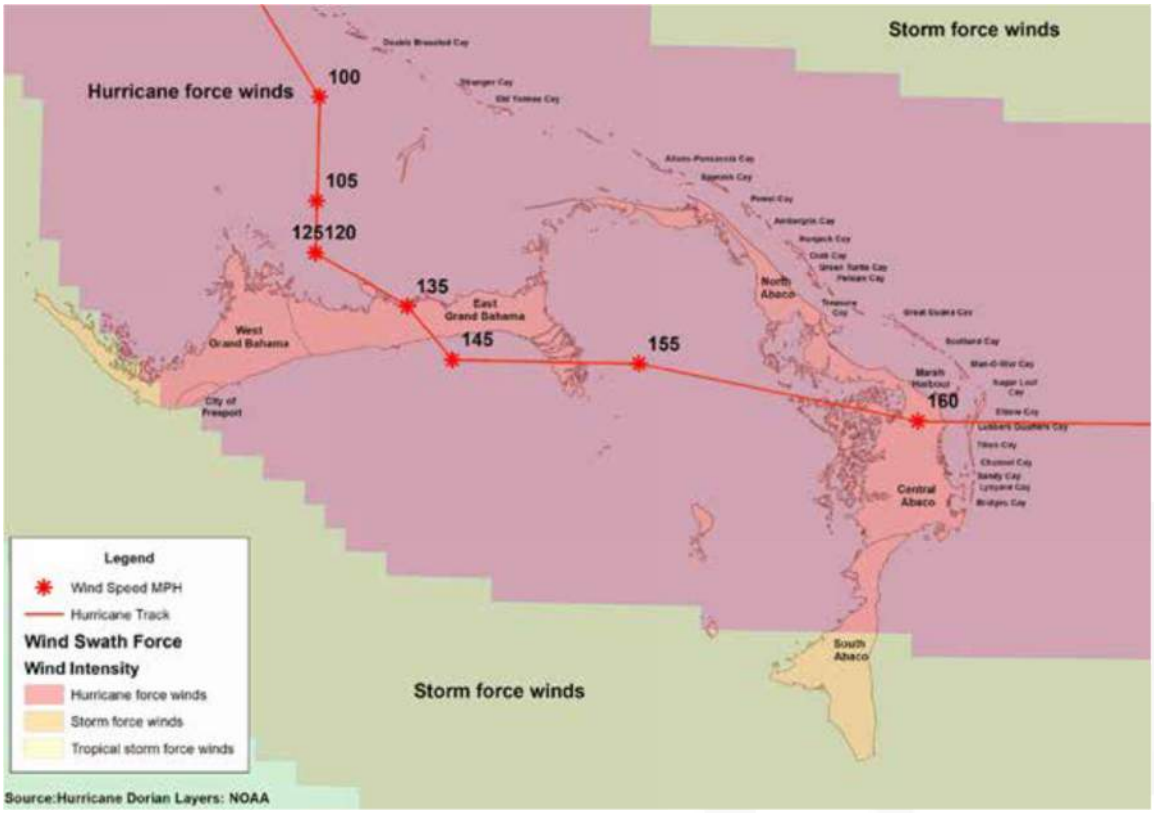


Figure 35. Timeline and impact of Hurricane Dorian [5]

RECURRENCE INTERVAL (yrs.)	ANNUAL FREQUENCY OF OCCURRENCE (%)	WIND SPEED (mph)
100	1	117
50	2	103
20	5	88
10	10	77
5	20	68

Figure 36. Return Period with respect to Wind speed [1]

Figure 36 shows the return period classification with respect to the wind speed. Dorian was the fourth named storm, the second hurricane, the first major hurricane, and the first Category 5 hurricane of the 2019 Atlantic hurricane season. Dorian struck the Abaco Islands on September 1 with maximum sustained winds of 185 mph (295 km/h), tying with the 1935 Labor Day hurricane

for the highest wind speeds of an Atlantic hurricane recorded at landfall. Dorian struck Grand Bahama at similar intensity, stalling just north of the territory with unrelenting winds for at least 24 hours. The resultant damage to these islands was catastrophic; most structures were flattened or swept to sea, and at least 70,000 people were left homeless. After it ravaged the Bahamas, Dorian proceeded along the coasts of the southeastern United States and Atlantic Canada, leaving considerable damage and economic losses in those regions [5].

Figure 37. Flood Inundation location within Grand Bahama

Dorian developed from a tropical wave on August 24 over the Central Atlantic. The storm moved through the Lesser Antilles and became a hurricane north of the Greater Antilles on August 28. Dorian proceeded to undergo rapid intensification over the following days, before reaching its peak as a Category 5 hurricane with one-minute sustained winds of 185 mph (295 km/h) and a minimum central pressure of 910 millibars (26.87 inHg) by September 1. It made landfall in the Bahamas in Elbow Cay, just east of Abaco Island, and again on Grand Bahama several hours later, where it remained nearly stationary for the next day or so [15].

Figure 37 shows the satellite image of the flood inundation area of the Freeport region. Synthetic aperture radar imagery from Ursa Space Systems shows a similar level of devastation on the Island of Grand Bahama. SAR instruments use radio waves to pierce cloudy skies, clearly showing flooding on the island. In focusing on the areas near Freeport and the west, the northern

sections of Grand Bahama got inundated, some centralized and western areas and portions of the coastline along the south also got flooded. This will form the basis for the model calibration.

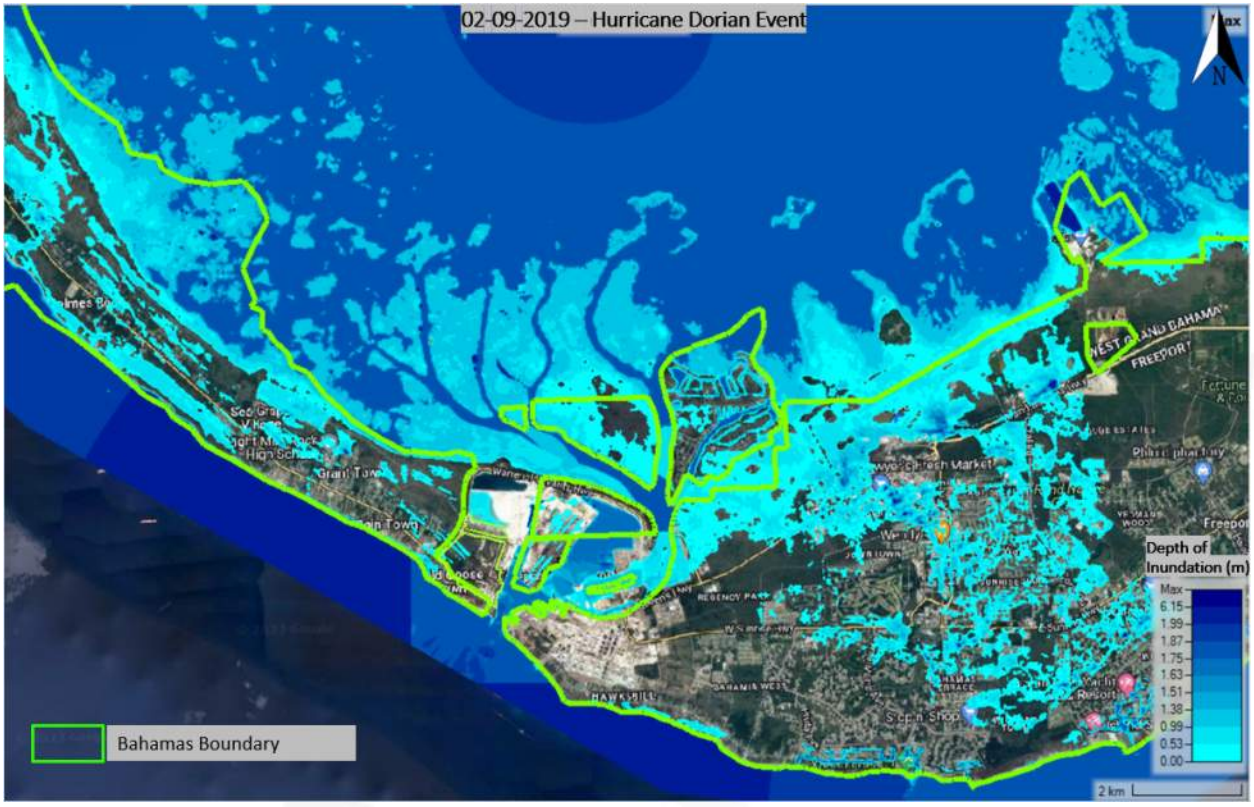


Figure 38. Calibrated Model with respect to 2019 event

5.2 MODEL VALIDATION

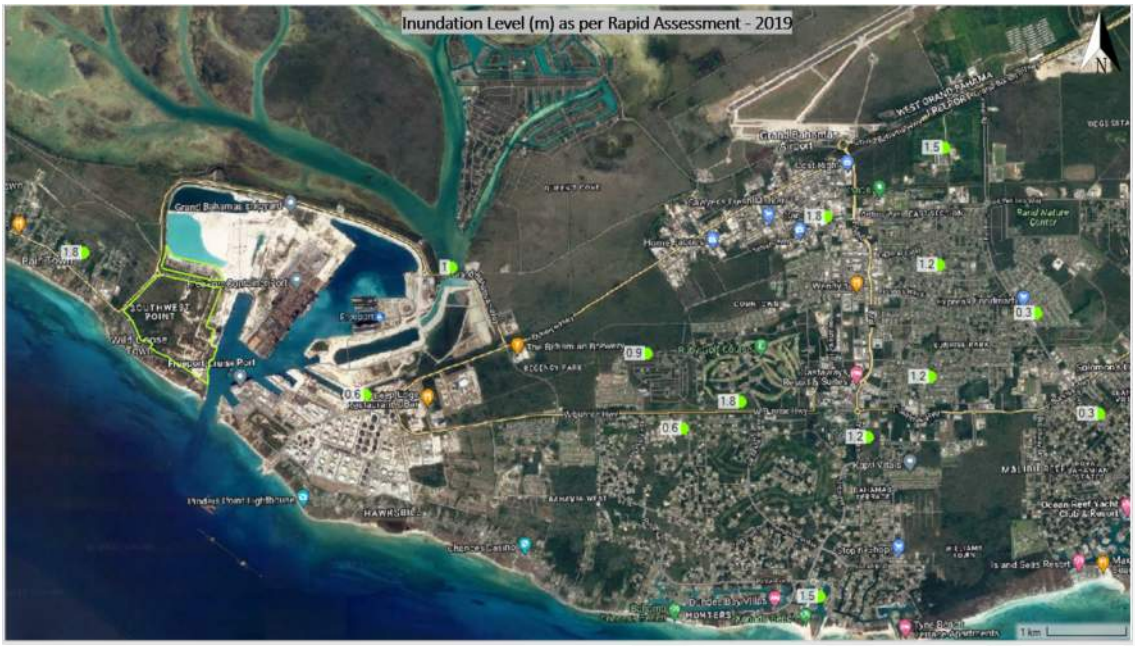


Figure 39. Flood Inundation level in m at various location

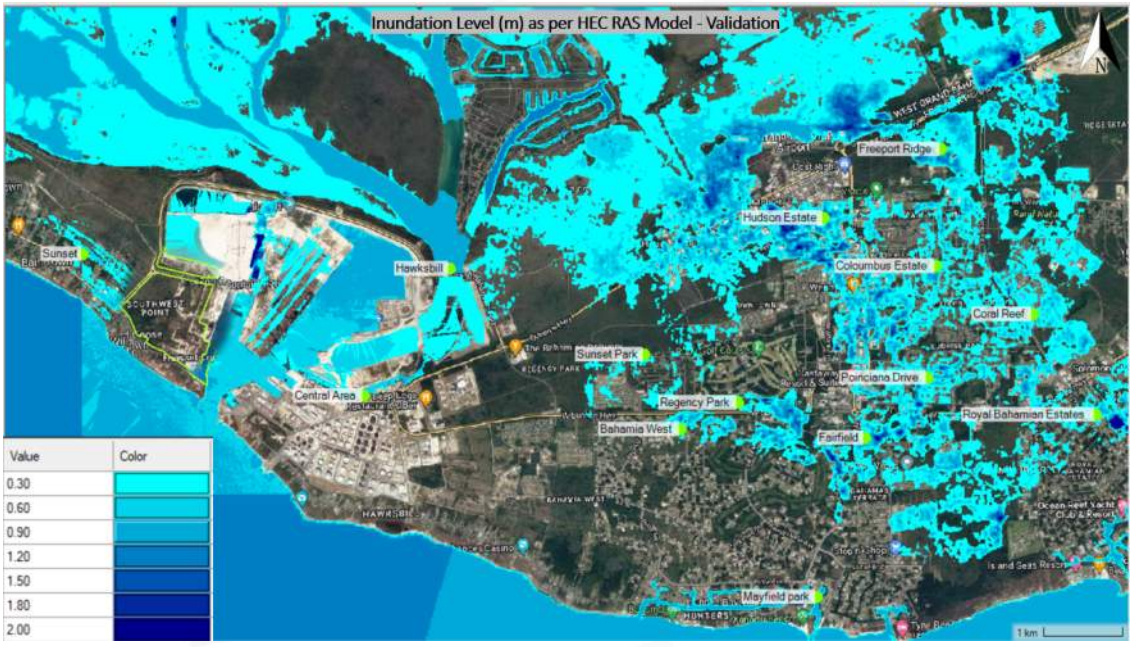


Figure 40. Flood Inundation level in m as per HEC-RAS model – Validation

Model validation is the process of checking the accuracy of calibrated parameters. The model has

been validated only for the areas where validated data was available. The validation levels ranged from 0 to 1.8 m (6ft); hence, Figure 40 shows only that extent. Validation is the justification of results/values obtained from the calibrated model using observed ground values such as flood level markings, the extent of the observed floodplain at a specified location, and duration of water inundation. The inundation levels have been extracted from the report "Rapid Assessment How far was the surge. Drone and Video data – GBPA /NEMA October 2, 2019" for the model validation Figure 39. The model has been calibrated and validated with an accuracy of 65 % towards the water's inundation depth and spatial extent.

5.3 Assumptions and Limitations

1. This study assumes consistent rainfall patterns based on historical data and does not account for potential future changes in climate.
2. The floodplain maps are generated for 5-, 50-, and 100-year return period rainfall events, which are based on historical data and may not fully capture future meteorological conditions.
3. The methodology relies heavily on digital elevation models and hydrological simulations, which, while robust, are subject to inherent uncertainties in model accuracy and data resolution.
4. Groundwater interactions are modeled based on the current understanding of the area's geology, and unforeseen sub-surface dynamics might not be fully captured.
5. The impact on the water table due to dredging is projected based on current geological knowledge, which may vary in reality.
6. A storm drainage network was not confirmed within the area; therefore, natural drainage patterns were assessed.

6 Results

6.1 Cause and Effect of Harbour Expansion

This section discusses the impact of the harbour expansion once the dredging has been completed. The land use pattern, terrain, soil type, and slope determine the water inundation in the region.

Land use and runoff generation

In the pre-development scenario, the land use pattern in the harbour region is shown in Figure 41. The majority of the land in the area consists of vegetation and forests. Due to this land use pattern, the weighted curve number is 82.

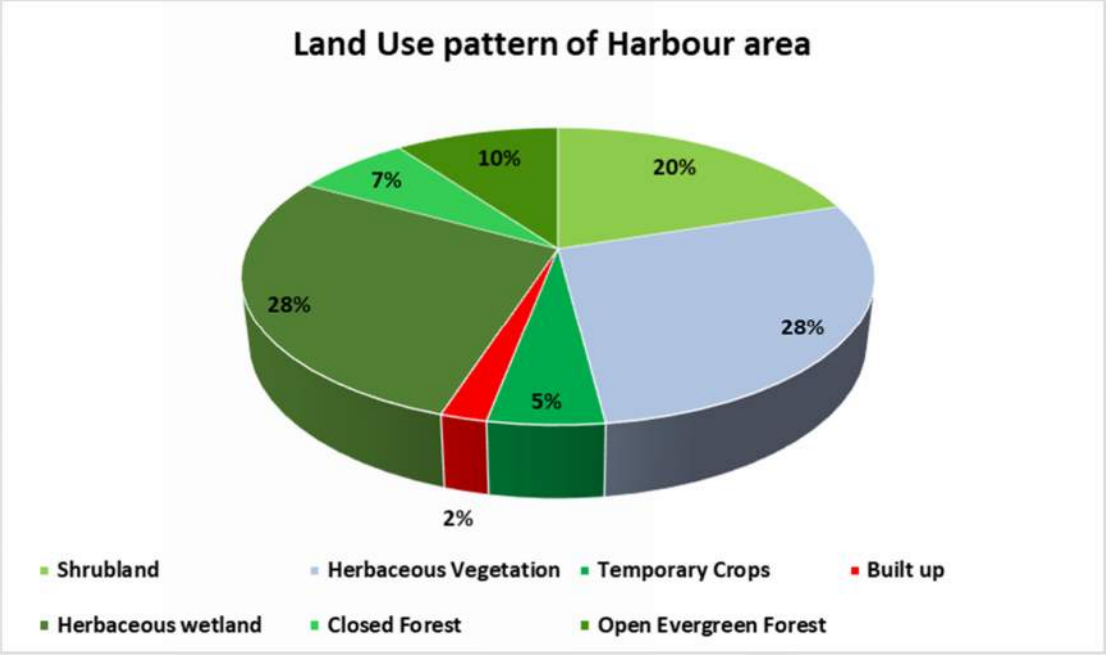


Figure 41. Land use pattern of Harbour area

The runoff curve (a curve number or simply CN) is an empirical parameter used in hydrology to predict direct runoff or infiltration from excess rainfall. The higher the curve number, the more runoff will be generated. A CN of 82 corresponds to moderate runoff generation. In the post-development scenario, the curve number will be 100 (CN of water is 100), and there will be increased runoff generation.

Soil and Infiltration capacity

The upper soil strata in the harbour area consist of sandstone. The sandstone's infiltration characteristics are high, so the water will infiltrate the ground. In the post-dredging scenario, there won't be any sandstone for the runoff to penetrate the ground, and whatever rainfall is falling will be converted into runoff. This leads to increased runoff generation.

Terrain and Storm Surge

The sectional profile of the harbour area (Figure 42) shows that the elevation difference from 0m

– 13m for a distance of 600m is sloping towards the south. We can also see undulation within this sectional profile and eventually draining into the sea in the south direction. In the pre-dredging scenario, some sections of the harbor area were not inundated because these sections' elevation is more than 7 m. Only those areas with lower elevations were inundated due to the storm surge. In the post-dredging scenario, the dredge area's elevation will be modeled at 0m MSL, and due to the storm surge, the water level will go up to 7m. Therefore, the areas near the dredged area will be susceptible to surge flooding.

Figure 42. Sectional profile of Harbour area – Pre dredging

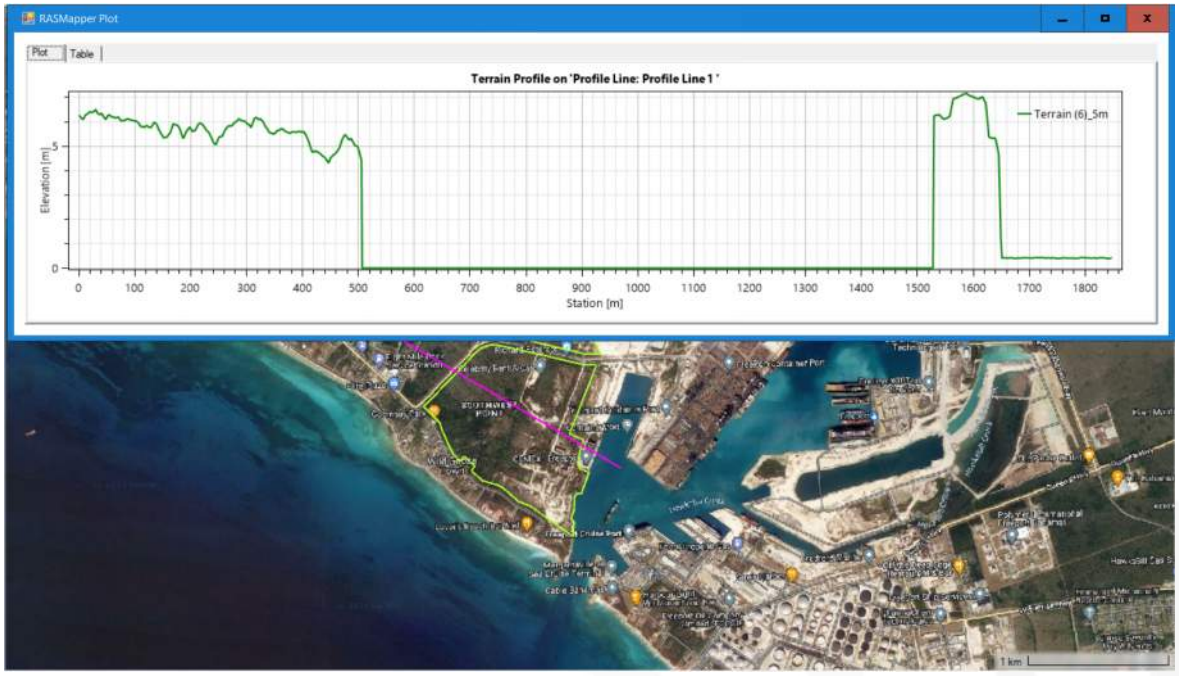


Figure 43. Sectional profile of Harbour area – Post dredging

Slope and Inundation

In the pre-development scenario, the undulating slopes are there, which prevents the runoff from inundating the surrounding area. Once dredged, the slope becomes flat and would be a body of water. Therefore, the site area becomes more susceptible to flooding.

Table 7. Cause and Effect of Harbour dredging

		Impact	
Cause	**Effect**	**Pre dredging**	**Post Dredging**
Land use	Runoff generation	Less	Moderate
Soil	Infiltration Capacity	High	Moderately less
Terrain	Storm surge flooding	Less	Moderate
Slope	Inundation capacity	Less	Moderate

The summary of the cause and effect of the harbor dredging is provided in Table 7. With this understanding, the model results shall be approached.

6.2 HYDROGRAPHS OF VARIOUS RETURN PERIODS

The hydrological analysis, conducted using HEC-HMS software, incorporated key catchment parameters such as area, length, slope, roughness, Manning's n value, and channel dimensions. This comprehensive approach allowed for a detailed assessment of the hydrological impact of the harbour expansion. The hydrological analysis, conducted using HEC-HMS software, incorporated key catchment parameters such as area, length, slope, roughness, Manning's n value, and channel dimensions. This comprehensive approach allowed for a detailed assessment of the hydrological impact of the harbour expansion.

Table 8. Peak Flow for Return Period

Return Period	5 yr	25 yr	50 yr	100 yr
Peak Flow (cumecs)	1376.1	1938.4	2246.6	2603.7

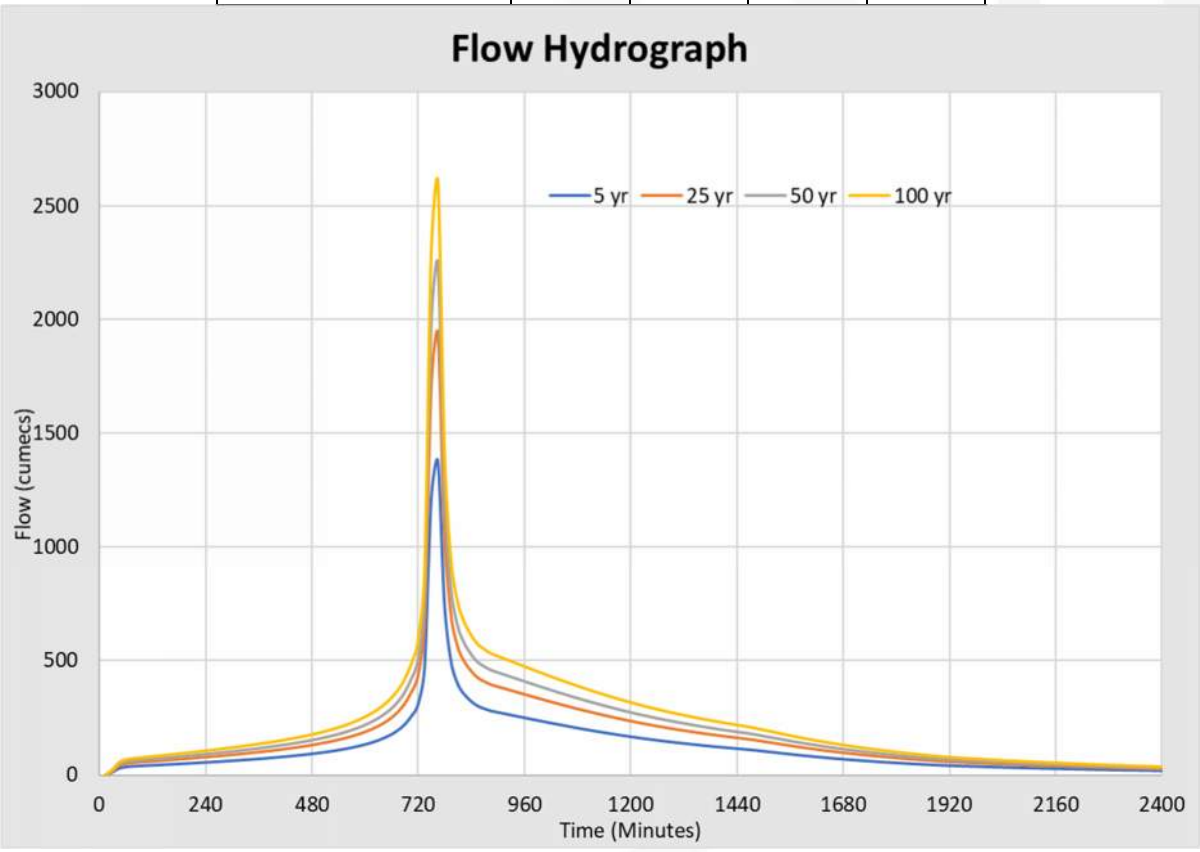


Figure 44. Flow Hydrograph

The physical representation of a watershed is accomplished with a basin model. Hydrologic elements are connected in a dendritic network to simulate runoff processes. Available elements include sub-basins, reaches, junctions, reservoirs, diversions, sources, and sinks. The study observed a significant increase in peak flow rates for return periods ranging from 5 to 100 years. Specifically, peak flow escalated from 1376.1 cumecs for a 5-year return period to 2603.7 cumecs for a 100-year return period, as summarized in Table 8 and visually represented in Figure 44.

6.3 Flood Inundation Analysis

The floodplain mapping process revealed critical insights into the spatial distribution of flood risk areas.

- **Flood Extents for Different Return Periods**: Figure 45, Figure 46, Figure 47, showcase the flood Extents for 5-year, 50-year, and 100-year return periods of pre and post-dredging, respectively. These maps illustrate how the flood risk escalates with more intense and less frequent rainfall events. The differences in the extent of inundation can be more visibly noticed along the shorelines than on the mainland across different return periods. The extent of the inundation along the Fishing Hole Road next to the Hawksbill Creek shows an evident increase in the water spread area as the return period event increases. Due to the terrain, the flood extents increase more towards the lowest elevation along the shoreline. When comparing the results of the pre- and post-dredging modeled scenarios, there is an observed increase of up to 10% in the flood extent. The inundation near the ridge in Freeport is due to the undulations/obstructions in the terrain as well as the anthropogenic factors. The runoff generated within the city should be discharged into the sea or any outfall point without any obstruction.

- **Impact of Dredging on Flood Extent**: The inundation maps clearly depict the flood extent post-dredging. Comparing the pre- and post-dredging scenarios reveals a change in the current flood trends. There is a slight increase in the generation of runoff post-dredging. The dredged area will act only as a sink for a short time (less than 15 minutes). During the storm surge, the dredged area acts more like a sea than a sink. The settled areas near the harbour limits that may have been less prone to storm surge flooding are now closer to the harbour limits and may be more inclined to storm surge flooding.

Figure 45. Water Spread area - 5-Year Return Period (Pre and Post Dredging Scenario)

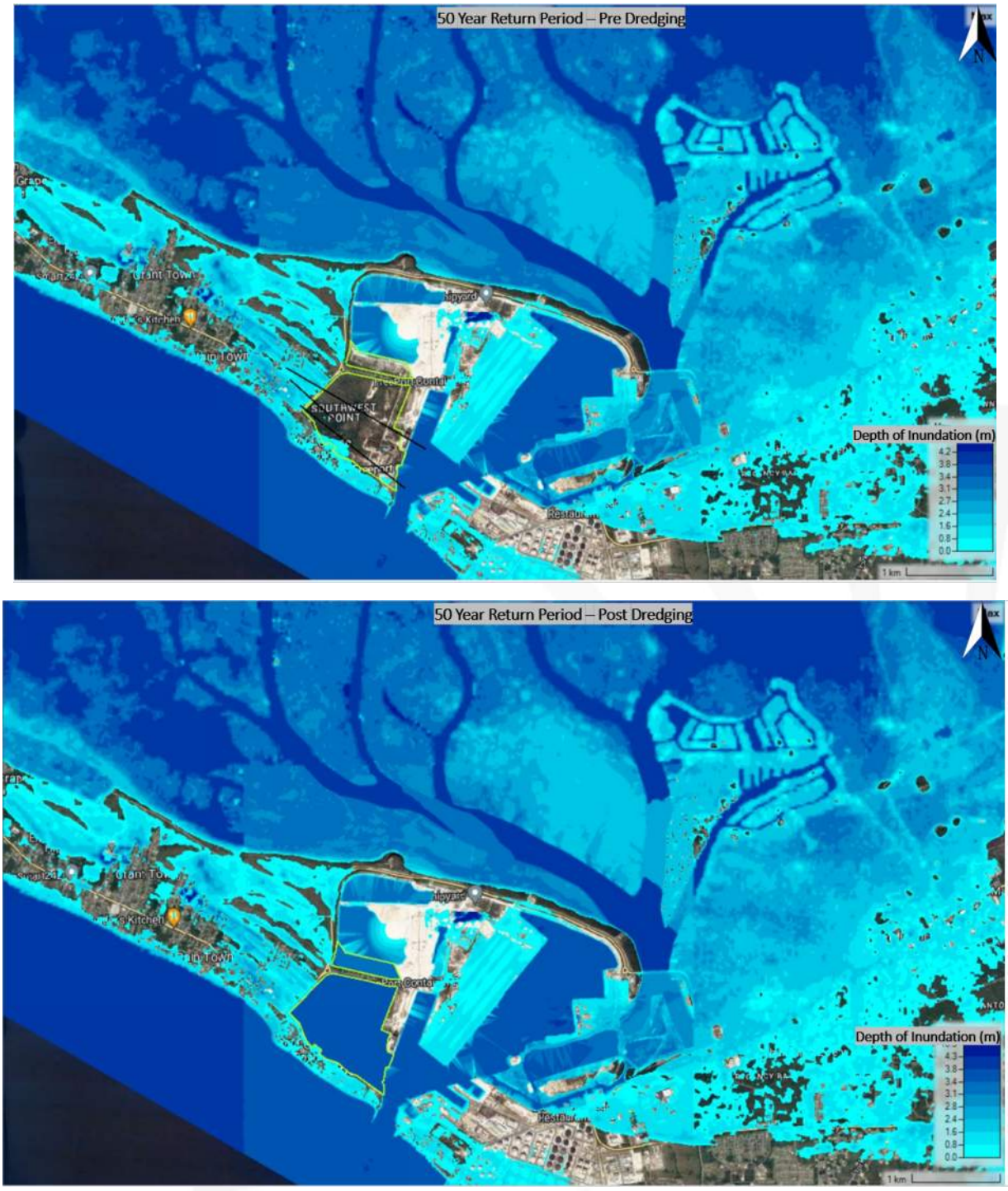


Figure 46. Water Spread area - 50-Year Return Period (Pre and Post Dredging Scenario)

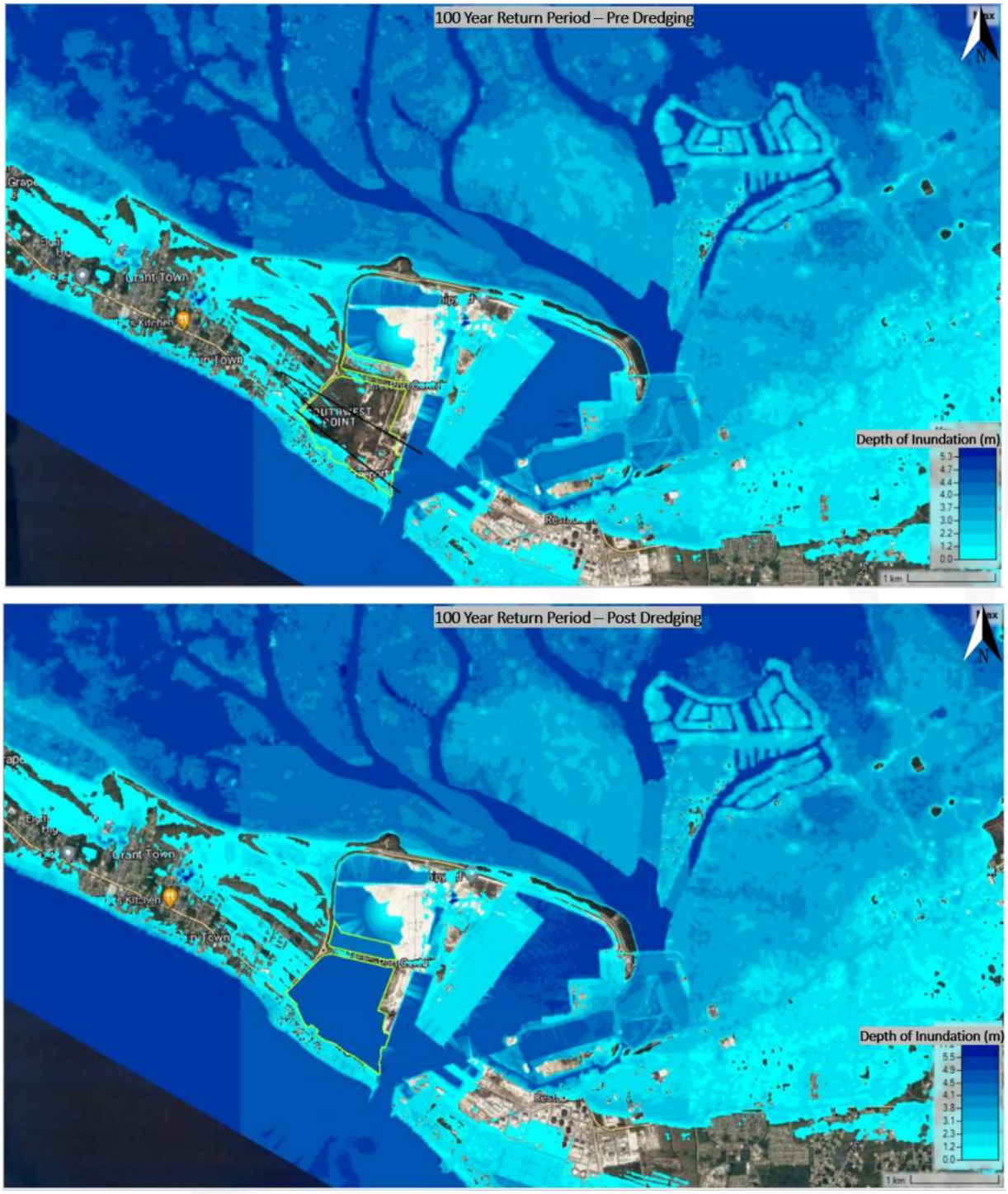


Figure 47. Water Spread area - 100-Year Return Period (Pre and Post Dredging Scenario)

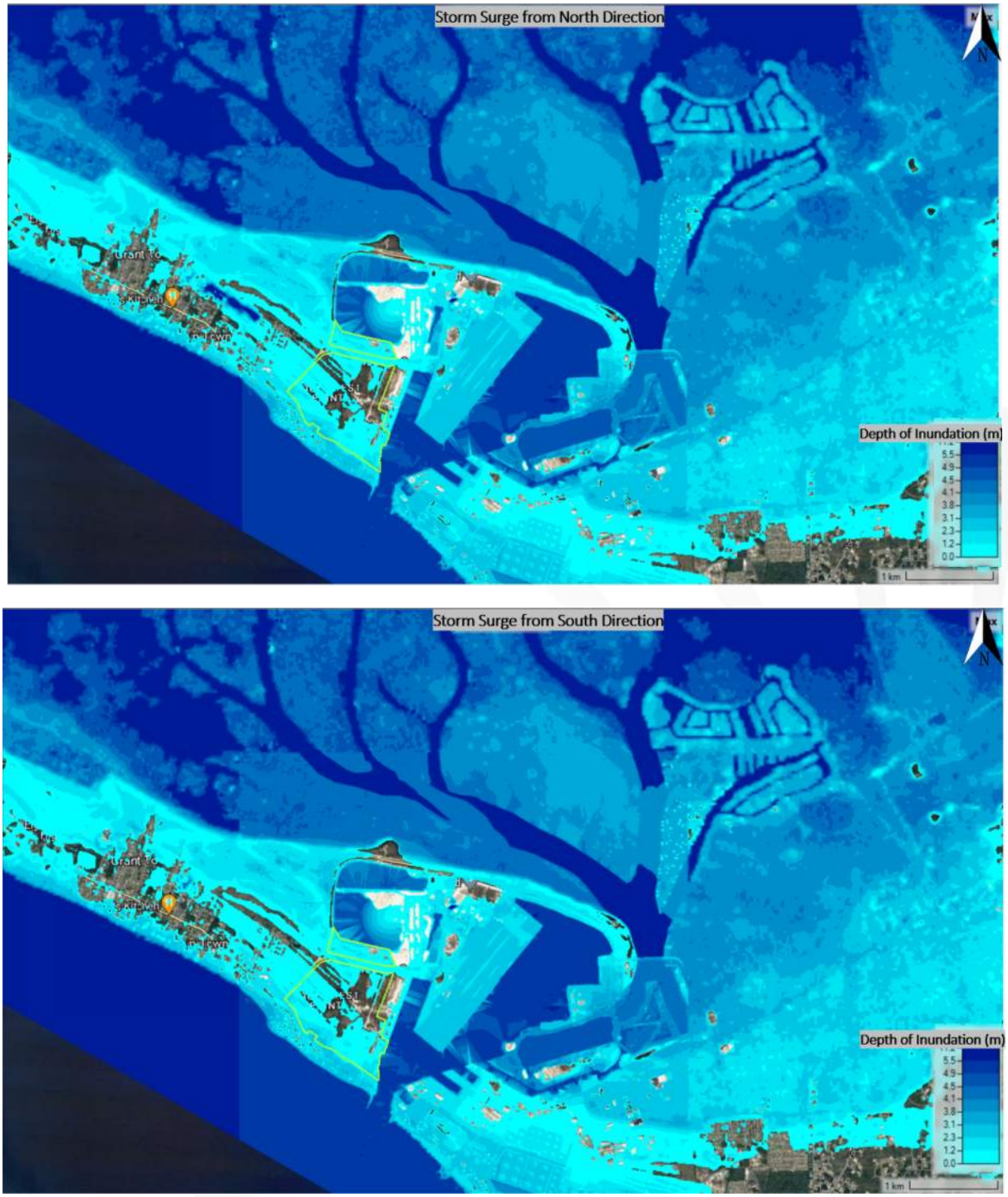


Figure 48. Water Spread area due to Storm Surge from North and South direction

6.4 Flood Inundation due to storm surge

Figure 48 shows the flood mapping due to storm surge. As per reference [9] the storm surges provoked extensive damage in the most proximal zones to the coasts and lowlands. According to the Department of Meteorology descriptions, storm surge and flooding caused the most severe damage during Hurricane Dorian, for example, especially on the eastern side of the island. According to technical staff from different institutions and persons interviewed during the field visits, the storm surge provoked a storm tide of 20 to 25 ft (6.1 to 7.6 m). Dorian also dropped an estimated 3 ft (0.91 m) of rain over the Bahamas. The distance between Freeport and the eye of the storm is around 55 km. The rainfall recorded during Hurricane Dorian in September was 22 mm. This infers that the flooding was primarily due to the storm surge, not the rainfall event.
The results show that the surrounding areas were inundated even without the dredged area due to the storm surge. Parts of the Harbor Area and surrounding areas will be flooded during most storm surge and rainfall events regardless. Since the study area is an island with no significant landmass consisting of varying elevations, no major difference exists in the water spread area between the north and south modeled surge events.

6.5 Water Table and Groundwater Dynamics

The study identified the water table in the area as being between 0 to 6 meters deep. The Harbour Area's location within limestone aquifers with low permeability suggests that groundwater traditionally does not seep into surface waters. However, the dredging operation risks altering this dynamic, potentially leading to more extensive water inundation and changes in the water table due to the alteration of the cone of depression.

6.6 Mitigation Measures - Best Management Practices

Best Management Practices (BMPs) are techniques, processes, activities, or structures used to manage stormwater and prevent flooding sustainably. These practices include source control (non-structural BMPs) and engineered structures for runoff treatment. BMPs are most effective when combined and tailored to specific site characteristics. Flood control measures can be categorized as structured or non-structured.

I.Structural Measures

Structural measures involve civil construction works to modify the structural system and improve runoff management. Figure 49 illustrates various structural measures.

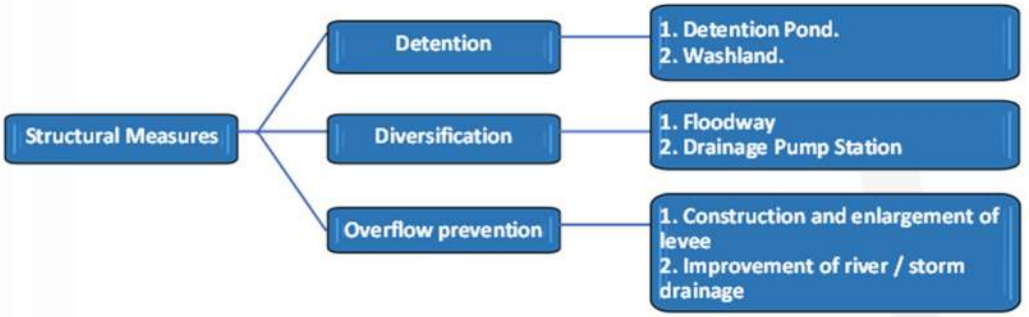


Figure 49. Type of Structural Measures

I.Design of Storm Drain Network

The absence of an efficient storm drain network is a major cause of flooding. Directing the runoff into the sea has led to backflow issues. Sustainable Drainage Systems (SUDS) aim to restore the original hydrologic regime and reduce surface runoff. Figure 50 displays the Sustainable Urban Drainage system.

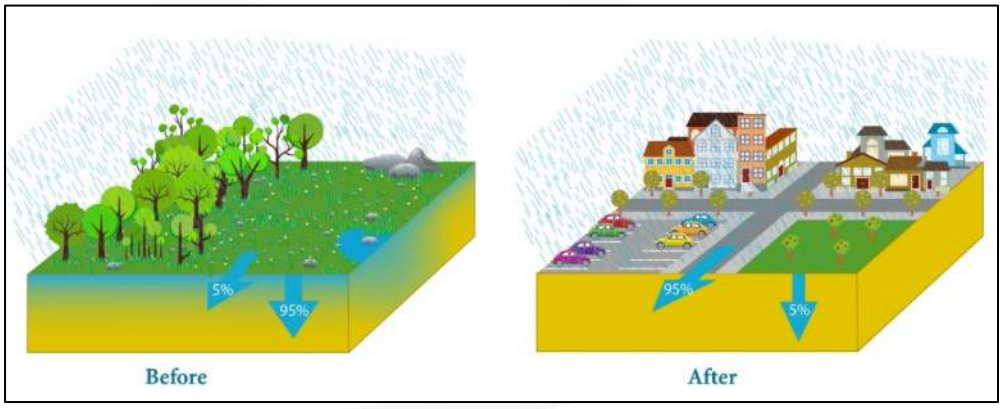


Figure 50. Sustainable Urban Drainage

Outfitting Freeport, particularly near the Harbour Area with green-blue infrastructures, maximizes the ecosystem services of nature-based solutions.

Other runoff management methods include:

- Stormwater drainage design, improvement, and maintenance.
- Rainwater harvesting structures.
- Landscape designing.

II.Flap gates

A storm surge, storm flood, tidal surge, or storm tide is a coastal flood or tsunami-like phenomenon of rising water commonly associated with low-pressure weather systems, such as cyclones. It is measured as the rise in water level above the normal tidal level and does not include waves. Tidal waves modulated over a range of timescales, from inter-daily to inter-annual variations, are responsible for coastal flooding, which is enhanced in tide-river environments.

In the study area, channelized and un-channelized storm drain networks are discharging the runoff into the sea. During the high tide period, backflow will happen into the storm drains, thus causing flooding in the area. The high tide goes up to 2.5 m; hence, any area with an elevation of less than 2.5 m will be affected due to tidal effect.

Flap gates must be provided at the end of the storm drain to avoid such situations. A flap gate is

a flow control device that functions as a check valve, allowing water to flow in only one direction. These special gates are mainly employed to control the flow of water through flood barriers, tidal surge, reservoirs and rivers etc., The flap gates mechanism allows the opening gate to shut down when there is high tide and opens only during the low tide situation. This allows the water from the study area free flow into the ocean without any back flow causing flooding.

III. Non-Structural Measures

Non-structural measures include floodplain zoning, watershed management, flood forecasting, and flood warnings. These measures have a minimal environmental impact and should be considered independently or alongside structural measures. They include:

1. Land use regulations.
2. Flood forecasting and warning.
3. Floodproofing; disaster prevention.
4. Preparedness and response mechanisms.
5. Town planning controls.
6. Strategic planning and institutional controls.
7. Pollution prevention procedures.
8. Education and participation programs.
9. Regulatory controls.

7 DISCUSSIONS

The expansion of Freeport Harbour has been rigorously analyzed for its impact on flood resilience. Using floodplain mapping for different return periods, our study indicates that dredging associated with the expansion could potentially increase flooding issues. This is due to the increased water extent, runoff generation post-dredging, and alterations to the natural groundwater flow patterns in the limestone aquifers. The water table, situated between 0 to 6 meters, is particularly vulnerable, with likely changes in the cone of depression. The flood inundation maps highlight at-risk areas, particularly on the harbor's west side. Contrarily, the more densely populated east side appears to be less affected. These findings underscore the need for careful consideration of the

environmental and demographic impacts of the harbour's expansion.

8 CONCLUSION

This report has meticulously examined the potential flood risks associated with the proposed expansion of Freeport Harbour. The primary objective was to critically evaluate whether the expansion would have an impact on flooding in the surrounding areas. The comprehensive analysis, including advanced floodplain mapping and hydrological studies, leads to several key conclusions:

- **Impact on Runoff and Flood Risks**: The findings reveal that the harbour expansion, as currently planned, may inadvertently increase flood risks. The expansion may increase runoff generation, which could increase flooding in the surrounding areas. This insight is pivotal for future planning and necessitates reevaluating the expansion strategy to incorporate flood mitigation measures.

- **Essential Role of Sustainable Urban Drainage Systems**: To counterbalance the potential increase in flood risk, the implementation of a Sustainable Urban Drainage System (SUDS) in Freeport, or at the very least, near the Harbour Area is critical. Such systems should be designed to effectively manage the anticipated increase in runoff, utilizing both green infrastructure and engineered solutions to create a resilient urban water management system.

- **Importance of Groundwater-Surface Water Dynamics**: The expansion's impact on the interaction between groundwater and surface water is a concern. The study underscores the need to preserve the delicate balance in this interaction, which is vital for the area's ecological health.

- **Adopting an Integrated Flood Management Approach**: The findings advocate for an integrated approach to flood management. This involves considering a range of structural and non-structural measures, community engagement, and ecological considerations to develop a comprehensive flood risk management strategy.

- **Ongoing Monitoring and Community Engagement**: Continuous monitoring of the

implemented flood management strategies is essential to ensure their effectiveness over time. Engaging with local communities and stakeholders in the planning and monitoring process is also crucial for the success of these measures.

In conclusion, this study highlights the need to incorporate flood resilience measures into the harbour expansion plans. Through careful planning and implementation of targeted mitigation strategies, Bahama Rock Limited can mitigate further potential flood risks associated with the harbour expansion and move towards a sustainable and resilient future.

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APPENDIX D – GEOSONICS REPORT - NOISE MEASUREMENT AND EVALUATION

GeoSonics

REPORT

TO

BAHAMA ROCK, LTD.
William J. Levarity Highway
Freeport, Grand Bahama Island
Bahamas

DATE

May 12, 2023

SUBJECT

Noise Measurement and Evaluation

West Port Expansion Project

NOISE MEASUREMENT AND EVALUATION

Noise Level Evaluation

May 12, 2023

PURPOSE

The purpose of this study was to evaluate noise levels for the proposed West Port Expansion project. The study was performed as part of the Environmental Impact Assessment (EIA) required for permitting of the project. In order to provide the evaluation, current and future noise levels were measured, predicted and evaluated as part of this study. In all aspects of this review, recommendations have been provided to reduce potential impacts for the surrounding communities. This is consistent with the goals to minimize the effects on adjacent communities while still conducting operations at Bahama Rock Ltd.(BRL).

EXECUTIVE SUMMARY

The proposed West Port Expansion project will utilize the Bahama Cement Company (BCC) property, which is located west of the current port operation. The expansion will be provided by BRL, a major employer and established company operating in Freeport, Grand Bahama.

Measurements of noise were taken of the operating equipment to be used within the project expansion. This includes loading equipment, plant site equipment and dragline operations used to excavate material to be transported to the current BRL processing plant. The noise levels were then compared to existing noise within the land uses adjacent to BRL. Considering starting distances of the excavation from residential homes and the future buffering that will occur in our professional opinion, noise levels within residential areas will have limited noise levels from the proposed project.

Industrial and commercial uses surround the project expansion area to the northeast and east and have significant existing noise levels from their own generation. These levels likely will mitigate noise that is produced by the proposed West Port Expansion and the associated transport and processing of excavated material at the current BRL facility.

PROCEDURE

Noise level assessment for the West Port Expansion project has been conducted using multiple evaluations. Noise levels of operating equipment at the BRL facility and at surrounding communities have been made from 2008 through April of 2023. These include the noise measurement of equipment operating, such as haul trucks, loaders, processing equipment and other vehicles used in the operation, in addition to, the measurement of noise levels within and adjacent to communities for both specific activity and ambient noise levels. These levels have

been reviewed and carefully evaluated for individual periods of time. All of these studies are included within this evaluation of noise levels for proposed West Harbor expansion.

Noise levels measurements were made in accordance with general noise level assessment techniques and standards for evaluation of noise. These include the use of calibrated and tested Integrating Sound Level Meters (ISLM) for measurement. In addition, noise level measurements followed standard procedures for calibration prior to noise level measurement and the mounting of the microphone and unit at a four-foot elevation above the ground.

Noise levels measurements were made of the existing BRL facility equipment at various locations and at specific distances. The noise levels were taken to be used in noise level prediction to include the proposed expansion on the BCC property. The specific BRL equipment that would be used was measured to allow for prediction of noise. In addition, noise levels were made of existing equipment that would remain stationary within the existing operation to allow a full review of noise to be completed. Initial measurements were taken in December of 2007 with equipment consistent through the current noise evaluation.

On September 24 – 26, 2013 background noise level measurements were made within the adjacent communities. As the excavation area is adjacent to the Grand Bahama, Freeport Port area, commercial locations and residentially established homes to the south and west, measurements were made adjacent to these locations.

Measurements in September 2008 and 2013 were made by Ms. Sarah K. Mayer, Field Technician of GeoSonics, Inc. Recordings made in April of 2023 were made by Ms. Sarah K. Mayer, Assistant Manager, and Mr. Jeffrey A. Straw, Vice President and Area Manager of GeoSonics, Inc. Overall recording procedures were designed by Mr. Jeffrey A. Straw, Vice President and Area Manager of GeoSonics, Inc.

NOISE LEVEL MEASUREMENT AND EQUIPMENT

Noise level measurements made during the April 2023 evaluation were conducted for Community Noise Level Assessment. Noise levels from excavation equipment and the overall noise within the adjacent communities are evaluated for general “annoyance or interference” to human activity. Standards are generally developed so that annoyance with speaking and sleep will not be produced. The overall evaluation of a community and not a single individual has been assessed and noise level standards recommended. Human responses to noise levels are made in a noise measurement method that equates to the way the human ear responds. The A-weighted measurement method is used for noise assessment and appears as a bell-shaped response curve that represents the human ear response to noise over various frequencies. The noise level measurements taken during this evaluation were taken with this weighting.

The following specifications are provided for the instrumentation used and specific configuration is indicated.

Noise level measurements were made using a Larson Davis System 824 Integrating Sound Level Meter, Serial No. 1157. The unit is a Type 1 Precision Integrating Sound Level Meter with real time 1/3 Octave Filter. The unit measures noise in a variety of methods. Additionally, a Larson Davis, LxT Integrating Sound Level Meter, Serial No. 4007 was used in April of 2023

During the test, the units were configured for A-Weighted noise level measurement, RMS (slow) response, as is normally used for Community Noise Level Evaluation. The A-Weighted noise network is a specific setting that provides response similar to human perception of noise. This network is set up to equate to the bell-shaped noise response that correlates well to human response. As there are not defined standards for the expansion operation, the A-weighted network and RMS response are used as they represent the most widely used standards for noise level measurement and evaluation for subject response. A graphic example of the response of the A-Weighted and other weighted sound level responses are included following the conclusion of this report.

The specifications on the ISLM's used during this study are summarized as follows:

Integration Characteristics:

The Larson Davis Systems measure and display sound-pressure level or sound-exposure level integrated over selectable time. Short-time standard FAST and SLOW (RMS) sound levels over a range of 115 dB are included in the integrated result.

Standards:

Meets the following:

ANSI Standard specifications for Sound-level Meters S1.4-1985, Type 1 (Precision).
IEC Standard 30651-1993, 60804-1993 Sound-level Meters (Type 1).
ANSI Standard Specification for Octave, half-octave, and Third-octave Band Filter Sets S1.11-1998, Type 1-D.

IEC 1260-1995 Class 1, Octave and Third-octave Band Filters for the Analysis of Sound and Vibration.

Reference Conditions:

Sound Pressure Level: 114.0 dB
Frequency: 1,000 Hz

Frequency Weighting and Filters:

A, C, and flat weighting per reference standards
Octave-band filters ranging from 12.5 Hz to 20 kHz.

Detector Characteristics:

Detector Response: Fast, Slow, impulse, Peak, and Leg switch selectable.

Microphone and Preamplifier:

TYPE: Larson Davis PRM Preamplifier random incidence, microphones.
Calibration:

The Larson-Davis System, Preamplifier, Microphone and CAL200 Precision Acoustic Calibrator unit are calibrated as required by Larson-Davis, the equipment manufacturer.

GeoSonics, Inc. procedures evaluate the proper operation of the noise level meter to insured the instrument is operating correctly prior to measurement.

RECORDING LOCATIONS

During this study, measurements were taken adjacent of individual pieces of equipment at initial points and extending outward over various distances to measure the attenuation of each piece of equipment. Additionally, locations within the community were measured to assess the specific ambient and community generated noise levels. These measurements were completed to design limitations for operations of the BRL equipment.

Specific instrument locations are as follows.

COMMUNITY MONITORING LOCATIONS – September 2008 / 2013 / 2023

1. Lindy Russell Residence: Measurements were taken on the property approximately 10 feet northeast of the east end of the driveway.

2. City Market parking lot: Measuring equipment was located approximately 30 feet northeast of the main roadway and south of City Market building.

3. Eight Mile Rock Clinic Parking lot: The noise level meter was set up approximately 10 feet southwest of roadway in northern half of parking lot.

4. Queens Cove – residential area south end of the site.

5. Fishing Hole Road at the approximate center of the Conch Shell bridge area.

6. Bahamas Shipyard – south of the main entrance road and east of the guard gate immediately north of the excavation area.

7. VForce Distributor – Warren J. Levarity Highway opposite the distributor building.

8. Polymer Factory – Opposite the factory site along the Queen's Highway entrance road.

9. Located at the south side of the Queen's Highway east end at the road turn from East / West to North / South approximately 370 feet north of the entrance road to Lover's Beach. This location is opposite the south end of the Bahama Cement property.

10. Measurements were made on the west side of road to Eight Mile Rock residences and approximately 50 feet west of the northwest corner of the Harbor West Cemetery.

11. Measurements were taken on the north side of Queens Highway within the Hepburn Town area.

EXCAVATION EQUIPMENT – December 2007 / 2008 / 2013 / 2023

12. Dragline: Measurements were made 250 and 500 feet south/southwest of the dragline operating at the SW corner of Lake in Area 3.

13. Excavation haul units: Measurements were made at distances of 500, 1,000 and 2,000 feet east of the stockpile with loaders filling haul trucks. The 1,000 and 2,000 feet recordings were made along the haul road with haul trucks passing within 250 feet. These measurements were not considered as produced by the joint hauler / loader activity. Additional measurements in 2023 were made of equipment operating at distances of 50 and 100 feet east of the noise meter with equipment moving up grade to an area adjacent to the primary crusher.

14. Haulers and Loaders: Measurements were made in the quarry at distances of 500, 1,000, 2,000 feet east of the stockpiles with loaders filling haul trucks. The 1,000- and 2,000-feet recordings were made along the haul road with haul trucks passing within 250 feet. These measurements were not considered as produced by the hauler / loader activity.

15. Processing Plant / Primary Crusher: Measurements were made 250 feet from the base of primary crusher. The crusher was stopped during the initial noise measurement and not restarted during additional times noise measurement was conducted.

16. Ship Loader and Conveyors: Measurements were made at distances of 250, 500, 1,000 and 1,750 feet from ship loader. The distance from the ship loader was increased to the south along conveyor system. (During this period the operation remained at a distance from the ship loader however; noise was created by the conveyor and overshadows the ship loading operation.

17. Larson Davis System 824 was operated on-site adjacent to the Dragline. The equipment was operated 100 feet from the dragline. During the testing, the equipment was operating only the minimal electrical system but was not used for excavation awaiting power company approval to begin excavation.

WEST PORT EXPANSION OPERATIONS

The proposed West Port Expansion on the BCC property may create or influence noise levels that may be audible within the surrounding community. The initial operation will be the development of an expansion within the south side of the area extending back parallel with the Queen's Highway towards Levarity Highway. The expansion will turn north per the site plan attached as part of this report and continue north.

The land use activities planned for the BCC property include the initial land clearing of existing vegetation; which, would be consistent with any overgrown property. Following removal of vegetation, the unusable surface materials would be excavated (scraped and piled into berms) and / or removed from the site. This will involve standard excavating equipment and hauling units.

Following the initial period described above, the initial key cut of the operation will be drilled and blasted. Drilling involves standard blast-hole drills with diesel engines similar to those of truck and loaders considered in the overall noise evaluation of equipment. This equipment operates only during daylight hours. Blasting itself is measured for noise in a different metric and is not considered in this study, but an accompanying report covers blasting. After blasting is complete, the electric dragline begins the excavation. This equipment is electrically powered and does not use diesel engines during digging. Following this procedure, the material is dug, raised and put on a spoil pile. Following this process, front end loader equipment begins loading off road haul trucks for transport to the processing plant. The process is for the loader to operate in a small area with trucks being loaded from the windrow and then full trucks will travel north and then northeast to the plant area, moving away from the existing residences and commercial areas. As such, noise levels will be at their maximum with the joint truck and loader in operation. The trucks traveling away from the residences will produce noise of a lesser level as the distance increases. While there is repetition to the trucks traveling to and from the loading area, there is not sufficient traffic to consider this a "line source" for noise modeling as a developed road would be evaluated. The material is processed in the crushing equipment / plant which is already operating and will remain in the existing location, which is on the current BRL property.

All of the operations described have been already completed in Area 3 which is located immediately north of the BCC property.

NOISE MEASUREMENTS

The Larson Davis equipment are Integrating Sound Level Meters (ISLM) and are Type 1 Laboratory Grade noise level meters. As such, the unit measures noise in a series of noise methodologies simultaneously. Noise levels audible to individuals have certain ranges with higher and lower frequencies attenuated. The range for human hearing is generally referenced as extending from 20 – 20,000 Hertz. The response of the human ear is a "bell" shaped curve with attenuation at the higher and lower frequencies occurring. For noise level measurements to be evaluated for community annoyance, the sound level meter must be configured in the A-

weighting network. This evaluation most closely approximates the response of the human ear. As ageing in humans occurs, the range of the bell curve shrinks with the response of the ear in the higher and lower frequency range reduced. All noise levels measured during this study were made with A-weighted sound measurements.

OPERATIONAL NOISE MEASURED

The noise levels from the various pieces of equipment were measured as a part of this study. Noise from the loaders and haul trucks and the dragline were measured at varying distances. Measurements were made to indicate relative distances from this equipment that operations could be conducted and meet noise standards, or at least would fall within ambient levels.

Specific noise levels for the equipment that would be in the BCC property are as follows:

Equipment Noise Measurements – A-Weighted Sound Levels
(2008 – 2023 Measurements)

Equipment	Distance (ft)	Noise Range dB(A)	Comment
Dragline	250	72-76	Dragline-Hoist, swing, dump & return
Dragline	500	65-72	Dragline-Hoist, swing, dump & return
Haul Trucks	50	81-87	Drive by, dump, return
Haul Trucks	100	68-70	Drive by, dump, return
Loader / Hall Units	500	60-68	Loading
Loader / Hall Units	1,000	50-67	Loading
Loader / Hall Units	2,000	50-60	Loading
Ship Loader	250	60-65	
Ship Loader	500	50-57	
Ship Loader	1,000	48-52	> 1,000’ Ship Loader not audible-conveyor louder noise
Conveyor	150	72	Ship Loader Conveyor with material
Conveyor	100	65	Primary Crusher Conveyor Empty

COMMUNITY NOISE LEVELS

Noise measurements were taken in order to address noise levels within the surrounding community and determine whether the noise would be audible at adjacent locations. Community noise levels are an aggregate of traffic, port activity, industrial activity in those locations plus general environmental ambient noise and individual activity within the communities measured. The noise levels were measured during periods of time that would represent work day and evening hours in order to determine existing ambient conditions. The hourly L_{Aeq} noise levels are summarized below in the following table containing measurements from three studies.

Community Noise Levels – 2008 - 2023

Monitoring Location	L_{Aeq} Daytime	L_{Aeq} Afternoon	L_{Aeq} Nighttime
Queen's Cove	52.1	-	-
Conch Bridge	67.6	-	67.3
Polymer Factory	65.4	65.5	57.8
Shipyard	64.6	59.6	64.8
VForce Distributors	67.9	-	-
Eight Mile Rock	54.3	52.1	-
Eight Mile Rock	50.0		60.0
Hepburn Town	49.9	-	-
Lover's Beach	-	47.4	-

Summary levels are taken from the instrument and provided in the previous table. The overall measurements represented in graphic format are included following the conclusion of the report.

EVALUATION OF RESULTS

Noise level measurements were made at multiple locations to address potential noise of the excavation operations on adjacent areas. Measurements of equipment operations in this study were made on site in order to complete a comparison of equipment operation to existing noise. The noise levels of ambient conditions were established to compare as baseline measurements. For the BCC property, the aggregate noise studies completed in 2008 and 2013 were used and new 2023 measurements were made to determine whether community or equipment levels have changed. The following summarizes the measurements made and are related to the BCC property.

There are no regulated noise standards that exist for Community Noise Levels within Grand Bahama Island or for the adjacent Eight Mile Rock, Hepburn Town and Lover's Beach community areas. As such, general noise levels may be considered and compared as part of this evaluation. Noise level standards developed for communities require an overall review of the

community noise signature to allow for the establishment of standards. The standards then are established at a level that includes community activity and allow for various peak noise levels that are produced. This requires a cross section of the community to be established for residential, commercial and industrial areas.

The residential areas measured during this evaluation have a baseline threshold of 47 to 70 decibels of noise for daytime through to nighttime noise that was measured. These levels include all of the ambient levels present, plus the individual noise peaks generated by activity within or adjacent to the community. This study attempted to find the lowest noise levels of the community, as well as specific peak noises to allow for a complete evaluation. From these measurements, some general noise guidelines may be recommended.

Based upon a review of residential noise levels, a suggested "residential" noise threshold of 55 – 60 dB (A) would be recommended for nighttime noise levels. The data suggests that a minimum limit of 60 – 65 dB (A) would be considered as the control for noise levels generated for daytime periods. These limits would be generally considered during time periods of 10:00 pm – 7:00 a.m. (nighttime) and 7:00 a.m. to 10:00 p.m. (daytime).

In addition, the noise levels generated where activity increases in commercial areas shows that noise levels ranged up to 65 – 70 decibels for the area adjacent to the City Market area when tested in 2008 and the clinic roadways. These levels were compounded by the existence of residential community areas that are nearby or are part of these more "commercial" zones. While the recent hurricanes to the area have created vacancy in many of the commercial buildings, the potential for future development remains and the noise levels would be expected to return. As such, the noise level recommendations would limit noise to 60 – 65 dB(A) and 65 – 70 dB(A) for nighttime and daytime noise, respectively.

The 2023 measurements were taken in the community locations listed above and were made at the closest physical locations of those communities to the proposed project area. Where noise levels overlapped prior measurements, Eight Mile Rock as an example, it was noted that more noise was now produced than in prior years. This would be expected as more community activity has occurred. This is generally seen as increased traffic noise. Specifically noted in the Eight Mile Rock community location, the morning traffic had an approximate 3-5 decibel increase from traffic on Warren J. Levarity Highway at 6:50 a.m. This would be generally expected as the traffic for work, school and other activity increases. This was specifically observed and noted during the recording as it was a consistent increase in noise and not a fluctuation for a short time.

In this evaluation there are two areas to review and address noise levels on adjacent residential communities. First, the closest residential home is on the order of 270 - 300 feet from the proposed expansion project. This is from the start of the excavation and with considering the western and southernmost approaches of excavation. This also considers that equipment will operate directly at the edge of the buffer along the BCC property line. Two types of equipment would be operated typically for the excavation. First, is the dragline which represents a single noise source operating at one location with little movement over the 7:00 am – 5:00 pm

and 9:00 pm – 7:00 am hours of operation. In the dragline's evaluation, noise levels were measured and the attenuation calculated for distance. The dragline at 250 feet was measured and would generate 72-76 dB (A) at that distance. Calculating sound power levels and then placing them in a sound / berm attenuation calculation reduces noise. Considering that a 15' ft berm could be generated with the spoil material from the initial land clearing, this would reduce noise to a range of 61 to 65.5 dBA.

To consider the adjacent Eight Mile Rock community, the levels would be considerably reduced. At a distance of 1,200 feet and with the same barrier in place, the expected levels would be on the order of 53-54 decibels.

The other equipment to address is the loader and haul truck operation. Measured levels show the equipment produced 60-68 dB (A) at 250 feet. The same application of noise buffering for the berm applies but also the dragline windrow of material further reduces noise levels. The noise expected since the equipment is also of limited height reduces the noise. In our opinion the noise would be at or below the 60-65 decibel limit recommended.

CONCLUSION

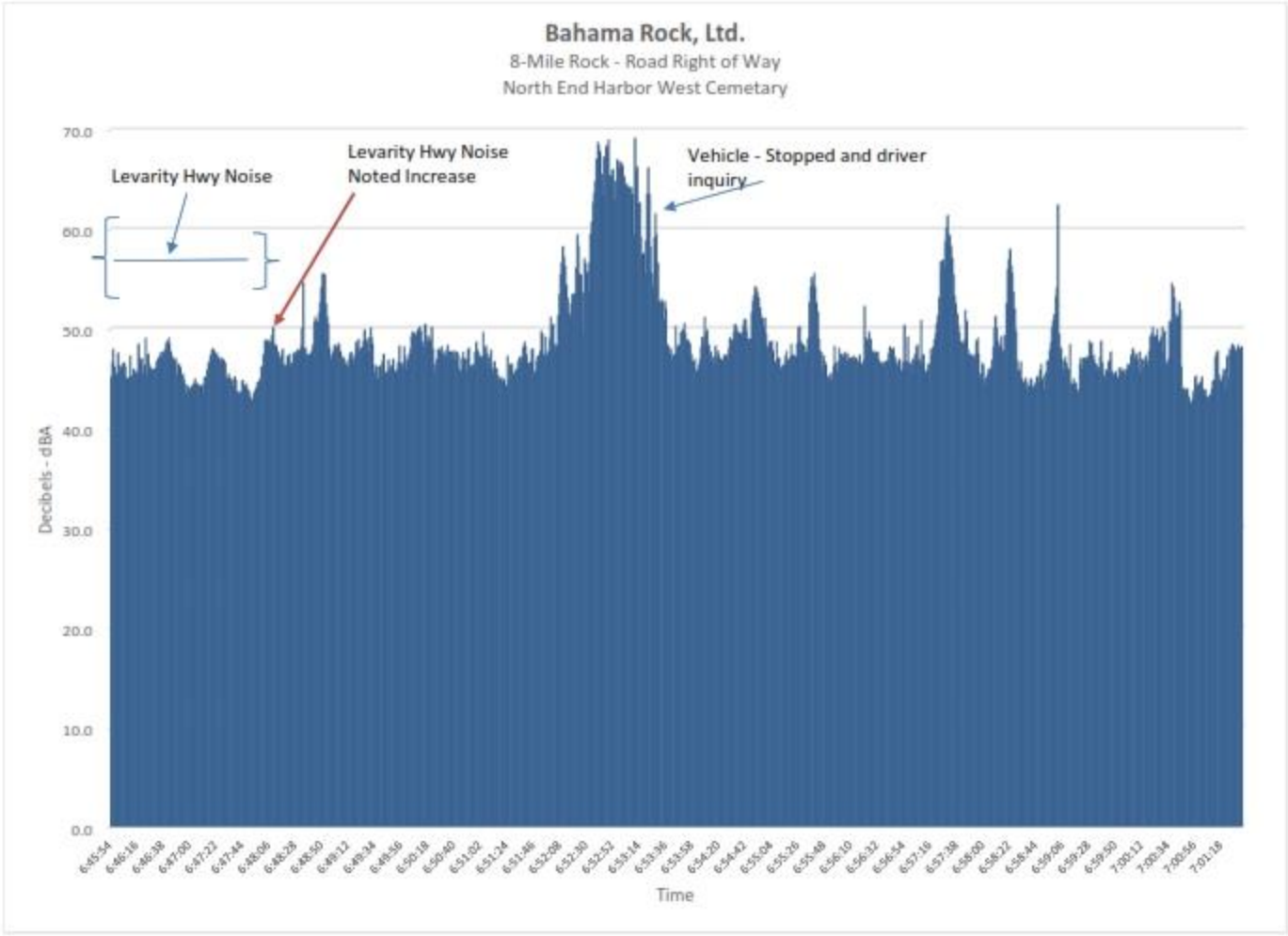
The operations of current excavation equipment were measured and updated in order to determine the noise levels from the specific equipment at the site. In addition, the noise levels in the communities adjacent to the proposed expansion site were also measured in order to determine ambient community noise levels already existing.

In review of existing noise, the projections for the excavation locations are less or generally equal to the recommended limits suggested within this report. Further buffering will be necessary for the closest approach of the excavation to the adjacent communities. This would occur with development of a berm at the site in a similar manner as the previous land disturbances by BRL. While the initial excavation separation will cause noise to be audible, it may be maintained within suggested limitations. Further, after the initial excavation occurs, the movement of equipment away from the closest point will reduce noise to levels that will be overshadowed by general noises within the surrounding community.

Respectfully submitted
GeoSonics, Inc.

Jeffrey A. Straw
Vice President & Area Manager

Noise Level Measurements


Bahama Rock, Ltd.
8-Mile Rock - Road Right of Way
North End Harbor West Cemetary
Levarity Hwy Noise
Levarity Hwy Noise
Noted Increase
Vehicle - Stopped and driver
inquiry
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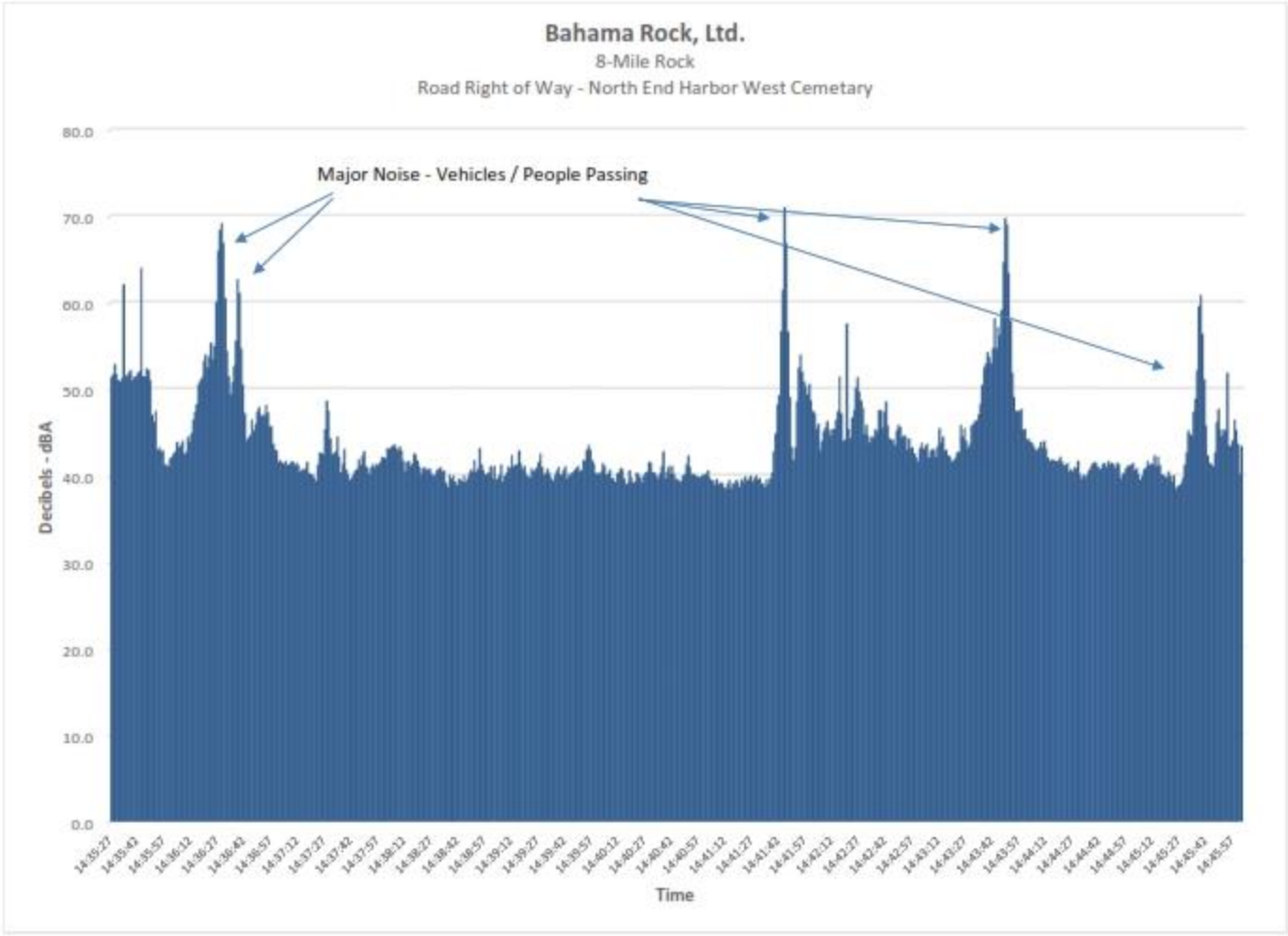
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Decibels - dBA
Time


Bahama Rock, Ltd.
8-Mile Rock
Road Right of Way - North End Harbor West Cemetary
Major Noise - Vehicles / People Passing
Decibels - dBA
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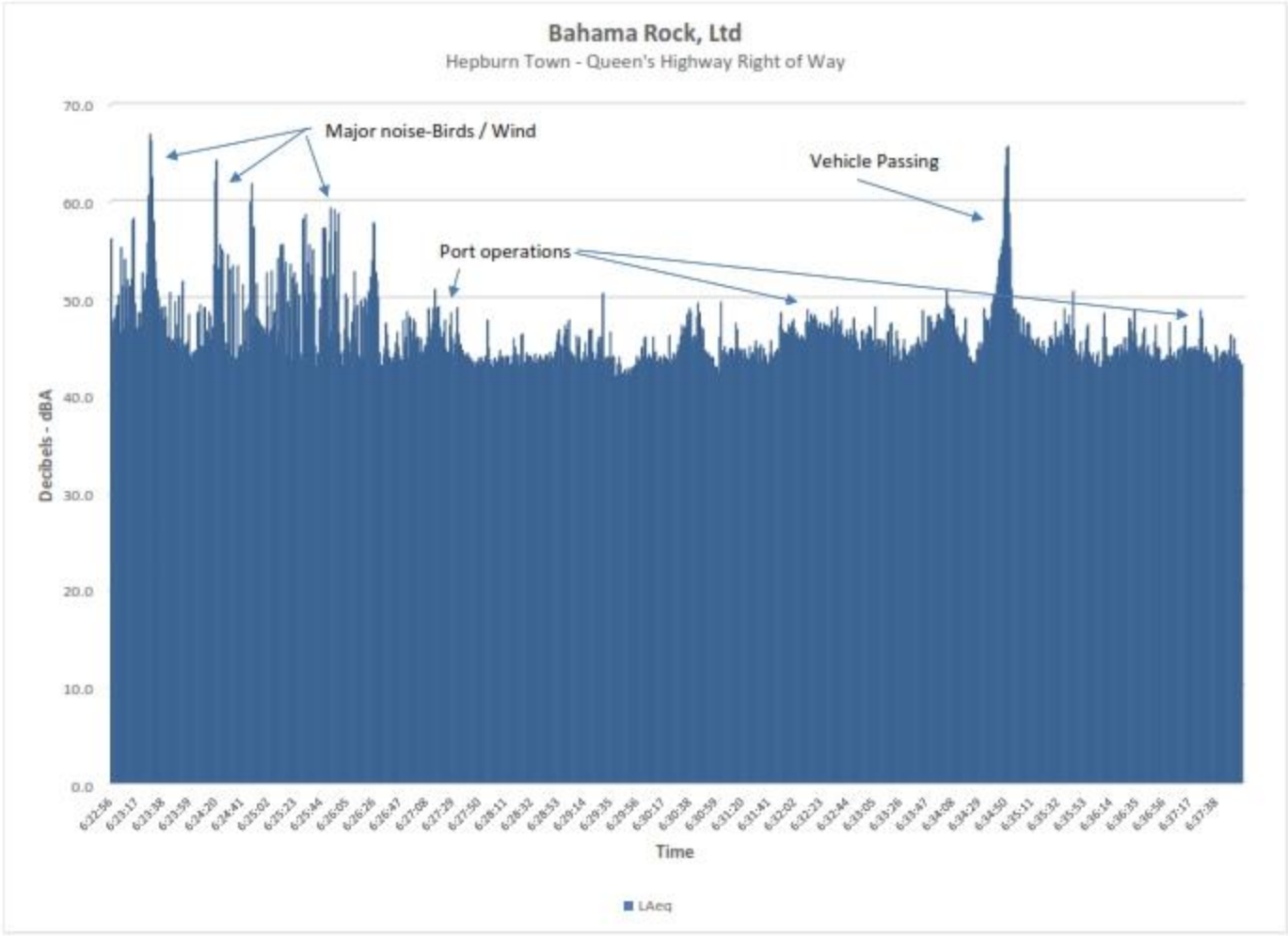
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Time


Bahama Rock, Ltd
Hepburn Town - Queen's Highway Right of Way
Major noise-Birds / Wind
Vehicle Passing
Port operations
Decibels - dBA
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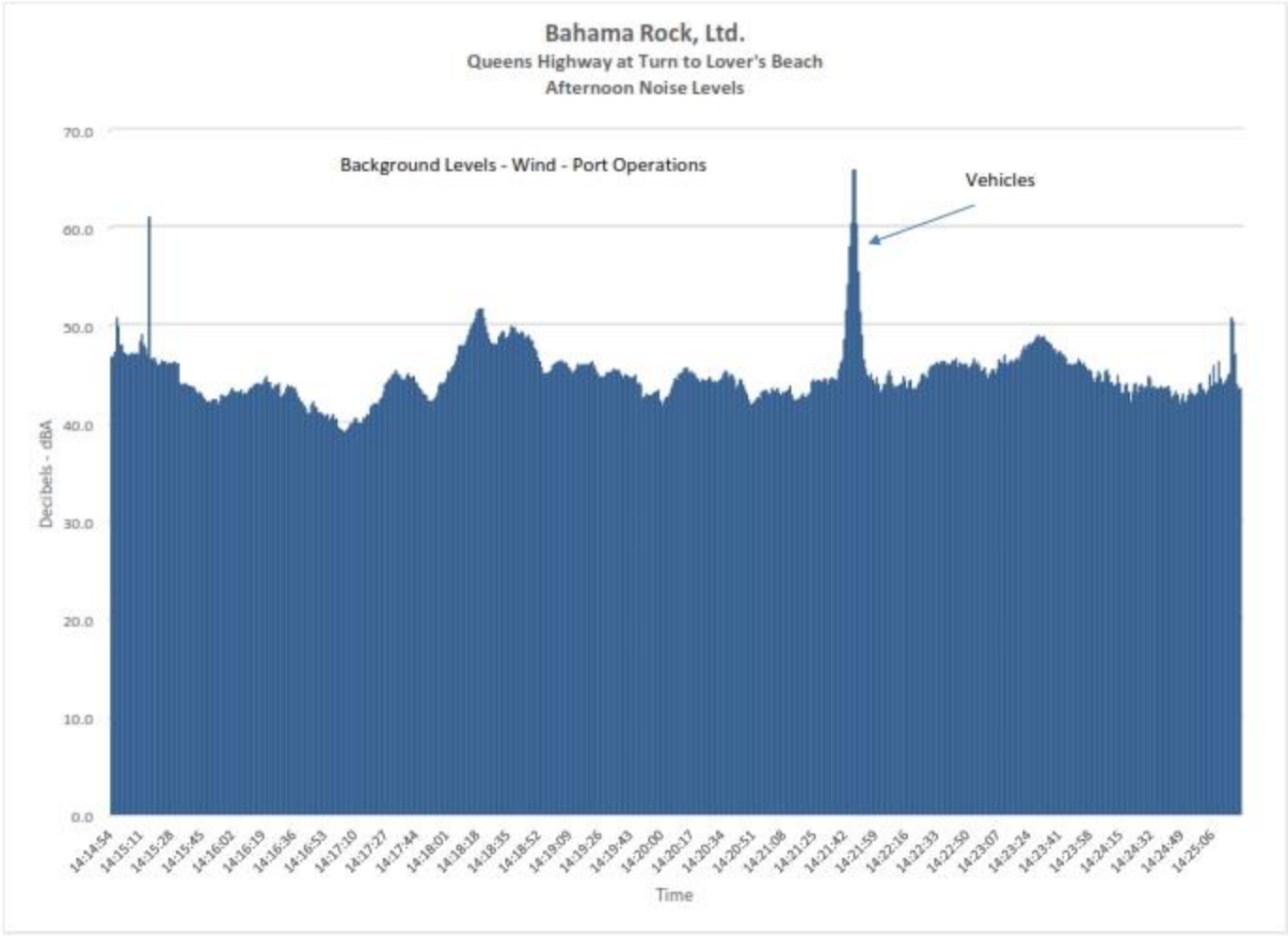
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Time
LAeq


Bahama Rock, Ltd.
Queens Highway at Turn to Lover's Beach
Afternoon Noise Levels
Background Levels - Wind - Port Operations
Vehicles
Decibels - dBA
70.0
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50.0
40.0
30.0
20.0
10.0
0.0
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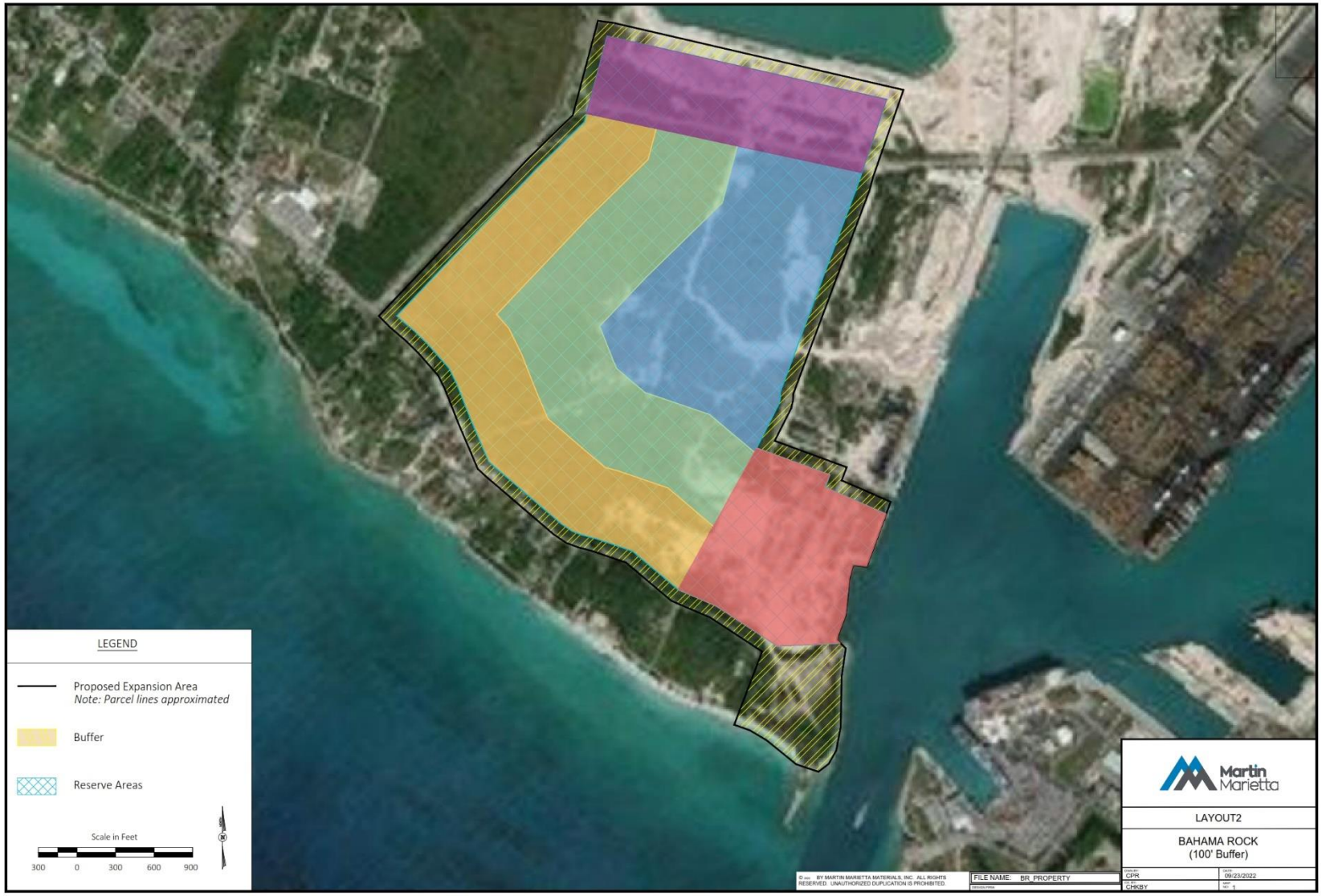
Time

Project Site Plan



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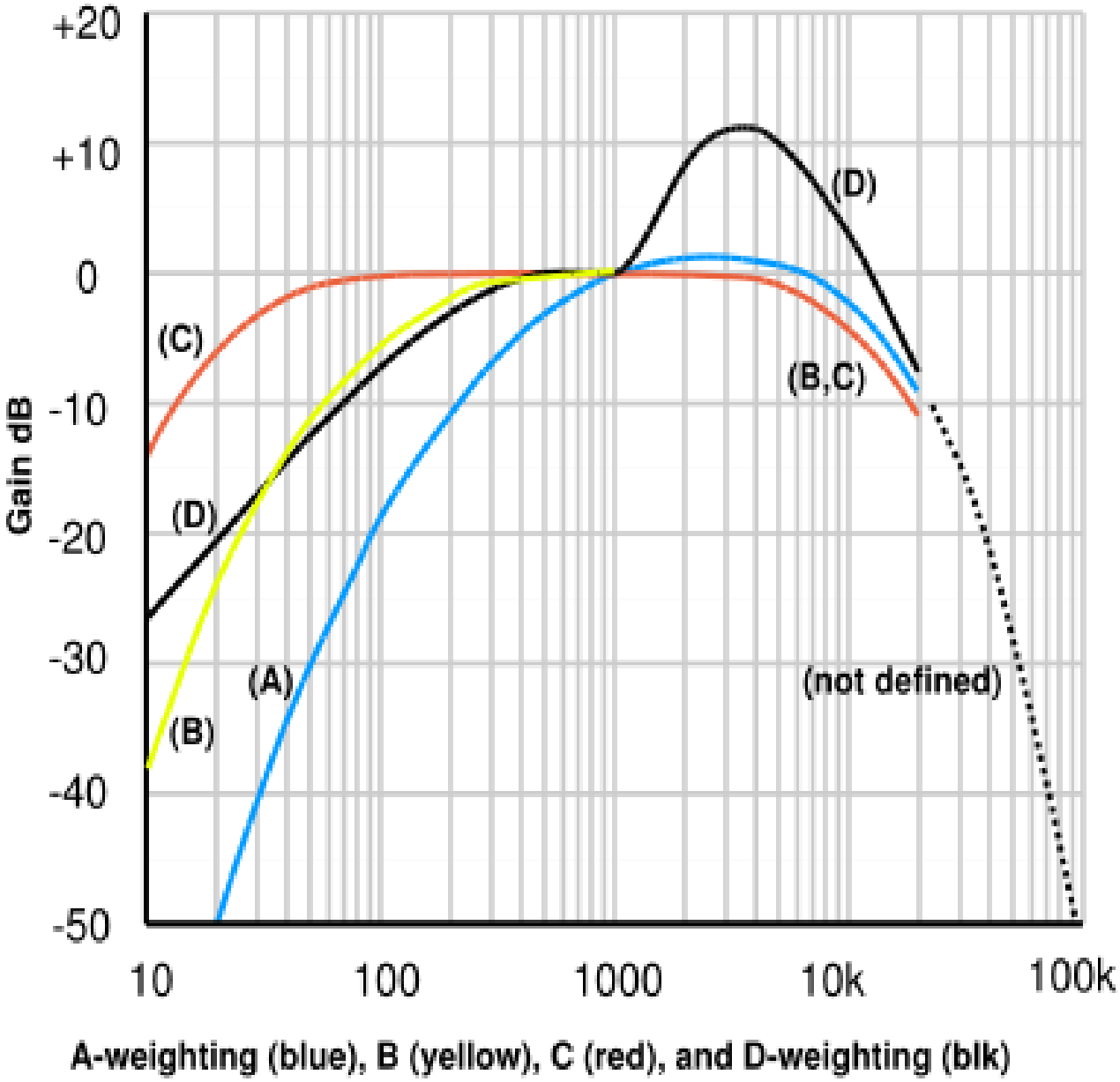
Noise Level Weighting Curves



A-weighting (blue), B (yellow), C (red), and D-weighting (blk)

2013 and 2023 Off Property Noise Monitoring Locations

Figure 1 - 2013 Noise Monitoring Locations

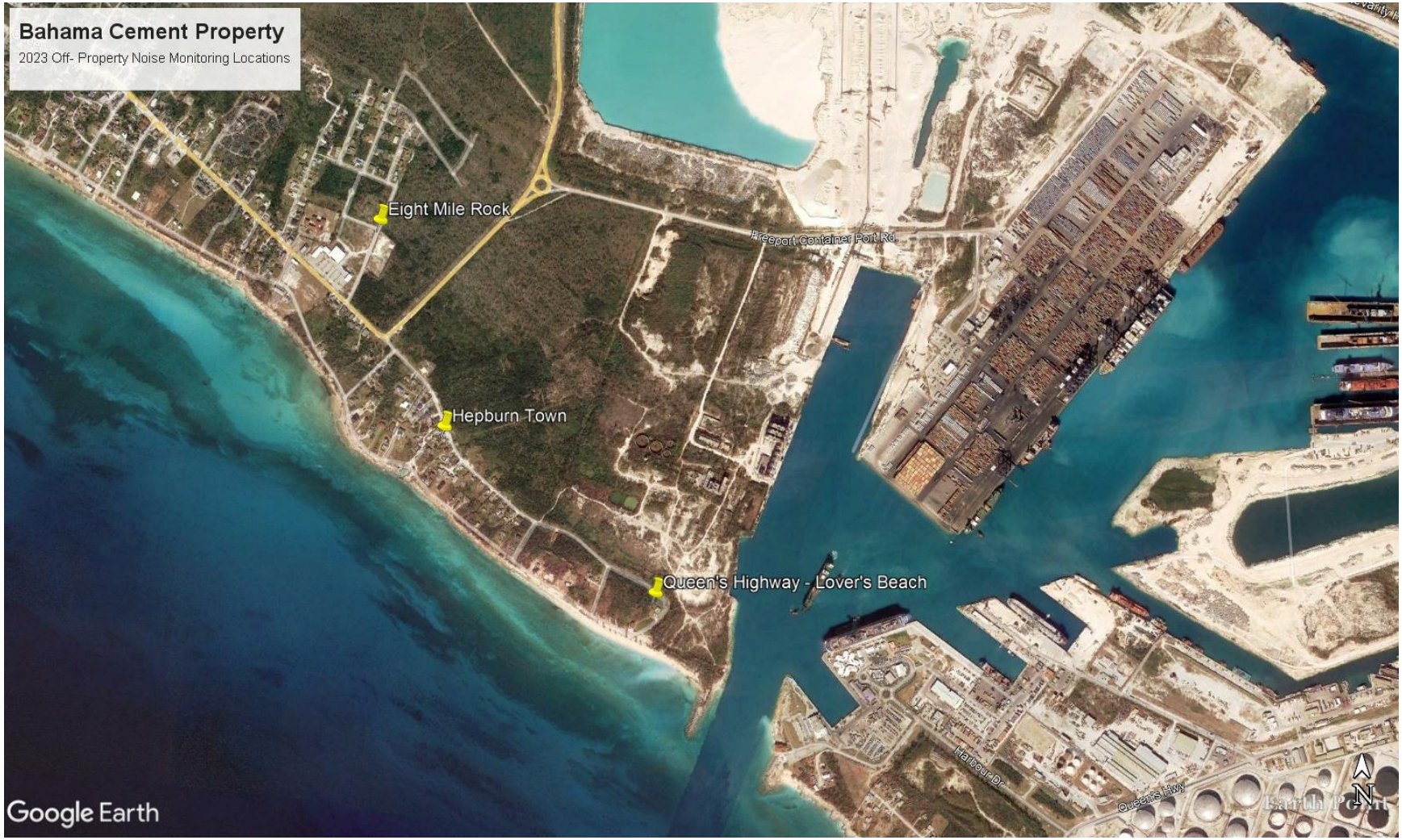


Figure 2 - 2023 Noise Monitoring Locations

APPENDIX E – GEOTECHNICAL SITE EVALUATION DOCK AND SHIP LOADER

REPORT
GEOTECHNICAL SITE EVALUATION
DOCK AND SHIPLOADER
GRAND BAHAMA ISLAND
FREEPORT, BAHAMAS
FOR BAHAMA ROCK LIMITED

JOB NUMBER 99/1321

DATE: MARCH 22, 1999

GEOCONSULT INTERNATIONAL
JUPITER, FLORIDA

TABLE OF CONTENTS

		Page
1.1	INTRODUCTION	1
	1.1.1 GENERAL	1
	1.1.2 PURPOSE AND SCOPE OF WORK	1
	1.1.3 PROPOSED CONSTRUCTION	2
1.2	SITE CONDITIONS	3
	1.2.1 REGIONAL GEOLOGY	3
	1.2.2 SURFACE CONDITIONS	3
	1.2.3 FIELD EXPLORATION	4
	1.2.4 SUBSURFACE CONDITIONS	4
	1.2.5 WATER TABLE	6
	1.2.6 HURRICANE STORM SURGE FLOODING	6
1.3	DISCUSSIONS AND RECOMMENDATIONS	7
	1.3.1 SITE GEOTECHNICAL SUITABILITY	7
	1.3.2 SITE PREPARATION	7
	1.3.3 FOUNDATION DESIGN	8
	1.3.3.1 TRANSFER STATIONS	8
	1.3.2.2 SHIPLOADER	9
	1.3.4 SEAWALL RECOMMENDATIONS	10
	1.3.4.1 STATIC FORCES ON BULKHEAD	10
	1.3.4.2 HEADWALL AND ANCHORAGES	11
	1.3.4.3 ROCK-ANCHORS AND TIEBACKS	11
	1.3.4.4 GROUTING PROGRAM	12
1.4	LIMITATIONS OF REPORT	12

REPORT
GEOTECHNICAL SITE EVALUATION
DOCK AND SHIPLOADER
GRAND BAHAMA ISLAND
FREEPORT, BAHAMAS
FOR BAHAMA ROCK LIMITED

1.1 INTRODUCTION

1.1.1 GENERAL

Pursuant to authorization from Bahama Rock Limited on January 4, 1999, we have completed field and office studies for the proposed new Dock and Shiploader facility in Freeport Harbour, Grand Bahama Island, Bahamas. The site is located adjacent to and north of the existing Bahama Rock Limited's facilities. The property location is shown on Plate 1, Vicinity Map.

Our field studies were completed in general conformance with our proposal dated August 10, 1998. Our exploration program, which comprised three core-borings and fifteen rock-probes, is shown on Plate 2. Details of the exploration program and subsequent analyses undertaken for this study are discussed within the appropriate sections of this report and its appendices.

1.1.2 PURPOSE AND SCOPE OF WORK

The purposes of this study were to define and evaluate the subsurface conditions at the proposed locations of the new bulkhead and shiploader, and provide recommendations for design and construction of these structures.

To the above ends, we have performed the following field and office studies;

1. Inspected the site areas and made observations relative to past and present use, topography, and vegetation.

2. Performed three (3) core-borings to depths of 100 feet at the locations shown on Plate 2.

3. Performed fifteen (15) rock-probes to depths between 97 and 111 feet at the locations shown on Plate 2.

Detailed information in regard to field procedures and data are referred to the appendices.

The data obtained in the field was processed, evaluated, and analyzed; and then compared with previous experience to provide input to the planning and design efforts as follows:

1. Define the subsurface conditions occurring within the areas of the planned structures, to establish the nature, sequence, and the condition of the in-place soil and rock.

2. Assess the influence of the subsurface conditions on the proposed construction, and identify any restraints or limitations that the site conditions may impose.

3. Identify feasible foundation systems for the proposed structures and equipment, and provide recommendations for foundation design.

4. Identify feasible bulkhead design, estimated earth pressures, and provide recommendations for design and construction.

5. Evaluate general site preparation procedures as related to the proposed construction.

1.1.3 PROPOSED CONSTRUCTION

The planned development comprises the construction of approximately 1700 feet of bulkheaded seawall able to accomodate 800 foot long ships. A basin of approximately 1700' x 650' will be blasted and excavated to elevation -55 feet MLW to form the necessary docking area.. The estimated surface grade for the landside development is +12 feet MLW. No paving is planned for the landside section of the site. A Shiploader is planned at the approximate mid-point of the seawall. The finished and processed rock products will be transferred by conveyor from the new plant to the shiploader using two transfer stations between the two end locations. The transfer stations will have lightly loaded foundations, whereas the shiploader will have to accomodate both uplift and down load on its four support legs.

The site elevations within the proposed construction areas varies in general between +16 and +25 feet MLW. The construction area is in part covered by high piles of limesilt from the existing settling ponds. Otherwise, the area has been used in the past for depositing various abandoned equipment and stacks of various soil and rock materials.

1.2 SITE CONDITIONS

1.2.1 REGIONAL GEOLOGY

Grand Bahama Island and other similar islands of the Bahamas group have developed in geologic time by the deposition of marine organisms and by precipitates from the calcareous rich waters of the area. Aided by chemical action and the physical effect of their own weight, the deposited material cemented together and formed the rocks which were encountered during our drilling program. These rocks are mostly limestones, oolitic and fossiliferous.

The rock strata are subjected to solutioning and erosion under the washing action of moving waters. This may be caused by the downward percolation of surface waters, by the action of existing ground water under a hydraulic gradient; by tidal fluctuations; and along the shoreline - by wave action. Under the influence of this destructive activity, small solution channels, sinkholes, and/or subsurface cavities have resulted. All of these features are present in the rocks forming Grand Bahama Island.

The solutioning process is influenced by the rate of water movement and by the chemistry of the waters. Although the formation, solutioning and destruction of the limestone is a continuing process, its rate is slow by human standards and almost impossible to discern over a human lifetime.

1.2.2 SURFACE CONDITIONS

The area investigated extends from the existing facility of Bahama Rock Limited to within a few hundred feet of Queens Highway to the north. A haul road crosses the area in an east-west direction at the location of Rock-probe RP-5. The area between the existing Plant and the Haulroad is relatively flat and is partially covered by old equipment, scrap, construction debris, and piles of aggregates. A few australian pines scatters the landscape. The major part of the deposited debris and scrap is located within the proposed basin area.

On the north side of the Haulroad and ostensibly west of the proposed Seawall line, large mounds of limesilt have been stockpiled from the current settlement ponds. These stockpiles are estimated as high as 25 to 30 feet above prevailing grades. The area extending all the way to the highway seems to be covered by these limesilt materials to a lesser or greater degree. Approaching the highway along the Seawall line, the area opens up to the west. Windrows of sand and aggregates, and piles of trash lumber are seen in this area, together with a line of australian pines forming the edge of the limesilt mounds. To the east of the Seawall line, stockpiles of various trash and soil materials are evident.

Surface elevations within the entire construction area probably varies from about +16 to +45 feet MLW.

1.2.3 FIELD EXPLORATION

The subsurface conditions at the site were explored by three (3) core-borings and fifteen (15) rock-probes. All borings and rock-probes were performed along the proposed seawall line. These explorations were performed in the time period of January 19 to February 26, 1999. All borings and rock-probes were taken to depths between 97 and 111 feet below grade, representing elevations between -76 and -90 feet MLW, local datum. Plate 2 of this report shows the location of all explorations. Appendix A provide detailed description of field procedures for drilling and sampling, and provide boring logs and rock-probe data. Appendix B provide laboratory test procedures and test data for unconfined compression tests from rock-core obtained in the drilling program.

1.2.4 SUBSURFACE CONDITIONS

Based on the data obtained from the borings and rock-probes, it appears that the subsurface stratification is very uniform across the site, and for all intents and purposes, only two distinct limestone formations are in evidence. These limestone types comprise an oolitic limestone formation which extends from elevations between +12 and +16 to an average elevation of about -13 feet MLW. Underlying this formation is a fossiliferous and recrystalline limestone of variable strength, porosity, and cementation. The layer is characterized by occasional cavities and voids, generally below elevation -40 feet MLW. A generalized subsurface section drawn along the length of the proposed seawall is presented on Plate 3. In consideration of the intended seawall construction, the emphasis in our limestone descriptions and delineations have been on rock quality, porosity, erodability, and strength. Hence the fossiliferous limestone stratum has been subdivided in three layers. A layer of limesilt, one to nine foot thick, overlies the natural limestone formations. The following descriptions of the subsurface strata are typical for the site.

Layer 1: This layer extends from the ground surface down to elevations between +11 and +16 MLW. This layer comprises a tan limesilt which has been deposited and spread from the operative settling ponds.

Layer 2: This layer underlies the limesilt and form the original surface grade of the area. It extends on average to elevation -13' MLW. This layer comprise a light brown to creamcolored oolitic limestone that is occasionally friable and of relatively low strength (275 - 665 psi). The limestone is normally weathered in the upper 2 to 3 feet and is penetrated by roots and vertical holes infilled with organic soils. Below this surface layer, the limestone is generally a hard and competent continuous rock mass, but does possess frequent zones of jointing and some fracturing. Towards the lower end of the stratum, the limestone becomes porous. The dry density of rock core in this investigation ranged between 94.9 and 111.9 pcf.. The stratum is near impervious above elevation -8 feet and can only transmit water through joint systems. Below elevation -8 feet, the porosity becomes connected

porespace. The base of this layer is the divider of the two distinctly different limestone formations at the site.

Layer 3 This limestone formation comprises a light brown to gray to rusty brown fossiliferous limestone. The stratum is generally very competent, dense and sometimes massive with high compressive strength. It is occasionally fractured and secondary porosity is observed below elevation -28 feet MLW. Secondary calcite is seen throughout the section. The layer extends to elevations between -62 and -70 feet MLW. At the lower end of the stratum, between elevations -46 and -62 feet MLW, a number of voids were encountered in both borings and rock probes. These cavities were generally 1 to 3 feet deep, but in RP-9 the cavity was about 8 feet deep. These voids were generally observed below -46 feet where the stratum tended to become fractured and porous. The unconfined compressive strength of this limestone stratum where intact rock cores were obtained, ranged between 281 and 4543 psi, and the dry density ranged between 95.5 and 140.1 pcf. The occasionally high secondary porosity of this stratum enables it to transmit water freely. The base of this layer forms the end of the cavity prone and porous section of this upper fossiliferous section.

Layer 3b: This limestone is the continuation of the above formation, and comprise light brown to gray to white fossiliferous and recrystalline limestones. The recrystalline effects diminishes below an elevation of -65 where the limestone grades into a generally white shelly limestone. The entire stratum is characterized by non-uniform sequences of well cemented and dense to weakly cemented and fractured limestones. Where well cemented limestone sections are in evidence, the limestone is generally jointed and variably porous. The unconfined compressive strength of intact cores ranged between 200 and 1231 psi, whereas the dry densities ranged between 80.0 and 120.0 pcf in this stratum. This layer extended to the maximum depths of -90 feet MLW in the exploration program.

We have compared the above data and information with the data obtained from adjacent properties, and have found the stratification and limestone properties to be very similar in all cases for this area. The only difference of consequence in this investigation is the good resolution between layers 3 and 3b.

1.2.5 WATER TABLE

Ground water elevations were recorded in all borings subsequent to completion of drilling. The recorded water levels were encountered between 14 and 22 feet below ground level. These water levels represented water surface elevations around +2 feet MLW. The tidal fluctuations in the area is about 3 feet.

The ground water levels at the site are expected to vary with tidal fluctuations, seasonal variations, and short term meteorological phenomena such as hurricanes and prolonged periods of wet weather.

1.2.6 HURRICANE STORM SURGE FLOODING

Historical information on hurricane storm surge flooding in the Bahamas is scarce. Hurricane landfalls in the Islands have been infrequent at most. It also appears that storm surge tides that may develop in conjunction with a hurricane landfall would be restricted to some significant extent by the deep waters that lie immediately offshore to the south of Grand Bahama Island. The most recent storm that came through was Hurricane Erin in August 1995. This was an 80 mph storm hitting the island from the north side flooding the Queens Cove area. Flood elevations during the peak of the storm were +8' MLW. Water elevations on the south side of the island were reputedly not affected during this storm. The estimated recurrence interval of this storm was 10 years.

The risk of high flood surges on the south side of Grand Bahama Island is considerably less than on the north side which is fronted by the shallow banks and which builds up high water elevations during the sweep of a hurricane. On the south side, the deep waters prevent buildup and a same magnitude hurricane would produce water levels of several feet less than on the north side.

In a most recent flooding study for the proposed Lucayan Plaza Beach Resort, a flood elevation of about +10 feet was predicted for the 100 year storm. This prediction is applicable to the harbour area.

1.3 DISCUSSIONS AND RECOMMENDATIONS

1.3.1 SITE GEOTECHNICAL SUITABILITY

The results of our field investigations and engineering assessments indicate that the proposed development areas are generally suitable for construction of a seawall and the proposed shiploader. The subsurface conditions along the proposed seawall line indicate that the limestone column is overall intact and competent down to elevation -46' MLW, but exhibits void activity and general weakness down to elevation -62' MLW. An eight foot deep cavity was encountered at the location of the proposed shiploader. These cavity locations coincide with the mudline elevation of -55' MLW. It is reasonable to assume from past experience that when the area is blasted, some weakening and further jointing of the landside limestones will occur. Past experience in the harbour area has shown vertical tension cracks up to 30 feet behind the blasting line. Furthermore, to get a clean vertical cut is near impossible in these limestones due to their heterogeneous nature. As a vertical unsupported rockface is not recommended for this site, a tieback sheetpile wall should be considered for design and construction. Backfilling between the limestone face and the bulkhead will provide the prime earthpressures on the bulkhead, together with the potential for localized wedge failures of the rockface which would tilt towards the top of the bulkhead thus introducing a potential horizontal point load. A tieback system will be needed for bulkhead stability as well as tying the rock mass together. In consideration of the large ships to be anchored at this location, it is generally recommended that a concrete headwall be incorporated in bulkhead design. This headwall would also serve as anchorage for bollards or other mooring devices. Foundations for the shiploader must be considered in light of the distance from the seawall line. If its legs are located in competent and unaltered limestones, high capacity augercast piles can be developed in the upper 40 feet of the subsurface profile, whereas if its legs are located in backfill areas, large diameter drilled shafts with tip elevations below -70' MLW would be needed. Recommendations for the project are contained in the following sections.

1.3.2. SITE PREPARATION

Clearing of the site for construction will require removal of all old equipment, scrap metals, stockpiles of materials, trees, and the large deposits of limesilt from the settling ponds.

Stripping and cutting down to the planned site grade of +12 feet MLW across the site will require excavation in the oolitic limestones for the major part of the area. Cutting through the upper weathered part of this stratum is not difficult as it is pinnacled and easily ripped. This levelling operation should be carried out down to good uncontaminated limestone. The removed materials should be discarded as these oolitic limestones disintegrate during compaction and loose its bearing when it becomes saturated.

We recommend that the area be cut down to six inches below finished grade, and that a working surface grade be provided using six inches of compacted limestone fill. This limestone fill should comprise materials from the fossiliferous stratum. A degree of compaction equal to 98% of Modified Proctor Dry Density (ASTM D-1557) is suggested for this surface layer.

1.3.3 FOUNDATION DESIGN

1.3.3.1 TRANSFER STATIONS

The oolitic limestones that outcrop on the site are competent rock masses that permit the use of shallow foundations for structural support. Accordingly, we recommend that these structures be supported on spread foundations that are designed for a maximum contact pressure of 6000 pounds per square foot (psf). These footings should have no dimension less than 30 inches. Footings should be founded in the undisturbed limestone at depths not less than 18 inches below the nearest adjacent grade. Foundations designed and constructed in this manner are expected to experience negligible total and differential settlements. Where structure foundations are planned in compacted limestone fill, a presumptive allowable bearing value of 4500 p.s.f. may be assumed provided the fill overlying limestone rock is compacted to 95% of Modified Proctor Maximum Dry Density (ASTM D-1557).

Horizontal forces on the structures can be resisted by earth pressures acting on the buried vertical faces of the foundations and by shearing resistance mobilized along the foundation/subgrade interface. Available earth pressure resistance may be determined using an equivalent fluid pressure of 350 pounds per square foot per foot depth for foundations surrounded by well compacted granular backfill, or in intimate contact with the oolitic limestone. A friction factor of 0.55 may be used to compute the magnitude of shearing forces mobilized along the footing base. Horizontal foundation resistance determined in accordance with the above should be considered an ultimate value. Thus the design should include a factor of safety of 1.5 or more with respect to applied load.

Foundations for these structures may sustain net uplift loads due to heavy forces under hurricane conditions. These loads may be resisted by the dead weight of the foundations and their overlying backfill. Typical unit weight values for concrete and compacted limestone fill may be taken as 150 and 130 pounds per cubic-foot (pcf), respectively. Should the structural analysis indicate this to be insufficient, additional uplift resistance may be provided with rock anchors composed of high strength rebars drilled and grouted into the limestone. The design of rock anchors of this type is dependent upon the strength of the oolitic limestone, the grout/rock adhesion that can be developed, and on foundation geometry. A minimum of a six

B. Drilled Shafts installed in Backfill

We recommend that drilled shafts be used as foundation support if the shiploader legs are underlain by limestone backfill materials. A three (3) foot diameter full length steel casing would be necessary to carry the load to below the anticipated sheetpile tips at around -70' MLW. This casing may be vibrated in-place, and the pile capacity estimated by the Pile Driving Analyzer (PDA) during installation. These casings should be installed into Layer 3b below elevation -70' MLW, to the desired bearing capacities. Uplift capacities are presumtive for these shafts. Subsequent to the installation of the casing, the backfill materials and natural limestone within the casing must be removed, and the casing filled with concrete. The tremie method of placement must be applied.

1.3.4 SEAWALL RECOMMENDATIONS

Based on the previous discussions, we recommend that the proposed harbour walls for the loading terminal be provided the support of a tiedback bulkhead to prevent instability by scour, and inherent rock weaknesses. We believe that a bulkhead at this location may be best achieved by steel sheet piling, allthough other alternatives may be cost effective. If sheet piles are used in design, they should penetrate at least 15 feet (to elevation -70' MLW) into rock below the mudline.

We recommend that the berthing forces be taken by a mass concrete block or headwall, 6 to 7 feet high and 9 to 10 feet deep, set into the top of the bulkhead. Bollards to take the mooring forces from the spring lines should be anchored into this concrete block. Rockbolts or anchors must be provided to the headwall at each bollard location to allow for spring line forces. The concrete headwall and the fender system will adequately provide for the impact forces from berthing ships. A conceptual layout of the suggested system is shown on Plate 4.

1.3.4.1 STATIC FORCES ON BULKHEAD

The static forces on the bulkhead may be introduced by either the backfill and/or local failure of the rock face. To estimate the latter, we considered past experience in the harbour area by actual failures caused by blasting. In these cases where cavities causes a rock overhang to occur, the rock fails in tension with an outward displacement at the top of the bulkhead. This tensional weakness is normally caused by the blasting process. Previous analyses of this potential failure mechanism for the Container Terminal using the FLAC (Fast Lagrangian Analysis of Continua) computer program indicated that rock failure could occur when caverns extended 10 to 30 feet in from the rockface at elevations of -15 and -47 feet MLW. The estimated translational force to the face of the bulkhead by a small tilting failure of a 10 foot section of limestone, would impart a potential static force on the bulkhead of 6 Kips/linear foot of bulkhead. We furthermore

estimate that the rock backfill may exhert an active pressure on the bulkhead of 6 Kips per foot of wall. We recommend that a horizontal force of 10 Kips per linear foot of wall be used in design for the entire length of wall.

1.3.4.2 HEADWALL AND ANCHORAGES

We recommend that a reinforced concrete headwall be designed and constructed along the length of the bulkhead. This headwall should be tied into the bulkhead and form the cap thereof. A fender system must be designed to front the headwall and absorb most of the berthing forces. The remainder will be absorbed by the Headwall/Limestone contact. Allowable dynamic contact pressures can be taken as 3 KSF (Kips per squarefoot). Where the limestone has to be excavated to seat the and construct the headwall, the limestone should be clean and concrete should be poured in direct contact with the limestone.

Bollards, capstains, or other mooring devices may be anchored in the headwall at regular intervals to absorb the springline pull from berthing ships. Pulls in excess of 100 tons can be expected from these ships. The headwall cannot accomodate these forces on its own, and rock-anchors or rockbolts installed into the rock behind the wall are needed to counteract these forces and maintain horizontal stability of the headwall. Design data for these anchors are given in the following section.

1.3.4.3 ROCK-ANCHORS AND TIEBACKS

We recommend that tiebacks for the selected type of seawall be high strength reinforcement bars or wedge type anchors (rockbolts), able to withstand the predicted tensile forces. We recommend that these bars be drilled inplace at an angle from 1.5 to 2 feet above MLW. These anchors should extend a minimum of 40 feet in from the front of the bulkhead, and the anchors should be grouted inplace from the tip and out. Proper spacers should be placed on the anchor bars to ensure centricity in the borehole. These tiebacks serve the dual purpose of tying the rockmass together and providing lateral restraint to the bulkhead.

In design of these anchors, an ultimate Rock/Grout Bond Stress of 6 KSF may be used, and a bond strength between steel and grout of 300 psi (pounds per square inch) may be used. The latter is not significant, as only a fraction will be developed under full loads. Factors of safety of at least two should be developed against Rock/Grout Bond failure, and against steel bar failures.

The rockbolts or anchors to be developed for the headwall can be designed and installed as for the tiebacks described above. The installation length into the rock behind the wall must be determined by the capacity to be developed, but should not be less than 20 feet. The steel/Concrete bond stress becomes of importance in this context. Appropriate values can be developed from the formula for

Development Length in Tension as given in ACI 318. Factors of safety against failure for Rock/Grout and Steel/Concrete should be at least two (2).

Proof-testing of the installed rock-anchors and rockbolts should be performed at regular intervals. Specifically, we recommend that every third anchor be proof-tested to 120 percent of design capacity.

1.3.4.4 GROUTING PROGRAM

We recommend that the area within 30 to 50 feet of the bulkhead be grouted in the depth interval -40 to -65 feet MLW subsequent to installation and backfilling of the bulkhead. Grouting of this section will fill the voids and cavities within the rock mass and eliminate the potential for local rock failures and hence stabilize the area. The prime reason for performing the grouting program after the bulkhead installation is because a hydraulic gradient of up to 3 feet exist between the north and south side of the island (the tidal difference). As these cavities are interconnected, a flushing action takes place at high tide on the north side. If grout was placed prior to sheetpile installations, the grout would most likely be washed into the basin.

We recommend that further rockprobes be performed during construction to further delineate voids and cavities along the length of the bulkhead. These probes can be used as injection points for the grout. Where deeper cavities exist such as that encountered at RP-9, it may be prudent to fill this section with inert material prior to injecting grout.

1.4 LIMITATIONS OF REPORT

The recommendations discussed in this report are based on Geoconsult International's interpretation and understanding of site conditions and on the results of subsequent engineering analyses. The contents of this report have been tailored to the requirements of the proposed development for Bahama Rock Limited.

The use of the recommended bulkhead system, tiebacks, pile and conventional foundation systems, will require appropriate construction surveillance under professional direction. Additionally, interaction between Geoconsult International and the design team is essential during design of the project which leads to construction. We recommend that this office participate in the review of final designs, load testing, and construction surveillance.

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The following Plates and Appendices are attached and complete this report:

Plate 1:	Vicinity Map
Plate 2:	Exploration Layout
Plate 3:	Generalized Subsurface Profile
Plate 4:	Conceptual Layout of Seawall
Appendix A:	Field Explorations
Appendix B	Laboratory Test Data

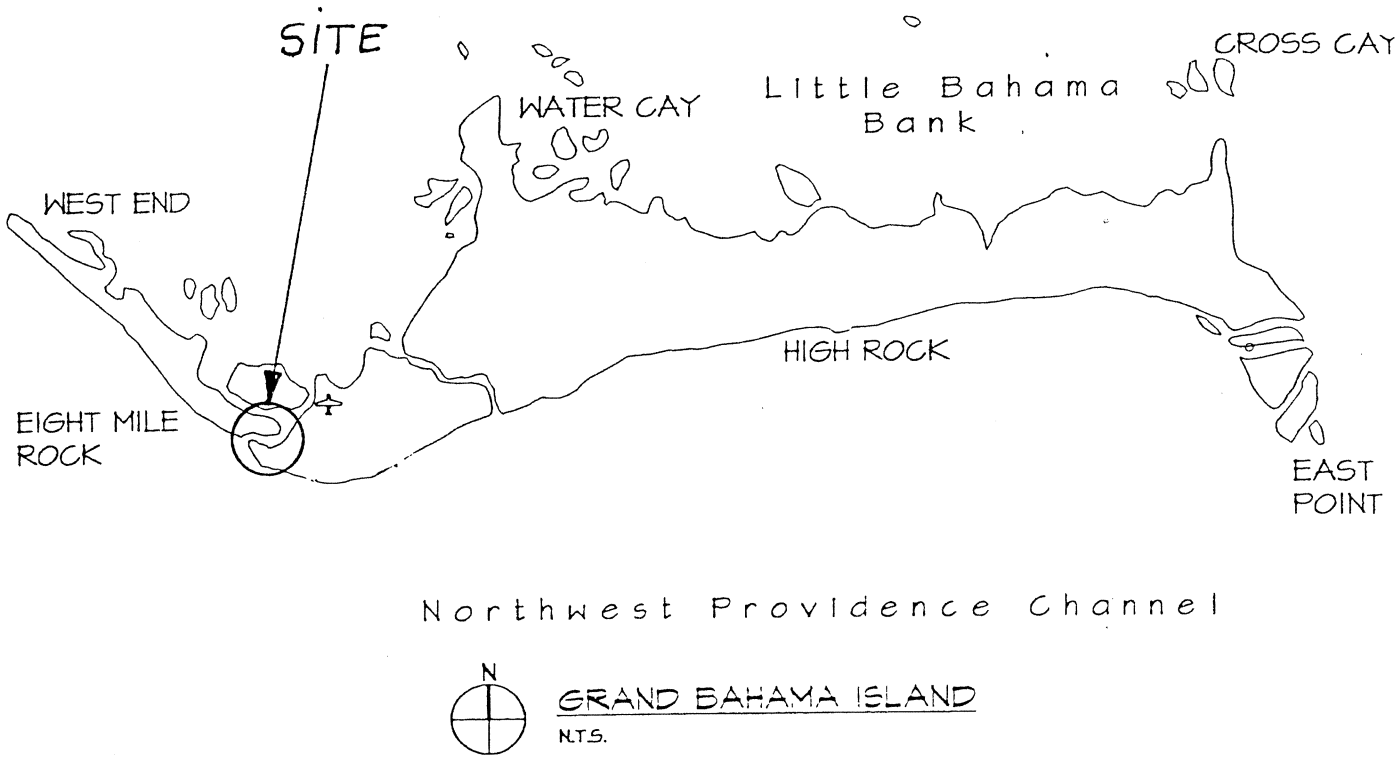
We appreciate the opportunity to have completed this study. If you have any questions regarding the contents of this report, please contact us at your convenience.

Respectfully Submitted
GeoConsult International

Carl H.D. Henriksen,P.E.
President

Project #99/1321

3/23/99

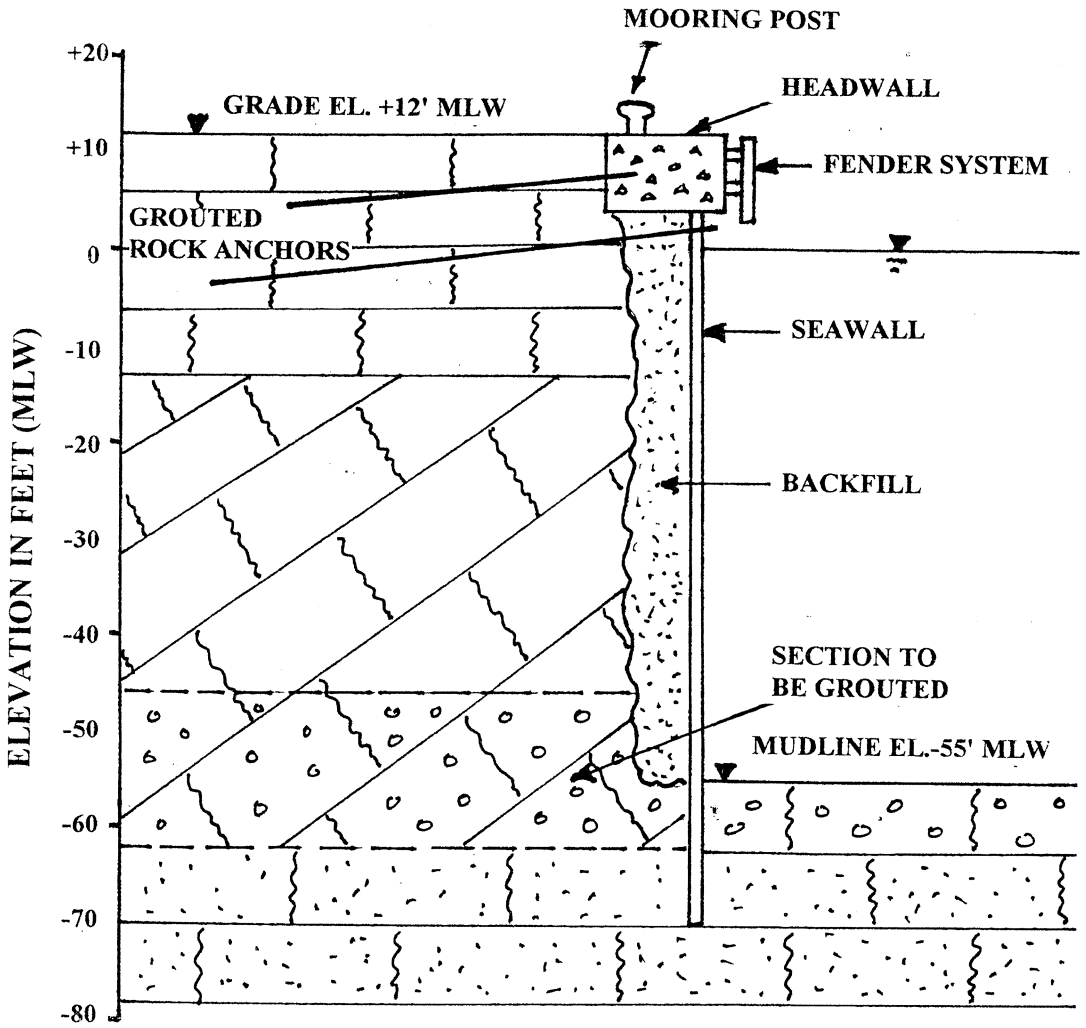


VICINITY MAP

DOCK AND SHIPLOADER FOR BAHAMA ROCK LTD. FREEPORT, GRAND BAHAMA ISLAND

PROJECT #99/1321

GEOCONSULT INTERNATIONAL



CONCEPTUAL LAYOUT OF SEAWALL
DOCK AND SHIPLOADER FOR BAHAMA ROCK LTD.
FREEPORT, GRAND BAHAMA ISLAND

PROJECT #99/1321 **GEOCONSULT INTERNATIONAL**

APPENDIX A

FIELD EXPLORATIONS

FIELD EXPLORATIONS

The subsurface conditions of the site were explored by a number of exploration techniques as described in the following paragraphs.

Three coreborings, B-1 through B-3, were drilled with a truckmounted Mayhew 1000 water well rig to depths between 99 and 100 feet in the time interval February 2 through 26, 1999. The location of these borings are shown on Plate 2.

The borings were advanced using a 10 foot long, 4.0-inch diameter corebarrel to obtain continuous representation of the limestone profile at these locations. During drilling, the drilling rate in Minutes/Foot were noted, and any freefalls of the Kelly-bar were noted to indicate any voids or caverns. For each core-run, which varied in length between 2 and 10 feet, the Recovery was noted and recorded as a percentage of the total core-run. Additionally, the Rock Quality Designation (RQD) for the core-run was calculated by adding the length of core recovered greater than 4 inches in length. The RQD was then expressed as a percentage of the total core-run. Each boring was advanced to a depth of ten feet before coring could be initiated. This was in order to accomodate the corebarrel. A Geoconsult International engineer was present during drilling operations, and prepared continuous boring logs and classified the limestone obtained in the drilling process. The drilling services were provided by Bahama Sanitary Engineering Limited. The logs of the core-borings are presented in this Appendix on Plates A-1 through A-3.

Fifteen Rock-probes, numbered RP-1 through RP-15, were planned for the project and were drilled in the time interval of January 19 through February 27, 1999. Their locations are shown on Plate 2. These rock-probes were drilled using a truck-mounted Mayhew 1000 water well rig with a 40 foot kelly bar, and the probes were advanced by rotary-air using a 4-inch diameter fish-tail bit. The rock-probes were taken to depths between 98 and 111 feet below prevailing grade, and the drilling rates in Seconds per Foot were recorded by a representative of Geoconsult International. Furthermore, where voids or caverns were encountered, the freefall distance of the Kelly-bar was recorded. The drilling services were provided by Bahama Sanitary Engineering Limited.

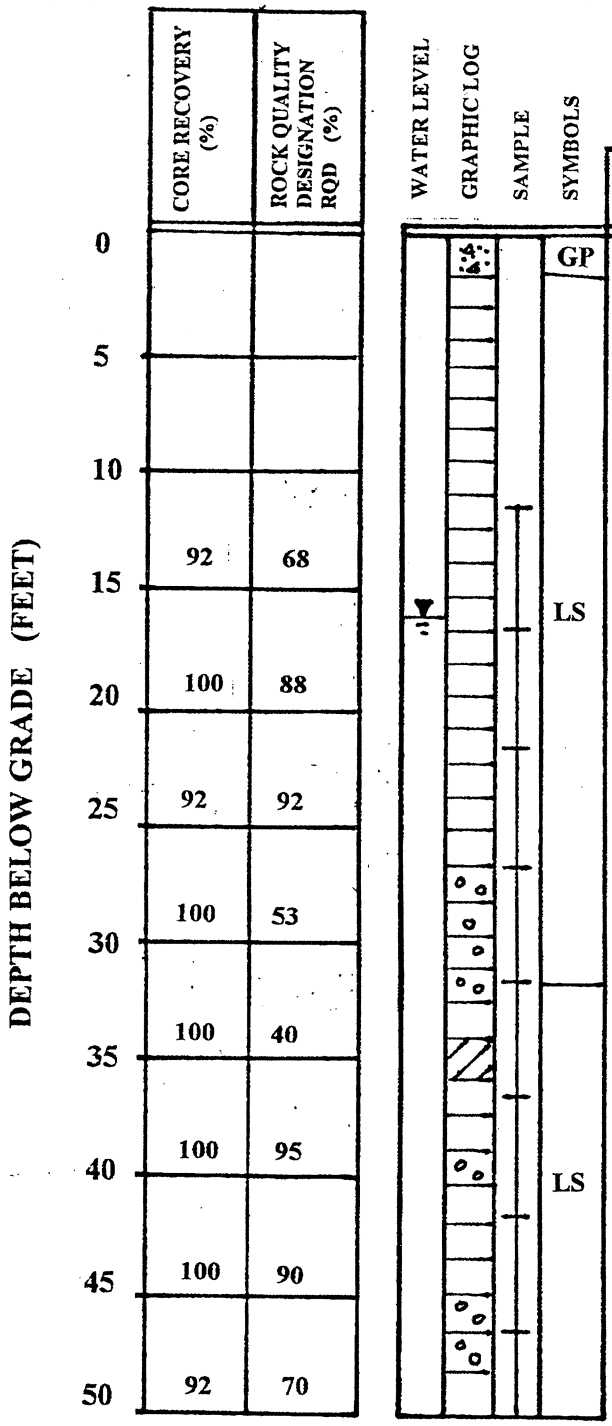
The graphical representation of these rock-probes as penetration rates versus depth are presented on Plates A-4 through A-5 in this Appendix. The actual penetration rates for each rock-probe is presented in Table A-1. A summary of Surface Elevations at the location of Borings and Rock-probes are provided in Table A-2.

The following Tables and Plates are attached and complete this Appendix.

Plate No.	Description
A-1	Log of Boring B-1
A-2	Log of Boring B-2
A-3	Log of Boring B-3
A-4	Rock-probes RP-1 through RP-8
A-5	Rock-probes RP-9 through RP-15
Table A-1	Penetration Rates with Depth for Rock-probes RP-1 through RP-15
Table A-2	Surface Elevations at Borings and Rock-probe Locations

BORING B-1

SURFACE ELEVATION + 18.0' MLW
COORDINATES



SOIL DESCRIPTION

Limestone fill

Light brown oolitic limestone. Moderately hard, dense, and jointed.

Grades porous

Grades very porous

Tan to gray recrystalline fossiliferous limestone. Hard , dense, and jointed.

Grades with secondary porosity

LEGEND:

- Jointed Limestone
- Fractured Limestone
- Porous Limestone
- Core Run
- Water Table

LOG OF BORING

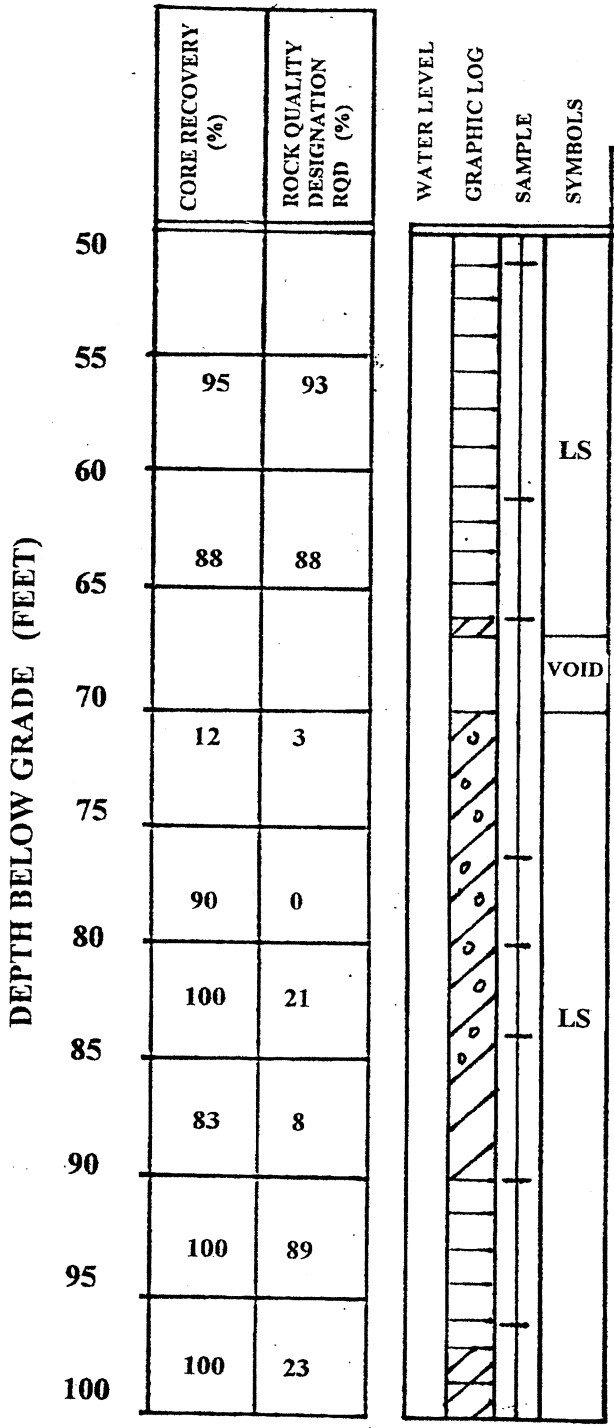
Dock and Shiploader for Bahama Rock Ltd.
Freeport, Grand Bahamas
Project # 98/1321

GEOCONSULT INTERNATIONAL

PLATE A-1

BORING B-1

SURFACE ELEVATION
COORDINATES



SOIL DESCRIPTION

Grades very dense and massive

Grades poorly cemented, fractured, and porous

Grades well cemented, dense, and jointed

Grades fractured

Boring completed at 100 feet on February 26, 1999.

LEGEND:

- Jointed Limestone
- Fractured Limestone
- Porous Limestone

LOG OF BORING

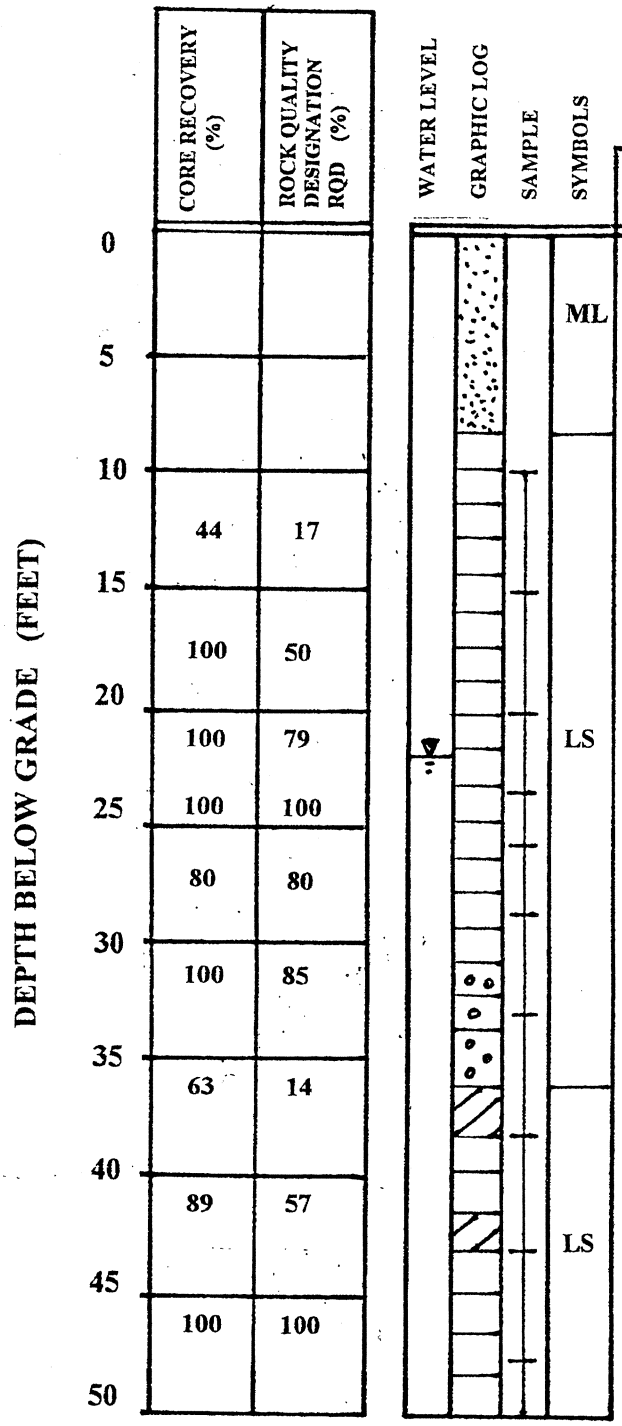
Dock and Shiploader for Bahama Rock Ltd.
Freeport, Grand Bahamas
Project # 98/1321

GEOCONSULT INTERNATIONAL

PLATE A-1

BORING B-2

SURFACE ELEVATION +24.0' MLW
COORDINATES



SOIL DESCRIPTION

Tan limesilt fill.

Light brown oolitic limestone. Moderately hard, dense, and jointed.

Grades very porous

Tan to gray recrystalline fossiliferous limestone. Fractured and porous.

Grades dense and jointed

Grades fractured

Grades dense and jointed

LEGEND:

- Jointed Limestone
- Fractured Limestone
- Porous Limestone
- Core Run
- Water Table

LOG OF BORING

Dock and Shiploader for Bahama Rock Ltd.
Freeport, Grand Bahamas
Project # 98/1321

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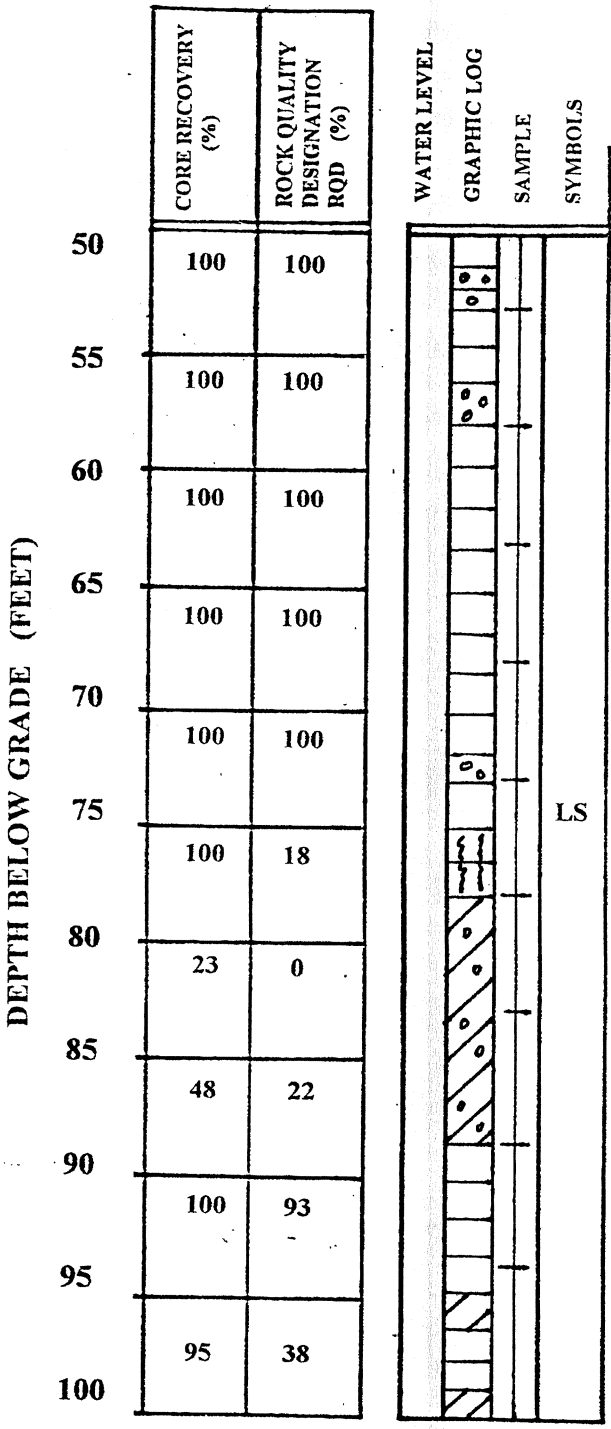
PLATE A-2

BORING B-2

SURFACE ELEVATION
COORDINATES



SOIL DESCRIPTION

Grades porous
Grades dense and jointed

Grades with secondary porosity
Grades very dense and massive

Grades with vertical fractures

Grades poorly cemented, porous and fractured

Grades dense and jointed with occasional fractures

Boring completed at 100 feet on February 22, 1999.

LEGEND:

- Jointed Limestone
- Fractured Limestone
- Porous Limestone

LOG OF BORING

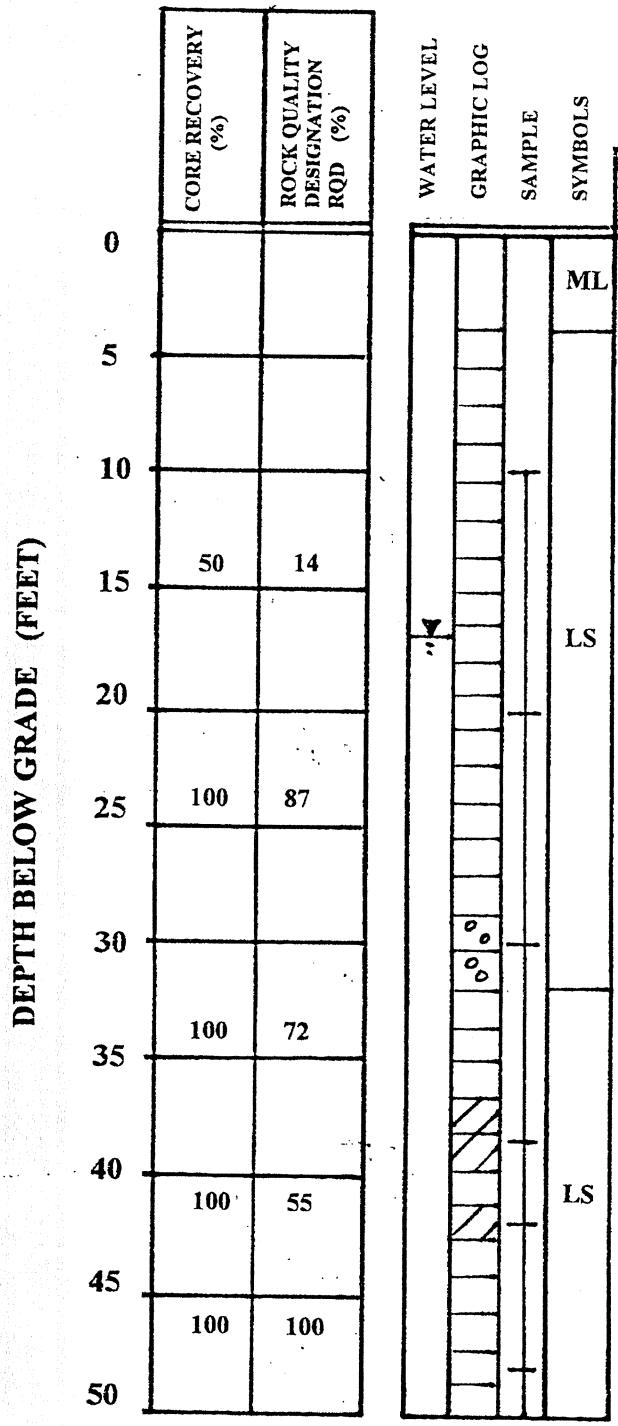
Dock and Shiploader for Bahama Rock Ltd.
Freeport, Grand Bahamas
Project # 98/1321

GEOCONSULT INTERNATIONAL

PLATE A-2

BORING B-3

SURFACE ELEVATION + 19.2' MLW
COORDINATES



SOIL DESCRIPTION

Tan limesilt fill.

Light brown oolitic limestone. Moderately hard, dense, and jointed.

Grades massive

Grades very porous

Tan to gray recrystalline fossiliferous limestone. Dense, hard, and jointed.

Grades fractured

Grades very dense and massive

Grades fractured

Grades dense and jointed

LEGEND:

- Jointed Limestone
- Fractured Limestone
- Porous Limestone
- Core Run
- Water Table

LOG OF BORING

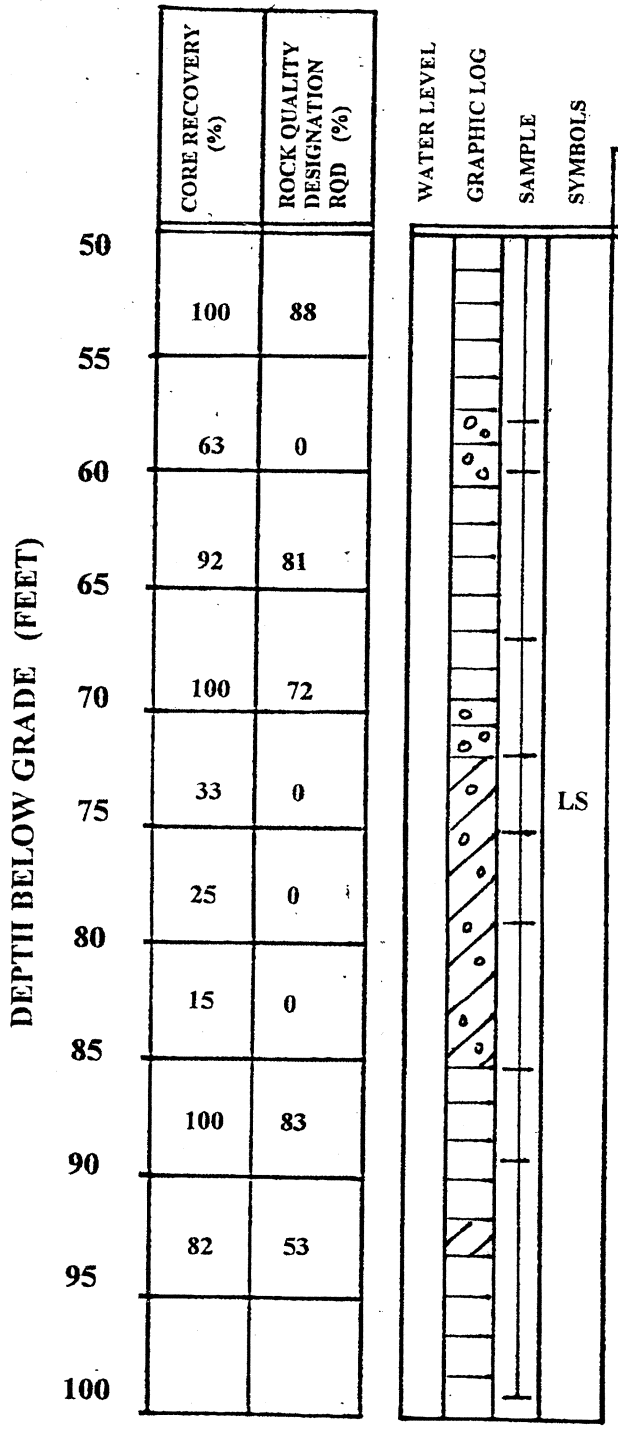
Dock and Shiploader for Bahama Rock Ltd.
Freeport, Grand Bahamas
Project # 98/1321

GEOCONSULT INTERNATIONAL

PLATE A-3

BORING B-3

SURFACE ELEVATION
COORDINATES



SOIL DESCRIPTION

Grades with secondary porosity

Grades dense and jointed

Grades very porous
Grades fractured, porous, and poorly cemented

Grades dense and jointed

Boring completed at 99 feet on February 5, 1999.

LEGEND:

- Jointed Limestone
- Fractured Limestone
- Porous Limestone

LOG OF BORING

Dock and Shiploader for Bahama Rock Ltd.
Freeport, Grand Bahamas
Project # 98/1321

GEOCONSULT INTERNATIONAL

TABLE A-1
SUMMARY OF ROCK-PROBE PENETRATION RATES WITH DEPTH

DEPTH (FEET)	ROCK-PROBE PENETRATION RATES (SECONDS/FOOT)							
	RP-1	RP-2	RP-3	RP-4	RP-5	RP-6	RP-7	RP-8
1	60	10	8	11	21	1	2	15
2	72	78	10	13	21	14	10	20
3	68	62	40	8	55	16	18	11
4	70	85	57	43	13	15	45	16
5	52	49	50	44	25	70	7	13
6	67	27	27	70	56	60	30	15
7	68	29	24	46	72	32	29	6
8	60	40	26	28	52	30	23	10
9	60	29	26	24	48	30	29	119
10	65	19	50	20	55	29	21	119
11	57	27	53	25	60	40	32	58
12	64	24	38	24	52	29	27	55
13	61	25	39	27	67	40	36	55
14	66	31	23	37	73	35	21	43
15	62	16	25	45	47	38	16	35
16	51	14	29	24	58	30	29	36
17	63	34	26	38	53	28	23	40
18	70	41	49	59	27	38	22	51
19	62	50	28	35	72	23	38	83
20	60	57	68	35	34	27	37	53
21	44	87	50	14	28	30	26	42
22	63	89	44	18	33	31	25	55
23	49	65	38	15	32	26	21	60
24	57	67	83	16	77	35	26	50
25	49	70	84	40	29	40	41	60
26	39	70	112	49	65	48	19	53
27	36	63	107	41	53	55	44	56
28	39	55	72	33	52	51	41	47
29	39	79	58	26	54	57	53	71
30	10	62	62	33	46	33	58	60
31	140	27	45	25	46	43	34	50
32	120	21	25	22	50	30	30	60
33	103	122	19	10	43	11	50	50
34	100	131	96	15	39	19	54	60
35	79	52	82	81	59	17	15	44
36	77	60	32	73	122	65	14	38
37	74	99	63	42	120	68	25	17
38	76	66	32	30	56	46	165	21
39	62	63	53	64	50	53	74	48
40	67	97	55	63	57	50	126	50
41	82	134	74	76	57	50	80	89
42	130	420	323	129	55	184	56	48
43	28	80	33	56	33	58	10	15
44	55	45	37	11	19	80	9	15
45	70	59	4	54	75	35	7	13
46	88	41	16	12	65	43	13	21
47	84	52	29	9	53	108	60	23
48	100	160	131	13	44	55	36	45
49	75	187	115	18	46	27	70	60
50	82	78	118	15	15	9	20	83
51	80	77	96	78	38	20	15	45
52	50	77	111	94	38	88	10	68
53	67	80	105	71	82	62	10	59
54	64	95	121	64	120	41	25	22
55	71	171	96	68	120	170	122	23

56	75	103	130	66	133	104	75	110
57	49	76	128	70	60	66	118	100
58	63	70	115	51	57	91	145	240
59	65	74	121	31	67	55	145	280
60	66	77	123	10	71	60	188	111
61	59	62	116	21	70	52	70	13
62	67	65	126	26	59	49	116	14
63	59	73	87	52	58	15	45	82
64	61	69	0	93	99	13	040	78
65	64	54	81	88	57	48	39	110
66	60	57	12	28	60	108	6	28
67	59	22	114	26	100	146	5	17
68	63	35	0	12	165	163	5	63
69	63	25	0	3	165	162	84	101
70	62	19	68	0	165	133	58	86
71	67	37	9	0	305	64	57	155
72	61	96	23	0	166	55	58	240
73	60	44	36	0	54	55	51	252
74	60	66	29	2	47	60	57	120
75	65	67	28	4	58	57	46	120
76	0	57	21	25	60	83	105	338
77	0	35	28	19	60	108	112	485
78	51	10	0	10	21	10	92	2
79	82	10	0	6	12	13	67	2
80	97	20	0	5	9	12	73	2
81	64	47	17	10	6	9	65	2
82	108	59	132	15	5	4	68	2
83	84	42	93	4	9	9	60	8
84	90	10	17	15	4	5	65	113
85	94	16	18	130	7	8	68	109
86	74	6	15	83	12	9	64	101
87	5	3	5	58	10	11	66	99
88	72	10	5	26	13	12	78	110
89	40	12	6	18	133	14	49	112
90	7	39	9	24	103	115	76	72
91	30	34	12	22	61	71	137	63
92	9	32	34	32	60	58	29	76
93	12	53	30	23	32	35	54	75
94	19	33	24	19	41	10	44	51
95	50	10	28	14	17	12	22	60
96	47	15	27	34	8	23	38	90
97	47	39	32	40	6	10	20	60
98		15	24		11	7	4	63
99		25	11		54	14	6	8
100		16	8		40	11	7	14
101		7	10			15	18	
102		7	20			115	21	
103		10	17				10	
104		51	7				12	
105		87	9				13	
106			12				14	
107			18				8	
108			35				8	
109							13	
110							16	
111							160	

TABLE A-1 CONTINUED
SUMMARY OF ROCK-PROBE PENETRATION RATES WITH DEPTH

DEPTH (FEET)	ROCK-PROBE PENETRATION RATES (SECONDS/FOOT)						
	RP-9	RP-10	RP-11	RP-12	RP-13	RP-14	RP-15
1	7	10	6	5	4	5	5
2	7	9	6	6	13	7	7
3	13	11	5	20	8	11	12
4	8	8	6	6	9	10	14
5	5	4	6	4	5	6	33
6	5	8	5	5	51	14	20
7	3	10	12	16	32	12	21
8	3	28	8	18	24	10	28
9	3	39	60	20	26	56	20
10	8	60	66	29	32	47	23
11	23	42	57	51	27	53	32
12	31	51	20	40	26	35	23
13	20	42	35	29	32	39	22
14	33	39	20	42	36	26	40
15	30	35	24	40	28	39	70
16	25	66	22	44	48	52	96
17	9	47	41	50	18	68	34
18	11	40	48	60	50	57	39
19	29	64	47	46	91	48	41
20	56	50	22	29	32	55	50
21	89	63	82	45	36	55	55
22	12	61	22	56	43	60	73
23	15	59	30	84	37	55	67
24	23	53	34	113	49	60	55
25	26	63	48	56	52	50	63
26	32	56	35	69	61	60	56
27	25	60	44	117	95	55	52
28	33	57	39	77	53	50	51
29	55	55	51	53	76	76	45
30	79	55	48	44	54	50	24
31	71	50	56	45	49	41	47
32	52	50	51	75	46	43	35
33	58	55	56	50	34	45	28
34	96	52	51	49	60	47	94
35	56	44	26	77	110	65	55
36	27	74	31	118	48	85	61
37	34	53	43	190	64	75	70
38	22	61	31	176	127	92	146
39	94	54	50	56	44	53	69
40	61	104	95	73	66	56	104
41	79	99	54	61	60	57	126
42	62	61	72	83	84	125	132
43	32	15	9	59	7	69	35
44	51	40	13	39	86	60	55
45	65	38	17	58	77	53	76
46	59	67	50	63	44	58	66
47	57	100	71	52	51	45	223
48	75	90	76	50	40	100	175
49	40	117	24	135	91	90	142
50	60	73	22	184	95	174	166
51	52	54	18	181	131	209	142
52	50	38	34	180	132	72	90
53	34	85	165	235	130	72	95
54	17	248	196	135	141	55	79
55	21	144	161	124	120	47	45

56	44	195	120	80	140	60	24
57	45	150	67	63	132	54	15
58	158	130	72	65	101	57	11
59	80	125	72	68	110	57	53
60	90	125	71	80	93	51	58
61	85	90	47	68	101	76	60
62	78	37	15	65	103	56	60
63	91	0	6	68	90	50	60
64	53	0	4	50	73	56	60
65	58	41	26	104	47	52	65
66	206	60	27	80	50	49	80
67	126	80	25	80	60	47	75
68	147	75	30	65	60	54	70
69	137	75	41	55	55	53	55
70	141	60	61	60	50	51	55
71	77	55	60	60	60	44	60
72	51	55	60	60	55	42	55
73	25	60	55	60	35	59	45
74	30	55	47	50	33	49	50
75	25	50	25	90	42	44	32
76	7	60	29	55	64	22	14
77	12	75	38	65	60	35	16
78	0	95	8	7	10	5	6
79	0	56	6	7	5	3	7
80	0	54	6	6	6	4	72
81	0	54	7	4	5	5	11
82	0	61	6	6	4	9	20
83	0	59	4	6	6	72	46
84	0	12	2	7	4	18	41
85	0	4	2	5	5	6	6
86	5	3	2	5	54	63	6
87	5	4	39	61	76	6	6
88	5	7	31	95	79	19	14
89	5	2	59	66	68	3	11
90	35	66	36	56	60	3	10
91	23	52	10	57	48	5	16
92	82	51	5	51	34	10	31
93	67	62	9	15	19	4	86
94	67	56	11	8	14	10	11
95	67	32	2	11	15	14	12
96	74	9	3	9	17	13	52
97	38	3	6	12	36	11	62
98	5	2	6	32	42	11	49
99	4	5	5	10	37	46	55
100	8	5	6	29	15	50	57
101		4	39				
102		6					
103		9					
104		8					
105		14					
106		9					
107		8					
108		5					
109		11					
110							

TABLE A-2
SURFACE ELEVATIONS AT BORING AND ROCK-PROBE LOCATIONS

BORING OR ROCK-PROBE NUMBER	SURFACE ELEVATION IN FEET (MLW)
*B-1	18.0
B-2	24.0
B-3	19.2
RP-1	16.1
RP-2	17.4
RP-3	18.3
RP-4	19.8
RP-5	20.3
RP-6	19.4
RP-7	21.9
*RP-8	24.0
RP-9	24.0
RP-10	22.8
RP-11	20.7
RP-12	20.8
RP-13	19.2
RP-14	18.7
RP-15	16.7

NOTE: Surface elevations were established by a surveyor from Costain. Elevations for B-1 and RP-8 were estimated.

APPENDIX B

LABORATORY TEST DATA

LABORATORY TESTING

As part of our studies, uniaxial compressive strength testing of intact 4.0 inch size rock cores were performed for the entire limestone column between +10' and -78' MLW elevation. Rock cores were selected to represent the best and worst quality of the available rock column. Care was taken in proper packing and shipping procedures to ensure intact specimen for testing. The twentynine selected core samples all arrived intact. All samples were saw cut to a height/diameter ratio of 2 : 1, and the ends squared by capping. Volume, weight, and moisture determinations were made for each rock-core prior to being tested in uniaxial compression. Tables B-1 through B-3 summarize the boring numbers, depths, elevations, dry density, and unconfined compressive strength for Limestone Layers 2, 3, and 3b, respectively. All testing services were provided by GFA International, Inc.. Their Test Data Sheets are attached.

The following Tables and Data Sheets complete this appendix.

Table B-1	Unconfined Compression Tests, Limestone Layer 2
Table B-2	Unconfined Compression Tests, Limestone Layer 3
Table B-3	Unconfined Compression Tests, Limestone Layer 3b

Test Data Sheets from GFA International

TABLE B-1
UNCONFINED COMPRESSION TESTS ON ROCK-CORES
LIMESTONE LAYER 2

TEST NO.	BORING NO.	ELEVN. FT. MLW	UNCONFINED COMP. STR. (PSI)	DRY DENSITY (PCF)	MOISTURE CONTENT (%)
1	B-1	-10	275	94.9	9.8
2	B-2	+6.5	399	111.9	0.9
3	B-2	+2	464	107.5	2.1
4	B-2	-3	517	102.2	2.2
5	B-3	-7	665	106.6	1.5

TABLE B-2
UNCONFINED COMPRESSION TESTS ON ROCK-CORES
LIMESTONE LAYER 3

TEST NO.	BORING NO.	ELEVN. FT. MLW	UNCONFINED COMP. STR. (PSI)	DRY DENSITY (PCF)	MOISTURE CONTENT (%)
1	B-1	-20	466	102.7	7.0
2	B-1	-25.5	281	97.9	10.2
3	B-1	-33.5	4097	137.2	2.7
4	B-1	-38	2965	137.2	1.2
5	B-1	-46	1736	129.0	2.5
6	B-2	-21	621	109.4	3.1
7	B-2	-30	2851	140.1	1.8
8	B-2	-38	3173	130.2	4.5
9	B-2	-46	1529	119.0	0.8
10	B-2	-50	504	99.2	1.6
11	B-2	-65	1745	133.8	2.4
12	B-2	-67.5	1009	118.1	3.0
13	B-3	-16.5	4543	101.5	0.8
14	B-3	-25.5	977	118.1	2.1
15	B-3	-33.5	2688	129.0	1.1
16	B-3	-43	387	95.5	7.0
17	B-3	-49.5	557	99.2	0.5

TABLE B-3
UNCONFINED COMPRESSION TESTS ON ROCK-CORES
LIMESTONE LAYER 3B

TEST NO.	BORING NO.	ELEVN. FT. MLW	UNCONFINED COMP. STR. (PSI)	DRY DENSITY (PCF)	MOISTURE CONTENT (%)
1	B-1	-74.5	834	116.4	4.3
2	B-1	-78	1088	120.0	4.9
3	B-2	-73	589	108.2	5.2
4	B-3	-68.5	901	116.5	2.3
5	B-3	-71.5	200	80.0	1.0
6	B-3	-77	339	91.5	0.6
7	B-3	-78	1231	95.7	1.0

UNCONFINED COMPRESSION OF ROCK CORES

PROJECT: Bahamas Rock Ltd.

LAB ID: RC-001

CLIENT: Geoconsult International

SAMPLED BY: Client Representative

TESTED BY: F.C.

SAMPLED DATE: N/A

TESTED DATE: 3.11-12.99

Sample Identification	Sample #	1	2	3	4
	Boring Number	B-2	B-2	B-2	B-3
	Boring Depth, ft	27-28	97-98	17.5-18.5	96-97
Sample Measurements	Diameter, Inches	3.986	3.918	3.914	3.828
	Wt. Before Capping, lbs	5.93	6.15	5.69	4.75
	Length Before Capping, Inches	7.87	7.75	7.25	7.75
	Volume, ft^3	0.0568	0.0540	0.0504	0.0516
	Cross-Section Area, Sq. Inches	12.478	12.056	12.031	11.508
Unconfined Compressive Strength Results	Maximum Loads, lbs	6,450	7,100	4,800	3,900
	Correction Factor	N/A	N/A	N/A	N/A
	Compressive Strength, PSI	516.9	588.9	399.0	338.9
	Type of Fracture	Cone	Shear	Cone/Shear	Shear
Moisture and Density Results	Wet Wt., lbs	1.665	1.325	0.237	0.643
	Dry Wt., lbs	1.630	1.259	0.235	0.639
	Wt. of Water, lbs	0.035	0.066	0.002	0.004
	Percent of Moisture	2.15	5.24	0.85	0.63
	Wet Density, lbs/ft^3	104.40	113.89	112.90	92.05
	Dry Density, lbs/ft^3	102.20	108.22	111.95	91.47

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Sample Identification	Sample #	5	1	2	3
	Boring Number	B-3	B-1	B-1	B-1
	Boring Depth,ft	62-63	38-39	51.5-52.5	28-29
Sample Measurements	Diameter, Inches	3.955	3.911	3.942	3.908
	Wt. Before Capping, lbs	5.33	5.96	7.71	5.65
	Length Before Capping, Inches	7.75	7.81	7.75	7.81
	Volume, ft^3	0.0550	0.0542	0.0547	0.0542
	Cross-Section Area, Sq. Inches	12.284	12.013	12.204	11.994
Unconfined Compressive Strength Results	Maximum Loads, lbs	4,750	5,600	50,000	3,300
	Correction Factor	N/A	N/A	N/A	N/A
	Compressive Strength, PSI	386.7	466.2	4,097.0	275.1
	Type of Fracture	Shear	Cone	Shear	Cone/Shear
Moisture and Density Results	Wet Wt., lbs	0.854	1.065	0.712	0.972
	Dry Wt., lbs	0.842	0.995	0.693	0.885
	Wt. of Water, lbs	0.012	0.070	0.019	0.087
	Percent of Moisture	1.43	7.04	2.74	9.83
	Wet Density, lbs/ft^3	96.91	109.96	140.95	104.24
	Dry Density, lbs/ft^3	95.54	102.73	137.19	94.91

GFA

Sample Identification	Sample #	4	5	1	2
	Boring Number	B-3	B-3	B-2	B-2
	Boring Depth,ft	52.5-53.5	87.5-88.5	54-55	91.5-92.5
Sample Measurements	Diameter, Inches	3.954	3.942	3.954	3.923
	Wt. Before Capping, lbs	7.29	6.46	7.97	6.64
	Length Before Capping, Inches	7.87	7.68	7.87	7.81
	Volume, ft^3	0.0559	0.0542	0.0559	0.0546
	Cross-Section Area, Sq. Inches	12.278	12.204	12.278	12.086
Unconfined Compressive Strength Results	Maximum Loads, lbs	33,000	11,000	35,000	12,200
	Correction Factor	N/A	N/A	N/A	N/A
	Compressive Strength, PSI	2687.7	901.3	2850.6	1009.4
	Type of Fracture	Columnar	Columnar	Cone/Shear	Shear
Moisture and Density Results	Wet Wt., lbs	0.810	1.015	1.544	0.835
	Dry Wt., lbs	0.801	0.992	1.517	0.811
	Wt. of Water, lbs	0.009	0.023	0.027	0.024
	Percent of Moisture	1.12	2.32	1.78	2.96
	Wet Density, lbs/ft^3	130.41	119.19	142.58	121.61
	Dry Density, lbs/ft^3	128.97	116.49	140.09	118.11

GFA

Sample Identification	Sample #	3	4	5	1
	Boring Number	B-1	B-2	B-3	B-1
	Boring Depth,ft	43.5-44.5	22-23	90.5-91.5	92.5-93.5
Sample Measurements	Diameter, Inches	3.928	3.989	3.910	3.916
	Wt. Before Capping, lbs	5.86	6.19	4.41	6.61
	Length Before Capping, Inches	7.75	7.81	7.87	7.81
	Volume, ft^3	0.0543	0.0564	0.0546	0.0544
	Cross-Section Area, Sq. Inches	12.117	12.496	12.006	12.043
Unconfined Compressive Strength Results	Maximum Loads, lbs	3,400	5,800	2,400	10,050
	Correction Factor	N/A	N/A	N/A	N/A
	Compressive Strength, PSI	280.6	464.1	199.9	834.5
	Type of Fracture	Cone	Cone/Shear	Cone/Shear	Cone
Moisture and Density Results	Wet Wt., lbs	0.787	0.681	0.409	1.127
	Dry Wt., lbs	0.714	0.667	0.405	1.080
	Wt. of Water, lbs	0.073	0.014	0.004	0.047
	Percent of Moisture	10.22	2.10	0.99	4.35
	Wet Density, lbs/ft^3	107.92	109.75	80.77	121.51
	Dry Density, lbs/ft^3	97.91	107.49	79.99	116.44

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Sample Identification	Sample #	2	3	4	5
	Boring Number	B-2	B-1	B-2	B-3
	Boring Depth,ft	45-46	64-65	62-63	96-97
Sample Measurements	Diameter, Inches	3.947	3.925	3.925	3.923
	Wt. Before Capping, lbs	6.18	7.17	7.61	5.24
	Length Before Capping, Inches	7.75	7.75	7.87	7.75
	Volume, ft^3	0.0548	0.0542	0.0559	0.0542
	Cross-Section Area, Sq. Inches	12.235	12.099	12.291	12.086
Unconfined Compressive Strength Results	Maximum Loads, lbs	7,600	21,000	39,000	14,875
	Correction Factor	N/A	N/A	N/A	N/A
	Compressive Strength, PSI	621.2	1,735.7	3,173.1	1,230.8
	Type of Fracture	Cone/Shear	Cone/Split	Cone	Cone/Split
Moisture and Density Results	Wet Wt., lbs	1.006	0.807	0.740	0.621
	Dry Wt., lbs	0.976	0.787	0.708	0.615
	Wt. of Water, lbs	0.030	0.020	0.032	0.006
	Percent of Moisture	3.07	2.54	4.52	0.98
	Wet Density, lbs/ft^3	112.77	132.29	136.14	96.68
	Dry Density, lbs/ft^3	109.41	129.01	130.25	95.74

GFA

Sample Identification	Sample #	1	2	3	4
	Boring Number	B-1	B-3	B-2	B-2
	Boring Depth,ft	96-97	44.5-45.5	74-75	89-90
Sample Measurements	Diameter, Inches	3.915	3.955	3.893	3.922
	Wt. Before Capping, lbs	6.90	6.69	5.41	7.41
	Length Before Capping, Inches	7.87	7.81	7.81	7.75
	Volume, ft^3	0.0548	0.0555	0.0537	0.0541
	Cross-Section Area, Sq. Inches	12.037	12.284	11.902	12.080
Unconfined Compressive Strength Results	Maximum Loads, lbs	13,100	12,000	6,000	21,450
	Correction Factor	N/A	N/A	N/A	N/A
	Compressive Strength, PSI	1,088.3	976.9	504.1	1,745.0
	Type of Fracture	Columnar	Cone/Split	Cone/Shear	Columnar
Moisture and Density Results	Wet Wt., lbs	0.617	0.583	0.708	0.826
	Dry Wt., lbs	0.588	0.571	0.697	0.807
	Wt. of Water, lbs	0.029	0.012	0.011	0.019
	Percent of Moisture	4.93	2.10	1.58	2.35
	Wet Density, lbs/ft^3	125.91	120.54	100.74	136.97
	Dry Density, lbs/ft^3	119.99	118.06	99.17	133.83

GFA

Sample Identification	Sample #	5	1	2	3
	Boring Number	B-3	B-3	B-1	B-2
	Boring Depth,ft	68.5-69.5	35.5-36.5	56-57	70-71
Sample Measurements	Diameter, Inches	3.942	3.967	3.932	3.930
	Wt. Before Capping, lbs	5.49	5.67	7.61	6.52
	Length Before Capping, Inches	7.81	7.75	7.81	7.75
	Volume, ft^3	0.0551	0.0554	0.0548	0.0544
	Cross-Section Area, Sq. Inches	12.204	12.359	12.142	12.130
Unconfined Compressive Strength Results	Maximum Loads, lbs	6,800	56,150	36,000	18,550
	Correction Factor	N/A	N/A	N/A	N/A
	Compressive Strength, PSI	557.2	4,543.2	2,964.9	1,529.3
	Type of Fracture	Cone	Shear	Shear	Cone/Split
Moisture and Density Results	Wet Wt., lbs	0.658	0.709	0.970	0.538
	Dry Wt., lbs	0.655	0.703	0.958	0.534
	Wt. of Water, lbs	0.003	0.006	0.012	0.534
	Percent of Moisture	0.46	0.85	1.25	0.75
	Wet Density, lbs/ft^3	99.64	102.35	138.87	119.85
	Dry Density, lbs/ft^3	99.18	101.49	137.16	118.96

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Sample Identification	Sample #	4			
	Boring Number	B-3			
	Boring Depth,ft	26-27			
Sample Measurements	Diameter, Inches	3.985			
	Wt. Before Capping, lbs	6.05			
	Length Before Capping, Inches	7.75			
	Volume, ft^3	0.0559			
	Cross-Section Area, Sq. Inches	12.471			
Unconfined Compressive Strength Results	Maximum Loads, lbs	8,300			
	Correction Factor	N/A			
	Compressive Strength, PSI	665.5			
	Type of Fracture	Cone/Shear			
Moisture and Density Results	Wet Wt., lbs	0.599			
	Dry Wt., lbs	0.590			
	Wt. of Water, lbs	0.009			
	Percent of Moisture	1.53			
	Wet Density, lbs/ft^3	108.23			
	Dry Density, lbs/ft^3	106.60			

Respectfully submitted,
GFA International

John F. Desmoyers, P.E.
Registered Engineer #47885

GFA

APPENDIX F – WATER RESOURCES ASSESSMENT

BAHAMA ROCK LIMITED

Freeport, Bahamas

WATER RESOURCES ASSESSMENT

Prepared by

R. C. Minning & Associates, Inc.

10218 Tarpon Drive, Treasure Island, FL 33706

January 2024

TABLE OF CONTENTS

1.0 INTRODUCTION 1
2.0 BASELINE CONDITIONS 2
2.1 Geology 2
2.2 Hydrogeology 2
2.2.1 Monitor Wells 3
2.2.2 Freshwater Lens 4
2.2.3 Freshwater Use 5
2.2.4 Development of the BCC Property 7
3.0 CONCLUSIONS 7

FIGURES

FIGURE - 1 - STUDY AREA
FIGURE - 2 - MONITOR WELL LOCATIONS
FIGURE - 3 - TOPOGRAPHIC MAP OF AREA
FIGURE - 4 – GENERALIZED FRESHWATER LENS THICKNESS – 12/07/2023
FIGURE - 5 - PRIVATE WELL SURVEY AREA
FIGURE - 6 - PRIVATE WELL LOCATIONS THAT WERE MEASURED
FIGURE - 7 - BCC MINING AREA

TABLES

TABLE - 1 - MONITOR WELL DEPTHS (IN TEXT)
TABLE - 2 - MONITOR WELL SALINITY PROFILES
TABLE - 3 - PIEZOMETRIC SURFACE ELEVATIONS (IN TEXT)
TABLE - 4 - PRIVATE WELL MEASUREMENTS (IN TEXT)

APPENDICIES

APPENDIX A - WATER RESOURCES ASSESSMENT REPORT – 2008
APPENDIX B - WATER RESOURCES ASSESSMENT REPORT ADDENDUM – 2008
APPENDIX C - DRILLERS LOGS
APPENDIX D - LETTER FROM PRINCIPAL JONES
APPENDIX E - PRIVATE WELL SURVEY

1.0 INTRODUCTION

Bahama Rock Ltd. (BRL) is proposing to develop additional acreage for the production of aggregate in an area west of Freeport, Grand Bahama Island. The acreage is known as the Bahamas Cement Company property (BCC) and is located south of their current operations in Area 3. Both areas are shown in Figure 1. The BCC property contains approximately 269 acres (total project area), and the approximate perimeter dimensions are about 2,600 feet on the north, 3,600 feet on the east, 4,800 feet on the south, and 2,200 feet on the west. There is also a portion of the existing Area 3 to be developed which is located to the north of the BCC property and contains approximately 36 acres. The proposed depth of excavation is 80 feet below Freeport Harbour-Mean Low Water Level datum. The status of the BCC property is currently undeveloped although historically, the southeast portion was used by the Bahama Cement Company for the manufacturing of cement.

Circa 2000, EnviroLogic International, Ltd (EIL) and R. C. Minning & Associates, Inc. (RCMA) conducted an Environmental Impact Assessment (EIA) of the BCC property for the Enron Corporation which was subsequently taken over by Tractabel Energy Corporation. The proposed development was to be a liquid natural gas (LNG) processing and storage/transfer facility; however, government approval was never obtained. The assessment identified several environmental issues related to the use of petroleum hydrocarbons for cement making operations. The status of any remediation activities is unknown.

In 2007/2008, R. C. Minning & Associates, Inc. and EnviroLogic International, Ltd prepared two (2) Water Resource Assessment reports for Bahama Rock Ltd. related to the potential development of Area 4. These reports contain considerable information on the freshwater lens in the area northwest of the Bahama Cement Company (BCC) property and are attached to this report as Appendices A and B. The reader is kindly referred to those reports.

2.0 BASELINE CONDITIONS

2.1 Geology

BRL has taken twenty-four (24) core borings within the BCC property for the purpose of verifying rock quality. In addition, two permanent monitor wells MW-100 and MW-101, originally MW-1 and MW-2, respectively, have been drilled in the western and southern berms. Their locations are shown in Figure 2. The driller's logs are presented in Appendix C and describe the nature of the bedrock penetrated. The log for MW-2 (101) notes that "sandstone rock" was encountered between the depths of 0 to -5 ft and -35 to -40 ft below ground level (bgl). Continuous cores were taken in each borehole to a total depth of -100 ft bgl. Further examination of the cores will assist in refining the nature of the bedrock in the 0 to -40 ft bgl interval as there is no known sandstone bedrock on Grand Bahama Island. The lithologic logs for deep disposal wells at the Grand Bahama Shipyard, Ltd. and Polymers International, Ltd. located approximately two (2) miles southeast of the BCC property show that limestone is present to a depth of -600 feet bgl.

2.2 Hydrogeology

The physiographic setting of the BCC property and adjacent areas on Grand Bahama Island together with the permeable limestone bedrock and climatological conditions form the overall hydrogeologic setting. The BCC property and adjacent areas including Area 3 and Freeport Harbour occupy the eastern portion of a peninsula of land (actually an island) that is bounded by the Grand Bahama Shipyard to the east, Area 3, Hawksbill Creek and the Little Bahama Bank to the north, the Atlantic Ocean (Northwest Providence Channel) to the south and a portion of the Grand Bahama Island land mass to the west. All of the surface water bodies are salt water. The peninsula is approximately 13 miles long (northwest to southeast) and averages less than one mile in width. At the western end of the BCC property, the peninsula is approximately 7,000 feet wide.

The upper 60 – 70 feet of the limestone bedrock comprises the Lucayan Limestone Aquifer (LLA) which is the principal aquifer on Grand Bahama Island including the BCC property and adjacent lands. By far most of the groundwater in the LLA is sea water. However, freshwater can occur as a lens or lenses within the LLA both horizontally and vertically depending upon rock density.

Such a lens exists in Area 4 to the northwest of the BCC property. Rainfall in the area averages approximately 60 inches per year of which about 30 inches infiltrates the subsurface and 18 inches returns to the atmosphere as evapotranspiration. At steady state, the freshwater lens receives an average of 10 - 12 inches of annual recharge. There are no perennial, natural, fresh-surface water bodies, i.e., ponds, streams or creeks within the BCC property or adjacent lands. However, within the BCC property, there are several depressional features in which the local water table is intermittently above the ground surface. This condition occurs during periods of higher precipitation and dissipates at times of low or no rainfall. Those depressional areas are reportedly due to the unauthorized removal of the surficial limestone.

2.2.1 Monitor Wells

As part of the BCC property investigation, two (2) monitor wells MW – 1 (100) and MW – 2 (101) were installed and a third monitor well (MW – 3R) in Area 4 was redrilled. BRON Ltd. was the drilling contractor, and drilling was supervised by BRON's crew chief. In addition, monitor wells MW-1, MW-2, MW-4 and MW-10 (Motel – 8 well) were located from the investigation of Area 4 in 2007/2008 and were verified as being in usable condition. MW – 3 was redrilled to a total depth of -65 ft bgl as MW – 3R due to it being plugged. MW – 1 (100) and MW – 2 (101) were each drilled to a total depth of -100 ft bgl. It is worthwhile noting that the driller reported that a "cave", defined as a sudden drop in the drill string, was encountered during the drilling of MW-2 (101) between the depths of -35 ft bgl to -45 ft bgl, and reported a "cavern" between the depths of -90 ft to -100 ft bgl. There were no reported "caves" or "caverns" during the drilling of MW – 1 (100) and MW – 3R. The driller's logs for MW-1 (100), MW – 2 (101) and MW – 3R are presented in Appendix C. MW – 5 could not be located and MWs 7, 8, and 9 were not used in this investigation. All monitor well locations are shown in Figure 2,

Total borehole depths in feet as measured from the Top of Casing (TOC) are presented in Table 1 below:

TABLE 1 - MONITOR WELL DEPTHS

Monitor Well	Depth
MW-1	73.3
MW-2	74.4
MW-3R	65.0

MW-4	70.2
MW-Motel 8	NM
`MW-100 (1)	100
MW-101 (2)	100

2.2.2 Freshwater Lens

In order to define the current (baseline) groundwater quality within the LLA and in the area around the BCC property, static water level measurements and salinity profiles were run in the available monitor wells during October, November and December 2023 and the data are presented in Table 2. Static water level measurements made on December 7, 2023, were converted to piezometric surface elevations and are presented in Table 3 below.

TABLE 3

PIEZOMETRIC SURFACE ELEVATIONS

	TOC Elev.	Well Depth	DTW	Water Elev.
MW-1	15.03	73.3	14.48	0.55
MW-2	15.92	74.4	14.6	1.32
MW-3R	14.43	75.9	15	-0.47
MW-4	17.66	70.2	16.48	1.18
MW-100	10.56	100	9.33	1.23
MW-101	23.16	100	22.33	0.83
MOTEL 8	17.66	68.3	15.55	2.11

NOTE: Depth to Water (DTW) measurements were made on 12/7/2023

The tidal stage was not recorded at the time of measurements.

An elevated potentiometric surface roughly coinciding with the elongated topographic axis (east – west) of the peninsula would be expected as can be seen in the topographic map of the area presented in Figure 3. The hydraulic gradient is expected to extend from the ridge towards the surrounding water bodies to the north, east and south; Hawksbill Creek, Freeport Harbour, and North West Providence Channel (Atlantic Ocean), respectively. In conformance with the hydraulic gradient, groundwater would be expected to flow radially away from the ridge of highest elevation. The piezometric surface elevations in Table 3 do not provide any support for such an elevated groundwater ridge. However, the salinity/conductivity and TDS measurements made in the monitor wells do.

Thirteen (13) rounds of salinity/conductivity profiles were taken with a YSI – Model 30 meter at one (1)-foot intervals to depths of 50 feet or greater over a three (3) month period (October – December). Not all monitor wells were available for measurements and profiling during this period, however all monitor wells were profiled on December 4 and 7, 2023. The thickness of the groundwater interval with a salinity of 0 – 699 ppm was plotted for each monitor well and contoured using the Surfer® computer routine as presented in Figure 4. A freshwater lens is present with a long east – west oriented axis to the west of Area 3 over an approximate distance of at least 4,000 feet. Note that the western portion of the lens has not been defined as monitor wells MW-7, MW-8 and MW-9 from the 2007 Area 4 investigation were not included in the BCC property investigation. The width of the lens (north-south) is about 4,200 feet and does not extend southward to the coastline (Atlantic Ocean). Maximum lens thickness as measured in MW-3R was 23 feet on December 7, 2023. The location and dimensions of the 2023 data defined freshwater lens are essentially the same as those in the 2007/2008 Area 4 investigation.

2.2.3 Freshwater Use

Private Wells / Water Supply - A private well location survey was conducted in a portion of the Eight Mile Rock community including the Eight Mile Rock High School, Hepburn Town, Hanna Hill, Bartlett Hill, and Harbour West settlements. Door to door interviews were carried out by the Eight Mile Rock High School students under the supervision of Mr. Alfred Jones (Principal) in December 2023. A summary letter from Principal Jones is presented in Appendix D. A standard form was provided to each student noting if the properties had either city water and/or a private well or both. The locations of the homes were noted as best as possible. Enlarged aerial photographs of the settlements were provided to the EMR High School students to delineate settlements and to identify streets and generally aid in the information collection. The survey results have been summarized and are presented in Appendix E. Out of the thirty-five (35) properties surveyed, twenty-two (22) in Hepburn Town, six (6) were in Bartlett Hill, three (3) in Harbour West, two (2) in Hannah Hill, and one (1) in Hepburn Town Corner. Thirty-one (31) properties have a private well, thirteen (13) of which are also connected to the municipal water supply system. Those properties appear to rely on the municipal supply for their drinking water, and either do not use the well or use the well for irrigation, washing, cleaning, bathing and

emergencies only. The general area in which of all thirty-five (35) properties that were surveyed is shown in Figure 5. On January 7, 2024, an EnviroLogic International Ltd. (EIL) chemist took water quality measurements from two (2) selected homes with private wells. One (1) of the homes was in the Hepburn Town community and the other was in the Harbour West community. The home locations are shown in Figure 6. Homes were selected based on their locations and obtaining approval from the owners. EIL explained that measurements were being made for water quality testing; both residents were helpful in allowing the measurements to be made. Due to configuration and lack of accessibility to the well/pump systems, no well measurements (depth, diameter and casing material) were made. The measurements were made using a YSI Model 30 combination conductivity/ specific conductivity/ temperature/salinity meter, the probe for which was lowered into each well. The results are presented in Table 5 below:

TABLE 5: PRIVATE WELL MEASUREMENTS

(In-well measurements were made on January 7, 2024)

SETTLEMENT	SALINITY	TDS	CONDUCTVITY
Hepburn Town (DR)	1.6 ppt	1989 mg/L	3010 µS/cm
Harbour West (DU)	1.1 ppt	1384 mg/L	2048 µS/cm

Based on our criteria for freshwater (salinity concentration of 0.0 – 0.6 ppt [0 – 699 ppm], and a conductivity value of less than 1,300 µS/cm), the groundwater supply for each private well can be classified as non-potable/brackish. No freshwater lens was detected in either well which is consistent with the configuration of the lens as shown in Figure 4. MW-2 and the Harbour West (DU) private well are near each other and the salinity in MW-2 was measured at 3.2 ppt and 1.8 ppt on December 4 and 7, 2023, respectively. MW-100 and the Hepburn Town private well are also close to one another and the salinity in MW-100 was measured at 4.6 ppt and 4.2 ppt on December 4 and 7, 2023, respectively. These data support the lack of any usable freshwater lens in and around the BCC property.

2.2.4 Development of the BCC Property

The proposed expansion of the BRL aggregate production operations would result in the creation of an approximately 269-acre open body of water contiguous to the Freeport Harbour as shown in Figure 7. At completion, the landmass-seawater interface would be moved some 4,800 ft to the west adjacent to the one hundred (100) foot setback from the William J. Levarity Highway (Queen's Highway) to the west and Eight Mile Rock Road to the south. Concern has been expressed regarding the potential effect the expansion could have on any potable groundwater resources in the area. The Hepburn Town settlements are on the south side of the BCC property. The groundwater quality in that area is non-potable based on the measurements made in MW-100 and private well DR. The well locations are shown in Figure 6. The salinity measurements in MW-100 made on December 4 and 7, 2023 showed a concentration of 30 ppt at -47 ft bgl and 30 ppt at -45 ft bgl on December 4 and 7, 2023, respectively which represents the transition zone from brackish to sea water. At full development of the BCC property, this transition zone would be expected to migrate upward however, a brackish water interval would remain. The thickness of the brackish water interval would fluctuate depending on precipitation and climatic conditions. The Harbour West settlements are located approximately 2,500 feet northwest of the BCC property. The groundwater quality in that area is non-potable based on the measurements made in MW-2 and private well DU. The well locations are shown in Figure 6. This condition is consistent with the salinity measurements made in MW-2 on July 21, 2008. Measurements in MW-2 made on December 4 and 7, 2023 showed salinity concentrations of 20.5 ppt at -55 ft bgl and 2.2 ppt at -55 ft bgl, respectively. Note that the 2.2 ppt concentration is considered a transcription error. No salinity concentrations indicative of sea water were measured to a depth of -55 ft bgl. At full development of the BCC property, this transition zone to sea water would be expected to become shallower however, a brackish water interval would remain. The thickness of the brackish water interval would fluctuate depending on precipitation and climatic conditions.

3.0 CONCLUSIONS

Based on the information and data obtained during this hydrogeological investigation, the following conclusions have been reached.

1. A freshwater lens exists to the northwest of the Bahama Cement Company property. This lens was identified in a Water Resources Assessment conducted in the area in 2007/2008. The current size and shape of the lens are virtually the same as they were in 2007/2008. This condition exists even with the full development of Bahama Rock Ltd.'s Area 3.

2. The thickness of the freshwater lens is and will continue to be in a more or less constant state of change, dynamic as opposed to steady state, due to frequency, duration and intensity of precipitation and climatic events. The aerial extent of the lens is also expected to fluctuate somewhat due to the same influences.

3. Twenty-seven (27) out of thirty-one (31) residents who responded to a private well survey conducted in the study area (settlements within the Eight Mile Rock community) revealed that they had a well on their property. Three (3) properties out of the thirty-one (31) surveyed stated that they were dependent upon a private well for their water supply. An additional thirteen (13) properties were connected to the GBUC municipal water supply system and also had private wells that were utilized for irrigation, washing, cleaning, bathing and emergencies only.

4. The development of the Bahama Cement Company property will not result in a decrease in the configuration (size and shape) of the existing freshwater lens. However, some of the private wells within the settlements in the southeastern portion of the Eight Mile Rock community are expected to continue their experiences with naturally fluctuating salinity concentrations in their groundwater supplies due to frequency, duration and intensity of precipitation and climatic events.

5. The development of the Bahama Cement Company property will not result in an increase in the use of freshwater from the GBUC municipal water supply system by BRL.

FIGURES

FIGURE - 1 - STUDY AREA

FIGURE - 2 - MONITOR WELL LOCATIONS

FIGURE - 3 - TOPOGRAPHIC MAP OF AREA

FIGURE - 4 – GENERALIZED FRESHWATER LENS THICKNESS – 12/07/2023

FIGURE - 5 - PRIVATE WELL SURVEY AREA

FIGURE - 6 - PRIVATE WELL LOCATIONS THAT WERE MEASURED

FIGURE - 7 - BCC MINING AREA

N

0 1000 2000 4000 feet

SCALE

FIGURE 1

LEGEND

- MAJOR ROADS/HIGHWAYS

FIGURE 1

STUDY AREA

BAHAMA ROCK, Ltd.

Water Resources Assessment - BCC Area
Grand Bahama, Bahamas

RCMA

N

0 1000 2000 4000 feet

SCALE

FIGURE 2

LEGEND

MW-1 - GROUNDWATER MONITORING WELL

SG-1 - SURFACE WATER STAFF GAUGE

- MAJOR ROADS/HIGHWAYS

FIGURE 2

MONITOR WELL LOCATIONS

BAHAMA ROCK, Ltd.

Water Resources Assessment - BCC Area
Grand Bahama, Bahamas

RCMA

N

NOT TO SCALE

FIGURE 3

LEGEND

FIGURE 3

HISTORICAL TOPOGRAPHIC MAP OF THE AREA

BAHAMA ROCK, Ltd.

Water Resources Assessment - BCC Area
Grand Bahama, Bahamas

RCMA

N

0 1000 2000 4000 feet

SCALE

FIGURE 4

LEGEND

MW-1 - GROUNDWATER MONITORING WELL

SG-1 - SURFACE WATER STAFF GAUGE

- MAJOR ROADS/HIGHWAYS

10 - FRESHWATER LENS THICKNESS (FT)

10 - FRESHWATER LENS THICKNESS ISOCONTOUR

CONTOUR INTERVAL - 5FT

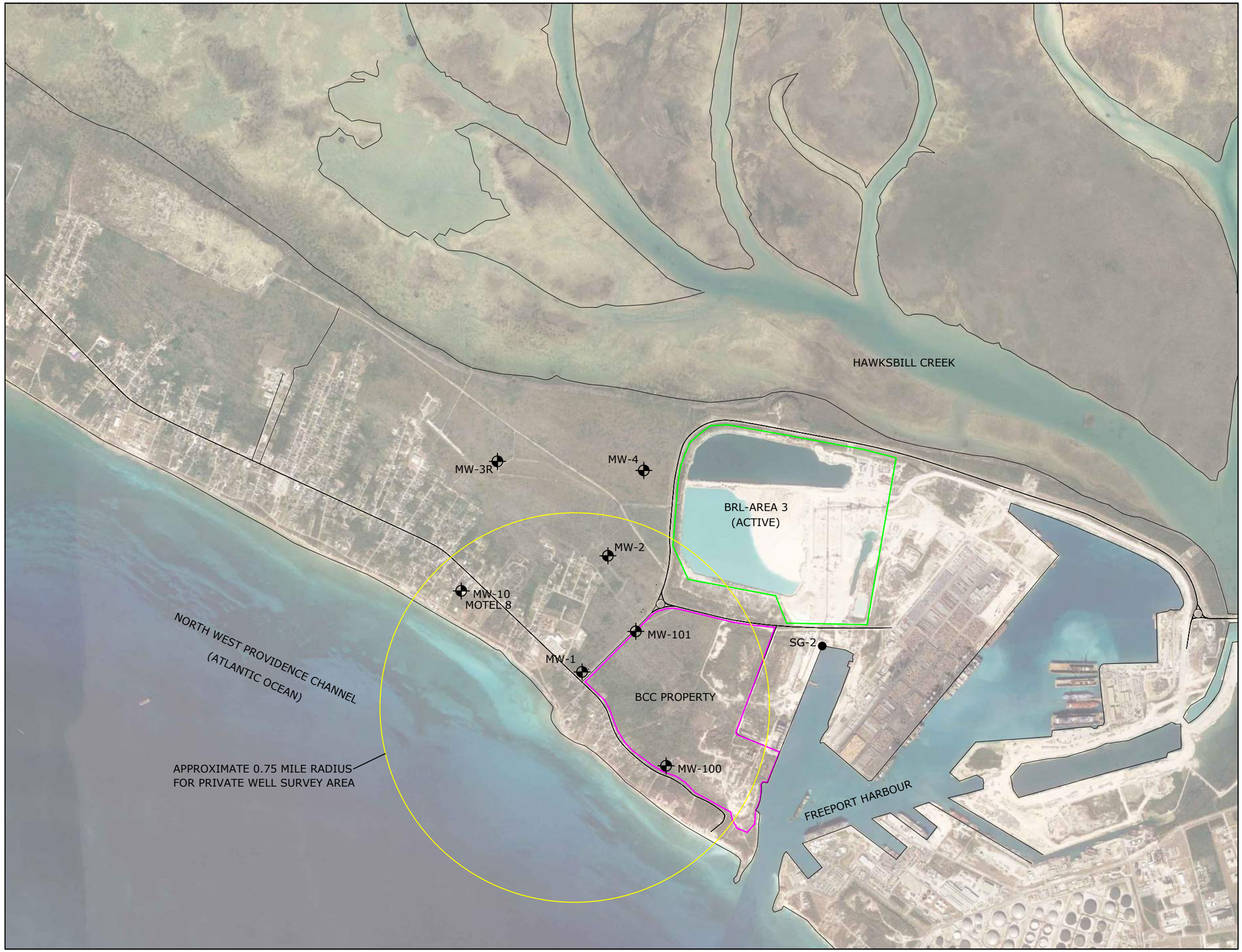
FIGURE 4

GENERALIZED FRESHWATER LENS CONTOURS - 12/07/2023

BAHAMA ROCK, Ltd.

Water Resources Assessment - BCC Area
Grand Bahama, Bahamas

RCMA



N

0 1000 2000 4000 feet

SCALE

FIGURE 5

LEGEND

MW-1 - GROUNDWATER MONITORING WELL

SG-1 - SURFACE WATER STAFF GAUGE

- MAJOR ROADS/HIGHWAYS

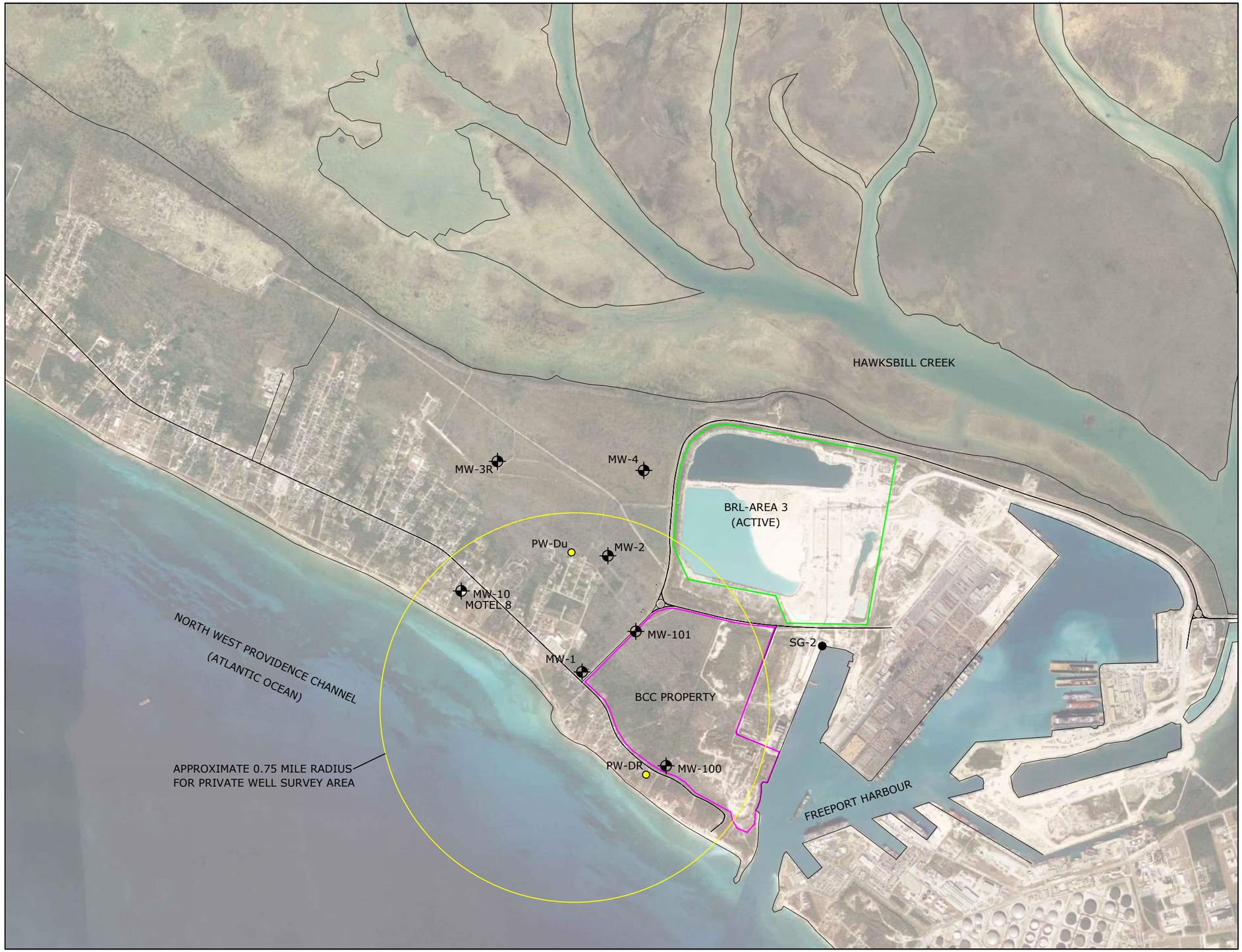
FIGURE 5

PRIVATE WELL SURVEY AREA

BAHAMA ROCK, Ltd.

Water Resources Assessment - BCC Area
Grand Bahama, Bahamas

RCMA



N

0 1000 2000 4000 feet

SCALE

FIGURE 6

LEGEND

MW-1 - GROUNDWATER MONITORING WELL

SG-1 - SURFACE WATER STAFF GAUGE

PW-Du - PRIVATE WELL LOCATIONS

- MAJOR ROADS/HIGHWAYS

FIGURE 6

PRIVATE WELL LOCATIONS
THAT WERE MEASURED

BAHAMA ROCK, Ltd.

Water Resources Assessment - BCC Area
Grand Bahama, Bahamas

RCMA

N

NOT TO SCALE

FIGURE 7

LEGEND

FIGURE 7

BCC MINING AREAS

BAHAMA ROCK, Ltd.

Water Resources Assessment - BCC Area
Grand Bahama, Bahamas

RCMA

TABLES

TABLE - 1 - MONITOR WELL DEPTHS (IN TEXT)

TABLE - 2 - MONITOR WELL SALINITY PROFILES

TABLE - 3 - PIEZOMETRIC SURFACE ELEVATIONS (IN TEXT)

TABLE - 4 - PRIVATE WELL MEASUREMENTS (IN TEXT)

TABLE 2
MONITOR WELL SALINITY PROFILES
BAHAMA ROCK, Ltd.
WATER RESOURCES ASSESSMENT - BCC AREA
GRAND BAHAMA, BAHAMAS

	10/6/2023	11/2/2023	12/4/2023	12/7/2023	10/9/2023	11/1/2023	12/4/2023	12/7/2023	11/27/2023	11/29/2023	12/1/2023	12/4/2023	12/7/2023	10/18/2023	10/23/2023	11/1/2023	11/9/2023	11/13/2023	11/17/2023	11/20/2023	11/23/2023	11/27/2023	11/29/2023	12/1/2023	12/4/2023	12/7/2023	11/3/2023	11/7/2023	11/9/2023	11/13/2023	11/17/2023	11/20/2023	11/23/2023	11/27/2023	11/29/2023	12/1/2023	12/4/2023	12/8/2023	11/9/2023	12/4/2023	12/7/2023
DTW		14.0' TOC	14.48' TOC	14.48' TOC	14.25' TOC	14.25' TOC	13.91' TOC	14.60' TOC	13.86' TOPC	13.86' TOPC	14.11 TOPC	14.73' TOPC	15.0' TOPC	15.15' TOC	16.08' TOC	15.20' TOC	16.30'	15.50' TOC	15.08' TOC	15.72' TOC	16.27' TOC	15.78 TOC	15.71' TOC	15.74 TOC	16.22' TOC	16.48 TOC	9.13' TOPC	9.73' TOPC	8.88' TOPC	9.33' TOC	21.20' TOPC	21.50' TOPC	22.05' TOPC	22.05 TOC	21.05' TOPC	21.05'	21.38' TPOC	22.45' TOPC	21.88' TOPC	21.11 TOPC	21.43' TOPC	22.33' TOPC	15.72' TOC	15.50' TOC	15.55' TOC
Feet	MW-1	MW-1	MW-1	MW-1	MW-2	MW-2	MW-2	MW-2	MW-3	MW-3	MW-3	MW-3	MW-3	MW-4	MW-4	MW-4	MW-4	MW-4	MW-4	MW-4	MW-4	MW-4	MW-4	MW-4	MW-4	MW-100	MW-100	MW-100	MW-100	MW-101	MW-101	MW-101	MW-101	MW-101	MW-101	MW-101	MW-101	MW-101	MW-101	MW-101	MW-101	8 MOTEL	8 MOTEL	8 MOTEL
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10																										5.6	1.8	4.6	4.2														
11																										.		4.6	4.6														
12																												6.8	4.9														
13																												13	5.7														
14																												14.3	8.1														
15	1.1	1.1			1.8	5.6	3.2		0.2	0.2	0.3	0.1														11.8	5.8	14.9	12.6														
16	5.9			0.9	1.8		3.2	1.8	0.2	0.2	0.2	0.2	0.2	0.2		0.2		0.2	0.2	0.1								14.9	13.3													0.4	0.7	0.8
17	6.3			2.4	1.7		3.3	1.8	0.3	0.2	0.2	0.2	0.2	0.2	0.2		0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2			14.9	13.5													0.8	0.8	0.8
18	6.5			4.8	1.7		3.3	1.8	0.3	0.3	0.2	0.2	0.2	0.2	0.2		0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2			14.9	13.6													0.9	1.0	1.0
19	6.5			5.0	1.7		3.4	1.7	0.3	0.3	0.2	0.2	0.2	0.2	0.2		0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2			14.9	13.6													1.0	1.1	1.1
20	6.5	8.1	0.9	5.0	1.7	5.5	3.4	1.7	0.3	0.4	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	14.1	8.2	14.9	13.6													1.0	1.1	1.1
21	6.6		4.4	5.0	1.7		3.4	1.7	0.3	0.4	0.2	0.2	0.2	0.2	0.2		0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2			14.8	13.6											11.5			1.0	1.1	1.1
22	6.7		5.0	5.0	1.7		3.4	1.7	0.4	0.4	0.2	0.2	0.2	0.2	0.2		0.2	0.3	0.3	0.2	0.2	0.2	0.3	0.2	0.2	0.2			14.8	13.6	0.3	0.3			9.4	9.6	0.9		11.8	`11.8	1.3		1.1	1.1	1.1
23	6.6		5.5	5.0	1.7		3.5	1.7	0.5	0.4	0.3	0.2	0.2	0.2	0.3		0.2	0.3	0.3	0.2	0.2	0.2	0.3	0.2	0.2	0.2			14.8	13.6		0.3	0.3	11.3	10.5	10.7	1.0	6.0	11.9	12.3	11.5	0.7	1.1	1.1	1.1
24	6.4		5.6	4.9	1.7		3.5	1.7	0.5	0.5	0.3	0.2	0.2	0.3	0.2		0.2	0.3	0.3	0.2	0.2	0.3	0.3	0.2	0.2	0.2			14.7	13.7		0.2	0.3	11.9	10.7	10.9	1.1	6.3	11.9	12.4	11.8	0.9	1.1	1.1	1.1
25	6.4	8.2	5.6	4.9	1.7	5.9	3.5	1.7	0.5	0.5	0.3	0.2	0.2	0.3	0.2	0.3	0.2	0.7	1.0	0.2	0.2	0.3	0.9	0.3	0.2	0.2		11.8	14.7	13.7	8.4	0.2	0.3	12.1	10.7	10.9	1.9	6.9	11.9	12.5	11.8	1.1	1.1	1.1	1.1
26	6.3		5.6	4.9	1.7		3.5	1.6	0.5	0.5	0.3	0.2	0.2	0.3	0.2		0.2	1.4	1.6	0.2	0.2	0.3	1.4	0.3	0.2	0.2			14.7	13.7		0.2	0.3	12.3	10.7	10.9	4.7	7.4	11.9	12.5	11.8	1.3	1.2	1.1	1.1
27	6.3		5.6	4.8	1.7		3.5	1.6	0.5	0.6	0.3	0.2	0.2	0.3	0.2		0.2	1.7	1.7	0.3	0.2	0.6	1.6	0.3	0.2	0.2			14.6	13.7		0.3	0.3	12.4	10.6	10.9	9.4	7.4	11.9	12.6	11.8	1.4	1.2	1.2	1.2
28	6.2		5.6	4.8	1.6		3.6	1.6	0.5	0.6	0.4	0.2	0.2	0.9	0.2	0.3	0.2	1.9	1.8	0.3	0.2	0.8	1.7	1.3	0.2	0.2			14.5	13.7		0.4	0.3	12.5	10.6	10.9	9.8	7.5	11.9	12.6	11.7	1.6	1.2	1.3	1.2
29	9.1		5.6	5.9	1.6		3.6	1.6	0.5	0.6	0.4	0.2	0.2	1.5	0.2	0.5	0.2	2.1	1.8	0.3	0.2	1	1.8	1.7	0.2	0.2			14.5	13.7		1.0	0.3	12.6	10.6	10.9	10.0	8.2	11.9	12.6	11.7	1.8	1.3	1.3	1.3
30	9.3	14.8	5.5	6.0	1.6	6.3	3.7	1.5	0.5	0.6	0.4	0.2	0.2	1.8	0.3	1.2	0.2	2.2	2.0	0.3	0.2	1.1	2.1	1.9	0.2	0.2	14.5	12.1	14.5	13.7	9.8	4.6	0.4	12.7	10.5	10.9	10.1	8.4	12.0	12.6	11.7	2.3			1.3
31	9.5		5.5	6.0	1.6		3.8	1.5	0.5	0.6	0.4	0.3	0.2	1.9	0.3		0.3	2.5	2.1	1.3	0.3	1.2	2.3	2.1	0.3	0.2			14.4	13.7		7.3	0.5	12.8	10.5	10.8	10.2	8.5	12.0	12.6	11.6	3			
32	12.6		5.4	6.1	1.6		3.9	1.4	0.5	0.6	0.4	0.3	0.2	2.0	0.3		0.3	3.1	2.1	1.6	0.3	1.3	3.0	2.4	0.3	0.2			14.4	13.7		8.3	0.6	12.8	10.5	10.8	10.2	8.6	12.0	12.6	11.6	3.4			
33	21		5.4	7.9	1.6		4.2	1.4	0.6	0.6	0.5	0.3	0.2	2.1	0.3		0.3	3.2	2.1	1.6	0.3	1.4	3.2	2.9	0.3	0.2			14.3	13.4		8.7	0.7	12.9	10.5	10.8	10.3	8.6	12.0	12.6	11.5	3.5			
34	21.3		5.3	14.9	1.6		4.4	1.3	0.6	0.6	0.6	0.3	0.3	2.2	0.3		0.3	3.3	2.1	1.7	0.3	1.5	3.3	3.4	0.9	0.3			14	13.4		9.2	0.7	12.9	10.4	10.8	10.3	8.7	12.0	12.6	11.5	3.6			
35	21.3	22.9	5.2	16.7	1.6	6.8	4.4	1.3	0.6	1.0	1.3	0.4	0.3	2.3	0.3	3.2	0.3	3.3	2.2	1.8	0.3	1.7	3.4	3.7	1.5	0.3	15.3	12.1	13.8	13.4	10.2	9.4	0.8	12.9	10.4	10.8	10.4	8.8	12.0	12.6	11.4	3.7			
36	21.3		5.2	17.1	1.6		4.5	1.3	0.9	3.8	4.1	1.6	0.3	2.4	0.3		0.4	3.4	2.3	1.9	0.4	1.9	3.5	5.3	1.6	0.3			12.4	12.8		9.5	0.8	12.9	10.4	10.7	10.4	8.8	12.0	12.6	11.4	3.8			
37	21.6		5.1	17.1	1.6		4.5	1.3	1.8	3.9	4.3	2.4	0.3	2.4	0.3		0.4	3.5	3.3	3.8	0.5	2.4	3.6	7.7	2.3	0.3			17.9	19.1					10.3	10.7	10.5	8.9	11.9	12.6	11.4	3.9			
38	21.6		5.1	17.1	1.6		4.5	1.3	3.6	4.00	4.3	2.4	0.6	2.4	2.1		1.8	10.7	3.3	5.0	1.3	6.9	8.0	9.9	6.5	1.8			22.6	21.9					10.0	10.7	10.5	8.8	11.9	12.6	11.4				
39	21.5		7.7	17.1	1.6		4.5	1.3	3.7	3.4	4.3	2.5	1.2	2.4	3.8		4.0	10.8	3.3	5.2	1.4	7.0	8.2	9.9	6.7	3.6			24.0	29.1					10.0	10.7	10.5		11.9	12.6					
40	21.5	22.9	9.5	17.1	1.6	6.9	4.5	1.3	3.7	3.5	4.4	2.5	1.5	10.2	4.0	11.9	4.5	10.7	5.3	5.4	1.6	7	8.1	10	6.9	3.9	29.1	29.3	29.4	30.0	10.3				9.6	10.7	10.5		11.9	12.6					
41	21.5		9.8	17.1	1.6		4.5	1.3	3.7	3.5	4.4	2.7	1.5	10.2	4.6		4.6	10.7	5.4	5.5	3.5	6.9	8.0	10.0	7.1	4.0			20.1	30.1					9.3	10.7	10.6		11.7						
42	21.1		10.1	17.1	1.6		4.6	1.3	3.7	3.5	4.4	2.8	1.4	10.00	4.9		4.7	10.6	5.4	5.6	3.6	6.8	7.9	10	7.3	4.1			30.1	30.2					9.2										
43			10.4	17	1.6		4.9	1.3	3.7	3.5	4.5	2.8	1.4		5		4.8	10.5	5.4	5.8	3.6	6.9	7.7	10.2	7.6	4.1			30.1	30.2															
44			10.8	16.9	1.6		9.4	1.3	3.7	3.5	4.4	2.9	1.4		5.1		4.8	11.0	5.6	6.3	3.6	7.0	7.8	10.9	8.3	4.2			30,2	30.3															
45		23.5	11.0	16.9	1.6	12.1	10.0	1.3	3.7	3.4	4.4	2.9	1.4		5.3	17.1	5	15.0	13.2	12.2	3.6	7.0	12.5	15.6	13.3	4.3	29.9	29.4	30.2	30.3															
46			11.4	16.6	1.6		10.4	1.4	3.7	3.4	4.3	2.9	1.4		7.9		7.5	15.9	15.6	13.6	3.8	7.4	14.1	17.7	14.4	5.0			30.4	30.4															
47			11.6	16.6	1.6		11.6	1.4	3.7	3.4	4.2	2.9	1.4		11.2		8.8	15.9	16.7	18.1	4.1	10.5	14.2	18.4	14.8	7.7			30.5	30.5															
48			11.8	16.4	1.6		12.1	1.4	3.7	3.3	4.3	2.9	1.4		15.2		15.2	16	16.7	18.5	7.3	13.7	15.0	22.5	15.9	14.6			30.6	30.6															
49			12.0	16.3	1.6		12.5	1.5	3.7	3.5	4.4	3.2	1.4		15.9		15.9	`19.7	17	19.3	14.7	15	17.0	24.2	18.8	15.4			30.8	30.9															
50		23.8	12.2	16.3	1.6	21.3	20.5	2.2	3.7	5.1	6.0	4.5	1.4		17.2	25.0	16.9	23.4	18.7	21.1	15.9	15.5	21.2	24.8	19.8	16.7	30.8	30.6	31.4	31.3															
51					1.7					7.0					21.6		21.9																											
52					2.1					7.5					23.9		22.3																											
53					18.3					12.2					24.7		24.2																											
54					22.9					17.9							24.9																											
55	26.8	26.8				25.9				18.0						25.1	25.0										31.2	31.0																	
60						26.2											25.3																											

TOC - Top of PVC casing
TOPC - Tp of Aluminium Protective Casing
DTW - Depth to Water

Wells MW-100 and MW-101 were profiled on Nov 3 , < 24 hrs after being blown clear with compressed air

APPENDIX A

WATER RESOURCES ASSESSMENT REPORT – 2008

WATER RESOURCES ASSESSMENT REPORT
and
GROUND WATER MODELLING

For

Bahama Rock Limited Area 4 Project
Freeport, Grand Bahama Island

Prepared by

R.C. Minning & Associates
Treasure Island, Fl

EXECUTIVE SUMMARY

Bahama Rock Ltd. proposes to develop approximately 157 acres of land (Area 4) west of Freeport Harbour and north of the Eight Mile Rock settlements for the purpose of aggregate extraction and harbour expansion. A water resource assessment was conducted in the area (study area) which included establishing baseline conditions for the freshwater lens, nature of potable water supply for local properties, groundwater quality in Area 4, and predictions of impact to the freshwater lens due to the development.

Ten (10) monitor wells were drilled throughout the study area as part of the assessment. Water levels and the vertical distribution of salinity and conductivity in each well were measured and recorded during November and December 2007, and in February 2008. Measurements of salinity and conductance were also made in segments of an existing trench well system just to the south of Area 4. These data were used to define the potentiometric surface and delineate the vertical and horizontal extent of the freshwater lens at the time of the measurements. A freshwater lens was determined to be present in the approximate area delineated by Hawksbill Creek to the north, the Warren J. Levarity Highway to the east, Queens Highway to the south, and Eight Mile Rock High School to the west. The thickness of the lens was approximately 22 - 25 feet. The size and shape of the freshwater lens are more or less in a constant state of change in response to the frequency, duration and intensity of local precipitation events.

Groundwater samples from the freshwater lens in each of the three monitor wells, MWs 4, 5 and 6 in Area 4 were analyzed for volatile organic compounds, semi-volatile organic compounds, TKN, nitrate/nitrite as N, total nitrogen, pH, chloride, and total recoverable barium, iron, potassium, magnesium and sodium. Analytical results shows that all parameters are below U. S. Environmental Protection Agency primary and secondary drinking water limits with the exception of benzene in MW-4 (1.1 ug/L vs MCL of 1.0 ug/L), and chloride in MW-6 (330 ppm vs MCL of 250 ppm).

A private well survey was conducted by students of the Eight Mile Rock High School within the settlements of the Eight Mile Rock community. Four hundred ninety-seven (497) properties were included in the survey of which twenty-three (23) were found to rely on a private well for their water supplies. Water samples from six (6) of the wells were collected and analyzed for salinity and conductivity on February 19, 2008. All water supplies were categorized as freshwater based on a salinity of <6.0 parts per thousand and a conductivity of <1,300 uS/cm. An additional eighteen (18) properties that were connected to the Grand Bahama Utilities Company municipal water supply system had private wells that were utilized for washing, cleaning, bathing and emergencies only. Detailed information on well construction, depths and method(s) of extraction were beyond the scope of the survey.

The data obtained from the baseline portion of the assessment together with published information were used as input to a numerical computer model utilizing Visual Modflow and the SEAWAT code. Modeling of the freshwater lens for three simulations was

conducted: completion of Area 3; fifty percent (50%) of Area 4 developed; and, full development of Area 4. The development of Area 4 at both fifty percent (50%) and to its full extent will result in a decrease in the size and shape (thickness and aerial extent) of the freshwater lens in the study area. While fresh groundwater would still be available to the private wells, the salinity (chloride content) would be expected to increase over the concentration currently found in those wells.

TABLE OF CONTENTS

1.0 INTRODUCTION……..1

2.0 BASELINE CONDITIONS……1
2.1 Geology ……..1
2.2 Hydrogeology……...1
2.2.1 Monitor Wells……...2
2.2.2 Data Loggers…….3
2.2.3 Lucayan Limestone Aquifer Characteristics……4
2.2.3.1 Hydraulic Conductivity……...4
2.2.3.2 Storage……5
2.2.4 Freshwater Lens……6
2.2.4.1 Historical Configuration…….6
2.2.4.2 Current Configuration……..7
2.2.5 Groundwater Quality – Freshwater Lens……..11
2.2.6 Freshwater Use – Water Supply……12
2.2.6.1 Private Wells……...12
2.2.6.2 Municipal Water Supply…….13

3.0 MODELING AND SIMULATIONS……..14
3.1 Model Code……...14
3.2 Conceptual Model…….15
3.3 Model Grid……15
3.4 Model Input……16
3.4.1 Hydraulic Conductivity……16
3.4.2 Storage……...16
3.4.3 Recharge……16
3.4.4 Dispersivity ……...17
3.4.5 Constant Head and Source Concentration…….17
3.5 Calibration…….17
3.6 Predictive Simulations……..….18
3.6.1 Simulation 1 – Area 3 Completed – Input…….18
3.6.2 Simulation 1 – Area 3 Completed – Output……...18
3.6.3 Simulation 2 – Area 4 at Fifty Percent (50%) Development – Input……19
3.6.4 Simulation 2 – Area 4 at Fifty Percent (50%) Development – Output……..19
3.6.5 Simulation 3 – Area 4 at Completion – Input…….19
3.6.6 Simulation 3 – Area 4 at Completion – Output……..19

4.0 DISCUSSION…….20

5.0 CONCLUSIONS……20

TABLES

IN-TEXT TABLES

Table A – Depth of Monitor Wells
Table B – Hydraulic Conductivity Reported by Halcrow
Table C – Sea Water Interface Elevations
Table D – Private Well Location Summary
Table E – Private Well Sampling and Analyses
Table F - 2007 BRL Municipal Water Consumption

ATTACHED TABLES

Table 1 - Monitor Well Locations and Elevations
Table 2 - Barometric Pressure and Water Levels During Tidal Test
Table 3 - Conductivity and Salinity Measurements –Bahama Cement Co., Trench Wells – August 2003
Table 4 – Salinity and Conductivity Measurements in Groundwater - November 6-13, 2007
Table 5 - Salinity and Conductivity Measurements in Groundwater – December 14-17, 2007
Table 6 – Salinity and Conductivity Measurements in Groundwater – February 19-20, 2008
Table 7 -Conductivity Measurements in Groundwater – December 6-10, 2007
Table 8 - Precipitation Records For Freeport, Grand Bahama
Table 9 – Salinity and Conductivity Measurements in Trench Wells September 13, 2007
Table 10 – Summary of Private Well Survey Data

FIGURES

Figure 1A - Site Location Map
Figure 1B - Aerial Photograph Illustrating Monitor Well Locations
Figure 1C – Plan View of Monitor Well Locations
Figure 1D – Aerial Photograph Illustrating Trench Well Locations
Figure 1E – Aerial Photograph Showing Surface Water Sampling Locations

Figure 2A - Plan View of Freshwater Lens -1975
Figure 2B – Plan View of Cross Section Locations
Figure 2C – Cross Section View of Freshwater Lens A-A' -1975
Figure 2D – Cross Section View of Freshwater Lens B-B' -1975
Figure 2E – Plan View of Potentiometric Surface - 11/20/2007 Morning
Figure 2F – Plan View of Potentiometric - 11/22/2007 Afternoon
Figure 2G – Plan View of Potentiometric - 12/14/2007 Morning
Figure 2H – Plan View of Freshwater Lens -11/6-13/2007
Figure 2I – Cross Section View of Freshwater Lens A-A' -11/6-13/2007
Figure 2J – Cross Section View of Freshwater Lens B-B' -11/6-13/2007
Figure 2K – Plan View of Freshwater Lens -12/10-17/2007
Figure 2L – Cross Section View of Freshwater Lens A-A' -12/10-17/2007
Figure 2M - Cross Section View of Freshwater Lens B-B' -12/10-17/2007
Figure 2N – Plan View of Freshwater Lens – 02/19-20/2008
Figure 2O – Cross Section View of Freshwater Lens A-A' -02/19-20/2008
Figure 2P – Cross Section View of Freshwater Lens B-B' -02/19-20/2008

Figure 2Q - Aerial Photograph Illustrating Private Wells and City Water Use
Figure 2R - Aerial Photograph Illustrating Private Well Sampling Locations
Figure 2S - Aerial Photograph Illustrating Freshwater Lens Thickness – 02/19-20/2008

Figure 3A – Cross Section View of Conceptual Model
Figure 3B – Plan View of Model Grid
Figure 3C – Plan View of Model Grid Illustrating Boundary Conditions
Figure 3D – Cross Section of Model Grid – Input Parameters and Boundary Conditions

Figure 4A – Plan View of Model Output Illustrating Calibration Scenario
Figure 4B – Cross Section View of Model Output Illustrating Calibration Scenario

Figure 5A – Plan View of Model Output – Simulation 1 – Area 3 Completed
Figure 5B – Cross Section of Model Output – Simulation 1 – Area 3 Completed
Figure 5C - Plan View of Model Output – Simulation 2 – Area 4 50% Complete
Figure 5D - Cross Section of Model Output – Simulation 2 – Area 4 50% Completed
Figure 5E - Plan View of Model Output – Simulation 3– Area 4 Completed
Figure 5F - Cross Section of Model Output – Simulation 3 – Area 4 Completed
Figure 5G – Aerial Photograph – Extent of Freshwater Lens – Simulation 3 - Area 4 Completed

GRAPHS

Graph 1 - Barometric Pressure Readings During Tidal Tests
Graph 2 - Water Levels During Tidal Cycles – MW-1, MW-2, MW-4, and Harbour
Graph 3 - Water Levels During Tidal Cycles – MW-10, MW-3, MW-5, and Harbour
Graph 4 - Water Levels During Tidal Cycles – MW-6, MW-7, MW-8, and Harbour
Graph 5 - Salinity Measurements in Groundwater - November 6-13, 2007
Graph 6 - Conductivity Measurements in Groundwater - November 6-13, 2007
Graph 7 - Conductivity Measurements in Groundwater – December 14-17, 2007
Graph 8 - Salinity Measurements in Groundwater – December 14-17, 2007
Graph 9 – Salinity Measurements in Groundwater – February 19-20, 2008
Graph 10 – Conductivity Measurements in Groundwater – February 19-20, 2008
Graph 11 - Conductivity Measurements in Groundwater – December 6-10, 2007

APPENDICES

Appendix A – Water Quality Results – Bahama Rock Ltd.
Appendix B – Test America Water Quality Results
Appendix C – Private Well Survey Information Sheets
Appendix D – 2003 Letter From Grand Bahama Utility Company
Appendix E - References

WATER RESOURCES ASSESSMENT

1.0 INTRODUCTION

Bahama Rock Ltd. (BRL) is proposing to develop additional acreage for the production of aggregate in an area west of Freeport, Grand Bahama Island (Figure 1A). The acreage is known as Area 4 and is located to the west of their current operations in Area 3. Both areas are shown in Figures 1b and 1c. Area 4 contains approximately 192 acres (total project area), and the perimeter dimensions are about 5,080 feet on the north, 2,070 feet on the east, 5,200 feet on the south, and 630 feet on the west. The area to be developed contains approximately 133 acres (69%), and the proposed depth of excavation is 80 feet below Freeport Harbour-Mean Low Water Level datum. The current status of Area 4 is undeveloped with the exception of a northwest-southeast trending access road near the south boundary.

The study area for this water resources assessment extends beyond Area 4 and includes the surrounding area bounded approximately by Hawksbill Creek to the north, Freeport Harbour to the east, North West Providence Channel (Atlantic Ocean) to the south, and Eight Mile Rock High School area to the west.

2.0 BASELINE CONDITIONS

2.1 Geology

BRL has taken four (4) core borings within Area 4, and inspection of the photo logs suggests that limestone of varying density, porosity and permeability are present to a depth of 110 feet below grade. This lithologic sequence is also confirmed to a depth of 150 feet below grade via the lithologic logs for boreholes drilled in the adjacent Area 3 to the east, and to 50 feet below grade for boreholes drilled in the Bahama Cement Company property to the southeast. The lithologic logs for deep disposal wells at the Grand Bahama Shipyard, Ltd. and Polymers International, Ltd. located approximately two (2) miles southeast of Area 4 show that the limestone/dolostone sequence is present to a depth of 600 feet below grade.

2.2 Hydrogeology

The physiographic setting of Area 4 and adjacent area on Grand Bahama Island together with the permeable limestone bedrock and climatological conditions form the overall hydrogeologic setting. Area 4 and adjacent areas including Area 3 and Freeport Harbour occupy the eastern portion of a peninsula of land (actually an island) that is bounded by Hawksbill Creek to the east, Hawksbill Creek and the Little Bahama Bank to the north, and the Atlantic Ocean (North West Providence Channel) to the south and west. All of these surface bodies are salt water. The peninsula is approximately 13 miles long (northwest to southeast) and averages less than one mile in width. At the western end of Area 4, the peninsula is approximately 4,450 feet wide.

The upper 60 – 70 feet of the limestone bedrock comprises the Lucayan Limestone Aquifer (LLA) which is the principal aquifer on Grand Bahama Island including Area 4 and adjacent lands. Within the LLA, freshwater can occur as a lens or lenses (often referred to as Ghyben-Hertzberg lenses) depending upon the amount of rainfall and the physical characteristics of the LLA. The permeability and porosity of the LLA varies both horizontally and vertically depending upon rock density. Rainfall in the area averages approximately 60 inches per year of which about 30 inches infiltrates the subsurface and 18 inches returns to the atmosphere as evapotranspiration. At steady state, the freshwater lens receives an average of 10 - 12 inches of annual recharge. There are no perennial, natural, fresh-surface water bodies, i.e., ponds, streams or creeks within Area 4 or adjacent lands. However, within Area 4, there are two karst depressional features in which the local water table is intermittently above the ground surface. This condition occurs during periods of higher precipitation and dissipates at times of low or no rainfall. A trench-well system is also present to the south of Area 4. This system was originally constructed to provide a freshwater supply to the Bahama Cement Company facility located on the western side of Freeport Harbour. The system can be seen in the aerial photograph presented as Figure 1D. There are also a number of ponds within Area 3 that have been formed through excavation and contain brackish to salt water.

2.2.1 Monitor Wells

As part of the Area 4 investigation, ten (10) monitor wells were installed: three (3) within Area 4; and, seven (7) in the adjacent areas. All ten (10) monitor wells were drilled using a diesel powered direct air rotary Mayhue 1000 Drill Rig. Bahamas Sanitary Engineering, Ltd. (BSEL) was the drilling contractor, and drilling was supervised by a geologist from EnviroLogic International, Ltd. (EIL). All monitor well locations are shown in Figures 1B and 1C. These locations are also described in Table 1 along with the measuring point and ground elevations for each well. As drilling proceeded, groundwater being airlifted from the borehole was checked every five (5) feet for specific conductivity, conductivity, salinity and temperature. Drilling was halted when the values for these parameters were representative of salt water. It is worthwhile noting that both the driller and the supervising geologist reported that no caverns, defined as a sudden drop in the drill string, were encountered during the drilling of any of the monitor wells. Monitor wells designated MW-1 to MW-3 were all initially started on October 22, 2007. For each well, a 12-inch auger was used to drill the borehole to a depth of approximately 6.0 feet for acceptance of an 8-inch schedule 40 PVC casing. MW-1 and MW-3 were drilled to 6.0 ft BLS and then the 8-inch casing was installed and cemented in place with Portland cement. MW-2 was drilled to a depth of 7.0 ft and an 8-inch schedule 40 PVC casing was installed and grouted in place. Drilling resumed on October 23, 2007 using a 6-inch drag bit, and the wells were subsequently completed as open boreholes.

Monitor wells MW-4, MW-5 and MW-6 within Area 4 were drilled on October 24, 2007. The initial portion of each of these wells was drilled to a depth of approximately 5.0 ft BLS using an 8-inch pilot hole. Then approximately 5.0 - 6.0 ft of 6-inch schedule 40 PVC casing was installed to prevent the near surface materials from falling in the borehole. These casings were not cemented in place. Drilling to total depth was completed as open borehole using a 6-inch drill bit.

Monitor wells MW-7, MW-8, MW-9 and MW-10 were installed throughout the Eight Mile Rock Community. The wells were drilled to their total depth using a 6-inch drill bit. These monitor wells are considered permanent, and were constructed using flush mounted (threaded couplings), Schedule 40 PVC, ten (#10) slot (0.01" openings) slotted screen pipe and risers. Before installing the slotted pipe well screens, a depth to water reading was taken. Thirty (30) feet of slotted pipe well screen was installed below the water table for each well, and the appropriate length of riser added to bring the PVC pipe to land surface. The screened portion of the borehole was not sand packed. A cement basket was added on the bottom of the riser just above the screen pipe, and approximately one (1) foot of bentonite pellets was added to seal the borehole. Each monitoring well was then grouted from the top of the bentonite pellet seal to land surface with Portland cement. A flush mounted monitoring well protective cover was cemented in place to complete the installation.

Total borehole depths in feet as measured from the Top of Casing (TOC) are presented in Table A below:

TABLE A
MONITOR WELL DEPTHS

Monitor Well	Depth
MW-1	73.3
MW-2	74.4
MW-3	75.9
MW-4	70.2
MW-5	66.9
MW-6	67.5
MW-7	73.4
MW-8	69.2
MW-9	70.6
MW-10	68.3

2.2.2 Data Loggers

Upon completion of the monitor wells, self-recording data loggers were placed in each well and at designated locations in Hawksbill Creek and Freeport Harbour. A separate data logger was also placed on the ground to monitor atmospheric pressure during the test. The two-day test was conducted from approximately 12 noon on November 20, 2007 until approximately 3 p.m. on November 22, 2007. No significant events were observed during the test, however two of the data loggers (MW-8 and Hawksbill Creek) were unable to be retrieved until the morning of November 23, 2007.

These pressure recording data loggers were used to provide data regarding: length of tidal period, magnitude of tidal and groundwater fluctuations, and the time lag between tidal change and groundwater level changes. These data were used to assist in estimating and calculating values of hydraulic conductivity, average and ranges in groundwater elevations, and water elevations of Hawksbill Creek and Freeport Harbour.

Once the test was complete the data were corrected to several factors. First, the barometric pressure, as measured by the data logger left on the ground, was subtracted from the data logger readings (absolute pressure). This removed the influence of the barometric pressure on the measured water levels (leaving only water pressure). The resulting water pressure readings were converted into feet of water by dividing by a factor of 0.433 psi/ ft of water. Lastly, the water level measurements were corrected with respect to the top of casing elevations for the monitor wells. In this manner the calculated water levels now represent actual water elevations as referenced to the Freeport Harbour mean low water datum. The recorded barometric pressure, water levels, and water level elevations are presented in Table 2. Graphs of the data are presented as Graphs 1, 2, 3 and 4. The water level elevations for each monitor well and the surface water gages were then used to construct maps of the potentiometric Surface (water table) for November 20 and 22, and December 14, 2007 as discussed in **Section 2.2.4.2** below.

2.2.3 Lucayan Limestone Aquifer Characteristics

2.2.3.1 Hydraulic Conductivity

Tidal period can be used to calculate the transmissivity (T) of an aquifer (hydraulic conductivity times aquifer thickness) by noting the difference and time lag between maximum and minimum water levels. Ratios of these water levels from the monitor wells are plotted against the distance of the wells from the tidal source (ocean) and a best-fit line is used to provide the slope factor, which, when using in the appropriate equation, provides a value of aquifer transmissivity. This value is divided by the aquifer thickness to determine the value of hydraulic conductivity.

As illustrated on Graphs 2, 3 and 4, the tidal fluctuations appear very regular and are transferred inland to the groundwater levels measured in the wells. While this is not a direct response (in time and in height), these variations and differences can assist in determining hydraulic properties of the aquifer materials. Data from the tidal test were utilized in the time lag and ration methods of calculation. Wells were analyzed in series based on a designation as being closest to ocean, midpoint from ocean, and farthest from ocean. An example of this is monitor well set MW-1 (closest), MW-2 (midpoint), and MW-4 (farthest) (see Figure 1B).

Calculation of hydraulic conductivity using these methods provided results in the millions of ft/day. While the hydraulic conductivity was expected to be high in the Lucayan, especially at depth, these values appear unrealistic. This may be due to the fact that the wells were constructed as open holes from the ground surface down to approximately 70 feet (there is no distinct screen interval). Photo borehole logs, driller's logs and lithologic logs for Areas 3 and 4 and the surrounding area show that there is considerable variation in the lithology, density, porosity, and hydraulic conductivity within the 70-foot interval of bedrock that comprises the LLA. Measurements were completed on the aggregate change in water level within each well. In other words, if well screens were installed at 60 to 70 feet below ground surface and another at 20 to 30

feet below ground surface water levels and responses measured during the tidal test may have been different.

Halcrow (2005 and 2007) provided estimates of hydraulic conductivity for different depths of the LLA beneath Grand Bahama Island. These values are presented in the following table (reproduced from Halcrow (2005).

TABLE B
HYDRAULIC CONDUCTIVITY –v- DEPTH

Depth below water table	Hydraulic Conductivity
0-15 ft	300 ft/day
15-30 ft	6000 ft/day
30-45 t	15,000 ft/day
> 45 ft	> 15,000 ft/day

Ritzi , et al., (2001) reports on research conducted on nearby Andros Island where the LLA is also present. The research provided by Ritzi, et al., specifically investigates the role of paleosols and related affects on hydraulic conductivity and the thickness of the freshwater lens. Other work reported in Ritzi, et al., provides the results of aquifer performance tests and indicates that hydraulic conductivity values of the upper Lucayan influenced by paleosol development can be less than 1 ft/day while the hydraulic conductivity values of the deeper LLA (uninfluenced by the paleosol formation) can be as high as 100,000 ft/day.

An article by Whitaker and Smart (1997) correlates hydraulic conductivity values in the LLA with climatic conditions in the greater Bahamas area. Hydraulic conductivity values noted in this paper vary from 1 ft/day to greater that 10,000 ft/day.

This wide range of published values for the LLA suggests that many factors influence the hydraulic conductivity values beneath a particular area. Further, investigation of the hydraulic conductivity through a traditional aquifer performance test would likely result in the unwise use of the freshwater resource (pumping for no reason). For these reasons, hydraulic conductivity will be used as a calibration parameter in the modeling process.

2.2.3.2 Storage

The storage of the LLA is based primarily on the primary porosity developed during the deposition of reef materials and secondary porosity developed from the formation of solution channels and fractures within the limestone matrix. The storage values can range from less than 1% to over 35% depending on the extent of this pore space and the extent of interconnectivity. Ritzi, et al., (2001) utilized a storage (effective porosity) value of 35% for the deeper Lucayan and lower values for the shallow intervals influenced by paleosol formation. Review of photographic logs of wells completed by Bahama Rock illustrate that porosity varies greatly beneath the property. Further, there is an apparent correlation between the hydraulic conductivity and the porosity of the limestone (greater porosity – greater hydraulic conductivity).

2.2.4 Freshwater Lens

Island land masses of sufficient size, aquifer characteristics and rainfall generally develop a lens of fresh water within the confines of the surrounding salt water. The size and shape of a lens roughly conforms to the shape of the land mass with the thickest portion of the lens located at the center and tapering towards the edges of the island. Fresh water lenses are dynamic features, solely dependent upon rainfall for recharge.

2.2.4.1 Historical Configuration

A 1975 report by Little, et al. (sometimes referred to as the Overseas Development Agency [ODA] report) contains a figure portraying a freshwater lens in the area from the current Freeport Harbour westward through BRL's Areas 3, 4 and 5. This map is presented as Figure 2A together with a cross section location figure (Figure 2B) and cross-sections through the lens shown in Figures 2C and 2D. As depicted, the freshwater lens conforms to the shape of the land mass, i.e., elongated along a northwest – southeast trending axis attaining a thickness of greater than 30 feet but less than 40 feet in the center. Halcrow (2007) discussing the 1975 Little, et al. investigation notes that two boreholes were drilled in the vicinity of Area 3.

"*Borehole GB 57 is about 1.3 km south east of Area 3 (towards Hawksbill Creek), and Borehole GB 58 is about 0.5 km south of Area 3 and close to the coastline. Both boreholes are 12m deep and were completed in the transition zone. Measurements of chloride concentrations with depth showed that, in 1975, the junction between fresh groundwater and the transition zone was 9 to 10.5m below ground surface for GB 57 and 10.5 to 12m below ground surface for GB 58; the profiles are shown in Table 3.3.*

Table 3.3 Depth-Chloride Profiles

Depth (m)	*Chloride*	*Concentrations (mg/l)*
	GB 57	***GB-58***
3.0	*99*	
4.5	*99*	*42*
6.0	*184*	*71*
7.5	*262*	*71*
9.0	*390*	*85*
10.5	*703*	*85*
12.0		*731*

(*Note: depth is quoted as meters from top of borehole casing, which is likely to be relatively close to ground surface.*)"

Boreholes GB 57 & 58 that were used to delineate the freshwater lens were taken in the vicinity of Freeport Harbour. There has been extensive development of Freeport Harbour since 1975, and the freshwater lens in that area (Area 3 and eastward) would be expected to have greatly diminished or disappeared.

Figure 2A shows a significant historical (1975) freshwater lens west of the William J. Levarity Highway. The basis for this delineation in the 1975 Little, et al. report could not be determined. Numerous attempts to obtain a copy of that report were unsuccessful. An inspection of a copy of the original freshwater lens thickness figure from the report shows few if any potential data points for this area. It may very well be that the data from GB 57 and GB 58 were extrapolated westward based on the configuration of the land mass.

Additional insight into the historical aerial extent of the freshwater lens can be made based on measurements made in the vicinity of Area 4 in 2003. The measurements were made in the trench well field that was constructed at the time operations at the Bahama Cement Company, Ltd. were initiated in 1968. It is reported that the system was shut down shortly after pumping began due to increasing chloride concentrations. The location of the trench well field and the various numbered segments can be seen on the aerial photograph presented as Figure 1D. The trench well field was designed to capture fresh water from the top of the freshwater lens. Maximum water depth in any of the trench segments is about five (5) feet. Table 3 presents the measurements of conductivity and salinity made in August 2003 (EnviroLogic International, Ltd., 2003). All of the salinity and conductivity values for that time were representative of fresh water indicating that the aerial extent of the freshwater lens at that time encompassed at least trench segments T-3, T-4 and T-7. Due to the shallowness of the trench well system, the thickness of the freshwater lens could not be determined at that time.

2.2.4.2 Current Configuration

In order to define the current (baseline) configuration of the freshwater lens within and in the area around Area 4, ten (10) monitor wells were drilled. Monitor well locations are shown in Figures 1B and 1C. Construction of these wells was discussed in **Section 2.2.1 – Monitor Wells** above. Upon completion of the wells, static water level measurements were obtained for all wells on November 20, 2007, November 22, 2007 and December 14, 2007. Water level measurements were also made on December 14, 2007 at two surface water locations: Hawksbill Creek and Freeport Harbour. These measurements were converted to water level elevations and used to prepare plan views of the potentiometric surface (water table). These plan views are presented as Figures 2E, 2F, and 2G. All of the figures depict an elongated ridge of elevated potentiometric surface roughly coinciding with the elongated axis (east – west) of the peninsula. The hydraulic gradient extends from the ridge towards the surrounding water bodies to the north, ease and south; Hawksbill Creek, Freeport Harbour, and North West Providence Channel (Atlantic Ocean), respectively. In conformance with the hydraulic gradient, groundwater would be expected to flow radially away from the ridge of highest elevation.

In addition to the static water level measurements, three rounds of salinity/conductivity readings were taken with a YSI – Model 30 meter at one (1)-foot intervals to a depth of 50 feet in all monitor wells. The first measuring event took place on November 6 and 13, 2007, the second event was conducted between December 14 and 17, 2007, and the third round of measurements was made on February 19 and 20, 2008. The data have been developed in tabular, graphic and figure form and are presented as: Tables 4, 5 and 6;

Graphs 5 through 10; and, Figures 2H through 2P, respectively. An additional measuring event was conducted on December 6, 7 and 10, 2007 during which conductivity only profiles were made at one (1)-foot intervals to the total depth of each monitor well. Measurements were made using a Solinst Model TLC 107 temperature/conductivity meter. These results are presented in Table 7 and Graph 11.

Freshwater as used in this report is taken to be water with an overall salinity concentration of 0 – 699 ppm, and a conductivity value of less than 1,300 uS/cm. These values coincide well with the measured values for tap water (municipal water supply provided by the Grand Bahama Utility Company [GBUC]) at the offices of EnviroLogic International, Ltd. (EIL)in Freeport on January 5, 2008. The measured values were 1,282 uS/cm for conductivity and 0.6 parts per thousand (ppt) or 600 parts per million (ppm) for salinity. (Note that the salinity value could range from 600 to 699 ppm.)

Figures 2H, 2I and 2J present the plan view, east-west cross section and north-south cross section, respectively, for the November 6 and 13, 2007 monitoring events. A freshwater lens is present with the long axis roughly along the southern boundary of Area 4 over an approximate east-west distance of 8,200 feet. The width of the lens (north-south) is about 4,200 feet, and does not extend southward to the coastline (Atlantic Ocean). Maximum thickness as measured at MW-3 was 22 feet (based on a maximum salinity of .5 ppt [<599 ppm]). Table 4 presents the salinity and conductivity measurements. Note that the salinity measurements for MW-5 do not exceed 0.6 ppt until the depth of 48 feet below top of casing or about 45 feet below grade. That would suggest that the lens thickness at the MW-5 location was about 36 feet thick, a thickness that is not supported by any of the measurements for adjacent wells. This condition is attributed to a collapse in the open portion of the MW-5 borehole. A comparison of Figures 2A and 2H shows a considerable "apparent" decrease in the size of the freshwater lens as compared to the 1975 conditions. The diminution of the lens in the vicinity of Freeport Harbour is to be expected due to the expansion/development of the harbour. MW-1 is located just north of the intersection of the Warren J. Levarity Highway and Queens Highway in the north section of the new park (Figures 1B and 1C). This is approximately the same location as Borehole GB 58 described in the 1975 ODA report discussed in Section 2.2.4.1 above. The freshwater lens thickness in Borehole GB 58 according to the Little, et al., 1975 report was between 35 and 40 feet. The freshwater lens thickness as measured in MW-1 on November 6, 2007 was five (5)-feet based on a salinity value of less than 0.6 ppt (699 ppm) (Table 4). This is a temporary condition as will be discussed below. The lack of a lens to the west and south of Area 4 is not readily explained. No changes in land use or groundwater use are apparent in the area. Some change in the topography west of Area 4 has occurred (BRL – Area 5) due to the removal of the surficial layer (10 – 15 ft) of limestone. The current land surface is more dense limestone at an elevation approximately equal to the water table. During periods of high water table, the area is under water, with the limestone surface being exposed at times of lower water table elevation. Recharge to the LLA would still occur although evaporation may be greater due to the larger exposed area. Consideration must be also be given to the possibility that the fresh water lens delineation presented in the Little, et al. 1975 report was based on an

extrapolation of the data from boreholes in the vicinity of Freeport Harbour, and did not exist to the extent depicted.

Figures 2K, 2L and 2M present the plan view, east-west, and north-south cross sections, respectively, for the December 14 - 17 monitoring events. The presence of a freshwater lens is again apparent; however, its size had decreased to approximately 7,200 feet along the east-west axis, the width remains about the same 4,200 feet, and the thickness as measured at MW-3 was 16 feet. A comparison of the salinity concentrations in Tables 4 and 5 shows the differences. Note that there would be no freshwater lens at the location of MW-1 with the salinity criteria at less than 0.6 ppt (699 ppm). Given that the LLA hydrogeologic characteristics are constant in Area 4 and surrounding area, the changes in the configuration of the freshwater lens between the November and December 2007 monitoring events can be attributed to a decrease in precipitation and coincident recharge to the LLA. Table 8 presents the 2007 – 2008 (through February 25, 2008) rainfall records for Freeport, Grand Bahama. Total recorded rainfall for 2007 was 52.90 inches through December 25th with 43.52 inches (82%) coming in the period June 1st through October 31st. Note the decrease in rainfall beginning in November and continuing into December. On this basis, the extent and thickness of the fresh water lens was most likely greater during the rainy season (April – October) than that delineated based on the November and December measurements.

Figures 2N, 2O and 2P present the plan view, east-west, and north-south cross sections, respectively, for the February 19 and 20, 2008 monitoring event. The freshwater lens remains present and the apparent center of the lens has shifted to the west. The approximate dimensions are a width (north –south) of 4,500 feet, a length (east – west) of 8,400 feet, and a thickness of 25 feet at MW-7. These dimensions are a little larger than those derived from the prior two monitoring events, a condition which can be directly attributed to the 2.60 inches of rainfall that the area received on February 13, 2008 (see Table 8). Also evident is the absence of the freshwater lens east of the Warren J. Levarity Highway. This condition is due to the development of Area 3 as shown in Figure 2S. The thickness of the lens as measured in MW-7 has increased when compared to the November and December measurements. As with the previous measurements, no freshwater lens was encountered at the location of MW-8.

The conductivity only profiles taken on December 6, 7 and 10, 2007 are presented in Table 7 and Graph 11, and are for the entire depth of each monitor well (borehole). Borehole depth measurements compare favorably with those reported by the driller BSEL (See **Section 2.2.1**). Conductivity values of less than (<) 1,300 uS/cm are taken as representative of freshwater, and those greater than 45,000 uS/cm are indicative of sea water (Davis and DeWeist, 1966). The conductivity values in Table 7 have been shaded to delineate freshwater and salt water. Evident is the constant increase in conductivity with depth associated with an increase in salinity. The freshwater lens encompasses the area around MWs-3 through 7, and attains a thickness of 21 feet in MW-3. The overall lens configuration is similar to those previously described for November 6 and 13, 2007, December 14, 16 and 17, 2007, and February 19 and 20, 2008 monitoring events.

The elevation of the sea water interface varies with the distance of the monitor well from the North West Providence Channel (Atlantic Ocean) to the south, and Hawksbill Creek to the north. Table C below shows that relationship with the highest sea water interface elevations being in MWs 1, 9 and 10 on the south, and 4, 5 and 6 on the north which are the closest to their respective shorelines. The interior monitor wells MWs 3, 7 and 8 have the greatest "non"-sea water (brackish water) thickness, i.e., lowest elevation for the sea water interface as would be expected considering the lensic nature of the fresh/salt water relationship.

TABLE C
SEA WATER INTERFACE ELEVATIONS

Monitor Well	M.P. Elevation	Depth to Sea Water (*)	Sea Water Interface Elev.
MW-1	17.08	58	-40.92 (-41)
MW-2	16.75	60	-43.25 (-43)
MW-3	16.02	64	-47.98 (-48)
MW-4	18.50	60	-41.50 (-42)
MW-5	13.97	57	-43.03 (-43)
MW-6	17.32	61	-43.68 (-44)
MW-7	16.85	64	-47.15 (-47)
MW-8	18.33	66	-47.67 (-48
MW-9	13.81	56	-42.19 (-42)
MW-10	14.67	57	-42.33 (-42)

(*) Based on a conductivity value > 45,000 uS/cm.

The trench well field associated with the Bahama Cement Company, Ltd., discussed previously in **Section 2.2.4.1** above, was revisited on September 13, 2007 as part of the current assessment activities. Conductivity, specific conductivity and salinity measurements were made in the same trench segments, T-3, T-4 and T-7 as in 2003. Two other trench segments, T-5 and T-6 were added for this measuring event. Their locations are also shown on Figure 1D. Measurements were made just below the water surface and at one (1)-foot intervals to the depth of the trench. Table 9 presents the data. In the eastern most trench segment, T-3, the conductivity and salinity values have increased to the point where only the upper two (2) feet of the water column meet the criteria for fresh water. This change can most likely be attributed to the mining activities and expansion of Freeport Harbour to the east. Further west along the trench well field, the conductivity and salinity values for segment T-7 support a freshwater lens of at least three (3)-feet thick. As can be seen on Figure 1B, MW-3 is located just to the west of this segment. Salinity and conductivity measurements made in MW-3 support the presence of a freshwater lens in the T-7/MW-3 area, and suggest that this may be the area of greatest thickness. At the western end of the trench system, the conductivity and salinity values for segment T-5 qualify for classification as fresh water although salinity and conductivity values are increasing somewhat. Note on Figure 1D that monitor well MW-7 is located close to the western end of segment T-5. Water quality data for MW-7 show that a thin freshwater lens (4 feet) was present at the time of the December 10 – 17, 2007 measurements, no freshwater lens was present at the time of the November 6 – 13,

2007 readings, and a 25 foot thick freshwater lens was measured on February 19 – 20, 2008. The data for MWs 7 & 8 indicate that this area is the western most extent of the freshwater lens with the exact configuration (vertically and horizontally) at any point in time being dependent upon the amount of recent precipitation.

Certain segments of the trench well system and other surface water bodies were also sampled by BRL personnel in January and April, 2007. Sample locations are shown in Figure 1E. All samples were submitted to A & S Laboratories, Inc., Odessa, Florida for analysis of pH, Chlorides as Cl, turbidity and specific conductance. The results are presented in Appendix A, and show that the chloride concentration in trench well segments T-3 and T-4 were 334 mg/L and 126 mg/L, respectively for the January sampling; and 411 mg/L in the April sample from T-3. The chloride concentrations compare favorably with the salinity measurements in the same trench segments on September 13, 2007 (Table 9). These together with the other results for excavated trenches in Area 3 demonstrate the diminution of the freshwater lens in the vicinity of trench well segment T-3 east and southeastward to Freeport Harbour.

2.2.5 Groundwater Quality – Freshwater Lens

In order to establish the background or baseline groundwater quality in Area 4, groundwater samples were collected from MWs 4, 5 and 6 on November 12, 2007. Construction of these wells had been completed on October 26, 2007 as six (6)-inch diameter open boreholes (See Section 2.2.1). The samples were collected from the top of the water table to assure that the freshwater portion of the water column was being sampled. A stainless steel bailer with a stainless steel cable drop-line was used to collect the samples. Given the relatively large borehole diameter and volume of water in storage within the water column, no purging was conducted prior to sample collection. All equipment was thoroughly cleaned between uses using industry standard procedures. Upon collection, all sample containers were placed in a cooler with ice at approximately 4°C and shipped via overnight delivery to TestAmerica laboratories in Tampa, Florida. Samples were received at TestAmerica laboratories at 9:30 AM on November 13, 2007. The analytical results are presented in TestAmerica's reported dated November 30, 2007 which is presented as Appendix B.

Samples from each of the three monitor wells, MWs 4, 5 and 6 were analyzed for volatile organic compounds, semi-volatile organic compounds, TKN, nitrate/nitrite as N, total nitrogen, pH, chloride, and total recoverable barium, iron, potassium, magnesium and sodium. A review of the test results shows that all parameters are below U. S. Environmental Protection Agency (EPA) primary and secondary drinking water limits with the exception of benzene in MW-4 and chloride in MW-6. The benzene concentration in the groundwater sample from MW-4 was 1.1 micrograms per liter (ug/L) and the maximum contaminant level (MCL) for benzene is 1.0 ug/L. Benzene was also detected in the sample from MW-5 at a concentration of 0.61 ug/L. It is suspected that the presence of benzene in the samples was due to the residual effects of the air rotary drilling process. No other potential source(s) in the area around MWs 4 and 5 are readily apparent. The concentration of chloride in MW-6 was detected at 330 milligrams per liter (mg/L), and the MCL is 250 mg/L. Considering the location of MW-6 with respect

to Hawksbill Creek and the thinness of the freshwater lens at that location, the elevated chloride concentration is to be expected.

2.2.6 Freshwater Use – Water Supply

2.2.6.1 Private Wells

A private well location survey was conducted in a portion of the Eight Mile Rock community including the Eight Mile Rock High School, Pinedale, Hanna Hill, Bartlett Hill and Harbour West settlements (Figure 2Q). Door to door interviews were carried out by the Eight Mile Rock High School students under the supervision of Mr. Alfred Jones (Senior Master) in November and December, 2007. A standard form was provided to each student noting if the properties had either city water and/or a private well or both. The locations of the homes were noted as best as possible and where persons provided names they were recorded on the survey sheets. Enlarged aerial photographs of the settlements were provided to the EMR High School students to delineate settlements and to identify streets and generally aid in the information collection.

The survey results have been summarized and are presented as Table 10. The full survey is presented in Appendix C. Out of the 497 properties surveyed, twenty-three (23) rely on a private well for their water supply. Of those 23 structures, fourteen (14) were located in Hanna Hill, five (5) in Pinedale, three (3) in Bartlett Hill, and one (1) in Martin Town.

TABLE D
PRIVATE WELL SURVEY SUMMARY

Settlement	Private Wells only	Private & City Water
Hannah Hill	14	10
Pinedale	5	5
Bartlett Hill	3	3
Martin Town	1	0
Totals	**23**	**18**

Another eighteen (18) properties have both a well and are connected to the municipal water supply system. Those properties appear to rely on the municipal supply for their drinking water, and either do not use the well or use the well for irrigation, washing, cleaning, bathing and emergencies only. The general locations of all forty-one (41) properties with a private well are shown in Figure 2Q. Note that due to the close proximity of some of the private well locations, they are represented by a single symbol as shown in the legend.

On February 19, 2008, an EIL chemist, accompanied by BRL personnel, collected water samples from selected homes with private wells. A total of six homes were sampled, two from each community (Bartlett Hill, Hanna Hill and Pinedale). The home locations are

shown in Figure 2R. Homes were selected based on visibility of the well and obtaining approval from the residents. EIL explained that samples were being collected for water quality testing; all residents were helpful in allowing sample collection. All the wells had an electric pump and small tank installed to supply water to the homes. Due to configuration and lack of accessibility to the well/pump systems, no well measurements (depth, diameter and casing material) were made. Samples were collected in 1 liter plastic bottles and analyzed at the offices of EIL using an YSI Model 30 combination conductivity/ specific conductivity/ temperature/salinity meter. The results are presented in Table E below:

TABLE E
PRIVATE WELL SAMPLING AND ANALYSIS
(All samples collected and analyzed on February 19, 2008)

Number	Settlement	Address	Resident	Conductivity uS/cm	Salinity(ppt)
1	Bartlett Hill	JRS R-13	Olive Spencer	742	0.4
2	Bartlett Hill	JRS R-14	Myrtle Williams	938	0.5
3	Pinedale	I-95 C-34	Keva Garland	701	0.4
4	Pinedale	EMRHS 2nd Street L-3	Jackie Hall	723	0.4
5	Hanna Hill	AndrosTown 1St. & Lane 1	Wellington Stuart	731	0.4
6	Hanna Hill	Jack Smith Road	Alfred Bethel	1120	0.6

No. 1 - 5	Private Well only
No. 6	Private Well and City Water

Based on our criteria for freshwater (salinity concentration of 0.0 – 0.6 ppt [0 – 699 ppm], and a conductivity value of less than 1,300 uS/cm), the groundwater supply for each private well can be classified as freshwater. Since no in well measurements were possible, the thickness of the freshwater lens at each location could not be determined. Some insight into lens thickness can be gained from plotting the private well locations together with the data from the February 19 – 20, 2008 monitoring event. Figure 2S present the combined information. The apparent thickness of the freshwater lens (at the time of sampling) in the private wells in the: Bartlett Hills settlement was 0 – 5 feet; Hanna Hill settlement was 10 – 20 feet; and, Pinedale settlement was 0 – 5 feet.

2.2.6.2 Municipal Water Supply
In 2003, as part of an Environmental Impact Assessment performed for the proposed Tractabel LNG project, EIL contacted the GBUC to determine their interest in the area west of Freeport Harbour for the development of a freshwater supply. Their July 7, 2003 response letter is presented in Appendix D and notes that: "*The Grand Bahama Utility Company, there fore regards the area as having no potential as a future potable water source.*" The GBUC does, however, supply the Eight Mile Rock area with potable water

via a transmission/distribution system along the Queens Highway. The results of the EMRHS private well survey identified those properties that are connected to the GBUC system (Appendix C). The source of the potable water supplied by the GBUC is from well fields located on the main portion of the island east of Freeport Harbour. The proposed development of Area 4 does not pose any threat to the water supply from those well fields.

The existing BRL operations in Area 3 and their offices on Warren J. Levarity Highway utilize freshwater from the GBUC municipal system. BRL uses the potable water supply primarily for consumption, washing and other office type uses. No water from the GBUC system is used directly in the production of aggregate. Water consumption records for 2007 are presented in Table F below, and show that a total of 1,247,000 gallons were used. Monthly consumption averaged 103,917 gallons, with a high of 251,000 gallons in July and a low of 29,000 in November. Average daily consumption was 3,416 gallons with a high of 8,367 gallons in July and a low of 967 gallons in November. The relocation of BRL offices and development of Area 4 will not result in any change in the use and consumption of their municipal water supply. Therefore, there will not be any increase in demand or strain on the municipal well fields operated by the GBUC.

TABLE F
2007 MUNICIPAL WATER CONSUMPTION
(U.S. gallons)

DATE	MONTHLY USE	AVERAGE DAILY USE
JAN	53,000	1,710
FEB	77,000	2,750
MAR	70,000	2,258
APR	54,000	1,800
MAY	196,000	6,323
JUNE	178,000	5,933
JULY	251,000	8,367
AUG	72,000	2,323
SEPT	68,000	2,267
OCT	157,000	5,065
NOV	29,000	967
DEC	42,000	1,355
TOTAL	1,247,000	3,416

3.0 MODELING AND SIMULATIONS

3.1 Model Code

Numerical modeling for this project was completed using Visual Modflow and the SEAWAT code. Modflow was developed by the US Geological Survey and is the standard for three dimensional groundwater flow and transport modeling. SEAWAT

couples the flow portion of the Modflow code with a mass/density-related flow transport model MT-3DMS. In addition to other solute transport projects, SEAWAT is specifically designed to simulate saltwater/freshwater interactions due to the density variations between salt and freshwater.

3.2 Conceptual Model

Pertinent details regarding the hydrogeologic conditions on Grand Bahama are presented in Section 2 of this report. The conceptual model for Grand Bahama Island consists of features presented graphically on Figure 3A.

As indicated in Section 2.2 of this report, this area is an island bounded on the north by Hawksbill Creek (a tidal flat area), to the south by the Atlantic Ocean, to the east by Freeport Harbour, and to the west by more island. Precipitation falls on the island, some of which returns to the atmosphere through evaporation and/or transpiration. There is very little if any precipitation that migrates as surface water runoff into the Atlantic Ocean, Freeport Harbour or Hawksbill Creek. A portion of the precipitation estimated at between fifteen to twenty percent (15 - 20%) infiltrates through the fractured and porous limestone and recharges the freshwater lens in the LLA. The freshwater lens that has developed in the LLA is dependent not only upon the available precipitation for its existence, but also on the porosity, hydraulic conductivity and storage capability of the aquifer materials. Additionally, it is understood that the freshwater lens thickness and extent can and does vary significantly due to changes in precipitation rates, seasonality (rainy vs dry season), and climatic events such as a tropical storms or hurricanes. Based on the dataset collected in this assessment, the thickness of the freshwater lens varies between approximately 16 and 22 feet at the MW-3 location. This location is noted because it is approximately halfway across the island (north to south) and, all other things being equal, would likely be the location (or close thereto) of the thickest portion of the lens. This location has been chosen as a point of calibration for these reasons. As discussed in **Section 2.2.4** of this report, this lens is limited in lateral extent and is not present at the extreme western (Eight Mile Rock High School) and eastern portions Area 3 and Freeport Harbour) of the study area. The exact reason(s) for absence in the western portion is unclear, although it may be a combination of natural hydraulic property variability and anthropogenic development. Its absence in the eastern portion is attributed to the expansion of Freeport Harbour including the development of Area 3.

Overall, the island is bounded by the ocean, with a salt concentration of 35,000 parts per million (ppm). Salt concentrations in the water located in the tidal flat area of Hawksbill Creek will likely vary between brackish and sea water-level concentrations depending on the strength and period of tide, time of season, and recent precipitation events. Again, freshwater as defined for this assessment has a salinity of less than 700 ppm.

3.3 Model Grid

The model grid was designed to cover the study area at a resolution that balances between number of columns and rows (which affects the complexity and run time of the model) and the amount of resolution needed to effectively describe and solve the problem

at hand. To this end, the model was constructed utilizing 90 rows (each 300 feet wide); 55 columns (each 150 feet wide), and seven vertical layers. These layers were utilized to simulate different depths of aquifer materials from the approximate ground surface down to 90 feet below sea level. The uppermost layer is 25 feet thick and each of the underlying six layers has a thickness of 15 feet. The model grid is illustrated on Figure 3B and model inputs area illustrated on Figure 3C and Figure 3D.

It is worthwhile to note that the Modflow model code utilizes finite difference (FD) approximation equations. The FD scenario assigns equations to each model cell, where they are solved based on the properties of that cell and cells adjoining. Because of the mathematics involved, the FD approximations can consider only rectilinear-shaped cells. In other words, diagonal or radial features (such as a coastline) must be represented through a series of "steps" in the rectilinear grid, instead of a straight line. This is illustrated in several areas of the grid, including the Atlantic Ocean, and Hawksbill Creek coastlines as can be seen in Figure 3C.

3.4 Model Input

Model inputs consist of various hydrogeologic parameters such as: hydraulic conductivity, storage, porosity, recharge, solute concentration, and dispersivity. Model input parameters were determined based on field collected data within the study area, regional observations, and empirical published values. In the end, ranges of these properties were utilized to calibrate the model to measured conditions of hydraulic head and salinity concentration.

3.4.1 Hydraulic Conductivity

The hydraulic conductivity (K) of the model was varied within the ranges presented in Table B as the model was calibrated to simulate the actual measured potentiometric surface. As a general rule, hydraulic conductivity values were increased with depth (as noted in the field and referenced publications). Representative values of hydraulic conductivity ranging from 1 ft/day up to 15,000 ft day were used in the calibration scenarios. These values were varied aerially and vertically in order to generally match changes in this hydrogeologic property. Figure 3D presents the layers of hydraulic conductivity along the cross section line B-B' showing the increases in K.

3.4.2 Storage

Values of storage and effective porosity were varied based on available published information. Values used in the calibration scenarios were ranged from 1 % to 30% with a general increase in depth in concert with the increase in hydraulic conductivity.

3.4.3 Recharge

Recharge is that component of the hydrogeologic cycle that actually enters the groundwater flow system. Recharge rates for the Caribbean islands vary greatly from season to season depending on climatic factors and also tropical storms and hurricanes. On average, however, recharge rates for the northern islands, such as ground Grand Bahama, appear higher than for the Southern islands. Recharge rates of between 5 and 20 inches per year were utilized in calibration scenarios. The rate of recharge was noted

to have a great influence on the thickness and location of the freshwater lens in the simulation. Average rates ranging from 3 to 10 inches per year appeared to be a reasonable estimation for the final calibration. The lower rate of 3 inches per year was used in the Area 5 location and in and around Area 3 and the former Bahama Cement Co., Ltd., property south of Area 3. The higher rate was used in the remainder of the area. The rate and area of recharge was varied during the calibration scenarios to imitate the "average" current configuration of the freshwater lens. It must be fully recognized, however, that there will be periods of time during which recharge to the freshwater lens will be greater and lower than the average.

3.4.4 Dispersivity

Dispersivity is a measure of the amount of mixing of solute in groundwater and is composed of two terms; dispersion and diffusion. Attempts have been made in the lab and field to quantify values of this parameter for various locations and hydraulic materials, but generally, its value is determined during the modeling process. Values between 0.3 and 30 ft were used in the calibration scenarios. Varying values of dispersivity did not have significant affect on the model.

3.4.5 Constant Head and Source Concentration

The simulations utilized source concentration of the Atlantic Ocean and the tidal flat area of Hawksbill Creek coupled with constant elevations along these margins. The constant elevation heads were maintained to simulate average elevations of the ocean and creek. The concentrations of simulating the seawater and heavily brackish water were utilized at 35,000 parts per million (ocean) and 17,500 parts per million (creek). It is expected that the salt concentration in the ocean does not change appreciably, while salt concentrations in the water located in the tidal flat area of Hawksbill Creek will likely vary between brackish and sea water-level concentrations depending on the strength and period of tide, time of season, and recent precipitation events.

The model also utilized constant head values of the ocean and creek based on measurements collected as part of this assessment. Based on the measured water level elevations for December 14, 2007 presented in Table 1, water surface in the Atlantic Ocean had an elevation of 0.11 feet and Hawksbill Creek had an elevation of 1.33 feet. These values were input to the model for the constant head values for these locations, respectively. Solving for exact hydraulic head desiring a near steady-state condition during periods of tidal flux can be difficult. Essentially, this is a moving target. For this reason, these near average values were used to simulate the water levels over a larger period of time.

3.5 Calibration

Various calibration runs were conducted in order to find a reasonable set of values of the input parameters such that the model simulated the observed field data. One of the complexities of the field measurements was the tidal cycle. It would be extremely complex to run a long model simulation and consider every tidal cycle. To better conceptualize this situation, average values of water levels were used during the

calibration as discussed above. That limited the number of time steps required for a simulation, but still provided a reasonable approach to calibration.

Calibration scenarios were run for a period of 365 days (one year). This time provided opportunity for the hydraulic head values and concentrations to come into a dynamic equilibrium (quasi- steady-state condition). The calibration scenario was utilized as the beginning sequence before predictive simulations were run considering the development of Area 4.

The calibration scenarios utilized a value of 0.11 feet constant head for the Atlantic Ocean and Freeport Harbour areas, and a value of 1.3 feet for the constant head for the Hawksbill Creek area. These values were considered average for water elevations in these areas and were based on measurements collected on December 14, 2007.

A plan view of the calibrated model is presented on Figure 4A and in cross section view on Figure 4B. As illustrated, the simulated potentiometric surface generally resembles the measured potentiometric surface and includes flow components to the north, east and south, originating in a hydrogeologic divide near the center of the island. The simulated freshwater lens thickness contours illustrate a freshwater lens with a depth and lateral configuration resembling the average freshwater lens configuration as determined from field measurements in November and December 2007 (Figures 2H through 2M). The width of the lens along cross section B-B' (north – south) is approximately 3500 feet wide, and approximately 8300 feet long (east – west). The simulated thickness of this lens is approximately 22 feet, with the thickest portion of the lens appearing between MW-3 and MW-5.

3.6 Predictive Simulations

Three (3) predictive simulations were considered. Simulation 1 included a model of the project area with Area 3 completely developed. Simulation 2 simulated the effects of the installation of the buffer trench and approximately fifty-percent (50%) of Area 4 developed. Lastly, Simulation 3 included the full development of Area 4 as proposed. These simulations are discussed in greater detail in the following paragraphs.

3.6.1 Simulation 1 – Area 3 Completed - Input

The input for Simulation 1 utilized the same dataset as the calibrated input noted in Section 3.5, with several noted exceptions in Area 3. First, Area 3 was connected to the harbour along the proposed channel as illustrated. Second, Area 3 was outlined utilizing a constant head of 0.11 feet to simulate the water elevation of the harbour (and ocean). Last, the Area 3 constant head cells were assigned a constant salt concentration of 35,000 ppm.

3.6.2 Simulation 1 – Area 3 Completed - Output

Predictive Simulation 1, which illustrates the effects of Area 3 being completely developed, does not show significant difference in the shape or thickness of the simulated freshwater lens from that detailed in the calibration simulation. The results of this simulation are presented on Figure 5A and Figure 5B. As illustrated, most of the

excavation and development activities take place in an area where the freshwater lens is already absent. Therefore, significant changes to the lens were not expected.

3.6.3 Simulation 2 – Area 4 at Fifty Percent (50%) Development - Input

The input for Simulation 2 utilized the Simulation 1 input (above), with several noted exceptions in Area 4. First, the seismic buffer trench and the southern one-half (approximately 50%) of Area 4 were illustrated as developed by replacing the cells with constant head cells set at 0.11 feet (to simulate the water elevation of the harbour and ocean). These cells were also assigned a constant salt concentration of 35,000 ppm. Note that at this stage of development Area 4 will not be in direct hydraulic communication (no open channel)with Area 3 and Freeport Harbour. However, the storage and hydraulic conductivity effects of the LLA on the formation and retention of a freshwater lens in that area will be gone and replaced by an open body of brackish/salt water.

3.6.4 Simulation 2 – Area 4 at Fifty Percent (50%) Development - Output

The second predictive simulation illustrates the construction of the seismic buffer trench and the development of the southern half (approximately 50%) of Area 4. This simulation illustrates the effects of the development on the location and the thickness of the freshwater lens.

As illustrated Figure 5C and Figure 5D, the north-south extent of the freshwater lens is affected significantly when the seismic buffer trench and development activities begin. Specifically, the freshwater lens is absent in the area of the seismic buffer trench and the active area. The lens present in the calibrated simulation has been divided into two smaller and thinner lenses, trending east and west, generally to the north and south of the seismic buffer trench and active area. Prior to the excavation of the seismic buffer trench and development activities in Area 4 the freshwater lens has an apparent thickness of 20-25 feet. The results of predictive Simulation 2 indicate that the smaller lens to the south has an average thickness of approximately 12-13 feet, and the smaller lens to the north has an average thickness of less than 5 feet.

3.6.5 Simulation 3 – Area 4 at Completion - Input

The input for Simulation 3 utilized the Simulation 2 input (above), with the addition of Area 4 being fully developed. This was simulated by replacing the cells in the Area 4 with constant head cells set at 0.11 feet (to simulate the water elevation of the harbour and ocean). These cells were also assigned a constant salt concentration of 35,000 ppm. Note that at this stage of development Area 4 will be in direct hydraulic communication via an open channel with Area 3 and Freeport Harbour.

3.6.6 Simulation 3 – Area 4 at Completion - Output

Predictive Simulation 3 illustrates the effects of Area 4 being completely developed to its total area and depth. Further changes to the freshwater lens are noted in this simulation as illustrated in Figure 5E, Figure 5F, and Figure 5G. Specifically, the small freshwater lens to the north in Simulation 2 has been replaced by a thin brackish lens area, similar to the water quality observed currently in the harbour and Bahama Cement Co. property

south of Area 3. A smaller freshwater lens is simulated in this scenario to the south of the seismic buffer trench area. Its location and thickness are similar to that in Simulation 2 (Figures 5C and 5D). As illustrated in Figures 5E and 5F, the lens is approximately 1800 feet across (north to south), 6000 feet long (east to west), and between 10 and 15 feet thick.

4.0 DISCUSSION

A comparison of Figures 2H through 2P (freshwater lens in November and December 2007, and February 2008) with Figures 5C through 5F (modeled freshwater lens at one-half and full development of Area 4) shows the average expected reduction in the size and shape of the freshwater lens due to the development of Area 4. The potential impact to the properties with private wells can be seen by comparing Figure 2Q to Figure 5G. While groundwater would still be available to the private wells, the salinity (chloride content) would be expected to increase over the concentration currently found in their well water. As stated previously, it is important to recognize that the modeled delineations of the freshwater lens in the above simulations are representative of average conditions. There will be periods of time during any particular season or year when due to changes in precipitation rates, seasonal conditions (rainy vs dry), and climatic events (tropical storms or hurricanes), the size and shape (thickness and extent) of the freshwater lens will be smaller or larger than as measured in November and December 2007, February 2008, and as predicted by the model.

5.0 CONCLUSIONS

Based on the information and data obtained during the course of this water resources assessment and the modeled predictions based thereon, the following conclusions have been reached.

1. A freshwater lens exists in the study area the size and shape of which are dependent upon the hydrogeologic characteristics of the Lucayan Limestone Aquifer and the frequency, duration and intensity of precipitation events.
2. The configuration of the freshwater lens is and will continue to be in a more or less constant state of change, dynamic as opposed to steady state, due to frequency, duration and intensity of precipitation events.
3. The extent of the freshwater lens in the study area has decreased in size since 1975 due to expansion of the Freeport Harbour and development of Area 3.
4. Groundwater quality in Area 4 meets all applicable U.S. Environmental Protection Agency criteria with the exception of benzene in the sample from MW-4 (1.1 ug/L vs MCL of 1.0 ug/L), and chloride in the sample from MW-6 (330 ppm vs MCL of 250 ppm).
5. A private well survey conducted in the study area (settlements within the Eight Mile Rock community) revealed that there were twenty-three (23) properties dependent upon a private well for their water supply. An additional

eighteen (18) properties were connected to the GBUC municipal water supply system and also had private wells that were utilized for irrigation, washing, cleaning, bathing and emergencies only.

6. The development of Area 4 will result in a decrease in the configuration (size and shape) of the freshwater lens in the study area. As a result, some of the private wells within the settlements of the Eight Mile Rock community will experience an increase in the salinity (chloride concentration) of their groundwater supplies in comparison to current conditions.
7. The development of Area 4 will not result in an increase in the use of freshwater from the GBUC municipal water supply system by BRL.

TABLES

Table 1
Summary of Water Elevations
Water Resources Assesment
Area 4 Environmental Impact Assessment
Bahama Rock, Ltd.
Grand Bahama, Bahamas

	East	North	TOC Elevation	Depth of Well	Date	Time	Depth to Water	Water Elevation	Date	Time	Depth to Water	Water Elevation	Date	Time	Depth to Water	Water Elevation
MW-1	2,363,685.01	9,633,509.40	17.08	73.30	11/20/2007	10:35	15.78	1.30	11/22/2007	14:48	15.28	1.80	12/14/2007	11:13	14.23	2.85
MW-2	2,364,070.42	9,635,846.98	16.75	74.40	11/20/2007	11:02	15.09	1.66	11/22/2007	16:09	14.25	2.50	12/14/2007	11:19	13.67	3.08
MW-3	2,361,847.42	9,637,618.76	16.02	75.90	11/20/2007	11:08	14.37	1.65	11/22/2007	15:35	13.75	2.27	12/14/2007	11:30	13.01	3.01
MW-4	2,364,862.88	9,637,509.84	18.56	70.20	11/20/2007	9:22	16.85	1.71	11/22/2007	16:00	16.39	2.17	12/14/2007	11:24	15.79	2.77
MW-5	2,362,139.79	9,638,342.29	13.97	66.90	11/20/2007	11:19	12.32	1.65	11/22/2007	15:49	12.65	1.32	12/14/2007	11:32	11.03	2.94
MW-6	2,360,474.02	9,639,600.67	17.32	67.50	11/20/2007	9:42	15.6	1.72	11/22/2007	15:41	15.06	2.26	12/14/2007	11:36	14.43	2.89
MW-7	2,360,176.43	9,638,215.99	16.85	73.40	11/20/2007	8:13	14.75	2.10	11/22/2007	15:12	14.61	2.24	12/14/2007	12:10	13.76	3.09
MW-8	2,357,082.91	9,639,630.04	18.33	69.20	11/20/2007	7:42	16.33	2.00	11/23/2007	8:39	15.37	2.96	12/14/2007	10:52	15.29	3.04
MW-9	2,359,332.51	9,636,378.59	13.81	70.60	11/20/2007	8:26	11.78	2.03	11/22/2007	15:03	11.36	2.45	12/14/2007	11:09	10.26	3.55
MW-10	2,361,305.67	9,635,212.68	14.67	68.30	11/20/2007	8:38	12.96	1.71	11/22/2007	14:53	12.79	1.88	12/14/2007	11:08	11.89	2.78
Hawksbill Creek	2,361,243.79	9,639,819.21	2.82	NA	11/20/2007	11:52	NM		11/23/2007	9:03	NM		12/14/2007	11:50	1.49	1.33
Harbour	2,367,369.83	9,631,312.11	7.36	NA	11/20/2007	8:56	9.85	-2.49	11/22/2007	14:36	8.9	-1.54	12/14/2007	12:01	7.25	0.11

Table 2 (Page 1 of 24)
Summary of Water Levels during Tidal Cycles
Water Resources Assessment
Area 4 Environmental Impact Assessment
Bahama Rock, Ltd.
Grand Bahama, Bahamas

	Atmosphere	MW-1				MW-2				MW-3				MW-4				MW-5				MW-6			
Time, GMT-05:00	Absolute Pressure (psi)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)
11/20/2007 12:00	14.81	17.39	2.57	5.94	1.89	18.69	3.88	8.96	2.14	19.99	5.18	11.95	2.13	20.03	5.22	12.05	1.95	19.07	4.25	9.82	1.05	19.22	4.40	10.17	2.14
11/20/2007 12:05	14.81	17.40	2.59	5.98	1.93	18.70	3.89	8.99	2.17	20.00	5.19	11.99	2.17	20.04	5.23	12.08	1.98	19.08	4.27	9.87	1.10	19.22	4.41	10.19	2.16
11/20/2007 12:10	14.81	17.40	2.59	5.99	1.94	18.71	3.90	9.01	2.19	20.01	5.20	12.00	2.18	20.05	5.24	12.10	2.00	19.09	4.28	9.88	1.11	19.23	4.42	10.22	2.19
11/20/2007 12:15	14.81	17.41	2.60	6.01	1.96	18.72	3.91	9.03	2.21	20.02	5.21	12.04	2.22	20.05	5.24	12.11	2.01	19.10	4.29	9.90	1.13	19.24	4.43	10.23	2.20
11/20/2007 12:20	14.81	17.42	2.61	6.04	1.99	18.73	3.93	9.07	2.25	20.03	5.22	12.05	2.23	20.06	5.26	12.14	2.04	19.11	4.30	9.93	1.16	19.25	4.44	10.25	2.22
11/20/2007 12:25	14.81	17.43	2.62	6.06	2.01	18.74	3.94	9.09	2.27	20.04	5.23	12.08	2.26	20.06	5.26	12.14	2.04	19.11	4.31	9.95	1.18	19.25	4.45	10.27	2.24
11/20/2007 12:30	14.81	17.44	2.63	6.08	2.03	18.75	3.94	9.11	2.29	20.04	5.23	12.09	2.27	20.07	5.26	12.15	2.05	19.13	4.32	9.98	1.21	19.26	4.45	10.28	2.25
11/20/2007 12:35	14.80	17.45	2.65	6.13	2.08	18.76	3.96	9.14	2.32	20.05	5.25	12.13	2.31	20.07	5.28	12.18	2.08	19.13	4.33	10.01	1.24	19.26	4.46	10.31	2.28
11/20/2007 12:40	14.80	17.45	2.65	6.12	2.07	18.76	3.96	9.15	2.33	20.05	5.25	12.13	2.31	20.08	5.28	12.19	2.09	19.14	4.33	10.01	1.24	19.27	4.46	10.31	2.28
11/20/2007 12:45	14.80	17.46	2.66	6.15	2.10	18.78	3.98	9.19	2.37	20.06	5.27	12.17	2.35	20.09	5.29	12.22	2.12	19.14	4.34	10.03	1.26	19.27	4.47	10.33	2.30
11/20/2007 12:50	14.80	17.47	2.67	6.16	2.11	18.78	3.98	9.19	2.37	20.06	5.27	12.16	2.34	20.10	5.30	12.23	2.13	19.15	4.35	10.05	1.28	19.28	4.48	10.35	2.32
11/20/2007 12:55	14.80	17.48	2.68	6.20	2.15	18.79	3.99	9.22	2.40	20.07	5.28	12.18	2.36	20.10	5.30	12.23	2.13	19.16	4.36	10.06	1.29	19.28	4.49	10.36	2.33
11/20/2007 13:00	14.79	17.49	2.70	6.23	2.18	18.80	4.01	9.25	2.43	20.08	5.29	12.22	2.40	20.11	5.31	12.27	2.17	19.17	4.37	10.10	1.33	19.29	4.50	10.39	2.36
11/20/2007 13:05	14.79	17.50	2.70	6.24	2.19	18.81	4.02	9.27	2.45	20.09	5.30	12.24	2.42	20.11	5.32	12.28	2.18	19.17	4.38	10.12	1.35	19.29	4.50	10.39	2.36
11/20/2007 13:10	14.79	17.51	2.71	6.26	2.21	18.82	4.02	9.29	2.47	20.10	5.31	12.25	2.43	20.12	5.32	12.29	2.19	19.18	4.39	10.13	1.36	19.30	4.51	10.41	2.38
11/20/2007 13:15	14.80	17.51	2.72	6.28	2.23	18.83	4.03	9.31	2.49	20.10	5.31	12.26	2.44	20.12	5.32	12.30	2.20	19.19	4.39	10.15	1.38	19.31	4.51	10.42	2.39
11/20/2007 13:20	14.79	17.52	2.73	6.30	2.25	18.84	4.04	9.34	2.52	20.11	5.32	12.29	2.47	20.12	5.33	12.32	2.22	19.19	4.40	10.17	1.40	19.31	4.52	10.44	2.41
11/20/2007 13:25	14.79	17.53	2.75	6.34	2.29	18.84	4.05	9.36	2.54	20.12	5.33	12.31	2.49	20.13	5.35	12.35	2.25	19.20	4.42	10.20	1.43	19.32	4.53	10.46	2.43
11/20/2007 13:30	14.79	17.55	2.76	6.36	2.31	18.85	4.06	9.37	2.55	20.13	5.34	12.33	2.51	20.14	5.35	12.36	2.26	19.21	4.42	10.20	1.43	19.33	4.54	10.47	2.44
11/20/2007 13:35	14.79	17.56	2.76	6.38	2.33	18.86	4.07	9.39	2.57	20.14	5.35	12.35	2.53	20.15	5.36	12.37	2.27	19.22	4.43	10.22	1.45	19.34	4.54	10.49	2.46
11/20/2007 13:40	14.79	17.56	2.77	6.41	2.36	18.87	4.08	9.42	2.60	20.14	5.35	12.36	2.54	20.15	5.37	12.39	2.29	19.23	4.45	10.27	1.50	19.34	4.55	10.51	2.48
11/20/2007 13:45	14.79	17.57	2.78	6.42	2.37	18.88	4.08	9.43	2.61	20.15	5.36	12.37	2.55	20.16	5.37	12.40	2.30	19.23	4.44	10.26	1.49	19.35	4.55	10.52	2.49
11/20/2007 13:50	14.79	17.58	2.80	6.46	2.41	18.88	4.10	9.46	2.64	20.16	5.37	12.41	2.59	20.17	5.38	12.43	2.33	19.24	4.46	10.29	1.52	19.35	4.56	10.54	2.51
11/20/2007 13:55	14.79	17.59	2.80	6.48	2.43	18.89	4.10	9.48	2.66	20.16	5.37	12.41	2.59	20.17	5.38	12.43	2.33	19.25	4.46	10.29	1.52	19.36	4.56	10.54	2.51
11/20/2007 14:00	14.79	17.60	2.81	6.50	2.45	18.90	4.11	9.49	2.67	20.17	5.38	12.42	2.60	20.18	5.39	12.44	2.34	19.26	4.47	10.32	1.55	19.36	4.58	10.57	2.54
11/20/2007 14:05	14.79	17.61	2.82	6.52	2.47	18.91	4.12	9.52	2.70	20.18	5.40	12.47	2.65	20.18	5.39	12.45	2.35	19.27	4.48	10.35	1.58	19.37	4.59	10.60	2.57
11/20/2007 14:10	14.79	17.62	2.83	6.53	2.48	18.91	4.12	9.52	2.70	20.18	5.39	12.45	2.63	20.19	5.40	12.46	2.36	19.27	4.48	10.34	1.57	19.37	4.58	10.59	2.56
11/20/2007 14:15	14.79	17.62	2.83	6.53	2.48	18.92	4.12	9.52	2.70	20.19	5.40	12.46	2.64	20.20	5.40	12.48	2.38	19.28	4.48	10.35	1.58	19.38	4.59	10.59	2.56
11/20/2007 14:20	14.79	17.64	2.85	6.58	2.53	18.92	4.14	9.55	2.73	20.20	5.42	12.51	2.69	20.20	5.41	12.49	2.39	19.28	4.49	10.38	1.61	19.38	4.60	10.61	2.58
11/20/2007 14:25	14.79	17.64	2.85	6.58	2.53	18.93	4.14	9.56	2.74	20.20	5.41	12.49	2.67	20.21	5.41	12.50	2.40	19.29	4.50	10.39	1.62	19.39	4.60	10.62	2.59
11/20/2007 14:30	14.80	17.66	2.86	6.59	2.54	18.94	4.14	9.56	2.74	20.21	5.41	12.50	2.68	20.21	5.41	12.50	2.40	19.30	4.50	10.38	1.61	19.40	4.60	10.62	2.59
11/20/2007 14:35	14.79	17.66	2.87	6.62	2.57	18.95	4.15	9.59	2.77	20.22	5.43	12.53	2.71	20.22	5.43	12.54	2.44	19.31	4.51	10.42	1.65	19.41	4.61	10.66	2.63
11/20/2007 14:40	14.79	17.66	2.87	6.64	2.59	18.95	4.16	9.61	2.79	20.22	5.43	12.55	2.73	20.22	5.43	12.54	2.44	19.31	4.52	10.44	1.67	19.41	4.62	10.67	2.64
11/20/2007 14:45	14.79	17.67	2.88	6.66	2.61	18.96	4.17	9.63	2.81	20.23	5.44	12.57	2.75	20.23	5.44	12.56	2.46	19.32	4.52	10.45	1.68	19.42	4.62	10.68	2.65
11/20/2007 14:50	14.79	17.68	2.89	6.68	2.63	18.96	4.17	9.63	2.81	20.23	5.44	12.57	2.75	20.23	5.44	12.57	2.47	19.32	4.53	10.46	1.69	19.42	4.63	10.69	2.66
11/20/2007 14:55	14.79	17.69	2.89	6.68	2.63	18.97	4.18	9.64	2.82	20.24	5.45	12.58	2.76	20.24	5.45	12.58	2.48	19.33	4.54	10.48	1.71	19.43	4.63	10.70	2.67
11/20/2007 15:00	14.79	17.70	2.91	6.71	2.66	18.97	4.18	9.66	2.84	20.25	5.46	12.60	2.78	20.24	5.45	12.60	2.50	19.33	4.54	10.48	1.71	19.43	4.64	10.72	2.69
11/20/2007 15:05	14.79	17.70	2.91	6.73	2.68	18.98	4.19	9.68	2.86	20.25	5.46	12.62	2.80	20.25	5.47	12.62	2.52	19.34	4.55	10.51	1.74	19.44	4.65	10.73	2.70
11/20/2007 15:10	14.79	17.71	2.91	6.73	2.68	18.99	4.19	9.68	2.86	20.26	5.46	12.62	2.80	20.26	5.47	12.62	2.52	19.34	4.55	10.51	1.74	19.44	4.65	10.73	2.70
11/20/2007 15:15	14.80	17.71	2.91	6.72	2.67	18.99	4.19	9.68	2.86	20.26	5.46	12.61	2.79	20.26	5.46	12.62	2.52	19.35	4.55	10.51	1.74	19.45	4.64	10.73	2.70
11/20/2007 15:20	14.79	17.72	2.92	6.75	2.70	19.00	4.20	9.71	2.89	20.27	5.47	12.64	2.82	20.27	5.48	12.65	2.55	19.35	4.56	10.53	1.76	19.45	4.66	10.75	2.72
11/20/2007 15:25	14.79	17.72	2.93	6.77	2.72	19.00	4.21	9.72	2.90	20.28	5.49	12.67	2.85	20.27	5.48	12.66	2.56	19.35	4.56	10.54	1.77	19.45	4.66	10.76	2.73
11/20/2007 15:30	14.79	17.73	2.93	6.78	2.73	19.00	4.21	9.73	2.91	20.28	5.49	12.67	2.85	20.27	5.48	12.66	2.56	19.36	4.57	10.56	1.79	19.46	4.67	10.78	2.75
11/20/2007 15:35	14.79	17.73	2.94	6.79	2.74	19.01	4.22	9.74	2.92	20.28	5.49	12.68	2.86	20.28	5.49	12.68	2.58	19.36	4.57	10.56	1.79	19.46	4.67	10.78	2.75
11/20/2007 15:40	14.79	17.73	2.93	6.77	2.72	19.01	4.22	9.74	2.92	20.29	5.49	12.69	2.87	20.28	5.49	12.68	2.58	19.37	4.58	10.58	1.81	19.46	4.67	10.79	2.76
11/20/2007 15:45	14.79	17.74	2.95	6.80	2.75	19.01	4.22	9.74	2.92	20.29	5.49	12.68	2.86	20.29	5.49	12.69	2.59	19.37	4.58	10.58	1.81	19.46	4.67	10.78	2.75
11/20/2007 15:50	14.80	17.73	2.94	6.79	2.74	19.01	4.22	9.74	2.92	20.29	5.49	12.68	2.86	20.29	5.49	12.68	2.58	19.37	4.58	10.57	1.80	19.47	4.68	10.80	2.77
11/20/2007 15:55	14.79	17.74	2.95	6.81	2.76	19.02	4.22	9.76	2.94	20.29	5.50	12.70	2.88	20.29	5.50	12.70	2.60	19.38	4.58	10.59	1.82	19.47	4.68	10.80	2.77
11/20/2007 16:00	14.79	17.73	2.94	6.80	2.75	19.02	4.23	9.76	2.94	20.30	5.51	12.72	2.90	20.29	5.50	12.71	2.61	19.38	4.59	10.60	1.83	19.47	4.68	10.81	2.78
11/20/2007 16:05	14.79	17.74	2.95	6.80	2.75	19.02	4.22	9.75	2.93	20.30	5.50	12.71	2.89	20.30	5.50	12.71	2.61	19.38	4.58	10.59	1.82	19.47	4.68	10.81	2.78
11/20/2007 16:10	14.79	17.73	2.95	6.80	2.75	19.02	4.23	9.76	2.94	20.30	5.51	12.72	2.90	20.30	5.51	12.72	2.62	19.38	4.59	10.61	1.84	19.47	4.68	10.82	2.79
11/20/2007 16:15	14.79	17.74	2.95	6.81	2.76	19.03	4.23	9.77	2.95	20.30	5.51	12.72	2.90	20.30	5.51	12.72	2.62	19.38	4.59	10.60	1.83	19.48	4.68	10.82	2.79
11/20/2007 16:20	14.79	17.74	2.95	6.82	2.77	19.03	4.23	9.78	2.96	20.30	5.51	12.72	2.90	20.30	5.51	12.72	2.62	19.38	4.59	10.60	1.83	19.48	4.69	10.83	2.80
11/20/2007 16:25	14.79	17.74	2.95	6.80	2.75	19.02	4.23	9.76	2.94	20.30	5.50	12.71	2.89	20.30	5.51	12.72	2.62	19.39	4.59	10.61	1.84	19.48	4.68	10.82	2.79

Table 2 (Page 2 of 24)
Summary of Water Levels during Tidal Cycles
Water Resources Assessment
Area 4 Environmental Impact Assessment
Bahama Rock, Ltd.
Grand Bahama, Bahamas

	Atmosphere	MW-1				MW-2				MW-3				MW-4				MW-5				MW-6			
Time, GMT-05:00	Absolute Pressure (psi)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)
11/20/2007 16:30	14.79	17.74	2.95	6.81	2.76	19.02	4.23	9.77	2.95	20.30	5.51	12.72	2.90	20.31	5.52	12.75	2.65	19.38	4.59	10.60	1.83	19.48	4.69	10.83	2.80
11/20/2007 16:35	14.80	17.73	2.94	6.79	2.74	19.02	4.23	9.76	2.94	20.30	5.50	12.70	2.88	20.31	5.52	12.74	2.64	19.38	4.59	10.59	1.82	19.48	4.68	10.81	2.78
11/20/2007 16:40	14.80	17.73	2.93	6.78	2.73	19.02	4.22	9.75	2.93	20.30	5.50	12.71	2.89	20.31	5.51	12.73	2.63	19.38	4.58	10.59	1.82	19.48	4.68	10.82	2.79
11/20/2007 16:45	14.79	17.73	2.94	6.78	2.73	19.02	4.22	9.75	2.93	20.29	5.50	12.70	2.88	20.31	5.51	12.73	2.63	19.38	4.58	10.59	1.82	19.48	4.68	10.82	2.79
11/20/2007 16:50	14.79	17.73	2.94	6.78	2.73	19.02	4.22	9.76	2.94	20.30	5.50	12.71	2.89	20.31	5.51	12.73	2.63	19.38	4.59	10.60	1.83	19.48	4.68	10.82	2.79
11/20/2007 16:55	14.79	17.73	2.93	6.77	2.72	19.02	4.23	9.76	2.94	20.30	5.50	12.71	2.89	20.31	5.52	12.75	2.65	19.38	4.59	10.59	1.82	19.48	4.69	10.82	2.79
11/20/2007 17:00	14.79	17.72	2.92	6.75	2.70	19.02	4.23	9.76	2.94	20.29	5.50	12.70	2.88	20.31	5.52	12.75	2.65	19.38	4.59	10.59	1.82	19.48	4.69	10.82	2.79
11/20/2007 17:05	14.79	17.72	2.92	6.75	2.70	19.01	4.22	9.74	2.92	20.28	5.49	12.68	2.86	20.31	5.52	12.74	2.64	19.37	4.58	10.58	1.81	19.48	4.69	10.82	2.79
11/20/2007 17:10	14.79	17.70	2.92	6.74	2.69	19.00	4.22	9.74	2.92	20.28	5.50	12.69	2.87	20.30	5.52	12.74	2.64	19.37	4.58	10.58	1.81	19.47	4.68	10.82	2.79
11/20/2007 17:15	14.79	17.70	2.90	6.70	2.65	19.00	4.21	9.71	2.89	20.27	5.48	12.65	2.83	20.30	5.51	12.72	2.62	19.36	4.57	10.55	1.78	19.46	4.67	10.78	2.75
11/20/2007 17:20	14.79	17.69	2.90	6.71	2.66	19.00	4.21	9.73	2.91	20.27	5.48	12.66	2.84	20.30	5.51	12.73	2.63	19.36	4.58	10.57	1.80	19.46	4.68	10.80	2.77
11/20/2007 17:25	14.79	17.68	2.90	6.69	2.64	18.99	4.20	9.71	2.89	20.27	5.48	12.65	2.83	20.30	5.51	12.73	2.63	19.36	4.57	10.56	1.79	19.46	4.67	10.79	2.76
11/20/2007 17:30	14.79	17.67	2.88	6.65	2.60	18.98	4.19	9.68	2.86	20.26	5.47	12.63	2.81	20.30	5.50	12.71	2.61	19.35	4.56	10.52	1.75	19.45	4.66	10.77	2.74
11/20/2007 17:35	14.79	17.66	2.87	6.63	2.58	18.98	4.19	9.67	2.85	20.26	5.47	12.62	2.80	20.29	5.50	12.70	2.60	19.34	4.55	10.50	1.73	19.45	4.66	10.76	2.73
11/20/2007 17:40	14.79	17.65	2.86	6.60	2.55	18.97	4.18	9.65	2.83	20.24	5.45	12.59	2.77	20.28	5.49	12.68	2.58	19.34	4.54	10.49	1.72	19.45	4.65	10.75	2.72
11/20/2007 17:45	14.79	17.64	2.85	6.57	2.52	18.96	4.16	9.62	2.80	20.23	5.44	12.57	2.75	20.28	5.49	12.67	2.57	19.33	4.54	10.48	1.71	19.44	4.64	10.73	2.70
11/20/2007 17:50	14.79	17.63	2.84	6.55	2.50	18.95	4.16	9.60	2.78	20.23	5.44	12.56	2.74	20.27	5.48	12.66	2.56	19.32	4.53	10.46	1.69	19.43	4.64	10.72	2.69
11/20/2007 17:55	14.79	17.62	2.83	6.54	2.49	18.94	4.15	9.59	2.77	20.22	5.43	12.54	2.72	20.27	5.48	12.65	2.55	19.31	4.52	10.44	1.67	19.42	4.63	10.70	2.67
11/20/2007 18:00	14.79	17.61	2.81	6.50	2.45	18.93	4.13	9.55	2.73	20.21	5.41	12.50	2.68	20.26	5.46	12.62	2.52	19.30	4.51	10.41	1.64	19.42	4.62	10.68	2.65
11/20/2007 18:05	14.79	17.59	2.80	6.47	2.42	18.92	4.12	9.52	2.70	20.19	5.40	12.47	2.65	20.25	5.46	12.60	2.50	19.29	4.50	10.39	1.62	19.40	4.61	10.64	2.61
11/20/2007 18:10	14.79	17.58	2.79	6.44	2.39	18.90	4.11	9.49	2.67	20.19	5.39	12.46	2.64	20.24	5.45	12.58	2.48	19.28	4.48	10.35	1.58	19.40	4.60	10.63	2.60
11/20/2007 18:15	14.79	17.57	2.78	6.41	2.36	18.89	4.10	9.46	2.64	20.18	5.39	12.44	2.62	20.23	5.44	12.57	2.47	19.27	4.48	10.34	1.57	19.39	4.60	10.61	2.58
11/20/2007 18:20	14.79	17.56	2.76	6.38	2.33	18.88	4.08	9.43	2.61	20.16	5.37	12.40	2.58	20.23	5.43	12.55	2.45	19.26	4.46	10.31	1.54	19.37	4.58	10.58	2.55
11/20/2007 18:25	14.80	17.54	2.75	6.34	2.29	18.87	4.07	9.40	2.58	20.15	5.36	12.37	2.55	20.22	5.42	12.51	2.41	19.25	4.45	10.28	1.51	19.37	4.57	10.56	2.53
11/20/2007 18:30	14.80	17.53	2.74	6.32	2.27	18.85	4.06	9.37	2.55	20.14	5.35	12.35	2.53	20.21	5.41	12.50	2.40	19.24	4.45	10.27	1.50	19.36	4.57	10.55	2.52
11/20/2007 18:35	14.80	17.52	2.73	6.30	2.25	18.85	4.05	9.36	2.54	20.14	5.34	12.34	2.52	20.21	5.41	12.49	2.39	19.23	4.44	10.25	1.48	19.36	4.56	10.53	2.50
11/20/2007 18:40	14.80	17.51	2.71	6.27	2.22	18.84	4.04	9.33	2.51	20.12	5.33	12.30	2.48	20.20	5.40	12.47	2.37	19.22	4.43	10.22	1.45	19.35	4.55	10.51	2.48
11/20/2007 18:45	14.80	17.50	2.70	6.23	2.18	18.82	4.02	9.29	2.47	20.11	5.31	12.27	2.45	20.19	5.39	12.45	2.35	19.22	4.42	10.20	1.43	19.35	4.54	10.50	2.47
11/20/2007 18:50	14.80	17.49	2.69	6.21	2.16	18.81	4.01	9.26	2.44	20.10	5.30	12.25	2.43	20.18	5.38	12.43	2.33	19.21	4.41	10.18	1.41	19.33	4.53	10.46	2.43
11/20/2007 18:55	14.80	17.48	2.68	6.18	2.13	18.80	4.00	9.24	2.42	20.09	5.29	12.22	2.40	20.17	5.37	12.41	2.31	19.20	4.40	10.16	1.39	19.32	4.52	10.44	2.41
11/20/2007 19:00	14.81	17.46	2.66	6.14	2.09	18.79	3.99	9.20	2.38	20.08	5.28	12.19	2.37	20.17	5.36	12.38	2.28	19.19	4.38	10.12	1.35	19.32	4.51	10.42	2.39
11/20/2007 19:05	14.81	17.45	2.64	6.10	2.05	18.78	3.97	9.17	2.35	20.07	5.27	12.17	2.35	20.16	5.35	12.36	2.26	19.18	4.37	10.10	1.33	19.30	4.50	10.39	2.36
11/20/2007 19:10	14.81	17.43	2.63	6.07	2.02	18.77	3.96	9.15	2.33	20.06	5.25	12.14	2.32	20.15	5.35	12.35	2.25	19.17	4.36	10.08	1.31	19.30	4.49	10.38	2.35
11/20/2007 19:15	14.80	17.42	2.62	6.04	1.99	18.76	3.95	9.12	2.30	20.05	5.25	12.11	2.29	20.14	5.34	12.33	2.23	19.16	4.35	10.05	1.28	19.28	4.48	10.35	2.32
11/20/2007 19:20	14.80	17.41	2.60	6.01	1.96	18.75	3.94	9.10	2.28	20.04	5.23	12.08	2.26	20.13	5.33	12.31	2.21	19.15	4.34	10.03	1.26	19.28	4.47	10.33	2.30
11/20/2007 19:25	14.81	17.39	2.58	5.97	1.92	18.73	3.92	9.06	2.24	20.03	5.22	12.05	2.23	20.13	5.32	12.29	2.19	19.14	4.33	9.99	1.22	19.27	4.46	10.30	2.27
11/20/2007 19:30	14.81	17.38	2.57	5.94	1.89	18.72	3.91	9.03	2.21	20.02	5.21	12.02	2.20	20.12	5.31	12.25	2.15	19.13	4.32	9.97	1.20	19.26	4.45	10.27	2.24
11/20/2007 19:35	14.81	17.37	2.56	5.91	1.86	18.71	3.90	9.01	2.19	20.00	5.19	11.99	2.17	20.11	5.30	12.23	2.13	19.11	4.30	9.94	1.17	19.25	4.44	10.26	2.23
11/20/2007 19:40	14.81	17.35	2.54	5.87	1.82	18.69	3.88	8.97	2.15	19.99	5.18	11.97	2.15	20.10	5.29	12.21	2.11	19.11	4.30	9.93	1.16	19.24	4.43	10.23	2.20
11/20/2007 19:45	14.81	17.34	2.53	5.84	1.79	18.68	3.87	8.94	2.12	19.98	5.17	11.93	2.11	20.08	5.27	12.18	2.08	19.09	4.28	9.89	1.12	19.22	4.41	10.19	2.16
11/20/2007 19:50	14.81	17.32	2.51	5.81	1.76	18.67	3.86	8.92	2.10	19.97	5.16	11.91	2.09	20.07	5.26	12.16	2.06	19.08	4.27	9.87	1.10	19.21	4.40	10.17	2.14
11/20/2007 19:55	14.81	17.31	2.50	5.77	1.72	18.66	3.85	8.89	2.07	19.95	5.14	11.88	2.06	20.06	5.25	12.13	2.03	19.07	4.26	9.84	1.07	19.20	4.40	10.15	2.12
11/20/2007 20:00	14.81	17.29	2.49	5.74	1.69	18.65	3.84	8.87	2.05	19.94	5.13	11.84	2.02	20.05	5.24	12.11	2.01	19.06	4.25	9.82	1.05	19.19	4.39	10.13	2.10
11/20/2007 20:05	14.81	17.28	2.47	5.71	1.66	18.63	3.82	8.83	2.01	19.93	5.12	11.82	2.00	20.04	5.23	12.08	1.98	19.05	4.24	9.79	1.02	19.18	4.37	10.10	2.07
11/20/2007 20:10	14.81	17.27	2.45	5.67	1.62	18.62	3.81	8.80	1.98	19.92	5.10	11.79	1.97	20.03	5.22	12.05	1.95	19.03	4.22	9.75	0.98	19.17	4.36	10.06	2.03
11/20/2007 20:15	14.81	17.25	2.44	5.64	1.59	18.60	3.80	8.77	1.95	19.90	5.09	11.76	1.94	20.02	5.21	12.04	1.94	19.02	4.22	9.74	0.97	19.16	4.35	10.05	2.02
11/20/2007 20:20	14.81	17.24	2.43	5.60	1.55	18.59	3.78	8.72	1.90	19.89	5.08	11.73	1.91	20.01	5.20	12.00	1.90	19.01	4.20	9.69	0.92	19.15	4.34	10.02	1.99
11/20/2007 20:25	14.81	17.23	2.42	5.59	1.54	18.58	3.77	8.72	1.90	19.88	5.07	11.71	1.89	20.00	5.19	11.99	1.89	19.00	4.19	9.68	0.91	19.14	4.33	10.01	1.98
11/20/2007 20:30	14.81	17.21	2.40	5.54	1.49	18.57	3.76	8.68	1.86	19.87	5.06	11.69	1.87	19.99	5.18	11.96	1.86	18.99	4.18	9.65	0.88	19.13	4.32	9.98	1.95
11/20/2007 20:35	14.81	17.20	2.39	5.52	1.47	18.56	3.75	8.65	1.83	19.86	5.05	11.65	1.83	19.98	5.17	11.94	1.84	18.98	4.17	9.63	0.86	19.12	4.31	9.96	1.93
11/20/2007 20:40	14.81	17.20	2.38	5.51	1.46	18.55	3.74	8.63	1.81	19.85	5.04	11.63	1.81	19.97	5.16	11.92	1.82	18.97	4.16	9.61	0.84	19.11	4.30	9.94	1.91
11/20/2007 20:45	14.81	17.18	2.37	5.46	1.41	18.54	3.73	8.61	1.79	19.84	5.03	11.61	1.79	19.97	5.15	11.91	1.81	18.96	4.14	9.57	0.80	19.10	4.29	9.90	1.87
11/20/2007 20:50	14.81	17.17	2.36	5.44	1.39	18.53	3.72	8.59	1.77	19.83	5.02	11.58	1.76	19.95	5.14	11.87	1.77	18.95	4.14	9.56	0.79	19.09	4.28	9.89	1.86
11/20/2007 20:55	14.81	17.16	2.35	5.42	1.37	18.52	3.71	8.56	1.74	19.82	5.01	11.57	1.75	19.94	5.13	11.85	1.75	18.94	4.13	9.54	0.77	19.09	4.28	9.88	1.85

Table 2 (Page 3 of 24)
Summary of Water Levels during Tidal Cycles
Water Resources Assessment
Area 4 Environmental Impact Assessment
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Grand Bahama, Bahamas

	Atmosphere	MW-1				MW-2				MW-3				MW-4				MW-5				MW-6			
Time, GMT-05:00	Absolute Pressure (psi)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)
11/20/2007 21:00	14.81	17.14	2.33	5.39	1.34	18.51	3.70	8.54	1.72	19.81	5.00	11.55	1.73	19.94	5.13	11.84	1.74	18.93	4.12	9.52	0.75	19.08	4.26	9.85	1.82
11/20/2007 21:05	14.81	17.14	2.33	5.39	1.34	18.50	3.69	8.52	1.70	19.81	5.00	11.54	1.72	19.93	5.12	11.82	1.72	18.92	4.11	9.49	0.72	19.07	4.26	9.84	1.81
11/20/2007 21:10	14.81	17.13	2.32	5.37	1.32	18.49	3.68	8.50	1.68	19.80	4.99	11.52	1.70	19.92	5.11	11.80	1.70	18.92	4.11	9.48	0.71	19.06	4.25	9.82	1.79
11/20/2007 21:15	14.81	17.13	2.31	5.34	1.29	18.48	3.67	8.48	1.66	19.79	4.98	11.49	1.67	19.91	5.10	11.78	1.68	18.91	4.10	9.46	0.69	19.05	4.24	9.79	1.76
11/20/2007 21:20	14.81	17.12	2.31	5.32	1.27	18.47	3.66	8.46	1.64	19.78	4.97	11.48	1.66	19.90	5.09	11.76	1.66	18.90	4.09	9.44	0.67	19.05	4.24	9.78	1.75
11/20/2007 21:25	14.81	17.11	2.30	5.31	1.26	18.47	3.66	8.45	1.63	19.77	4.96	11.46	1.64	19.89	5.08	11.74	1.64	18.89	4.08	9.43	0.66	19.04	4.23	9.76	1.73
11/20/2007 21:30	14.82	17.10	2.29	5.28	1.23	18.46	3.65	8.42	1.60	19.77	4.95	11.44	1.62	19.89	5.07	11.71	1.61	18.88	4.07	9.40	0.63	19.03	4.22	9.74	1.71
11/20/2007 21:35	14.82	17.10	2.29	5.28	1.23	18.45	3.64	8.40	1.58	19.76	4.94	11.42	1.60	19.88	5.07	11.70	1.60	18.88	4.06	9.38	0.61	19.03	4.21	9.73	1.70
11/20/2007 21:40	14.81	17.09	2.28	5.27	1.22	18.45	3.64	8.41	1.59	19.76	4.95	11.43	1.61	19.88	5.07	11.70	1.60	18.87	4.06	9.39	0.62	19.02	4.21	9.72	1.69
11/20/2007 21:45	14.81	17.09	2.27	5.25	1.20	18.45	3.63	8.39	1.57	19.75	4.94	11.41	1.59	19.87	5.05	11.67	1.57	18.87	4.05	9.36	0.59	19.01	4.20	9.70	1.67
11/20/2007 21:50	14.81	17.08	2.27	5.24	1.19	18.44	3.62	8.37	1.55	19.74	4.93	11.38	1.56	19.86	5.05	11.66	1.56	18.86	4.05	9.34	0.57	19.00	4.19	9.68	1.65
11/20/2007 21:55	14.81	17.07	2.26	5.22	1.17	18.43	3.62	8.36	1.54	19.74	4.92	11.37	1.55	19.85	5.04	11.63	1.53	18.85	4.04	9.33	0.56	19.00	4.19	9.68	1.65
11/20/2007 22:00	14.81	17.07	2.26	5.23	1.18	18.43	3.62	8.36	1.54	19.73	4.92	11.37	1.55	19.85	5.04	11.63	1.53	18.85	4.04	9.33	0.56	19.00	4.19	9.68	1.65
11/20/2007 22:05	14.81	17.07	2.26	5.23	1.18	18.43	3.62	8.35	1.53	19.73	4.92	11.37	1.55	19.85	5.04	11.63	1.53	18.85	4.04	9.33	0.56	19.00	4.19	9.67	1.64
11/20/2007 22:10	14.81	17.07	2.26	5.22	1.17	18.43	3.61	8.34	1.52	19.73	4.92	11.36	1.54	19.84	5.03	11.61	1.51	18.84	4.03	9.30	0.53	18.99	4.18	9.65	1.62
11/20/2007 22:15	14.81	17.07	2.26	5.22	1.17	18.42	3.61	8.33	1.51	19.72	4.91	11.34	1.52	19.84	5.02	11.60	1.50	18.84	4.03	9.30	0.53	18.99	4.18	9.65	1.62
11/20/2007 22:20	14.81	17.07	2.26	5.22	1.17	18.43	3.61	8.34	1.52	19.73	4.92	11.35	1.53	19.83	5.02	11.59	1.49	18.84	4.03	9.30	0.53	18.99	4.17	9.64	1.61
11/20/2007 22:25	14.81	17.07	2.26	5.21	1.16	18.42	3.61	8.33	1.51	19.72	4.91	11.34	1.52	19.83	5.01	11.58	1.48	18.84	4.02	9.29	0.52	18.99	4.17	9.64	1.61
11/20/2007 22:30	14.82	17.07	2.26	5.21	1.16	18.42	3.60	8.31	1.49	19.72	4.90	11.32	1.50	19.83	5.01	11.57	1.47	18.84	4.02	9.28	0.51	18.98	4.16	9.62	1.59
11/20/2007 22:35	14.82	17.07	2.26	5.21	1.16	18.42	3.60	8.31	1.49	19.72	4.91	11.33	1.51	19.82	5.01	11.56	1.46	18.83	4.01	9.27	0.50	18.98	4.16	9.62	1.59
11/20/2007 22:40	14.82	17.08	2.26	5.22	1.17	18.42	3.60	8.32	1.50	19.72	4.91	11.33	1.51	19.83	5.01	11.57	1.47	18.84	4.02	9.28	0.51	18.98	4.16	9.61	1.58
11/20/2007 22:45	14.82	17.08	2.27	5.23	1.18	18.42	3.60	8.31	1.49	19.72	4.91	11.33	1.51	19.82	5.01	11.56	1.46	18.84	4.02	9.28	0.51	18.98	4.16	9.61	1.58
11/20/2007 22:50	14.82	17.09	2.27	5.24	1.19	18.42	3.60	8.32	1.50	19.72	4.91	11.33	1.51	19.82	5.00	11.55	1.45	18.84	4.02	9.28	0.51	18.98	4.16	9.61	1.58
11/20/2007 22:55	14.82	17.09	2.27	5.25	1.20	18.42	3.60	8.31	1.49	19.72	4.90	11.32	1.50	19.82	5.01	11.56	1.46	18.84	4.02	9.28	0.51	18.98	4.16	9.61	1.58
11/20/2007 23:00	14.82	17.09	2.27	5.25	1.20	18.42	3.60	8.31	1.49	19.73	4.91	11.33	1.51	19.82	5.00	11.55	1.45	18.84	4.01	9.27	0.50	18.98	4.16	9.60	1.57
11/20/2007 23:05	14.82	17.10	2.29	5.28	1.23	18.43	3.61	8.34	1.52	19.72	4.91	11.34	1.52	19.82	5.01	11.56	1.46	18.84	4.02	9.29	0.52	18.98	4.17	9.62	1.59
11/20/2007 23:10	14.82	17.11	2.29	5.29	1.24	18.43	3.61	8.35	1.53	19.73	4.91	11.35	1.53	19.82	5.00	11.55	1.45	18.84	4.02	9.29	0.52	18.98	4.17	9.62	1.59
11/20/2007 23:15	14.82	17.11	2.30	5.30	1.25	18.43	3.61	8.35	1.53	19.73	4.92	11.36	1.54	19.82	5.01	11.56	1.46	18.84	4.02	9.29	0.52	18.98	4.17	9.62	1.59
11/20/2007 23:20	14.82	17.12	2.30	5.31	1.26	18.44	3.62	8.37	1.55	19.73	4.92	11.36	1.54	19.82	5.01	11.56	1.46	18.84	4.03	9.31	0.54	18.98	4.17	9.62	1.59
11/20/2007 23:25	14.82	17.13	2.31	5.33	1.28	18.44	3.63	8.38	1.56	19.74	4.92	11.37	1.55	19.82	5.01	11.56	1.46	18.85	4.03	9.32	0.55	18.99	4.17	9.63	1.60
11/20/2007 23:30	14.82	17.13	2.32	5.36	1.31	18.45	3.64	8.40	1.58	19.74	4.93	11.38	1.56	19.82	5.01	11.56	1.46	18.85	4.04	9.33	0.56	18.99	4.18	9.64	1.61
11/20/2007 23:35	14.82	17.14	2.33	5.38	1.33	18.45	3.64	8.40	1.58	19.75	4.93	11.39	1.57	19.83	5.01	11.58	1.48	18.86	4.04	9.34	0.57	19.00	4.18	9.65	1.62
11/20/2007 23:40	14.81	17.15	2.34	5.41	1.36	18.46	3.65	8.43	1.61	19.76	4.95	11.43	1.61	19.83	5.02	11.59	1.49	18.86	4.05	9.36	0.59	19.00	4.19	9.67	1.64
11/20/2007 23:45	14.81	17.17	2.36	5.46	1.41	18.47	3.67	8.47	1.65	19.76	4.96	11.45	1.63	19.84	5.03	11.62	1.52	18.87	4.06	9.39	0.62	19.00	4.19	9.69	1.66
11/20/2007 23:50	14.81	17.18	2.37	5.46	1.41	18.48	3.67	8.47	1.65	19.77	4.96	11.46	1.64	19.84	5.03	11.62	1.52	18.88	4.07	9.40	0.63	19.00	4.19	9.68	1.65
11/20/2007 23:55	14.81	17.19	2.39	5.51	1.46	18.49	3.68	8.50	1.68	19.78	4.98	11.50	1.68	19.85	5.04	11.64	1.54	18.88	4.08	9.42	0.65	19.01	4.21	9.72	1.69
11/21/2007 0:00	14.81	17.20	2.39	5.52	1.47	18.49	3.68	8.50	1.68	19.78	4.97	11.48	1.66	19.85	5.04	11.64	1.54	18.89	4.08	9.43	0.66	19.02	4.21	9.72	1.69
11/21/2007 0:05	14.81	17.21	2.40	5.55	1.50	18.51	3.70	8.55	1.73	19.80	4.99	11.53	1.71	19.86	5.05	11.67	1.57	18.90	4.09	9.45	0.68	19.03	4.22	9.75	1.72
11/21/2007 0:10	14.81	17.22	2.42	5.58	1.53	18.52	3.71	8.58	1.76	19.81	5.00	11.55	1.73	19.87	5.06	11.69	1.59	18.91	4.10	9.47	0.70	19.04	4.23	9.77	1.74
11/21/2007 0:15	14.81	17.24	2.44	5.63	1.58	18.53	3.73	8.61	1.79	19.82	5.02	11.59	1.77	19.88	5.07	11.71	1.61	18.92	4.12	9.51	0.74	19.05	4.24	9.80	1.77
11/21/2007 0:20	14.81	17.25	2.45	5.65	1.60	18.55	3.74	8.64	1.82	19.83	5.02	11.60	1.78	19.88	5.07	11.72	1.62	18.94	4.13	9.54	0.77	19.06	4.25	9.82	1.79
11/21/2007 0:25	14.81	17.27	2.46	5.68	1.63	18.56	3.75	8.67	1.85	19.84	5.04	11.63	1.81	19.89	5.09	11.75	1.65	18.95	4.14	9.56	0.79	19.07	4.26	9.84	1.81
11/21/2007 0:30	14.81	17.28	2.47	5.70	1.65	18.57	3.77	8.70	1.88	19.85	5.05	11.66	1.84	19.90	5.10	11.78	1.68	18.96	4.16	9.60	0.83	19.08	4.27	9.86	1.83
11/21/2007 0:35	14.81	17.29	2.49	5.75	1.70	18.59	3.78	8.73	1.91	19.86	5.06	11.68	1.86	19.91	5.10	11.79	1.69	18.97	4.17	9.62	0.85	19.09	4.28	9.88	1.85
11/21/2007 0:40	14.81	17.30	2.49	5.76	1.71	18.60	3.79	8.76	1.94	19.88	5.07	11.71	1.89	19.92	5.12	11.82	1.72	18.98	4.18	9.64	0.87	19.10	4.29	9.92	1.89
11/21/2007 0:45	14.80	17.32	2.52	5.81	1.76	18.62	3.82	8.81	1.99	19.89	5.09	11.76	1.94	19.93	5.13	11.85	1.75	19.00	4.19	9.69	0.92	19.10	4.30	9.94	1.91
11/21/2007 0:50	14.81	17.33	2.53	5.83	1.78	18.63	3.82	8.82	2.00	19.90	5.10	11.77	1.95	19.94	5.14	11.86	1.76	19.01	4.20	9.71	0.94	19.12	4.31	9.96	1.93
11/21/2007 0:55	14.80	17.34	2.54	5.87	1.82	18.64	3.84	8.88	2.06	19.91	5.11	11.80	1.98	19.96	5.16	11.91	1.81	19.02	4.22	9.75	0.98	19.13	4.33	10.00	1.97
11/21/2007 1:00	14.81	17.36	2.55	5.89	1.84	18.65	3.85	8.88	2.06	19.93	5.12	11.83	2.01	19.97	5.16	11.92	1.82	19.03	4.23	9.77	1.00	19.14	4.34	10.02	1.99
11/21/2007 1:05	14.80	17.36	2.56	5.92	1.87	18.67	3.87	8.93	2.11	19.94	5.14	11.86	2.04	19.98	5.18	11.95	1.85	19.04	4.24	9.80	1.03	19.15	4.35	10.05	2.02
11/21/2007 1:10	14.80	17.38	2.58	5.95	1.90	18.68	3.88	8.96	2.14	19.95	5.15	11.88	2.06	19.99	5.19	11.98	1.88	19.06	4.26	9.83	1.06	19.17	4.37	10.08	2.05
11/21/2007 1:15	14.80	17.40	2.60	6.00	1.95	18.69	3.89	8.99	2.17	19.96	5.16	11.92	2.10	20.00	5.19	12.00	1.90	19.07	4.27	9.86	1.09	19.18	4.37	10.10	2.07
11/21/2007 1:20	14.80	17.41	2.61	6.03	1.98	18.71	3.91	9.02	2.20	19.97	5.17	11.94	2.12	20.01	5.20	12.02	1.92	19.08	4.28	9.88	1.11	19.18	4.38	10.13	2.10
11/21/2007 1:25	14.80	17.42	2.62	6.05	2.00	18.72	3.92	9.05	2.23	19.99	5.19	11.98	2.16	20.01	5.21	12.04	1.94	19.09	4.29	9.91	1.14	19.20	4.40	10.16	2.13

Table 2 (Page 4 of 24)
Summary of Water Levels during Tidal Cycles
Water Resources Assessment
Area 4 Environmental Impact Assessment
Bahama Rock, Ltd.
Grand Bahama, Bahamas

	Atmosphere	MW-1				MW-2				MW-3				MW-4				MW-5				MW-6			
Time, GMT-05:00	Absolute Pressure (psi)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)
11/21/2007 1:30	14.80	17.43	2.63	6.08	2.03	18.73	3.93	9.08	2.26	20.00	5.20	12.00	2.18	20.03	5.23	12.08	1.98	19.10	4.30	9.94	1.17	19.21	4.41	10.18	2.15
11/21/2007 1:35	14.80	17.45	2.64	6.11	2.06	18.75	3.94	9.10	2.28	20.01	5.20	12.01	2.19	20.03	5.23	12.08	1.98	19.12	4.31	9.96	1.19	19.22	4.41	10.19	2.16
11/21/2007 1:40	14.80	17.46	2.66	6.15	2.10	18.76	3.96	9.15	2.33	20.02	5.22	12.06	2.24	20.05	5.25	12.12	2.02	19.13	4.33	9.99	1.22	19.23	4.43	10.24	2.21
11/21/2007 1:45	14.80	17.48	2.68	6.18	2.13	18.77	3.97	9.17	2.35	20.04	5.24	12.09	2.27	20.06	5.26	12.14	2.04	19.14	4.34	10.02	1.25	19.24	4.44	10.26	2.23
11/21/2007 1:50	14.80	17.49	2.69	6.22	2.17	18.78	3.98	9.20	2.38	20.04	5.25	12.11	2.29	20.07	5.27	12.17	2.07	19.15	4.35	10.05	1.28	19.26	4.46	10.29	2.26
11/21/2007 1:55	14.80	17.51	2.71	6.25	2.20	18.79	3.99	9.21	2.39	20.05	5.25	12.13	2.31	20.08	5.27	12.18	2.08	19.16	4.36	10.06	1.29	19.27	4.46	10.30	2.27
11/21/2007 2:00	14.80	17.52	2.72	6.27	2.22	18.80	4.00	9.24	2.42	20.07	5.27	12.16	2.34	20.09	5.28	12.20	2.10	19.17	4.37	10.08	1.31	19.27	4.47	10.32	2.29
11/21/2007 2:05	14.80	17.53	2.73	6.29	2.24	18.82	4.01	9.27	2.45	20.08	5.28	12.19	2.37	20.09	5.29	12.21	2.11	19.18	4.38	10.11	1.34	19.28	4.48	10.35	2.32
11/21/2007 2:10	14.80	17.55	2.74	6.34	2.29	18.83	4.02	9.29	2.47	20.09	5.29	12.21	2.39	20.10	5.30	12.24	2.14	19.19	4.39	10.14	1.37	19.29	4.49	10.37	2.34
11/21/2007 2:15	14.80	17.55	2.75	6.35	2.30	18.84	4.04	9.32	2.50	20.10	5.30	12.23	2.41	20.11	5.31	12.26	2.16	19.20	4.40	10.16	1.39	19.30	4.50	10.39	2.36
11/21/2007 2:20	14.80	17.58	2.77	6.40	2.35	18.85	4.05	9.34	2.52	20.11	5.31	12.27	2.45	20.12	5.32	12.29	2.19	19.21	4.41	10.19	1.42	19.31	4.51	10.42	2.39
11/21/2007 2:25	14.80	17.59	2.79	6.44	2.39	18.86	4.06	9.37	2.55	20.13	5.33	12.30	2.48	20.13	5.33	12.31	2.21	19.23	4.43	10.22	1.45	19.32	4.52	10.44	2.41
11/21/2007 2:30	14.80	17.60	2.80	6.46	2.41	18.87	4.07	9.40	2.58	20.14	5.34	12.33	2.51	20.14	5.34	12.34	2.24	19.24	4.44	10.24	1.47	19.34	4.53	10.47	2.44
11/21/2007 2:35	14.81	17.62	2.81	6.49	2.44	18.88	4.07	9.41	2.59	20.15	5.34	12.34	2.52	20.15	5.35	12.35	2.25	19.25	4.44	10.25	1.48	19.34	4.53	10.47	2.44
11/21/2007 2:40	14.80	17.63	2.82	6.52	2.47	18.89	4.09	9.44	2.62	20.16	5.36	12.37	2.55	20.16	5.36	12.37	2.27	19.26	4.45	10.29	1.52	19.35	4.55	10.50	2.47
11/21/2007 2:45	14.80	17.64	2.84	6.56	2.51	18.90	4.10	9.47	2.65	20.17	5.37	12.39	2.57	20.17	5.37	12.39	2.29	19.27	4.47	10.31	1.54	19.36	4.56	10.53	2.50
11/21/2007 2:50	14.80	17.66	2.85	6.59	2.54	18.92	4.11	9.50	2.68	20.18	5.38	12.42	2.60	20.18	5.38	12.43	2.33	19.28	4.48	10.35	1.58	19.37	4.57	10.56	2.53
11/21/2007 2:55	14.80	17.67	2.87	6.63	2.58	18.93	4.13	9.53	2.71	20.19	5.39	12.45	2.63	20.19	5.39	12.45	2.35	19.29	4.49	10.36	1.59	19.38	4.58	10.57	2.54
11/21/2007 3:00	14.80	17.68	2.88	6.64	2.59	18.93	4.13	9.54	2.72	20.20	5.40	12.47	2.65	20.20	5.40	12.46	2.36	19.30	4.49	10.38	1.61	19.39	4.59	10.59	2.56
11/21/2007 3:05	14.81	17.69	2.88	6.66	2.61	18.94	4.14	9.55	2.73	20.21	5.40	12.47	2.65	20.20	5.40	12.46	2.36	19.31	4.50	10.39	1.62	19.40	4.59	10.60	2.57
11/21/2007 3:10	14.80	17.69	2.89	6.68	2.63	18.95	4.15	9.58	2.76	20.22	5.42	12.52	2.70	20.21	5.41	12.49	2.39	19.31	4.51	10.41	1.64	19.40	4.60	10.63	2.60
11/21/2007 3:15	14.80	17.71	2.91	6.72	2.67	18.96	4.16	9.61	2.79	20.23	5.43	12.53	2.71	20.23	5.42	12.53	2.43	19.33	4.53	10.46	1.69	19.41	4.61	10.65	2.62
11/21/2007 3:20	14.81	17.73	2.92	6.74	2.69	18.97	4.17	9.62	2.80	20.24	5.44	12.56	2.74	20.23	5.42	12.53	2.43	19.34	4.53	10.47	1.70	19.42	4.62	10.66	2.63
11/21/2007 3:25	14.80	17.73	2.93	6.76	2.71	18.98	4.18	9.66	2.84	20.25	5.45	12.59	2.77	20.24	5.44	12.56	2.46	19.35	4.55	10.50	1.73	19.43	4.63	10.69	2.66
11/21/2007 3:30	14.80	17.73	2.93	6.78	2.73	18.99	4.19	9.67	2.85	20.26	5.46	12.61	2.79	20.25	5.45	12.58	2.48	19.35	4.55	10.52	1.75	19.44	4.64	10.71	2.68
11/21/2007 3:35	14.80	17.74	2.95	6.81	2.76	19.00	4.20	9.70	2.88	20.27	5.47	12.63	2.81	20.25	5.46	12.60	2.50	19.36	4.56	10.54	1.77	19.45	4.65	10.74	2.71
11/21/2007 3:40	14.80	17.75	2.95	6.82	2.77	19.00	4.20	9.70	2.88	20.27	5.47	12.63	2.81	20.26	5.46	12.60	2.50	19.37	4.57	10.55	1.78	19.45	4.65	10.74	2.71
11/21/2007 3:45	14.80	17.77	2.97	6.85	2.80	19.01	4.21	9.73	2.91	20.29	5.49	12.67	2.85	20.27	5.47	12.64	2.54	19.37	4.57	10.56	1.79	19.45	4.65	10.75	2.72
11/21/2007 3:50	14.80	17.77	2.97	6.86	2.81	19.01	4.22	9.74	2.92	20.29	5.49	12.68	2.86	20.28	5.48	12.66	2.56	19.38	4.58	10.58	1.81	19.46	4.67	10.78	2.75
11/21/2007 3:55	14.80	17.78	2.98	6.87	2.82	19.03	4.23	9.76	2.94	20.30	5.49	12.69	2.87	20.28	5.48	12.66	2.56	19.39	4.59	10.59	1.82	19.47	4.67	10.78	2.75
11/21/2007 4:00	14.80	17.78	2.98	6.88	2.83	19.03	4.23	9.76	2.94	20.30	5.50	12.70	2.88	20.29	5.49	12.67	2.57	19.39	4.59	10.60	1.83	19.48	4.68	10.80	2.77
11/21/2007 4:05	14.80	17.79	2.98	6.89	2.84	19.04	4.23	9.78	2.96	20.31	5.50	12.71	2.89	20.29	5.49	12.68	2.58	19.40	4.60	10.63	1.86	19.48	4.68	10.81	2.78
11/21/2007 4:10	14.80	17.79	2.99	6.90	2.85	19.04	4.24	9.79	2.97	20.31	5.51	12.72	2.90	20.30	5.50	12.70	2.60	19.40	4.60	10.63	1.86	19.48	4.68	10.81	2.78
11/21/2007 4:15	14.80	17.81	3.00	6.94	2.89	19.05	4.25	9.81	2.99	20.32	5.51	12.74	2.92	20.31	5.51	12.73	2.63	19.41	4.61	10.65	1.88	19.49	4.69	10.83	2.80
11/21/2007 4:20	14.80	17.81	3.00	6.94	2.89	19.05	4.25	9.82	3.00	20.32	5.52	12.75	2.93	20.32	5.51	12.74	2.64	19.41	4.61	10.65	1.88	19.50	4.70	10.84	2.81
11/21/2007 4:25	14.80	17.81	3.01	6.95	2.90	19.06	4.26	9.83	3.01	20.33	5.52	12.76	2.94	20.32	5.52	12.75	2.65	19.42	4.62	10.67	1.90	19.50	4.70	10.85	2.82
11/21/2007 4:30	14.80	17.81	3.01	6.96	2.91	19.06	4.26	9.84	3.02	20.33	5.53	12.78	2.96	20.32	5.52	12.76	2.66	19.42	4.63	10.68	1.91	19.51	4.71	10.88	2.85
11/21/2007 4:35	14.80	17.81	3.01	6.96	2.91	19.07	4.27	9.85	3.03	20.34	5.54	12.79	2.97	20.33	5.52	12.76	2.66	19.43	4.63	10.68	1.91	19.51	4.71	10.88	2.85
11/21/2007 4:40	14.80	17.82	3.02	6.97	2.92	19.07	4.27	9.86	3.04	20.34	5.54	12.79	2.97	20.34	5.53	12.78	2.68	19.43	4.63	10.69	1.92	19.51	4.71	10.87	2.84
11/21/2007 4:45	14.80	17.82	3.02	6.97	2.92	19.08	4.27	9.87	3.05	20.35	5.55	12.81	2.99	20.34	5.54	12.79	2.69	19.44	4.64	10.71	1.94	19.52	4.71	10.88	2.85
11/21/2007 4:50	14.80	17.82	3.02	6.97	2.92	19.08	4.27	9.87	3.05	20.35	5.55	12.81	2.99	20.34	5.54	12.79	2.69	19.44	4.63	10.70	1.93	19.53	4.72	10.91	2.88
11/21/2007 4:55	14.80	17.82	3.02	6.97	2.92	19.08	4.27	9.87	3.05	20.35	5.55	12.81	2.99	20.35	5.54	12.80	2.70	19.44	4.64	10.71	1.94	19.53	4.72	10.91	2.88
11/21/2007 5:00	14.80	17.81	3.01	6.96	2.91	19.08	4.27	9.87	3.05	20.35	5.55	12.81	2.99	20.35	5.55	12.81	2.71	19.44	4.64	10.71	1.94	19.53	4.72	10.91	2.88
11/21/2007 5:05	14.80	17.82	3.02	6.97	2.92	19.08	4.28	9.88	3.06	20.36	5.55	12.82	3.00	20.35	5.55	12.82	2.72	19.45	4.64	10.72	1.95	19.53	4.72	10.91	2.88
11/21/2007 5:10	14.80	17.82	3.02	6.97	2.92	19.08	4.28	9.88	3.06	20.36	5.55	12.82	3.00	20.36	5.56	12.83	2.73	19.45	4.64	10.72	1.95	19.53	4.73	10.93	2.90
11/21/2007 5:15	14.80	17.82	3.02	6.97	2.92	19.08	4.28	9.88	3.06	20.36	5.56	12.84	3.02	20.36	5.56	12.83	2.73	19.45	4.65	10.74	1.97	19.53	4.73	10.92	2.89
11/21/2007 5:20	14.81	17.82	3.02	6.97	2.92	19.08	4.28	9.88	3.06	20.36	5.55	12.82	3.00	20.36	5.56	12.83	2.73	19.45	4.64	10.72	1.95	19.53	4.72	10.91	2.88
11/21/2007 5:25	14.80	17.82	3.02	6.97	2.92	19.08	4.28	9.88	3.06	20.36	5.55	12.82	3.00	20.36	5.56	12.84	2.74	19.45	4.65	10.74	1.97	19.53	4.73	10.92	2.89
11/21/2007 5:30	14.80	17.81	3.01	6.96	2.91	19.08	4.28	9.89	3.07	20.36	5.56	12.84	3.02	20.37	5.57	12.85	2.75	19.45	4.65	10.74	1.97	19.53	4.73	10.93	2.90
11/21/2007 5:35	14.80	17.81	3.01	6.94	2.89	19.08	4.28	9.89	3.07	20.36	5.56	12.84	3.02	20.37	5.57	12.85	2.75	19.45	4.65	10.74	1.97	19.53	4.73	10.93	2.90
11/21/2007 5:40	14.81	17.81	3.00	6.92	2.87	19.08	4.27	9.87	3.05	20.36	5.55	12.82	3.00	20.37	5.57	12.85	2.75	19.45	4.64	10.72	1.95	19.53	4.73	10.92	2.89
11/21/2007 5:45	14.80	17.81	3.00	6.93	2.88	19.08	4.28	9.88	3.06	20.36	5.55	12.82	3.00	20.37	5.57	12.87	2.77	19.45	4.64	10.72	1.95	19.53	4.73	10.93	2.90
11/21/2007 5:50	14.80	17.80	3.00	6.92	2.87	19.08	4.28	9.88	3.06	20.36	5.55	12.83	3.01	20.37	5.57	12.87	2.77	19.45	4.64	10.72	1.95	19.53	4.73	10.93	2.90
11/21/2007 5:55	14.80	17.80	2.99	6.91	2.86	19.07	4.27	9.86	3.04	20.35	5.54	12.80	2.98	20.37	5.57	12.87	2.77	19.45	4.64	10.72	1.95	19.53	4.73	10.93	2.90

Table 2 (Page 5 of 24)
Summary of Water Levels during Tidal Cycles
Water Resources Assessment
Area 4 Environmental Impact Assessment
Bahama Rock, Ltd.
Grand Bahama, Bahamas

	Atmosphere	MW-1				MW-2				MW-3				MW-4				MW-5				MW-6			
Time, GMT-05:00	Absolute Pressure (psi)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)
11/21/2007 6:00	14.81	17.79	2.98	6.88	2.83	19.07	4.26	9.84	3.02	20.35	5.54	12.79	2.97	20.37	5.57	12.85	2.75	19.44	4.63	10.70	1.93	19.53	4.72	10.91	2.88
11/21/2007 6:05	14.81	17.77	2.96	6.85	2.80	19.07	4.26	9.84	3.02	20.34	5.53	12.78	2.96	20.37	5.56	12.84	2.74	19.44	4.63	10.69	1.92	19.53	4.72	10.90	2.87
11/21/2007 6:10	14.81	17.77	2.96	6.84	2.79	19.06	4.26	9.83	3.01	20.34	5.53	12.77	2.95	20.37	5.57	12.85	2.75	19.43	4.62	10.68	1.91	19.53	4.72	10.90	2.87
11/21/2007 6:15	14.81	17.76	2.96	6.83	2.78	19.06	4.26	9.83	3.01	20.34	5.53	12.77	2.95	20.37	5.56	12.84	2.74	19.43	4.62	10.68	1.91	19.53	4.72	10.90	2.87
11/21/2007 6:20	14.81	17.75	2.95	6.80	2.75	19.05	4.25	9.81	2.99	20.33	5.52	12.75	2.93	20.36	5.56	12.83	2.73	19.43	4.62	10.67	1.90	19.52	4.71	10.89	2.86
11/21/2007 6:25	14.81	17.74	2.93	6.77	2.72	19.05	4.24	9.80	2.98	20.32	5.51	12.73	2.91	20.36	5.55	12.82	2.72	19.42	4.61	10.65	1.88	19.51	4.70	10.86	2.83
11/21/2007 6:30	14.81	17.72	2.91	6.73	2.68	19.04	4.23	9.78	2.96	20.32	5.51	12.72	2.90	20.35	5.55	12.81	2.71	19.41	4.60	10.62	1.85	19.51	4.70	10.85	2.82
11/21/2007 6:35	14.81	17.71	2.90	6.71	2.66	19.03	4.22	9.74	2.92	20.31	5.50	12.70	2.88	20.35	5.54	12.80	2.70	19.40	4.59	10.60	1.83	19.50	4.69	10.84	2.81
11/21/2007 6:40	14.81	17.70	2.89	6.67	2.62	19.02	4.21	9.72	2.90	20.29	5.48	12.66	2.84	20.35	5.54	12.79	2.69	19.39	4.59	10.59	1.82	19.49	4.68	10.82	2.79
11/21/2007 6:45	14.81	17.69	2.88	6.65	2.60	19.01	4.20	9.70	2.88	20.29	5.48	12.65	2.83	20.34	5.53	12.78	2.68	19.38	4.58	10.57	1.80	19.49	4.68	10.81	2.78
11/21/2007 6:50	14.81	17.67	2.86	6.61	2.56	19.00	4.19	9.68	2.86	20.28	5.47	12.63	2.81	20.33	5.52	12.75	2.65	19.37	4.57	10.54	1.77	19.48	4.67	10.78	2.75
11/21/2007 6:55	14.81	17.66	2.85	6.57	2.52	18.99	4.18	9.65	2.83	20.27	5.46	12.61	2.79	20.33	5.52	12.74	2.64	19.36	4.56	10.52	1.75	19.47	4.66	10.77	2.74
11/21/2007 7:00	14.81	17.64	2.83	6.54	2.49	18.97	4.16	9.62	2.80	20.25	5.44	12.57	2.75	20.32	5.51	12.72	2.62	19.35	4.55	10.50	1.73	19.46	4.65	10.75	2.72
11/21/2007 7:05	14.81	17.62	2.81	6.48	2.43	18.96	4.15	9.57	2.75	20.25	5.43	12.55	2.73	20.31	5.49	12.68	2.58	19.34	4.53	10.46	1.69	19.45	4.64	10.72	2.69
11/21/2007 7:10	14.81	17.61	2.80	6.46	2.41	18.95	4.14	9.55	2.73	20.23	5.42	12.52	2.70	20.30	5.49	12.68	2.58	19.33	4.53	10.45	1.68	19.44	4.64	10.70	2.67
11/21/2007 7:15	14.81	17.60	2.78	6.43	2.38	18.94	4.12	9.52	2.70	20.22	5.40	12.48	2.66	20.30	5.48	12.66	2.56	19.33	4.51	10.42	1.65	19.44	4.63	10.68	2.65
11/21/2007 7:20	14.82	17.58	2.77	6.40	2.35	18.92	4.11	9.49	2.67	20.21	5.40	12.47	2.65	20.29	5.47	12.64	2.54	19.32	4.50	10.39	1.62	19.43	4.62	10.66	2.63
11/21/2007 7:25	14.82	17.57	2.75	6.36	2.31	18.92	4.10	9.47	2.65	20.20	5.39	12.44	2.62	20.28	5.46	12.61	2.51	19.31	4.49	10.38	1.61	19.42	4.61	10.64	2.61
11/21/2007 7:30	14.82	17.56	2.74	6.34	2.29	18.90	4.09	9.44	2.62	20.19	5.38	12.42	2.60	20.27	5.46	12.60	2.50	19.30	4.48	10.36	1.59	19.41	4.60	10.61	2.58
11/21/2007 7:35	14.81	17.55	2.73	6.32	2.27	18.89	4.08	9.41	2.59	20.18	5.37	12.39	2.57	20.27	5.46	12.60	2.50	19.29	4.47	10.33	1.56	19.41	4.59	10.61	2.58
11/21/2007 7:40	14.81	17.53	2.72	6.28	2.23	18.88	4.07	9.39	2.57	20.17	5.35	12.37	2.55	20.26	5.45	12.58	2.48	19.28	4.47	10.32	1.55	19.40	4.58	10.59	2.56
11/21/2007 7:45	14.82	17.52	2.70	6.23	2.18	18.87	4.05	9.35	2.53	20.16	5.34	12.34	2.52	20.25	5.43	12.54	2.44	19.27	4.45	10.28	1.51	19.39	4.57	10.55	2.52
11/21/2007 7:50	14.82	17.51	2.69	6.22	2.17	18.85	4.04	9.32	2.50	20.15	5.34	12.33	2.51	20.24	5.43	12.54	2.44	19.27	4.45	10.28	1.51	19.38	4.57	10.55	2.52
11/21/2007 7:55	14.82	17.50	2.67	6.18	2.13	18.84	4.02	9.28	2.46	20.14	5.32	12.28	2.46	20.23	5.41	12.50	2.40	19.26	4.44	10.25	1.48	19.37	4.55	10.50	2.47
11/21/2007 8:00	14.82	17.48	2.66	6.14	2.09	18.83	4.01	9.26	2.44	20.13	5.31	12.27	2.45	20.23	5.40	12.48	2.38	19.25	4.43	10.22	1.45	19.36	4.54	10.49	2.46
11/21/2007 8:05	14.82	17.47	2.65	6.12	2.07	18.82	4.00	9.24	2.42	20.12	5.31	12.25	2.43	20.22	5.40	12.47	2.37	19.23	4.42	10.20	1.43	19.36	4.54	10.48	2.45
11/21/2007 8:10	14.82	17.45	2.64	6.09	2.04	18.81	3.99	9.22	2.40	20.11	5.29	12.22	2.40	20.21	5.39	12.45	2.35	19.22	4.41	10.17	1.40	19.35	4.53	10.46	2.43
11/21/2007 8:15	14.82	17.44	2.62	6.06	2.01	18.80	3.98	9.19	2.37	20.10	5.28	12.19	2.37	20.20	5.38	12.43	2.33	19.22	4.40	10.16	1.39	19.34	4.52	10.43	2.40
11/21/2007 8:20	14.82	17.43	2.61	6.03	1.98	18.79	3.97	9.16	2.34	20.09	5.27	12.18	2.36	20.19	5.37	12.41	2.31	19.21	4.39	10.15	1.38	19.33	4.51	10.42	2.39
11/21/2007 8:25	14.82	17.42	2.60	6.00	1.95	18.78	3.96	9.14	2.32	20.08	5.26	12.15	2.33	20.18	5.36	12.38	2.28	19.20	4.38	10.11	1.34	19.32	4.50	10.40	2.37
11/21/2007 8:30	14.82	17.41	2.59	5.98	1.93	18.76	3.94	9.11	2.29	20.06	5.24	12.11	2.29	20.18	5.36	12.37	2.27	19.19	4.37	10.09	1.32	19.31	4.49	10.37	2.34
11/21/2007 8:35	14.82	17.39	2.57	5.94	1.89	18.75	3.93	9.07	2.25	20.05	5.23	12.09	2.27	20.16	5.34	12.34	2.24	19.18	4.36	10.06	1.29	19.30	4.48	10.35	2.32
11/21/2007 8:40	14.82	17.38	2.56	5.91	1.86	18.74	3.92	9.06	2.24	20.04	5.23	12.07	2.25	20.15	5.34	12.32	2.22	19.17	4.35	10.05	1.28	19.29	4.48	10.34	2.31
11/21/2007 8:45	14.82	17.37	2.55	5.88	1.83	18.73	3.90	9.02	2.20	20.03	5.21	12.02	2.20	20.15	5.33	12.30	2.20	19.16	4.34	10.02	1.25	19.28	4.46	10.30	2.27
11/21/2007 8:50	14.82	17.36	2.54	5.85	1.80	18.71	3.89	8.98	2.16	20.02	5.19	11.99	2.17	20.14	5.31	12.27	2.17	19.15	4.33	9.99	1.22	19.27	4.45	10.28	2.25
11/21/2007 8:55	14.83	17.34	2.51	5.80	1.75	18.70	3.87	8.94	2.12	20.01	5.18	11.96	2.14	20.12	5.29	12.23	2.13	19.14	4.31	9.95	1.18	19.26	4.43	10.23	2.20
11/21/2007 9:00	14.83	17.34	2.51	5.80	1.75	18.69	3.87	8.93	2.11	20.00	5.17	11.95	2.13	20.12	5.30	12.24	2.14	19.13	4.30	9.94	1.17	19.26	4.43	10.23	2.20
11/21/2007 9:05	14.82	17.32	2.50	5.77	1.72	18.69	3.86	8.93	2.11	19.99	5.16	11.92	2.10	20.11	5.28	12.20	2.10	19.12	4.29	9.92	1.15	19.25	4.42	10.21	2.18
11/21/2007 9:10	14.82	17.31	2.49	5.75	1.70	18.67	3.85	8.88	2.06	19.98	5.15	11.90	2.08	20.10	5.28	12.18	2.08	19.11	4.28	9.89	1.12	19.24	4.41	10.19	2.16
11/21/2007 9:15	14.83	17.30	2.47	5.71	1.66	18.67	3.84	8.87	2.05	19.97	5.14	11.87	2.05	20.09	5.26	12.16	2.06	19.10	4.28	9.87	1.10	19.23	4.40	10.16	2.13
11/21/2007 9:20	14.83	17.28	2.46	5.68	1.63	18.66	3.83	8.84	2.02	19.96	5.13	11.85	2.03	20.08	5.25	12.14	2.04	19.09	4.27	9.85	1.08	19.22	4.39	10.14	2.11
11/21/2007 9:25	14.83	17.28	2.45	5.67	1.62	18.65	3.82	8.83	2.01	19.95	5.12	11.82	2.00	20.07	5.25	12.11	2.01	19.08	4.25	9.82	1.05	19.21	4.38	10.12	2.09
11/21/2007 9:30	14.82	17.27	2.45	5.65	1.60	18.64	3.82	8.81	1.99	19.94	5.11	11.81	1.99	20.06	5.24	12.10	2.00	19.07	4.25	9.81	1.04	19.20	4.38	10.11	2.08
11/21/2007 9:35	14.83	17.26	2.43	5.61	1.56	18.63	3.80	8.78	1.96	19.93	5.10	11.77	1.95	20.05	5.22	12.06	1.96	19.06	4.23	9.76	0.99	19.19	4.36	10.08	2.05
11/21/2007 9:40	14.83	17.25	2.42	5.60	1.55	18.62	3.79	8.76	1.94	19.92	5.09	11.76	1.94	20.05	5.22	12.06	1.96	19.05	4.23	9.76	0.99	19.18	4.35	10.05	2.02
11/21/2007 9:45	14.83	17.24	2.41	5.57	1.52	18.62	3.79	8.74	1.92	19.91	5.08	11.73	1.91	20.04	5.21	12.03	1.93	19.05	4.22	9.74	0.97	19.18	4.34	10.03	2.00
11/21/2007 9:50	14.83	17.24	2.41	5.56	1.51	18.60	3.77	8.71	1.89	19.90	5.07	11.71	1.89	20.03	5.20	12.00	1.90	19.04	4.21	9.71	0.94	19.17	4.34	10.02	1.99
11/21/2007 9:55	14.83	17.23	2.40	5.55	1.50	18.59	3.76	8.69	1.87	19.90	5.07	11.70	1.88	20.02	5.19	11.99	1.89	19.03	4.20	9.70	0.93	19.17	4.34	10.01	1.98
11/21/2007 10:00	14.83	17.22	2.39	5.52	1.47	18.59	3.75	8.67	1.85	19.89	5.05	11.67	1.85	20.01	5.18	11.97	1.87	19.02	4.19	9.68	0.91	19.16	4.32	9.99	1.96
11/21/2007 10:05	14.83	17.22	2.39	5.51	1.46	18.58	3.75	8.65	1.83	19.88	5.05	11.66	1.84	20.01	5.17	11.94	1.84	19.02	4.19	9.67	0.90	19.15	4.31	9.96	1.93
11/21/2007 10:10	14.83	17.21	2.38	5.50	1.45	18.57	3.74	8.64	1.82	19.87	5.04	11.64	1.82	20.00	5.17	11.94	1.84	19.01	4.18	9.65	0.88	19.14	4.31	9.96	1.93
11/21/2007 10:15	14.83	17.20	2.37	5.47	1.42	18.56	3.73	8.62	1.80	19.86	5.03	11.62	1.80	19.99	5.16	11.92	1.82	19.00	4.17	9.63	0.86	19.13	4.30	9.92	1.89
11/21/2007 10:20	14.83	17.20	2.36	5.46	1.41	18.56	3.73	8.61	1.79	19.86	5.02	11.60	1.78	19.99	5.15	11.90	1.80	19.00	4.16	9.61	0.84	19.12	4.29	9.91	1.88
11/21/2007 10:25	14.83	17.20	2.36	5.45	1.40	18.55	3.72	8.59	1.77	19.85	5.02	11.59	1.77	19.98	5.14	11.88	1.78	18.99	4.16	9.60	0.83	19.12	4.28	9.89	1.86

Table 2 (Page 6 of 24)
Summary of Water Levels during Tidal Cycles
Water Resources Assessment
Area 4 Environmental Impact Assessment
Bahama Rock, Ltd.
Grand Bahama, Bahamas

	Atmosphere	MW-1				MW-2				MW-3				MW-4				MW-5				MW-6			
Time, GMT-05:00	Absolute Pressure (psi)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)
11/21/2007 10:30	14.83	17.19	2.36	5.45	1.40	18.55	3.72	8.58	1.76	19.85	5.02	11.59	1.77	19.97	5.14	11.87	1.77	18.98	4.15	9.59	0.82	19.11	4.28	9.89	1.86
11/21/2007 10:35	14.83	17.19	2.36	5.44	1.39	18.55	3.71	8.58	1.76	19.84	5.01	11.57	1.75	19.97	5.14	11.87	1.77	18.98	4.15	9.58	0.81	19.11	4.28	9.88	1.85
11/21/2007 10:40	14.83	17.18	2.35	5.42	1.37	18.54	3.70	8.55	1.73	19.84	5.00	11.55	1.73	19.97	5.13	11.85	1.75	18.98	4.14	9.56	0.79	19.11	4.27	9.87	1.84
11/21/2007 10:45	14.83	17.18	2.34	5.41	1.36	18.53	3.70	8.54	1.72	19.83	5.00	11.55	1.73	19.96	5.12	11.83	1.73	18.97	4.13	9.54	0.77	19.10	4.27	9.85	1.82
11/21/2007 10:50	14.83	17.18	2.35	5.42	1.37	18.53	3.70	8.54	1.72	19.83	5.00	11.54	1.72	19.95	5.12	11.82	1.72	18.97	4.14	9.55	0.78	19.09	4.27	9.85	1.82
11/21/2007 10:55	14.83	17.17	2.34	5.41	1.36	18.52	3.69	8.53	1.71	19.82	4.99	11.53	1.71	19.94	5.11	11.81	1.71	18.96	4.13	9.53	0.76	19.09	4.26	9.84	1.81
11/21/2007 11:00	14.83	17.17	2.34	5.41	1.36	18.52	3.69	8.52	1.70	19.82	4.99	11.53	1.71	19.94	5.11	11.80	1.70	18.96	4.13	9.53	0.76	19.09	4.26	9.83	1.80
11/21/2007 11:05	14.83	17.17	2.34	5.41	1.36	18.52	3.69	8.53	1.71	19.82	4.99	11.52	1.70	19.93	5.10	11.79	1.69	18.95	4.12	9.52	0.75	19.08	4.25	9.82	1.79
11/21/2007 11:10	14.84	17.17	2.33	5.38	1.33	18.52	3.68	8.50	1.68	19.82	4.98	11.50	1.68	19.93	5.09	11.76	1.66	18.95	4.11	9.50	0.73	19.08	4.24	9.80	1.77
11/21/2007 11:15	14.83	17.18	2.35	5.42	1.37	18.52	3.69	8.52	1.70	19.82	4.99	11.52	1.70	19.92	5.09	11.76	1.66	18.95	4.12	9.50	0.73	19.08	4.25	9.81	1.78
11/21/2007 11:20	14.83	17.17	2.34	5.40	1.35	18.51	3.68	8.51	1.69	19.81	4.98	11.51	1.69	19.92	5.09	11.76	1.66	18.95	4.12	9.51	0.74	19.08	4.25	9.81	1.78
11/21/2007 11:25	14.83	17.17	2.34	5.42	1.37	18.52	3.69	8.53	1.71	19.81	4.99	11.51	1.69	19.92	5.10	11.77	1.67	18.94	4.11	9.50	0.73	19.07	4.24	9.80	1.77
11/21/2007 11:30	14.83	17.18	2.35	5.43	1.38	18.51	3.69	8.52	1.70	19.81	4.98	11.51	1.69	19.92	5.09	11.76	1.66	18.94	4.12	9.51	0.74	19.07	4.25	9.81	1.78
11/21/2007 11:35	14.82	17.18	2.35	5.43	1.38	18.51	3.69	8.52	1.70	19.81	4.98	11.51	1.69	19.91	5.09	11.76	1.66	18.94	4.12	9.51	0.74	19.07	4.24	9.80	1.77
11/21/2007 11:40	14.83	17.18	2.36	5.44	1.39	18.51	3.69	8.52	1.70	19.81	4.99	11.52	1.70	19.91	5.09	11.75	1.65	18.94	4.12	9.51	0.74	19.07	4.25	9.81	1.78
11/21/2007 11:45	14.83	17.19	2.36	5.45	1.40	18.51	3.69	8.52	1.70	19.81	4.99	11.52	1.70	19.91	5.09	11.75	1.65	18.95	4.12	9.52	0.75	19.07	4.24	9.79	1.76
11/21/2007 11:50	14.83	17.20	2.37	5.47	1.42	18.52	3.69	8.52	1.70	19.81	4.98	11.51	1.69	19.91	5.09	11.74	1.64	18.94	4.11	9.50	0.73	19.07	4.24	9.79	1.76
11/21/2007 11:55	14.82	17.20	2.37	5.48	1.43	18.52	3.70	8.54	1.72	19.82	5.00	11.54	1.72	19.91	5.09	11.76	1.66	18.94	4.12	9.52	0.75	19.07	4.25	9.80	1.77
11/21/2007 12:00	14.82	17.20	2.38	5.49	1.44	18.53	3.71	8.56	1.74	19.82	5.00	11.54	1.72	19.91	5.09	11.76	1.66	18.95	4.13	9.53	0.76	19.07	4.25	9.80	1.77
11/21/2007 12:05	14.82	17.20	2.39	5.52	1.47	18.53	3.71	8.57	1.75	19.82	5.00	11.55	1.73	19.91	5.09	11.76	1.66	18.95	4.13	9.54	0.77	19.07	4.25	9.83	1.80
11/21/2007 12:10	14.81	17.21	2.40	5.54	1.49	18.53	3.72	8.58	1.76	19.82	5.01	11.56	1.74	19.91	5.10	11.79	1.69	18.95	4.14	9.55	0.78	19.07	4.26	9.84	1.81
11/21/2007 12:15	14.81	17.22	2.40	5.55	1.50	18.53	3.72	8.58	1.76	19.82	5.01	11.57	1.75	19.91	5.09	11.77	1.67	18.95	4.13	9.54	0.77	19.07	4.26	9.83	1.80
11/21/2007 12:20	14.81	17.23	2.41	5.58	1.53	18.54	3.73	8.61	1.79	19.83	5.01	11.58	1.76	19.91	5.10	11.78	1.68	18.96	4.14	9.57	0.80	19.08	4.26	9.84	1.81
11/21/2007 12:25	14.81	17.24	2.42	5.60	1.55	18.54	3.73	8.61	1.79	19.83	5.01	11.58	1.76	19.92	5.10	11.79	1.69	18.96	4.14	9.57	0.80	19.08	4.27	9.85	1.82
11/21/2007 12:30	14.81	17.25	2.43	5.62	1.57	18.55	3.74	8.64	1.82	19.84	5.02	11.60	1.78	19.92	5.10	11.79	1.69	18.96	4.15	9.58	0.81	19.08	4.27	9.85	1.82
11/21/2007 12:35	14.81	17.26	2.44	5.64	1.59	18.56	3.74	8.65	1.83	19.84	5.03	11.61	1.79	19.92	5.11	11.80	1.70	18.97	4.16	9.60	0.83	19.09	4.27	9.86	1.83
11/21/2007 12:40	14.81	17.27	2.45	5.66	1.61	18.56	3.75	8.66	1.84	19.85	5.04	11.64	1.82	19.93	5.11	11.81	1.71	18.98	4.16	9.61	0.84	19.09	4.28	9.89	1.86
11/21/2007 12:45	14.82	17.28	2.46	5.68	1.63	18.58	3.76	8.69	1.87	19.86	5.04	11.64	1.82	19.93	5.12	11.82	1.72	18.98	4.17	9.62	0.85	19.10	4.28	9.89	1.86
11/21/2007 12:50	14.81	17.28	2.47	5.71	1.66	18.58	3.77	8.71	1.89	19.87	5.06	11.68	1.86	19.93	5.12	11.83	1.73	18.99	4.18	9.65	0.88	19.10	4.29	9.92	1.89
11/21/2007 12:55	14.81	17.29	2.48	5.73	1.68	18.59	3.78	8.73	1.91	19.87	5.06	11.69	1.87	19.94	5.13	11.85	1.75	19.00	4.18	9.66	0.89	19.10	4.29	9.91	1.88
11/21/2007 13:00	14.81	17.30	2.50	5.77	1.72	18.60	3.79	8.76	1.94	19.88	5.08	11.72	1.90	19.95	5.14	11.87	1.77	19.00	4.20	9.70	0.93	19.12	4.31	9.96	1.93
11/21/2007 13:05	14.81	17.32	2.51	5.80	1.75	18.62	3.81	8.79	1.97	19.89	5.08	11.73	1.91	19.95	5.14	11.87	1.77	19.01	4.20	9.71	0.94	19.12	4.31	9.96	1.93
11/21/2007 13:10	14.80	17.33	2.52	5.83	1.78	18.63	3.82	8.83	2.01	19.90	5.10	11.78	1.96	19.96	5.16	11.92	1.82	19.02	4.22	9.75	0.98	19.13	4.33	10.00	1.97
11/21/2007 13:15	14.80	17.34	2.53	5.85	1.80	18.63	3.83	8.85	2.03	19.91	5.11	11.80	1.98	19.98	5.17	11.95	1.85	19.03	4.23	9.77	1.00	19.14	4.33	10.01	1.98
11/21/2007 13:20	14.80	17.35	2.54	5.87	1.82	18.65	3.84	8.88	2.06	19.92	5.12	11.82	2.00	19.98	5.18	11.96	1.86	19.04	4.24	9.79	1.02	19.15	4.35	10.04	2.01
11/21/2007 13:25	14.80	17.36	2.55	5.89	1.84	18.66	3.86	8.91	2.09	19.93	5.13	11.84	2.02	19.99	5.19	11.98	1.88	19.05	4.25	9.82	1.05	19.16	4.36	10.07	2.04
11/21/2007 13:30	14.80	17.37	2.57	5.93	1.88	18.67	3.87	8.93	2.11	19.94	5.14	11.87	2.05	20.00	5.19	11.99	1.89	19.06	4.26	9.83	1.06	19.17	4.36	10.08	2.05
11/21/2007 13:35	14.80	17.38	2.58	5.95	1.90	18.68	3.88	8.97	2.15	19.95	5.15	11.89	2.07	20.01	5.20	12.02	1.92	19.07	4.27	9.87	1.10	19.18	4.37	10.10	2.07
11/21/2007 13:40	14.80	17.38	2.58	5.97	1.92	18.70	3.90	9.00	2.18	19.96	5.16	11.92	2.10	20.01	5.21	12.04	1.94	19.08	4.28	9.89	1.12	19.18	4.39	10.13	2.10
11/21/2007 13:45	14.80	17.39	2.59	5.99	1.94	18.71	3.91	9.03	2.21	19.97	5.17	11.94	2.12	20.02	5.23	12.07	1.97	19.09	4.29	9.91	1.14	19.20	4.40	10.16	2.13
11/21/2007 13:50	14.80	17.41	2.61	6.02	1.97	18.72	3.92	9.06	2.24	19.98	5.18	11.97	2.15	20.03	5.24	12.09	1.99	19.10	4.30	9.94	1.17	19.20	4.41	10.17	2.14
11/21/2007 13:55	14.80	17.42	2.62	6.05	2.00	18.73	3.94	9.09	2.27	20.00	5.20	12.01	2.19	20.04	5.25	12.12	2.02	19.11	4.31	9.96	1.19	19.21	4.42	10.20	2.17
11/21/2007 14:00	14.80	17.43	2.63	6.07	2.02	18.74	3.95	9.11	2.29	20.00	5.20	12.02	2.20	20.05	5.26	12.14	2.04	19.12	4.32	9.99	1.22	19.22	4.43	10.22	2.19
11/21/2007 14:05	14.80	17.44	2.64	6.10	2.05	18.75	3.95	9.13	2.31	20.01	5.21	12.04	2.22	20.06	5.26	12.15	2.05	19.13	4.33	10.01	1.24	19.23	4.44	10.24	2.21
11/21/2007 14:10	14.80	17.45	2.65	6.12	2.07	18.76	3.96	9.15	2.33	20.02	5.22	12.06	2.24	20.07	5.27	12.17	2.07	19.14	4.34	10.02	1.25	19.24	4.44	10.25	2.22
11/21/2007 14:15	14.80	17.46	2.66	6.14	2.09	18.77	3.97	9.17	2.35	20.03	5.23	12.08	2.26	20.07	5.27	12.18	2.08	19.15	4.35	10.05	1.28	19.25	4.45	10.27	2.24
11/21/2007 14:20	14.80	17.47	2.67	6.17	2.12	18.78	3.98	9.19	2.37	20.04	5.24	12.10	2.28	20.08	5.28	12.20	2.10	19.16	4.36	10.07	1.30	19.26	4.46	10.30	2.27
11/21/2007 14:25	14.80	17.48	2.68	6.19	2.14	18.79	3.99	9.21	2.39	20.05	5.25	12.12	2.30	20.09	5.29	12.22	2.12	19.17	4.36	10.08	1.31	19.27	4.46	10.31	2.28
11/21/2007 14:30	14.80	17.50	2.69	6.22	2.17	18.80	4.00	9.23	2.41	20.06	5.26	12.14	2.32	20.10	5.30	12.24	2.14	19.18	4.38	10.11	1.34	19.27	4.47	10.33	2.30
11/21/2007 14:35	14.80	17.51	2.71	6.25	2.20	18.81	4.00	9.25	2.43	20.07	5.27	12.16	2.34	20.11	5.30	12.24	2.14	19.19	4.39	10.13	1.36	19.28	4.48	10.35	2.32
11/21/2007 14:40	14.80	17.52	2.72	6.28	2.23	18.82	4.02	9.28	2.46	20.08	5.28	12.19	2.37	20.12	5.32	12.28	2.18	19.19	4.39	10.15	1.38	19.29	4.49	10.38	2.35
11/21/2007 14:45	14.80	17.53	2.73	6.31	2.26	18.83	4.03	9.30	2.48	20.09	5.29	12.21	2.39	20.12	5.32	12.30	2.20	19.20	4.40	10.17	1.40	19.30	4.50	10.39	2.36
11/21/2007 14:50	14.80	17.54	2.74	6.33	2.28	18.84	4.04	9.33	2.51	20.10	5.30	12.24	2.42	20.13	5.33	12.31	2.21	19.21	4.41	10.19	1.42	19.31	4.51	10.41	2.38
11/21/2007 14:55	14.80	17.55	2.75	6.35	2.30	18.84	4.04	9.34	2.52	20.11	5.31	12.26	2.44	20.13	5.33	12.32	2.22	19.22	4.42	10.21	1.44	19.32	4.52	10.43	2.40

Table 2 (Page 7 of 24)
Summary of Water Levels during Tidal Cycles
Water Resources Assessment
Area 4 Environmental Impact Assessment
Bahama Rock, Ltd.
Grand Bahama, Bahamas

	Atmosphere	MW-1				MW-2				MW-3				MW-4				MW-5				MW-6			
Time, GMT-05:00	Absolute Pressure (psi)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)
11/21/2007 15:00	14.80	17.56	2.76	6.37	2.32	18.85	4.05	9.36	2.54	20.11	5.31	12.27	2.45	20.14	5.34	12.34	2.24	19.23	4.43	10.24	1.47	19.32	4.52	10.44	2.41
11/21/2007 15:05	14.81	17.57	2.76	6.38	2.33	18.86	4.06	9.37	2.55	20.12	5.32	12.28	2.46	20.15	5.34	12.34	2.24	19.24	4.43	10.24	1.47	19.33	4.53	10.45	2.42
11/21/2007 15:10	14.80	17.58	2.78	6.42	2.37	18.87	4.07	9.39	2.57	20.13	5.33	12.32	2.50	20.16	5.36	12.38	2.28	19.25	4.45	10.27	1.50	19.34	4.54	10.48	2.45
11/21/2007 15:15	14.80	17.59	2.78	6.43	2.38	18.88	4.08	9.41	2.59	20.14	5.34	12.33	2.51	20.17	5.36	12.39	2.29	19.26	4.45	10.28	1.51	19.35	4.54	10.49	2.46
11/21/2007 15:20	14.80	17.60	2.80	6.46	2.41	18.89	4.09	9.45	2.63	20.15	5.35	12.35	2.53	20.18	5.38	12.42	2.32	19.27	4.47	10.32	1.55	19.36	4.56	10.52	2.49
11/21/2007 15:25	14.80	17.61	2.81	6.49	2.44	18.90	4.10	9.47	2.65	20.16	5.36	12.39	2.57	20.18	5.38	12.43	2.33	19.27	4.47	10.33	1.56	19.36	4.57	10.54	2.51
11/21/2007 15:30	14.80	17.62	2.82	6.52	2.47	18.91	4.11	9.48	2.66	20.17	5.37	12.41	2.59	20.19	5.39	12.45	2.35	19.28	4.48	10.35	1.58	19.37	4.57	10.56	2.53
11/21/2007 15:35	14.80	17.64	2.84	6.55	2.50	18.92	4.12	9.51	2.69	20.17	5.37	12.41	2.59	20.20	5.40	12.47	2.37	19.29	4.49	10.37	1.60	19.38	4.58	10.58	2.55
11/21/2007 15:40	14.80	17.64	2.84	6.55	2.50	18.92	4.12	9.52	2.70	20.19	5.39	12.45	2.63	20.21	5.41	12.49	2.39	19.30	4.50	10.39	1.62	19.38	4.58	10.59	2.56
11/21/2007 15:45	14.80	17.65	2.85	6.59	2.54	18.93	4.13	9.54	2.72	20.19	5.40	12.46	2.64	20.21	5.41	12.50	2.40	19.30	4.50	10.40	1.63	19.39	4.60	10.61	2.58
11/21/2007 15:50	14.80	17.66	2.86	6.60	2.55	18.94	4.14	9.56	2.74	20.20	5.40	12.48	2.66	20.22	5.41	12.51	2.41	19.31	4.51	10.41	1.64	19.39	4.59	10.61	2.58
11/21/2007 15:55	14.80	17.66	2.86	6.62	2.57	18.95	4.15	9.58	2.76	20.21	5.41	12.50	2.68	20.23	5.43	12.53	2.43	19.32	4.52	10.43	1.66	19.40	4.60	10.63	2.60
11/21/2007 16:00	14.80	17.67	2.88	6.64	2.59	18.96	4.16	9.60	2.78	20.22	5.42	12.52	2.70	20.23	5.43	12.55	2.45	19.33	4.53	10.46	1.69	19.41	4.61	10.66	2.63
11/21/2007 16:05	14.80	17.68	2.88	6.66	2.61	18.96	4.16	9.60	2.78	20.22	5.42	12.52	2.70	20.23	5.43	12.55	2.45	19.33	4.53	10.46	1.69	19.41	4.61	10.65	2.62
11/21/2007 16:10	14.80	17.69	2.89	6.67	2.62	18.96	4.16	9.62	2.80	20.23	5.43	12.53	2.71	20.24	5.44	12.56	2.46	19.34	4.54	10.48	1.71	19.42	4.62	10.67	2.64
11/21/2007 16:15	14.80	17.70	2.90	6.69	2.64	18.97	4.17	9.64	2.82	20.23	5.43	12.55	2.73	20.24	5.45	12.58	2.48	19.34	4.55	10.50	1.73	19.43	4.63	10.69	2.66
11/21/2007 16:20	14.80	17.71	2.91	6.72	2.67	18.98	4.18	9.65	2.83	20.24	5.44	12.57	2.75	20.26	5.46	12.61	2.51	19.35	4.55	10.51	1.74	19.44	4.64	10.71	2.68
11/21/2007 16:25	14.81	17.71	2.90	6.70	2.65	18.98	4.18	9.64	2.82	20.25	5.44	12.57	2.75	20.26	5.45	12.59	2.49	19.35	4.55	10.50	1.73	19.44	4.63	10.70	2.67
11/21/2007 16:30	14.80	17.71	2.91	6.71	2.66	18.99	4.18	9.66	2.84	20.26	5.45	12.59	2.77	20.26	5.46	12.61	2.51	19.36	4.55	10.52	1.75	19.44	4.64	10.71	2.68
11/21/2007 16:35	14.80	17.72	2.91	6.73	2.68	18.99	4.19	9.67	2.85	20.26	5.45	12.59	2.77	20.27	5.46	12.62	2.52	19.36	4.56	10.52	1.75	19.45	4.64	10.72	2.69
11/21/2007 16:40	14.80	17.72	2.92	6.74	2.69	19.00	4.20	9.70	2.88	20.26	5.46	12.61	2.79	20.27	5.47	12.64	2.54	19.36	4.57	10.55	1.78	19.45	4.65	10.74	2.71
11/21/2007 16:45	14.80	17.72	2.93	6.76	2.71	19.00	4.20	9.71	2.89	20.27	5.47	12.64	2.82	20.27	5.48	12.65	2.55	19.37	4.57	10.56	1.79	19.45	4.65	10.75	2.72
11/21/2007 16:50	14.80	17.73	2.93	6.76	2.71	19.00	4.21	9.71	2.89	20.27	5.47	12.63	2.81	20.28	5.48	12.66	2.56	19.37	4.58	10.57	1.80	19.45	4.66	10.75	2.72
11/21/2007 16:55	14.80	17.73	2.93	6.76	2.71	19.00	4.20	9.71	2.89	20.27	5.47	12.63	2.81	20.28	5.48	12.66	2.56	19.37	4.57	10.56	1.79	19.45	4.65	10.75	2.72
11/21/2007 17:00	14.80	17.73	2.93	6.77	2.72	19.01	4.21	9.72	2.90	20.27	5.47	12.64	2.82	20.29	5.49	12.67	2.57	19.37	4.57	10.56	1.79	19.46	4.66	10.77	2.74
11/21/2007 17:05	14.80	17.73	2.93	6.77	2.72	19.01	4.21	9.72	2.90	20.28	5.48	12.65	2.83	20.29	5.49	12.69	2.59	19.38	4.58	10.58	1.81	19.46	4.67	10.78	2.75
11/21/2007 17:10	14.80	17.73	2.93	6.76	2.71	19.01	4.21	9.73	2.91	20.28	5.48	12.66	2.84	20.29	5.50	12.69	2.59	19.37	4.58	10.57	1.80	19.46	4.67	10.78	2.75
11/21/2007 17:15	14.80	17.73	2.93	6.76	2.71	19.01	4.21	9.72	2.90	20.28	5.48	12.65	2.83	20.29	5.49	12.69	2.59	19.38	4.58	10.58	1.81	19.46	4.66	10.77	2.74
11/21/2007 17:20	14.80	17.72	2.92	6.74	2.69	19.01	4.21	9.73	2.91	20.28	5.47	12.64	2.82	20.29	5.49	12.68	2.58	19.38	4.58	10.57	1.80	19.46	4.66	10.77	2.74
11/21/2007 17:25	14.80	17.72	2.92	6.74	2.69	19.01	4.21	9.72	2.90	20.27	5.47	12.64	2.82	20.30	5.50	12.69	2.59	19.38	4.58	10.57	1.80	19.46	4.66	10.77	2.74
11/21/2007 17:30	14.80	17.72	2.92	6.75	2.70	19.01	4.21	9.72	2.90	20.27	5.47	12.64	2.82	20.30	5.50	12.71	2.61	19.38	4.58	10.58	1.81	19.46	4.66	10.77	2.74
11/21/2007 17:35	14.80	17.72	2.92	6.74	2.69	19.01	4.21	9.73	2.91	20.28	5.48	12.65	2.83	20.30	5.50	12.70	2.60	19.37	4.58	10.57	1.80	19.46	4.67	10.78	2.75
11/21/2007 17:40	14.80	17.71	2.91	6.73	2.68	19.00	4.21	9.72	2.90	20.27	5.47	12.63	2.81	20.30	5.51	12.71	2.61	19.37	4.58	10.57	1.80	19.46	4.67	10.78	2.75
11/21/2007 17:45	14.80	17.71	2.91	6.72	2.67	19.00	4.21	9.72	2.90	20.27	5.47	12.64	2.82	20.30	5.50	12.71	2.61	19.37	4.57	10.56	1.79	19.46	4.67	10.78	2.75
11/21/2007 17:50	14.79	17.70	2.91	6.71	2.66	19.00	4.21	9.71	2.89	20.26	5.47	12.63	2.81	20.30	5.50	12.71	2.61	19.37	4.57	10.56	1.79	19.46	4.66	10.77	2.74
11/21/2007 17:55	14.80	17.70	2.90	6.69	2.64	19.00	4.20	9.70	2.88	20.26	5.46	12.62	2.80	20.30	5.50	12.70	2.60	19.36	4.57	10.54	1.77	19.45	4.66	10.75	2.72
11/21/2007 18:00	14.80	17.69	2.89	6.67	2.62	19.00	4.20	9.69	2.87	20.26	5.46	12.61	2.79	20.30	5.50	12.70	2.60	19.36	4.57	10.54	1.77	19.45	4.66	10.75	2.72
11/21/2007 18:05	14.80	17.68	2.88	6.65	2.60	18.99	4.19	9.67	2.85	20.25	5.45	12.60	2.78	20.30	5.50	12.70	2.60	19.36	4.56	10.53	1.76	19.45	4.65	10.74	2.71
11/21/2007 18:10	14.79	17.67	2.88	6.66	2.61	18.98	4.19	9.68	2.86	20.25	5.46	12.60	2.78	20.29	5.50	12.70	2.60	19.35	4.56	10.53	1.76	19.44	4.65	10.75	2.72
11/21/2007 18:15	14.80	17.66	2.87	6.62	2.57	18.98	4.18	9.66	2.84	20.24	5.45	12.58	2.76	20.29	5.49	12.68	2.58	19.34	4.55	10.50	1.73	19.44	4.64	10.72	2.69
11/21/2007 18:20	14.80	17.65	2.85	6.58	2.53	18.97	4.17	9.63	2.81	20.23	5.43	12.54	2.72	20.29	5.49	12.67	2.57	19.34	4.54	10.48	1.71	19.44	4.64	10.71	2.68
11/21/2007 18:25	14.80	17.64	2.84	6.56	2.51	18.96	4.16	9.62	2.80	20.23	5.43	12.53	2.71	20.29	5.49	12.67	2.57	19.34	4.54	10.48	1.71	19.43	4.63	10.69	2.66
11/21/2007 18:30	14.80	17.63	2.83	6.54	2.49	18.96	4.16	9.60	2.78	20.22	5.42	12.51	2.69	20.28	5.48	12.65	2.55	19.33	4.53	10.46	1.69	19.43	4.63	10.68	2.65
11/21/2007 18:35	14.80	17.62	2.82	6.52	2.47	18.95	4.15	9.58	2.76	20.21	5.41	12.50	2.68	20.28	5.48	12.65	2.55	19.32	4.52	10.44	1.67	19.42	4.62	10.67	2.64
11/21/2007 18:40	14.80	17.60	2.80	6.48	2.43	18.93	4.13	9.55	2.73	20.20	5.40	12.48	2.66	20.27	5.47	12.63	2.53	19.31	4.51	10.42	1.65	19.41	4.61	10.65	2.62
11/21/2007 18:45	14.80	17.60	2.80	6.47	2.42	18.92	4.13	9.53	2.71	20.19	5.39	12.46	2.64	20.26	5.46	12.61	2.51	19.30	4.50	10.40	1.63	19.41	4.61	10.64	2.61
11/21/2007 18:50	14.80	17.58	2.78	6.41	2.36	18.91	4.11	9.49	2.67	20.18	5.38	12.43	2.61	20.25	5.45	12.58	2.48	19.29	4.49	10.37	1.60	19.40	4.59	10.61	2.58
11/21/2007 18:55	14.80	17.58	2.78	6.41	2.36	18.90	4.10	9.48	2.66	20.17	5.38	12.41	2.59	20.24	5.45	12.58	2.48	19.29	4.49	10.37	1.60	19.39	4.59	10.61	2.58
11/21/2007 19:00	14.80	17.56	2.76	6.37	2.32	18.89	4.09	9.44	2.62	20.16	5.36	12.38	2.56	20.23	5.43	12.55	2.45	19.27	4.47	10.32	1.55	19.38	4.58	10.57	2.54
11/21/2007 19:05	14.80	17.55	2.74	6.34	2.29	18.88	4.07	9.41	2.59	20.15	5.35	12.35	2.53	20.23	5.42	12.52	2.42	19.26	4.46	10.30	1.53	19.37	4.57	10.55	2.52
11/21/2007 19:10	14.80	17.54	2.74	6.33	2.28	18.87	4.06	9.39	2.57	20.14	5.34	12.34	2.52	20.22	5.41	12.50	2.40	19.25	4.45	10.28	1.51	19.36	4.56	10.53	2.50
11/21/2007 19:15	14.81	17.52	2.72	6.27	2.22	18.85	4.05	9.34	2.52	20.13	5.32	12.29	2.47	20.21	5.40	12.48	2.38	19.24	4.44	10.24	1.47	19.36	4.55	10.50	2.47
11/21/2007 19:20	14.80	17.51	2.71	6.26	2.21	18.84	4.04	9.33	2.51	20.12	5.32	12.28	2.46	20.21	5.40	12.48	2.38	19.23	4.43	10.23	1.46	19.35	4.54	10.49	2.46
11/21/2007 19:25	14.80	17.50	2.70	6.24	2.19	18.84	4.03	9.31	2.49	20.11	5.31	12.27	2.45	20.20	5.39	12.46	2.36	19.22	4.42	10.21	1.44	19.34	4.54	10.48	2.45

Table 2 (Page 8 of 24)
Summary of Water Levels during Tidal Cycles
Water Resources Assessment
Area 4 Environmental Impact Assessment
Bahama Rock, Ltd.
Grand Bahama, Bahamas

	Atmosphere	MW-1				MW-2				MW-3				MW-4				MW-5				MW-6			
Time, GMT-05:00	Absolute Pressure (psi)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)
11/21/2007 19:30	14.81	17.50	2.69	6.21	2.16	18.82	4.02	9.27	2.45	20.10	5.30	12.23	2.41	20.19	5.39	12.44	2.34	19.22	4.41	10.19	1.42	19.33	4.52	10.45	2.42
11/21/2007 19:35	14.81	17.48	2.68	6.18	2.13	18.81	4.00	9.24	2.42	20.09	5.29	12.21	2.39	20.18	5.38	12.42	2.32	19.21	4.40	10.17	1.40	19.32	4.52	10.43	2.40
11/21/2007 19:40	14.81	17.47	2.66	6.15	2.10	18.79	3.99	9.21	2.39	20.08	5.28	12.19	2.37	20.18	5.37	12.40	2.30	19.20	4.39	10.15	1.38	19.31	4.51	10.41	2.38
11/21/2007 19:45	14.81	17.45	2.65	6.11	2.06	18.79	3.98	9.19	2.37	20.07	5.26	12.16	2.34	20.17	5.36	12.38	2.28	19.19	4.38	10.12	1.35	19.30	4.50	10.39	2.36
11/21/2007 19:50	14.81	17.44	2.63	6.08	2.03	18.77	3.97	9.16	2.34	20.06	5.25	12.13	2.31	20.16	5.36	12.37	2.27	19.17	4.37	10.09	1.32	19.30	4.49	10.38	2.35
11/21/2007 19:55	14.81	17.43	2.62	6.05	2.00	18.76	3.95	9.13	2.31	20.04	5.24	12.10	2.28	20.15	5.35	12.35	2.25	19.17	4.36	10.07	1.30	19.28	4.48	10.34	2.31
11/21/2007 20:00	14.81	17.41	2.61	6.02	1.97	18.75	3.94	9.11	2.29	20.04	5.23	12.08	2.26	20.14	5.33	12.32	2.22	19.16	4.35	10.05	1.28	19.27	4.47	10.32	2.29
11/21/2007 20:05	14.81	17.40	2.59	5.99	1.94	18.73	3.93	9.07	2.25	20.03	5.22	12.06	2.24	20.13	5.32	12.30	2.20	19.15	4.34	10.02	1.25	19.27	4.46	10.30	2.27
11/21/2007 20:10	14.81	17.38	2.57	5.94	1.89	18.72	3.91	9.04	2.22	20.01	5.21	12.02	2.20	20.12	5.32	12.29	2.19	19.13	4.33	9.99	1.22	19.26	4.45	10.28	2.25
11/21/2007 20:15	14.81	17.36	2.55	5.90	1.85	18.71	3.90	9.00	2.18	20.00	5.19	11.98	2.16	20.11	5.30	12.24	2.14	19.12	4.31	9.96	1.19	19.24	4.43	10.23	2.20
11/21/2007 20:20	14.81	17.35	2.55	5.88	1.83	18.70	3.89	8.99	2.17	19.99	5.18	11.96	2.14	20.10	5.30	12.23	2.13	19.11	4.31	9.95	1.18	19.23	4.43	10.22	2.19
11/21/2007 20:25	14.80	17.34	2.54	5.86	1.81	18.68	3.88	8.97	2.15	19.97	5.17	11.94	2.12	20.09	5.29	12.22	2.12	19.10	4.30	9.92	1.15	19.22	4.42	10.21	2.18
11/21/2007 20:30	14.80	17.32	2.52	5.81	1.76	18.67	3.87	8.93	2.11	19.96	5.16	11.91	2.09	20.08	5.28	12.19	2.09	19.09	4.28	9.89	1.12	19.21	4.40	10.17	2.14
11/21/2007 20:35	14.81	17.31	2.50	5.77	1.72	18.66	3.85	8.89	2.07	19.95	5.14	11.87	2.05	20.07	5.26	12.14	2.04	19.08	4.27	9.86	1.09	19.20	4.39	10.14	2.11
11/21/2007 20:40	14.80	17.29	2.49	5.75	1.70	18.64	3.84	8.87	2.05	19.94	5.13	11.85	2.03	20.06	5.25	12.13	2.03	19.07	4.26	9.85	1.08	19.19	4.38	10.13	2.10
11/21/2007 20:45	14.80	17.28	2.47	5.71	1.66	18.63	3.83	8.83	2.01	19.92	5.12	11.82	2.00	20.05	5.24	12.11	2.01	19.05	4.25	9.81	1.04	19.18	4.37	10.09	2.06
11/21/2007 20:50	14.80	17.26	2.46	5.67	1.62	18.62	3.81	8.80	1.98	19.91	5.10	11.78	1.96	20.03	5.23	12.08	1.98	19.04	4.24	9.79	1.02	19.17	4.36	10.07	2.04
11/21/2007 20:55	14.80	17.24	2.44	5.63	1.58	18.60	3.80	8.77	1.95	19.89	5.09	11.75	1.93	20.02	5.22	12.06	1.96	19.03	4.22	9.76	0.99	19.15	4.35	10.04	2.01
11/21/2007 21:00	14.80	17.23	2.43	5.61	1.56	18.59	3.79	8.74	1.92	19.88	5.08	11.73	1.91	20.01	5.21	12.03	1.93	19.02	4.22	9.73	0.96	19.15	4.34	10.03	2.00
11/21/2007 21:05	14.80	17.21	2.41	5.57	1.52	18.58	3.77	8.71	1.89	19.87	5.07	11.70	1.88	20.00	5.20	12.00	1.90	19.00	4.20	9.70	0.93	19.13	4.33	10.00	1.97
11/21/2007 21:10	14.80	17.20	2.40	5.53	1.48	18.56	3.76	8.68	1.86	19.86	5.05	11.67	1.85	19.99	5.19	11.98	1.88	19.00	4.19	9.68	0.91	19.12	4.31	9.96	1.93
11/21/2007 21:15	14.81	17.19	2.38	5.49	1.44	18.55	3.74	8.64	1.82	19.85	5.04	11.64	1.82	19.98	5.17	11.94	1.84	18.98	4.17	9.62	0.85	19.11	4.30	9.93	1.90
11/21/2007 21:20	14.81	17.17	2.36	5.46	1.41	18.54	3.73	8.62	1.80	19.83	5.02	11.60	1.78	19.97	5.16	11.92	1.82	18.97	4.16	9.61	0.84	19.10	4.29	9.91	1.88
11/21/2007 21:25	14.80	17.16	2.36	5.45	1.40	18.53	3.72	8.60	1.78	19.82	5.02	11.59	1.77	19.96	5.15	11.90	1.80	18.96	4.15	9.59	0.82	19.09	4.28	9.89	1.86
11/21/2007 21:30	14.80	17.15	2.34	5.41	1.36	18.51	3.71	8.57	1.75	19.81	5.01	11.57	1.75	19.95	5.15	11.89	1.79	18.95	4.14	9.57	0.80	19.08	4.28	9.88	1.85
11/21/2007 21:35	14.80	17.13	2.33	5.38	1.33	18.51	3.70	8.55	1.73	19.80	4.99	11.53	1.71	19.94	5.14	11.87	1.77	18.94	4.13	9.54	0.77	19.07	4.26	9.84	1.81
11/21/2007 21:40	14.80	17.13	2.32	5.36	1.31	18.49	3.69	8.52	1.70	19.79	4.98	11.51	1.69	19.93	5.12	11.83	1.73	18.92	4.12	9.51	0.74	19.06	4.25	9.82	1.79
11/21/2007 21:45	14.80	17.11	2.31	5.33	1.28	18.48	3.68	8.50	1.68	19.78	4.97	11.49	1.67	19.92	5.11	11.81	1.71	18.91	4.10	9.48	0.71	19.05	4.24	9.80	1.77
11/21/2007 21:50	14.80	17.10	2.29	5.29	1.24	18.47	3.67	8.47	1.65	19.77	4.96	11.46	1.64	19.90	5.10	11.78	1.68	18.90	4.09	9.45	0.68	19.03	4.23	9.77	1.74
11/21/2007 21:55	14.80	17.08	2.28	5.26	1.21	18.45	3.65	8.42	1.60	19.75	4.95	11.43	1.61	19.89	5.09	11.76	1.66	18.89	4.08	9.43	0.66	19.02	4.22	9.74	1.71
11/21/2007 22:00	14.80	17.07	2.27	5.24	1.19	18.45	3.64	8.41	1.59	19.74	4.94	11.41	1.59	19.89	5.08	11.73	1.63	18.88	4.07	9.41	0.64	19.01	4.21	9.72	1.69
11/21/2007 22:05	14.80	17.07	2.26	5.23	1.18	18.44	3.64	8.40	1.58	19.74	4.94	11.41	1.59	19.88	5.08	11.72	1.62	18.87	4.07	9.40	0.63	19.01	4.21	9.71	1.68
11/21/2007 22:10	14.80	17.06	2.26	5.22	1.17	18.43	3.63	8.38	1.56	19.73	4.93	11.38	1.56	19.88	5.07	11.71	1.61	18.87	4.06	9.39	0.62	19.00	4.20	9.69	1.66
11/21/2007 22:15	14.81	17.05	2.25	5.19	1.14	18.42	3.61	8.34	1.52	19.72	4.91	11.35	1.53	19.87	5.06	11.68	1.58	18.85	4.05	9.34	0.57	18.99	4.18	9.66	1.63
11/21/2007 22:20	14.81	17.04	2.24	5.16	1.11	18.42	3.61	8.34	1.52	19.71	4.91	11.34	1.52	19.85	5.05	11.66	1.56	18.84	4.04	9.33	0.56	18.99	4.18	9.66	1.63
11/21/2007 22:25	14.81	17.04	2.23	5.15	1.10	18.40	3.60	8.31	1.49	19.70	4.90	11.32	1.50	19.84	5.04	11.63	1.53	18.84	4.04	9.32	0.55	18.98	4.17	9.63	1.60
11/21/2007 22:30	14.81	17.03	2.22	5.13	1.08	18.40	3.59	8.30	1.48	19.69	4.89	11.29	1.47	19.84	5.03	11.62	1.52	18.83	4.02	9.29	0.52	18.97	4.17	9.62	1.59
11/21/2007 22:35	14.81	17.03	2.22	5.13	1.08	18.39	3.58	8.28	1.46	19.69	4.89	11.29	1.47	19.83	5.02	11.60	1.50	18.83	4.02	9.28	0.51	18.97	4.16	9.61	1.58
11/21/2007 22:40	14.80	17.02	2.22	5.13	1.08	18.39	3.59	8.29	1.47	19.69	4.89	11.29	1.47	19.82	5.02	11.60	1.50	18.82	4.02	9.28	0.51	18.96	4.16	9.60	1.57
11/21/2007 22:45	14.80	17.02	2.22	5.12	1.07	18.39	3.58	8.28	1.46	19.68	4.88	11.28	1.46	19.81	5.01	11.58	1.48	18.82	4.01	9.27	0.50	18.95	4.15	9.59	1.56
11/21/2007 22:50	14.80	17.01	2.21	5.10	1.05	18.38	3.58	8.26	1.44	19.68	4.88	11.27	1.45	19.81	5.01	11.57	1.47	18.81	4.01	9.25	0.48	18.95	4.15	9.58	1.55
11/21/2007 22:55	14.80	17.01	2.21	5.11	1.06	18.37	3.57	8.25	1.43	19.67	4.87	11.26	1.44	19.80	5.00	11.56	1.46	18.80	4.00	9.24	0.47	18.94	4.14	9.57	1.54
11/21/2007 23:00	14.80	17.00	2.20	5.09	1.04	18.37	3.57	8.25	1.43	19.67	4.87	11.25	1.43	19.79	5.00	11.54	1.44	18.80	4.00	9.23	0.46	18.94	4.14	9.56	1.53
11/21/2007 23:05	14.80	17.00	2.20	5.08	1.03	18.37	3.56	8.23	1.41	19.66	4.86	11.23	1.41	19.79	4.99	11.51	1.41	18.80	3.99	9.22	0.45	18.94	4.13	9.55	1.52
11/21/2007 23:10	14.80	17.01	2.20	5.09	1.04	18.37	3.56	8.23	1.41	19.66	4.86	11.23	1.41	19.79	4.99	11.53	1.43	18.79	3.99	9.21	0.44	18.93	4.13	9.54	1.51
11/21/2007 23:15	14.80	17.01	2.21	5.10	1.05	18.37	3.56	8.23	1.41	19.66	4.86	11.23	1.41	19.79	4.99	11.52	1.42	18.79	3.99	9.21	0.44	18.93	4.13	9.54	1.51
11/21/2007 23:20	14.81	17.01	2.20	5.08	1.03	18.36	3.55	8.21	1.39	19.66	4.86	11.22	1.40	19.79	4.98	11.50	1.40	18.79	3.98	9.20	0.43	18.93	4.12	9.52	1.49
11/21/2007 23:25	14.80	17.01	2.21	5.10	1.05	18.36	3.56	8.22	1.40	19.66	4.86	11.22	1.40	19.78	4.98	11.50	1.40	18.79	3.98	9.20	0.43	18.93	4.13	9.54	1.51
11/21/2007 23:30	14.80	17.01	2.21	5.10	1.05	18.36	3.55	8.21	1.39	19.66	4.86	11.21	1.39	19.78	4.98	11.49	1.39	18.79	3.98	9.20	0.43	18.92	4.12	9.52	1.49
11/21/2007 23:35	14.80	17.02	2.21	5.11	1.06	18.36	3.56	8.22	1.40	19.66	4.86	11.22	1.40	19.78	4.97	11.48	1.38	18.79	3.98	9.20	0.43	18.92	4.12	9.51	1.48
11/21/2007 23:40	14.81	17.02	2.22	5.12	1.07	18.36	3.56	8.22	1.40	19.66	4.85	11.21	1.39	19.78	4.97	11.49	1.39	18.79	3.98	9.20	0.43	18.92	4.12	9.51	1.48
11/21/2007 23:45	14.80	17.03	2.23	5.15	1.10	18.37	3.57	8.24	1.42	19.66	4.86	11.24	1.42	19.78	4.97	11.49	1.39	18.79	3.99	9.22	0.45	18.93	4.13	9.54	1.51
11/21/2007 23:50	14.80	17.04	2.24	5.16	1.11	18.37	3.57	8.25	1.43	19.66	4.86	11.24	1.42	19.78	4.97	11.49	1.39	18.79	3.99	9.21	0.44	18.92	4.12	9.52	1.49
11/21/2007 23:55	14.80	17.04	2.24	5.16	1.11	18.37	3.57	8.25	1.43	19.66	4.86	11.24	1.42	19.77	4.97	11.48	1.38	18.79	3.99	9.21	0.44	18.92	4.12	9.52	1.49

Table 2 (Page 9 of 24)
Summary of Water Levels during Tidal Cycles
Water Resources Assessment
Area 4 Environmental Impact Assessment
Bahama Rock, Ltd.
Grand Bahama, Bahamas

	Atmosphere	MW-1				MW-2				MW-3				MW-4				MW-5				MW-6			
Time, GMT-05:00	Absolute Pressure (psi)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)
11/22/2007 0:00	14.81	17.05	2.24	5.17	1.12	18.37	3.57	8.24	1.42	19.67	4.86	11.24	1.42	19.77	4.97	11.47	1.37	18.79	3.99	9.21	0.44	18.93	4.12	9.52	1.49
11/22/2007 0:05	14.80	17.05	2.25	5.21	1.16	18.38	3.58	8.26	1.44	19.67	4.87	11.25	1.43	19.78	4.98	11.49	1.39	18.80	4.00	9.24	0.47	18.93	4.13	9.55	1.52
11/22/2007 0:10	14.80	17.06	2.26	5.22	1.17	18.39	3.58	8.27	1.45	19.68	4.88	11.26	1.44	19.78	4.98	11.49	1.39	18.80	4.00	9.23	0.46	18.93	4.13	9.54	1.51
11/22/2007 0:15	14.80	17.07	2.27	5.25	1.20	18.39	3.59	8.30	1.48	19.68	4.89	11.28	1.46	19.78	4.98	11.50	1.40	18.81	4.01	9.25	0.48	18.94	4.14	9.56	1.53
11/22/2007 0:20	14.80	17.08	2.28	5.27	1.22	18.40	3.60	8.31	1.49	19.69	4.89	11.29	1.47	19.78	4.98	11.51	1.41	18.81	4.01	9.26	0.49	18.94	4.14	9.57	1.54
11/22/2007 0:25	14.80	17.09	2.29	5.29	1.24	18.41	3.61	8.33	1.51	19.69	4.89	11.30	1.48	19.79	4.99	11.52	1.42	18.82	4.01	9.27	0.50	18.94	4.14	9.57	1.54
11/22/2007 0:30	14.80	17.11	2.31	5.33	1.28	18.41	3.62	8.35	1.53	19.70	4.90	11.32	1.50	19.79	5.00	11.54	1.44	18.83	4.03	9.30	0.53	18.95	4.15	9.59	1.56
11/22/2007 0:35	14.80	17.12	2.32	5.35	1.30	18.42	3.62	8.36	1.54	19.71	4.91	11.33	1.51	19.80	5.00	11.54	1.44	18.84	4.03	9.31	0.54	18.96	4.16	9.60	1.57
11/22/2007 0:40	14.80	17.13	2.33	5.38	1.33	18.43	3.63	8.39	1.57	19.72	4.92	11.36	1.54	19.80	5.00	11.55	1.45	18.84	4.04	9.34	0.57	18.97	4.16	9.62	1.59
11/22/2007 0:45	14.80	17.14	2.34	5.41	1.36	18.45	3.64	8.42	1.60	19.73	4.93	11.38	1.56	19.81	5.01	11.56	1.46	18.85	4.05	9.35	0.58	18.97	4.17	9.63	1.60
11/22/2007 0:50	14.80	17.16	2.36	5.44	1.39	18.46	3.65	8.44	1.62	19.74	4.94	11.40	1.58	19.81	5.01	11.57	1.47	18.85	4.05	9.36	0.59	18.98	4.18	9.65	1.62
11/22/2007 0:55	14.80	17.18	2.38	5.49	1.44	18.47	3.67	8.48	1.66	19.75	4.96	11.44	1.62	19.82	5.02	11.60	1.50	18.87	4.08	9.41	0.64	18.99	4.19	9.68	1.65
11/22/2007 1:00	14.80	17.19	2.39	5.53	1.48	18.48	3.68	8.51	1.69	19.77	4.97	11.48	1.66	19.84	5.04	11.64	1.54	18.88	4.09	9.43	0.66	19.00	4.20	9.70	1.67
11/22/2007 1:05	14.80	17.21	2.41	5.57	1.52	18.50	3.70	8.54	1.72	19.78	4.98	11.50	1.68	19.84	5.04	11.65	1.55	18.89	4.10	9.46	0.69	19.01	4.21	9.73	1.70
11/22/2007 1:10	14.80	17.22	2.43	5.60	1.55	18.51	3.72	8.58	1.76	19.79	4.99	11.54	1.72	19.85	5.05	11.67	1.57	18.90	4.10	9.48	0.71	19.02	4.23	9.76	1.73
11/22/2007 1:15	14.80	17.24	2.44	5.63	1.58	18.53	3.73	8.62	1.80	19.81	5.01	11.57	1.75	19.87	5.07	11.70	1.60	18.92	4.12	9.53	0.76	19.03	4.24	9.78	1.75
11/22/2007 1:20	14.80	17.25	2.45	5.67	1.62	18.55	3.75	8.66	1.84	19.82	5.02	11.59	1.77	19.88	5.08	11.73	1.63	18.93	4.13	9.55	0.78	19.05	4.25	9.81	1.78
11/22/2007 1:25	14.80	17.26	2.46	5.69	1.64	18.56	3.77	8.70	1.88	19.83	5.04	11.63	1.81	19.89	5.09	11.76	1.66	18.95	4.15	9.59	0.82	19.06	4.26	9.85	1.82
11/22/2007 1:30	14.80	17.28	2.48	5.72	1.67	18.58	3.78	8.73	1.91	19.85	5.05	11.66	1.84	19.90	5.10	11.78	1.68	18.96	4.16	9.62	0.85	19.07	4.27	9.87	1.84
11/22/2007 1:35	14.80	17.28	2.49	5.74	1.69	18.59	3.79	8.75	1.93	19.86	5.06	11.70	1.88	19.91	5.11	11.80	1.70	18.97	4.17	9.64	0.87	19.09	4.29	9.90	1.87
11/22/2007 1:40	14.79	17.30	2.51	5.80	1.75	18.60	3.81	8.80	1.98	19.87	5.08	11.73	1.91	19.92	5.13	11.84	1.74	18.99	4.19	9.68	0.91	19.09	4.30	9.93	1.90
11/22/2007 1:45	14.80	17.31	2.51	5.81	1.76	18.62	3.82	8.83	2.01	19.89	5.09	11.75	1.93	19.93	5.13	11.86	1.76	19.00	4.20	9.70	0.93	19.10	4.31	9.94	1.91
11/22/2007 1:50	14.80	17.33	2.53	5.84	1.79	18.63	3.83	8.85	2.03	19.90	5.10	11.78	1.96	19.94	5.14	11.88	1.78	19.01	4.22	9.74	0.97	19.11	4.31	9.96	1.93
11/22/2007 1:55	14.79	17.35	2.55	5.89	1.84	18.65	3.85	8.90	2.08	19.91	5.12	11.82	2.00	19.96	5.16	11.92	1.82	19.03	4.23	9.78	1.01	19.13	4.33	10.01	1.98
11/22/2007 2:00	14.80	17.36	2.56	5.92	1.87	18.66	3.87	8.93	2.11	19.92	5.13	11.84	2.02	19.97	5.17	11.94	1.84	19.04	4.24	9.80	1.03	19.14	4.34	10.03	2.00
11/22/2007 2:05	14.79	17.37	2.58	5.96	1.91	18.67	3.88	8.96	2.14	19.94	5.15	11.88	2.06	19.98	5.19	11.98	1.88	19.05	4.26	9.85	1.08	19.15	4.36	10.07	2.04
11/22/2007 2:10	14.79	17.39	2.60	6.01	1.96	18.69	3.90	9.01	2.19	19.95	5.16	11.92	2.10	19.99	5.20	12.01	1.91	19.07	4.28	9.89	1.12	19.16	4.38	10.11	2.08
11/22/2007 2:15	14.79	17.40	2.62	6.04	1.99	18.70	3.92	9.04	2.22	19.96	5.18	11.95	2.13	20.00	5.21	12.03	1.93	19.07	4.29	9.90	1.13	19.17	4.39	10.13	2.10
11/22/2007 2:20	14.79	17.42	2.63	6.06	2.01	18.71	3.92	9.06	2.24	19.97	5.18	11.95	2.13	20.01	5.22	12.04	1.94	19.09	4.30	9.92	1.15	19.18	4.39	10.14	2.11
11/22/2007 2:25	14.79	17.43	2.65	6.11	2.06	18.73	3.94	9.10	2.28	19.99	5.20	12.00	2.18	20.02	5.23	12.08	1.98	19.10	4.31	9.96	1.19	19.19	4.40	10.17	2.14
11/22/2007 2:30	14.79	17.45	2.66	6.15	2.10	18.74	3.95	9.13	2.31	20.00	5.21	12.02	2.20	20.03	5.24	12.10	2.00	19.12	4.33	9.99	1.22	19.21	4.42	10.21	2.18
11/22/2007 2:35	14.79	17.46	2.67	6.17	2.12	18.76	3.97	9.17	2.35	20.02	5.23	12.07	2.25	20.04	5.25	12.12	2.02	19.13	4.34	10.02	1.25	19.22	4.43	10.23	2.20
11/22/2007 2:40	14.79	17.48	2.69	6.22	2.17	18.77	3.98	9.19	2.37	20.03	5.24	12.09	2.27	20.05	5.26	12.15	2.05	19.14	4.35	10.05	1.28	19.23	4.44	10.25	2.22
11/22/2007 2:45	14.78	17.50	2.71	6.26	2.21	18.78	4.00	9.23	2.41	20.04	5.26	12.14	2.32	20.06	5.27	12.18	2.08	19.16	4.37	10.10	1.33	19.24	4.46	10.29	2.26
11/22/2007 2:50	14.78	17.51	2.73	6.29	2.24	18.80	4.01	9.26	2.44	20.05	5.27	12.16	2.34	20.07	5.29	12.21	2.11	19.17	4.38	10.12	1.35	19.25	4.47	10.32	2.29
11/22/2007 2:55	14.79	17.53	2.74	6.33	2.28	18.81	4.02	9.29	2.47	20.07	5.28	12.19	2.37	20.08	5.29	12.22	2.12	19.18	4.39	10.14	1.37	19.26	4.47	10.33	2.30
11/22/2007 3:00	14.78	17.55	2.76	6.38	2.33	18.82	4.04	9.32	2.50	20.08	5.30	12.23	2.41	20.10	5.31	12.27	2.17	19.19	4.41	10.17	1.40	19.27	4.49	10.37	2.34
11/22/2007 3:05	14.78	17.57	2.78	6.43	2.38	18.84	4.05	9.36	2.54	20.09	5.31	12.26	2.44	20.11	5.32	12.29	2.19	19.21	4.43	10.22	1.45	19.29	4.51	10.40	2.37
11/22/2007 3:10	14.78	17.58	2.79	6.45	2.40	18.85	4.06	9.39	2.57	20.10	5.32	12.29	2.47	20.11	5.33	12.30	2.20	19.21	4.43	10.23	1.46	19.30	4.51	10.43	2.40
11/22/2007 3:15	14.78	17.60	2.82	6.50	2.45	18.86	4.08	9.42	2.60	20.12	5.34	12.32	2.50	20.13	5.35	12.35	2.25	19.23	4.45	10.28	1.51	19.31	4.52	10.45	2.42
11/22/2007 3:20	14.78	17.61	2.83	6.53	2.48	18.88	4.10	9.46	2.64	20.13	5.35	12.36	2.54	20.13	5.35	12.36	2.26	19.24	4.46	10.30	1.53	19.32	4.54	10.48	2.45
11/22/2007 3:25	14.78	17.63	2.84	6.57	2.52	18.89	4.11	9.49	2.67	20.15	5.37	12.39	2.57	20.15	5.37	12.39	2.29	19.26	4.47	10.33	1.56	19.33	4.55	10.50	2.47
11/22/2007 3:30	14.78	17.64	2.86	6.61	2.56	18.90	4.12	9.52	2.70	20.16	5.38	12.43	2.61	20.16	5.38	12.43	2.33	19.27	4.49	10.38	1.61	19.34	4.56	10.54	2.51
11/22/2007 3:35	14.78	17.66	2.88	6.65	2.60	18.92	4.13	9.54	2.72	20.18	5.40	12.46	2.64	20.17	5.39	12.44	2.34	19.28	4.50	10.39	1.62	19.36	4.57	10.56	2.53
11/22/2007 3:40	14.78	17.67	2.89	6.68	2.63	18.93	4.15	9.58	2.76	20.18	5.40	12.47	2.65	20.18	5.40	12.47	2.37	19.30	4.51	10.42	1.65	19.36	4.58	10.58	2.55
11/22/2007 3:45	14.79	17.69	2.90	6.70	2.65	18.94	4.15	9.59	2.77	20.20	5.41	12.50	2.68	20.19	5.40	12.47	2.37	19.31	4.52	10.44	1.67	19.37	4.59	10.59	2.56
11/22/2007 3:50	14.79	17.71	2.92	6.75	2.70	18.96	4.17	9.63	2.81	20.22	5.43	12.54	2.72	20.20	5.41	12.51	2.41	19.32	4.53	10.47	1.70	19.39	4.60	10.63	2.60
11/22/2007 3:55	14.78	17.72	2.94	6.79	2.74	18.96	4.18	9.66	2.84	20.22	5.44	12.57	2.75	20.21	5.43	12.54	2.44	19.33	4.55	10.50	1.73	19.40	4.62	10.66	2.63
11/22/2007 4:00	14.79	17.73	2.95	6.81	2.76	18.98	4.20	9.69	2.87	20.24	5.45	12.59	2.77	20.22	5.43	12.55	2.45	19.34	4.55	10.52	1.75	19.41	4.63	10.68	2.65
11/22/2007 4:05	14.79	17.74	2.96	6.83	2.78	18.99	4.20	9.70	2.88	20.25	5.46	12.61	2.79	20.23	5.44	12.57	2.47	19.35	4.56	10.54	1.77	19.42	4.63	10.69	2.66
11/22/2007 4:10	14.79	17.76	2.97	6.86	2.81	19.00	4.21	9.73	2.91	20.26	5.48	12.65	2.83	20.24	5.46	12.61	2.51	19.36	4.58	10.57	1.80	19.43	4.64	10.72	2.69
11/22/2007 4:15	14.79	17.77	2.99	6.90	2.85	19.01	4.23	9.76	2.94	20.27	5.49	12.67	2.85	20.25	5.47	12.63	2.53	19.37	4.59	10.60	1.83	19.44	4.65	10.75	2.72
11/22/2007 4:20	14.79	17.79	3.00	6.93	2.88	19.02	4.24	9.78	2.96	20.29	5.50	12.70	2.88	20.26	5.48	12.65	2.55	19.38	4.60	10.62	1.85	19.45	4.66	10.77	2.74
11/22/2007 4:25	14.79	17.80	3.01	6.95	2.90	19.04	4.25	9.82	3.00	20.30	5.51	12.73	2.91	20.27	5.49	12.67	2.57	19.39	4.61	10.64	1.87	19.46	4.67	10.79	2.76

Table 2 (Page 10 of 24)
Summary of Water Levels during Tidal Cycles
Water Resources Assessment
Area 4 Environmental Impact Assessment
Bahama Rock, Ltd.
Grand Bahama, Bahamas

	Atmosphere	MW-1				MW-2				MW-3				MW-4				MW-5				MW-6			
Time, GMT-05:00	Absolute Pressure (psi)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)
11/22/2007 4:30	14.78	17.81	3.03	7.00	2.95	19.04	4.26	9.85	3.03	20.30	5.52	12.75	2.93	20.28	5.50	12.71	2.61	19.41	4.63	10.69	1.92	19.47	4.69	10.83	2.80
11/22/2007 4:35	14.79	17.81	3.03	7.00	2.95	19.05	4.27	9.86	3.04	20.31	5.53	12.76	2.94	20.29	5.51	12.72	2.62	19.41	4.63	10.69	1.92	19.48	4.69	10.84	2.81
11/22/2007 4:40	14.78	17.83	3.04	7.03	2.98	19.07	4.28	9.89	3.07	20.32	5.54	12.79	2.97	20.30	5.52	12.74	2.64	19.42	4.64	10.71	1.94	19.48	4.70	10.85	2.82
11/22/2007 4:45	14.78	17.83	3.05	7.04	2.99	19.08	4.29	9.91	3.09	20.33	5.55	12.81	2.99	20.31	5.53	12.76	2.66	19.43	4.64	10.72	1.95	19.49	4.71	10.87	2.84
11/22/2007 4:50	14.78	17.85	3.06	7.07	3.02	19.08	4.30	9.93	3.11	20.34	5.56	12.83	3.01	20.32	5.54	12.79	2.69	19.44	4.65	10.74	1.97	19.50	4.72	10.89	2.86
11/22/2007 4:55	14.78	17.85	3.06	7.07	3.02	19.09	4.31	9.94	3.12	20.35	5.56	12.85	3.03	20.33	5.54	12.80	2.70	19.45	4.66	10.77	2.00	19.51	4.73	10.92	2.89
11/22/2007 5:00	14.78	17.85	3.07	7.09	3.04	19.09	4.31	9.95	3.13	20.36	5.57	12.87	3.05	20.34	5.55	12.82	2.72	19.45	4.67	10.78	2.01	19.52	4.73	10.93	2.90
11/22/2007 5:05	14.78	17.86	3.07	7.10	3.05	19.10	4.32	9.98	3.16	20.36	5.58	12.88	3.06	20.34	5.56	12.83	2.73	19.46	4.67	10.79	2.02	19.52	4.74	10.94	2.91
11/22/2007 5:10	14.78	17.87	3.08	7.12	3.07	19.11	4.33	10.00	3.18	20.37	5.59	12.90	3.08	20.35	5.57	12.86	2.76	19.46	4.68	10.80	2.03	19.53	4.74	10.95	2.92
11/22/2007 5:15	14.78	17.87	3.09	7.13	3.08	19.12	4.33	10.01	3.19	20.38	5.59	12.92	3.10	20.35	5.57	12.87	2.77	19.47	4.69	10.83	2.06	19.53	4.75	10.97	2.94
11/22/2007 5:20	14.78	17.87	3.09	7.13	3.08	19.12	4.34	10.02	3.20	20.38	5.60	12.93	3.11	20.36	5.58	12.88	2.78	19.48	4.69	10.84	2.07	19.54	4.76	10.98	2.95
11/22/2007 5:25	14.79	17.88	3.09	7.14	3.09	19.13	4.34	10.03	3.21	20.39	5.60	12.93	3.11	20.37	5.58	12.89	2.79	19.48	4.69	10.84	2.07	19.54	4.76	10.98	2.95
11/22/2007 5:30	14.79	17.88	3.10	7.15	3.10	19.13	4.35	10.04	3.22	20.39	5.60	12.94	3.12	20.38	5.59	12.91	2.81	19.49	4.70	10.85	2.08	19.55	4.77	11.01	2.98
11/22/2007 5:35	14.78	17.88	3.09	7.14	3.09	19.13	4.35	10.04	3.22	20.39	5.61	12.95	3.13	20.38	5.60	12.92	2.82	19.49	4.70	10.86	2.09	19.55	4.77	11.01	2.98
11/22/2007 5:40	14.78	17.90	3.12	7.20	3.15	19.14	4.36	10.07	3.25	20.40	5.62	12.97	3.15	20.39	5.61	12.94	2.84	19.50	4.71	10.88	2.11	19.56	4.78	11.03	3.00
11/22/2007 5:45	14.79	17.89	3.10	7.16	3.11	19.14	4.35	10.05	3.23	20.40	5.61	12.96	3.14	20.39	5.60	12.94	2.84	19.50	4.71	10.88	2.11	19.56	4.78	11.03	3.00
11/22/2007 5:50	14.79	17.90	3.12	7.20	3.15	19.15	4.36	10.08	3.26	20.41	5.62	12.98	3.16	20.40	5.61	12.96	2.86	19.50	4.72	10.89	2.12	19.57	4.78	11.04	3.01
11/22/2007 5:55	14.79	17.89	3.10	7.16	3.11	19.15	4.36	10.07	3.25	20.41	5.62	12.98	3.16	20.40	5.61	12.96	2.86	19.50	4.72	10.89	2.12	19.57	4.78	11.04	3.01
11/22/2007 6:00	14.79	17.89	3.11	7.17	3.12	19.15	4.36	10.07	3.25	20.42	5.63	12.99	3.17	20.40	5.61	12.97	2.87	19.50	4.72	10.89	2.12	19.57	4.78	11.05	3.02
11/22/2007 6:05	14.79	17.88	3.09	7.14	3.09	19.15	4.36	10.07	3.25	20.41	5.62	12.98	3.16	20.41	5.62	12.98	2.88	19.50	4.72	10.89	2.12	19.57	4.78	11.05	3.02
11/22/2007 6:10	14.79	17.89	3.10	7.15	3.10	19.15	4.36	10.07	3.25	20.42	5.62	12.98	3.16	20.41	5.61	12.97	2.87	19.51	4.72	10.89	2.12	19.58	4.78	11.05	3.02
11/22/2007 6:15	14.79	17.88	3.09	7.14	3.09	19.15	4.36	10.07	3.25	20.42	5.62	12.98	3.16	20.42	5.62	12.99	2.89	19.51	4.72	10.89	2.12	19.57	4.78	11.04	3.01
11/22/2007 6:20	14.79	17.88	3.09	7.14	3.09	19.15	4.36	10.07	3.25	20.42	5.62	12.98	3.16	20.42	5.62	12.99	2.89	19.51	4.72	10.90	2.13	19.58	4.79	11.06	3.03
11/22/2007 6:25	14.79	17.88	3.09	7.14	3.09	19.15	4.36	10.08	3.26	20.42	5.63	13.00	3.18	20.42	5.63	13.01	2.91	19.51	4.73	10.92	2.15	19.58	4.79	11.06	3.03
11/22/2007 6:30	14.79	17.87	3.08	7.11	3.06	19.15	4.35	10.06	3.24	20.41	5.62	12.97	3.15	20.42	5.62	12.99	2.89	19.51	4.72	10.89	2.12	19.57	4.78	11.04	3.01
11/22/2007 6:35	14.79	17.86	3.07	7.09	3.04	19.14	4.35	10.05	3.23	20.41	5.62	12.97	3.15	20.42	5.63	13.00	2.90	19.50	4.71	10.88	2.11	19.58	4.79	11.05	3.02
11/22/2007 6:40	14.79	17.86	3.06	7.08	3.03	19.14	4.35	10.05	3.23	20.41	5.62	12.97	3.15	20.42	5.63	13.00	2.90	19.50	4.71	10.88	2.11	19.58	4.79	11.05	3.02
11/22/2007 6:45	14.79	17.85	3.05	7.05	3.00	19.13	4.34	10.03	3.21	20.40	5.61	12.95	3.13	20.42	5.62	12.99	2.89	19.50	4.71	10.87	2.10	19.57	4.78	11.04	3.01
11/22/2007 6:50	14.79	17.84	3.05	7.04	2.99	19.13	4.34	10.01	3.19	20.40	5.61	12.95	3.13	20.42	5.63	13.00	2.90	19.50	4.71	10.87	2.10	19.57	4.78	11.04	3.01
11/22/2007 6:55	14.79	17.83	3.04	7.02	2.97	19.13	4.34	10.01	3.19	20.39	5.60	12.93	3.11	20.42	5.62	12.99	2.89	19.49	4.70	10.85	2.08	19.57	4.77	11.03	3.00
11/22/2007 7:00	14.79	17.82	3.03	7.00	2.95	19.12	4.33	10.00	3.18	20.39	5.60	12.92	3.10	20.42	5.62	12.98	2.88	19.49	4.70	10.85	2.08	19.57	4.77	11.02	2.99
11/22/2007 7:05	14.80	17.81	3.02	6.97	2.92	19.12	4.32	9.98	3.16	20.38	5.59	12.90	3.08	20.42	5.62	12.98	2.88	19.48	4.69	10.82	2.05	19.56	4.77	11.01	2.98
11/22/2007 7:10	14.80	17.80	3.00	6.94	2.89	19.11	4.32	9.97	3.15	20.38	5.58	12.89	3.07	20.41	5.62	12.97	2.87	19.48	4.68	10.81	2.04	19.56	4.76	11.00	2.97
11/22/2007 7:15	14.79	17.79	3.00	6.93	2.88	19.10	4.31	9.95	3.13	20.37	5.58	12.88	3.06	20.41	5.61	12.97	2.87	19.47	4.68	10.80	2.03	19.55	4.76	11.00	2.97
11/22/2007 7:20	14.79	17.78	2.99	6.91	2.86	19.09	4.31	9.94	3.12	20.36	5.57	12.87	3.05	20.40	5.61	12.97	2.87	19.47	4.68	10.80	2.03	19.54	4.76	10.98	2.95
11/22/2007 7:25	14.79	17.76	2.97	6.86	2.81	19.08	4.29	9.91	3.09	20.35	5.56	12.84	3.02	20.40	5.60	12.94	2.84	19.46	4.66	10.77	2.00	19.54	4.75	10.96	2.93
11/22/2007 7:30	14.79	17.75	2.96	6.82	2.77	19.08	4.28	9.89	3.07	20.34	5.55	12.81	2.99	20.39	5.59	12.92	2.82	19.44	4.65	10.73	1.96	19.53	4.74	10.94	2.91
11/22/2007 7:35	14.79	17.73	2.94	6.78	2.73	19.06	4.27	9.87	3.05	20.33	5.54	12.80	2.98	20.38	5.59	12.92	2.82	19.44	4.65	10.73	1.96	19.53	4.74	10.94	2.91
11/22/2007 7:40	14.79	17.71	2.92	6.74	2.69	19.05	4.25	9.83	3.01	20.32	5.52	12.75	2.93	20.38	5.58	12.90	2.80	19.43	4.63	10.70	1.93	19.52	4.72	10.90	2.87
11/22/2007 7:45	14.80	17.70	2.90	6.70	2.65	19.04	4.24	9.79	2.97	20.31	5.51	12.73	2.91	20.37	5.57	12.87	2.77	19.41	4.62	10.66	1.89	19.51	4.71	10.88	2.85
11/22/2007 7:50	14.80	17.67	2.88	6.65	2.60	19.02	4.23	9.76	2.94	20.30	5.50	12.70	2.88	20.36	5.56	12.85	2.75	19.41	4.61	10.65	1.88	19.50	4.70	10.86	2.83
11/22/2007 7:55	14.80	17.66	2.86	6.61	2.56	19.01	4.22	9.74	2.92	20.28	5.49	12.67	2.85	20.35	5.55	12.83	2.73	19.40	4.60	10.63	1.86	19.49	4.69	10.83	2.80
11/22/2007 8:00	14.79	17.64	2.84	6.57	2.52	19.00	4.20	9.71	2.89	20.27	5.48	12.65	2.83	20.34	5.55	12.81	2.71	19.38	4.59	10.60	1.83	19.47	4.68	10.81	2.78
11/22/2007 8:05	14.79	17.62	2.83	6.53	2.48	18.98	4.19	9.67	2.85	20.26	5.46	12.62	2.80	20.33	5.54	12.79	2.69	19.37	4.58	10.58	1.81	19.47	4.67	10.79	2.76
11/22/2007 8:10	14.80	17.61	2.81	6.50	2.45	18.96	4.17	9.63	2.81	20.25	5.45	12.59	2.77	20.32	5.53	12.76	2.66	19.36	4.57	10.55	1.78	19.45	4.66	10.76	2.73
11/22/2007 8:15	14.80	17.59	2.80	6.46	2.41	18.95	4.15	9.59	2.77	20.23	5.44	12.55	2.73	20.31	5.51	12.74	2.64	19.35	4.55	10.51	1.74	19.44	4.65	10.73	2.70
11/22/2007 8:20	14.80	17.58	2.78	6.42	2.37	18.94	4.14	9.56	2.74	20.22	5.42	12.53	2.71	20.31	5.51	12.72	2.62	19.34	4.54	10.49	1.72	19.44	4.64	10.71	2.68
11/22/2007 8:25	14.79	17.57	2.77	6.40	2.35	18.93	4.13	9.55	2.73	20.21	5.41	12.50	2.68	20.30	5.50	12.71	2.61	19.33	4.54	10.48	1.71	19.43	4.64	10.71	2.68
11/22/2007 8:30	14.80	17.55	2.76	6.37	2.32	18.92	4.12	9.52	2.70	20.20	5.41	12.49	2.67	20.29	5.50	12.70	2.60	19.33	4.53	10.46	1.69	19.42	4.63	10.68	2.65
11/22/2007 8:35	14.80	17.53	2.74	6.32	2.27	18.90	4.10	9.47	2.65	20.19	5.40	12.46	2.64	20.28	5.48	12.66	2.56	19.32	4.52	10.43	1.66	19.41	4.61	10.66	2.63
11/22/2007 8:40	14.80	17.52	2.72	6.29	2.24	18.88	4.09	9.43	2.61	20.18	5.38	12.42	2.60	20.27	5.47	12.63	2.53	19.30	4.50	10.40	1.63	19.40	4.60	10.63	2.60
11/22/2007 8:45	14.80	17.50	2.70	6.23	2.18	18.87	4.07	9.40	2.58	20.16	5.36	12.38	2.56	20.26	5.46	12.62	2.52	19.29	4.49	10.37	1.60	19.39	4.59	10.61	2.58
11/22/2007 8:50	14.80	17.49	2.68	6.20	2.15	18.86	4.06	9.38	2.56	20.15	5.35	12.36	2.54	20.25	5.45	12.59	2.49	19.28	4.48	10.35	1.58	19.38	4.58	10.58	2.55
11/22/2007 8:55	14.80	17.47	2.66	6.15	2.10	18.85	4.05	9.34	2.52	20.14	5.34	12.32	2.50	20.25	5.45	12.58	2.48	19.27	4.47	10.32	1.55	19.37	4.57	10.56	2.53

Table 2 (Page 11 of 24)
Summary of Water Levels during Tidal Cycles
Water Resources Assessment
Area 4 Environmental Impact Assessment
Bahama Rock, Ltd.
Grand Bahama, Bahamas

	Atmosphere	MW-1				MW-2				MW-3				MW-4				MW-5				MW-6			
Time, GMT-05:00	Absolute Pressure (psi)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)
11/22/2007 9:00	14.80	17.45	2.65	6.12	2.07	18.83	4.03	9.30	2.48	20.13	5.32	12.30	2.48	20.24	5.44	12.55	2.45	19.26	4.45	10.28	1.51	19.36	4.56	10.53	2.50
11/22/2007 9:05	14.81	17.43	2.63	6.07	2.02	18.82	4.01	9.26	2.44	20.11	5.31	12.26	2.44	20.23	5.42	12.53	2.43	19.25	4.44	10.26	1.49	19.36	4.55	10.51	2.48
11/22/2007 9:10	14.80	17.42	2.62	6.05	2.00	18.80	4.00	9.24	2.42	20.09	5.29	12.22	2.40	20.22	5.41	12.50	2.40	19.23	4.43	10.23	1.46	19.34	4.54	10.48	2.45
11/22/2007 9:15	14.80	17.41	2.60	6.01	1.96	18.79	3.98	9.20	2.38	20.08	5.28	12.20	2.38	20.21	5.40	12.48	2.38	19.22	4.42	10.20	1.43	19.33	4.52	10.45	2.42
11/22/2007 9:20	14.80	17.39	2.59	5.98	1.93	18.77	3.97	9.18	2.36	20.07	5.27	12.17	2.35	20.20	5.40	12.48	2.38	19.21	4.41	10.18	1.41	19.32	4.52	10.45	2.42
11/22/2007 9:25	14.80	17.37	2.57	5.94	1.89	18.76	3.96	9.14	2.32	20.05	5.25	12.13	2.31	20.19	5.39	12.44	2.34	19.20	4.40	10.17	1.40	19.31	4.51	10.41	2.38
11/22/2007 9:30	14.81	17.35	2.55	5.89	1.84	18.75	3.94	9.10	2.28	20.04	5.24	12.10	2.28	20.17	5.37	12.39	2.29	19.18	4.38	10.11	1.34	19.30	4.49	10.37	2.34
11/22/2007 9:35	14.80	17.34	2.54	5.86	1.81	18.73	3.93	9.08	2.26	20.03	5.23	12.07	2.25	20.17	5.37	12.39	2.29	19.17	4.37	10.10	1.33	19.28	4.48	10.35	2.32
11/22/2007 9:40	14.81	17.33	2.52	5.81	1.76	18.72	3.91	9.03	2.21	20.02	5.21	12.02	2.20	20.15	5.34	12.34	2.24	19.16	4.35	10.05	1.28	19.27	4.47	10.31	2.28
11/22/2007 9:45	14.81	17.31	2.50	5.78	1.73	18.71	3.90	9.00	2.18	20.00	5.19	11.99	2.17	20.14	5.33	12.32	2.22	19.15	4.34	10.01	1.24	19.26	4.45	10.28	2.25
11/22/2007 9:50	14.81	17.30	2.49	5.76	1.71	18.69	3.88	8.96	2.14	19.99	5.18	11.96	2.14	20.13	5.32	12.29	2.19	19.13	4.32	9.99	1.22	19.25	4.44	10.25	2.22
11/22/2007 9:55	14.80	17.28	2.48	5.72	1.67	18.67	3.87	8.94	2.12	19.98	5.17	11.95	2.13	20.12	5.31	12.27	2.17	19.12	4.32	9.98	1.21	19.23	4.43	10.23	2.20
11/22/2007 10:00	14.81	17.27	2.46	5.69	1.64	18.66	3.85	8.90	2.08	19.96	5.15	11.90	2.08	20.10	5.29	12.23	2.13	19.11	4.30	9.93	1.16	19.22	4.42	10.20	2.17
11/22/2007 10:05	14.80	17.26	2.45	5.67	1.62	18.65	3.85	8.89	2.07	19.95	5.15	11.89	2.07	20.09	5.29	12.21	2.11	19.10	4.29	9.92	1.15	19.21	4.41	10.19	2.16
11/22/2007 10:10	14.80	17.24	2.44	5.63	1.58	18.64	3.84	8.86	2.04	19.94	5.13	11.85	2.03	20.08	5.28	12.19	2.09	19.08	4.28	9.88	1.11	19.20	4.40	10.15	2.12
11/22/2007 10:15	14.80	17.23	2.42	5.60	1.55	18.63	3.82	8.82	2.00	19.93	5.12	11.83	2.01	20.07	5.26	12.15	2.05	19.07	4.26	9.85	1.08	19.19	4.39	10.13	2.10
11/22/2007 10:20	14.81	17.21	2.41	5.56	1.51	18.61	3.81	8.79	1.97	19.91	5.10	11.78	1.96	20.05	5.25	12.12	2.02	19.06	4.25	9.82	1.05	19.18	4.37	10.09	2.06
11/22/2007 10:25	14.81	17.20	2.40	5.54	1.49	18.60	3.79	8.76	1.94	19.89	5.09	11.75	1.93	20.04	5.24	12.10	2.00	19.04	4.24	9.79	1.02	19.17	4.36	10.07	2.04
11/22/2007 10:30	14.80	17.19	2.38	5.50	1.45	18.59	3.78	8.74	1.92	19.88	5.08	11.73	1.91	20.03	5.23	12.07	1.97	19.03	4.23	9.76	0.99	19.16	4.35	10.05	2.02
11/22/2007 10:35	14.80	17.18	2.38	5.50	1.45	18.57	3.77	8.72	1.90	19.87	5.07	11.72	1.90	20.02	5.22	12.06	1.96	19.02	4.22	9.75	0.98	19.14	4.34	10.03	2.00
11/22/2007 10:40	14.80	17.17	2.37	5.47	1.42	18.56	3.76	8.69	1.87	19.86	5.06	11.70	1.88	20.01	5.21	12.04	1.94	19.01	4.22	9.74	0.97	19.13	4.33	10.01	1.98
11/22/2007 10:45	14.80	17.16	2.35	5.44	1.39	18.55	3.75	8.66	1.84	19.85	5.05	11.66	1.84	20.00	5.19	11.99	1.89	19.00	4.19	9.68	0.91	19.12	4.31	9.96	1.93
11/22/2007 10:50	14.80	17.15	2.35	5.43	1.38	18.55	3.75	8.65	1.83	19.84	5.04	11.64	1.82	19.99	5.19	11.98	1.88	18.99	4.19	9.68	0.91	19.11	4.31	9.96	1.93
11/22/2007 10:55	14.80	17.13	2.34	5.39	1.34	18.53	3.73	8.62	1.80	19.83	5.03	11.62	1.80	19.98	5.18	11.96	1.86	18.98	4.18	9.65	0.88	19.10	4.30	9.93	1.90
11/22/2007 11:00	14.80	17.13	2.33	5.38	1.33	18.52	3.72	8.59	1.77	19.82	5.02	11.60	1.78	19.97	5.17	11.93	1.83	18.97	4.17	9.62	0.85	19.09	4.29	9.91	1.88
11/22/2007 11:05	14.79	17.12	2.32	5.36	1.31	18.51	3.72	8.58	1.76	19.81	5.02	11.59	1.77	19.96	5.16	11.92	1.82	18.96	4.16	9.61	0.84	19.08	4.29	9.90	1.87
11/22/2007 11:10	14.79	17.11	2.32	5.36	1.31	18.50	3.71	8.57	1.75	19.80	5.01	11.58	1.76	19.95	5.16	11.91	1.81	18.95	4.16	9.60	0.83	19.07	4.28	9.89	1.86
11/22/2007 11:15	14.79	17.11	2.31	5.35	1.30	18.49	3.70	8.55	1.73	19.79	5.00	11.55	1.73	19.93	5.14	11.87	1.77	18.94	4.15	9.57	0.80	19.06	4.27	9.86	1.83
11/22/2007 11:20	14.79	17.10	2.31	5.32	1.27	18.49	3.70	8.54	1.72	19.78	4.99	11.53	1.71	19.92	5.13	11.85	1.75	18.93	4.14	9.55	0.78	19.05	4.26	9.84	1.81
11/22/2007 11:25	14.79	17.09	2.30	5.31	1.26	18.48	3.70	8.54	1.72	19.78	4.99	11.53	1.71	19.92	5.13	11.85	1.75	18.92	4.13	9.54	0.77	19.05	4.26	9.84	1.81
11/22/2007 11:30	14.79	17.09	2.30	5.31	1.26	18.47	3.68	8.50	1.68	19.77	4.98	11.50	1.68	19.91	5.12	11.83	1.73	18.91	4.12	9.53	0.76	19.04	4.25	9.82	1.79
11/22/2007 11:35	14.79	17.08	2.29	5.30	1.25	18.46	3.67	8.48	1.66	19.76	4.98	11.49	1.67	19.90	5.11	11.80	1.70	18.90	4.11	9.50	0.73	19.03	4.24	9.80	1.77
11/22/2007 11:40	14.78	17.07	2.29	5.29	1.24	18.46	3.67	8.48	1.66	19.76	4.97	11.49	1.67	19.89	5.11	11.79	1.69	18.90	4.11	9.50	0.73	19.03	4.24	9.80	1.77
11/22/2007 11:45	14.79	17.07	2.28	5.27	1.22	18.46	3.67	8.47	1.65	19.75	4.97	11.47	1.65	19.89	5.10	11.78	1.68	18.89	4.11	9.48	0.71	19.02	4.24	9.78	1.75
11/22/2007 11:50	14.79	17.07	2.28	5.27	1.22	18.45	3.66	8.45	1.63	19.75	4.96	11.46	1.64	19.88	5.09	11.76	1.66	18.89	4.10	9.47	0.70	19.02	4.23	9.77	1.74
11/22/2007 11:55	14.79	17.07	2.29	5.28	1.23	18.45	3.66	8.45	1.63	19.74	4.96	11.45	1.63	19.88	5.09	11.75	1.65	18.88	4.09	9.45	0.68	19.01	4.22	9.75	1.72
11/22/2007 12:00	14.79	17.07	2.28	5.27	1.22	18.44	3.66	8.44	1.62	19.74	4.95	11.44	1.62	19.88	5.09	11.75	1.65	18.88	4.09	9.45	0.68	19.01	4.22	9.75	1.72
11/22/2007 12:05	14.79	17.07	2.28	5.27	1.22	18.44	3.65	8.43	1.61	19.73	4.95	11.43	1.61	19.87	5.08	11.73	1.63	18.87	4.09	9.44	0.67	19.00	4.22	9.74	1.71
11/22/2007 12:10	14.79	17.06	2.28	5.26	1.21	18.43	3.65	8.42	1.60	19.73	4.94	11.41	1.59	19.86	5.07	11.72	1.62	18.87	4.09	9.44	0.67	19.00	4.21	9.73	1.70
11/22/2007 12:15	14.79	17.06	2.28	5.26	1.21	18.43	3.65	8.42	1.60	19.73	4.95	11.43	1.61	19.86	5.07	11.71	1.61	18.87	4.08	9.43	0.66	19.00	4.21	9.72	1.69
11/22/2007 12:20	14.79	17.07	2.28	5.26	1.21	18.43	3.64	8.41	1.59	19.73	4.94	11.40	1.58	19.86	5.07	11.70	1.60	18.86	4.07	9.41	0.64	19.00	4.20	9.71	1.68
11/22/2007 12:25	14.79	17.07	2.28	5.26	1.21	18.43	3.64	8.41	1.59	19.73	4.94	11.40	1.58	19.85	5.06	11.68	1.58	18.86	4.07	9.41	0.64	18.99	4.20	9.70	1.67
11/22/2007 12:30	14.79	17.07	2.28	5.27	1.22	18.43	3.64	8.41	1.59	19.72	4.94	11.40	1.58	19.85	5.06	11.69	1.59	18.86	4.07	9.41	0.64	18.99	4.20	9.71	1.68
11/22/2007 12:35	14.79	17.07	2.29	5.28	1.23	18.43	3.64	8.41	1.59	19.73	4.94	11.41	1.59	19.84	5.06	11.67	1.57	18.86	4.08	9.42	0.65	18.99	4.20	9.71	1.68
11/22/2007 12:40	14.79	17.08	2.29	5.29	1.24	18.43	3.64	8.41	1.59	19.73	4.94	11.41	1.59	19.84	5.05	11.67	1.57	18.86	4.07	9.40	0.63	18.99	4.20	9.70	1.67
11/22/2007 12:45	14.79	17.08	2.29	5.30	1.25	18.43	3.64	8.41	1.59	19.73	4.94	11.41	1.59	19.84	5.05	11.66	1.56	18.86	4.07	9.40	0.63	18.99	4.20	9.69	1.66
11/22/2007 12:50	14.79	17.08	2.29	5.30	1.25	18.43	3.64	8.41	1.59	19.73	4.94	11.41	1.59	19.84	5.05	11.66	1.56	18.86	4.07	9.40	0.63	18.99	4.20	9.69	1.66
11/22/2007 12:55	14.78	17.09	2.30	5.32	1.27	18.43	3.65	8.43	1.61	19.73	4.95	11.42	1.60	19.84	5.05	11.67	1.57	18.86	4.08	9.41	0.64	18.99	4.20	9.71	1.68
11/22/2007 13:00	14.78	17.09	2.31	5.33	1.28	18.43	3.65	8.43	1.61	19.73	4.95	11.43	1.61	19.83	5.05	11.66	1.56	18.86	4.08	9.42	0.65	18.98	4.20	9.69	1.66
11/22/2007 13:05	14.78	17.10	2.32	5.36	1.31	18.44	3.66	8.45	1.63	19.73	4.95	11.44	1.62	19.83	5.05	11.67	1.57	18.87	4.09	9.45	0.68	18.99	4.21	9.72	1.69
11/22/2007 13:10	14.78	17.11	2.33	5.37	1.32	18.44	3.66	8.46	1.64	19.73	4.95	11.44	1.62	19.83	5.05	11.67	1.57	18.86	4.08	9.43	0.66	18.99	4.21	9.71	1.68
11/22/2007 13:15	14.78	17.11	2.33	5.37	1.32	18.45	3.66	8.46	1.64	19.74	4.95	11.44	1.62	19.84	5.05	11.67	1.57	18.87	4.08	9.43	0.66	18.99	4.21	9.71	1.68
11/22/2007 13:20	14.78	17.12	2.34	5.40	1.35	18.45	3.67	8.47	1.65	19.74	4.95	11.44	1.62	19.84	5.05	11.67	1.57	18.87	4.09	9.44	0.67	19.00	4.21	9.73	1.70
11/22/2007 13:25	14.78	17.13	2.35	5.43	1.38	18.46	3.68	8.50	1.68	19.74	4.97	11.47	1.65	19.84	5.06	11.69	1.59	18.88	4.10	9.47	0.70	19.00	4.22	9.74	1.71

Table 2 (Page 12 of 24)
Summary of Water Levels during Tidal Cycles
Water Resources Assessment
Area 4 Environmental Impact Assessment
Bahama Rock, Ltd.
Grand Bahama, Bahamas

	Atmosphere	MW-1				MW-2				MW-3				MW-4				MW-5				MW-6			
Time, GMT-05:00	Absolute Pressure (psi)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)
11/22/2007 13:30	14.78	17.14	2.36	5.44	1.39	18.47	3.69	8.51	1.69	19.75	4.97	11.47	1.65	19.84	5.06	11.68	1.58	18.88	4.10	9.46	0.69	19.00	4.22	9.75	1.72
11/22/2007 13:35	14.78	17.15	2.37	5.47	1.42	18.47	3.69	8.52	1.70	19.76	4.98	11.49	1.67	19.85	5.07	11.71	1.61	18.88	4.10	9.47	0.70	19.00	4.22	9.75	1.72
11/22/2007 13:40	14.78	17.16	2.38	5.50	1.45	18.48	3.70	8.54	1.72	19.76	4.98	11.51	1.69	19.85	5.07	11.71	1.61	18.89	4.11	9.50	0.73	19.01	4.23	9.78	1.75
11/22/2007 13:45	14.78	17.17	2.39	5.53	1.48	18.49	3.71	8.56	1.74	19.77	4.99	11.53	1.71	19.86	5.08	11.73	1.63	18.90	4.12	9.51	0.74	19.02	4.24	9.79	1.76
11/22/2007 13:50	14.78	17.18	2.40	5.55	1.50	18.50	3.72	8.58	1.76	19.78	5.00	11.55	1.73	19.86	5.08	11.74	1.64	18.91	4.13	9.55	0.78	19.02	4.24	9.79	1.76
11/22/2007 13:55	14.78	17.19	2.41	5.57	1.52	18.51	3.73	8.61	1.79	19.79	5.01	11.57	1.75	19.87	5.09	11.75	1.65	18.92	4.14	9.56	0.79	19.02	4.24	9.80	1.77
11/22/2007 14:00	14.78	17.20	2.43	5.60	1.55	18.51	3.74	8.63	1.81	19.79	5.01	11.58	1.76	19.87	5.09	11.76	1.66	18.92	4.14	9.56	0.79	19.03	4.25	9.83	1.80
11/22/2007 14:05	14.78	17.22	2.44	5.64	1.59	18.53	3.75	8.66	1.84	19.80	5.03	11.61	1.79	19.87	5.09	11.76	1.66	18.93	4.15	9.58	0.81	19.04	4.26	9.84	1.81
11/22/2007 14:10	14.78	17.23	2.46	5.67	1.62	18.54	3.76	8.69	1.87	19.82	5.04	11.64	1.82	19.89	5.11	11.81	1.71	18.94	4.16	9.61	0.84	19.05	4.27	9.86	1.83
11/22/2007 14:15	14.78	17.25	2.47	5.70	1.65	18.56	3.78	8.73	1.91	19.82	5.05	11.65	1.83	19.89	5.12	11.82	1.72	18.95	4.17	9.63	0.86	19.06	4.28	9.88	1.85
11/22/2007 14:20	14.78	17.26	2.48	5.72	1.67	18.56	3.78	8.74	1.92	19.83	5.05	11.67	1.85	19.90	5.13	11.84	1.74	18.96	4.18	9.66	0.89	19.07	4.29	9.90	1.87
11/22/2007 14:25	14.78	17.27	2.48	5.74	1.69	18.58	3.80	8.78	1.96	19.85	5.07	11.70	1.88	19.91	5.13	11.85	1.75	18.97	4.19	9.67	0.90	19.08	4.29	9.92	1.89
11/22/2007 14:30	14.78	17.28	2.50	5.77	1.72	18.59	3.81	8.79	1.97	19.86	5.07	11.72	1.90	19.92	5.14	11.87	1.77	18.99	4.20	9.71	0.94	19.09	4.30	9.94	1.91
11/22/2007 14:35	14.78	17.29	2.52	5.81	1.76	18.60	3.82	8.83	2.01	19.87	5.09	11.76	1.94	19.93	5.15	11.90	1.80	18.99	4.21	9.73	0.96	19.10	4.32	9.98	1.95
11/22/2007 14:40	14.78	17.30	2.52	5.82	1.77	18.62	3.84	8.86	2.04	19.88	5.10	11.78	1.96	19.94	5.16	11.91	1.81	19.00	4.22	9.75	0.98	19.10	4.32	9.99	1.96

Table 2 (Page 13 of 24)
Summary of Water Levels during Tidal Cycles
Water Resources Assessment
Area 4 Environmental Impact Assessment
Bahama Rock, Ltd.
Grand Bahama, Bahamas

	Atmosphere	MW-7				MW-8*				MW-10				Harbour				Hawksbill Creek*			
Time, GMT-05:00	Absolute Pressure (psi)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)
11/20/2007 12:00	14.81	17.48	2.67	6.16	2.11	16.97	2.15	4.97	2.52	17.90	3.09	7.14	1.95	17.78	2.96	6.84	-1.62	15.32	0.51	1.17	
11/20/2007 12:05	14.81	17.49	2.69	6.20	2.15	16.98	2.17	5.01	2.56	17.91	3.10	7.16	1.97	17.82	3.01	6.95	-1.51	15.32	0.51	1.18	
11/20/2007 12:10	14.81	17.50	2.69	6.21	2.16	16.99	2.18	5.03	2.58	17.91	3.11	7.17	1.98	17.80	2.99	6.91	-1.55	15.32	0.51	1.17	
11/20/2007 12:15	14.81	17.51	2.70	6.24	2.19	17.00	2.19	5.05	2.60	17.92	3.11	7.18	1.99	17.85	3.04	7.03	-1.43	15.31	0.50	1.16	
11/20/2007 12:20	14.81	17.52	2.71	6.26	2.21	17.01	2.20	5.08	2.63	17.92	3.12	7.20	2.01	17.86	3.05	7.05	-1.41	15.31	0.50	1.15	
11/20/2007 12:25	14.81	17.53	2.72	6.29	2.24	17.02	2.21	5.11	2.66	17.93	3.13	7.22	2.03	17.87	3.06	7.07	-1.39	15.30	0.50	1.14	
11/20/2007 12:30	14.81	17.53	2.73	6.30	2.25	17.03	2.22	5.12	2.67	17.94	3.14	7.24	2.05	18.01	3.20	7.40	-1.06	15.30	0.49	1.13	
11/20/2007 12:35	14.80	17.54	2.75	6.35	2.30	17.03	2.24	5.17	2.72	17.95	3.15	7.28	2.09	17.98	3.18	7.35	-1.11	15.30	0.50	1.15	
11/20/2007 12:40	14.80	17.55	2.75	6.34	2.29	17.04	2.24	5.18	2.73	17.95	3.15	7.28	2.09	18.06	3.26	7.52	-0.94	15.30	0.49	1.14	
11/20/2007 12:45	14.80	17.56	2.76	6.37	2.32	17.05	2.25	5.20	2.75	17.96	3.16	7.31	2.12	17.94	3.14	7.26	-1.20	15.29	0.49	1.14	
11/20/2007 12:50	14.80	17.56	2.76	6.38	2.33	17.06	2.26	5.22	2.77	17.97	3.17	7.32	2.13	18.02	3.22	7.44	-1.02	15.29	0.49	1.13	
11/20/2007 12:55	14.80	17.57	2.77	6.41	2.36	17.07	2.27	5.24	2.79	17.98	3.18	7.34	2.15	18.06	3.26	7.53	-0.93	15.28	0.48	1.11	
11/20/2007 13:00	14.79	17.58	2.79	6.43	2.38	17.08	2.28	5.27	2.82	17.98	3.19	7.37	2.18	17.96	3.17	7.32	-1.14	15.28	0.49	1.13	
11/20/2007 13:05	14.79	17.59	2.79	6.45	2.40	17.09	2.29	5.30	2.85	17.99	3.20	7.38	2.19	18.04	3.25	7.50	-0.96	15.28	0.48	1.12	
11/20/2007 13:10	14.79	17.59	2.80	6.47	2.42	17.09	2.30	5.31	2.86	17.99	3.20	7.39	2.20	18.04	3.24	7.49	-0.97	15.28	0.48	1.11	
11/20/2007 13:15	14.80	17.60	2.81	6.48	2.43	17.10	2.31	5.33	2.88	18.00	3.21	7.41	2.22	18.03	3.23	7.47	-0.99	15.28	0.48	1.11	
11/20/2007 13:20	14.79	17.61	2.82	6.51	2.46	17.11	2.32	5.36	2.91	18.01	3.22	7.43	2.24	18.09	3.30	7.61	-0.85	15.26	0.47	1.08	
11/20/2007 13:25	14.79	17.62	2.83	6.53	2.48	17.12	2.33	5.38	2.93	18.02	3.23	7.46	2.27	18.14	3.35	7.73	-0.73	15.26	0.47	1.09	
11/20/2007 13:30	14.79	17.62	2.83	6.54	2.49	17.13	2.34	5.39	2.94	18.03	3.24	7.47	2.28	18.14	3.35	7.73	-0.73	15.26	0.47	1.09	
11/20/2007 13:35	14.79	17.63	2.84	6.56	2.51	17.14	2.34	5.41	2.96	18.03	3.24	7.48	2.29	18.15	3.35	7.75	-0.71	15.26	0.46	1.07	
11/20/2007 13:40	14.79	17.64	2.85	6.59	2.54	17.15	2.36	5.45	3.00	18.04	3.25	7.52	2.33	18.15	3.37	7.77	-0.69	15.25	0.47	1.07	
11/20/2007 13:45	14.79	17.65	2.86	6.60	2.55	17.16	2.36	5.46	3.01	18.05	3.25	7.52	2.33	18.28	3.48	8.05	-0.41	15.26	0.47	1.08	
11/20/2007 13:50	14.79	17.66	2.87	6.63	2.58	17.16	2.38	5.49	3.04	18.05	3.26	7.54	2.35	18.25	3.46	7.99	-0.47	15.25	0.47	1.07	
11/20/2007 13:55	14.79	17.67	2.88	6.64	2.59	17.17	2.38	5.50	3.05	18.06	3.27	7.56	2.37	18.23	3.44	7.95	-0.51	15.25	0.46	1.07	
11/20/2007 14:00	14.79	17.67	2.88	6.66	2.61	17.18	2.39	5.52	3.07	18.07	3.28	7.58	2.39	18.21	3.42	7.89	-0.57	15.25	0.46	1.06	
11/20/2007 14:05	14.79	17.68	2.89	6.68	2.63	17.19	2.40	5.55	3.10	18.08	3.29	7.61	2.42	18.20	3.42	7.89	-0.57	15.25	0.46	1.07	
11/20/2007 14:10	14.79	17.69	2.90	6.69	2.64	17.20	2.41	5.56	3.11	18.08	3.29	7.60	2.41	18.32	3.53	8.15	-0.31	15.25	0.46	1.06	
11/20/2007 14:15	14.79	17.69	2.90	6.70	2.65	17.20	2.41	5.56	3.11	18.09	3.29	7.61	2.42	18.20	3.40	7.86	-0.60	15.24	0.45	1.04	
11/20/2007 14:20	14.79	17.70	2.91	6.73	2.68	17.21	2.42	5.59	3.14	18.10	3.31	7.64	2.45	18.33	3.55	8.19	-0.27	15.24	0.45	1.04	
11/20/2007 14:25	14.79	17.71	2.92	6.74	2.69	17.22	2.43	5.60	3.15	18.10	3.31	7.64	2.45	18.31	3.51	8.11	-0.35	15.24	0.44	1.03	
11/20/2007 14:30	14.80	17.72	2.92	6.74	2.69	17.23	2.43	5.61	3.16	18.11	3.31	7.65	2.46	18.37	3.57	8.25	-0.21	15.24	0.44	1.01	
11/20/2007 14:35	14.79	17.72	2.93	6.76	2.71	17.24	2.44	5.65	3.20	18.12	3.33	7.69	2.50	18.40	3.61	8.33	-0.13	15.23	0.44	1.02	
11/20/2007 14:40	14.79	17.73	2.94	6.78	2.73	17.24	2.45	5.67	3.22	18.13	3.34	7.71	2.52	18.38	3.59	8.30	-0.16	15.23	0.44	1.02	
11/20/2007 14:45	14.79	17.74	2.94	6.80	2.75	17.25	2.46	5.68	3.23	18.13	3.34	7.71	2.52	18.39	3.60	8.32	-0.14	15.23	0.44	1.02	
11/20/2007 14:50	14.79	17.74	2.95	6.82	2.77	17.26	2.46	5.69	3.24	18.14	3.35	7.73	2.54	18.41	3.62	8.36	-0.10	15.23	0.44	1.02	
11/20/2007 14:55	14.79	17.75	2.95	6.82	2.77	17.26	2.47	5.71	3.26	18.15	3.36	7.75	2.56	18.32	3.53	8.16	-0.30	15.23	0.43	1.00	
11/20/2007 15:00	14.79	17.75	2.96	6.84	2.79	17.27	2.48	5.73	3.28	18.15	3.36	7.75	2.56	18.36	3.57	8.25	-0.21	15.23	0.44	1.02	
11/20/2007 15:05	14.79	17.76	2.97	6.86	2.81	17.28	2.49	5.74	3.29	18.16	3.37	7.78	2.59	18.44	3.65	8.43	-0.03	15.22	0.43	1.00	
11/20/2007 15:10	14.79	17.77	2.97	6.87	2.82	17.28	2.49	5.75	3.30	18.16	3.37	7.78	2.59	18.38	3.59	8.29	-0.17	15.23	0.43	1.00	
11/20/2007 15:15	14.80	17.77	2.97	6.85	2.80	17.29	2.49	5.75	3.30	18.17	3.37	7.78	2.59	18.40	3.60	8.31	-0.15	15.22	0.42	0.97	
11/20/2007 15:20	14.79	17.77	2.98	6.88	2.83	17.29	2.50	5.77	3.32	18.18	3.38	7.81	2.62	18.40	3.61	8.34	-0.12	15.23	0.43	1.00	
11/20/2007 15:25	14.79	17.78	2.99	6.90	2.85	17.30	2.51	5.79	3.34	18.18	3.39	7.83	2.64	18.43	3.64	8.40	-0.06	15.23	0.44	1.01	
11/20/2007 15:30	14.79	17.78	2.99	6.91	2.86	17.30	2.51	5.80	3.35	18.19	3.39	7.84	2.65	18.41	3.62	8.36	-0.10	15.22	0.43	0.99	
11/20/2007 15:35	14.79	17.79	2.99	6.91	2.86	17.31	2.52	5.81	3.36	18.19	3.39	7.84	2.65	18.43	3.64	8.41	-0.05	15.22	0.43	0.98	
11/20/2007 15:40	14.79	17.79	3.00	6.92	2.87	17.31	2.52	5.82	3.37	18.19	3.40	7.85	2.66	18.47	3.68	8.49	0.03	15.22	0.43	0.98	
11/20/2007 15:45	14.79	17.79	3.00	6.93	2.88	17.31	2.52	5.81	3.36	18.20	3.40	7.85	2.66	18.55	3.75	8.67	0.21	15.22	0.42	0.98	
11/20/2007 15:50	14.80	17.80	3.00	6.93	2.88	17.32	2.52	5.82	3.37	18.20	3.40	7.85	2.66	18.47	3.68	8.49	0.03	15.22	0.42	0.97	
11/20/2007 15:55	14.79	17.80	3.01	6.95	2.90	17.32	2.52	5.83	3.38	18.20	3.41	7.88	2.69	18.46	3.66	8.46	0.00	15.21	0.42	0.97	
11/20/2007 16:00	14.79	17.80	3.01	6.95	2.90	17.32	2.53	5.84	3.39	18.20	3.41	7.88	2.69	18.39	3.60	8.32	-0.14	15.21	0.42	0.96	
11/20/2007 16:05	14.79	17.80	3.01	6.95	2.90	17.32	2.53	5.83	3.38	18.20	3.41	7.88	2.69	18.59	3.80	8.77	0.31	15.21	0.42	0.97	
11/20/2007 16:10	14.79	17.80	3.01	6.96	2.91	17.32	2.53	5.84	3.39	18.20	3.42	7.89	2.70	18.43	3.64	8.42	-0.04	15.21	0.42	0.96	
11/20/2007 16:15	14.79	17.81	3.01	6.96	2.91	17.32	2.53	5.84	3.39	18.21	3.42	7.89	2.70	18.48	3.69	8.52	0.06	15.21	0.41	0.95	
11/20/2007 16:20	14.79	17.81	3.02	6.97	2.92	17.32	2.53	5.84	3.39	18.21	3.42	7.89	2.70	18.36	3.57	8.25	-0.21	15.21	0.42	0.97	
11/20/2007 16:25	14.79	17.81	3.01	6.96	2.91	17.32	2.53	5.84	3.39	18.21	3.42	7.90	2.71	18.46	3.67	8.47	0.01	15.21	0.41	0.95	

Table 2 (Page 14 of 24)
Summary of Water Levels during Tidal Cycles
Water Resources Assessment
Area 4 Environmental Impact Assessment
Bahama Rock, Ltd.
Grand Bahama, Bahamas

	Atmosphere	MW-7				MW-8*				MW-10				Harbour				Hawksbill Creek*			
Time, GMT-05:00	Absolute Pressure (psi)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)
11/20/2007 16:30	14.79	17.81	3.02	6.97	2.92	17.32	2.53	5.85	3.40	18.21	3.42	7.90	2.71	18.42	3.63	8.38	-0.08	15.20	0.41	0.95	
11/20/2007 16:35	14.80	17.81	3.01	6.96	2.91	17.32	2.52	5.83	3.38	18.21	3.41	7.88	2.69	18.39	3.59	8.30	-0.16	15.20	0.41	0.94	
11/20/2007 16:40	14.80	17.81	3.01	6.96	2.91	17.32	2.52	5.83	3.38	18.21	3.41	7.89	2.70	18.37	3.58	8.27	-0.19	15.21	0.41	0.95	
11/20/2007 16:45	14.79	17.81	3.01	6.96	2.91	17.32	2.52	5.82	3.37	18.21	3.42	7.89	2.70	18.31	3.51	8.11	-0.35	15.20	0.41	0.94	
11/20/2007 16:50	14.79	17.81	3.02	6.96	2.91	17.32	2.52	5.82	3.37	18.21	3.42	7.89	2.70	18.26	3.47	8.01	-0.45	15.20	0.40	0.93	
11/20/2007 16:55	14.79	17.81	3.02	6.97	2.92	17.31	2.52	5.82	3.37	18.21	3.42	7.89	2.70	18.31	3.52	8.12	-0.34	15.20	0.40	0.93	
11/20/2007 17:00	14.79	17.80	3.01	6.96	2.91	17.31	2.51	5.81	3.36	18.20	3.41	7.88	2.69	18.30	3.51	8.10	-0.36	15.20	0.41	0.94	
11/20/2007 17:05	14.79	17.80	3.01	6.95	2.90	17.30	2.51	5.80	3.35	18.20	3.41	7.88	2.69	18.31	3.52	8.13	-0.33	15.20	0.41	0.94	
11/20/2007 17:10	14.79	17.80	3.01	6.96	2.91	17.30	2.51	5.80	3.35	18.20	3.41	7.87	2.68	18.26	3.47	8.01	-0.45	15.20	0.41	0.95	
11/20/2007 17:15	14.79	17.79	3.00	6.93	2.88	17.29	2.50	5.77	3.32	18.20	3.40	7.85	2.66	18.19	3.40	7.85	-0.61	15.20	0.40	0.93	
11/20/2007 17:20	14.79	17.79	3.00	6.93	2.88	17.29	2.50	5.77	3.32	18.19	3.40	7.86	2.67	18.24	3.45	7.96	-0.50	15.19	0.40	0.93	
11/20/2007 17:25	14.79	17.79	3.00	6.93	2.88	17.28	2.49	5.75	3.30	18.19	3.40	7.85	2.66	18.27	3.48	8.03	-0.43	15.20	0.41	0.94	
11/20/2007 17:30	14.79	17.78	2.99	6.91	2.86	17.27	2.48	5.73	3.28	18.18	3.39	7.83	2.64	18.22	3.42	7.91	-0.55	15.20	0.40	0.93	
11/20/2007 17:35	14.79	17.77	2.98	6.89	2.84	17.26	2.47	5.70	3.25	18.17	3.38	7.81	2.62	18.15	3.36	7.76	-0.70	15.19	0.40	0.92	
11/20/2007 17:40	14.79	17.76	2.97	6.87	2.82	17.26	2.46	5.69	3.24	18.17	3.38	7.80	2.61	18.18	3.39	7.82	-0.64	15.19	0.40	0.93	
11/20/2007 17:45	14.79	17.76	2.97	6.86	2.81	17.24	2.45	5.66	3.21	18.16	3.37	7.79	2.60	18.14	3.35	7.73	-0.73	15.19	0.40	0.93	
11/20/2007 17:50	14.79	17.75	2.96	6.84	2.79	17.23	2.44	5.64	3.19	18.16	3.37	7.78	2.59	18.14	3.35	7.73	-0.73	15.20	0.41	0.94	
11/20/2007 17:55	14.79	17.74	2.95	6.81	2.76	17.22	2.43	5.62	3.17	18.15	3.36	7.76	2.57	18.12	3.33	7.70	-0.76	15.20	0.41	0.94	
11/20/2007 18:00	14.79	17.73	2.94	6.78	2.73	17.21	2.42	5.58	3.13	18.14	3.35	7.74	2.55	18.10	3.31	7.64	-0.82	15.20	0.40	0.93	
11/20/2007 18:05	14.79	17.72	2.93	6.76	2.71	17.20	2.40	5.55	3.10	18.13	3.34	7.70	2.51	18.06	3.26	7.54	-0.92	15.20	0.40	0.93	
11/20/2007 18:10	14.79	17.71	2.92	6.73	2.68	17.19	2.39	5.53	3.08	18.12	3.33	7.68	2.49	18.03	3.24	7.48	-0.98	15.20	0.41	0.94	
11/20/2007 18:15	14.79	17.70	2.91	6.71	2.66	17.18	2.38	5.50	3.05	18.11	3.32	7.66	2.47	18.03	3.24	7.47	-0.99	15.21	0.41	0.96	
11/20/2007 18:20	14.79	17.69	2.90	6.69	2.64	17.17	2.37	5.48	3.03	18.10	3.31	7.64	2.45	17.99	3.20	7.39	-1.07	15.21	0.41	0.96	
11/20/2007 18:25	14.80	17.68	2.88	6.65	2.60	17.16	2.36	5.45	3.00	18.09	3.29	7.60	2.41	17.95	3.16	7.29	-1.17	15.22	0.42	0.97	
11/20/2007 18:30	14.80	17.67	2.87	6.64	2.59	17.15	2.35	5.43	2.98	18.08	3.29	7.59	2.40	17.97	3.17	7.33	-1.13	15.22	0.42	0.97	
11/20/2007 18:35	14.80	17.66	2.86	6.61	2.56	17.13	2.34	5.40	2.95	18.07	3.28	7.57	2.38	17.90	3.10	7.17	-1.29	15.22	0.42	0.98	
11/20/2007 18:40	14.80	17.65	2.85	6.58	2.53	17.12	2.33	5.37	2.92	18.06	3.26	7.53	2.34	17.88	3.08	7.12	-1.34	15.23	0.43	0.99	
11/20/2007 18:45	14.80	17.64	2.84	6.55	2.50	17.11	2.31	5.34	2.89	18.06	3.26	7.52	2.33	17.84	3.03	7.01	-1.45	15.23	0.43	0.99	
11/20/2007 18:50	14.80	17.63	2.83	6.54	2.49	17.10	2.29	5.30	2.85	18.04	3.24	7.48	2.29	17.84	3.03	7.01	-1.45	15.24	0.44	1.00	
11/20/2007 18:55	14.80	17.62	2.82	6.51	2.46	17.08	2.28	5.26	2.81	18.04	3.23	7.47	2.28	17.86	3.05	7.05	-1.41	15.24	0.44	1.02	
11/20/2007 19:00	14.81	17.61	2.80	6.47	2.42	17.07	2.26	5.23	2.78	18.02	3.22	7.43	2.24	17.79	2.98	6.88	-1.58	15.24	0.44	1.01	
11/20/2007 19:05	14.81	17.60	2.80	6.46	2.41	17.06	2.25	5.20	2.75	18.01	3.21	7.41	2.22	17.72	2.92	6.74	-1.72	15.25	0.44	1.02	
11/20/2007 19:10	14.81	17.59	2.78	6.42	2.37	17.04	2.24	5.17	2.72	18.00	3.20	7.39	2.20	17.70	2.90	6.69	-1.77	15.26	0.45	1.04	
11/20/2007 19:15	14.80	17.57	2.77	6.40	2.35	17.03	2.22	5.14	2.69	17.99	3.19	7.37	2.18	17.68	2.88	6.65	-1.81	15.26	0.46	1.05	
11/20/2007 19:20	14.80	17.57	2.76	6.38	2.33	17.01	2.21	5.10	2.65	17.98	3.18	7.33	2.14	17.62	2.82	6.51	-1.95	15.27	0.46	1.07	
11/20/2007 19:25	14.81	17.55	2.74	6.33	2.28	17.00	2.19	5.06	2.61	17.97	3.16	7.30	2.11	17.69	2.88	6.65	-1.81	15.27	0.46	1.05	
11/20/2007 19:30	14.81	17.54	2.73	6.30	2.25	16.99	2.18	5.03	2.58	17.96	3.15	7.27	2.08	17.67	2.86	6.61	-1.85	15.27	0.46	1.07	
11/20/2007 19:35	14.81	17.53	2.72	6.28	2.23	16.97	2.16	5.00	2.55	17.94	3.13	7.24	2.05	17.57	2.76	6.38	-2.08	15.28	0.47	1.09	
11/20/2007 19:40	14.81	17.52	2.71	6.25	2.20	16.96	2.15	4.96	2.51	17.93	3.12	7.20	2.01	17.53	2.72	6.28	-2.18	15.29	0.48	1.10	
11/20/2007 19:45	14.81	17.50	2.69	6.22	2.17	16.94	2.13	4.93	2.48	17.92	3.11	7.18	1.99	17.57	2.77	6.39	-2.07	15.29	0.48	1.11	
11/20/2007 19:50	14.81	17.49	2.68	6.19	2.14	16.93	2.12	4.90	2.45	17.90	3.10	7.15	1.96	17.48	2.67	6.17	-2.29	15.30	0.49	1.12	
11/20/2007 19:55	14.81	17.48	2.67	6.16	2.11	16.92	2.11	4.87	2.42	17.89	3.08	7.12	1.93	17.48	2.67	6.16	-2.30	15.30	0.49	1.14	
11/20/2007 20:00	14.81	17.47	2.66	6.14	2.09	16.90	2.09	4.84	2.39	17.88	3.07	7.10	1.91	17.48	2.67	6.17	-2.29	15.31	0.50	1.15	
11/20/2007 20:05	14.81	17.45	2.64	6.11	2.06	16.89	2.08	4.81	2.36	17.87	3.06	7.06	1.87	17.47	2.66	6.14	-2.32	15.31	0.50	1.16	
11/20/2007 20:10	14.81	17.44	2.63	6.07	2.02	16.88	2.06	4.76	2.31	17.86	3.04	7.03	1.84	17.47	2.66	6.14	-2.32	15.32	0.51	1.17	
11/20/2007 20:15	14.81	17.43	2.62	6.05	2.00	16.86	2.05	4.74	2.29	17.84	3.04	7.01	1.82	17.39	2.58	5.97	-2.49	15.32	0.52	1.19	
11/20/2007 20:20	14.81	17.42	2.61	6.02	1.97	16.85	2.04	4.71	2.26	17.83	3.02	6.98	1.79	17.42	2.61	6.03	-2.43	15.33	0.52	1.19	
11/20/2007 20:25	14.81	17.41	2.60	6.01	1.96	16.83	2.03	4.68	2.23	17.82	3.02	6.97	1.78	17.34	2.53	5.84	-2.62	15.33	0.53	1.22	
11/20/2007 20:30	14.81	17.40	2.59	5.97	1.92	16.82	2.01	4.64	2.19	17.81	3.00	6.92	1.73	17.41	2.60	6.00	-2.46	15.34	0.53	1.22	
11/20/2007 20:35	14.81	17.39	2.57	5.94	1.89	16.81	2.00	4.62	2.17	17.80	2.98	6.89	1.70	17.33	2.52	5.81	-2.65	15.34	0.53	1.23	
11/20/2007 20:40	14.81	17.38	2.56	5.92	1.87	16.80	1.99	4.59	2.14	17.79	2.98	6.87	1.68	17.35	2.54	5.86	-2.60	15.35	0.54	1.24	
11/20/2007 20:45	14.81	17.36	2.55	5.89	1.84	16.79	1.98	4.57	2.12	17.78	2.97	6.85	1.66	17.32	2.51	5.79	-2.67	15.35	0.54	1.25	
11/20/2007 20:50	14.81	17.36	2.55	5.88	1.83	16.78	1.97	4.55	2.10	17.77	2.96	6.83	1.64	17.30	2.49	5.75	-2.71	15.36	0.55	1.26	
11/20/2007 20:55	14.81	17.35	2.54	5.86	1.81	16.77	1.96	4.53	2.08	17.76	2.95	6.81	1.62	17.25	2.44	5.63	-2.83	15.36	0.55	1.28	

Table 2 (Page 15 of 24)
Summary of Water Levels during Tidal Cycles
Water Resources Assessment
Area 4 Environmental Impact Assessment
Bahama Rock, Ltd.
Grand Bahama, Bahamas

	Atmosphere	MW-7				MW-8*				MW-10				Harbour				Hawksbill Creek*			
Time, GMT-05:00	Absolute Pressure (psi)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)
11/20/2007 21:00	14.81	17.34	2.53	5.83	1.78	16.76	1.95	4.51	2.06	17.75	2.94	6.79	1.60	17.32	2.51	5.79	-2.67	15.37	0.56	1.29	
11/20/2007 21:05	14.81	17.33	2.52	5.81	1.76	16.75	1.94	4.49	2.04	17.74	2.93	6.76	1.57	17.26	2.45	5.66	-2.80	15.37	0.56	1.29	
11/20/2007 21:10	14.81	17.32	2.51	5.80	1.75	16.74	1.93	4.46	2.01	17.74	2.92	6.75	1.56	17.26	2.45	5.65	-2.81	15.37	0.56	1.30	
11/20/2007 21:15	14.81	17.31	2.50	5.78	1.73	16.74	1.93	4.46	2.01	17.73	2.91	6.73	1.54	17.20	2.39	5.53	-2.93	15.38	0.57	1.31	
11/20/2007 21:20	14.81	17.30	2.49	5.76	1.71	16.73	1.92	4.43	1.98	17.72	2.91	6.71	1.52	17.19	2.38	5.50	-2.96	15.37	0.56	1.30	
11/20/2007 21:25	14.81	17.30	2.48	5.74	1.69	16.72	1.91	4.42	1.97	17.71	2.90	6.70	1.51	17.21	2.40	5.55	-2.91	15.37	0.56	1.30	
11/20/2007 21:30	14.82	17.29	2.47	5.71	1.66	16.71	1.90	4.38	1.93	17.70	2.89	6.67	1.48	17.18	2.36	5.46	-3.00	15.38	0.56	1.30	
11/20/2007 21:35	14.82	17.28	2.47	5.70	1.65	16.71	1.90	4.38	1.93	17.70	2.88	6.66	1.47	17.21	2.39	5.53	-2.93	15.37	0.56	1.29	
11/20/2007 21:40	14.81	17.28	2.47	5.70	1.65	16.71	1.90	4.38	1.93	17.69	2.88	6.65	1.46	17.19	2.38	5.51	-2.95	15.37	0.56	1.30	
11/20/2007 21:45	14.81	17.27	2.46	5.68	1.63	16.70	1.89	4.35	1.90	17.69	2.87	6.64	1.45	17.22	2.41	5.56	-2.90	15.37	0.55	1.28	
11/20/2007 21:50	14.81	17.27	2.46	5.67	1.62	16.70	1.88	4.34	1.89	17.68	2.87	6.63	1.44	17.21	2.39	5.53	-2.93	15.37	0.55	1.28	
11/20/2007 21:55	14.81	17.26	2.45	5.65	1.60	16.69	1.87	4.32	1.87	17.68	2.86	6.62	1.43	17.20	2.39	5.52	-2.94	15.36	0.55	1.27	
11/20/2007 22:00	14.81	17.26	2.45	5.65	1.60	16.69	1.88	4.33	1.88	17.67	2.86	6.62	1.43	17.20	2.39	5.53	-2.93	15.36	0.55	1.27	
11/20/2007 22:05	14.81	17.25	2.44	5.64	1.59	16.68	1.88	4.33	1.88	17.67	2.86	6.61	1.42	17.25	2.44	5.63	-2.83	15.35	0.55	1.26	
11/20/2007 22:10	14.81	17.25	2.44	5.63	1.58	16.68	1.87	4.31	1.86	17.67	2.86	6.59	1.40	17.21	2.40	5.53	-2.93	15.35	0.54	1.25	
11/20/2007 22:15	14.81	17.25	2.43	5.62	1.57	16.68	1.87	4.32	1.87	17.66	2.85	6.58	1.39	17.22	2.41	5.56	-2.90	15.35	0.54	1.25	
11/20/2007 22:20	14.81	17.25	2.43	5.62	1.57	16.68	1.87	4.32	1.87	17.66	2.85	6.58	1.39	17.21	2.40	5.54	-2.92	15.35	0.54	1.24	
11/20/2007 22:25	14.81	17.24	2.43	5.61	1.56	16.68	1.87	4.31	1.86	17.66	2.85	6.58	1.39	17.21	2.40	5.54	-2.92	15.34	0.53	1.23	
11/20/2007 22:30	14.82	17.24	2.43	5.60	1.55	16.68	1.86	4.30	1.85	17.66	2.84	6.56	1.37	17.28	2.47	5.69	-2.77	15.34	0.53	1.22	
11/20/2007 22:35	14.82	17.24	2.42	5.59	1.54	16.68	1.86	4.31	1.86	17.66	2.84	6.55	1.36	17.26	2.45	5.65	-2.81	15.34	0.52	1.20	
11/20/2007 22:40	14.82	17.24	2.42	5.60	1.55	16.68	1.87	4.31	1.86	17.66	2.84	6.56	1.37	17.21	2.40	5.54	-2.92	15.34	0.52	1.21	
11/20/2007 22:45	14.82	17.24	2.42	5.60	1.55	16.69	1.87	4.32	1.87	17.66	2.85	6.58	1.39	17.31	2.50	5.76	-2.70	15.33	0.52	1.19	
11/20/2007 22:50	14.82	17.24	2.42	5.60	1.55	16.69	1.87	4.32	1.87	17.66	2.85	6.58	1.39	17.29	2.47	5.71	-2.75	15.33	0.52	1.20	
11/20/2007 22:55	14.82	17.24	2.43	5.60	1.55	16.69	1.88	4.33	1.88	17.66	2.84	6.57	1.38	17.34	2.53	5.83	-2.63	15.33	0.51	1.18	
11/20/2007 23:00	14.82	17.24	2.42	5.59	1.54	16.69	1.87	4.32	1.87	17.66	2.84	6.57	1.38	17.27	2.45	5.65	-2.81	15.33	0.51	1.17	
11/20/2007 23:05	14.82	17.25	2.43	5.61	1.56	16.70	1.88	4.35	1.90	17.66	2.85	6.58	1.39	17.30	2.48	5.73	-2.73	15.32	0.51	1.17	
11/20/2007 23:10	14.82	17.25	2.43	5.62	1.57	16.70	1.89	4.36	1.91	17.67	2.85	6.59	1.40	17.38	2.56	5.92	-2.54	15.32	0.50	1.16	
11/20/2007 23:15	14.82	17.25	2.44	5.63	1.58	16.71	1.89	4.37	1.92	17.67	2.86	6.60	1.41	17.44	2.62	6.05	-2.41	15.31	0.50	1.15	
11/20/2007 23:20	14.82	17.26	2.44	5.63	1.58	16.72	1.90	4.39	1.94	17.68	2.86	6.61	1.42	17.38	2.57	5.93	-2.53	15.31	0.49	1.14	
11/20/2007 23:25	14.82	17.26	2.44	5.65	1.60	16.72	1.91	4.40	1.95	17.68	2.87	6.62	1.43	17.41	2.59	5.98	-2.48	15.31	0.49	1.14	
11/20/2007 23:30	14.82	17.26	2.45	5.65	1.60	16.73	1.91	4.42	1.97	17.69	2.87	6.63	1.44	17.46	2.64	6.10	-2.36	15.30	0.49	1.13	
11/20/2007 23:35	14.82	17.27	2.45	5.67	1.62	16.73	1.92	4.43	1.98	17.69	2.87	6.64	1.45	17.46	2.64	6.10	-2.36	15.30	0.48	1.12	
11/20/2007 23:40	14.81	17.27	2.46	5.68	1.63	16.74	1.93	4.46	2.01	17.70	2.89	6.67	1.48	17.45	2.64	6.10	-2.36	15.29	0.48	1.12	
11/20/2007 23:45	14.81	17.28	2.47	5.71	1.66	16.75	1.95	4.49	2.04	17.70	2.90	6.69	1.50	17.43	2.62	6.05	-2.41	15.29	0.48	1.12	
11/20/2007 23:50	14.81	17.29	2.48	5.72	1.67	16.76	1.95	4.51	2.06	17.71	2.90	6.70	1.51	17.50	2.69	6.20	-2.26	15.29	0.48	1.11	
11/20/2007 23:55	14.81	17.30	2.49	5.76	1.71	16.77	1.97	4.55	2.10	17.72	2.91	6.72	1.53	17.55	2.74	6.34	-2.12	15.28	0.48	1.11	
11/21/2007 0:00	14.81	17.30	2.49	5.76	1.71	16.79	1.97	4.56	2.11	17.73	2.92	6.73	1.54	17.59	2.78	6.42	-2.04	15.28	0.47	1.08	
11/21/2007 0:05	14.81	17.31	2.51	5.79	1.74	16.80	1.99	4.60	2.15	17.74	2.93	6.77	1.58	17.63	2.83	6.53	-1.93	15.28	0.47	1.10	
11/21/2007 0:10	14.81	17.33	2.52	5.83	1.78	16.81	2.00	4.63	2.18	17.74	2.94	6.79	1.60	17.65	2.85	6.58	-1.88	15.27	0.47	1.08	
11/21/2007 0:15	14.81	17.34	2.53	5.85	1.80	16.83	2.02	4.67	2.22	17.75	2.95	6.81	1.62	17.62	2.82	6.51	-1.95	15.27	0.46	1.07	
11/21/2007 0:20	14.81	17.35	2.55	5.88	1.83	16.84	2.03	4.69	2.24	17.76	2.96	6.83	1.64	17.67	2.86	6.61	-1.85	15.27	0.46	1.07	
11/21/2007 0:25	14.81	17.36	2.56	5.91	1.86	16.85	2.05	4.73	2.28	17.78	2.97	6.86	1.67	17.73	2.92	6.75	-1.71	15.26	0.46	1.06	
11/21/2007 0:30	14.81	17.38	2.58	5.95	1.90	16.86	2.06	4.75	2.30	17.79	2.98	6.89	1.70	17.75	2.94	6.79	-1.67	15.26	0.45	1.05	
11/21/2007 0:35	14.81	17.39	2.58	5.96	1.91	16.88	2.07	4.79	2.34	17.80	2.99	6.91	1.72	17.66	2.86	6.60	-1.86	15.25	0.45	1.04	
11/21/2007 0:40	14.81	17.40	2.60	6.00	1.95	16.89	2.09	4.82	2.37	17.81	3.00	6.93	1.74	17.73	2.92	6.75	-1.71	15.25	0.44	1.03	
11/21/2007 0:45	14.80	17.42	2.62	6.04	1.99	16.91	2.11	4.87	2.42	17.82	3.02	6.97	1.78	17.81	3.01	6.95	-1.51	15.25	0.45	1.04	
11/21/2007 0:50	14.81	17.43	2.62	6.06	2.01	16.92	2.12	4.89	2.44	17.83	3.03	6.99	1.80	17.88	3.07	7.09	-1.37	15.25	0.44	1.02	
11/21/2007 0:55	14.80	17.44	2.64	6.09	2.04	16.94	2.14	4.94	2.49	17.85	3.05	7.04	1.85	17.86	3.06	7.07	-1.39	15.25	0.44	1.03	
11/21/2007 1:00	14.81	17.45	2.65	6.11	2.06	16.95	2.15	4.96	2.51	17.86	3.05	7.05	1.86	17.90	3.09	7.15	-1.31	15.24	0.43	1.00	
11/21/2007 1:05	14.80	17.47	2.67	6.15	2.10	16.97	2.17	5.00	2.55	17.87	3.07	7.08	1.89	17.95	3.15	7.27	-1.19	15.24	0.43	1.00	
11/21/2007 1:10	14.80	17.48	2.68	6.19	2.14	16.98	2.18	5.03	2.58	17.88	3.08	7.10	1.91	17.98	3.18	7.35	-1.11	15.24	0.43	1.00	
11/21/2007 1:15	14.80	17.48	2.68	6.20	2.15	17.00	2.20	5.07	2.62	17.89	3.09	7.14	1.95	18.01	3.21	7.42	-1.04	15.23	0.43	0.99	
11/21/2007 1:20	14.80	17.50	2.70	6.23	2.18	17.01	2.21	5.11	2.66	17.90	3.10	7.16	1.97	18.05	3.25	7.50	-0.96	15.23	0.43	0.99	
11/21/2007 1:25	14.80	17.51	2.71	6.27	2.22	17.02	2.22	5.13	2.68	17.91	3.11	7.19	2.00	18.15	3.35	7.74	-0.72	15.23	0.43	0.98	

Table 2 (Page 16 of 24)
Summary of Water Levels during Tidal Cycles
Water Resources Assessment
Area 4 Environmental Impact Assessment
Bahama Rock, Ltd.
Grand Bahama, Bahamas

	Atmosphere	MW-7				MW-8*				MW-10				Harbour				Hawksbill Creek*			
Time, GMT-05:00	Absolute Pressure (psi)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)
11/21/2007 1:30	14.80	17.52	2.72	6.29	2.24	17.03	2.23	5.16	2.71	17.92	3.12	7.21	2.02	18.09	3.29	7.59	-0.87	15.23	0.43	0.98	
11/21/2007 1:35	14.80	17.54	2.73	6.31	2.26	17.05	2.24	5.18	2.73	17.93	3.13	7.22	2.03	18.10	3.30	7.62	-0.84	15.22	0.42	0.96	
11/21/2007 1:40	14.80	17.55	2.75	6.35	2.30	17.06	2.26	5.22	2.77	17.95	3.15	7.27	2.08	18.15	3.35	7.73	-0.73	15.22	0.42	0.97	
11/21/2007 1:45	14.80	17.56	2.76	6.38	2.33	17.08	2.28	5.26	2.81	17.96	3.16	7.29	2.10	18.19	3.39	7.82	-0.64	15.22	0.42	0.96	
11/21/2007 1:50	14.80	17.57	2.77	6.40	2.35	17.09	2.29	5.29	2.84	17.97	3.17	7.32	2.13	18.20	3.40	7.85	-0.61	15.22	0.42	0.96	
11/21/2007 1:55	14.80	17.58	2.78	6.42	2.37	17.10	2.30	5.31	2.86	17.98	3.18	7.33	2.14	18.23	3.42	7.90	-0.56	15.21	0.41	0.94	
11/21/2007 2:00	14.80	17.59	2.79	6.44	2.39	17.12	2.31	5.34	2.89	17.99	3.19	7.37	2.18	18.22	3.41	7.88	-0.58	15.21	0.41	0.94	
11/21/2007 2:05	14.80	17.61	2.80	6.48	2.43	17.13	2.32	5.37	2.92	18.00	3.20	7.39	2.20	18.23	3.43	7.92	-0.54	15.21	0.40	0.93	
11/21/2007 2:10	14.80	17.62	2.81	6.49	2.44	17.14	2.34	5.40	2.95	18.01	3.21	7.41	2.22	18.27	3.46	8.00	-0.46	15.21	0.40	0.93	
11/21/2007 2:15	14.80	17.63	2.82	6.52	2.47	17.15	2.35	5.43	2.98	18.03	3.22	7.44	2.25	18.36	3.56	8.21	-0.25	15.21	0.40	0.93	
11/21/2007 2:20	14.80	17.64	2.84	6.55	2.50	17.17	2.36	5.46	3.01	18.04	3.23	7.47	2.28	18.32	3.52	8.13	-0.33	15.21	0.40	0.93	
11/21/2007 2:25	14.80	17.65	2.85	6.57	2.52	17.18	2.38	5.49	3.04	18.05	3.25	7.51	2.32	18.38	3.58	8.26	-0.20	15.20	0.40	0.92	
11/21/2007 2:30	14.80	17.66	2.85	6.59	2.54	17.19	2.39	5.51	3.06	18.06	3.26	7.52	2.33	18.29	3.49	8.05	-0.41	15.19	0.39	0.90	
11/21/2007 2:35	14.81	17.66	2.86	6.60	2.55	17.20	2.39	5.52	3.07	18.06	3.26	7.52	2.33	18.37	3.56	8.23	-0.23	15.19	0.38	0.88	
11/21/2007 2:40	14.80	17.67	2.87	6.63	2.58	17.21	2.41	5.57	3.12	18.08	3.28	7.56	2.37	18.34	3.54	8.18	-0.28	15.20	0.39	0.91	
11/21/2007 2:45	14.80	17.68	2.88	6.65	2.60	17.23	2.43	5.60	3.15	18.09	3.29	7.60	2.41	18.52	3.72	8.59	0.13	15.19	0.39	0.90	
11/21/2007 2:50	14.80	17.69	2.89	6.68	2.63	17.24	2.44	5.63	3.18	18.10	3.30	7.62	2.43	18.41	3.61	8.34	-0.12	15.19	0.38	0.89	
11/21/2007 2:55	14.80	17.70	2.90	6.71	2.66	17.25	2.45	5.66	3.21	18.11	3.31	7.64	2.45	18.56	3.76	8.67	0.21	15.19	0.38	0.89	
11/21/2007 3:00	14.80	17.71	2.91	6.72	2.67	17.26	2.46	5.69	3.24	18.12	3.31	7.65	2.46	18.54	3.74	8.63	0.17	15.19	0.38	0.89	
11/21/2007 3:05	14.81	17.72	2.91	6.72	2.67	17.27	2.47	5.70	3.25	18.12	3.32	7.66	2.47	18.50	3.69	8.52	0.06	15.19	0.38	0.88	
11/21/2007 3:10	14.80	17.73	2.93	6.76	2.71	17.28	2.48	5.73	3.28	18.13	3.33	7.70	2.51	18.52	3.72	8.59	0.13	15.18	0.38	0.88	
11/21/2007 3:15	14.80	17.74	2.94	6.78	2.73	17.29	2.49	5.76	3.31	18.14	3.34	7.72	2.53	18.59	3.79	8.74	0.28	15.18	0.38	0.88	
11/21/2007 3:20	14.81	17.74	2.94	6.78	2.73	17.30	2.50	5.76	3.31	18.16	3.35	7.74	2.55	18.53	3.73	8.61	0.15	15.18	0.37	0.86	
11/21/2007 3:25	14.80	17.75	2.95	6.82	2.77	17.31	2.51	5.80	3.35	18.16	3.36	7.76	2.57	18.60	3.80	8.78	0.32	15.18	0.37	0.86	
11/21/2007 3:30	14.80	17.76	2.96	6.84	2.79	17.32	2.52	5.82	3.37	18.17	3.37	7.77	2.58	18.59	3.79	8.75	0.29	15.17	0.37	0.85	
11/21/2007 3:35	14.80	17.77	2.97	6.86	2.81	17.32	2.53	5.84	3.39	18.17	3.38	7.80	2.61	18.65	3.85	8.89	0.43	15.17	0.37	0.86	
11/21/2007 3:40	14.80	17.77	2.97	6.86	2.81	17.34	2.53	5.85	3.40	18.19	3.39	7.82	2.63	18.54	3.74	8.64	0.18	15.17	0.37	0.85	
11/21/2007 3:45	14.80	17.78	2.98	6.89	2.84	17.34	2.54	5.87	3.42	18.19	3.38	7.82	2.63	18.67	3.87	8.94	0.48	15.17	0.37	0.85	
11/21/2007 3:50	14.80	17.79	2.99	6.91	2.86	17.35	2.56	5.90	3.45	18.19	3.39	7.84	2.65	18.55	3.75	8.66	0.20	15.17	0.37	0.86	
11/21/2007 3:55	14.80	17.79	2.99	6.90	2.85	17.36	2.56	5.90	3.45	18.20	3.40	7.86	2.67	18.60	3.79	8.76	0.30	15.17	0.36	0.84	
11/21/2007 4:00	14.80	17.80	3.00	6.92	2.87	17.36	2.56	5.91	3.46	18.20	3.40	7.86	2.67	18.55	3.75	8.65	0.19	15.17	0.36	0.84	
11/21/2007 4:05	14.80	17.81	3.01	6.94	2.89	17.37	2.56	5.92	3.47	18.21	3.41	7.88	2.69	18.66	3.85	8.90	0.44	15.17	0.36	0.84	
11/21/2007 4:10	14.80	17.81	3.01	6.95	2.90	17.37	2.57	5.94	3.49	18.22	3.42	7.89	2.70	18.66	3.86	8.91	0.45	15.16	0.36	0.83	
11/21/2007 4:15	14.80	17.82	3.01	6.96	2.91	17.38	2.58	5.95	3.50	18.23	3.43	7.91	2.72	18.68	3.87	8.95	0.49	15.16	0.36	0.83	
11/21/2007 4:20	14.80	17.82	3.02	6.98	2.93	17.38	2.58	5.96	3.51	18.23	3.43	7.93	2.74	18.64	3.84	8.87	0.41	15.16	0.36	0.83	
11/21/2007 4:25	14.80	17.83	3.02	6.98	2.93	17.39	2.58	5.97	3.52	18.24	3.44	7.94	2.75	18.66	3.86	8.91	0.45	15.16	0.36	0.83	
11/21/2007 4:30	14.80	17.83	3.03	7.01	2.96	17.39	2.59	5.98	3.53	18.24	3.44	7.95	2.76	18.66	3.86	8.92	0.46	15.16	0.36	0.84	
11/21/2007 4:35	14.80	17.84	3.03	7.00	2.95	17.39	2.59	5.99	3.54	18.25	3.45	7.97	2.78	18.65	3.85	8.89	0.43	15.16	0.36	0.83	
11/21/2007 4:40	14.80	17.84	3.04	7.01	2.96	17.40	2.59	5.99	3.54	18.26	3.45	7.98	2.79	18.64	3.83	8.85	0.39	15.16	0.36	0.83	
11/21/2007 4:45	14.80	17.84	3.04	7.02	2.97	17.40	2.60	6.00	3.55	18.26	3.45	7.98	2.79	18.68	3.87	8.94	0.48	15.16	0.35	0.81	
11/21/2007 4:50	14.80	17.84	3.04	7.02	2.97	17.40	2.60	6.01	3.56	18.26	3.46	7.99	2.80	18.64	3.83	8.85	0.39	15.16	0.35	0.81	
11/21/2007 4:55	14.80	17.85	3.05	7.04	2.99	17.41	2.60	6.01	3.56	18.27	3.46	8.00	2.81	18.61	3.80	8.78	0.32	15.16	0.35	0.81	
11/21/2007 5:00	14.80	17.85	3.05	7.04	2.99	17.40	2.60	6.00	3.55	18.27	3.46	8.00	2.81	18.61	3.80	8.78	0.32	15.16	0.35	0.81	
11/21/2007 5:05	14.80	17.85	3.05	7.04	2.99	17.40	2.60	6.01	3.56	18.27	3.47	8.01	2.82	18.61	3.80	8.78	0.32	15.16	0.35	0.81	
11/21/2007 5:10	14.80	17.85	3.05	7.04	2.99	17.40	2.60	6.01	3.56	18.27	3.47	8.01	2.82	18.58	3.77	8.72	0.26	15.16	0.35	0.81	
11/21/2007 5:15	14.80	17.86	3.05	7.05	3.00	17.41	2.60	6.01	3.56	18.28	3.47	8.02	2.83	18.63	3.82	8.83	0.37	15.15	0.35	0.80	
11/21/2007 5:20	14.81	17.86	3.05	7.04	2.99	17.40	2.60	5.99	3.54	18.28	3.47	8.01	2.82	18.58	3.77	8.72	0.26	15.16	0.35	0.80	
11/21/2007 5:25	14.80	17.86	3.06	7.06	3.01	17.40	2.60	6.01	3.56	18.27	3.47	8.01	2.82	18.47	3.67	8.46	0.00	15.15	0.35	0.80	
11/21/2007 5:30	14.80	17.86	3.05	7.05	3.00	17.40	2.60	6.00	3.55	18.27	3.47	8.01	2.82	18.51	3.71	8.57	0.11	15.15	0.35	0.80	
11/21/2007 5:35	14.80	17.86	3.06	7.06	3.01	17.40	2.60	6.00	3.55	18.28	3.47	8.02	2.83	18.51	3.71	8.57	0.11	15.15	0.35	0.80	
11/21/2007 5:40	14.81	17.86	3.05	7.05	3.00	17.40	2.59	5.98	3.53	18.28	3.47	8.01	2.82	18.58	3.77	8.70	0.24	15.15	0.34	0.79	
11/21/2007 5:45	14.80	17.86	3.06	7.06	3.01	17.40	2.59	5.99	3.54	18.27	3.47	8.01	2.82	18.51	3.71	8.57	0.11	15.15	0.35	0.80	
11/21/2007 5:50	14.80	17.86	3.06	7.06	3.01	17.39	2.59	5.98	3.53	18.27	3.47	8.01	2.82	18.45	3.65	8.43	-0.03	15.15	0.35	0.80	
11/21/2007 5:55	14.80	17.86	3.06	7.06	3.01	17.39	2.59	5.97	3.52	18.27	3.46	8.00	2.81	18.50	3.69	8.53	0.07	15.15	0.35	0.80	

Table 2 (Page 17 of 24)
Summary of Water Levels during Tidal Cycles
Water Resources Assessment
Area 4 Environmental Impact Assessment
Bahama Rock, Ltd.
Grand Bahama, Bahamas

	Atmosphere	MW-7				MW-8*				MW-10				Harbour				Hawksbill Creek*			
Time, GMT-05:00	Absolute Pressure (psi)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)
11/21/2007 6:00	14.81	17.85	3.04	7.03	2.98	17.38	2.57	5.94	3.49	18.27	3.46	7.99	2.80	18.44	3.64	8.40	-0.06	15.15	0.34	0.79	
11/21/2007 6:05	14.81	17.85	3.04	7.02	2.97	17.38	2.57	5.93	3.48	18.26	3.45	7.98	2.79	18.43	3.62	8.36	-0.10	15.15	0.34	0.79	
11/21/2007 6:10	14.81	17.85	3.04	7.02	2.97	17.37	2.56	5.91	3.46	18.26	3.45	7.97	2.78	18.40	3.59	8.29	-0.17	15.15	0.34	0.79	
11/21/2007 6:15	14.81	17.84	3.04	7.01	2.96	17.36	2.56	5.90	3.45	18.25	3.44	7.95	2.76	18.40	3.60	8.31	-0.15	15.15	0.34	0.79	
11/21/2007 6:20	14.81	17.84	3.03	7.00	2.95	17.35	2.55	5.88	3.43	18.25	3.44	7.94	2.75	18.36	3.55	8.20	-0.26	15.15	0.34	0.79	
11/21/2007 6:25	14.81	17.83	3.03	6.99	2.94	17.34	2.54	5.86	3.41	18.24	3.43	7.93	2.74	18.34	3.53	8.16	-0.30	15.15	0.34	0.79	
11/21/2007 6:30	14.81	17.83	3.02	6.98	2.93	17.33	2.53	5.83	3.38	18.24	3.43	7.92	2.73	18.36	3.55	8.20	-0.26	15.16	0.35	0.80	
11/21/2007 6:35	14.81	17.82	3.01	6.96	2.91	17.32	2.52	5.81	3.36	18.23	3.42	7.90	2.71	18.29	3.48	8.04	-0.42	15.16	0.35	0.80	
11/21/2007 6:40	14.81	17.81	3.01	6.94	2.89	17.31	2.51	5.79	3.34	18.22	3.41	7.88	2.69	18.27	3.46	7.98	-0.48	15.16	0.35	0.81	
11/21/2007 6:45	14.81	17.80	3.00	6.92	2.87	17.31	2.50	5.77	3.32	18.22	3.41	7.88	2.69	18.22	3.41	7.88	-0.58	15.17	0.36	0.82	
11/21/2007 6:50	14.81	17.79	2.99	6.90	2.85	17.29	2.48	5.74	3.29	18.20	3.40	7.84	2.65	18.25	3.44	7.94	-0.52	15.17	0.36	0.84	
11/21/2007 6:55	14.81	17.79	2.98	6.87	2.82	17.28	2.47	5.71	3.26	18.20	3.39	7.83	2.64	18.17	3.36	7.77	-0.69	15.17	0.36	0.83	
11/21/2007 7:00	14.81	17.77	2.96	6.84	2.79	17.27	2.46	5.67	3.22	18.19	3.38	7.81	2.62	18.12	3.31	7.64	-0.82	15.17	0.36	0.83	
11/21/2007 7:05	14.81	17.76	2.95	6.81	2.76	17.25	2.44	5.63	3.18	18.18	3.37	7.78	2.59	18.12	3.30	7.63	-0.83	15.18	0.36	0.83	
11/21/2007 7:10	14.81	17.75	2.94	6.80	2.75	17.24	2.43	5.62	3.17	18.17	3.36	7.76	2.57	18.11	3.30	7.62	-0.84	15.18	0.37	0.86	
11/21/2007 7:15	14.81	17.74	2.93	6.76	2.71	17.23	2.42	5.58	3.13	18.16	3.35	7.73	2.54	18.08	3.26	7.54	-0.92	15.19	0.37	0.86	
11/21/2007 7:20	14.82	17.74	2.92	6.74	2.69	17.22	2.41	5.56	3.11	18.15	3.33	7.70	2.51	18.04	3.23	7.46	-1.00	15.19	0.37	0.87	
11/21/2007 7:25	14.82	17.72	2.91	6.72	2.67	17.21	2.40	5.53	3.08	18.14	3.32	7.67	2.48	18.04	3.23	7.45	-1.01	15.19	0.38	0.88	
11/21/2007 7:30	14.82	17.71	2.90	6.69	2.64	17.20	2.38	5.51	3.06	18.13	3.32	7.66	2.47	17.96	3.15	7.27	-1.19	15.20	0.38	0.89	
11/21/2007 7:35	14.81	17.70	2.89	6.68	2.63	17.19	2.38	5.50	3.05	18.12	3.31	7.65	2.46	17.99	3.18	7.34	-1.12	15.20	0.39	0.91	
11/21/2007 7:40	14.81	17.70	2.88	6.66	2.61	17.19	2.37	5.48	3.03	18.11	3.30	7.62	2.43	17.93	3.12	7.20	-1.26	15.21	0.40	0.93	
11/21/2007 7:45	14.82	17.68	2.86	6.61	2.56	17.17	2.35	5.43	2.98	18.10	3.28	7.58	2.39	17.92	3.10	7.15	-1.31	15.22	0.40	0.92	
11/21/2007 7:50	14.82	17.67	2.86	6.60	2.55	17.16	2.35	5.42	2.97	18.09	3.28	7.57	2.38	17.93	3.12	7.20	-1.26	15.22	0.41	0.95	
11/21/2007 7:55	14.82	17.66	2.84	6.57	2.52	17.15	2.33	5.37	2.92	18.08	3.26	7.53	2.34	17.90	3.07	7.10	-1.36	15.23	0.41	0.94	
11/21/2007 8:00	14.82	17.66	2.83	6.54	2.49	17.13	2.31	5.34	2.89	18.07	3.25	7.51	2.32	17.81	2.99	6.90	-1.56	15.24	0.42	0.96	
11/21/2007 8:05	14.82	17.65	2.83	6.53	2.48	17.12	2.30	5.32	2.87	18.06	3.24	7.49	2.30	17.79	2.97	6.86	-1.60	15.25	0.43	1.00	
11/21/2007 8:10	14.82	17.63	2.82	6.50	2.45	17.11	2.29	5.29	2.84	18.04	3.23	7.45	2.26	17.76	2.94	6.80	-1.66	15.26	0.44	1.02	
11/21/2007 8:15	14.82	17.62	2.80	6.47	2.42	17.09	2.27	5.25	2.80	18.03	3.21	7.42	2.23	17.76	2.94	6.79	-1.67	15.27	0.45	1.04	
11/21/2007 8:20	14.82	17.61	2.79	6.45	2.40	17.08	2.26	5.21	2.76	18.02	3.20	7.39	2.20	17.73	2.91	6.73	-1.73	15.28	0.46	1.06	
11/21/2007 8:25	14.82	17.60	2.78	6.43	2.38	17.06	2.24	5.18	2.73	18.01	3.19	7.37	2.18	17.70	2.88	6.65	-1.81	15.28	0.46	1.07	
11/21/2007 8:30	14.82	17.59	2.77	6.40	2.35	17.05	2.23	5.14	2.69	18.00	3.18	7.34	2.15	17.75	2.93	6.77	-1.69	15.30	0.48	1.11	
11/21/2007 8:35	14.82	17.58	2.76	6.37	2.32	17.04	2.22	5.12	2.67	17.99	3.17	7.31	2.12	17.64	2.82	6.51	-1.95	15.31	0.49	1.14	
11/21/2007 8:40	14.82	17.57	2.75	6.36	2.31	17.02	2.20	5.09	2.64	17.98	3.16	7.30	2.11	17.58	2.77	6.39	-2.07	15.32	0.51	1.17	
11/21/2007 8:45	14.82	17.56	2.73	6.32	2.27	17.01	2.18	5.04	2.59	17.97	3.14	7.26	2.07	17.60	2.78	6.42	-2.04	15.33	0.51	1.18	
11/21/2007 8:50	14.82	17.55	2.72	6.29	2.24	16.99	2.17	5.01	2.56	17.95	3.13	7.22	2.03	17.57	2.75	6.35	-2.11	15.35	0.53	1.22	
11/21/2007 8:55	14.83	17.54	2.71	6.25	2.20	16.98	2.15	4.97	2.52	17.94	3.11	7.19	2.00	17.59	2.76	6.37	-2.09	15.36	0.53	1.23	
11/21/2007 9:00	14.83	17.53	2.70	6.24	2.19	16.97	2.14	4.94	2.49	17.93	3.11	7.17	1.98	17.56	2.74	6.32	-2.14	15.37	0.55	1.26	
11/21/2007 9:05	14.82	17.52	2.70	6.23	2.18	16.96	2.13	4.93	2.48	17.92	3.10	7.16	1.97	17.54	2.72	6.27	-2.19	15.39	0.56	1.30	
11/21/2007 9:10	14.82	17.51	2.68	6.20	2.15	16.94	2.12	4.89	2.44	17.91	3.09	7.13	1.94	17.45	2.63	6.07	-2.39	15.40	0.57	1.32	
11/21/2007 9:15	14.83	17.50	2.67	6.17	2.12	16.93	2.11	4.87	2.42	17.90	3.08	7.11	1.92	17.43	2.60	6.02	-2.44	15.41	0.58	1.34	
11/21/2007 9:20	14.83	17.49	2.66	6.15	2.10	16.92	2.09	4.83	2.38	17.89	3.07	7.08	1.89	17.52	2.69	6.21	-2.25	15.42	0.59	1.36	
11/21/2007 9:25	14.83	17.48	2.65	6.12	2.07	16.91	2.08	4.81	2.36	17.89	3.06	7.06	1.87	17.44	2.61	6.04	-2.42	15.43	0.60	1.39	
11/21/2007 9:30	14.82	17.47	2.64	6.10	2.05	16.90	2.08	4.80	2.35	17.88	3.05	7.05	1.86	17.43	2.61	6.02	-2.44	15.44	0.61	1.42	
11/21/2007 9:35	14.83	17.46	2.63	6.06	2.01	16.89	2.06	4.75	2.30	17.87	3.04	7.01	1.82	17.40	2.57	5.93	-2.53	15.45	0.62	1.43	
11/21/2007 9:40	14.83	17.45	2.62	6.06	2.01	16.88	2.05	4.74	2.29	17.86	3.03	7.00	1.81	17.44	2.61	6.04	-2.42	15.45	0.62	1.44	
11/21/2007 9:45	14.83	17.44	2.61	6.04	1.99	16.87	2.04	4.71	2.26	17.85	3.02	6.97	1.78	17.37	2.54	5.86	-2.60	15.46	0.63	1.46	
11/21/2007 9:50	14.83	17.44	2.60	6.01	1.96	16.86	2.03	4.69	2.24	17.84	3.01	6.95	1.76	17.42	2.59	5.98	-2.48	15.47	0.64	1.48	
11/21/2007 9:55	14.83	17.43	2.60	6.00	1.95	16.86	2.02	4.68	2.23	17.83	3.00	6.94	1.75	17.43	2.60	6.01	-2.45	15.48	0.65	1.49	
11/21/2007 10:00	14.83	17.42	2.59	5.97	1.92	16.85	2.01	4.65	2.20	17.82	2.99	6.91	1.72	17.38	2.54	5.88	-2.58	15.48	0.65	1.50	
11/21/2007 10:05	14.83	17.41	2.58	5.95	1.90	16.84	2.01	4.63	2.18	17.82	2.99	6.90	1.71	17.35	2.52	5.82	-2.64	15.49	0.65	1.51	
11/21/2007 10:10	14.83	17.40	2.57	5.94	1.89	16.83	2.00	4.62	2.17	17.82	2.99	6.89	1.70	17.39	2.56	5.92	-2.54	15.49	0.66	1.53	
11/21/2007 10:15	14.83	17.40	2.57	5.93	1.88	16.82	1.99	4.60	2.15	17.81	2.97	6.87	1.68	17.33	2.50	5.78	-2.68	15.50	0.67	1.54	
11/21/2007 10:20	14.83	17.39	2.56	5.91	1.86	16.82	1.98	4.58	2.13	17.80	2.97	6.86	1.67	17.33	2.50	5.77	-2.69	15.50	0.66	1.54	
11/21/2007 10:25	14.83	17.39	2.55	5.89	1.84	16.81	1.98	4.56	2.11	17.80	2.96	6.84	1.65	17.36	2.53	5.84	-2.62	15.50	0.67	1.54	

Table 2 (Page 18 of 24)
Summary of Water Levels during Tidal Cycles
Water Resources Assessment
Area 4 Environmental Impact Assessment
Bahama Rock, Ltd.
Grand Bahama, Bahamas

	Atmosphere	MW-7				MW-8*				MW-10				Harbour				Hawksbill Creek*			
Time, GMT-05:00	Absolute Pressure (psi)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)
11/21/2007 10:30	14.83	17.38	2.55	5.89	1.84	16.81	1.98	4.56	2.11	17.79	2.96	6.83	1.64	17.36	2.53	5.84	-2.62	15.50	0.67	1.55	
11/21/2007 10:35	14.83	17.38	2.55	5.88	1.83	16.80	1.97	4.55	2.10	17.78	2.95	6.82	1.63	17.34	2.51	5.80	-2.66	15.51	0.68	1.56	
11/21/2007 10:40	14.83	17.38	2.54	5.87	1.82	16.80	1.96	4.53	2.08	17.78	2.95	6.81	1.62	17.35	2.51	5.80	-2.66	15.51	0.67	1.55	
11/21/2007 10:45	14.83	17.36	2.53	5.85	1.80	16.79	1.96	4.52	2.07	17.77	2.94	6.79	1.60	17.37	2.53	5.85	-2.61	15.50	0.67	1.55	
11/21/2007 10:50	14.83	17.36	2.53	5.84	1.79	16.79	1.96	4.52	2.07	17.77	2.94	6.80	1.61	17.31	2.48	5.72	-2.74	15.50	0.67	1.54	
11/21/2007 10:55	14.83	17.36	2.53	5.84	1.79	16.79	1.96	4.52	2.07	17.77	2.94	6.79	1.60	17.33	2.50	5.78	-2.68	15.50	0.67	1.54	
11/21/2007 11:00	14.83	17.35	2.52	5.82	1.77	16.78	1.95	4.51	2.06	17.77	2.94	6.78	1.59	17.37	2.54	5.86	-2.60	15.50	0.67	1.54	
11/21/2007 11:05	14.83	17.35	2.52	5.83	1.78	16.78	1.95	4.51	2.06	17.76	2.93	6.77	1.58	17.36	2.53	5.85	-2.61	15.49	0.66	1.52	
11/21/2007 11:10	14.84	17.35	2.51	5.79	1.74	16.78	1.94	4.49	2.04	17.76	2.92	6.75	1.56	17.38	2.55	5.88	-2.58	15.49	0.65	1.50	
11/21/2007 11:15	14.83	17.35	2.52	5.81	1.76	16.78	1.95	4.50	2.05	17.76	2.93	6.77	1.58	17.37	2.54	5.86	-2.60	15.48	0.65	1.49	
11/21/2007 11:20	14.83	17.34	2.51	5.80	1.75	16.78	1.95	4.50	2.05	17.76	2.93	6.76	1.57	17.41	2.58	5.96	-2.50	15.47	0.64	1.49	
11/21/2007 11:25	14.83	17.35	2.52	5.82	1.77	16.78	1.95	4.50	2.05	17.76	2.93	6.77	1.58	17.40	2.57	5.95	-2.51	15.47	0.65	1.49	
11/21/2007 11:30	14.83	17.34	2.52	5.81	1.76	16.78	1.95	4.51	2.06	17.75	2.93	6.76	1.57	17.44	2.61	6.03	-2.43	15.47	0.64	1.48	
11/21/2007 11:35	14.82	17.34	2.52	5.81	1.76	16.78	1.96	4.52	2.07	17.75	2.93	6.77	1.58	17.40	2.58	5.95	-2.51	15.46	0.64	1.48	
11/21/2007 11:40	14.83	17.34	2.52	5.81	1.76	16.78	1.96	4.52	2.07	17.76	2.93	6.77	1.58	17.42	2.59	5.98	-2.48	15.46	0.64	1.47	
11/21/2007 11:45	14.83	17.34	2.52	5.81	1.76	16.79	1.96	4.53	2.08	17.76	2.93	6.77	1.58	17.46	2.64	6.09	-2.37	15.46	0.63	1.46	
11/21/2007 11:50	14.83	17.34	2.51	5.81	1.76	16.79	1.96	4.52	2.07	17.76	2.93	6.77	1.58	17.47	2.64	6.09	-2.37	15.46	0.63	1.45	
11/21/2007 11:55	14.82	17.35	2.53	5.83	1.78	16.79	1.97	4.55	2.10	17.76	2.94	6.78	1.59	17.53	2.71	6.27	-2.19	15.45	0.63	1.46	
11/21/2007 12:00	14.82	17.35	2.53	5.84	1.79	16.79	1.97	4.56	2.11	17.76	2.94	6.80	1.61	17.50	2.67	6.18	-2.28	15.45	0.63	1.45	
11/21/2007 12:05	14.82	17.35	2.53	5.85	1.80	16.80	1.98	4.58	2.13	17.77	2.95	6.82	1.63	17.50	2.68	6.19	-2.27	15.44	0.62	1.44	
11/21/2007 12:10	14.81	17.35	2.54	5.86	1.81	16.80	1.99	4.60	2.15	17.77	2.96	6.83	1.64	17.50	2.69	6.21	-2.25	15.44	0.63	1.45	
11/21/2007 12:15	14.81	17.35	2.54	5.87	1.82	16.81	2.00	4.61	2.16	17.77	2.96	6.83	1.64	17.53	2.72	6.28	-2.18	15.43	0.61	1.42	
11/21/2007 12:20	14.81	17.36	2.55	5.88	1.83	16.82	2.00	4.63	2.18	17.78	2.96	6.84	1.65	17.55	2.74	6.32	-2.14	15.42	0.61	1.41	
11/21/2007 12:25	14.81	17.36	2.55	5.89	1.84	16.82	2.01	4.64	2.19	17.78	2.97	6.86	1.67	17.57	2.76	6.38	-2.08	15.42	0.61	1.40	
11/21/2007 12:30	14.81	17.37	2.55	5.90	1.85	16.83	2.02	4.66	2.21	17.79	2.98	6.88	1.69	17.65	2.83	6.55	-1.91	15.41	0.60	1.38	
11/21/2007 12:35	14.81	17.38	2.56	5.92	1.87	16.84	2.03	4.68	2.23	17.80	2.98	6.89	1.70	17.60	2.79	6.44	-2.02	15.40	0.59	1.36	
11/21/2007 12:40	14.81	17.38	2.57	5.93	1.88	16.85	2.04	4.70	2.25	17.80	2.99	6.90	1.71	17.63	2.81	6.50	-1.96	15.40	0.59	1.35	
11/21/2007 12:45	14.82	17.39	2.57	5.95	1.90	16.86	2.04	4.72	2.27	17.81	2.99	6.91	1.72	17.67	2.86	6.60	-1.86	15.39	0.58	1.34	
11/21/2007 12:50	14.81	17.40	2.59	5.97	1.92	16.87	2.06	4.75	2.30	17.81	3.00	6.93	1.74	17.66	2.85	6.59	-1.87	15.39	0.58	1.34	
11/21/2007 12:55	14.81	17.41	2.60	6.00	1.95	16.88	2.07	4.77	2.32	17.82	3.00	6.94	1.75	17.67	2.86	6.60	-1.86	15.38	0.57	1.31	
11/21/2007 13:00	14.81	17.42	2.61	6.04	1.99	16.89	2.08	4.81	2.36	17.82	3.02	6.97	1.78	17.76	2.96	6.83	-1.63	15.38	0.57	1.31	
11/21/2007 13:05	14.81	17.43	2.62	6.05	2.00	16.90	2.09	4.82	2.37	17.83	3.02	6.98	1.79	17.73	2.92	6.75	-1.71	15.37	0.56	1.29	
11/21/2007 13:10	14.80	17.44	2.64	6.09	2.04	16.92	2.12	4.89	2.44	17.84	3.04	7.02	1.83	17.77	2.97	6.86	-1.60	15.37	0.56	1.30	
11/21/2007 13:15	14.80	17.45	2.65	6.11	2.06	16.92	2.12	4.90	2.45	17.85	3.05	7.04	1.85	17.77	2.96	6.85	-1.61	15.36	0.56	1.29	
11/21/2007 13:20	14.80	17.46	2.66	6.14	2.09	16.94	2.14	4.94	2.49	17.86	3.06	7.06	1.87	17.98	3.18	7.35	-1.11	15.35	0.55	1.26	
11/21/2007 13:25	14.80	17.47	2.67	6.16	2.11	16.95	2.15	4.96	2.51	17.87	3.07	7.09	1.90	17.87	3.06	7.07	-1.39	15.35	0.54	1.25	
11/21/2007 13:30	14.80	17.48	2.68	6.19	2.14	16.96	2.16	4.99	2.54	17.88	3.08	7.11	1.92	17.90	3.10	7.16	-1.30	15.34	0.54	1.24	
11/21/2007 13:35	14.80	17.49	2.69	6.21	2.16	16.97	2.17	5.02	2.57	17.89	3.09	7.12	1.93	17.92	3.12	7.21	-1.25	15.34	0.54	1.24	
11/21/2007 13:40	14.80	17.50	2.70	6.24	2.19	16.99	2.19	5.05	2.60	17.90	3.10	7.16	1.97	17.92	3.13	7.22	-1.24	15.33	0.53	1.23	
11/21/2007 13:45	14.80	17.51	2.71	6.26	2.21	17.00	2.20	5.09	2.64	17.91	3.11	7.18	1.99	17.91	3.11	7.17	-1.29	15.33	0.53	1.23	
11/21/2007 13:50	14.80	17.52	2.72	6.29	2.24	17.01	2.21	5.11	2.66	17.92	3.12	7.21	2.02	17.92	3.13	7.22	-1.24	15.33	0.53	1.22	
11/21/2007 13:55	14.80	17.53	2.74	6.32	2.27	17.02	2.23	5.14	2.69	17.93	3.14	7.24	2.05	18.00	3.20	7.39	-1.07	15.32	0.52	1.20	
11/21/2007 14:00	14.80	17.54	2.74	6.34	2.29	17.03	2.24	5.16	2.71	17.94	3.14	7.25	2.06	18.01	3.21	7.42	-1.04	15.31	0.51	1.19	
11/21/2007 14:05	14.80	17.55	2.75	6.36	2.31	17.05	2.25	5.20	2.75	17.95	3.15	7.28	2.09	18.02	3.23	7.45	-1.01	15.31	0.51	1.19	
11/21/2007 14:10	14.80	17.56	2.77	6.39	2.34	17.06	2.26	5.22	2.77	17.96	3.16	7.30	2.11	18.06	3.26	7.53	-0.93	15.30	0.50	1.17	
11/21/2007 14:15	14.80	17.57	2.77	6.41	2.36	17.07	2.27	5.24	2.79	17.96	3.16	7.31	2.12	18.08	3.28	7.59	-0.87	15.31	0.51	1.17	
11/21/2007 14:20	14.80	17.58	2.78	6.42	2.37	17.08	2.28	5.27	2.82	17.98	3.18	7.33	2.14	18.11	3.31	7.64	-0.82	15.30	0.50	1.16	
11/21/2007 14:25	14.80	17.59	2.79	6.44	2.39	17.09	2.29	5.28	2.83	17.98	3.18	7.34	2.15	18.06	3.26	7.53	-0.93	15.30	0.50	1.14	
11/21/2007 14:30	14.80	17.60	2.80	6.47	2.42	17.10	2.30	5.30	2.85	17.99	3.19	7.36	2.17	18.14	3.33	7.70	-0.76	15.30	0.49	1.14	
11/21/2007 14:35	14.80	17.61	2.81	6.48	2.43	17.11	2.31	5.33	2.88	18.00	3.20	7.39	2.20	18.21	3.41	7.87	-0.59	15.29	0.48	1.11	
11/21/2007 14:40	14.80	17.62	2.82	6.51	2.46	17.12	2.32	5.37	2.92	18.01	3.21	7.42	2.23	18.15	3.35	7.73	-0.73	15.29	0.49	1.12	
11/21/2007 14:45	14.80	17.63	2.83	6.53	2.48	17.13	2.33	5.39	2.94	18.02	3.22	7.44	2.25	18.23	3.43	7.91	-0.55	15.28	0.48	1.11	
11/21/2007 14:50	14.80	17.64	2.84	6.55	2.50	17.14	2.34	5.41	2.96	18.03	3.23	7.45	2.26	18.25	3.45	7.97	-0.49	15.28	0.48	1.10	
11/21/2007 14:55	14.80	17.65	2.85	6.57	2.52	17.15	2.35	5.43	2.98	18.04	3.24	7.47	2.28	18.28	3.48	8.04	-0.42	15.28	0.48	1.10	

Table 2 (Page 19 of 24)
Summary of Water Levels during Tidal Cycles
Water Resources Assessment
Area 4 Environmental Impact Assessment
Bahama Rock, Ltd.
Grand Bahama, Bahamas

	Atmosphere	MW-7				MW-8*				MW-10				Harbour				Hawksbill Creek*			
Time, GMT-05:00	Absolute Pressure (psi)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)
11/21/2007 15:00	14.80	17.66	2.85	6.59	2.54	17.16	2.36	5.45	3.00	18.05	3.24	7.49	2.30	18.27	3.47	8.00	-0.46	15.27	0.47	1.09	
11/21/2007 15:05	14.81	17.66	2.86	6.60	2.55	17.17	2.37	5.47	3.02	18.05	3.25	7.51	2.32	18.27	3.47	8.00	-0.46	15.27	0.47	1.08	
11/21/2007 15:10	14.80	17.67	2.87	6.63	2.58	17.18	2.38	5.50	3.05	18.06	3.26	7.54	2.35	18.33	3.54	8.16	-0.30	15.27	0.47	1.09	
11/21/2007 15:15	14.80	17.68	2.87	6.64	2.59	17.19	2.39	5.51	3.06	18.07	3.27	7.55	2.36	18.33	3.53	8.15	-0.31	15.27	0.46	1.07	
11/21/2007 15:20	14.80	17.69	2.89	6.67	2.62	17.20	2.40	5.54	3.09	18.08	3.28	7.58	2.39	18.36	3.56	8.22	-0.24	15.26	0.46	1.07	
11/21/2007 15:25	14.80	17.70	2.90	6.69	2.64	17.21	2.41	5.57	3.12	18.09	3.29	7.60	2.41	18.39	3.59	8.29	-0.17	15.26	0.46	1.07	
11/21/2007 15:30	14.80	17.70	2.91	6.71	2.66	17.22	2.42	5.59	3.14	18.10	3.30	7.63	2.44	18.39	3.59	8.29	-0.17	15.26	0.46	1.06	
11/21/2007 15:35	14.80	17.71	2.92	6.73	2.68	17.23	2.43	5.61	3.16	18.11	3.31	7.64	2.45	18.38	3.58	8.28	-0.18	15.26	0.46	1.06	
11/21/2007 15:40	14.80	17.72	2.92	6.75	2.70	17.24	2.44	5.64	3.19	18.12	3.32	7.67	2.48	18.43	3.63	8.39	-0.07	15.25	0.45	1.05	
11/21/2007 15:45	14.80	17.73	2.93	6.76	2.71	17.25	2.45	5.66	3.21	18.12	3.33	7.68	2.49	18.43	3.64	8.40	-0.06	15.25	0.45	1.05	
11/21/2007 15:50	14.80	17.73	2.93	6.77	2.72	17.26	2.46	5.67	3.22	18.13	3.33	7.70	2.51	18.39	3.59	8.29	-0.17	15.25	0.45	1.03	
11/21/2007 15:55	14.80	17.74	2.94	6.80	2.75	17.27	2.47	5.70	3.25	18.14	3.34	7.71	2.52	18.48	3.68	8.49	0.03	15.25	0.45	1.03	
11/21/2007 16:00	14.80	17.75	2.95	6.82	2.77	17.27	2.48	5.72	3.27	18.15	3.35	7.74	2.55	18.48	3.68	8.50	0.04	15.24	0.44	1.02	
11/21/2007 16:05	14.80	17.76	2.96	6.83	2.78	17.28	2.48	5.73	3.28	18.16	3.36	7.75	2.56	18.49	3.69	8.53	0.07	15.24	0.44	1.02	
11/21/2007 16:10	14.80	17.76	2.96	6.85	2.80	17.29	2.49	5.74	3.29	18.16	3.36	7.77	2.58	18.42	3.62	8.36	-0.10	15.23	0.43	1.00	
11/21/2007 16:15	14.80	17.77	2.97	6.85	2.80	17.29	2.49	5.75	3.30	18.17	3.37	7.78	2.59	18.48	3.68	8.51	0.05	15.23	0.43	1.00	
11/21/2007 16:20	14.80	17.77	2.98	6.87	2.82	17.30	2.50	5.77	3.32	18.17	3.37	7.79	2.60	18.48	3.68	8.51	0.05	15.24	0.44	1.02	
11/21/2007 16:25	14.81	17.78	2.97	6.87	2.82	17.31	2.50	5.78	3.33	18.19	3.38	7.81	2.62	18.47	3.67	8.47	0.01	15.23	0.43	0.98	
11/21/2007 16:30	14.80	17.79	2.98	6.88	2.83	17.31	2.51	5.79	3.34	18.19	3.38	7.81	2.62	18.44	3.63	8.39	-0.07	15.23	0.43	0.99	
11/21/2007 16:35	14.80	17.79	2.98	6.89	2.84	17.31	2.51	5.80	3.35	18.19	3.39	7.82	2.63	18.49	3.68	8.51	0.05	15.23	0.42	0.98	
11/21/2007 16:40	14.80	17.79	3.00	6.92	2.87	17.32	2.52	5.82	3.37	18.20	3.40	7.85	2.66	18.53	3.73	8.61	0.15	15.23	0.43	0.99	
11/21/2007 16:45	14.80	17.80	3.00	6.93	2.88	17.32	2.52	5.83	3.38	18.20	3.40	7.85	2.66	18.46	3.66	8.46	0.00	15.23	0.43	1.00	
11/21/2007 16:50	14.80	17.80	3.00	6.94	2.89	17.32	2.52	5.83	3.38	18.20	3.40	7.86	2.67	18.51	3.71	8.58	0.12	15.23	0.43	0.99	
11/21/2007 16:55	14.80	17.80	3.00	6.93	2.88	17.33	2.53	5.83	3.38	18.20	3.40	7.86	2.67	18.44	3.64	8.41	-0.05	15.22	0.42	0.97	
11/21/2007 17:00	14.80	17.81	3.01	6.94	2.89	17.33	2.53	5.84	3.39	18.21	3.41	7.87	2.68	18.49	3.69	8.52	0.06	15.23	0.43	0.99	
11/21/2007 17:05	14.80	17.81	3.01	6.95	2.90	17.33	2.53	5.84	3.39	18.21	3.41	7.88	2.69	18.46	3.66	8.45	-0.01	15.22	0.42	0.98	
11/21/2007 17:10	14.80	17.81	3.01	6.95	2.90	17.33	2.53	5.84	3.39	18.21	3.42	7.89	2.70	18.48	3.69	8.51	0.05	15.22	0.43	0.98	
11/21/2007 17:15	14.80	17.81	3.01	6.95	2.90	17.32	2.53	5.83	3.38	18.21	3.41	7.88	2.69	18.48	3.68	8.50	0.04	15.22	0.42	0.98	
11/21/2007 17:20	14.80	17.81	3.01	6.95	2.90	17.32	2.52	5.83	3.38	18.21	3.41	7.87	2.68	18.44	3.64	8.41	-0.05	15.22	0.42	0.97	
11/21/2007 17:25	14.80	17.81	3.01	6.94	2.89	17.32	2.52	5.83	3.38	18.21	3.41	7.87	2.68	18.46	3.66	8.46	0.00	15.22	0.42	0.96	
11/21/2007 17:30	14.80	17.81	3.01	6.95	2.90	17.32	2.53	5.83	3.38	18.21	3.41	7.88	2.69	18.46	3.66	8.45	-0.01	15.22	0.42	0.96	
11/21/2007 17:35	14.80	17.81	3.01	6.95	2.90	17.32	2.52	5.83	3.38	18.21	3.41	7.88	2.69	18.41	3.61	8.34	-0.12	15.22	0.42	0.97	
11/21/2007 17:40	14.80	17.81	3.01	6.95	2.90	17.32	2.52	5.83	3.38	18.20	3.41	7.87	2.68	18.42	3.62	8.36	-0.10	15.22	0.42	0.97	
11/21/2007 17:45	14.80	17.80	3.01	6.94	2.89	17.31	2.52	5.81	3.36	18.20	3.41	7.87	2.68	18.37	3.58	8.26	-0.20	15.21	0.42	0.96	
11/21/2007 17:50	14.79	17.80	3.00	6.94	2.89	17.31	2.51	5.81	3.36	18.20	3.41	7.86	2.67	18.35	3.55	8.21	-0.25	15.21	0.42	0.96	
11/21/2007 17:55	14.80	17.80	3.00	6.93	2.88	17.30	2.51	5.79	3.34	18.20	3.40	7.84	2.65	18.31	3.52	8.12	-0.34	15.21	0.41	0.95	
11/21/2007 18:00	14.80	17.80	3.00	6.93	2.88	17.30	2.50	5.77	3.32	18.20	3.40	7.85	2.66	18.35	3.56	8.21	-0.25	15.21	0.41	0.96	
11/21/2007 18:05	14.80	17.79	2.99	6.91	2.86	17.29	2.49	5.75	3.30	18.19	3.39	7.84	2.65	18.35	3.55	8.20	-0.26	15.21	0.41	0.95	
11/21/2007 18:10	14.79	17.79	2.99	6.91	2.86	17.29	2.49	5.76	3.31	18.18	3.39	7.83	2.64	18.30	3.50	8.09	-0.37	15.20	0.41	0.95	
11/21/2007 18:15	14.80	17.78	2.98	6.89	2.84	17.28	2.48	5.73	3.28	18.18	3.38	7.82	2.63	18.27	3.47	8.02	-0.44	15.21	0.41	0.95	
11/21/2007 18:20	14.80	17.77	2.97	6.86	2.81	17.27	2.47	5.70	3.25	18.18	3.38	7.81	2.62	18.21	3.41	7.88	-0.58	15.20	0.40	0.93	
11/21/2007 18:25	14.80	17.77	2.97	6.85	2.80	17.26	2.46	5.69	3.24	18.17	3.37	7.79	2.60	18.23	3.43	7.92	-0.54	15.21	0.41	0.94	
11/21/2007 18:30	14.80	17.77	2.97	6.85	2.80	17.25	2.45	5.66	3.21	18.17	3.37	7.78	2.59	18.20	3.40	7.86	-0.60	15.20	0.40	0.93	
11/21/2007 18:35	14.80	17.75	2.96	6.82	2.77	17.24	2.44	5.63	3.18	18.16	3.36	7.77	2.58	18.17	3.37	7.78	-0.68	15.21	0.41	0.94	
11/21/2007 18:40	14.80	17.75	2.95	6.81	2.76	17.23	2.43	5.61	3.16	18.15	3.35	7.75	2.56	18.10	3.30	7.63	-0.83	15.20	0.40	0.93	
11/21/2007 18:45	14.80	17.74	2.94	6.78	2.73	17.22	2.42	5.59	3.14	18.14	3.35	7.73	2.54	18.10	3.30	7.62	-0.84	15.20	0.40	0.93	
11/21/2007 18:50	14.80	17.72	2.92	6.74	2.69	17.21	2.41	5.56	3.11	18.13	3.33	7.69	2.50	18.14	3.33	7.70	-0.76	15.20	0.40	0.92	
11/21/2007 18:55	14.80	17.72	2.92	6.74	2.69	17.20	2.40	5.54	3.09	18.12	3.33	7.68	2.49	18.09	3.29	7.60	-0.86	15.20	0.40	0.93	
11/21/2007 19:00	14.80	17.70	2.90	6.70	2.65	17.19	2.38	5.51	3.06	18.12	3.31	7.65	2.46	18.06	3.26	7.52	-0.94	15.21	0.40	0.93	
11/21/2007 19:05	14.80	17.69	2.89	6.68	2.63	17.17	2.37	5.48	3.03	18.11	3.30	7.63	2.44	18.01	3.21	7.41	-1.05	15.21	0.41	0.95	
11/21/2007 19:10	14.80	17.68	2.88	6.65	2.60	17.17	2.37	5.46	3.01	18.10	3.30	7.62	2.43	18.00	3.20	7.38	-1.08	15.21	0.40	0.93	
11/21/2007 19:15	14.81	17.67	2.86	6.62	2.57	17.15	2.35	5.42	2.97	18.09	3.28	7.58	2.39	17.94	3.14	7.25	-1.21	15.21	0.40	0.92	
11/21/2007 19:20	14.80	17.66	2.86	6.61	2.56	17.14	2.34	5.41	2.96	18.08	3.28	7.57	2.38	17.94	3.14	7.25	-1.21	15.21	0.41	0.95	
11/21/2007 19:25	14.80	17.66	2.85	6.59	2.54	17.14	2.33	5.39	2.94	18.07	3.27	7.54	2.35	17.98	3.18	7.34	-1.12	15.21	0.41	0.95	

Table 2 (Page 20 of 24)
Summary of Water Levels during Tidal Cycles
Water Resources Assessment
Area 4 Environmental Impact Assessment
Bahama Rock, Ltd.
Grand Bahama, Bahamas

	Atmosphere	MW-7				MW-8*				MW-10				Harbour				Hawksbill Creek*			
Time, GMT-05:00	Absolute Pressure (psi)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)
11/21/2007 19:30	14.81	17.65	2.84	6.56	2.51	17.12	2.31	5.34	2.89	18.06	3.25	7.51	2.32	17.90	3.09	7.14	-1.32	15.22	0.42	0.96	
11/21/2007 19:35	14.81	17.63	2.83	6.53	2.48	17.11	2.30	5.31	2.86	18.05	3.24	7.49	2.30	17.85	3.04	7.03	-1.43	15.23	0.42	0.97	
11/21/2007 19:40	14.81	17.62	2.81	6.50	2.45	17.09	2.29	5.28	2.83	18.04	3.23	7.46	2.27	17.85	3.04	7.02	-1.44	15.23	0.42	0.97	
11/21/2007 19:45	14.81	17.61	2.80	6.48	2.43	17.08	2.27	5.25	2.80	18.02	3.22	7.43	2.24	17.82	3.02	6.96	-1.50	15.23	0.43	0.98	
11/21/2007 19:50	14.81	17.60	2.79	6.45	2.40	17.06	2.26	5.21	2.76	18.01	3.21	7.41	2.22	17.79	2.99	6.90	-1.56	15.23	0.43	0.98	
11/21/2007 19:55	14.81	17.59	2.78	6.42	2.37	17.05	2.24	5.18	2.73	18.00	3.20	7.38	2.19	17.77	2.96	6.84	-1.62	15.24	0.43	0.99	
11/21/2007 20:00	14.81	17.57	2.77	6.40	2.35	17.04	2.23	5.15	2.70	17.99	3.18	7.35	2.16	17.79	2.98	6.88	-1.58	15.24	0.43	0.99	
11/21/2007 20:05	14.81	17.56	2.76	6.37	2.32	17.02	2.21	5.11	2.66	17.98	3.17	7.33	2.14	17.70	2.90	6.69	-1.77	15.24	0.44	1.01	
11/21/2007 20:10	14.81	17.55	2.75	6.34	2.29	17.01	2.20	5.08	2.63	17.97	3.16	7.30	2.11	17.67	2.86	6.61	-1.85	15.25	0.44	1.02	
11/21/2007 20:15	14.81	17.54	2.73	6.30	2.25	16.99	2.18	5.03	2.58	17.95	3.14	7.26	2.07	17.61	2.80	6.46	-2.00	15.25	0.44	1.02	
11/21/2007 20:20	14.81	17.52	2.72	6.28	2.23	16.97	2.17	5.01	2.56	17.94	3.14	7.24	2.05	17.60	2.79	6.45	-2.01	15.26	0.46	1.05	
11/21/2007 20:25	14.80	17.51	2.71	6.26	2.21	16.96	2.16	4.99	2.54	17.93	3.13	7.22	2.03	17.59	2.79	6.45	-2.01	15.26	0.46	1.07	
11/21/2007 20:30	14.80	17.50	2.70	6.23	2.18	16.95	2.14	4.94	2.49	17.91	3.11	7.18	1.99	17.63	2.83	6.53	-1.93	15.27	0.46	1.07	
11/21/2007 20:35	14.81	17.49	2.68	6.19	2.14	16.93	2.12	4.90	2.45	17.90	3.09	7.15	1.96	17.56	2.75	6.35	-2.11	15.28	0.47	1.08	
11/21/2007 20:40	14.80	17.48	2.67	6.17	2.12	16.91	2.11	4.87	2.42	17.89	3.09	7.13	1.94	17.54	2.74	6.33	-2.13	15.29	0.48	1.11	
11/21/2007 20:45	14.80	17.46	2.66	6.13	2.08	16.90	2.09	4.83	2.38	17.88	3.07	7.09	1.90	17.48	2.68	6.18	-2.28	15.29	0.49	1.12	
11/21/2007 20:50	14.80	17.45	2.64	6.11	2.06	16.88	2.08	4.80	2.35	17.87	3.06	7.07	1.88	17.42	2.61	6.03	-2.43	15.29	0.49	1.12	
11/21/2007 20:55	14.80	17.44	2.63	6.08	2.03	16.87	2.07	4.77	2.32	17.85	3.05	7.04	1.85	17.46	2.66	6.14	-2.32	15.30	0.50	1.15	
11/21/2007 21:00	14.80	17.42	2.61	6.04	1.99	16.86	2.05	4.74	2.29	17.84	3.03	7.01	1.82	17.41	2.61	6.02	-2.44	15.31	0.50	1.16	
11/21/2007 21:05	14.80	17.41	2.60	6.01	1.96	16.84	2.03	4.69	2.24	17.82	3.02	6.98	1.79	17.38	2.58	5.95	-2.51	15.32	0.51	1.18	
11/21/2007 21:10	14.80	17.39	2.59	5.98	1.93	16.82	2.02	4.66	2.21	17.81	3.01	6.94	1.75	17.38	2.57	5.94	-2.52	15.32	0.51	1.18	
11/21/2007 21:15	14.81	17.39	2.58	5.95	1.90	16.81	2.00	4.63	2.18	17.80	2.99	6.91	1.72	17.35	2.54	5.87	-2.59	15.33	0.52	1.19	
11/21/2007 21:20	14.81	17.37	2.56	5.92	1.87	16.80	1.99	4.60	2.15	17.79	2.98	6.88	1.69	17.29	2.48	5.74	-2.72	15.33	0.52	1.20	
11/21/2007 21:25	14.80	17.36	2.56	5.91	1.86	16.78	1.98	4.57	2.12	17.78	2.97	6.87	1.68	17.32	2.51	5.80	-2.66	15.34	0.53	1.22	
11/21/2007 21:30	14.80	17.35	2.55	5.88	1.83	16.77	1.97	4.55	2.10	17.76	2.96	6.83	1.64	17.33	2.52	5.83	-2.63	15.34	0.54	1.24	
11/21/2007 21:35	14.80	17.34	2.54	5.86	1.81	16.76	1.96	4.52	2.07	17.75	2.95	6.81	1.62	17.33	2.53	5.84	-2.62	15.34	0.54	1.25	
11/21/2007 21:40	14.80	17.33	2.52	5.83	1.78	16.75	1.94	4.49	2.04	17.74	2.94	6.79	1.60	17.21	2.41	5.57	-2.89	15.35	0.55	1.26	
11/21/2007 21:45	14.80	17.32	2.51	5.80	1.75	16.73	1.93	4.46	2.01	17.73	2.93	6.76	1.57	17.26	2.46	5.68	-2.78	15.36	0.56	1.28	
11/21/2007 21:50	14.80	17.30	2.50	5.77	1.72	16.72	1.92	4.44	1.99	17.71	2.91	6.71	1.52	17.16	2.36	5.45	-3.01	15.36	0.56	1.28	
11/21/2007 21:55	14.80	17.30	2.49	5.75	1.70	16.71	1.90	4.40	1.95	17.71	2.90	6.70	1.51	17.20	2.39	5.53	-2.93	15.36	0.56	1.28	
11/21/2007 22:00	14.80	17.28	2.48	5.73	1.68	16.70	1.90	4.38	1.93	17.70	2.89	6.68	1.49	17.15	2.35	5.43	-3.03	15.37	0.57	1.30	
11/21/2007 22:05	14.80	17.28	2.48	5.72	1.67	16.70	1.89	4.37	1.92	17.69	2.88	6.66	1.47	17.19	2.39	5.51	-2.95	15.37	0.57	1.30	
11/21/2007 22:10	14.80	17.27	2.47	5.69	1.64	16.69	1.88	4.35	1.90	17.68	2.88	6.65	1.46	17.23	2.43	5.61	-2.85	15.37	0.57	1.32	
11/21/2007 22:15	14.81	17.26	2.45	5.66	1.61	16.68	1.87	4.31	1.86	17.67	2.86	6.62	1.43	17.23	2.42	5.59	-2.87	15.37	0.56	1.30	
11/21/2007 22:20	14.81	17.25	2.45	5.65	1.60	16.67	1.87	4.31	1.86	17.66	2.86	6.60	1.41	17.09	2.28	5.27	-3.19	15.37	0.57	1.31	
11/21/2007 22:25	14.81	17.24	2.44	5.63	1.58	16.66	1.85	4.28	1.83	17.65	2.85	6.57	1.38	17.13	2.32	5.36	-3.10	15.37	0.56	1.30	
11/21/2007 22:30	14.81	17.24	2.43	5.61	1.56	16.65	1.85	4.27	1.82	17.65	2.84	6.56	1.37	17.16	2.35	5.44	-3.02	15.37	0.56	1.30	
11/21/2007 22:35	14.81	17.23	2.42	5.60	1.55	16.65	1.84	4.26	1.81	17.65	2.84	6.56	1.37	17.14	2.33	5.38	-3.08	15.37	0.56	1.30	
11/21/2007 22:40	14.80	17.23	2.43	5.60	1.55	16.64	1.84	4.26	1.81	17.64	2.84	6.55	1.36	17.15	2.35	5.42	-3.04	15.36	0.56	1.30	
11/21/2007 22:45	14.80	17.22	2.42	5.58	1.53	16.64	1.84	4.25	1.80	17.63	2.83	6.54	1.35	17.21	2.41	5.57	-2.89	15.36	0.56	1.29	
11/21/2007 22:50	14.80	17.22	2.41	5.58	1.53	16.63	1.83	4.24	1.79	17.63	2.83	6.53	1.34	17.16	2.36	5.45	-3.01	15.35	0.55	1.28	
11/21/2007 22:55	14.80	17.21	2.41	5.57	1.52	16.63	1.83	4.23	1.78	17.62	2.82	6.52	1.33	17.13	2.33	5.38	-3.08	15.35	0.55	1.28	
11/21/2007 23:00	14.80	17.21	2.41	5.56	1.51	16.63	1.83	4.23	1.78	17.62	2.82	6.51	1.32	17.11	2.31	5.34	-3.12	15.35	0.55	1.27	
11/21/2007 23:05	14.80	17.20	2.40	5.54	1.49	16.63	1.82	4.21	1.76	17.62	2.81	6.50	1.31	17.15	2.35	5.42	-3.04	15.35	0.55	1.26	
11/21/2007 23:10	14.80	17.20	2.40	5.54	1.49	16.63	1.82	4.21	1.76	17.62	2.81	6.50	1.31	17.18	2.38	5.50	-2.96	15.34	0.54	1.25	
11/21/2007 23:15	14.80	17.20	2.40	5.54	1.49	16.63	1.83	4.22	1.77	17.62	2.81	6.50	1.31	17.17	2.37	5.46	-3.00	15.34	0.54	1.25	
11/21/2007 23:20	14.81	17.20	2.39	5.52	1.47	16.63	1.82	4.20	1.75	17.62	2.81	6.49	1.30	17.18	2.37	5.48	-2.98	15.34	0.53	1.23	
11/21/2007 23:25	14.80	17.20	2.39	5.53	1.48	16.63	1.82	4.21	1.76	17.61	2.81	6.49	1.30	17.16	2.36	5.45	-3.01	15.34	0.54	1.25	
11/21/2007 23:30	14.80	17.20	2.39	5.53	1.48	16.63	1.82	4.21	1.76	17.61	2.80	6.48	1.29	17.19	2.39	5.52	-2.94	15.33	0.53	1.23	
11/21/2007 23:35	14.80	17.20	2.39	5.52	1.47	16.63	1.83	4.22	1.77	17.61	2.81	6.48	1.29	17.22	2.41	5.58	-2.88	15.33	0.53	1.22	
11/21/2007 23:40	14.81	17.20	2.39	5.52	1.47	16.63	1.83	4.23	1.78	17.61	2.81	6.48	1.29	17.29	2.49	5.75	-2.71	15.33	0.52	1.21	
11/21/2007 23:45	14.80	17.20	2.40	5.53	1.48	16.64	1.84	4.25	1.80	17.61	2.81	6.50	1.31	17.21	2.41	5.58	-2.88	15.32	0.52	1.20	
11/21/2007 23:50	14.80	17.20	2.40	5.55	1.50	16.64	1.84	4.25	1.80	17.62	2.82	6.51	1.32	17.29	2.49	5.75	-2.71	15.32	0.52	1.20	
11/21/2007 23:55	14.80	17.20	2.40	5.54	1.49	16.64	1.84	4.26	1.81	17.62	2.82	6.51	1.32	17.28	2.48	5.73	-2.73	15.32	0.51	1.19	

Table 2 (Page 21 of 24)
Summary of Water Levels during Tidal Cycles
Water Resources Assessment
Area 4 Environmental Impact Assessment
Bahama Rock, Ltd.
Grand Bahama, Bahamas

	Atmosphere	MW-7				MW-8*				MW-10				Harbour				Hawksbill Creek*			
Time, GMT-05:00	Absolute Pressure (psi)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)
11/22/2007 0:00	14.81	17.21	2.40	5.54	1.49	16.65	1.85	4.26	1.81	17.62	2.82	6.51	1.32	17.36	2.55	5.89	-2.57	15.32	0.51	1.18	
11/22/2007 0:05	14.80	17.21	2.41	5.56	1.51	16.66	1.86	4.28	1.83	17.63	2.83	6.53	1.34	17.32	2.52	5.82	-2.64	15.31	0.51	1.18	
11/22/2007 0:10	14.80	17.21	2.41	5.56	1.51	16.66	1.86	4.29	1.84	17.63	2.83	6.53	1.34	17.28	2.48	5.72	-2.74	15.31	0.50	1.16	
11/22/2007 0:15	14.80	17.22	2.42	5.58	1.53	16.67	1.87	4.32	1.87	17.64	2.84	6.55	1.36	17.38	2.58	5.95	-2.51	15.31	0.51	1.17	
11/22/2007 0:20	14.80	17.22	2.42	5.59	1.54	16.68	1.88	4.35	1.90	17.64	2.84	6.56	1.37	17.44	2.64	6.09	-2.37	15.30	0.50	1.15	
11/22/2007 0:25	14.80	17.23	2.43	5.61	1.56	16.69	1.89	4.36	1.91	17.65	2.84	6.57	1.38	17.45	2.65	6.12	-2.34	15.29	0.49	1.13	
11/22/2007 0:30	14.80	17.23	2.44	5.63	1.58	16.70	1.90	4.39	1.94	17.66	2.86	6.60	1.41	17.39	2.59	5.98	-2.48	15.29	0.49	1.14	
11/22/2007 0:35	14.80	17.25	2.45	5.65	1.60	16.71	1.91	4.40	1.95	17.66	2.86	6.61	1.42	17.46	2.66	6.14	-2.32	15.29	0.49	1.13	
11/22/2007 0:40	14.80	17.26	2.45	5.66	1.61	16.72	1.92	4.43	1.98	17.67	2.87	6.63	1.44	17.43	2.62	6.06	-2.40	15.29	0.48	1.12	
11/22/2007 0:45	14.80	17.27	2.46	5.69	1.64	16.74	1.93	4.46	2.01	17.68	2.88	6.64	1.45	17.54	2.74	6.33	-2.13	15.29	0.48	1.11	
11/22/2007 0:50	14.80	17.28	2.48	5.72	1.67	16.75	1.94	4.49	2.04	17.69	2.89	6.66	1.47	17.60	2.80	6.46	-2.00	15.29	0.48	1.11	
11/22/2007 0:55	14.80	17.29	2.49	5.76	1.71	16.76	1.96	4.53	2.08	17.70	2.90	6.71	1.52	17.57	2.78	6.41	-2.05	15.28	0.48	1.11	
11/22/2007 1:00	14.80	17.30	2.50	5.78	1.73	16.78	1.98	4.57	2.12	17.72	2.92	6.74	1.55	17.56	2.77	6.39	-2.07	15.28	0.48	1.10	
11/22/2007 1:05	14.80	17.32	2.52	5.82	1.77	16.79	1.99	4.60	2.15	17.72	2.92	6.75	1.56	17.56	2.76	6.38	-2.08	15.27	0.47	1.09	
11/22/2007 1:10	14.80	17.33	2.53	5.85	1.80	16.81	2.01	4.65	2.20	17.74	2.94	6.79	1.60	17.66	2.86	6.61	-1.85	15.27	0.47	1.09	
11/22/2007 1:15	14.80	17.35	2.55	5.88	1.83	16.83	2.03	4.68	2.23	17.75	2.95	6.82	1.63	17.72	2.92	6.74	-1.72	15.27	0.47	1.08	
11/22/2007 1:20	14.80	17.36	2.56	5.92	1.87	16.84	2.04	4.72	2.27	17.76	2.96	6.84	1.65	17.73	2.93	6.78	-1.68	15.26	0.46	1.06	
11/22/2007 1:25	14.80	17.37	2.57	5.94	1.89	16.86	2.06	4.76	2.31	17.77	2.98	6.87	1.68	17.80	3.00	6.94	-1.52	15.26	0.46	1.07	
11/22/2007 1:30	14.80	17.38	2.59	5.97	1.92	16.88	2.08	4.80	2.35	17.79	2.99	6.90	1.71	17.74	2.94	6.80	-1.66	15.25	0.45	1.05	
11/22/2007 1:35	14.80	17.40	2.60	6.01	1.96	16.89	2.09	4.83	2.38	17.80	3.00	6.94	1.75	17.77	2.97	6.87	-1.59	15.25	0.45	1.05	
11/22/2007 1:40	14.79	17.41	2.62	6.05	2.00	16.90	2.11	4.88	2.43	17.81	3.02	6.97	1.78	17.84	3.04	7.03	-1.43	15.25	0.45	1.05	
11/22/2007 1:45	14.80	17.42	2.62	6.06	2.01	16.92	2.12	4.90	2.45	17.83	3.03	7.00	1.81	17.88	3.08	7.11	-1.35	15.24	0.44	1.02	
11/22/2007 1:50	14.80	17.44	2.64	6.09	2.04	16.94	2.14	4.94	2.49	17.84	3.04	7.02	1.83	17.90	3.10	7.16	-1.30	15.24	0.44	1.01	
11/22/2007 1:55	14.79	17.45	2.66	6.14	2.09	16.95	2.16	4.98	2.53	17.85	3.06	7.06	1.87	17.99	3.19	7.38	-1.08	15.23	0.44	1.01	
11/22/2007 2:00	14.80	17.46	2.67	6.16	2.11	16.97	2.17	5.02	2.57	17.86	3.07	7.08	1.89	18.04	3.25	7.50	-0.96	15.23	0.43	1.00	
11/22/2007 2:05	14.79	17.48	2.68	6.20	2.15	16.98	2.19	5.06	2.61	17.87	3.08	7.12	1.93	18.01	3.22	7.44	-1.02	15.22	0.43	0.99	
11/22/2007 2:10	14.79	17.48	2.70	6.23	2.18	17.00	2.21	5.11	2.66	17.89	3.10	7.16	1.97	18.06	3.27	7.56	-0.90	15.22	0.44	1.01	
11/22/2007 2:15	14.79	17.50	2.71	6.27	2.22	17.01	2.22	5.13	2.68	17.90	3.11	7.18	1.99	18.06	3.27	7.56	-0.90	15.21	0.43	0.98	
11/22/2007 2:20	14.79	17.51	2.72	6.29	2.24	17.03	2.24	5.16	2.71	17.91	3.12	7.20	2.01	18.13	3.34	7.71	-0.75	15.21	0.42	0.97	
11/22/2007 2:25	14.79	17.52	2.74	6.32	2.27	17.04	2.25	5.19	2.74	17.92	3.13	7.24	2.05	18.17	3.38	7.81	-0.65	15.21	0.42	0.96	
11/22/2007 2:30	14.79	17.54	2.75	6.36	2.31	17.05	2.26	5.23	2.78	17.93	3.14	7.26	2.07	18.15	3.36	7.77	-0.69	15.21	0.42	0.96	
11/22/2007 2:35	14.79	17.55	2.76	6.38	2.33	17.06	2.27	5.25	2.80	17.95	3.16	7.29	2.10	18.20	3.41	7.88	-0.58	15.20	0.41	0.95	
11/22/2007 2:40	14.79	17.57	2.78	6.41	2.36	17.08	2.29	5.29	2.84	17.96	3.17	7.33	2.14	18.26	3.47	8.02	-0.44	15.20	0.41	0.95	
11/22/2007 2:45	14.78	17.57	2.79	6.44	2.39	17.10	2.31	5.34	2.89	17.97	3.19	7.36	2.17	18.23	3.45	7.96	-0.50	15.19	0.41	0.94	
11/22/2007 2:50	14.78	17.59	2.80	6.48	2.43	17.11	2.33	5.37	2.92	17.98	3.20	7.38	2.19	18.26	3.47	8.02	-0.44	15.19	0.41	0.94	
11/22/2007 2:55	14.79	17.60	2.81	6.50	2.45	17.12	2.34	5.39	2.94	17.99	3.20	7.39	2.20	18.20	3.41	7.88	-0.58	15.19	0.40	0.93	
11/22/2007 3:00	14.78	17.62	2.83	6.54	2.49	17.14	2.36	5.45	3.00	18.00	3.21	7.42	2.23	18.37	3.59	8.29	-0.17	15.19	0.40	0.93	
11/22/2007 3:05	14.78	17.63	2.84	6.57	2.52	17.16	2.37	5.48	3.03	18.01	3.23	7.46	2.27	18.28	3.50	8.08	-0.38	15.18	0.40	0.92	
11/22/2007 3:10	14.78	17.64	2.85	6.59	2.54	17.17	2.38	5.51	3.06	18.02	3.24	7.48	2.29	18.45	3.66	8.46	0.00	15.18	0.40	0.92	
11/22/2007 3:15	14.78	17.65	2.87	6.62	2.57	17.19	2.40	5.55	3.10	18.04	3.25	7.51	2.32	18.43	3.65	8.43	-0.03	15.18	0.39	0.91	
11/22/2007 3:20	14.78	17.66	2.88	6.64	2.59	17.20	2.42	5.59	3.14	18.04	3.26	7.53	2.34	18.43	3.65	8.43	-0.03	15.17	0.39	0.90	
11/22/2007 3:25	14.78	17.68	2.89	6.68	2.63	17.22	2.44	5.63	3.18	18.05	3.27	7.55	2.36	18.59	3.80	8.78	0.32	15.17	0.39	0.90	
11/22/2007 3:30	14.78	17.68	2.91	6.71	2.66	17.23	2.45	5.66	3.21	18.07	3.29	7.60	2.41	18.54	3.76	8.69	0.23	15.17	0.39	0.91	
11/22/2007 3:35	14.78	17.70	2.91	6.73	2.68	17.25	2.46	5.69	3.24	18.08	3.30	7.61	2.42	18.54	3.76	8.68	0.22	15.17	0.38	0.89	
11/22/2007 3:40	14.78	17.70	2.92	6.75	2.70	17.26	2.48	5.72	3.27	18.08	3.30	7.62	2.43	18.55	3.77	8.71	0.25	15.17	0.38	0.89	
11/22/2007 3:45	14.79	17.72	2.93	6.77	2.72	17.27	2.49	5.74	3.29	18.10	3.31	7.64	2.45	18.70	3.91	9.04	0.58	15.17	0.38	0.88	
11/22/2007 3:50	14.79	17.73	2.94	6.80	2.75	17.29	2.50	5.78	3.33	18.11	3.32	7.67	2.48	18.62	3.83	8.86	0.40	15.16	0.37	0.87	
11/22/2007 3:55	14.78	17.74	2.96	6.83	2.78	17.30	2.52	5.82	3.37	18.12	3.33	7.70	2.51	18.70	3.92	9.05	0.59	15.16	0.38	0.88	
11/22/2007 4:00	14.79	17.75	2.96	6.84	2.79	17.31	2.52	5.83	3.38	18.12	3.34	7.71	2.52	18.71	3.93	9.07	0.61	15.16	0.37	0.87	
11/22/2007 4:05	14.79	17.76	2.98	6.87	2.82	17.32	2.54	5.86	3.41	18.13	3.34	7.72	2.53	18.66	3.87	8.94	0.48	15.16	0.37	0.85	
11/22/2007 4:10	14.79	17.78	2.99	6.90	2.85	17.34	2.55	5.89	3.44	18.14	3.36	7.75	2.56	18.70	3.92	9.05	0.59	15.16	0.37	0.87	
11/22/2007 4:15	14.79	17.78	3.00	6.92	2.87	17.35	2.57	5.93	3.48	18.15	3.37	7.78	2.59	18.76	3.98	9.19	0.73	15.16	0.37	0.86	
11/22/2007 4:20	14.79	17.80	3.01	6.95	2.90	17.36	2.57	5.95	3.50	18.16	3.38	7.80	2.61	18.81	4.03	9.30	0.84	15.16	0.38	0.87	
11/22/2007 4:25	14.79	17.80	3.02	6.97	2.92	17.37	2.59	5.97	3.52	18.17	3.38	7.81	2.62	18.64	3.86	8.90	0.44	15.16	0.37	0.86	

Table 2 (Page 22 of 24)
Summary of Water Levels during Tidal Cycles
Water Resources Assessment
Area 4 Environmental Impact Assessment
Bahama Rock, Ltd.
Grand Bahama, Bahamas

	Atmosphere	MW-7				MW-8*				MW-10				Harbour				Hawksbill Creek*			
Time, GMT-05:00	Absolute Pressure (psi)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)
11/22/2007 4:30	14.78	17.82	3.04	7.01	2.96	17.38	2.60	6.01	3.56	18.18	3.40	7.85	2.66	18.77	3.99	9.21	0.75	15.16	0.38	0.87	
11/22/2007 4:35	14.79	17.83	3.04	7.02	2.97	17.39	2.60	6.02	3.57	18.19	3.40	7.85	2.66	18.82	4.03	9.32	0.86	15.15	0.37	0.85	
11/22/2007 4:40	14.78	17.84	3.05	7.04	2.99	17.40	2.62	6.04	3.59	18.20	3.42	7.89	2.70	18.79	4.01	9.26	0.80	15.15	0.37	0.85	
11/22/2007 4:45	14.78	17.84	3.06	7.06	3.01	17.41	2.63	6.06	3.61	18.20	3.42	7.90	2.71	18.84	4.05	9.36	0.90	15.15	0.36	0.84	
11/22/2007 4:50	14.78	17.85	3.07	7.09	3.04	17.42	2.63	6.08	3.63	18.21	3.43	7.92	2.73	18.84	4.06	9.37	0.91	15.15	0.36	0.84	
11/22/2007 4:55	14.78	17.86	3.07	7.10	3.05	17.43	2.64	6.10	3.65	18.21	3.43	7.92	2.73	18.79	4.00	9.25	0.79	15.15	0.36	0.84	
11/22/2007 5:00	14.78	17.87	3.08	7.12	3.07	17.43	2.65	6.11	3.66	18.22	3.44	7.94	2.75	18.71	3.93	9.07	0.61	15.15	0.36	0.84	
11/22/2007 5:05	14.78	17.87	3.09	7.13	3.08	17.44	2.65	6.13	3.68	18.23	3.45	7.97	2.78	18.81	4.03	9.31	0.85	15.15	0.36	0.84	
11/22/2007 5:10	14.78	17.88	3.09	7.15	3.10	17.44	2.66	6.14	3.69	18.24	3.45	7.98	2.79	18.81	4.03	9.31	0.85	15.14	0.36	0.83	
11/22/2007 5:15	14.78	17.88	3.10	7.16	3.11	17.45	2.66	6.15	3.70	18.24	3.46	7.99	2.80	18.81	4.03	9.31	0.85	15.15	0.36	0.84	
11/22/2007 5:20	14.78	17.89	3.10	7.17	3.12	17.45	2.67	6.16	3.71	18.25	3.47	8.01	2.82	18.83	4.05	9.34	0.88	15.15	0.36	0.84	
11/22/2007 5:25	14.79	17.89	3.11	7.17	3.12	17.46	2.67	6.16	3.71	18.26	3.47	8.01	2.82	18.82	4.03	9.31	0.85	15.14	0.35	0.82	
11/22/2007 5:30	14.79	17.90	3.11	7.19	3.14	17.46	2.67	6.17	3.72	18.27	3.48	8.03	2.84	18.70	3.92	9.05	0.59	15.14	0.35	0.82	
11/22/2007 5:35	14.78	17.90	3.12	7.20	3.15	17.46	2.68	6.18	3.73	18.27	3.49	8.05	2.86	18.70	3.91	9.03	0.57	15.14	0.36	0.83	
11/22/2007 5:40	14.78	17.91	3.13	7.22	3.17	17.47	2.68	6.20	3.75	18.28	3.49	8.07	2.88	18.77	3.99	9.22	0.76	15.14	0.36	0.83	
11/22/2007 5:45	14.79	17.91	3.12	7.21	3.16	17.47	2.68	6.18	3.73	18.28	3.49	8.05	2.86	18.76	3.98	9.18	0.72	15.14	0.35	0.80	
11/22/2007 5:50	14.79	17.92	3.13	7.23	3.18	17.48	2.69	6.21	3.76	18.28	3.50	8.08	2.89	18.72	3.93	9.08	0.62	15.14	0.35	0.82	
11/22/2007 5:55	14.79	17.92	3.13	7.23	3.18	17.47	2.69	6.20	3.75	18.29	3.50	8.09	2.90	18.79	4.01	9.25	0.79	15.14	0.35	0.82	
11/22/2007 6:00	14.79	17.92	3.13	7.23	3.18	17.48	2.69	6.21	3.76	18.29	3.51	8.10	2.91	18.71	3.92	9.06	0.60	15.14	0.35	0.82	
11/22/2007 6:05	14.79	17.92	3.13	7.23	3.18	17.47	2.68	6.20	3.75	18.30	3.51	8.11	2.92	18.69	3.90	9.01	0.55	15.14	0.35	0.82	
11/22/2007 6:10	14.79	17.92	3.13	7.23	3.18	17.47	2.68	6.18	3.73	18.30	3.51	8.11	2.92	18.75	3.96	9.15	0.69	15.14	0.35	0.80	
11/22/2007 6:15	14.79	17.92	3.13	7.22	3.17	17.47	2.68	6.18	3.73	18.31	3.52	8.12	2.93	18.68	3.88	8.97	0.51	15.14	0.35	0.80	
11/22/2007 6:20	14.79	17.92	3.13	7.23	3.18	17.47	2.67	6.17	3.72	18.31	3.52	8.13	2.94	18.63	3.83	8.85	0.39	15.14	0.35	0.80	
11/22/2007 6:25	14.79	17.92	3.13	7.24	3.19	17.47	2.68	6.19	3.74	18.31	3.53	8.14	2.95	18.68	3.89	8.98	0.52	15.15	0.36	0.83	
11/22/2007 6:30	14.79	17.92	3.13	7.22	3.17	17.46	2.67	6.16	3.71	18.31	3.52	8.13	2.94	18.68	3.89	8.98	0.52	15.14	0.35	0.81	
11/22/2007 6:35	14.79	17.92	3.12	7.21	3.16	17.46	2.67	6.16	3.71	18.31	3.52	8.13	2.94	18.69	3.90	9.00	0.54	15.14	0.35	0.81	
11/22/2007 6:40	14.79	17.91	3.12	7.20	3.15	17.45	2.66	6.14	3.69	18.31	3.52	8.13	2.94	18.58	3.78	8.74	0.28	15.14	0.35	0.81	
11/22/2007 6:45	14.79	17.91	3.12	7.20	3.15	17.44	2.65	6.12	3.67	18.31	3.52	8.12	2.93	18.50	3.71	8.56	0.10	15.14	0.35	0.80	
11/22/2007 6:50	14.79	17.91	3.11	7.19	3.14	17.44	2.65	6.12	3.67	18.30	3.51	8.11	2.92	18.51	3.71	8.58	0.12	15.15	0.35	0.82	
11/22/2007 6:55	14.79	17.90	3.11	7.18	3.13	17.43	2.64	6.10	3.65	18.30	3.51	8.11	2.92	18.49	3.69	8.53	0.07	15.14	0.35	0.80	
11/22/2007 7:00	14.79	17.90	3.11	7.17	3.12	17.43	2.64	6.09	3.64	18.30	3.50	8.09	2.90	18.45	3.65	8.44	-0.02	15.14	0.35	0.80	
11/22/2007 7:05	14.80	17.89	3.10	7.15	3.10	17.42	2.62	6.05	3.60	18.29	3.50	8.08	2.89	18.49	3.70	8.54	0.08	15.14	0.35	0.80	
11/22/2007 7:10	14.80	17.89	3.09	7.14	3.09	17.42	2.62	6.05	3.60	18.28	3.49	8.06	2.87	18.39	3.60	8.31	-0.15	15.14	0.35	0.80	
11/22/2007 7:15	14.79	17.88	3.09	7.13	3.08	17.41	2.61	6.04	3.59	18.28	3.49	8.05	2.86	18.44	3.65	8.43	-0.03	15.15	0.35	0.82	
11/22/2007 7:20	14.79	17.88	3.09	7.13	3.08	17.39	2.60	6.01	3.56	18.27	3.48	8.04	2.85	18.41	3.62	8.36	-0.10	15.15	0.36	0.83	
11/22/2007 7:25	14.79	17.87	3.07	7.10	3.05	17.38	2.59	5.98	3.53	18.27	3.47	8.02	2.83	18.36	3.57	8.25	-0.21	15.15	0.36	0.83	
11/22/2007 7:30	14.79	17.86	3.06	7.07	3.02	17.37	2.58	5.95	3.50	18.26	3.46	8.00	2.81	18.32	3.53	8.16	-0.30	15.15	0.36	0.83	
11/22/2007 7:35	14.79	17.85	3.06	7.07	3.02	17.36	2.57	5.93	3.48	18.25	3.46	8.00	2.81	18.27	3.48	8.03	-0.43	15.15	0.36	0.84	
11/22/2007 7:40	14.79	17.84	3.05	7.04	2.99	17.34	2.55	5.89	3.44	18.24	3.45	7.96	2.77	18.33	3.54	8.16	-0.30	15.16	0.36	0.84	
11/22/2007 7:45	14.80	17.83	3.04	7.01	2.96	17.33	2.54	5.86	3.41	18.23	3.44	7.94	2.75	18.30	3.50	8.08	-0.38	15.16	0.36	0.83	
11/22/2007 7:50	14.80	17.82	3.03	6.99	2.94	17.32	2.52	5.83	3.38	18.22	3.43	7.92	2.73	18.22	3.43	7.91	-0.55	15.17	0.37	0.85	
11/22/2007 7:55	14.80	17.81	3.01	6.95	2.90	17.31	2.51	5.80	3.35	18.21	3.42	7.89	2.70	18.24	3.44	7.95	-0.51	15.17	0.37	0.85	
11/22/2007 8:00	14.79	17.80	3.00	6.94	2.89	17.29	2.50	5.77	3.32	18.20	3.41	7.88	2.69	18.24	3.44	7.95	-0.51	15.17	0.38	0.87	
11/22/2007 8:05	14.79	17.79	2.99	6.91	2.86	17.28	2.49	5.74	3.29	18.20	3.40	7.85	2.66	18.12	3.33	7.69	-0.77	15.18	0.38	0.88	
11/22/2007 8:10	14.80	17.77	2.98	6.88	2.83	17.26	2.47	5.70	3.25	18.19	3.39	7.83	2.64	18.04	3.24	7.49	-0.97	15.19	0.39	0.90	
11/22/2007 8:15	14.80	17.76	2.97	6.85	2.80	17.25	2.46	5.67	3.22	18.17	3.37	7.79	2.60	18.09	3.29	7.60	-0.86	15.19	0.39	0.90	
11/22/2007 8:20	14.80	17.75	2.96	6.83	2.78	17.25	2.45	5.65	3.20	18.16	3.36	7.76	2.57	18.16	3.36	7.76	-0.70	15.20	0.40	0.92	
11/22/2007 8:25	14.79	17.75	2.95	6.82	2.77	17.23	2.44	5.63	3.18	18.15	3.35	7.75	2.56	17.95	3.16	7.29	-1.17	15.20	0.41	0.94	
11/22/2007 8:30	14.80	17.73	2.94	6.78	2.73	17.22	2.42	5.60	3.15	18.14	3.34	7.72	2.53	18.04	3.25	7.50	-0.96	15.21	0.42	0.96	
11/22/2007 8:35	14.80	17.72	2.93	6.76	2.71	17.21	2.41	5.56	3.11	18.12	3.33	7.68	2.49	17.95	3.16	7.29	-1.17	15.22	0.42	0.98	
11/22/2007 8:40	14.80	17.71	2.92	6.73	2.68	17.19	2.40	5.53	3.08	18.12	3.32	7.66	2.47	17.88	3.08	7.12	-1.34	15.23	0.43	1.00	
11/22/2007 8:45	14.80	17.70	2.90	6.70	2.65	17.18	2.38	5.50	3.05	18.10	3.30	7.62	2.43	17.90	3.09	7.15	-1.31	15.24	0.44	1.02	
11/22/2007 8:50	14.80	17.69	2.89	6.67	2.62	17.17	2.37	5.46	3.01	18.09	3.29	7.59	2.40	17.86	3.06	7.06	-1.40	15.25	0.45	1.04	
11/22/2007 8:55	14.80	17.68	2.87	6.64	2.59	17.15	2.35	5.42	2.97	18.07	3.27	7.55	2.36	17.79	2.98	6.89	-1.57	15.27	0.46	1.07	

Table 2 (Page 23 of 24)
Summary of Water Levels during Tidal Cycles
Water Resources Assessment
Area 4 Environmental Impact Assessment
Bahama Rock, Ltd.
Grand Bahama, Bahamas

	Atmosphere	MW-7				MW-8*				MW-10				Harbour				Hawksbill Creek*			
Time, GMT-05:00	Absolute Pressure (psi)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)
11/22/2007 9:00	14.80	17.67	2.86	6.61	2.56	17.14	2.33	5.38	2.93	18.06	3.26	7.53	2.34	17.79	2.98	6.89	-1.57	15.28	0.47	1.09	
11/22/2007 9:05	14.81	17.65	2.84	6.57	2.52	17.12	2.31	5.35	2.90	18.05	3.24	7.49	2.30	17.78	2.98	6.87	-1.59	15.29	0.48	1.12	
11/22/2007 9:10	14.80	17.64	2.84	6.55	2.50	17.10	2.30	5.31	2.86	18.04	3.23	7.47	2.28	17.87	3.07	7.09	-1.37	15.31	0.50	1.16	
11/22/2007 9:15	14.80	17.62	2.82	6.52	2.47	17.08	2.28	5.27	2.82	18.02	3.22	7.43	2.24	17.68	2.88	6.65	-1.81	15.32	0.51	1.18	
11/22/2007 9:20	14.80	17.61	2.81	6.49	2.44	17.07	2.27	5.24	2.79	18.01	3.21	7.42	2.23	17.63	2.83	6.54	-1.92	15.33	0.53	1.23	
11/22/2007 9:25	14.80	17.60	2.80	6.46	2.41	17.05	2.25	5.20	2.75	18.00	3.20	7.39	2.20	17.59	2.79	6.45	-2.01	15.34	0.54	1.26	
11/22/2007 9:30	14.81	17.58	2.78	6.41	2.36	17.03	2.23	5.15	2.70	17.98	3.17	7.33	2.14	17.60	2.80	6.46	-2.00	15.36	0.56	1.29	
11/22/2007 9:35	14.80	17.57	2.77	6.39	2.34	17.02	2.21	5.11	2.66	17.97	3.17	7.31	2.12	17.57	2.77	6.39	-2.07	15.37	0.57	1.32	
11/22/2007 9:40	14.81	17.56	2.75	6.34	2.29	17.00	2.19	5.06	2.61	17.95	3.14	7.26	2.07	17.55	2.75	6.34	-2.12	15.39	0.58	1.34	
11/22/2007 9:45	14.81	17.54	2.73	6.31	2.26	16.99	2.18	5.02	2.57	17.94	3.13	7.22	2.03	17.52	2.71	6.26	-2.20	15.40	0.59	1.37	
11/22/2007 9:50	14.81	17.53	2.72	6.28	2.23	16.97	2.16	4.99	2.54	17.92	3.12	7.20	2.01	17.51	2.70	6.25	-2.21	15.41	0.61	1.40	
11/22/2007 9:55	14.80	17.52	2.71	6.27	2.22	16.95	2.15	4.96	2.51	17.91	3.11	7.18	1.99	17.52	2.71	6.27	-2.19	15.43	0.63	1.46	
11/22/2007 10:00	14.81	17.50	2.70	6.23	2.18	16.93	2.13	4.91	2.46	17.90	3.09	7.14	1.95	17.34	2.53	5.84	-2.62	15.44	0.64	1.47	
11/22/2007 10:05	14.80	17.49	2.69	6.21	2.16	16.92	2.12	4.89	2.44	17.89	3.08	7.12	1.93	17.38	2.58	5.96	-2.50	15.45	0.65	1.50	
11/22/2007 10:10	14.80	17.48	2.67	6.17	2.12	16.90	2.10	4.85	2.40	17.87	3.07	7.09	1.90	17.39	2.59	5.98	-2.48	15.46	0.66	1.53	
11/22/2007 10:15	14.80	17.46	2.66	6.14	2.09	16.89	2.08	4.81	2.36	17.86	3.05	7.05	1.86	17.44	2.64	6.09	-2.37	15.47	0.67	1.55	
11/22/2007 10:20	14.81	17.45	2.65	6.11	2.06	16.88	2.07	4.78	2.33	17.85	3.04	7.03	1.84	17.36	2.56	5.90	-2.56	15.48	0.68	1.57	
11/22/2007 10:25	14.81	17.44	2.63	6.08	2.03	16.86	2.05	4.74	2.29	17.83	3.03	6.99	1.80	17.42	2.62	6.04	-2.42	15.50	0.69	1.60	
11/22/2007 10:30	14.80	17.43	2.62	6.06	2.01	16.84	2.04	4.71	2.26	17.82	3.02	6.97	1.78	17.34	2.54	5.87	-2.59	15.50	0.70	1.62	
11/22/2007 10:35	14.80	17.42	2.62	6.05	2.00	16.84	2.04	4.70	2.25	17.81	3.01	6.96	1.77	17.37	2.57	5.93	-2.53	15.50	0.71	1.63	
11/22/2007 10:40	14.80	17.40	2.61	6.02	1.97	16.82	2.02	4.67	2.22	17.80	3.00	6.92	1.73	17.31	2.51	5.81	-2.65	15.52	0.72	1.66	
11/22/2007 10:45	14.80	17.39	2.59	5.98	1.93	16.81	2.01	4.63	2.18	17.79	2.98	6.89	1.70	17.30	2.50	5.77	-2.69	15.52	0.72	1.66	
11/22/2007 10:50	14.80	17.38	2.58	5.97	1.92	16.80	2.00	4.61	2.16	17.78	2.98	6.88	1.69	17.28	2.48	5.73	-2.73	15.52	0.72	1.67	
11/22/2007 10:55	14.80	17.37	2.57	5.94	1.89	16.79	1.99	4.59	2.14	17.76	2.96	6.85	1.66	17.22	2.42	5.60	-2.86	15.53	0.73	1.68	
11/22/2007 11:00	14.80	17.36	2.56	5.92	1.87	16.77	1.97	4.56	2.11	17.75	2.95	6.82	1.63	17.15	2.36	5.44	-3.02	15.53	0.73	1.69	
11/22/2007 11:05	14.79	17.35	2.56	5.91	1.86	16.77	1.97	4.55	2.10	17.74	2.95	6.81	1.62	17.28	2.49	5.75	-2.71	15.53	0.74	1.71	
11/22/2007 11:10	14.79	17.35	2.55	5.90	1.85	16.76	1.97	4.54	2.09	17.73	2.94	6.79	1.60	17.14	2.34	5.41	-3.05	15.53	0.74	1.71	
11/22/2007 11:15	14.79	17.33	2.54	5.87	1.82	16.75	1.96	4.52	2.07	17.73	2.94	6.79	1.60	17.15	2.36	5.45	-3.01	15.53	0.74	1.71	
11/22/2007 11:20	14.79	17.33	2.53	5.85	1.80	16.74	1.95	4.50	2.05	17.72	2.93	6.76	1.57	17.23	2.44	5.63	-2.83	15.53	0.74	1.70	
11/22/2007 11:25	14.79	17.32	2.53	5.85	1.80	16.73	1.94	4.49	2.04	17.71	2.92	6.75	1.56	17.20	2.41	5.57	-2.89	15.52	0.74	1.70	
11/22/2007 11:30	14.79	17.31	2.52	5.83	1.78	16.72	1.94	4.47	2.02	17.71	2.92	6.74	1.55	17.12	2.33	5.39	-3.07	15.52	0.74	1.70	
11/22/2007 11:35	14.79	17.30	2.52	5.81	1.76	16.72	1.93	4.46	2.01	17.70	2.91	6.73	1.54	17.20	2.41	5.57	-2.89	15.52	0.73	1.69	
11/22/2007 11:40	14.78	17.30	2.52	5.81	1.76	16.71	1.93	4.46	2.01	17.70	2.91	6.73	1.54	17.14	2.36	5.45	-3.01	15.51	0.73	1.69	
11/22/2007 11:45	14.79	17.29	2.51	5.79	1.74	16.71	1.92	4.44	1.99	17.69	2.90	6.70	1.51	17.30	2.52	5.81	-2.65	15.50	0.72	1.65	
11/22/2007 11:50	14.79	17.29	2.50	5.78	1.73	16.70	1.92	4.43	1.98	17.68	2.90	6.69	1.50	17.20	2.42	5.58	-2.88	15.50	0.71	1.64	
11/22/2007 11:55	14.79	17.28	2.50	5.77	1.72	16.70	1.92	4.42	1.97	17.68	2.89	6.68	1.49	17.20	2.41	5.57	-2.89	15.49	0.71	1.63	
11/22/2007 12:00	14.79	17.28	2.49	5.76	1.71	16.70	1.91	4.41	1.96	17.68	2.89	6.68	1.49	17.23	2.45	5.65	-2.81	15.49	0.70	1.62	
11/22/2007 12:05	14.79	17.28	2.49	5.75	1.70	16.70	1.91	4.41	1.96	17.67	2.89	6.67	1.48	17.22	2.43	5.62	-2.84	15.48	0.69	1.60	
11/22/2007 12:10	14.79	17.28	2.49	5.75	1.70	16.70	1.91	4.41	1.96	17.67	2.89	6.67	1.48	17.24	2.45	5.66	-2.80	15.48	0.69	1.60	
11/22/2007 12:15	14.79	17.27	2.49	5.74	1.69	16.69	1.91	4.40	1.95	17.67	2.89	6.67	1.48	17.16	2.38	5.49	-2.97	15.47	0.69	1.59	
11/22/2007 12:20	14.79	17.27	2.48	5.72	1.67	16.69	1.90	4.39	1.94	17.67	2.88	6.66	1.47	17.30	2.51	5.79	-2.67	15.47	0.68	1.57	
11/22/2007 12:25	14.79	17.27	2.48	5.72	1.67	16.69	1.90	4.39	1.94	17.67	2.88	6.66	1.47	17.19	2.40	5.54	-2.92	15.46	0.67	1.56	
11/22/2007 12:30	14.79	17.27	2.48	5.73	1.68	16.69	1.91	4.40	1.95	17.67	2.89	6.67	1.48	17.22	2.44	5.63	-2.83	15.45	0.67	1.54	
11/22/2007 12:35	14.79	17.27	2.48	5.73	1.68	16.69	1.91	4.40	1.95	17.67	2.89	6.67	1.48	17.37	2.58	5.96	-2.50	15.45	0.67	1.54	
11/22/2007 12:40	14.79	17.27	2.48	5.73	1.68	16.70	1.91	4.41	1.96	17.67	2.89	6.67	1.48	17.29	2.50	5.77	-2.69	15.44	0.66	1.52	
11/22/2007 12:45	14.79	17.27	2.48	5.72	1.67	16.70	1.91	4.41	1.96	17.67	2.89	6.66	1.47	17.35	2.56	5.91	-2.55	15.44	0.65	1.50	
11/22/2007 12:50	14.79	17.27	2.48	5.73	1.68	16.70	1.91	4.41	1.96	17.67	2.89	6.66	1.47	17.38	2.59	5.98	-2.48	15.43	0.64	1.48	
11/22/2007 12:55	14.78	17.27	2.49	5.74	1.69	16.70	1.92	4.43	1.98	17.67	2.89	6.68	1.49	17.41	2.62	6.06	-2.40	15.43	0.64	1.48	
11/22/2007 13:00	14.78	17.27	2.49	5.74	1.69	16.70	1.92	4.44	1.99	17.67	2.89	6.68	1.49	17.30	2.52	5.82	-2.64	15.42	0.64	1.47	
11/22/2007 13:05	14.78	17.27	2.49	5.76	1.71	16.71	1.93	4.46	2.01	17.68	2.90	6.70	1.51	17.39	2.61	6.02	-2.44	15.42	0.64	1.47	
11/22/2007 13:10	14.78	17.28	2.50	5.77	1.72	16.72	1.94	4.47	2.02	17.68	2.90	6.71	1.52	17.34	2.56	5.91	-2.55	15.41	0.63	1.46	
11/22/2007 13:15	14.78	17.28	2.50	5.76	1.71	16.72	1.94	4.47	2.02	17.69	2.90	6.70	1.51	17.33	2.55	5.88	-2.58	15.41	0.63	1.44	
11/22/2007 13:20	14.78	17.28	2.50	5.77	1.72	16.72	1.94	4.48	2.03	17.69	2.91	6.72	1.53	17.41	2.62	6.06	-2.40	15.41	0.62	1.43	
11/22/2007 13:25	14.78	17.29	2.51	5.80	1.75	16.73	1.96	4.52	2.07	17.69	2.91	6.73	1.54	17.52	2.74	6.33	-2.13	15.40	0.62	1.44	

Table 2 (Page 24 of 24)
Summary of Water Levels during Tidal Cycles
Water Resources Assessment
Area 4 Environmental Impact Assessment
Bahama Rock, Ltd.
Grand Bahama, Bahamas

	Atmosphere	MW-7				MW-8*				MW-10				Harbour				Hawksbill Creek*			
Time, GMT-05:00	Absolute Pressure (psi)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)	Absolute Pressure (psi)	Water pressure (psI)	Height of Water (ft)	Water Level* (ft)
11/22/2007 13:30	14.78	17.29	2.51	5.80	1.75	16.74	1.96	4.52	2.07	17.70	2.92	6.74	1.55	17.46	2.67	6.17	-2.29	15.40	0.61	1.41	
11/22/2007 13:35	14.78	17.30	2.52	5.82	1.77	16.75	1.97	4.54	2.09	17.71	2.93	6.77	1.58	17.52	2.74	6.32	-2.14	15.39	0.61	1.41	
11/22/2007 13:40	14.78	17.30	2.52	5.83	1.78	16.76	1.98	4.57	2.12	17.72	2.94	6.78	1.59	17.65	2.87	6.63	-1.83	15.38	0.60	1.39	
11/22/2007 13:45	14.78	17.31	2.53	5.85	1.80	16.77	1.99	4.60	2.15	17.72	2.94	6.79	1.60	17.60	2.82	6.52	-1.94	15.38	0.60	1.39	
11/22/2007 13:50	14.78	17.32	2.54	5.87	1.82	16.78	2.00	4.62	2.17	17.73	2.95	6.82	1.63	17.61	2.83	6.55	-1.91	15.38	0.60	1.38	
11/22/2007 13:55	14.78	17.33	2.55	5.89	1.84	16.79	2.01	4.64	2.19	17.74	2.96	6.84	1.65	17.58	2.81	6.48	-1.98	15.37	0.59	1.37	
11/22/2007 14:00	14.78	17.34	2.56	5.92	1.87	16.80	2.02	4.67	2.22	17.74	2.96	6.84	1.65	17.54	2.77	6.39	-2.07	15.37	0.59	1.36	
11/22/2007 14:05	14.78	17.35	2.57	5.94	1.89	16.81	2.03	4.70	2.25	17.75	2.98	6.87	1.68	17.65	2.87	6.63	-1.83	15.36	0.58	1.35	
11/22/2007 14:10	14.78	17.36	2.58	5.96	1.91	16.82	2.05	4.72	2.27	17.76	2.99	6.89	1.70	17.67	2.90	6.69	-1.77	15.35	0.57	1.32	
11/22/2007 14:15	14.78	17.37	2.59	5.98	1.93	16.84	2.06	4.76	2.31	17.77	2.99	6.91	1.72	17.73	2.95	6.81	-1.65	15.35	0.57	1.31	
11/22/2007 14:20	14.78	17.38	2.60	6.01	1.96	16.85	2.07	4.78	2.33	17.78	3.00	6.94	1.75	17.61	2.83	6.54	-1.92	15.35	0.57	1.31	
11/22/2007 14:25	14.78	17.39	2.61	6.04	1.99	16.86	2.08	4.81	2.36	17.79	3.01	6.95	1.76	17.64	2.86	6.61	-1.85	15.34	0.56	1.28	
11/22/2007 14:30	14.78	17.40	2.62	6.05	2.00	16.88	2.10	4.84	2.39	17.81	3.02	6.98	1.79	17.75	2.97	6.86	-1.60	15.34	0.55	1.28	
11/22/2007 14:35	14.78	17.42	2.64	6.10	2.05	16.89	2.11	4.88	2.43	17.81	3.03	7.00	1.81	17.78	3.00	6.92	-1.54	15.34	0.56	1.29	
11/22/2007 14:40	14.78	17.43	2.65	6.12	2.07	16.90	2.12	4.91	2.46	17.82	3.04	7.03	1.84				-1.54	15.33	0.55	1.26	

Table 3
Summary of Conductivity and Salinity Measurements in
Bahama Cement Co., Ltd., Trench Wells
Water Resources Assessment
Area 4 Environmental Impact Assessment
Bahama Rock, Ltd.
Grand Bahama, Bahamas

Surface (Water Table)

Location	Depth to Water Surface(ft.)	Conductivity (uS/cm)	Sp. Conductivity (uS/cm)	Salinity (ppt)
Trench 3 East (0 ft.)	7.0	486.2	473.3	0.2
Trench 3 (420 ft.)	10.66	507	494	0.2
Trench 3 West (913 ft.)	5.41	617	601	0.3
Trench 4 East (0 ft.)	10.66	465.6	461	0.2
Trench 4 (400ft.)	11.0	450.3	442	0.2
Trench 4 West (1200 ft.)	11.58	408.9	399.9	0.2
Trench 7 East (0 ft.)	11.66	308.3	299.9	0.1
Trench 7 (571 ft.)	11.75	335.3	324.1	0.2

Bottom of Trench

Location	Depth to Trench Bottom (ft)	Conductivity (uS/cm)	Sp. Conductivity (uS/cm)	Salinity (ppt)
Trench 3 East (0 ft.)	9.6	511	501	0.2
Trench 3 (420 ft.)	14.6	621	607	0.3
Trench 3 West (913 ft.)	10.2	736	722	0.4
Trench 4 East (0 ft.)	15.2	569	559	0.3
Trench 4 (400ft.)	15.6	535	532	0.3
Trench 4 West (1200 ft.)	13.6	442	435.2	0.2
Trench 7 East (0 ft.)	16.0	384.2	376.9	0.2
Trench 7 (571 ft.)	15.4	361.4	354.5	0.2

Surface Water

Location	Direction	Conductivity (uScm)	Sp. Conductivity (uS/cm)	Salinity (ppt)
Hawksbill Creek (Fishing Hole Rd.)	North	50.6	47.3	29.4
Hawksbill Creek (Fishing Hole Rd.)	South	58.7	51.8	34

Salinity in uS/cm- microSeimens per centimeter
Conductivity in ppt - parts per thousand
Field Measurements collected with a Yellow Springs Instrument Model 30 portable Conductivity/Specific Conductivity/Salinity and Temperature Meter
Temperature Meter
Measurements made in August 2003

Table 4
Summary of Salinity and Conductivity in Groundwater
November 6-13, 2007
Water Resources Assessment
Area 4 Environmental Impact Assessment
Bahama Rock, Ltd.
Grand Bahama, Bahamas

	MW-1		MW-2		MW-3		MW-4		MW-5		MW-6		MW-7		MW-8		MW-9		MW-10	
Depth (ft)	Conductivity (us/cm)	Salinity (ppt)	Conductivity (us/cm)	Salinity (ppt)	Conductivity (us/cm)	Salinity (ppt)	Conductivity (us/cm)	Salinity (ppt)	Conductivity (us/cm)	Salinity (ppt)	Conductivity (us/cm)	Salinity (ppt)	Conductivity (us/cm)	Salinity (ppt)	Conductivity (us/cm)	Salinity (ppt)	Conductivity (us/cm)	Salinity (ppt)	Conductivity (us/cm)	Salinity (ppt)
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3044	1.6	0	0
12	0	0	0	0	0	0	0	0	931	0.4	0	0	0	0	0	0	3153	1.6	4350	2.2
13	0	0	0	0	0	0	0	0	937	0.4	0	0	0	0	0	0	3142	1.6	4720	2.5
14	0	0	0	0	463	0.2	0	0	947	0.5	0	0	1593	0.8	0	0	3159	1.6	6070	3.2
15	0	0	3,171	1.7	501	0.2	0	0	958	0.5	0	0	1568	0.8	0	0	3202	1.7	6320	3.4
16	1,228	0.6	3,024	1.6	575	0.3	0	0	974	0.5	851	0.4	1,850	0.9	0	0	3192	1.6	6310	3.4
17	1,188	0.6	2,925	1.5	697	0.3	571	0.3	977	0.5	880	0.4	2,273	1.2	6,490	3.5	3118	1.6	6300	3.4
18	1,188	0.6	2,630	1.4	743	0.3	573	0.3	977	0.5	914	0.4	3,245	1.7	6,520	3.5	3062	1.6	6270	3.4
19	1,171	0.6	2,706	1.4	740	0.3	592	0.3	968	0.5	906	0.4	5,160	2.8	6,520	3.5	3051	1.6	6270	3.4
20	1,260	0.6	2,772	1.4	746	0.4	594	0.3	960	0.5	906	0.4	6,070	3.3	6,520	3.5	3033	1.6	6270	3.4
21	1,334	0.7	2,790	1.4	744	0.4	574	0.3	949	0.5	912	0.4	6,640	3.6	6,520	3.5	2991	1.6	6270	3.4
22	1,393	0.7	2,818	1.4	743	0.4	556	0.3	941	0.5	919	0.4	6,960	3.8	6,520	3.5	3010	1.5	6270	3.4
23	1,410	0.7	2,822	1.4	741	0.4	554	0.3	940	0.5	923	0.4	7,320	4	6,520	3.5	3005	1.5	6270	3.4
24	1,484	0.8	2,805	1.4	740	0.4	551	0.3	932	0.5	927	0.4	7,660	4.2	6,520	3.5	3004	1.5	6270	3.4
25	1,503	0.8	2,831	1.4	736	0.3	548	0.3	960	0.5	932	0.4	7,850	4.3	6,520	3.5	3004	1.5	6270	3.4
26	1,538	0.8	2,843	1.5	744	0.4	546	0.3	955	0.5	919	0.5	7,960	4.4	6,560	3.5	2969	1.5	6270	3.4
27	1,568	0.8	2,811	1.4	759	0.4	548	0.3	967	0.5	924	0.5	8,130	4.5	6,560	3.5	2968	1.5	6270	3.4
28	1,574	0.8	2,744	1.4	757	0.4	548	0.3	968	0.5	931	0.5	8,530	4.8	6,560	3.5	2970	1.5	6270	3.4
29	1,583	0.8	2,718	1.4	736	0.4	546	0.3	971	0.5	934	0.5	9,060	5.1	6,550	3.5	2965	1.5	6280	3.4
30	2,834	1.5	2,673	1.4	750	0.4	548	0.3	980	0.5	935	0.5	9,420	5.3	6,530	3.5	2958	1.5	6280	3.4
31	2,866	1.5	2,686	1.4	766	0.4	558	0.3	1,002	0.5	944	0.5	9,590	5.4	6,480	3.5	2948	1.5	6280	3.4
32	2,842	1.5	2,624	1.3	755	0.4	573	0.3	1,195	0.6	951	0.5	9,650	5.4	6,450	3.5	2942	1.5	6270	3.4
33	2,842	2.4	2,563	1.3	780	0.4	588	0.3	1,264	0.6	963	0.5	9,710	5.4	6,430	3.5	2953	1.5	6270	3.4
34	3,510	4.4	2,015	1.0	775	0.4	629	0.3	1,281	0.6	1,269	0.6	9,800	5.5	6,400	3.5	2953	1.5	6270	3.4
35	7,940	4.4	2,105	1.1	905	0.4	645	0.3	1,280	0.6	2,080	1	12,450	7.1	6,410	3.5	2954	1.5	6250	3.4
36	8,060	4.5	2,157	1.1	1,015	0.5	626	0.3	1,287	0.6	2,140	1.1	12,550	7.2	6,440	3.5	2,970	1.5	6240	3.3
37	8,110	4.6	2,180	1.1	1,199	0.6	1,059	0.5	1,287	0.6	2,404	1.2	12,590	7.2	6,400	3.4	2,950	1.5	6,230	3.3
38	8,200	4.6	2,217	1.1	1,607	0.8	2,229	1.1	1,287	0.6	2,390	1.2	12,600	7.2	6,390	3.4	2,948	1.5	6,230	3.3
39	8,180	4.6	2,242	1.1	2,177	1.1	2,772	1.4	1,285	0.6	2,302	1.2	12,600	7.2	6,380	3.4	2,951	1.5	6,220	3.3
40	8,180	4.6	2,251	1.1	2,393	1.2	2,761	1.4	1,284	0.6	2,300	1.2	12,600	7.2	6,390	3.4	2,923	1.5	6,210	3.3
41	8,200	4.6	2,772	1.2	2,450	1.3	2,801	1.5	1,282	0.6	2,226	1.2	12,610	7.2	6,380	3.4	2,919	1.5	6,210	3.3
42	8,210	4.6	2,290	1.2	2,458	1.3	2,823	1.5	1,280	0.6	2,265	1.2	12,630	7.2	6,370	3.4	2,893	1.5	6,210	3.3
43	8,200	4.6	2,323	1.2	2,463	1.3	2,852	1.5	1,280	0.6	2,265	1.2	12,650	7.2	6,360	3.4	3,009	1.5	6,210	3.3
44	8,210	4.6	2,325	1.2	2,457	1.3	2,868	1.5	1,277	0.6	2,242	1.1	12,650	7.3	6,240	3.3	2,955	1.5	6,290	3.4
45	8,430	4.7	2,348	1.2	2,455	1.3	2,882	1.5	1,276	0.6	2,208	1.1	12,650	7.3	6,290	3.4	3,181	1.6	11,520	6.5
46	10,440	6.0	2,316	1.2	2,458	1.3	2,891	1.5	1,274	0.6	2,708	1.1	12,650	7.3	6,290	3.1	3,233	1.6	25,100	15.4
47	11,490	6.6	2,372	1.2	2,460	1.3	2,907	1.5	1,273	0.6	2,210	1.1	12,670	7.3	6,640	3.6	3,274	1.7	30,170	18.5
48	11,460	6.6	2,380	1.2	2,462	1.3	2,924	1.5	1,273	0.6	2,210	1.1	12,670	7.3	7,210	3.9	3,819	1.9	33,210	20.7
49	11,440	6.6	2,385	1.2	2,462	1.3	2,927	1.5	5,410	2.9	2,198	1.1	12,780	7.4	7,420	4.0	4,061	2.5	33,870	21.2
50	11,460	6.6	2,388	1.2	2,461	1.3	2,957	1.5	9,200	5.1	2,190	1.1	13,530	7.6	8,060	4.4	10,320	5.7	34,650	21.7
51																	18,190	10.6		

Notes - Measured from Top of Casing
Conductivity in uS/cm - microSiemens/centimeter (freshwater 0-1,300 uS/cm)
Salinity in ppt - parts per thousand (freshwater 0-600 ppt)

Table 5
Summary of Conductivity and Salinity in Groundwater - December 14-17, 2007
Water Resources Assessment
Area 4 Environmental Impact Assessment
Bahama Rock, Ltd.
Grand Bahama, Bahamas

	MW-1		MW-2		MW-3		MW-4		MW-5		MW-6		MW-7		MW-8		MW-9		MW-10	
Depth	**Conductivity**	**Salinity**	**Conductivity**	**Salinity**	**Conductivity**	**Salinity**	**Conductivity**	**Salinity**	**Conductivity**	**Salinity**	**Conductivity**	**Salinity**	**Conductivity**	**Salinity**	**Conductivity**	**Salinity**	**Conductivity**	**Salinity**	**Conductivity**	**Salinity**
(Feet)	(uS/cm)	ppt	(uS/cm)	ppt	(uS/cm)	ppt	(uS/cm)	ppt	(uS/cm)	ppt	(uS/cm)	ppt	(uS/cm)	ppt	(uS/cm)	ppt	(uS/cm)	ppt	(uS/cm)	ppt
11																	3803	2		
12									941	0.5							3778	2		
13									927	0.4							3,765	2	954	0.5
14			8,170	4.8					911	0.4			761	0.4			3,751	2	2,997	1.5
15			8,800	4.9	519	0.2			901	0.4	787	0.4	731	0.4			3,731	1.9	3,086	1.6
16	1,372	0.7	8,840	4.9	549	0.3	524	0.3	896	0.4	906	0.4	741	0.4	7,260	4.0	3,715	1.9	3,129	1.6
17	1,388	0.7	8,850	4.9	594	0.3	528	0.3	893	0.4	1,227	0.6	1,045	0.5	7,540	4.1	3,700	1.9	3,164	1.6
18	1,813	0.9	8,860	4.9	635	0.3	538	0.3	903	0.4	2,009	1.0	2,329	1.2	7,670	4.2	3,689	1.9	3,223	1.7
19	3,339	1.8	8,870	4.9	648	0.3	540	0.3	933	0.5	2,355	1.2	2,825	1.5	7,750	4.2	3,683	1.9	3,325	1.7
20	6,330	3.4	8,880	4.9	655	0.3	541	0.3	948	0.5	2,490	1.3	2,903	1.5	7,750	4.3	3,638	1.9	3,437	1.8
21	9,190	5.1	8,880	4.9	657	0.3	544	0.3	5,666	0.5	2,527	1.3	2,907	1.5	7,840	4.3	3,654	1.9	3,590	1.9
22	9,850	5.6	8,900	5.0	655	0.3	548	0.3	1,280	0.6	2,606	1.3	2,916	1.5	7,870	4.3	3,648	1.9	3,535	2.0
23	10,110	5.7	8,900	5.0	656	0.3	567	0.3	1,350	0.7	2,673	1.4	2,860	1.5	7,880	4.3	3,630	1.9	4,325	2.3
24	10,220	5.8	8,830	4.9	672	0.3	637	0.3	1,423	0.7	2,692	1.4	2,877	1.5	7,830	4.3	3,621	1.9	4,767	2.5
25	12,490	7.1	8,940	5.0	688	0.3	776	0.4	1,710	0.9	2,797	1.4	2,874	1.5	7,920	4.3	3,621	1.9	5,030	2.6
26	13,540	7.9	8,960	5.0	707	0.3	1,009	0.5	2,566	1.3	2,858	1.5	2,874	1.5	7,930	4.3	3,608	1.9	5,300	2.8
27	14,170	8.3	8,970	5.0	717	0.4	2,211	1.1	2,584	1.3	2,899	1.5	2,768	1.4	7,940	4.3	3,571	1.9	5,660	3.0
28	17,910	8.8	8,980	5.0	836	0.4	3,176	1.7	2,691	1.3	2,988	1.5	2,740	1.4	7,960	4.4	3,545	1.9	6,180	3.3
29	15,570	9.1	9,000	5.0	1,004	0.5	3,886	2.0	2,574	1.3	3,157	1.6	2,770	1.4	8,140	4.5	3,564	1.9	6,710	3.6
30	15,860	9.4	9,020	5.0	1,133	0.6	6,450	3.5	2,557	1.3	3,256	1.7	2,788	1.4	8,210	4.5	3,560	1.8	7,090	3.9
31	16,190	9.6	9,030	5.0	3,469	0.6	7,380	4.0	2,557	1.3	3,469	1.8	2,763	1.4	8,220	4.5	3,540	1.8	7,590	4.1
32	16,530	9.8	9,060	5.1	1,258	0.7	7,800	4.3	2,557	1.3	5,100	2.7	2,765	1.4	8,150	4.5	3,537	1.8	7,760	4.2
33	16,820	10.0	9,090	5.1	1,863	0.9	8,560	4.8	2,552	1.3	5,570	3.0	2,764	1.4	8,240	4.5	3,520	1.8	7,870	4.3
34	17,080	10.1	9,090	5.1	2,120	1.1	9,100	5.1	2,550	1.3	5,610	3.0	2,775	1.4	8,270	4.5	3,530	1.8	8,090	4.4
35	17,160	10.2	9,090	5.1	5,820	3.1	9,440	5.3	2,552	1.3	5,600	3.0	2,782	1.4	8,300	4.6	3,518	1.8	8,210	4.5
36	17,260	10.2	9,080	5.1	7,640	4.2	9,790	5.5	2,564	1.3	5,600	3.0	2,781	1.4	9,130	5.0	3,508	1.8	8,330	4.6
37	17,280	10.3	9,080	5.1	7,930	4.3	9,980	5.6	2,575	1.3	5,580	3.0	2,781	1.4	9,060	5.0	3,506	1.8	8,700	4.8
38	17,300	10.3	9,070	5.1	7,960	4.4	10,050	5.7	2,589	1.3	5,560	3.0	2,782	1.4	9,070	5.0	3,497	1.8	8,770	4.8
39	17,390	10.3	9,060	5.1	8,020	4.4	10,070	5.7	2,588	1.3	5,560	3.0	2,782	1.4	9,080	5.0	3,497	1.8	8,670	4.8
40	17,450	10.4	9,070	5.1	8,140	4.5	10,080	5.7	2,632	1.4	5,570	3.0	2,782	1.4	9,120	5.0	3,463	1.8	8,660	4.8
41	17,500	10.4	9,070	5.1	8,590	4.7	10,110	5.7	2,645	1.4	5,570	3.0	5,470	2.9	9,120	5.0	3,420	1.8	8,620	4.7
42	17,570	10.5	9,120	5.1	8,750	4.9	10,070	5.7	2,652	1.4	5,560	3.0	8,740	4.9	9,170	5.0	3,231	1.7	8,590	4.7
43	17,670	10.5	9,850	5.6	8,860	4.9	1,017	5.7	2,690	1.4	5,570	3.0	10,420	5.9	9,150	5.0	3,095	1.6	8,600	4.7
44	17,930	10.6	10,650	6.0	8,870	4.9	10,210	6.1	2,667	1.4	5,590	3.0	10,750	6.1	9,200	5.1	3,043	1.6	11,580	6.5
45	17,950	10.7	10,650	6.2	8,920	5.0	14,160	8.2	2,681	1.4	5,630	3.0	11,560	6.6	9,240	5.1	3,026	1.6	14,600	8.3
46	10,800	10.8	10,670	6.3	40	5.1	14,420	8.3	3,010	1.6	5,740	3.1	11,670	6.6	8,740	4.7	3,056	1.6	39,380	24.1
47	10,900	10.9	11,030	6.5	9,830	5.4	14,860	8.7	4,350	2.3	5,890	3.1	11,660	6.6	9,510	5.3	3,074	1.6	40,480	25.9
48	11,300	11.3	11,090	6.3	10,290	5.8	21,620	13.0	6,170	3.4	5,960	3.2	11,520	6.6	10,200	5.7	3,160	1.6	40,600	25.9
49	11,400	11.4	11,540	6.5	10,490	5.9	22,190	13.3	9,060	5.1	5,660	3.1	11,510	6.5	10,710	6	3,615	1.9	40,770	26
50	12,600	12.6	14,640	8.5	11,030	6.1	23,160	14.0	17,380	10.03	5,820	3.2	11,500	6.5	11,280	6.2	4,836	2.5	40,880	26.1
51					22,920	13.8	24,350	14.9			26,920	16.6					12,700	12.7		

Notes: Measured from Top of Casing with YSI 30 Meter
Conductivity in uS/cm - microSiemens/centimeter (freshwater 0-1,300 uS/cm)
Salinity in ppt - parts per thousand (freshwater 0-600 ppt)

Table 6
Summary of Salinity and Conductivity in Groundwater
Feruary 19-20, 2008
Area 4 Environmental Impact Assessment
Bahama Rock Ltd.
Grand Bahama, Bahamas

	MW-1		MW-2		MW-3		MW-4		MW-5		MW-6		MW-7		MW-8		MW-9		MW-10	
Depth	**Conductivity**	**Salinity**	**Conductivity**	**Salinity**	**Conductivity**	**Salinity**	**Conductivity**	**Salinity**	**Conductivity**	**Salinity**	**Conductivity**	**Salinity**	**Conductivity**	**Salinity**	**Conductivity**	**Salinity**	**Conductivity**	**Salinity**	**Conductivity**	**Salinity**
(Feet)	(uS/cm)	ppt	(uS/cm)	ppt	(uS/cm)	ppt	(uS/cm)	ppt	(uS/cm)	ppt	(uS/cm)	ppt	(uS/cm)	ppt	(uS/cm)	ppt	(uS/cm)	ppt	(uS/cm)	ppt
12	0	0	0	0	0	0	0	0			0	0	0	0	0	0	2633	1.4	0	0
13	0	0	0	0	0	0	0	0	783	0.4	0	0	0	0	0	0	2787	1.4	783	0.4
14	0	0	0	0	0	0	0	0	788	0.4	0	0	0	0	0	0	2886	1.5	840	0.4
15	0	0	9,620	5.4	538	0.3	0	0	788	0.4	0	0	679	0.3	0	0	2921	1.5	1096	0.5
16	1,756	0.9	9,640	5.4	542	0.3	504	0.2	789	0.4	771	0.4	714	0.3	0	0	2936	1.5	1754	0.8
17	1,789	0.9	9,610	5.4	542	0.3	498	0.2	789	0.4	960	0.5	720	0.4	4256	2.2	2940	1.5	2189	1.1
18	2,264	1.2	9,570	5.4	555	0.3	501	0.2	793	0.4	1487	0.7	721	0.4	4357	2.3	2946	1.5	2271	1.1
19	3,764	2	9,520	5.3	568	0.3	506	0.2	801	0.4	1994	1	727	0.4	4396	2.3	2951	1.5	2304	1.2
20	4,188	2.2	9,480	5.3	565	0.3	525	0.3	806	0.4	2484	1.3	724	0.4	4455	2.3	2958	1.5	2314	1.2
21	7,720	4.1	9,440	5.3	578	0.3	592	0.3	810	0.4	2692	1.4	730	0.4	4479	2.4	2945	1.5	2324	1.2
22	9,250	5.2	9,370	5.2	580	0.3	932	0.5	816	0.4	2836	1.4	737	0.4	4498	2.4	2945	1.5	2330	1.2
23	9,890	5.6	9,350	5.2	594	0.3	1312	0.7	835	0.4	2985	1.5	739	0.4	4506	2.4	2943	1.5	2335	1.2
24	10,070	5.7	9,310	5.2	600	0.3	3240	1.6	850	0.4	3082	1.6	745	0.4	4520	2.4	2937	1.5	2347	1.2
25	10,300	5.8	9,260	5.2	597	0.3	5470	2.9	904	0.4	3099	1.6	747	0.4	4513	2.4	2930	1.5	2357	1.2
26	12,120	7.0	9,220	5.2	603	0.3	7980	4.4	959	0.5	3129	1.6	750	0.4	4518	2.4	2934	1.5	2365	1.2
27	13,260	7.7	9,120	5.1	611	0.3	9400	5.2	1001	0.5	3154	1.6	750	0.4	4520	2.4	2928	1.5	2386	1.2
28	14,070	8.2	9,180	5.1	619	0.3	10180	5.7	1034	0.5	3174	1.6	750	0.4	4531	2.4	2926	1.5	2404	1.2
29	14,870	8.7	9,030	5.1	620	0.3	10750	6.1	1120	0.6	3178	1.6	749	0.4	4541	2.4	2922	1.5	2430	1.2
30	15,260	9.0	9,140	5.1	635	0.3	11760	6.7	1209	0.6	3195	1.6	748	0.4	4556	2.4	2923	1.5	2465	1.3
31	15,540	9.1	9,090	5.1	631	0.3	12160	7.0	1,684	0.8	3207	1.7	747	0.4	4,560	2.4	2917	1.5	3540	1.8
32	15,890	9.4	9,080	5.1	630	0.3	11980	6.8	2,219	1.1	3230	1.7	745	0.4	4,548	2.4	2921	1.5	3819	2
33	16,080	9.5	8,970	5.0	654	0.3	11930	6.8	2,248	1.1	3267	1.7	744	0.4	4,548	2.4	2910	1.5	3980	2.1
34	16,200	9.6	8,990	5.0	683	0.3	11770	6.7	2,364	1.2	3,447	1.8	744	0.4	4,525	2.4	2,904	1.5	4,190	2.3
35	16,350	9.6	8,980	5.0	1186	0.6	11570	6.6	Well Obsrtuction		4,087	2.2	743	0.4	4,515	2.4	2,896	1.5	4,366	2.3
36	16,390	9.6	8,860	5.0	1,441	0.7	11480	6.5			5,160	2.7	743	0.4	4,520	2.4	2,892	1.5	4,640	2.4
37	16,330	9.6	8,810	4.9	1,996	1	11,320	6.4			5,280	2.8	742	0.4	4,527	2.4	2,880	1.5	4,790	2.5
38	16,350	9.6	8,770	4.9	2,457	1.2	11,150	6.3			5,280	2.8	742	0.4	4,530	2.4	2,012	1.5	4,945	2.6
39	16,520	9.7	8,710	4.8	3,444	1.8	10,960	6.2			5,280	2.8	743	0.4	4,541	2.4	2,864	1.5	5,170	2.8
40	16,440	9.7	8,680	4.8	3,960	2.1	10,910	6.2			5,270	2.8	1,560	0.8	4,561	2.4	2,820	1.4	5,510	2.9
41	16,500	9.7	8,660	4.8	4,020	2.1	10,840	6.2			5,270	2.8	1,747	0.9	4,598	2.4	2,776	1.4	7,040	3.8
42	16,560	9.8	8,620	4.8	4,062	2.1	10,790	6.1			5,200	2.8	2,362	1.2	4,613	2.4	2,768	1.4	7,500	4.1
43	16,630	9.8	9,300	5.2	4,114	2.2	10,840	6.2			5,210	2.8	3,664	1.9	4,651	2.4	2,760	1.4	7,890	4.3
44	16,700	9.9	9,510	5.3	4,100	2.1	12,000	6.6			5,210	2.8	4,700	2.5	4,660	2.5	2,757	1.4	8,200	4.5
45	16,850	10.0	9,520	5.3	4,105	2.2	13,930	8			5,190	2.8	6,490	3.6	4,848	2.6	2,757	1.4	8,090	4.4
46	17,050	10.1	9,480	5.3	4,105	2.2	13,690	7.9			5,170	2.8	6,510	3.6	4,860	2.6	2,757	1.4	7,970	4.4
47	17,380	10.2	9,420	5.3	4,101	2.1	14,600	8.6			5,170	2.8	6,530	3.6	4,864	2.6	2,757	1.4	7,800	4.3
48	17,810	10.6	9,390	5.3	4,100	2.1	18,180	10.7			5,160	2.7	6,350	3.4	4,867	2.6	2,756	1.4	7,920	4.3
49	18,360	10.9	9,350	5.2	4,099	2.1	18,400	10.8			5,150	2.7	6,470	3.5	4,871	2.6	2,756	1.4	18,200	10.5
50	19,360	11.6	15,440	8.9	4,093	2.1	19,000	11.3			5,150	2.7	6,660	3.6	4,860	2.6	2,756	1.4	22,070	13.1

Notes: Measured from Top of Casing with YSI 30 Meter
Conductivity in uS/cm - microSiemens/centimeter (freshwater 0-1,300 uS/cm)
Salinity in ppt - parts per thousand (freshwater 0-600 ppt)
All wells sampled Feb. 19, 2008 except MW-2 and MW-4 (Feb. 20, 2008)

Table 7
Summary of Conductivity in Groundwater
December 6-10, 2007
Water Resources Assessment
Area 4 Environmental Impact Assessment
Bahama Rock, Ltd.
Grand Bahama, Bahamas

Depth (ft.)	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10
12					680				3,226	
13					693				3,377	612
14					695				3,426	1,697
15	639	3,535	363		700	572	556	2,207	3,474	2,224
16	1,349	3,587	368	353	704	678	571	2,274	3,476	2,667
17	1,452	3,643	388	374	744	1,332	587	5,039	3,484	3,088
18	1,262	3,238	413	385	778	3,375	636	5,515	3,484	3,404
19	1,015	3,382	442	390	1,072	3,914	822	5,615	3,486	3,626
20	1,395	3,435	466	394	1,858	4,102	1,009	5,413	3,535	3,806
21	1,481	3,449	485	395	2,358	4,305	1,177	5,413	3,535	3,938
22	1,604	3,451	482	550	2,612	4,452	1,319	5,318	3,535	4,026
23	1,691	3,453	483	932	2,756	4,392	1,427	5,221	3,551	4,090
24	1,714	3,409	483	1,513	2,791	4,429	1,527	5,221	3,563	4,187
25	1,783	3,335	478	4,731	2,804	4,467	1,641	5,221	3,608	4,223
26	1,798	3,051	474	7,093	2,791	5,544	1,693	5,281	3,617	4,299
27	1,859	3,090	476	7,934	2,739	4,544	1,662	5,221	3,640	4,299
28	1,889	3,064	462	8,457	2,739	4,562	1,635	5,281	3,640	4,299
29	1,889	2,932	469	8,985	2,687	4,790	1,596	5,313	3,640	4,368
30	3,399	2,832	478	9,391	2,642	4,862	1,601	5,313	3,643	4,438
31	3,536	2,561	478	9,722	2,559	4,891	1,601	5,313	3,617	4,474
32	3610	2532	487	9,661	2,479	4,891	1,596	5,300	3,631	4,519
33	3955	2372	506	9,556	2,422	5,064	1,565	5,221	3,640	4,593
34	9349	2261	578	9,446	2,422	5,171	1,475	5,221	3,668	4,749
35	9995	2196	916	9,305	2,380	5,173	1,494	5,327	3,640	4,837
36	10,000	2,196	989	9,091	2,407	5,173	1,496	5,634	3,649	4,923
37	10,200	2,196	2,057	8,938	2,407	5,173	1,487	5,661	3,618	5,022
38	10,200	2,184	2,271	8,781	2,407	5,173	1,487	5,712	3,618	5,188
39	10,200	2,193	3,993	8,618	2,392	5,172	1,485	5,728	3,625	5,374
40	10,200	2,196	4,139	8,492	2,376	5,172	1,596	5,745	3,675	5,480
41	10,200	2,196	4,009	8,492	2,376	5,081	2,076	5,808	3,698	5,588
42	10,200	2,132	3,948	8,404	2,347	5,168	2,626	5,837	3,671	5,703
43	10,300	2,195	3,948	8,481	2,352	5,168	3,349	5,843	3,672	5,833
44	10,300	2,158	4,139	8,584	2,376	5,093	3,754	5,938	3,672	6,782
45	10,300	2,154	4,236	10,300	2,371	5,093	8,584	5,956	3,674	7,064
46	11,800	2,158	4,180	11,100	2,835	5,080	9,305	5,943	3,675	7,068
47	12,600	2,158	4,225	11,400	3,675	5,059	8,584	5,937	3,675	7,121
48	12,700	2,142	4,075	17,600	6,256	5,024	8,584	5,843	3,674	7,682
49	12,600	2,187	4,009	18,600	8,958	4,994	8,492	5,841	3,674	8,295
50	13,000	2,207	4,009	19,900	14,600	4,906	8,584	5,841	3,649	8,774
51	13,000	2,233	4,009	20,800	20,700	5,259	8,584	5,819	3,813	9,785
52	13,000	2,232	8,821	23,500	26,700	6,448	8,592	5,734	4,406	11,800
53	13,000	2,233	11,600	24,400	41,900	6,469	8,642	5,634	22,600	28,200
54	18,400	15,100	17,400	25,100	43,000	32,200	8,637	5,628	28,100	42,600
55	39,500	24,100	22,700	30,100	43,500	32,100	8,584	11,600	36,600	42,900
56	42,700	30,100	22,700	35,900	44,500	34,000	8,616	13,100	46,600	42,900
57	43,400	34,500	25,200	39,700	46,800	34,000	8,584	18,100	50,700	46,700
58	47,200	37,000	31,100	42,500	46,800	34,300	8,491	19,800	51,000	56,200
59	47,200	43,200	32,100	43,000	46,800	39,600	8,584	20,700	51,000	56,200
60	47,200	45,900	32,100	46,800	48,900	39,600	8,584	22,700	51,400	56,200
61	47,200	46,700	34,300	50,500	51,200	56,300	8,627	26,100	54,000	56,300
62	47,200	47,000	34,300	51,200	51,200	56,300	26,900	28,200	55,800	56,300
63	47,200	47,100	36,800	51,200	54,900	56,300	43,100	30,500	56,100	56,300
64	47,200	47,200	46,800	51,200	56,300	56,300	46,800	34,600	56,100	56,300
65	53,500	47,100	51,200	51,200	56,300	59,400	46,800	39,600	56,100	56,300
66	54,600	47,100	51,900	51,200	56,300	59,500	51,200	42,900	56,300	56,300
67	55,500	55,500	56,300	51,200	56,300	59,700	51,300	46,700	58,200	56,400
68	56,600	56,600	56,400	51,300			62,100	51,800	61,300	
69	56,700	56,600	56,400	51,300			62,100	55,100	61,300	
70	56,800	57,200	61,600	56,300			62,100		62,100	
71	58,800	58,900	62,100							
72	59,700	59,700	62,200							
73	60,500	59,800	62,200							
74	60,500	60,400	62,400							
75			62,400							
76			62,400							

Notes: Measurement from Top of Casing
Conductivity in uS/cm - microSiemens per centimeter (freshwater 0-1,300 uS/cm and saltwater > 45,000 uS/cm)

Table 8
Precipitation Records 2007
Freeport, Grand Bahama
Water Resources Assessment
Area 4 Environmental Impact Assessment
Bahama Rock, Ltd.
Grand Bahama, Bahamas

Bahmet 30

RAINFALL RECORDS 2007

Station 78062 (MYGF) FREEPORT, G.B. **Number** **Year** 2007-08
Island GRAND BAHAMA **Lat** 26.5°N **Long** 78.8°W **Alt** 7'

DATE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB
01	0.05	0.00	0.00		0.18	0.84	0.13		T	2.53	0.08		0.24	
02	0.14	0.06	0.00		T	0.89	0.17	T	0.25	0.07	T	0.13		
03	0.00	0.07	0.00		T		T	T				0.03	T	
04	0.00	0.09			0.00	T	0.73		0.17			0.05	T	0.07
05	0.00	0.01		0.53	0.01	0.25	0.17		0.04	0.01				
06	0.00	0.00		0.09		0.10	0.01		0.57	0.14				T
07	0.00	0.00			0.18	0.01	0.01		0.01		0.01			
08	0.03	0.00			T	2.34		0.08	0.18			0.23	0.04	
09	TR	0.24				0.14		0.24	0.11	0.02		0.30	0.16	0.41
10	0.00	0.00		1.58				0.02	0.01	0.09				
11	TR	TR							0.41	0.34				
12	0.01			0.01		0.02			0.71	T	T			0.10
13	0.00					0.08	T	0.01			0.27	0.25		2.60
14						0.40		0.19			0.04	0.11		
15	0.06	0.25	0.04	0.06		1.48	T	0.04	T	0.02		0.02		
16	0.05	TR	0.17		0.02	1.75	0.01		0.04	2.16		0.07		
17	TR		TR			2.12		0.03	1.23					
18	0.00	0.07			0.12	0.77		0.02	2.91					
19	0.00				0.04				0.00	0.24			0.20	0.23
20			TR				0.24		0.88				0.01	T
21			TR		T		0.59	0.11	0.25		0.01	0.02	T	0.01
22			0.03				0.09	0.02	0.08			0.02	0.04	
23			0.27	T	T		0.03	0.48	0.33				0.05	
24	0.37		0.01	0.01	0.10		0.29		0.27			0.13		0.52
25	0.35						0.03	0.19	0.31	1.00	0.10	0.36		0.39
26		0.12				T	0.24		3.11	0.08			0.02	
27	0.01	0.02			0.02	0.17	0.11	T	0.95				0.41	
28	0.25	1.38		0.04	T	0.88	0.00	1.41	T	0.02	0.01			
29					T	2.98	0.00	0.92	0.05	0.04				
30	TR					0.20			1.58	0.02	TR			
31							0.12	T		0.14				
Total	1.32	2.31	0.52	2.32	0.67	15.42	2.97	3.76	14.45	6.92	0.52	1.72	1.17	4.33
Trace	*0*	*0*	*0*	*1*	*7*	*2*	*3*	*4*	*3*	*1*	*2*	*0*	*3*	*2*
Rain Days	*10*	*10*	*5*	*7*	*8*	*18*	*16*	*14*	*23*	*16*	*7*	*13*	*12*	*10*
Total Days	10	10	5	8	15	20	19	18	26	17	9	13	15	12
Date	0.37 24TH	1.38 28TH	0.27 23RD	1.58 10TH	0.18 07TH	2.98 29TH	0.73 04TH	1.41 28TH	3.11 26TH	2.53 01ST	0.27 13TH	0.36 25TH	0.24 1ST	2.6 13TH

Table 9
Summary of Salinity and Conductivity in BRL Trench Wells - September 13, 2007
Water Resources Assessment
Area 4 Environmental Impact Assessment
Bahama Rock, Ltd.
Grand Bahama, Bahamas

Location	Depth of Measurement(ft.)	Conductivity (uS/cm)	Sp. Conductivity (uS/cm)	Salinity (ppt)
TRENCH 3 - Midpoint of trench	Surface	1,330	1,296	0.6
Depth to water = 7.03 ft below	1.0	1,330	1,298	0.6
top center of concrete cover.	2.0	1,452	1,418	0.7
	3.0	1,490	1,456	0.7
	4.0 (bottom)	1,516	1,483	0.7
TRENCH 4 - Midpoint of trench	Surface	557	547	0.3
Depth to water = 11.74 ft below	1.0	560	550	0.3
top center of concrete cover.	2.0	567	554	0.3
	3.0	601	593	0.3
	4.0 (bottom)	596	589	0.3
TRENCH 6 - Midpoint of trench	Surface	563	551	0.3
Depth to water = 12.67 ft below	1.0	575	565	0.3
top center of concrete cover.	2.0	596	588	0.3
	3.0 (bottom)	636	627	0.3
TRENCH 7 - Midpoint of trench	Surface	615	603	0.3
Depth to water = 12.28 ft below	1.0	615	604	0.3
inside edge of north trench wall.	2.0	619	609	0.3
	3.0 (bottom)	629	620	0.3
TRENCH 5 - Midpoint of trench	Surface	758	736	0.4
Depth to water = 10.91 ft below	1.0	760	738	0.4
top center of concrete cover.	2.0	764	743	0.4
	3.0 (bottom)	800	776	0.4

Salinity in uS/cm - microSeimens per centimeter
Conductivity in ppt - parts per thousand
Field Measurements collected with a Yellow Springs Instrument Model 30 portable Conductivity/Specific Conductivity/Salinity and Temperature Mete

Table 10
Private Well Survey*
Water Resources Assessment
Area 4 Environmental Impact Assessment
Bahama Rock, Ltd.
Grand Bahama, Bahamas

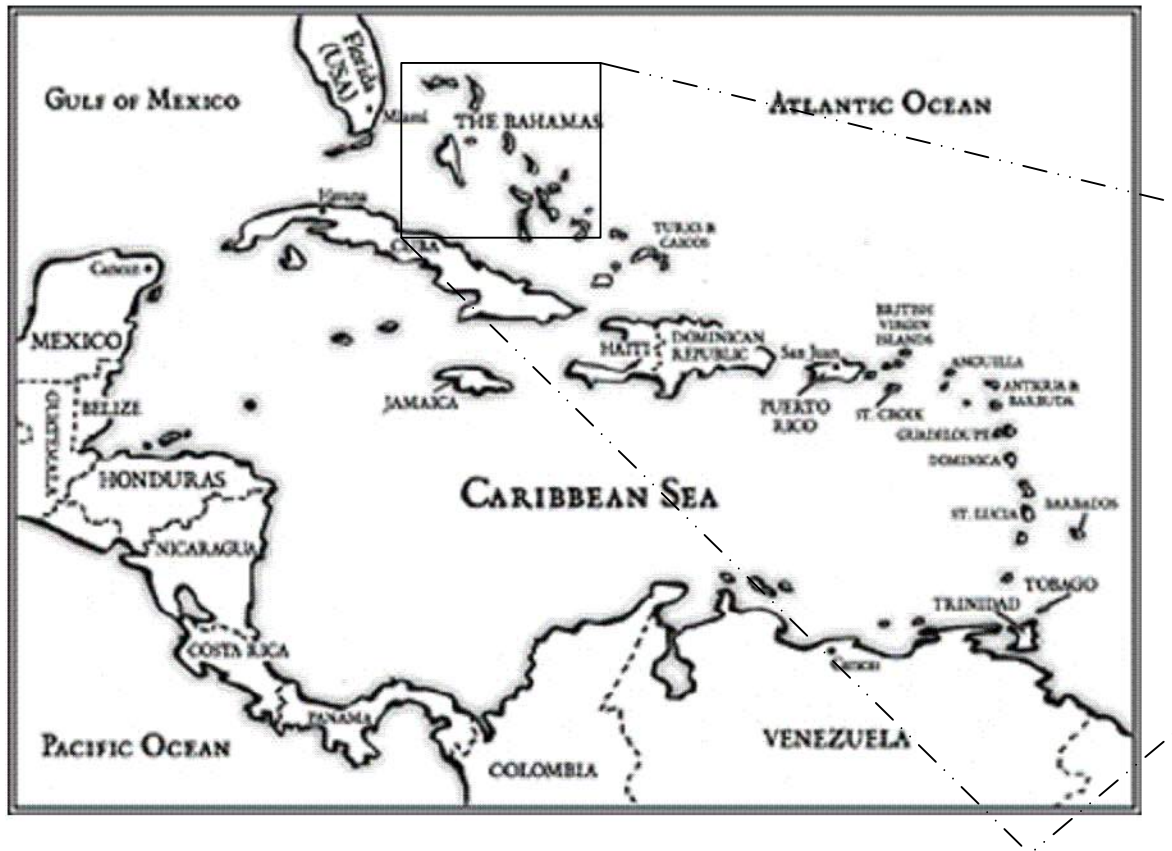
Number	Settlement	Address	Resident	City	Private	Both	Student	Comment
1	Hanna Hill	Andros Town Corner R-1 (Sec.	Melinda Smith	X	X	X	Ra.D	
2	Hanna Hill	Andros Town Corner R-3 (Lane	Paulette Ferguson		X		Ra.D	
3	Hanna Hill	Andros Town Corner R-1 (Lane	Jennifer Louistean		X		Te.D	Does not drink well water - uses for everything else
4	Hanna Hill	Andros Town Corner LC-6 (Firs	Alonzo Antonio		X		Ra.D	
5	Hanna Hill	Andros Town Corner RC-3 (Firs	Signed but not readable		X		Te.D	Washing and Cooking
6	Hanna Hill	Andros Town Corner R-4 (First	Patricia Green		X		Te.D	Cleans with Well water -claims water was tested
7	Hanna Hill	Andros Town Corner RC-7 (Firs	Elizabeth Nancy		X		Ra.D	Applied for C.W. connection - no reposnse by utility
8	Hanna Hill	Andros Town Corner RC-8 (Firs	S. Innocent		X		Te. D	Well- for cleaning, cooking and bathing
9	Hanna Hill	Jack Smith R-8	Alfred Bethel		X		Te.D	Uses well for everything but Drinking
10	Hanna Hill	Jack Smith L-4	Graham Forbes	X	X	X	Ra.D	Well not used
11	Hanna Hill	Butler Corner R-6	Rudolf Evans	X	X	X	Te.D	City water used for watering garden
12	Barlett Hill	BH Hwy L-10	Beana Deveaux	X	X	X	Ra.D	Scared of Blasting Effects
13	Barlett Hill	BH Hwy C-11B	Jackson Deveaux	X	X	X	Ra.D.	
14	Barlett Hill	JRS R-13	Olive Spencer		X		Ra.D	Does not have to pay bill - C.W. soon
15	Barlett Hill	JRS R-14			X		Ra.D	NAH - Neighbor informed Private Well
16	Barlett Hill	JRS R-17	Krystal Mott	X	X	X	Ra.D.	Use private well for hurricanes
17	Barlett Hill	JRS L -6 Center	Claudia Bain		X		Jones	Water brackish dirty -Seriuosly Upset w/blasting
18	Pinedale	PDF L-17	Jhan Phare(?)	X	X	X	R. Mack	Private well used for washing and cleaning.
19	Pinedale	PDF L-22	Monica Delancy	X	X	X	R. Mack	Private well used for washing and bathing.
20	Pinedale	PDT R-24	Murial Smith	X	X	X	O. Jones	Private well water comes out brown but was coming out clear.
21	Pinedale	TMC R-16	Loramise Alcime	X	X	X	T. Davis	Private well for hurricane
22	Pinedale	I-95 R-28	Stephanie Harvey	X	X	X	R. Mack	Private well used to water grass
23	Pinedale	I-95 L-34			X		R. Mack	NAH
24	Pinedale	I-95 C-34	Keva Garland		X		R. Mack	Private well used for household washing, cleaning, cooking
25	Pinedale	I-95 R			X		R. Mack	NAH
26	Pinedale	I-95 LC-8	Lee Frith		X		R. Mack	Use well for bath and washing
27	Pinedale	I-95 L-29	Paul Forbes		X			Uses private well for washing and bath
28	Martin Town	EMRHS 2nd Street L-3			X		T. Davis	Under construction
29	Hanna Hill	COG W L-1	Donavan chams	X	X	X	C.B.Jr	
30	Hanna Hill	COG W L-7	Henley Arthur		X		C.B.Jr.	Hurricane Use and Basic
31	Hanna Hill	COG L-12	Y. Williams		X		Ra.D	
32	Hanna Hill	COG LC-12	Andrew Stuart		X		Ra.D	No water bill - well water better than city water
33	Hanna Hill	COG E RC-1		X	X	X	Ra.D	Private Well not used
34	Hanna Hill	SDR L-1	Mr. Joseph		X		Ra.D	Private Well only
35	Hanna Hill	SDR L-5			X		Ra.D	NAH -Pump visible in front yard
36	Hanna Hill	SDR R-9	Edith Lazare	X	X	X	Te.D	
37	Hanna Hill	SDR R-18A	Violet Simmons	X	X	X	Ra.D	Does not use private well
38	Hanna Hill	COG W 16	Emily Grey	X	X	X	C.B Jr.	Private Well for Hurricane Use
39	Hanna Hill	COG W-17	Peter Grey Sr.	X	X	X	C.B Jr.	Private Well for Hurricane Use
40	Hanna Hill	COG E RC-4	Wilbert Vilneus		X			Uses Well for all everything
41	Hanna Hill	COG W 16	Emily Grey	X	X	X	C.B Jr.	Private Well for Hurricane Use

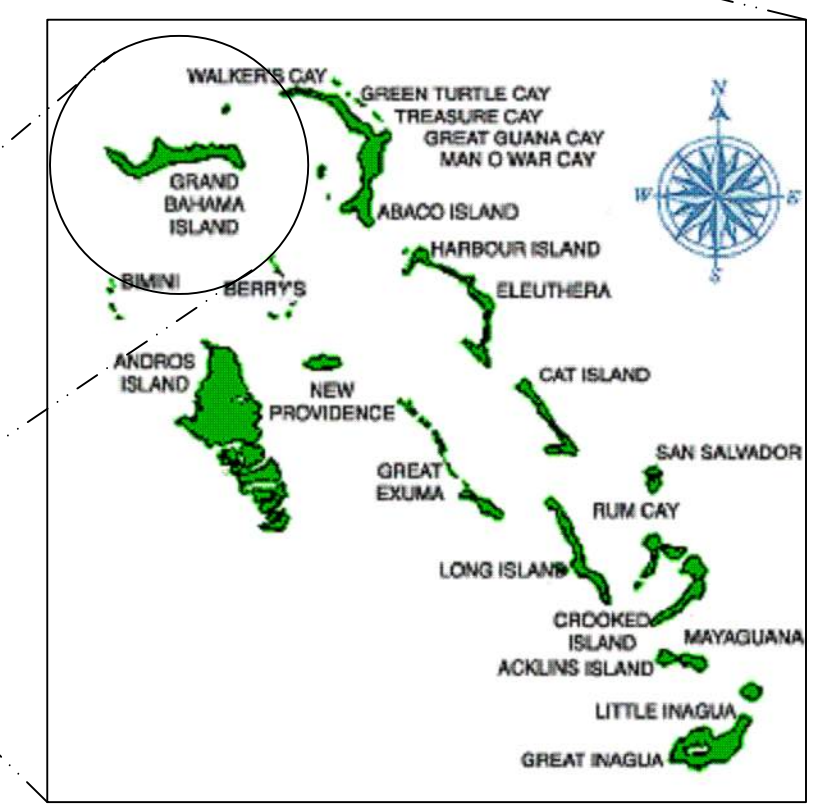
Note: Private Wells only - 23 Residents
Both City Water and Private Wells - 18 Residents

COG- Church of God
BH- Bartlett Hill- Highway
JRS - John Rolle Street
PDF - Pine Dale - First Street
SDR- Sapodilla Road
TMC - Take Me Corner

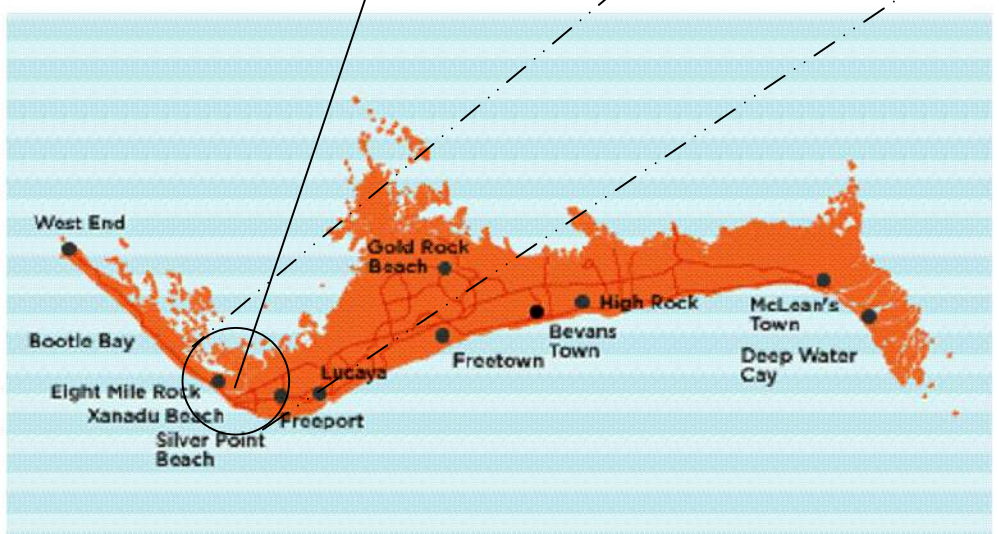
(*) Private Well Survey Performed by Eight Mile Rock High School

FIGURES





SITE LOCATION



N

DRAWING NOT TO SCALE

FIGURE 1A

FIGURE 1A

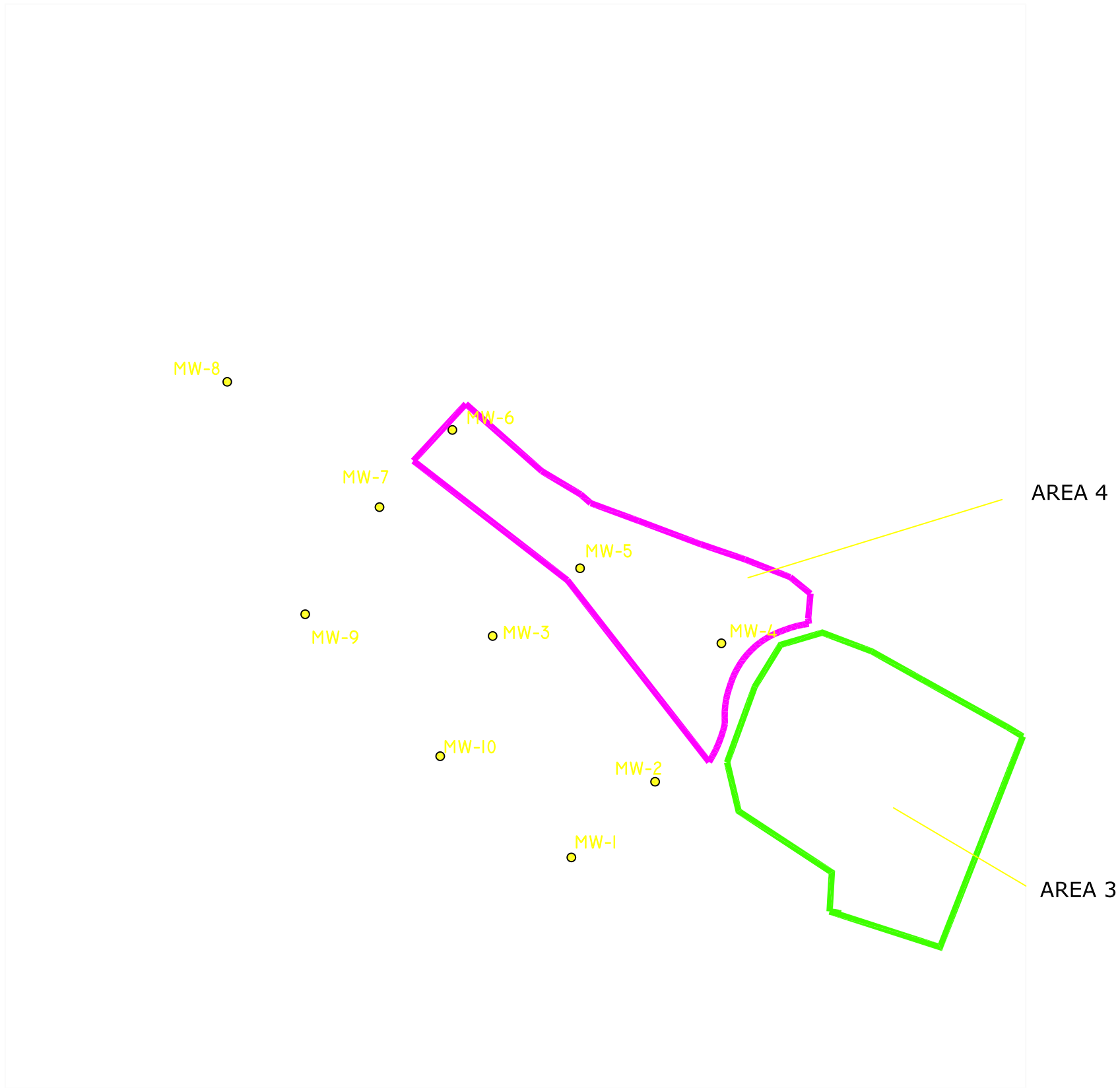
SITE LOCATION MAP

BAHAMA ROCK, Ltd.

Water Resources Assessment-AREA 4 EIA

Grand Bahama, Bahamas

RCMA



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SCALE

FIGURE 1B

LEGEND

MW-1 - GROUNDWATER MONITOR WELL

- OUTLINE OF BRL - AREA 3 (ACTIVE)

- OUTLINE OF BRL - AREA 4 (PROPOSED)

FIGURE 1B

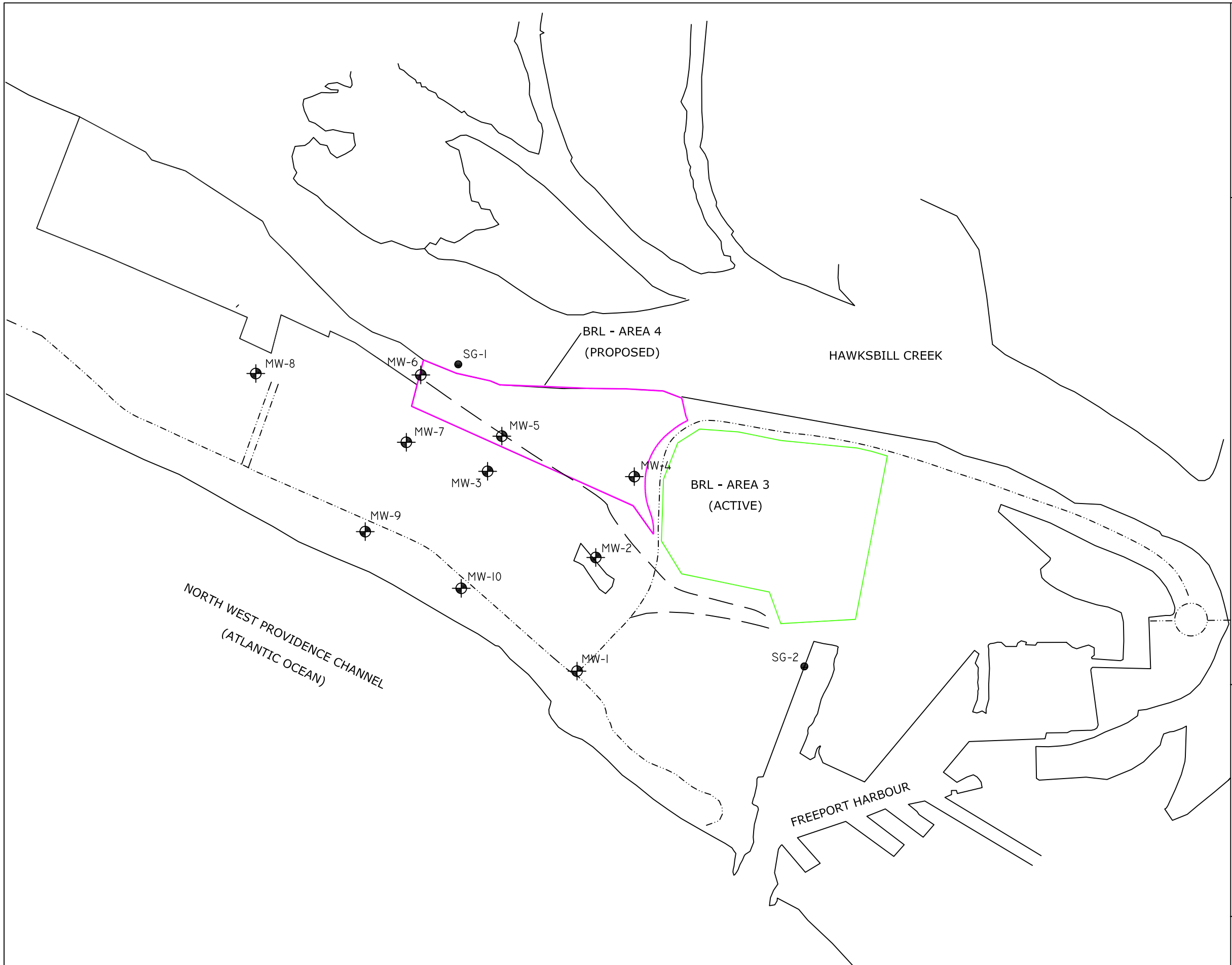
AERIAL PHOTOGRAPH ILLUSTRATING MONITOR WELL LOCATIONS

BAHAMA ROCK, Ltd.

Water Resources Assessment - AREA 4 EIA

Grand Bahama, Bahamas

RCMA



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0 1000 2000 4000 feet

SCALE

FIGURE 1C

LEGEND

MW-1 - GROUNDWATER MONITOR WELL

- MAJOR ROADS/HIGHWAYS

- ACCESS ROADS

- OUTLINE OF BRL - AREA 3 (ACTIVE)

- OUTLINE OF BRL - AREA 4 (PROPOSED)

SG-2 - SURFACE WATER STAFF GAUGE

FIGURE 1C

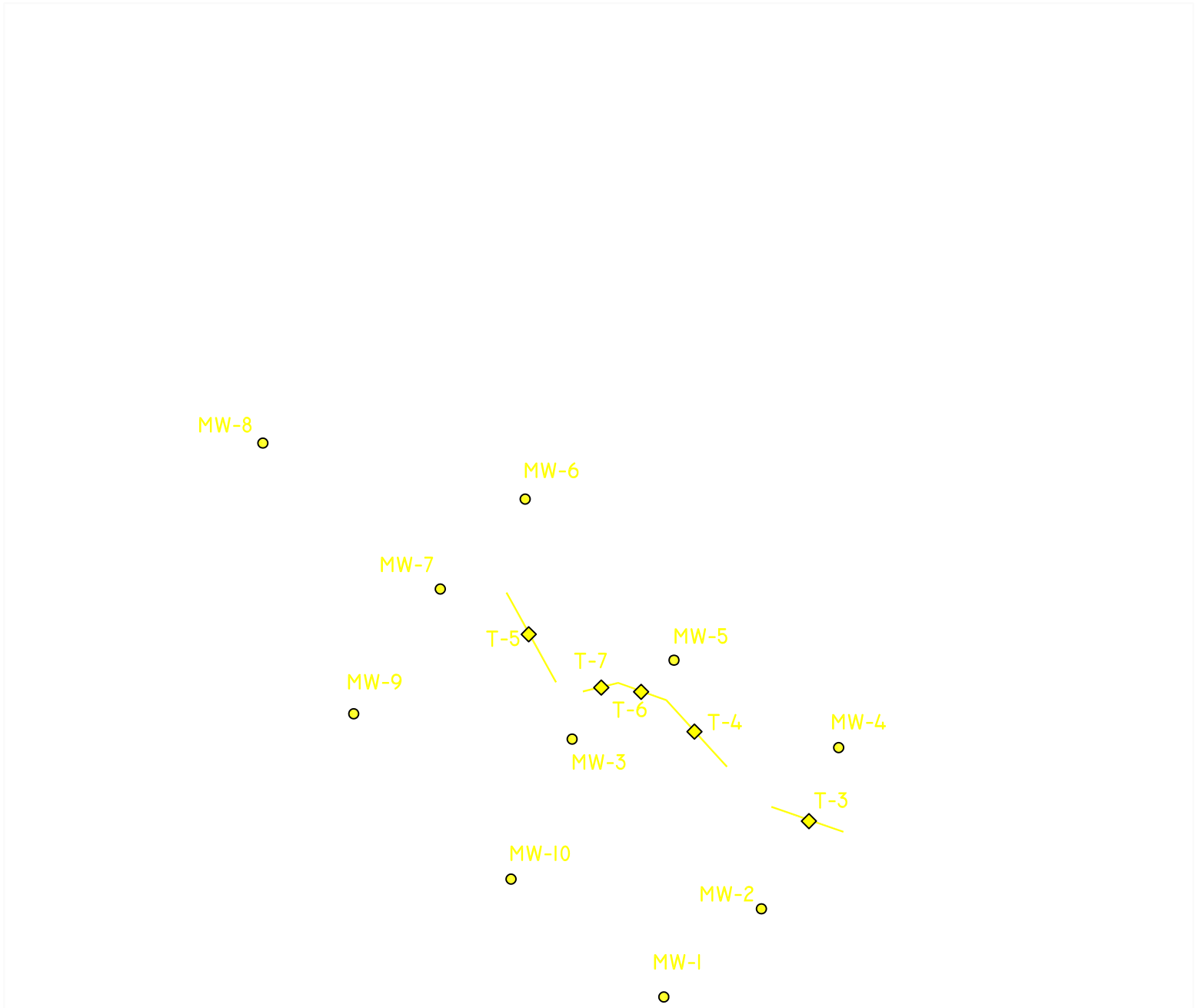
PLAN VIEW OF MONITOR WELL LOCATIONS

BAHAMA ROCK, Ltd.

Water Resources Assessment - AREA 4 EIA

Grand Bahama, Bahamas

RCMA



N

0 1000 2000 4000 feet

SCALE

FIGURE 1D

LEGEND

MW-1 - GROUNDWATER MONITOR WELL

- TRENCH WELL - BAHAMA CEMENT Co, Ltd.

T-3 - TRENCH WELL MONITORING LOCATION

FIGURE 1D

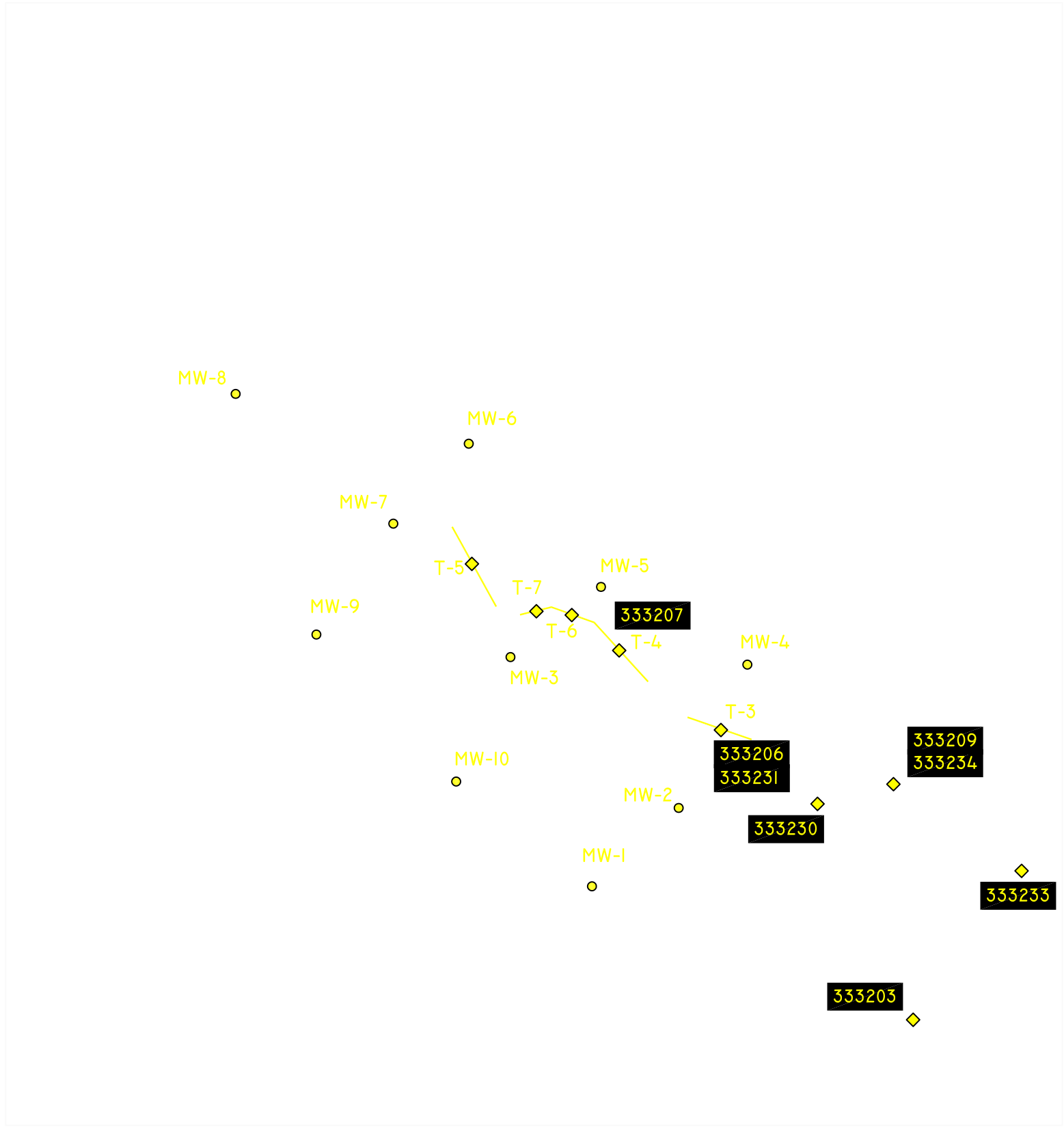
AERIAL PHOTOGRAPH ILLUSTRATING TRENCH WELL LOCATIONS

BAHAMA ROCK, Ltd.

Water Resources Assessment - AREA 4 EIA

Grand Bahama, Bahamas

RCMA



N

0 1000 2000 4000 feet

SCALE

FIGURE 1E

LEGEND

MW-1 - GROUNDWATER MONITOR WELL

- TRENCH WELL - BAHAMA CEMENT Co, Ltd.

T-3 - TRENCH WELL MONITORING LOCATION

- SURFACE WATER SAMPLING LOCATION

333203

FIGURE 1E

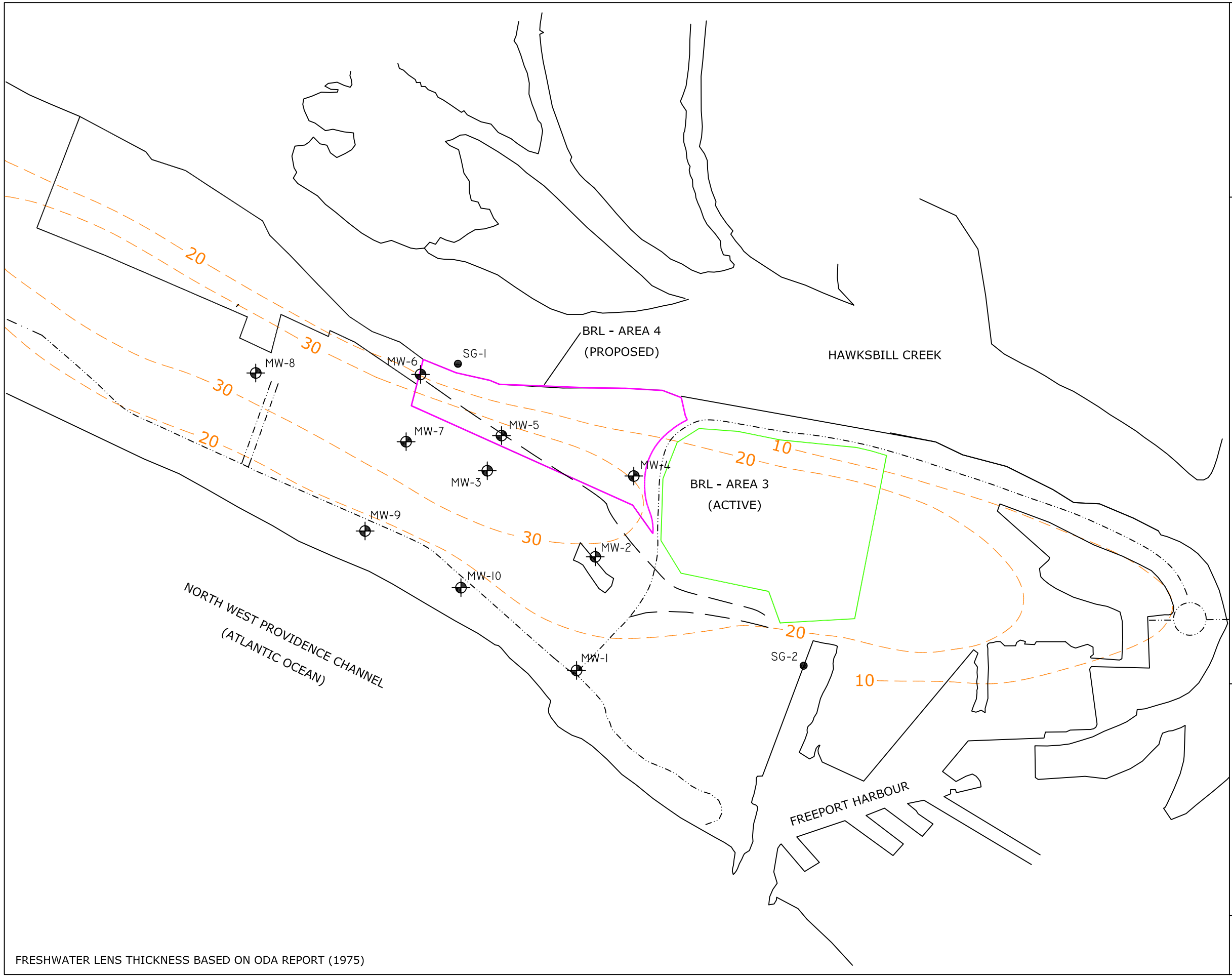
AERIAL PHOTOGRAPH ILLUSTRATING SURFACE WATER SAMPLE LOCATIONS

BAHAMA ROCK, Ltd.

Water Resources Assessment - AREA 4 EIA

Grand Bahama, Bahamas

RCMA



FRESHWATER LENS THICKNESS BASED ON ODA REPORT (1975)

N

0 1000 2000 4000 feet

SCALE

FIGURE 2A

LEGEND

MW-1 - GROUNDWATER MONITOR WELL

- MAJOR ROADS/HIGHWAYS

- ACCESS ROADS

- OUTLINE OF BRL - AREA 3 (ACTIVE)

- OUTLINE OF BRL - AREA 4 (PROPOSED)

SG-2 - SURFACE WATER STAFF GAUGE

- FRESHWATER LENS THICKNESS CONTOUR (AFTER LITTLE, ET AL, 1975)

FIGURE 2A

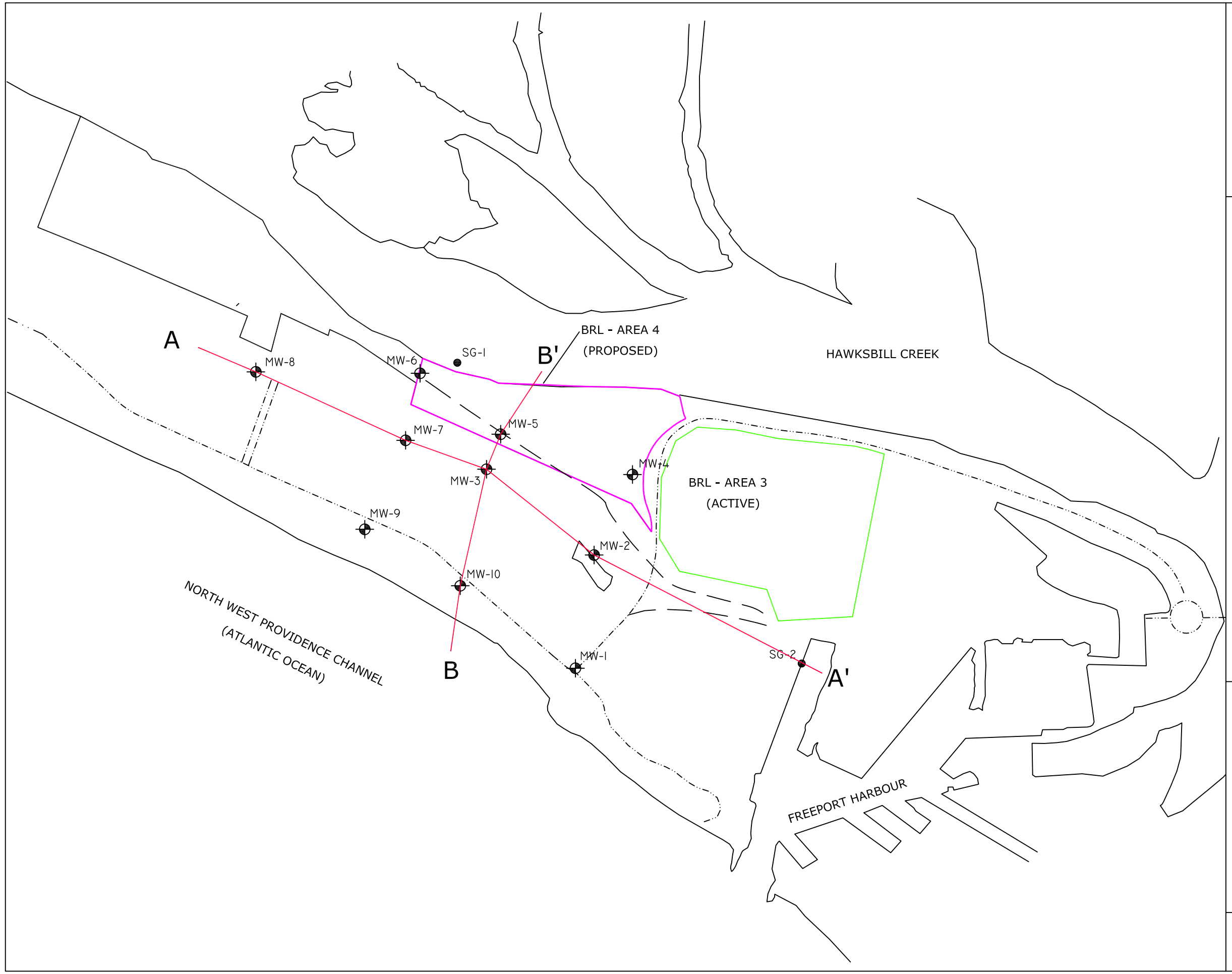
PLAN VIEW OF FRESHWATER LENS - 1975

BAHAMA ROCK, Ltd.

Water Resources Assessment - AREA 4 EIA

Grand Bahama, Bahamas

RCMA



N

0 1000 2000 4000 feet

SCALE

FIGURE 2B

LEGEND

- MW-1 - GROUNDWATER MONITOR WELL
- MAJOR ROADS/HIGHWAYS
- ACCESS ROADS
- OUTLINE OF BRL - AREA 3 (ACTIVE)
- OUTLINE OF BRL - AREA 4 (PROPOSED)
- SG-2 - SURFACE WATER STAFF GAUGE
- CROSS SECTION LINE

FIGURE 2B

PLAN VIEW OF CROSS SECTION LOCATIONS

BAHAMA ROCK, Ltd.

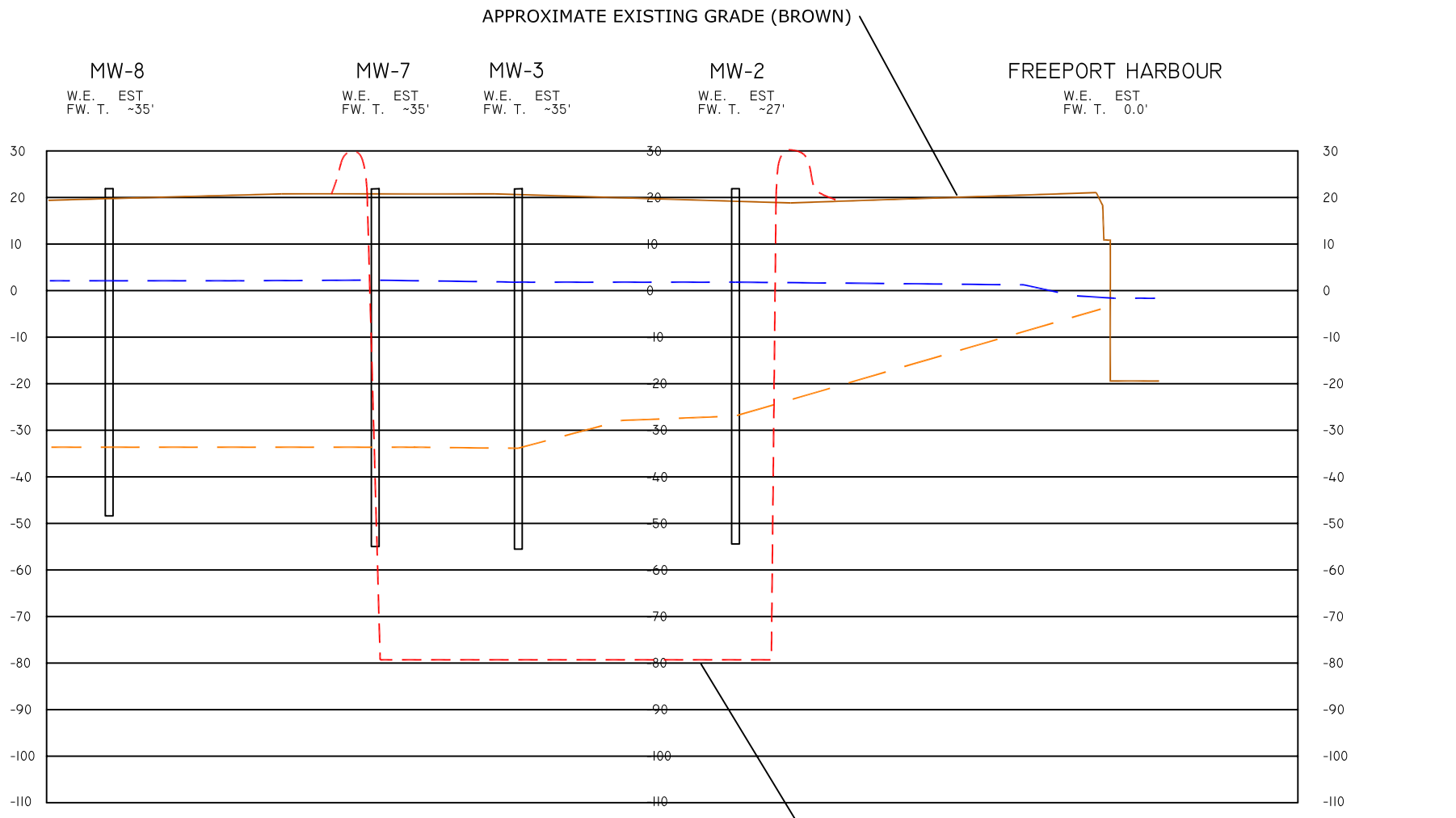
Water Resources Assessment - AREA 4 EIA

Grand Bahama, Bahamas

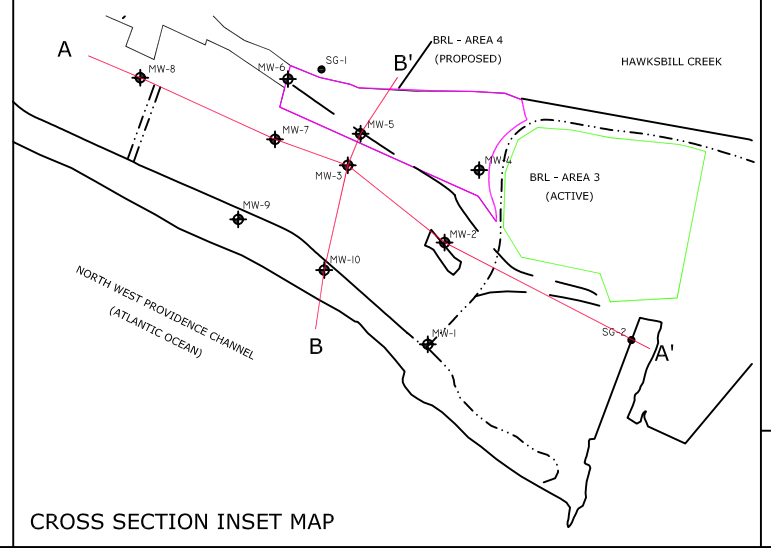
RCMA

A

A'



VERTICAL SCALE EXAGGERATED 60X



CROSS SECTION INSET MAP

0 1000 2000 4000 feet

SCALE

FIGURE 2C

LEGEND

MW-1 - GROUNDWATER MONITOR WELL

- GROUND ELEVATION

- APPROXIMATE WATER TABLE ELEVATION

- APPROXIMATE FRESH-SALTWATER INTERFACE (BASED ON 1975 DATA)

- PROPOSED EXCAVATION LIMITS - BRL AREA 4 EXCAVATION PLANS

W.E. - MEASURED WATER ELEVATION

FW. T. - MEASURED FRESHWATER THICKNESS

FIGURE 2C

CROSS SECTION VIEW OF FRESHWATER LENS A-A' 1975

BAHAMA ROCK, Ltd.

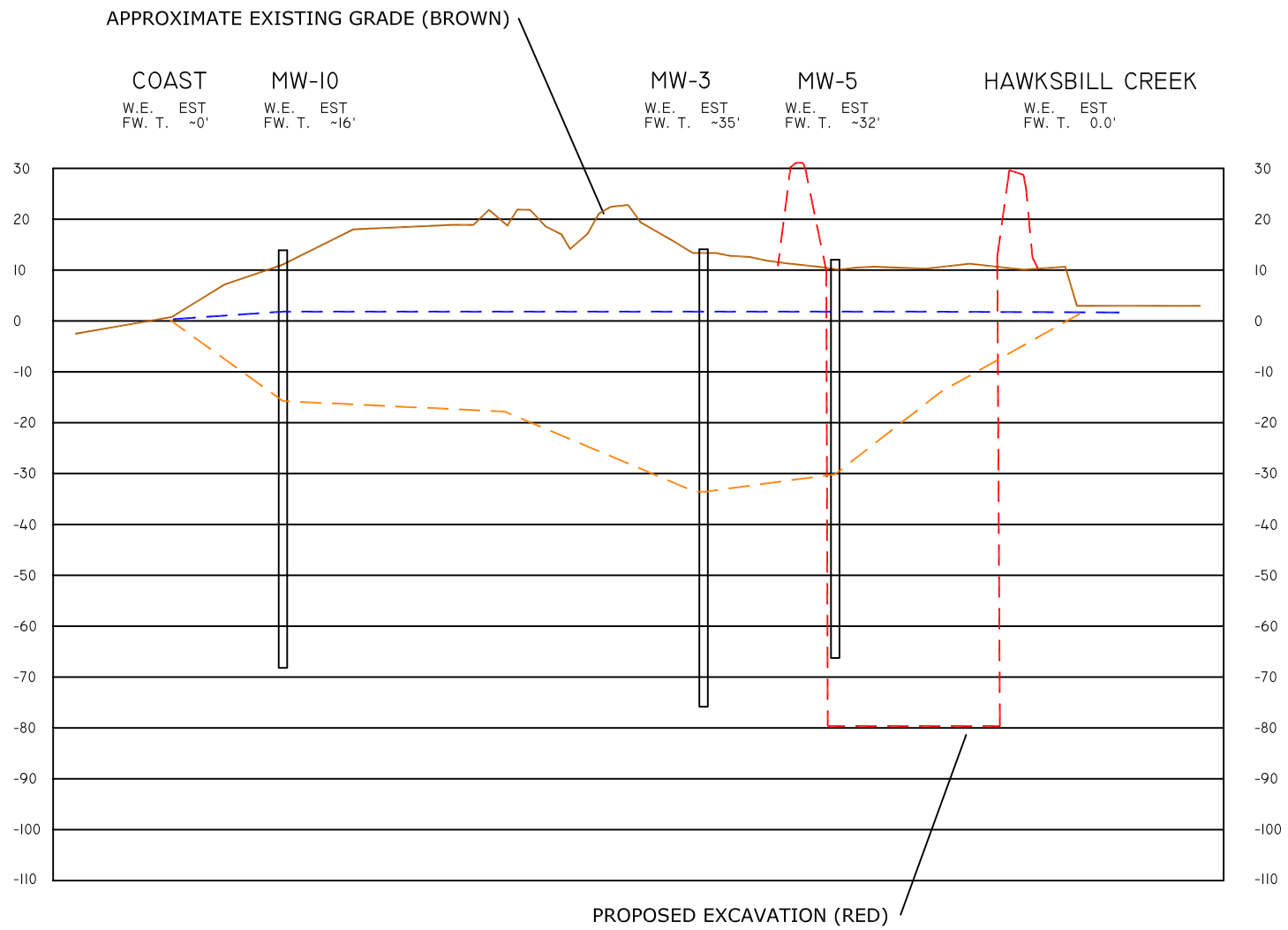
Water Resources Assessment - AREA 4 EIA

Grand Bahama, Bahamas

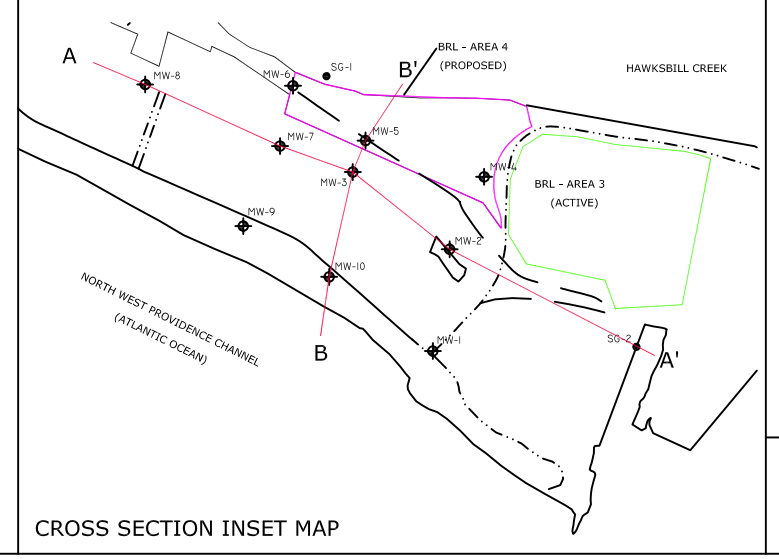
RCMA

B

B'



VERTICAL SCALE EXAGGERATED 30X



CROSS SECTION INSET MAP

0 500 1000 2000 feet

SCALE

FIGURE 2D

LEGEND

MW-1 - GROUNDWATER MONITOR WELL

- GROUND ELEVATION

- APPROXIMATE WATER TABLE ELEVATION

- APPROXIMATE FRESH-SALTWATER INTERFACE (BASED ON 1975 DATA)

- PROPOSED EXCAVATION LIMITS - BRL AREA 4 EXCAVATION PLANS

W.E. - MEASURED WATER ELEVATION

FW. T. - MEASURED FRESHWATER THICKNESS

FIGURE 2D

CROSS SECTION VIEW OF FRESHWATER LENS B-B' 1975

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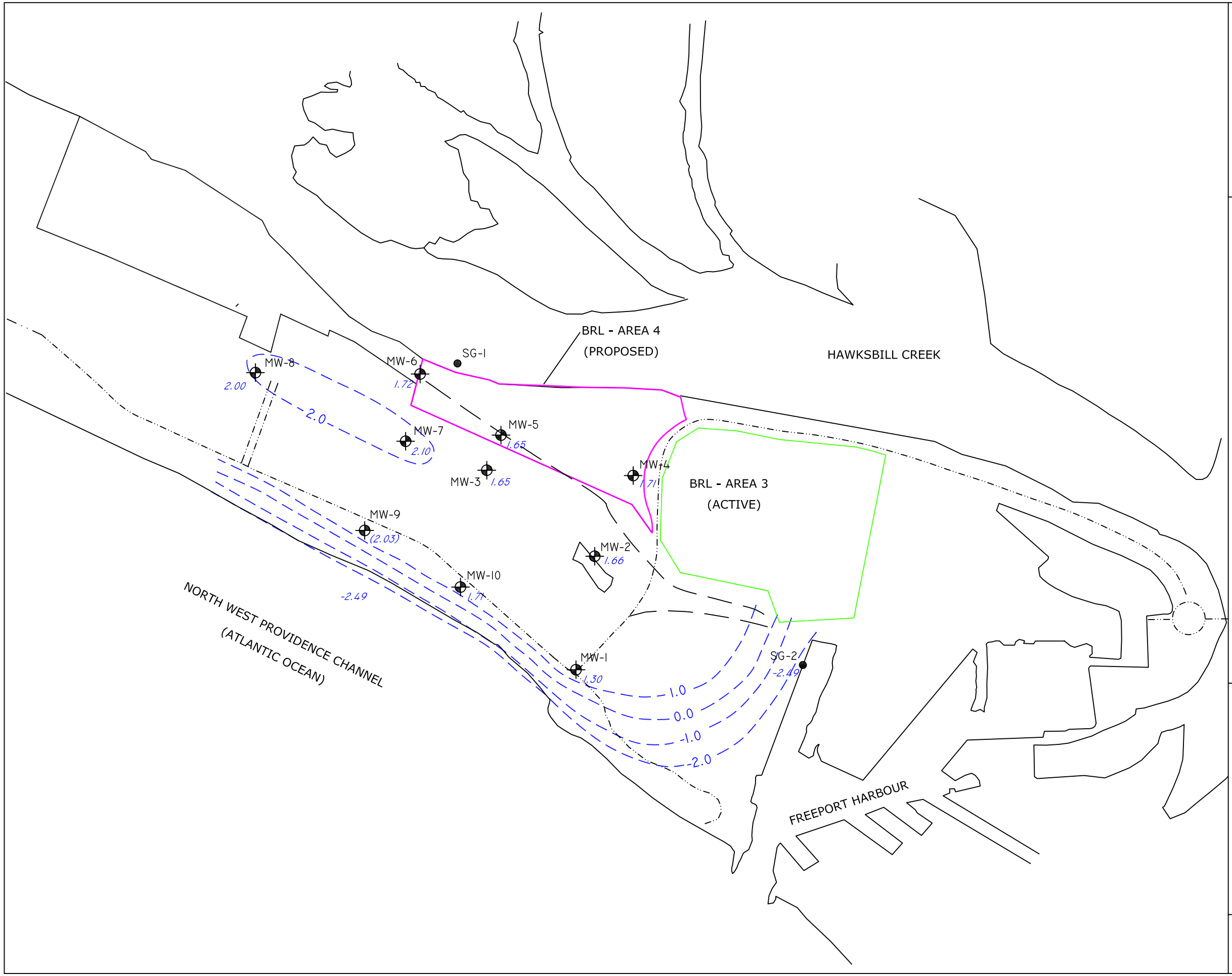

N

0 1000 2000 4000 feet

SCALE

FIGURE 2E

LEGEND

MW-1 - GROUNDWATER MONITOR WELL

- MAJOR ROADS/HIGHWAYS

- ACCESS ROADS

- OUTLINE OF BRL - AREA 3 (ACTIVE)

- OUTLINE OF BRL - AREA 4 (PROPOSED)

SG-2 - SURFACE WATER STAFF GAUGE

- POTENTIOMETRIC SURFACE

1.65 - CALCULATED GROUNDWATER ELEVATION BASED ON FREEPORT HARBOUR - MEAN LOW WATER DATUM

(1.65) - INVALID DATA POINT - NOT USED

FIGURE 2E

PLAN VIEW OF POTENTIOMETRIC SURFACE 11/20/2007 - Morning

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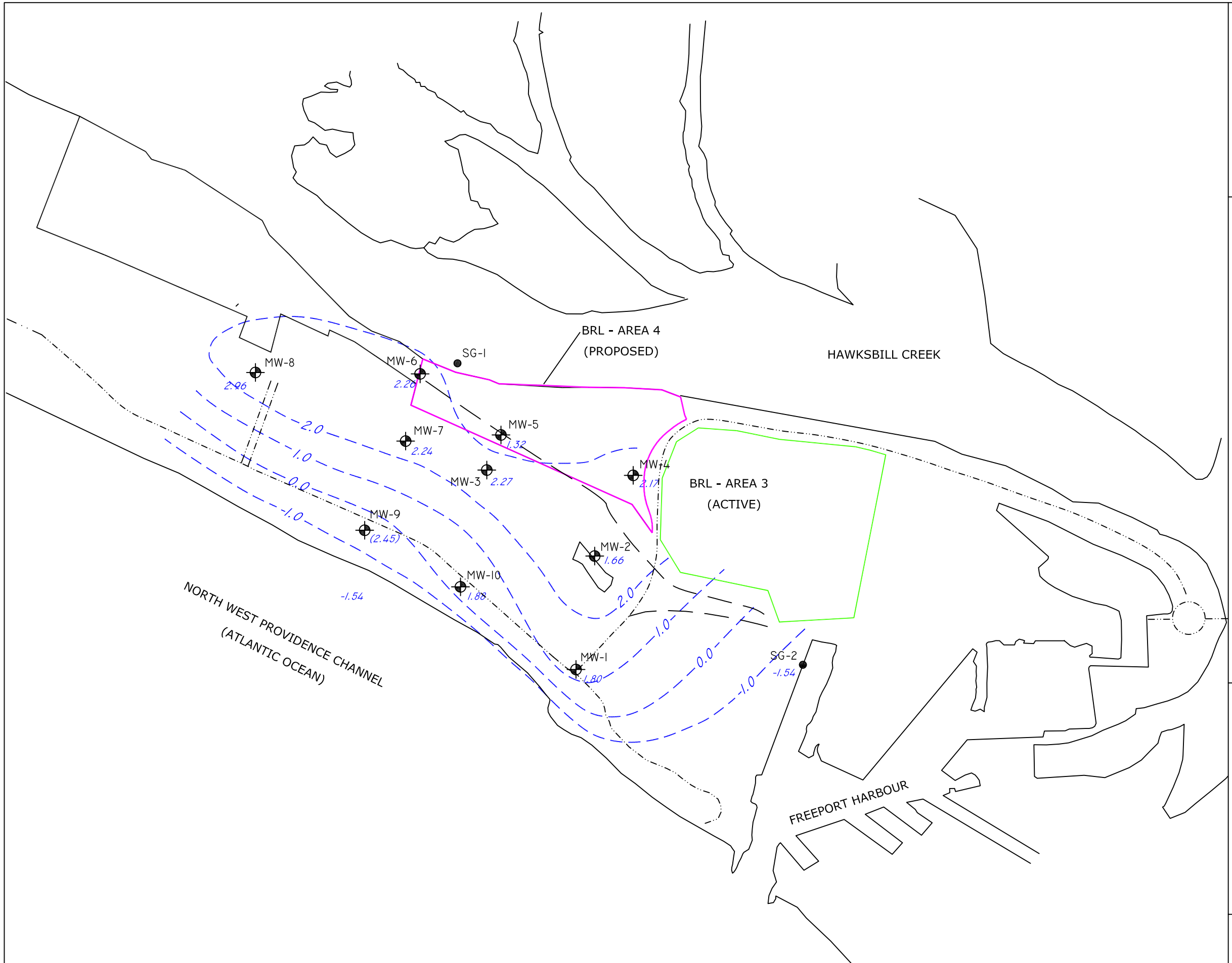

N

0 1000 2000 4000 feet

SCALE

FIGURE 2F

LEGEND

MW-1 - GROUNDWATER MONITOR WELL

- MAJOR ROADS/HIGHWAYS

- ACCESS ROADS

- OUTLINE OF BRL - AREA 3 (ACTIVE)

- OUTLINE OF BRL - AREA 4 (PROPOSED)

SG-2 - SURFACE WATER STAFF GAUGE

- POTENTIOMETRIC SURFACE

1.65 - CALCULATED GROUNDWATER ELEVATION BASED ON FREEPORT HARBOUR - MEAN LOW WATER DATUM

(1.65) - INVALID DATA POINT - NOT USED

FIGURE 2F

PLAN VIEW OF POTENTIOMETRIC SURFACE 11/22/2007 - Afternoon

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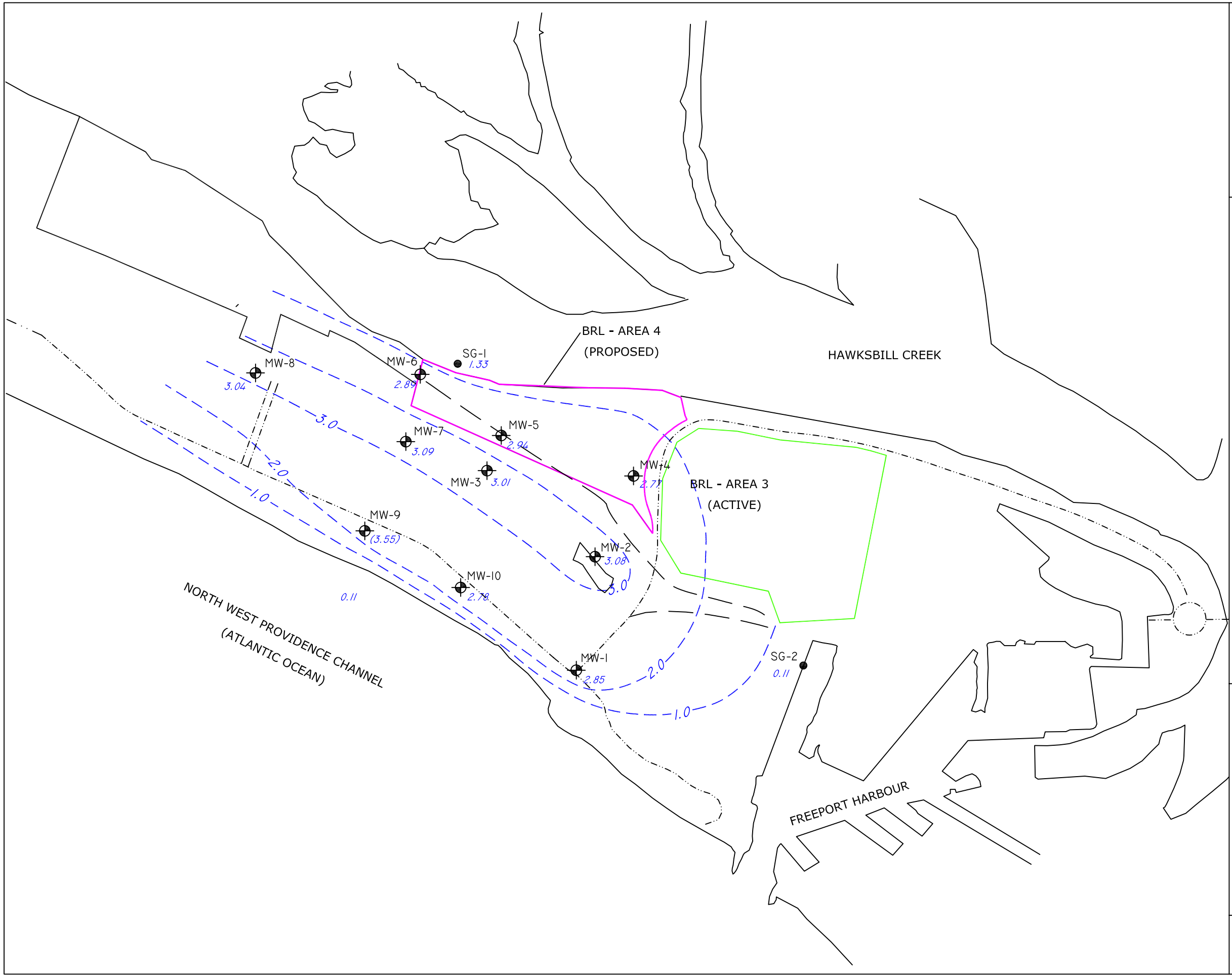

N

0 1000 2000 4000 feet

SCALE

FIGURE 2G

LEGEND

- MW-1 - GROUNDWATER MONITOR WELL
- - MAJOR ROADS/HIGHWAYS
- - ACCESS ROADS
- - OUTLINE OF BRL - AREA 3 (ACTIVE)
- - OUTLINE OF BRL - AREA 4 (PROPOSED)
- SG-2 - SURFACE WATER STAFF GAUGE
- - POTENTIOMETRIC SURFACE
- 1.65 - CALCULATED GROUNDWATER ELEVATION BASED ON FREEPORT HARBOUR - MEAN LOW WATER DATUM
- (1.65) - INVALID DATA POINT - NOT USED

FIGURE 2G

PLAN VIEW OF POTENTIOMETRIC SURFACE 12/14/2007 - Morning

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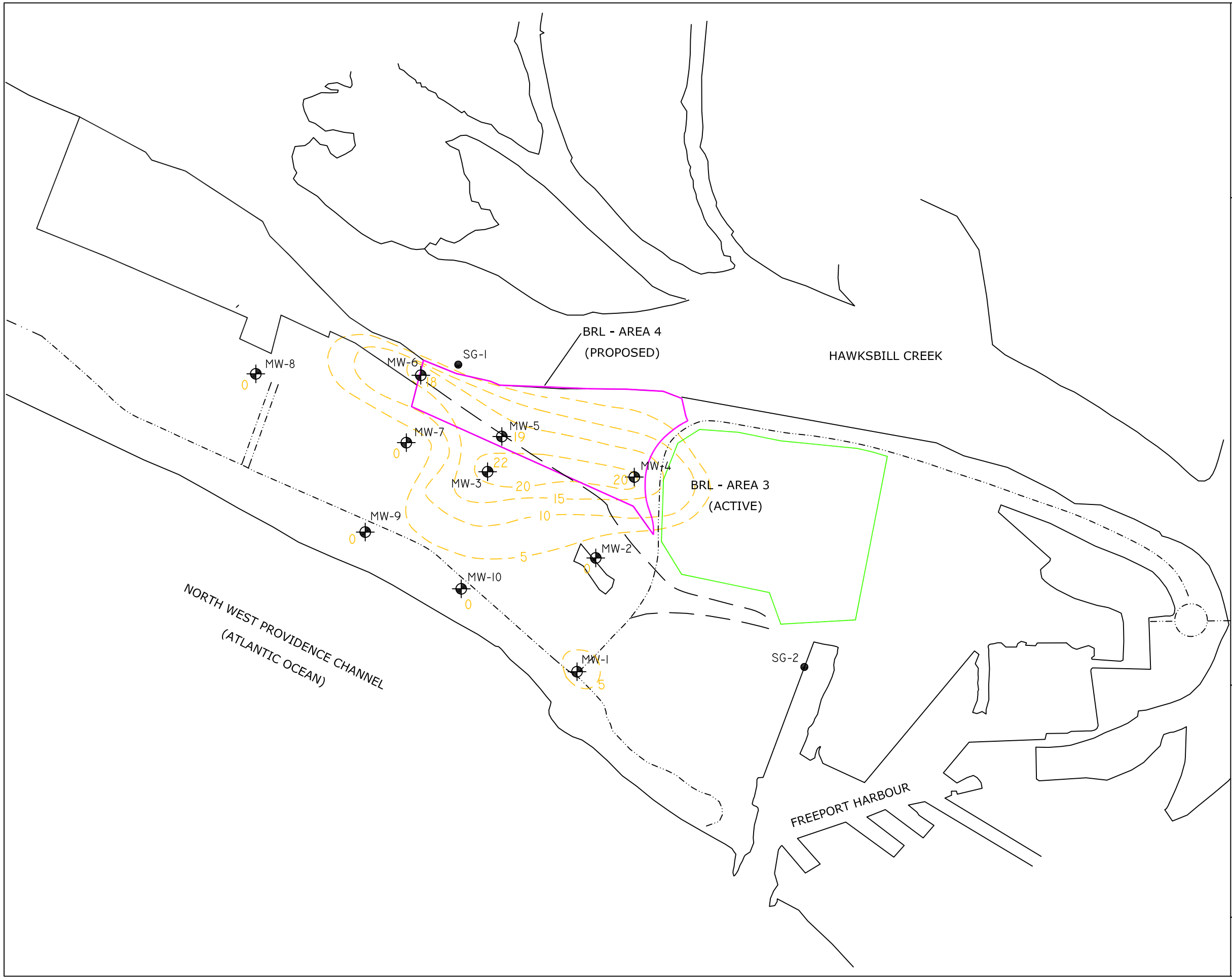

N

0 1000 2000 4000 feet

SCALE

FIGURE 2H

LEGEND

- MW-1 - GROUNDWATER MONITOR WELL
- - MAJOR ROADS/HIGHWAYS
- - ACCESS ROADS
- - OUTLINE OF BRL - AREA 3 (ACTIVE)
- - OUTLINE OF BRL - AREA 4 (PROPOSED)
- SG-2 - SURFACE WATER STAFF GAUGE
- - FRESHWATER LENS THICKNESS CONTOUR

FIGURE 2H

PLAN VIEW OF FRESHWATER LENS - 11/6-13/2007

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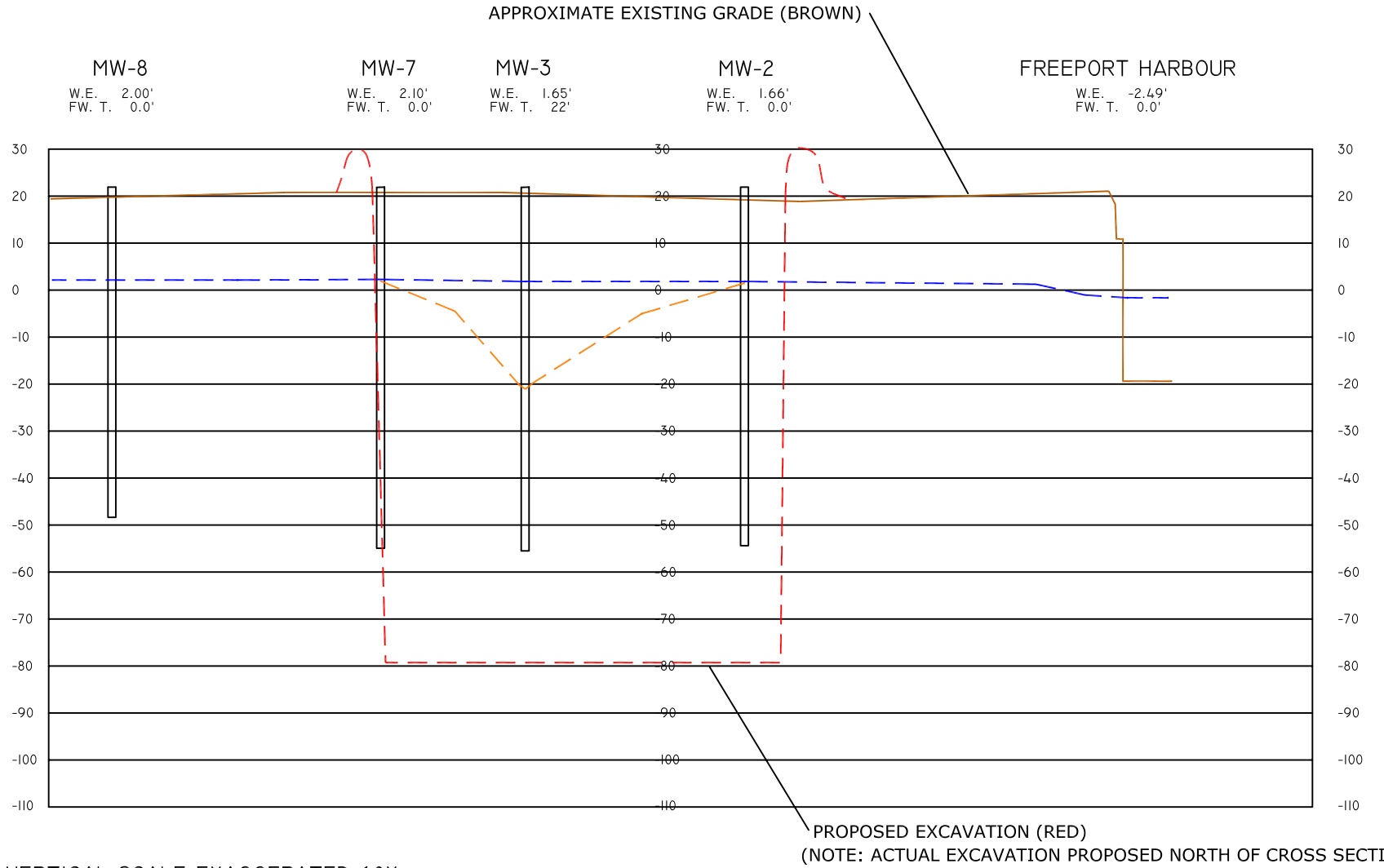
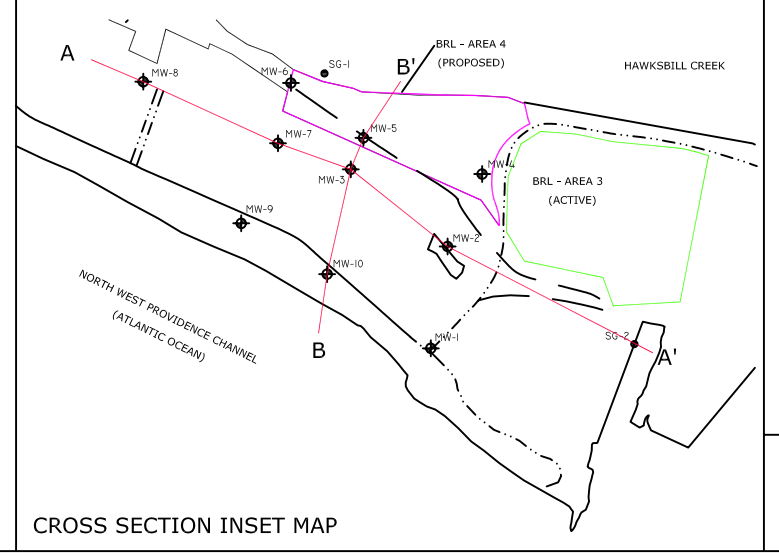
A

A'



VERTICAL SCALE EXAGGERATED 60X



CROSS SECTION INSET MAP

0 1000 2000 4000 feet

SCALE

FIGURE 2I

LEGEND

MW-1 - GROUNDWATER MONITOR WELL

- GROUND ELEVATION

- APPROXIMATE WATER TABLE ELEVATION (BASED ON NOVEMBER 20, 2007)

- APPROXIMATE FRESH-SALTWATER INTERFACE (BASED ON 11/6-13/07)

- PROPOSED EXCAVATION LIMITS - BRL AREA 4 EXCAVATION PLANS

W.E. - MEASURED WATER ELEVATION

FW. T. - MEASURED FRESHWATER THICKNESS

FIGURE 2I

CROSS SECTION VIEW OF FRESHWATER LENS A-A' 11/6-13/2007

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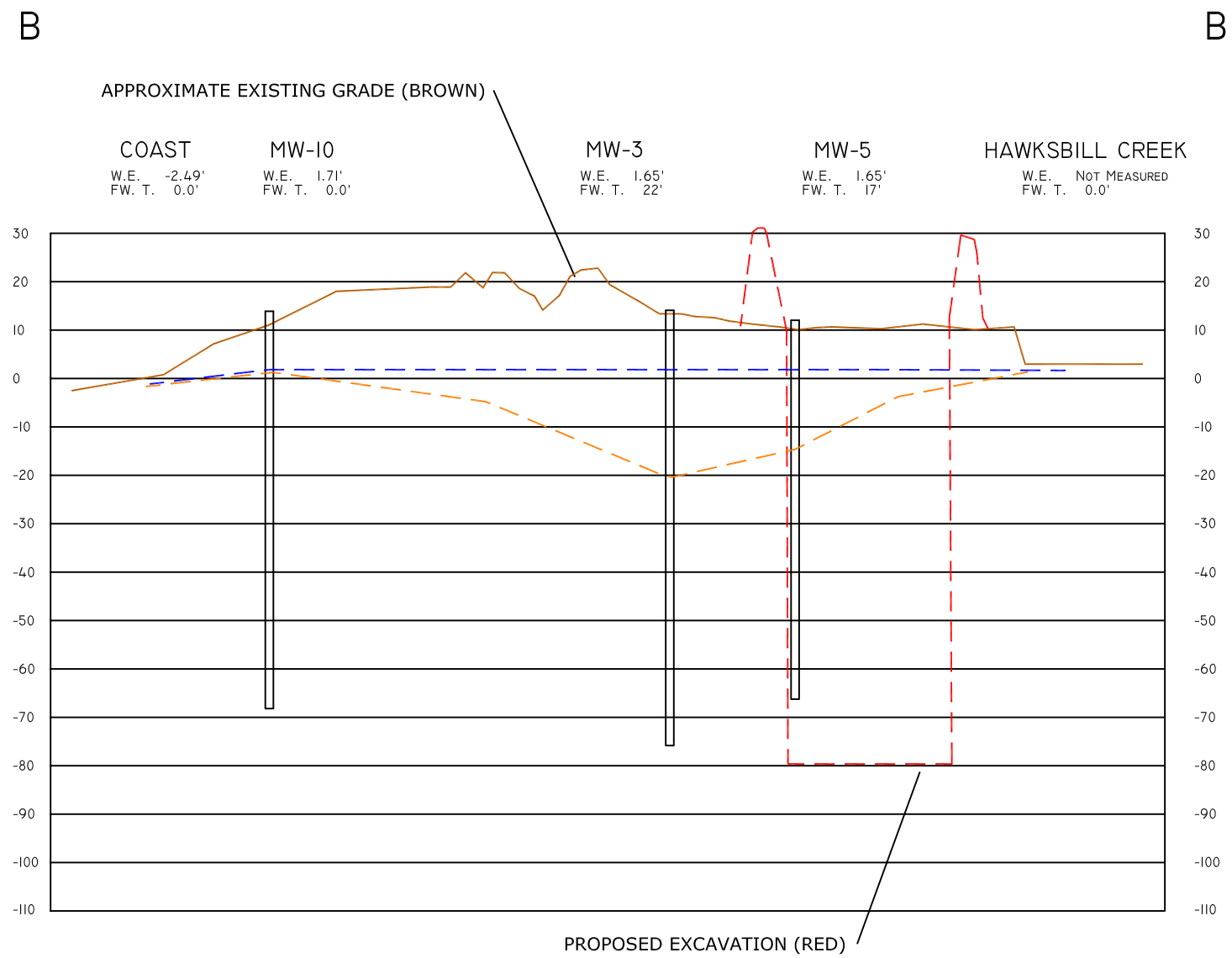
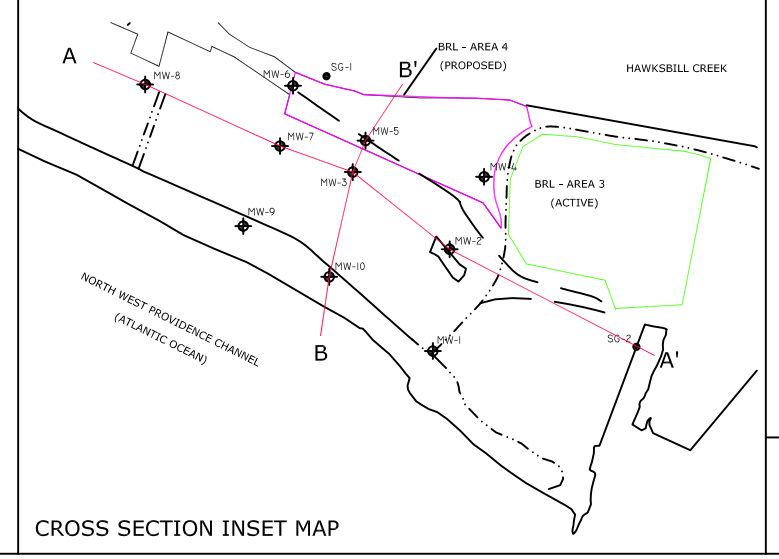


VERTICAL SCALE EXAGGERATED 30X



CROSS SECTION INSET MAP

0 500 1000 2000 feet

SCALE

FIGURE 2J

LEGEND

MW-1 - GROUNDWATER MONITOR WELL

- GROUND ELEVATION

- APPROXIMATE WATER TABLE ELEVATION (BASED ON NOVEMBER 20, 2007)

- APPROXIMATE FRESH-SALTWATER INTERFACE (BASED ON 11/6-13/07)

- PROPOSED EXCAVATION LIMITS - BRL AREA 4 EXCAVATION PLANS

W.E. - MEASURED WATER ELEVATION

FW. T. - MEASURED FRESHWATER THICKNESS

FIGURE 2J

CROSS SECTION VIEW OF FRESHWATER LENS B-B' 11/6-13/2007

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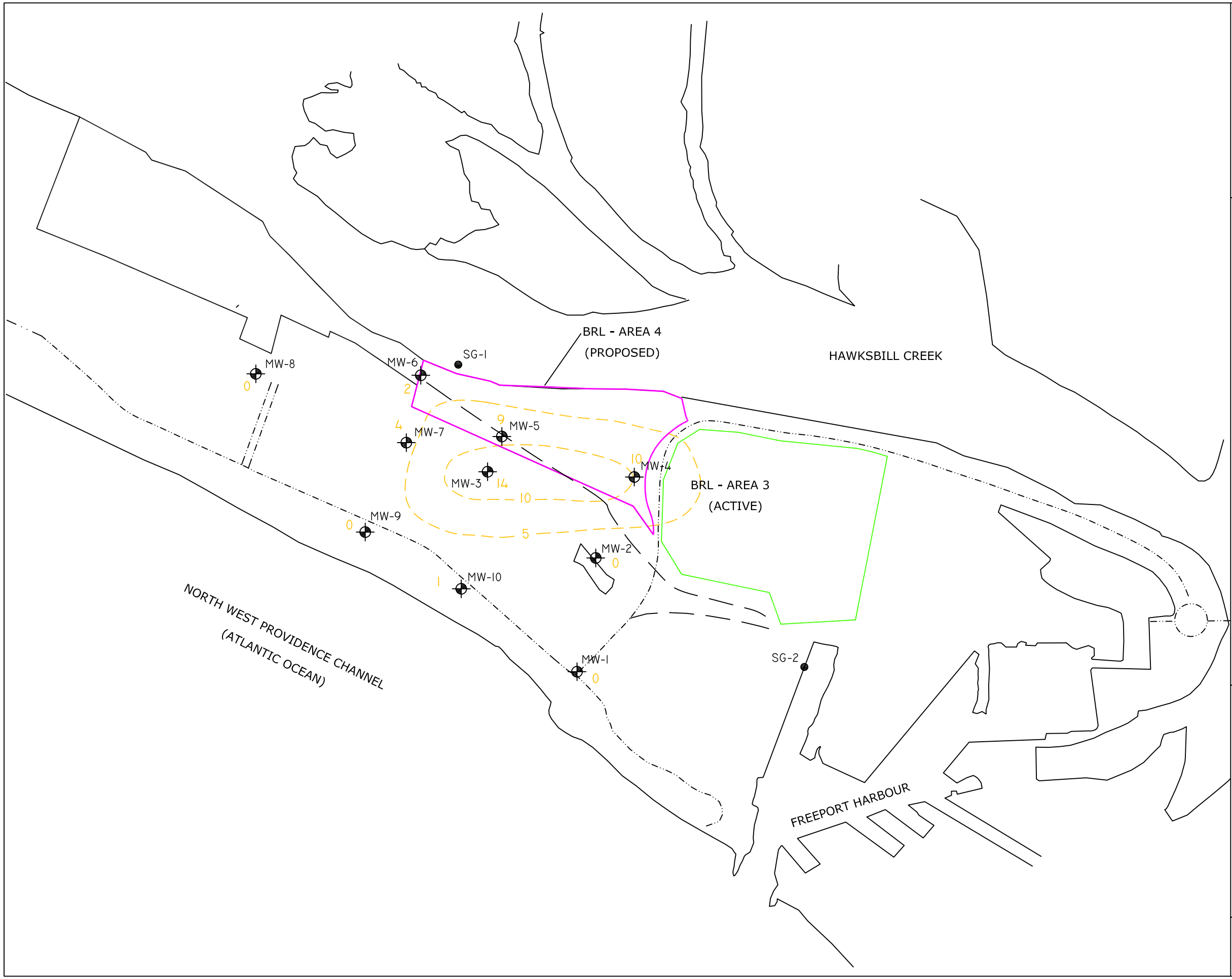

N

0 1000 2000 4000 feet

SCALE

FIGURE 2K

LEGEND

- MW-1 - GROUNDWATER MONITOR WELL
- - MAJOR ROADS/HIGHWAYS
- - ACCESS ROADS
- - OUTLINE OF BRL - AREA 3 (ACTIVE)
- - OUTLINE OF BRL - AREA 4 (PROPOSED)
- SG-2 - SURFACE WATER STAFF GAUGE
- - FRESHWATER LENS THICKNESS CONTOUR

FIGURE 2K

PLAN VIEW OF FRESHWATER LENS - 12/10-17/2007

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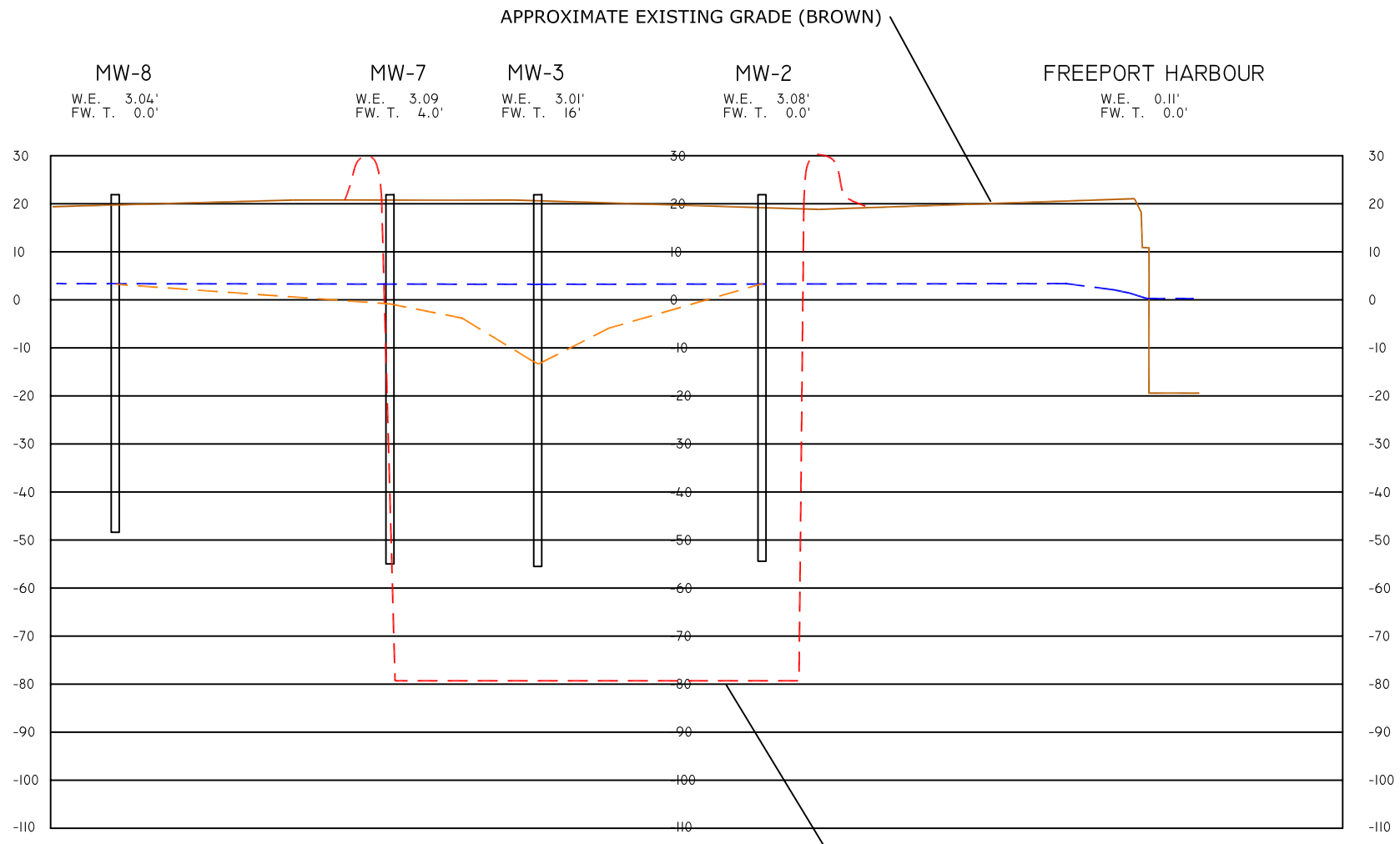
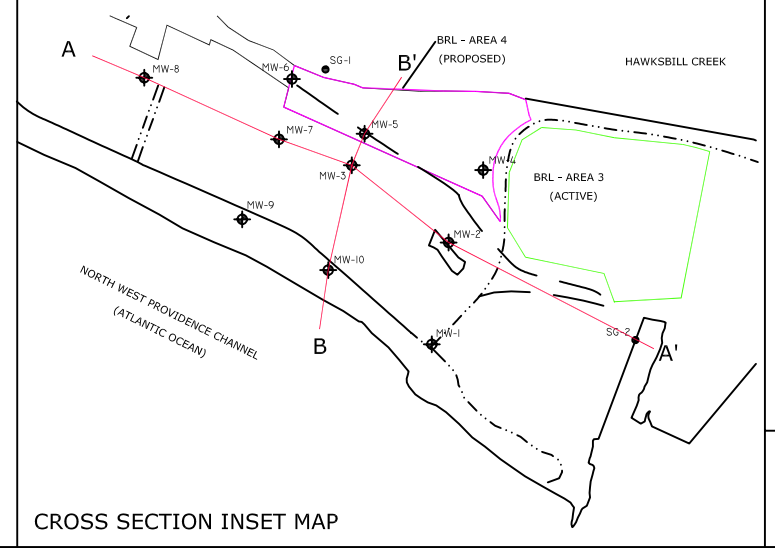
A

A'



VERTICAL SCALE EXAGGERATED 60X



CROSS SECTION INSET MAP

0 1000 2000 4000 feet

SCALE

FIGURE 2L

LEGEND

MW-1 - GROUNDWATER MONITOR WELL

- GROUND ELEVATION

- APPROXIMATE WATER TABLE ELEVATION (BASED ON DECEMBER 14, 2007)

- APPROXIMATE FRESH-SALTWATER INTERFACE (BASED ON 12/10-17/07)

- PROPOSED EXCAVATION LIMITS - BRL AREA 4 EXCAVATION PLANS

W.E. - MEASURED WATER ELEVATION

FW. T. - MEASURED FRESHWATER THICKNESS

FIGURE 2L

CROSS SECTION VIEW OF FRESHWATER LENS A-A' 12/10-17/2007

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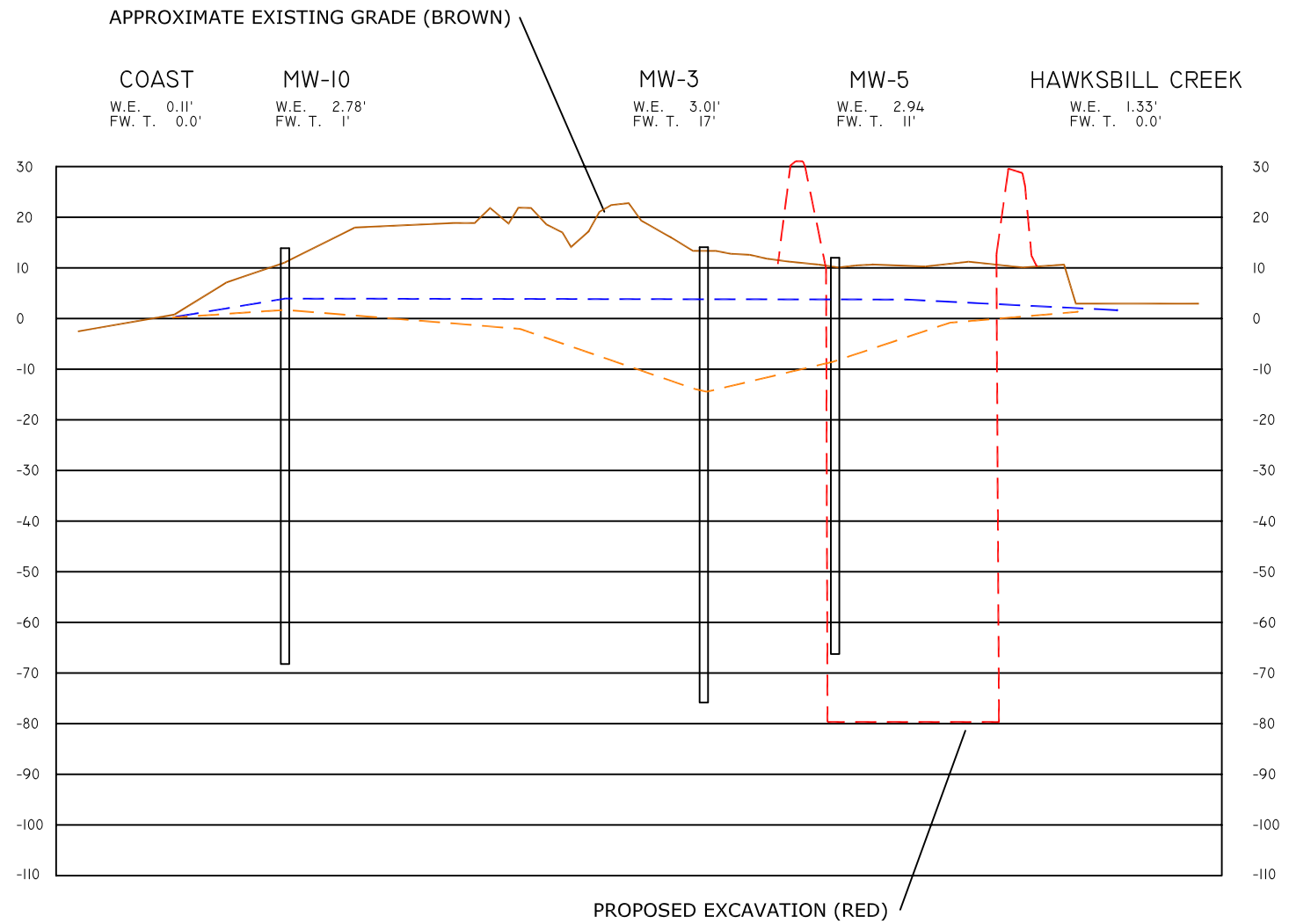
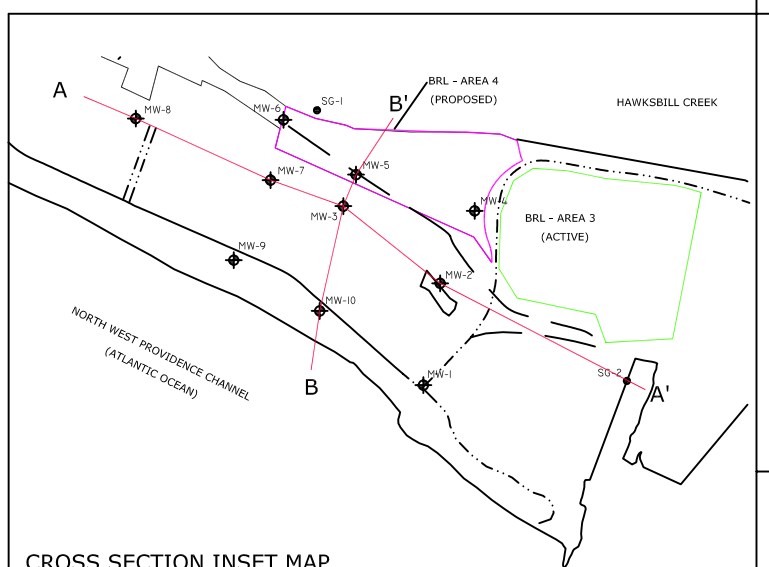
B

B'



VERTICAL SCALE EXAGGERATED 30X



CROSS SECTION INSET MAP

0 500 1000 2000 feet

SCALE

FIGURE 2M

LEGEND

MW-1 - GROUNDWATER MONITOR WELL

- GROUND ELEVATION

- APPROXIMATE WATER TABLE ELEVATION (BASED ON DECEMBER 14, 2007)

- APPROXIMATE FRESH-SALTWATER INTERFACE (BASED ON 12/14-17/07)

- PROPOSED EXCAVATION LIMITS - BRL AREA 4 EXCAVATION PLANS

W.E. - MEASURED WATER ELEVATION

FW. T. - MEASURED FRESHWATER THICKNESS

FIGURE 2M

CROSS SECTION VIEW OF FRESHWATER LENS B-B' 12/10-17/2007

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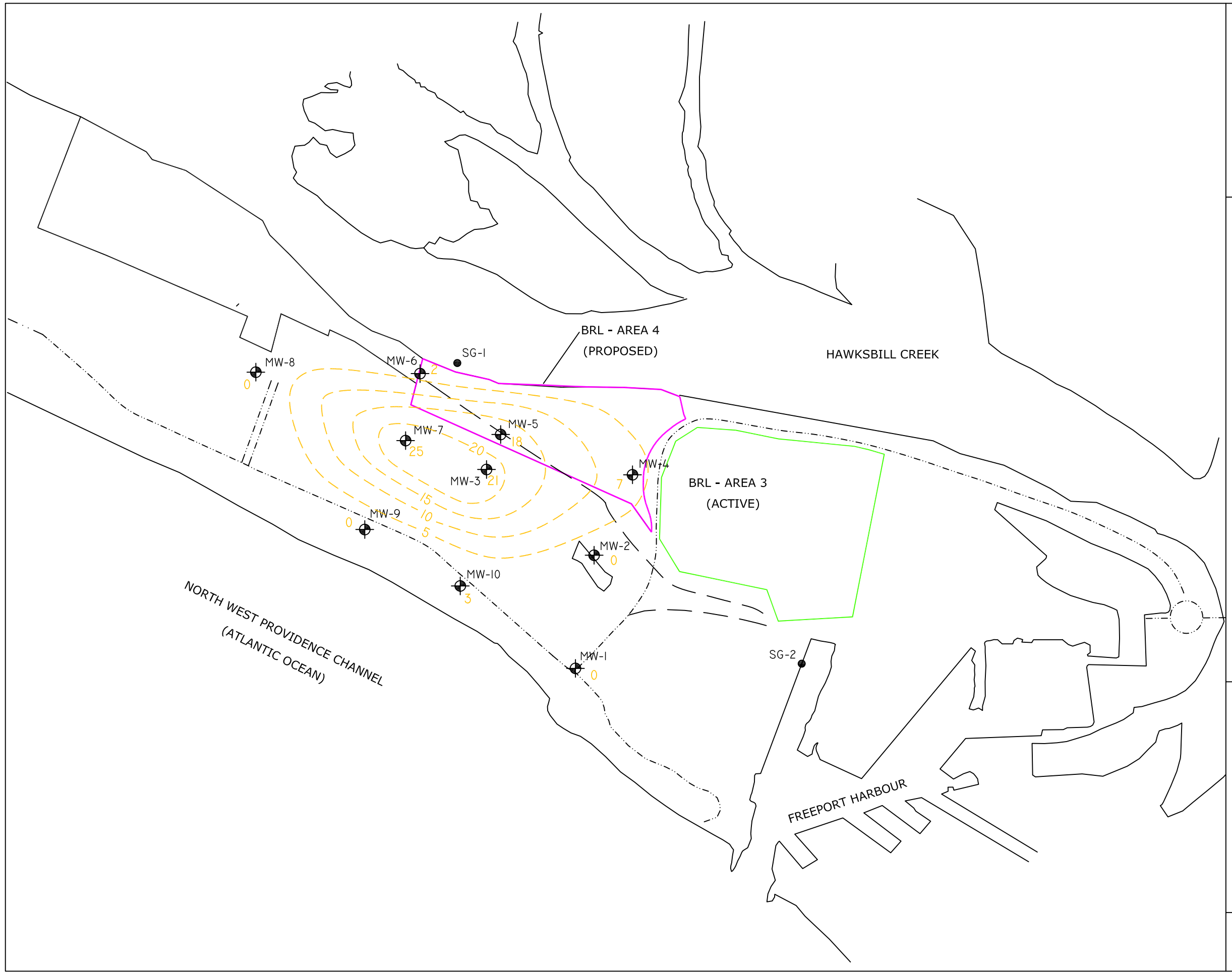

N

0 1000 2000 4000 feet

SCALE

FIGURE 2N

LEGEND

MW-1 - GROUNDWATER MONITOR WELL

- MAJOR ROADS/HIGHWAYS

- ACCESS ROADS

- OUTLINE OF BRL - AREA 3 (ACTIVE)

- OUTLINE OF BRL - AREA 4 (PROPOSED)

SG-2 - SURFACE WATER STAFF GAUGE

- FRESHWATER LENS THICKNESS CONTOUR

FIGURE 2N

PLAN VIEW OF FRESHWATER LENS - 2/19-20/2008

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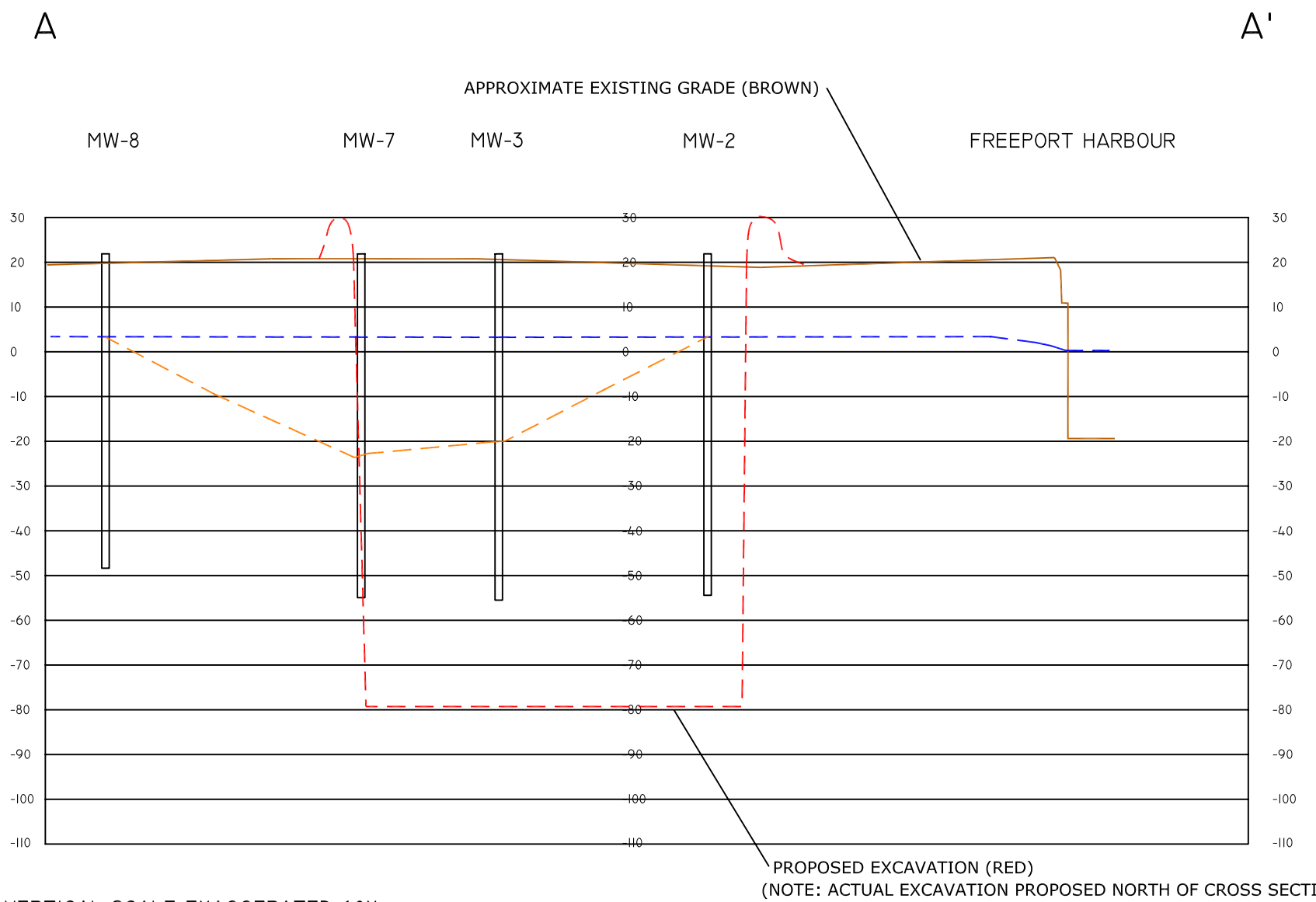


VERTICAL SCALE EXAGGERATED 60X

0 1000 2000 4000 feet

SCALE

FIGURE 2O

LEGEND

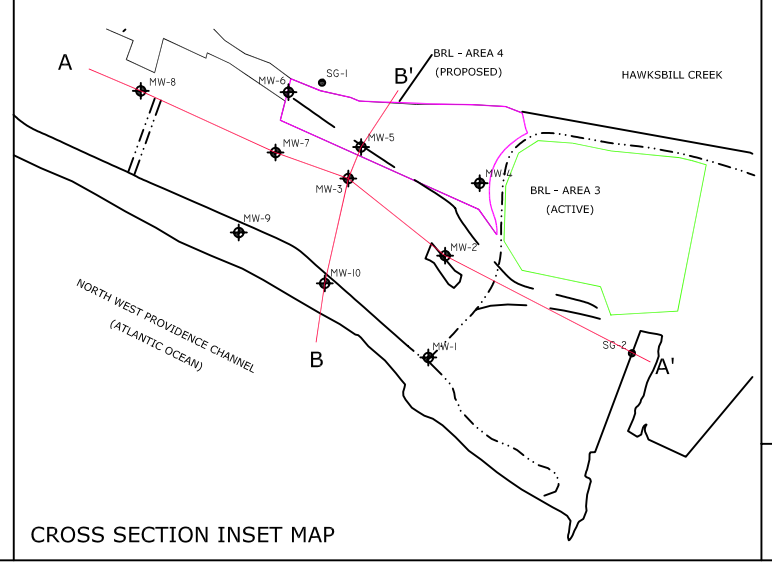
MW-1 - GROUNDWATER MONITOR WELL

- GROUND ELEVATION

- APPROXIMATE WATER TABLE ELEVATION (BASED ON DECEMBER 14, 2007)

- APPROXIMATE FRESH-SALTWATER INTERFACE (BASED ON 2/19-20/08)

- PROPOSED EXCAVATION LIMITS - BRL AREA 4 EXCAVATION PLANS



CROSS SECTION INSET MAP

FIGURE 2O

CROSS SECTION VIEW OF FRESHWATER LENS A-A' 2/19-20/2008

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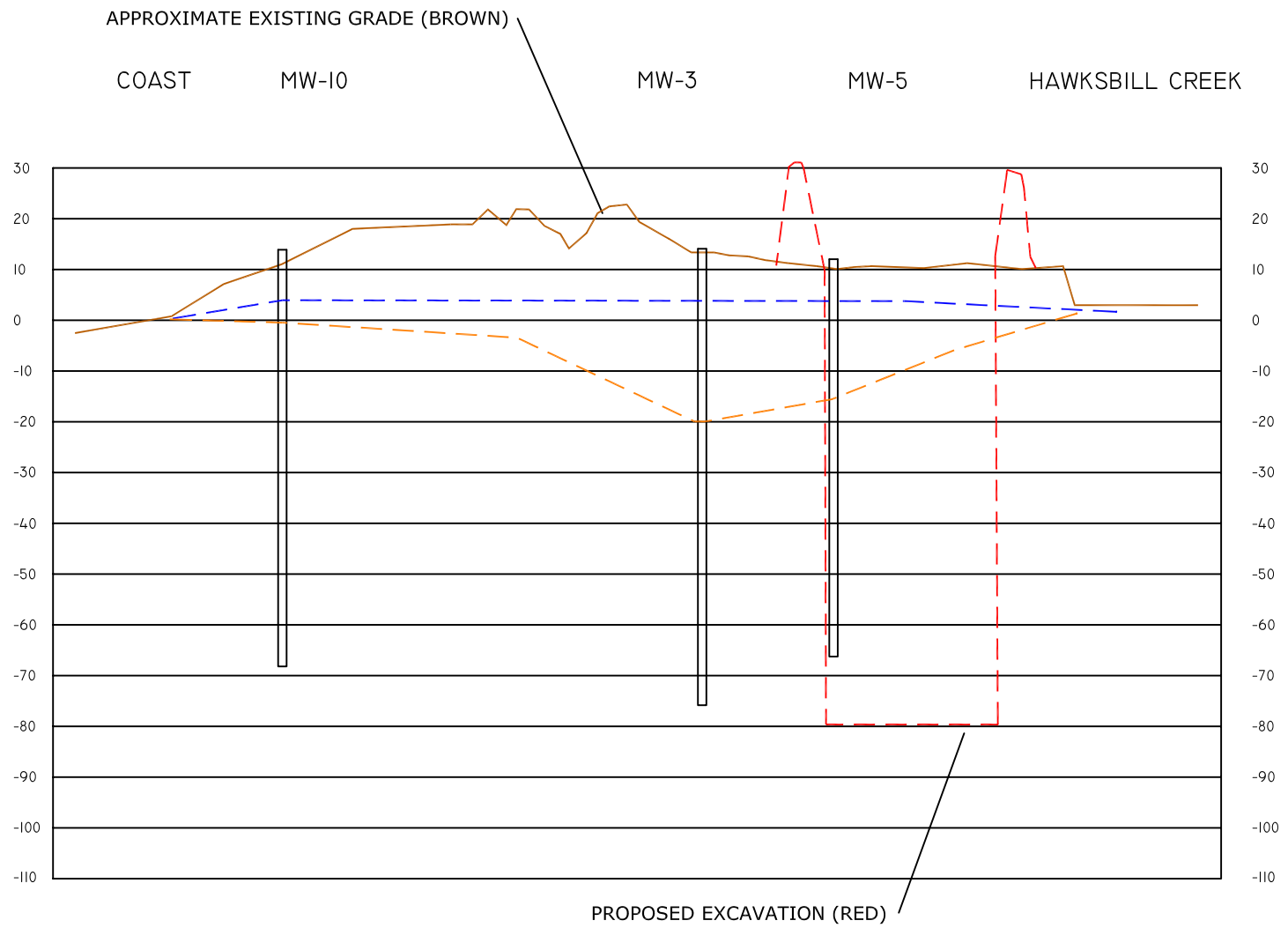
B

B'



VERTICAL SCALE EXAGGERATED 30X

0 500 1000 2000 feet

SCALE

FIGURE 2P

LEGEND

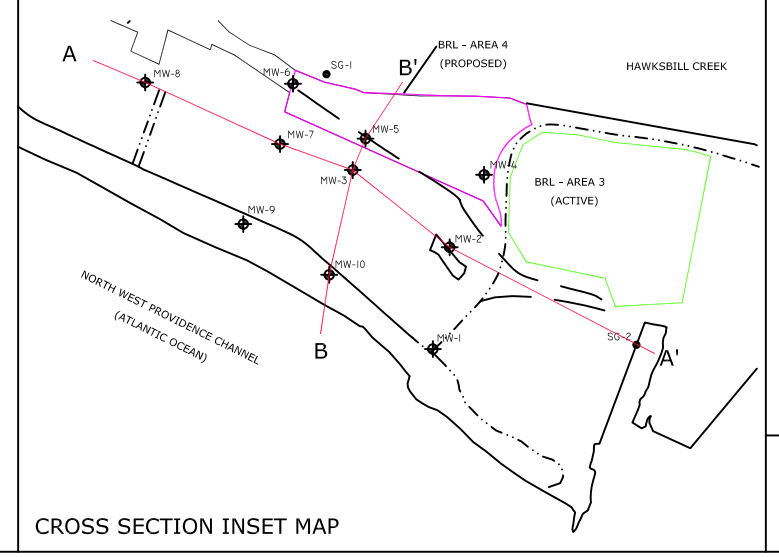
MW-1 - GROUNDWATER MONITOR WELL

- GROUND ELEVATION

- APPROXIMATE WATER TABLE ELEVATION (BASED ON DECEMBER 14, 2007)

- APPROXIMATE FRESH-SALTWATER INTERFACE (BASED ON 2/19-20/08)

- PROPOSED EXCAVATION LIMITS - BRL AREA 4 EXCAVATION PLANS



CROSS SECTION INSET MAP

FIGURE 2P

CROSS SECTION VIEW OF FRESHWATER LENS B-B' 2/19-20/2008

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N

0 800 1600 3200 feet

SCALE

FIGURE 2Q

LEGEND

- CITY WATER AND PRIVATE WELL

- PRIVATE WELL

FIGURE 2Q

AERIAL PHOTOGRAPH - ILLUSTRATING PRIVATE WELLS & CITY WATER USE

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N

0 800 1600 2400 feet

SCALE

FIGURE 2R

LEGEND

- CITY WATER AND PRIVATE WELL

- PRIVATE WELL

- OUTLINE OF BRL - AREA 3 OPEN WATER

FIGURE 2R

AERIAL PHOTOGRAPH - PRIVATE WELL SAMPLING LOCATIONS - 2/19/2008

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N

0 800 1600 2400 feet

SCALE

FIGURE 2S

LEGEND

- MW-1 - GROUNDWATER MONITOR WELL
- FRESHWATER LENS THICKNESS CONTOUR
- CITY WATER AND PRIVATE WELL
- PRIVATE WELL
- OUTLINE OF BRL - AREA 3 OPEN WATER

FIGURE 2S

AERIAL PHOTOGRAPH - THICKNESS OF FRESHWATER LENS - 02/19-20/2008

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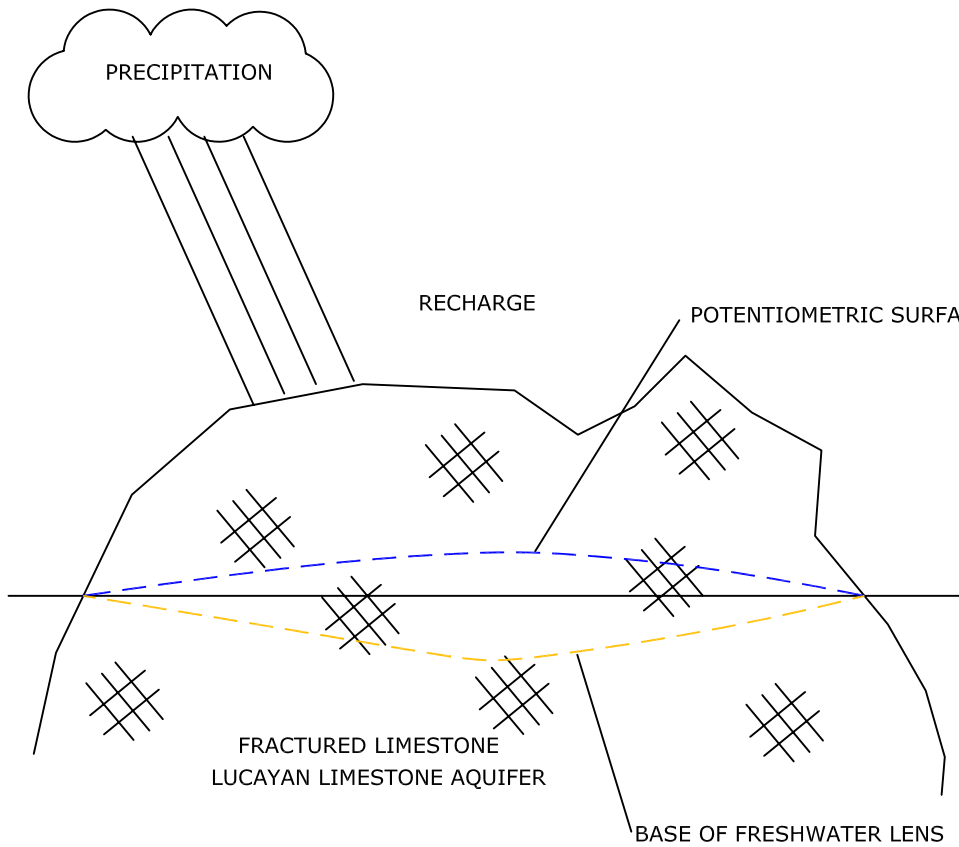
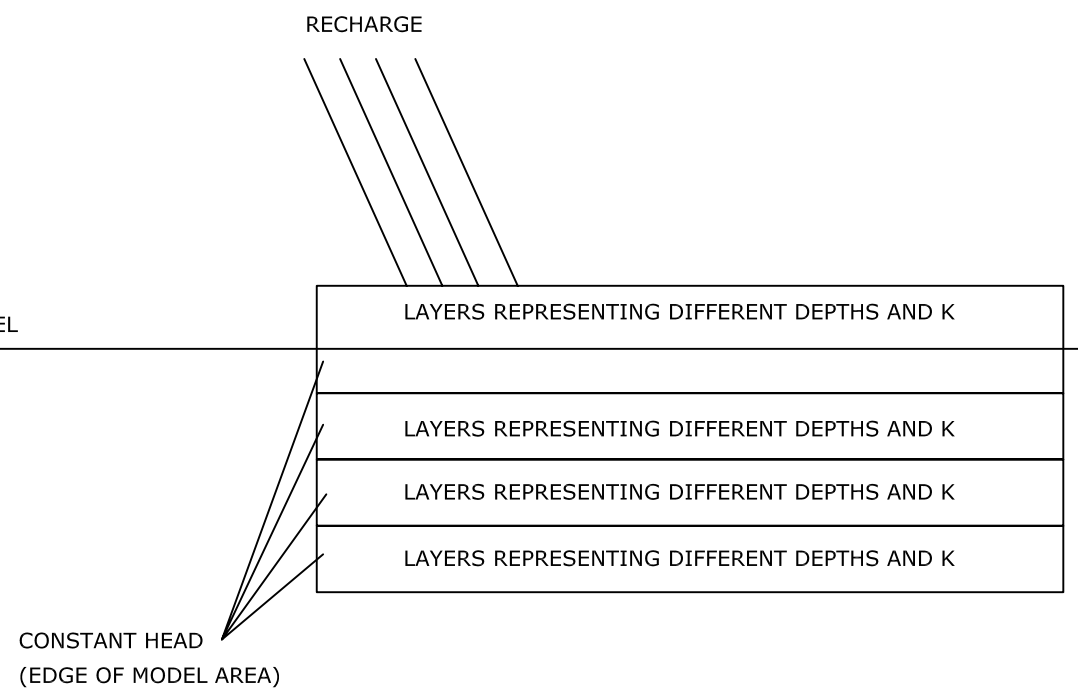


GRAND BAHAMA



CONCEPTUAL MODEL

DRAWING NOT TO SCALE

FIGURE 3A

LEGEND

- POTENTIOMETRIC SURFACE

- FRESHWATER - SALTWATER INTERFACE

FIGURE 3A

CROSS SECTION VIEW OF CONCEPTUAL MODEL

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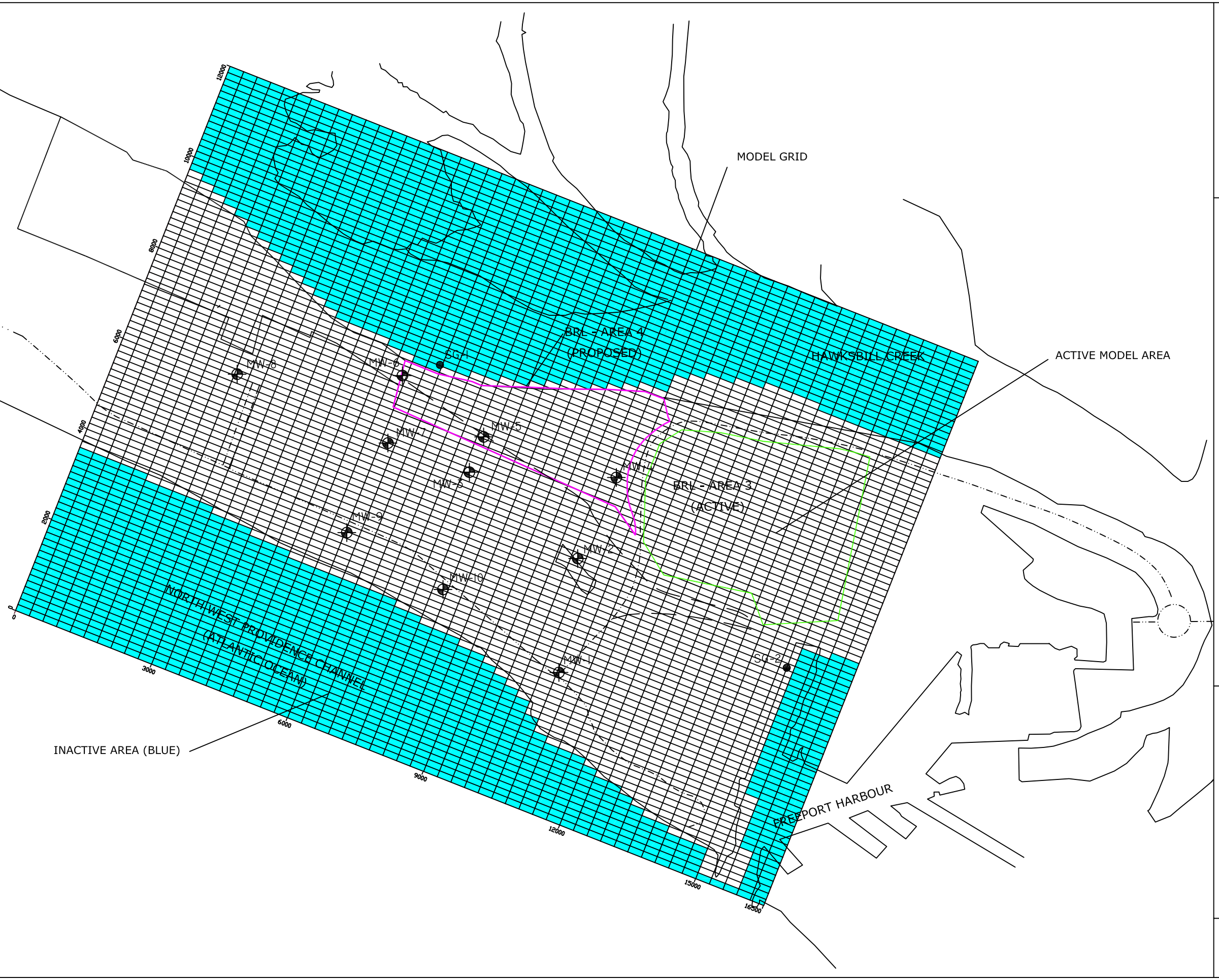

N

0 1000 2000 4000 feet

SCALE

FIGURE 3B

LEGEND

MW-1 - GROUNDWATER MONITOR WELL

- MAJOR ROADS/HIGHWAYS

- ACCESS ROADS

- OUTLINE OF BRL - AREA 3 (ACTIVE)

- OUTLINE OF BRL - AREA 4 (PROPOSED)

SG-2 - SURFACE WATER STAFF GAUGE

- ACTIVE MODEL CELL

- INACTIVE MODEL CELL

FIGURE 3B

PLAN VIEW OF MODEL GRID

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N

0 1000 2000 4000 feet

SCALE

FIGURE 3C

LEGEND

- MW-1 - GROUNDWATER MONITOR WELL
- - MAJOR ROADS/HIGHWAYS
- - ACCESS ROADS
- - OUTLINE OF BRL - AREA 3 (ACTIVE)
- - OUTLINE OF BRL - AREA 4 (PROPOSED)
- SG-2 - SURFACE WATER STAFF GAUGE
- - ACTIVE MODEL CELL
- - INACTIVE MODEL CELL
- - CONSTANT HEAD MODEL CELL
- - GENERAL HEAD MODEL CELL

FIGURE 3C

PLAN VIEW OF MODEL GRID ILLUSTRATING BOUNDARY CONDITIONS

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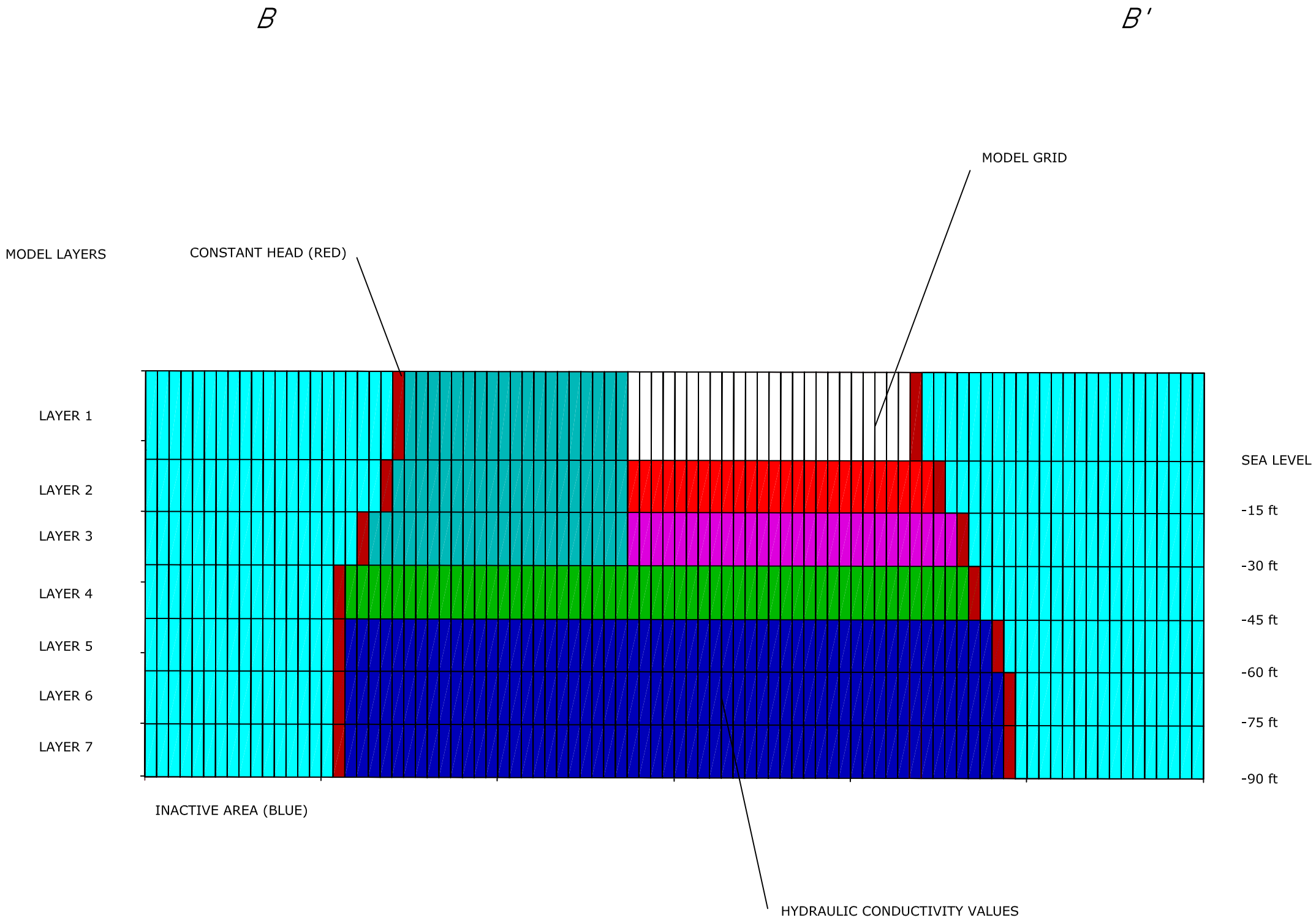

0 1000 2000 4000 feet

SCALE

FIGURE 3D

LEGEND

- ACTIVE MODEL CELL
- INACTIVE MODEL CELL
- CONSTANT HEAD MODEL CELL
- SIMULATED K - 150 FT/DAY
- SIMULATED K - 300 FT/DAY
- SIMULATED K - 1500 FT/DAY
- SIMULATED K - 6000 FT/DAY
- SIMULATED K - 3000 FT/DAY
- SIMULATED K - 15000 FT/DAY

FIGURE 3D

CROSS SECTION OF MODEL GRID - INPUT PARAMETERS/ BOUNDARY CONDITIONS

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MODEL GRID

SIMULATED EXTENT OF FRESHWATER LENS

BRL - AREA 4
(PROPOSED)

HAWKSBILL CREEK

BRL - AREA 3
(ACTIVE)

NORTH WEST PROVIDENCE CHANNEL
(ATLANTIC OCEAN)

INACTIVE AREA (BLUE)

FREEPORT HARBOUR

SIMULATED POTENTIOMETRIC CONTOUR

MW-1
MW-2
MW-3
MW-4
MW-5
MW-6
MW-7
MW-8
MW-9
MW-10
SG-1
SG-2

20
15
10
5
0

12000
10000
8000
6000
4000
2000
0
3000
6000
9000
12000
15000
16500

N

0 1000 2000 4000 feet

SCALE

FIGURE 4A

LEGEND

- MW-1 - GROUNDWATER MONITOR WELL
- - MAJOR ROADS/HIGHWAYS
- - ACCESS ROADS
- - OUTLINE OF BRL - AREA 3 (ACTIVE)
- - OUTLINE OF BRL - AREA 4 (PROPOSED)
- SG-2 - SURFACE WATER STAFF GAUGE
- - ACTIVE MODEL CELL
- - INACTIVE MODEL CELL
- - SIMULATED POTENIOMETRIC CONTOUR
- - SIMULATED FRESHWATER LENS THICKNESS CONTOUR

FIGURE 4A

PLAN VIEW OF MODEL OUTPUT ILLUSTRATING CALIBRATION SCENARIO

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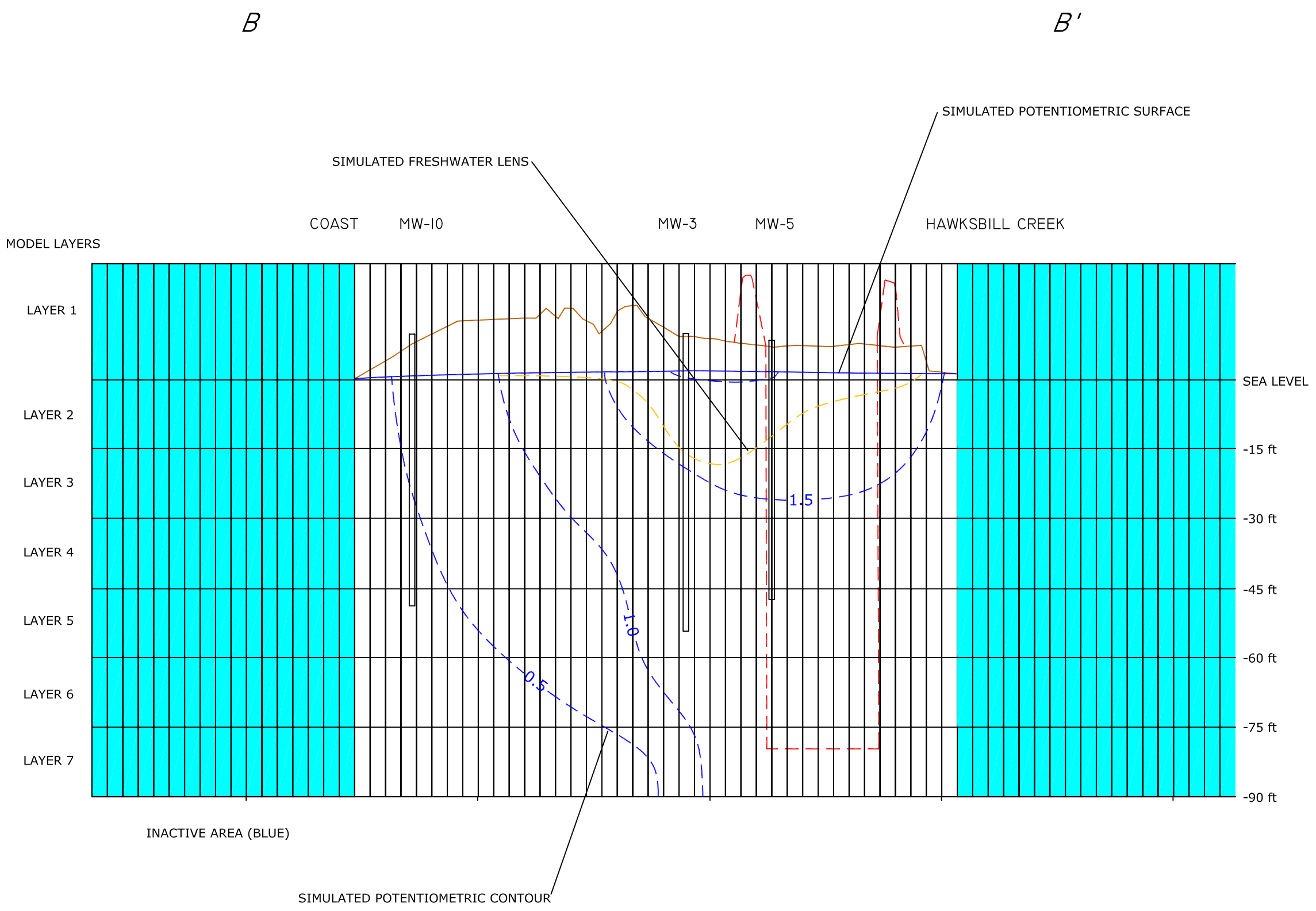

NOTE: LINE OF CROSS SECTION GENERALLY OVERLAPS CROSS SECTION B-B'

0 500 1000 2000 feet

SCALE

FIGURE 4B

LEGEND

- ACTIVE MODEL CELL
- INACTIVE MODEL CELL
- SIMULATED POTENIOMETRIC CONTOUR
- SIMULATED FRESHWATER LENS EXTENT
- PROPOSED EXCAVATION LIMITS - BRL AREA 4 EXCAVATION PLANS
- GROUND ELEVATION

FIGURE 4B

CROSS SECTION OF MODEL OUTPUT ILLUSTRATING CALIBRATION SCENARIO

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MODEL GRID

SIMULATED EXTENT OF FRESHWATER LENS

BRL - AREA 4
(PROPOSED)

HAWKSBILL CREEK

BRL - AREA 3
(ACTIVE)

PROPOSED FUTURE CHANNEL

NORTH WEST PROVIDENCE CHANNEL
(ATLANTIC OCEAN)

FREEPORT HARBOUR

INACTIVE AREA (BLUE)

SIMULATED POTENTIOMETRIC CONTOUR

MW-1 MW-2 MW-3 MW-4 MW-5 MW-6 MW-7 MW-8 MW-9 MW-10

SG-1 SG-2

0.5 1.0 1.5 2.0 2.0 1.5 1.0 0.5

20 15 10 5 0

0 3000 6000 9000 12000 15000 16500

2000 4000 6000 8000 10000 12000

N

0 1000 2000 4000 feet

SCALE

FIGURE 5A

LEGEND

- MW-1 - GROUNDWATER MONITOR WELL
- - MAJOR ROADS/HIGHWAYS
- - ACCESS ROADS
- - OUTLINE OF BRL - AREA 3 (ACTIVE)
- - OUTLINE OF BRL - AREA 4 (PROPOSED)
- SG-2 - SURFACE WATER STAFF GAUGE
- - ACTIVE MODEL CELL
- - INACTIVE MODEL CELL
- - CONSTANT HEAD MODEL CELL
- - GENERAL HEAD MODEL CELL
- - SIMULATED POTENIOMETRIC CONTOUR
- - SIMULATED LENS THICKNESS CONTOUR

FIGURE 5A

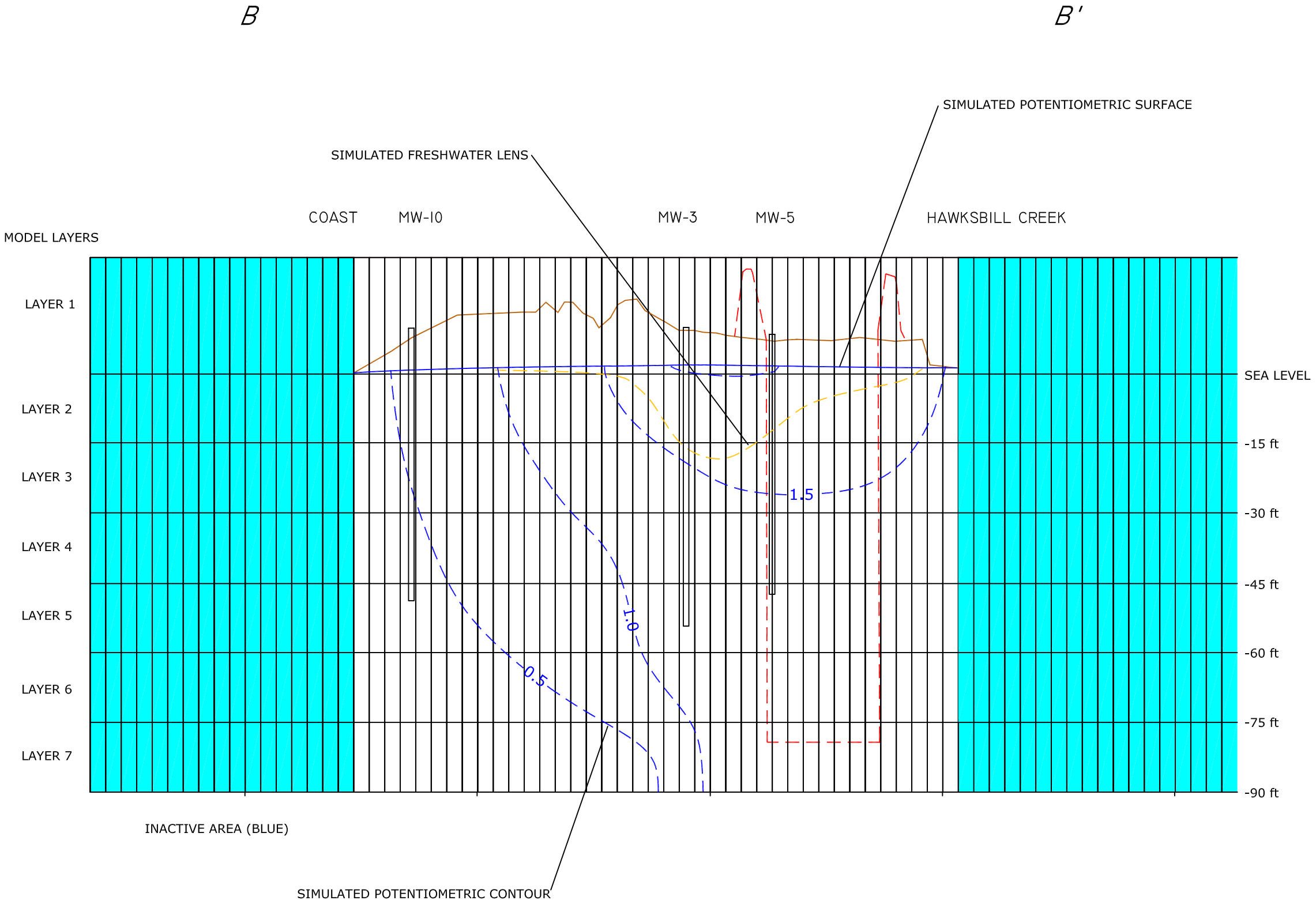
PLAN VIEW OF MODEL SIMULATION 1 AREA 3 COMPLETED

BAHAMA ROCK, Ltd.

Water Resources Assessment - AREA 4 EIA

Grand Bahama, Bahamas

RCMA



NOTE: LINE OF CROSS SECTION GENERALLY OVERLAPS CROSS SECTION B-B'

0 500 1000 2000 feet

SCALE

FIGURE 5B

LEGEND

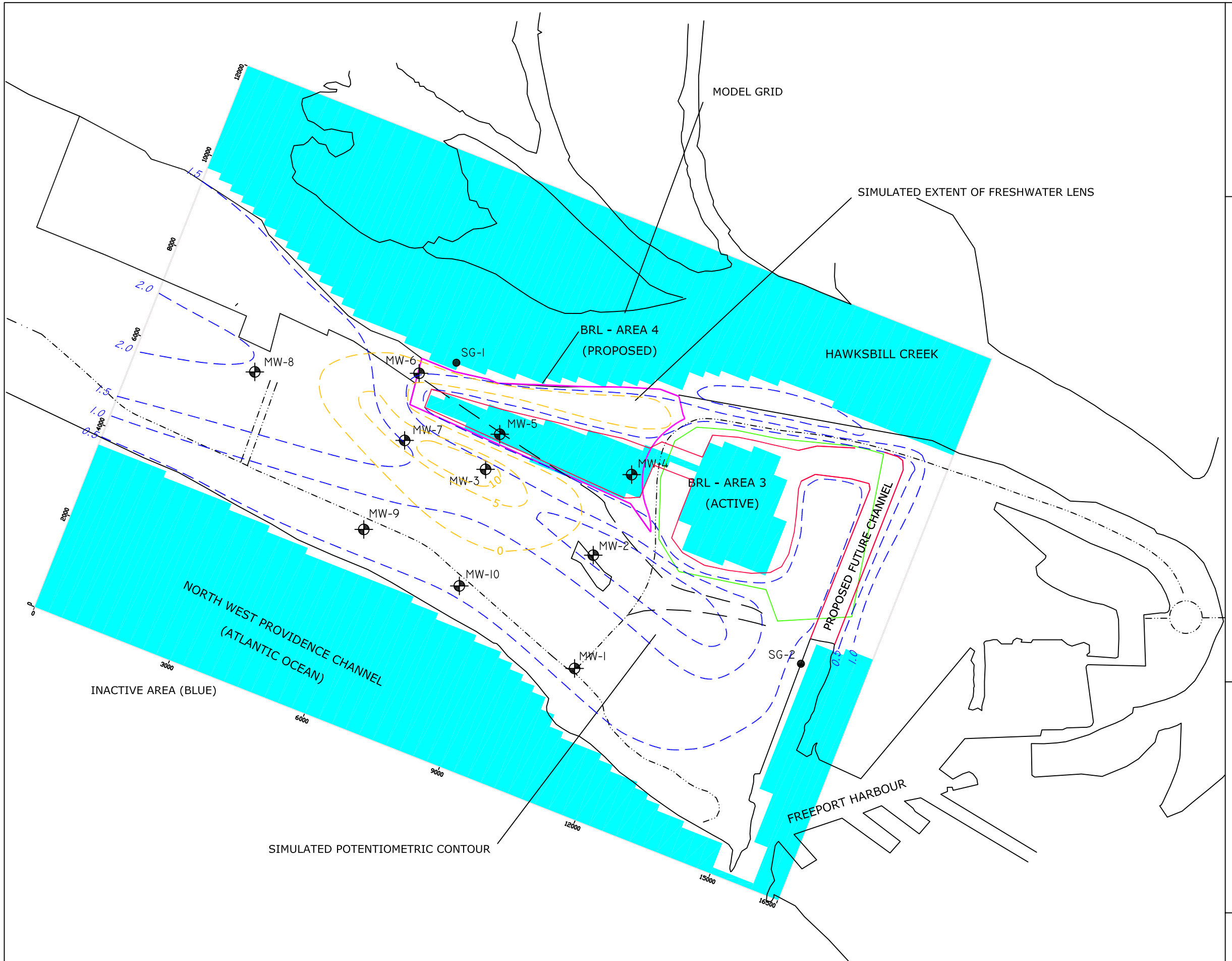
- ACTIVE MODEL CELL
- INACTIVE MODEL CELL
- SIMULATED POTENIOMETRIC CONTOUR
- SIMULATED LENS EXTENT
- PROPOSED EXCAVATION LIMITS - BRL AREA 4 EXCAVATION PLANS
- GROUND ELEVATION

FIGURE 5B
CROSS SECTION VIEW OF MODEL OUTPUT SIMULATION 1 - AREA 3 COMPLETED

BAHAMA ROCK, Ltd.

Water Resources Assessment - AREA 4 EIA
Grand Bahama, Bahamas

RCMA



N

0 1000 2000 4000 feet

SCALE

FIGURE 5C

LEGEND

- MW-1 - GROUNDWATER MONITOR WELL
- - MAJOR ROADS/HIGHWAYS
- - ACCESS ROADS
- - OUTLINE OF BRL - AREA 3 (ACTIVE)
- - OUTLINE OF BRL - AREA 4 (PROPOSED)
- SG-2 - SURFACE WATER STAFF GAUGE
- - ACTIVE MODEL CELL
- - INACTIVE MODEL CELL
- - CONSTANT HEAD MODEL CELL
- - GENERAL HEAD MODEL CELL
- - SIMULATED POTENIOMETRIC CONTOUR
- - SIMULATED LENS THICKNESS CONTOUR

FIGURE 5C

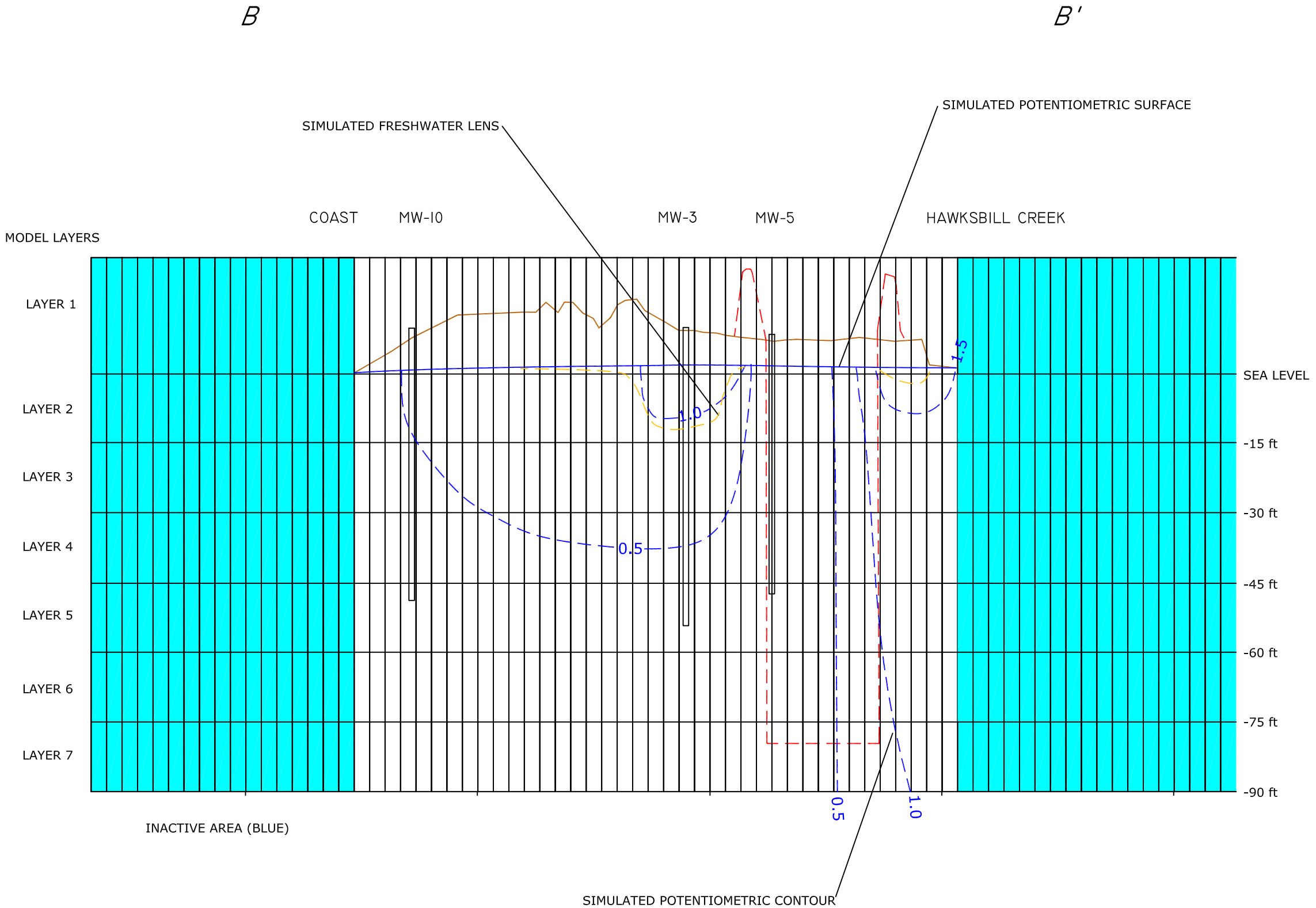
PLAN VIEW OF MODEL SIMULATION 2 AREA 4 50% COMPLETED

BAHAMA ROCK, Ltd.

Water Resources Assessment - AREA 4 EIA

Grand Bahama, Bahamas

RCMA



NOTE: LINE OF CROSS SECTION GENERALLY OVERLAPS CROSS SECTION B-B'

0 500 1000 2000 feet

SCALE

FIGURE 5D

LEGEND

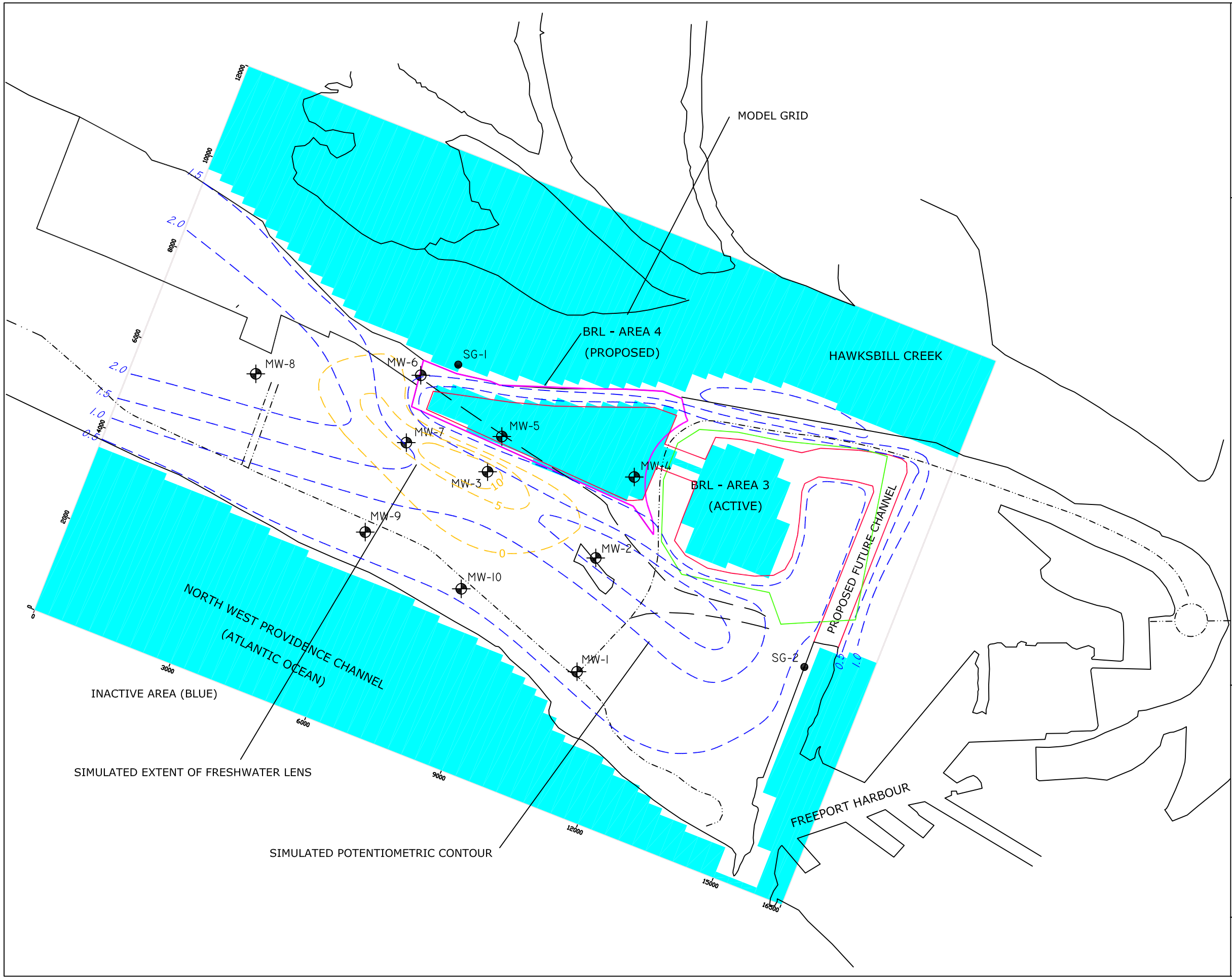
- ACTIVE MODEL CELL
- INACTIVE MODEL CELL
- SIMULATED POTENIOMETRIC CONTOUR
- SIMULATED LENS EXTENT
- PROPOSED EXCAVATION LIMITS - BRL AREA 4 EXCAVATION PLANS
- GROUND ELEVATION

FIGURE 5D
CROSS SECTION VIEW OF MODEL OUTPUT SIMULATION 2 - AREA 4 50% COMPLETED

BAHAMA ROCK, Ltd.

Water Resources Assessment - AREA 4 EIA
Grand Bahama, Bahamas

RCMA



N

0 1000 2000 4000 feet

SCALE

FIGURE 5E

LEGEND

- MW-1 - GROUNDWATER MONITOR WELL
- - MAJOR ROADS/HIGHWAYS
- - ACCESS ROADS
- - OUTLINE OF BRL - AREA 3 (ACTIVE)
- - OUTLINE OF BRL - AREA 4 (PROPOSED)
- SG-2 - SURFACE WATER STAFF GAUGE
- - ACTIVE MODEL CELL
- - INACTIVE MODEL CELL
- - CONSTANT HEAD MODEL CELL
- - GENERAL HEAD MODEL CELL
- - SIMULATED POTENIOMETRIC CONTOUR
- - SIMULATED LENS THICKNESS CONTOUR

FIGURE 5E

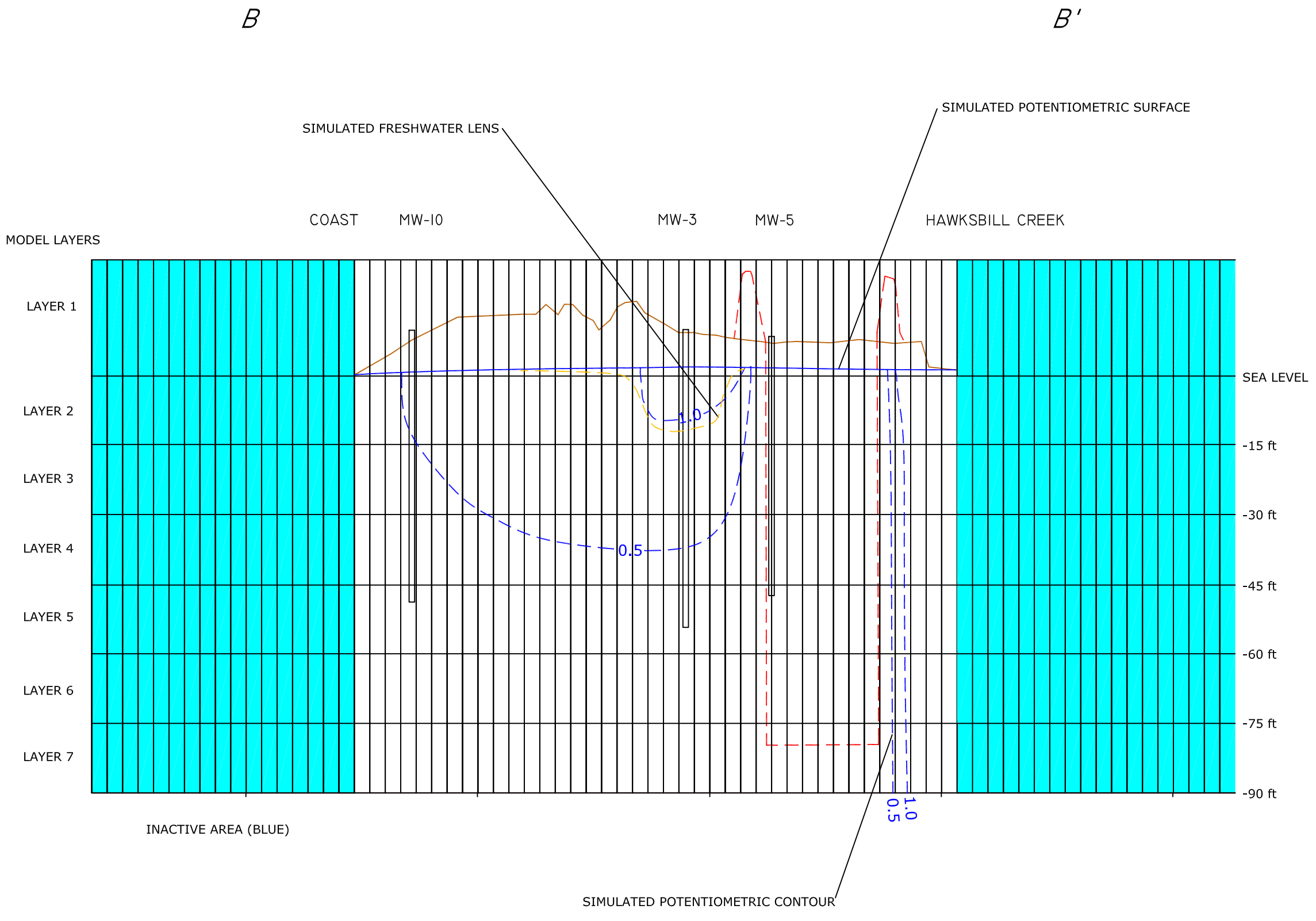
PLAN VIEW OF MODEL SIMULATION 3 AREA 4 COMPLETED

BAHAMA ROCK, Ltd.

Water Resources Assessment - AREA 4 EIA

Grand Bahama, Bahamas

RCMA



NOTE: LINE OF CROSS SECTION GENERALLY OVERLAPS CROSS SECTION B-B'

0 500 1000 2000 feet

SCALE

FIGURE 5F

LEGEND

- ACTIVE MODEL CELL
- INACTIVE MODEL CELL
- SIMULATED POTENIOMETRIC CONTOUR
- SIMULATED LENS EXTENT
- PROPOSED EXCAVATION LIMITS - BRL AREA 4 EXCAVATION PLANS
- GROUND ELEVATION

FIGURE 5F

CROSS SECTION VIEW OF MODEL OUTPUT SIMULATION 3 - AREA 4 COMPLETED

BAHAMA ROCK, Ltd.

Water Resources Assessment - AREA 4 EIA
Grand Bahama, Bahamas

RCMA

N

0 800 1600 2400 feet

SCALE

FIGURE 5G

LEGEND

MW-1 - GROUNDWATER MONITOR WELL

- SIMULATED LENS EXTENT

FIGURE 5G

AERIAL PHOTOGRAPH - EXTENT OF FRESHWATER LENS - SIMULATION 3 AREA 4 COMPLETED

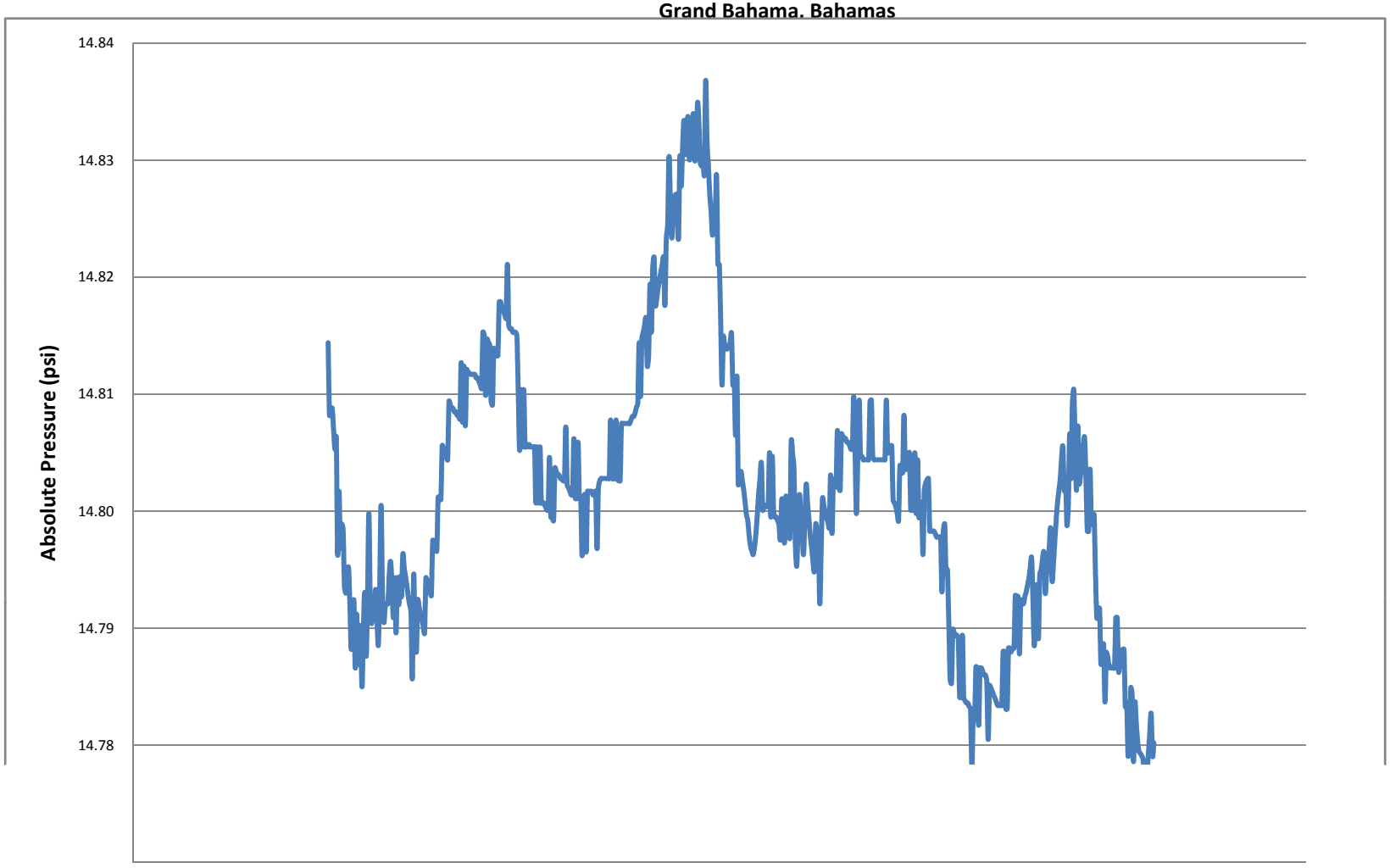
BAHAMA ROCK, Ltd.

Water Resources Assessment - AREA 4 EIA
Grand Bahama, Bahamas

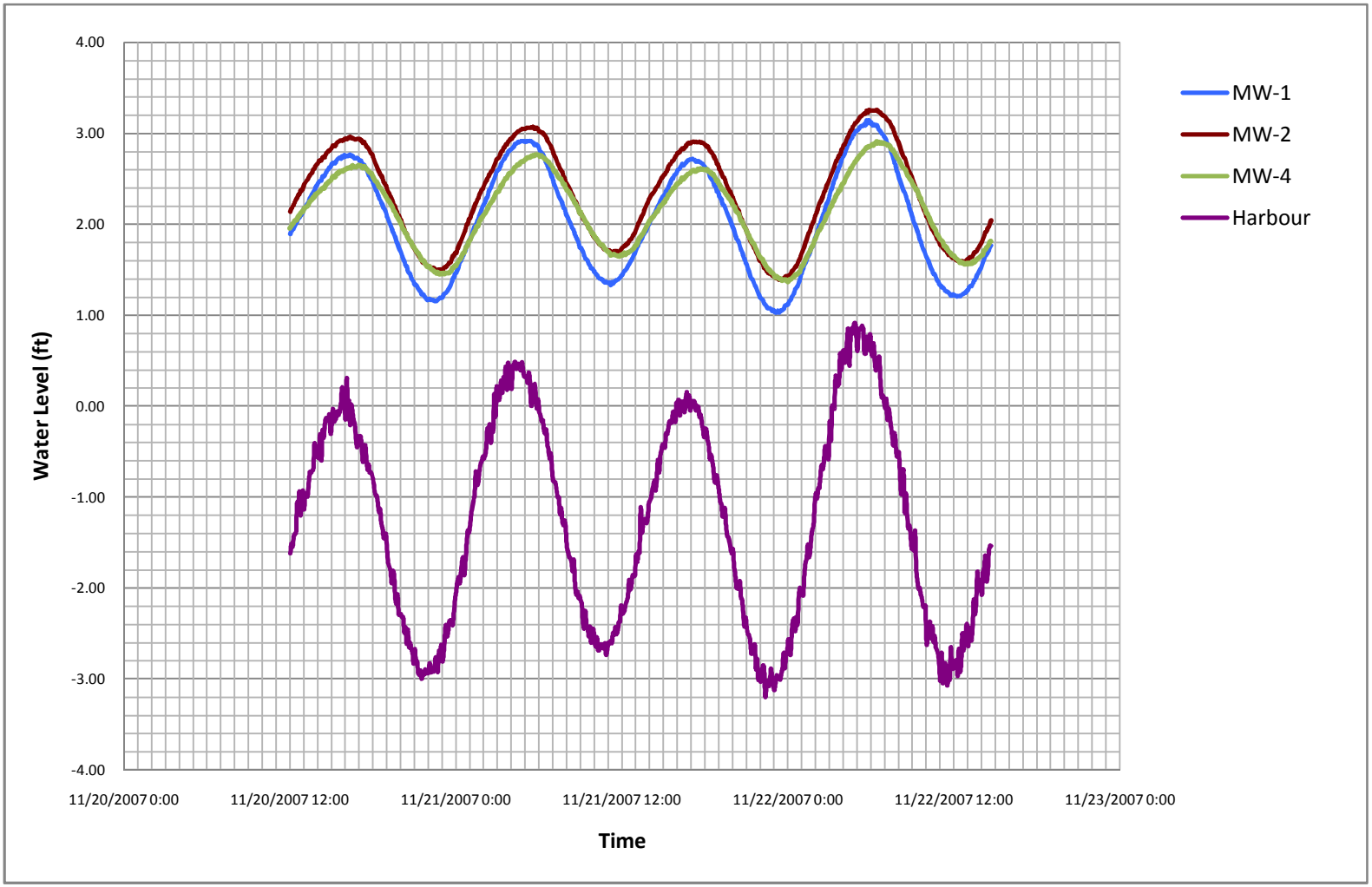
RCMA

GRAPHS

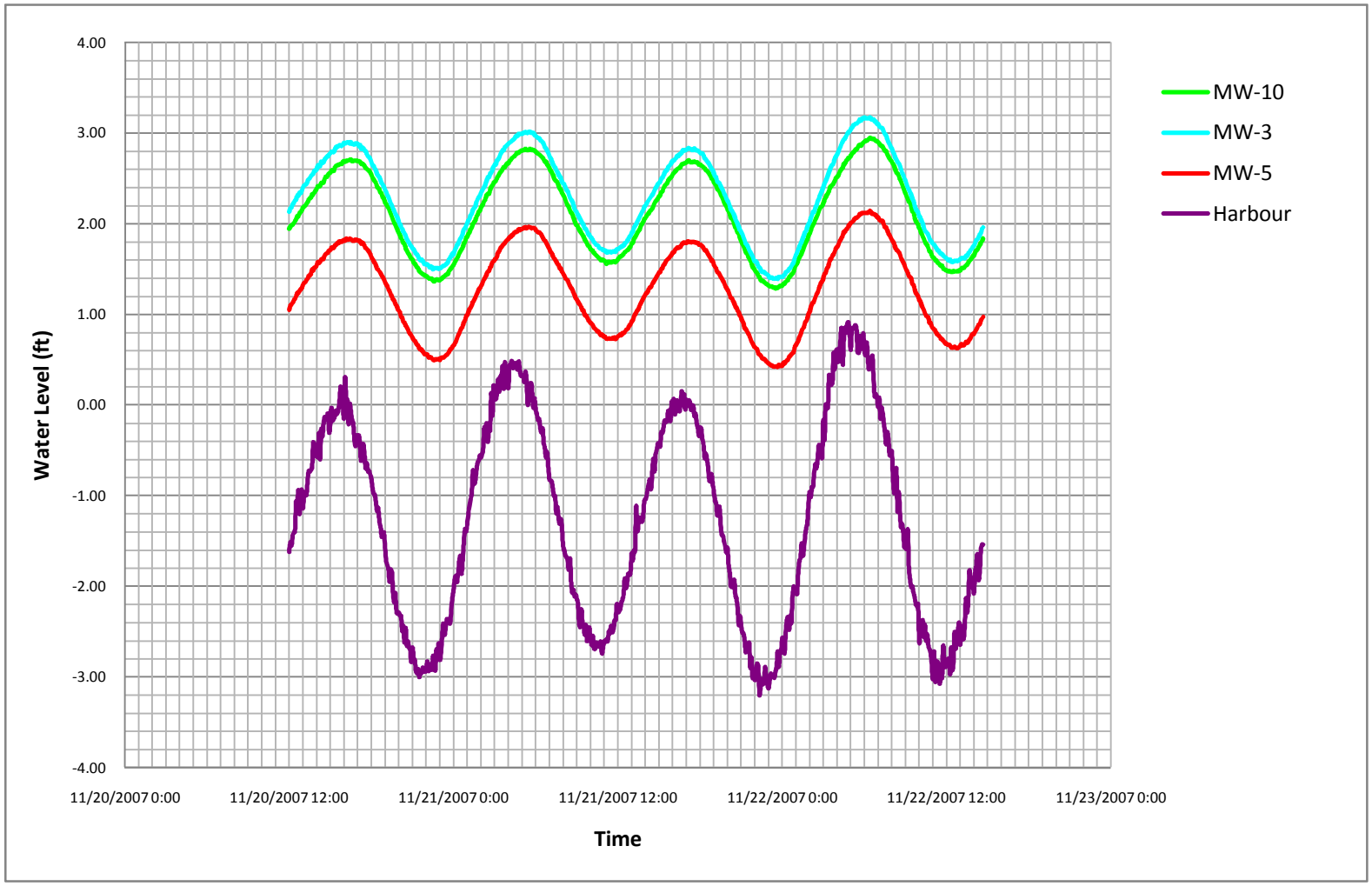
Graph 1
Barometric Pressure During Tidal Tests
Water Resources Assessment
Area 4 Environmental Impact Assessment
Bahama Rock Ltd.
Grand Bahama, Bahamas



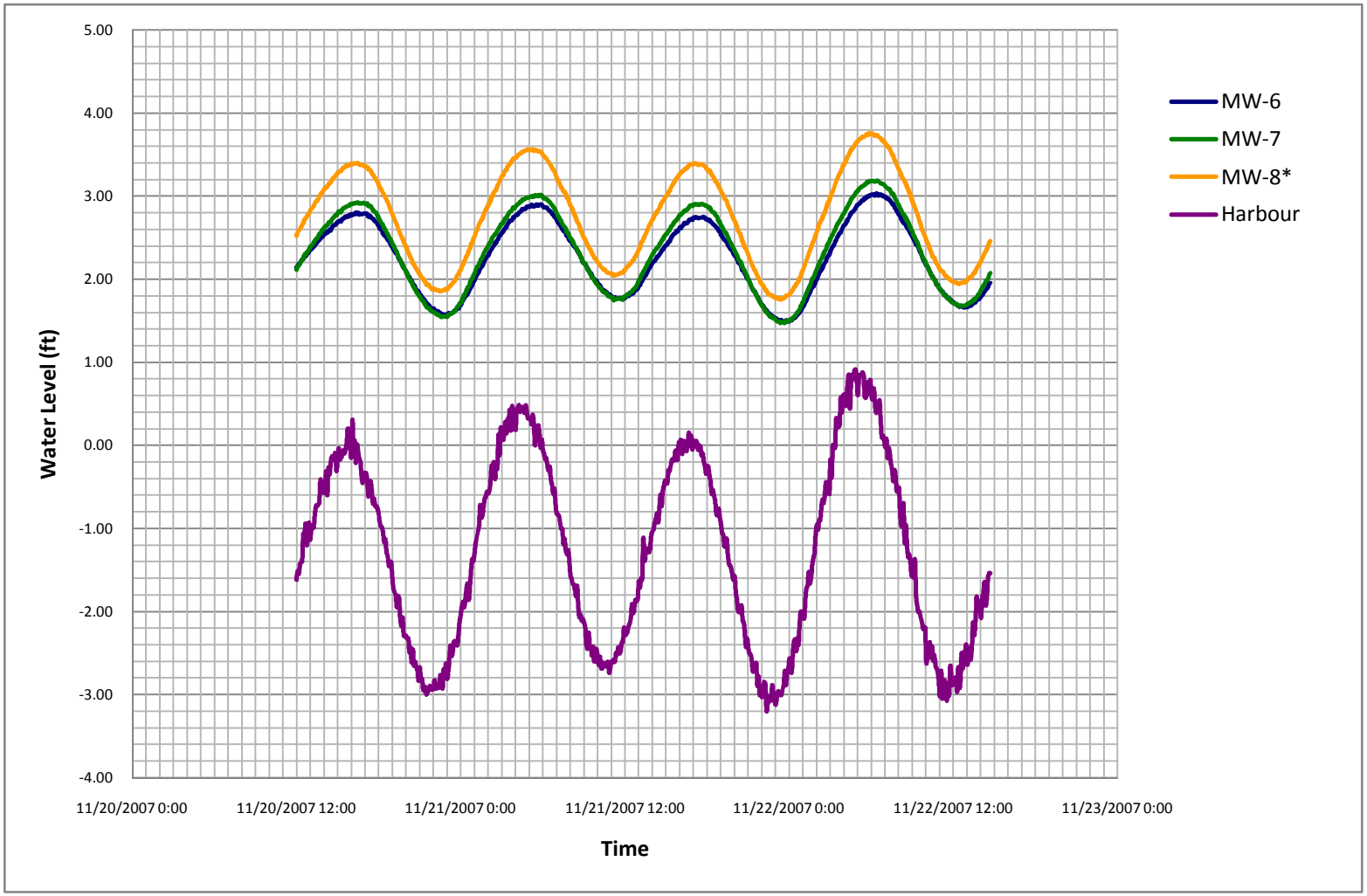
Graph 2
Water Levels During Tidal Cycles
MW-1, MW-2, MW-4, and Harbour
Water Resources Assessment
Area 4 Environmental Impact Assessment
Bahama Rock Ltd.
Grand Bahama, Bahamas



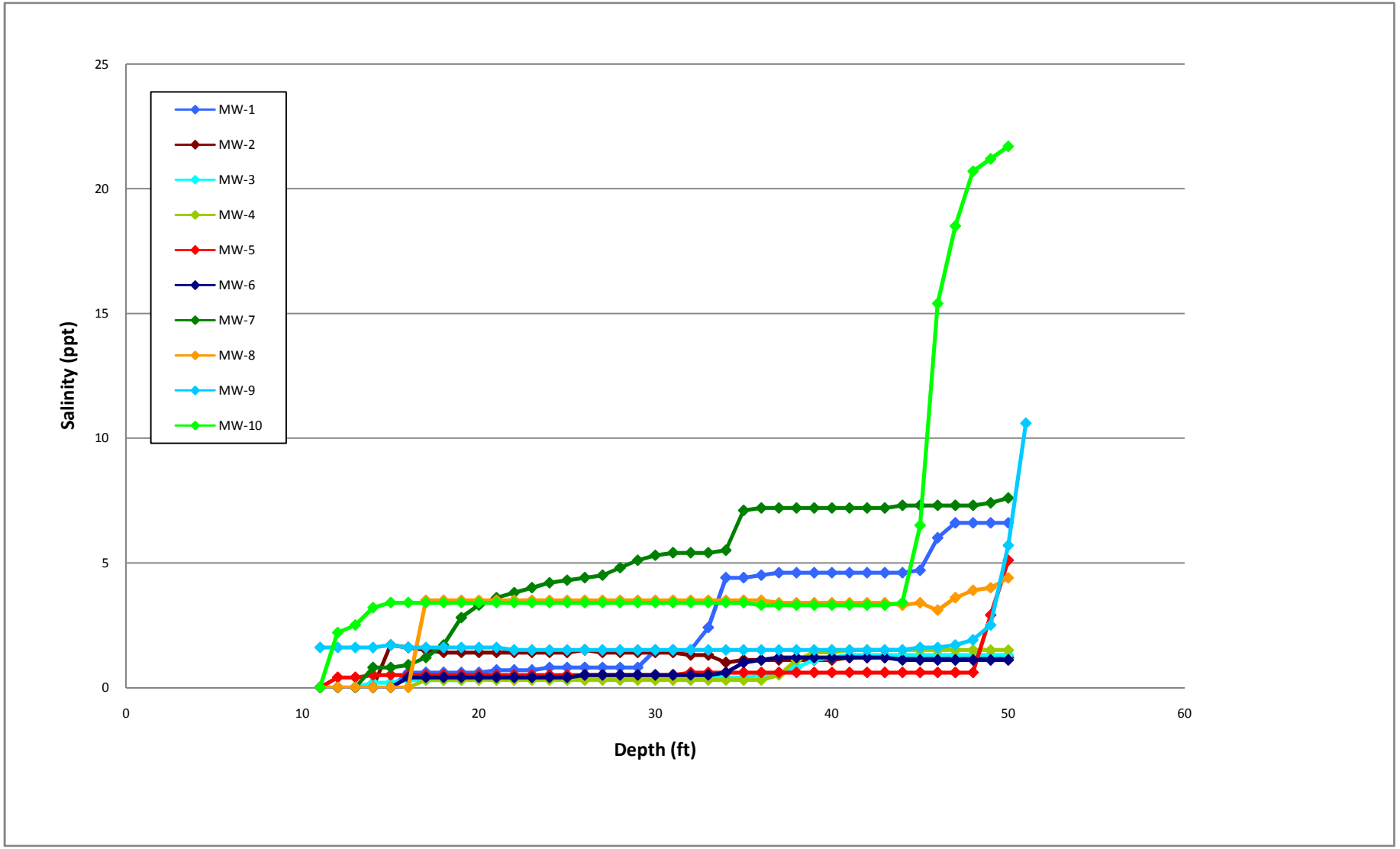
Graph 3
Water Levels During Tidal Cycles
MW-3, MW-5, MW-10, and Harbour
Water Resources Assessment
Area 4 Environmental Impact Assessment
Bahama Rock Ltd.
Grand Bahama, Bahamas



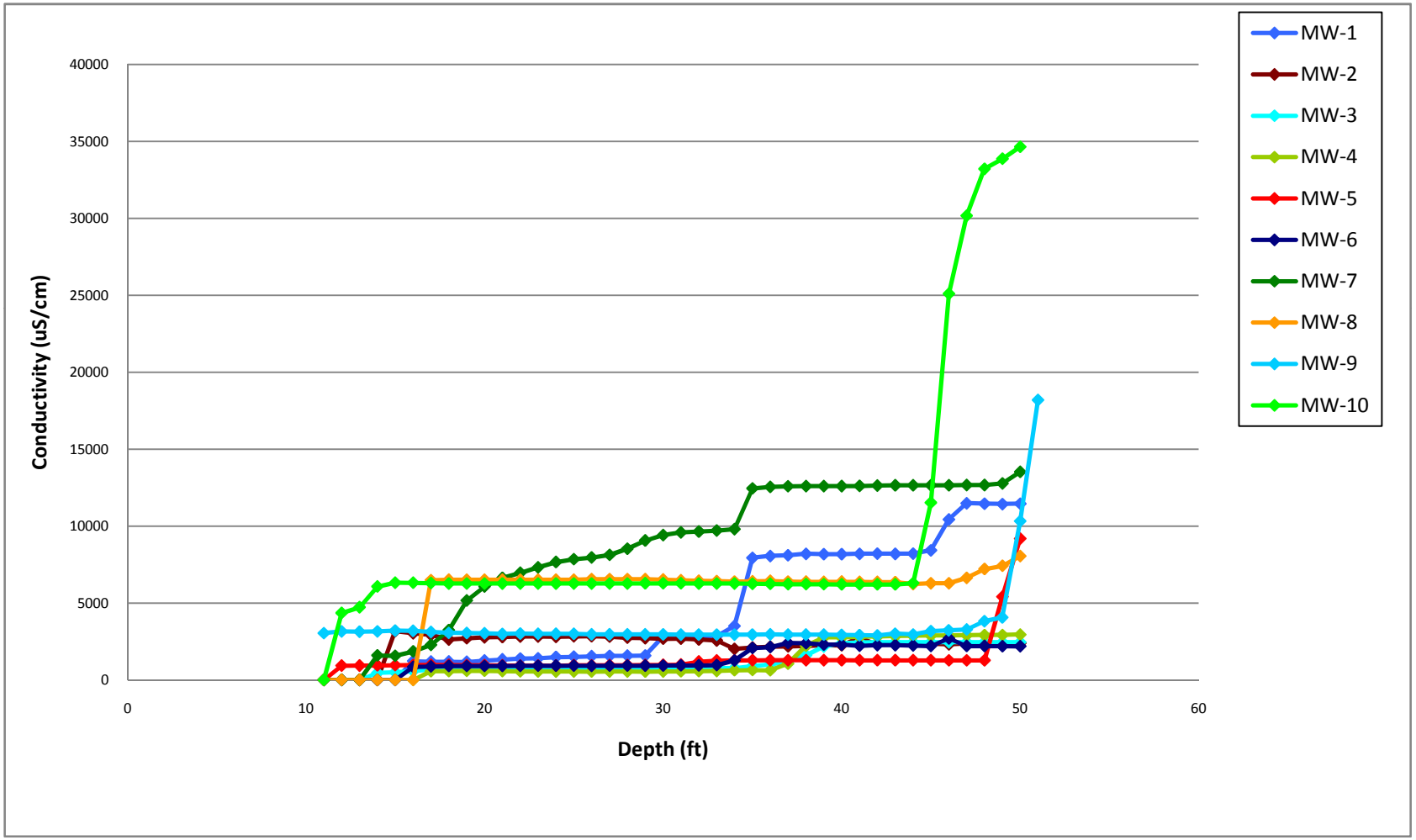
Graph 4
Water Levels During Tidal Cycles
MW-6, MW-7, MW-8, and Harbour
Water Resources Assessment
Area 4 Environmental Impact Assessment
Bahama Rock Ltd.
Grand Bahama, Bahamas



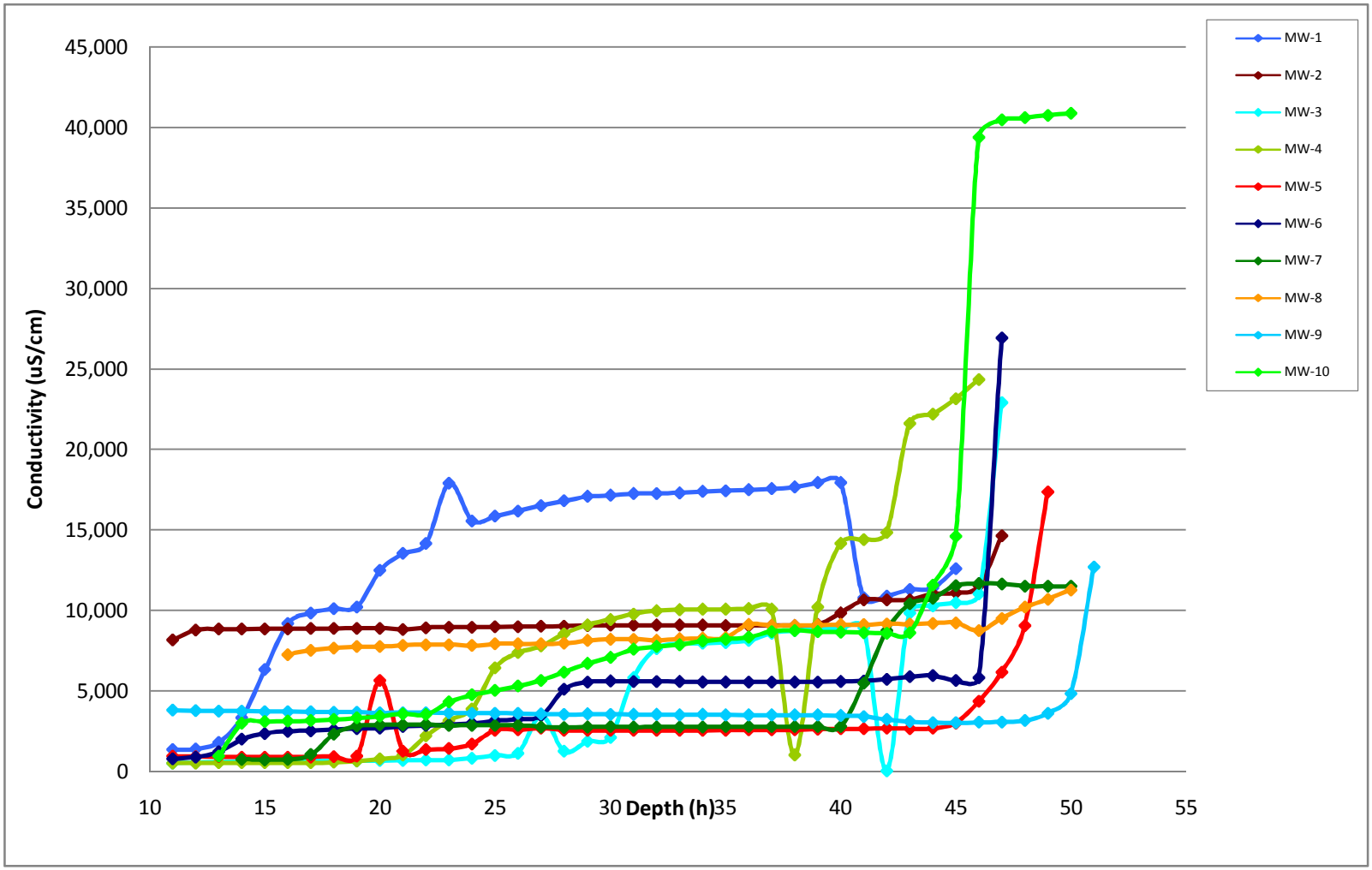
Graph 5
Summary of Salinity Measurements in Groundwater
November 6 - 13, 2007
Water Resources Assessment
Area 4 Environmental Impact Assessment
Bahama Rock, Ltd.
Grand Bahama, Bahamas



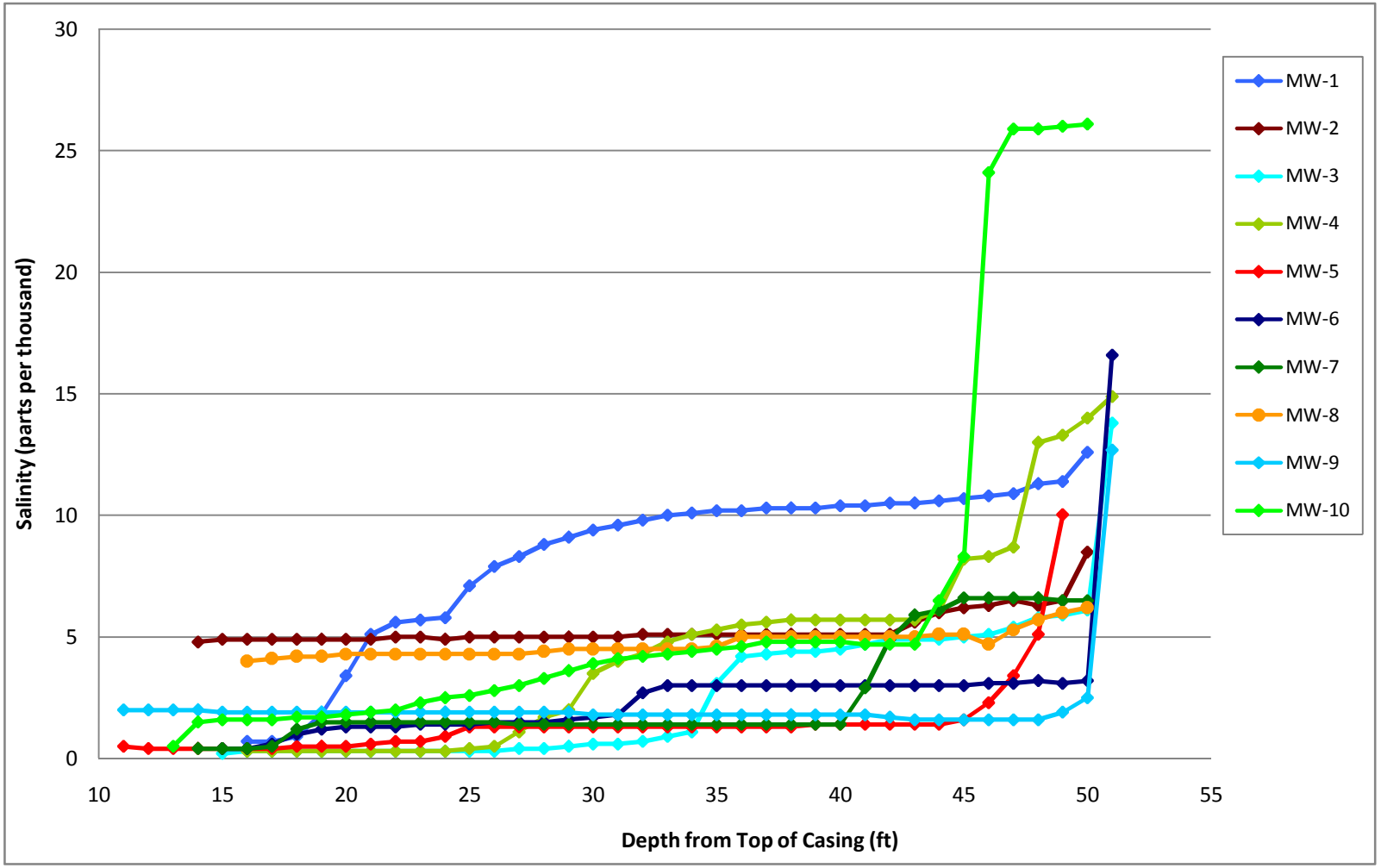
Graph 6
Summary of Conductivity Measurements in Groundwater
November 6 - 13, 2007
Water Resources Assessment
Area 4 Environmental Impact Assessment
Bahama Rock, Ltd.
Grand Bahama, Bahamas



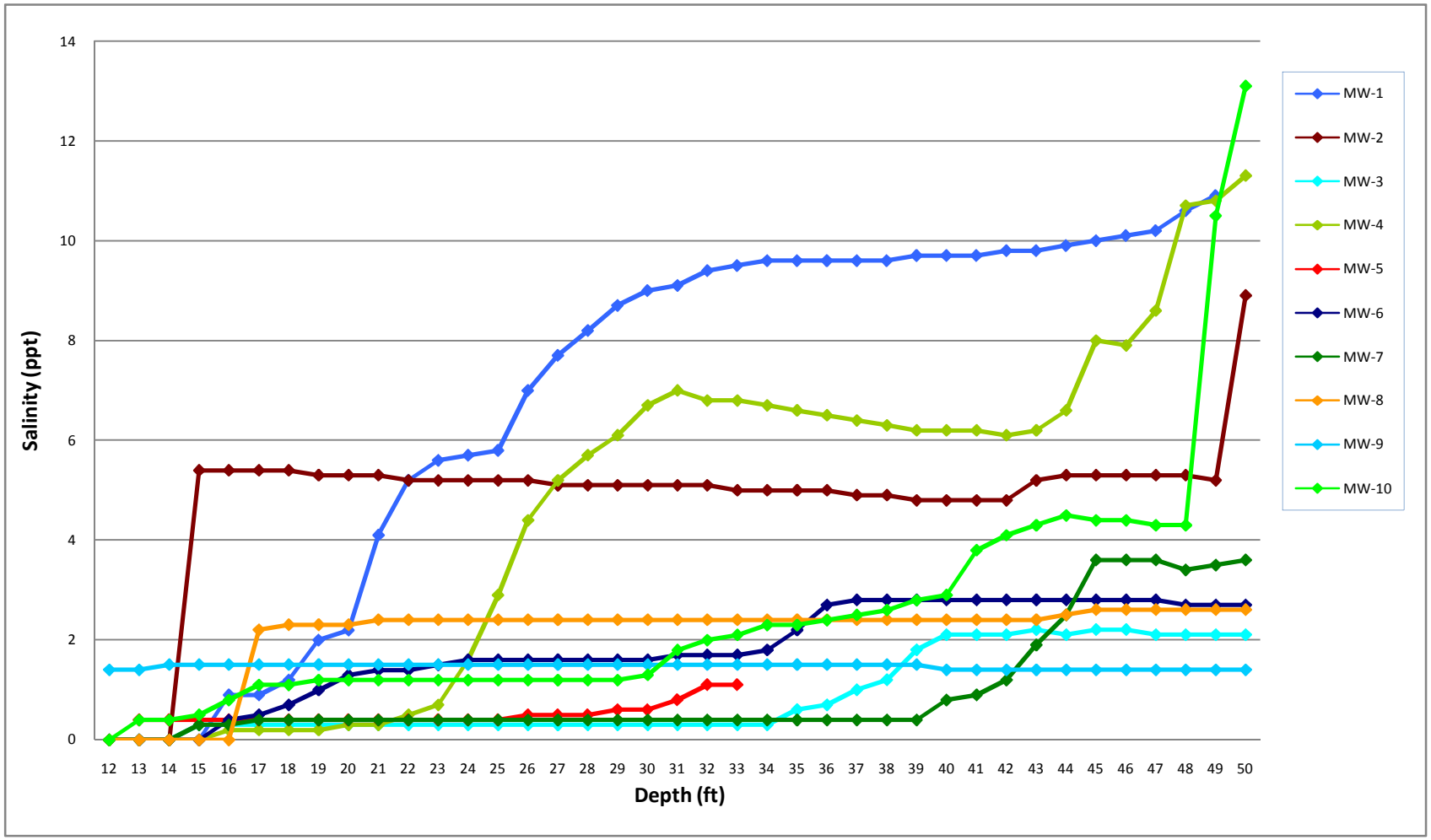
Graph 7
Summary of Conductivity Measurements in Groundwater - December 10-14, 2007
Water Resources Assessment
Area 4 Environmental Impact Assessment
Bahama Rock Ltd.
Grand Bahama, Bahamas



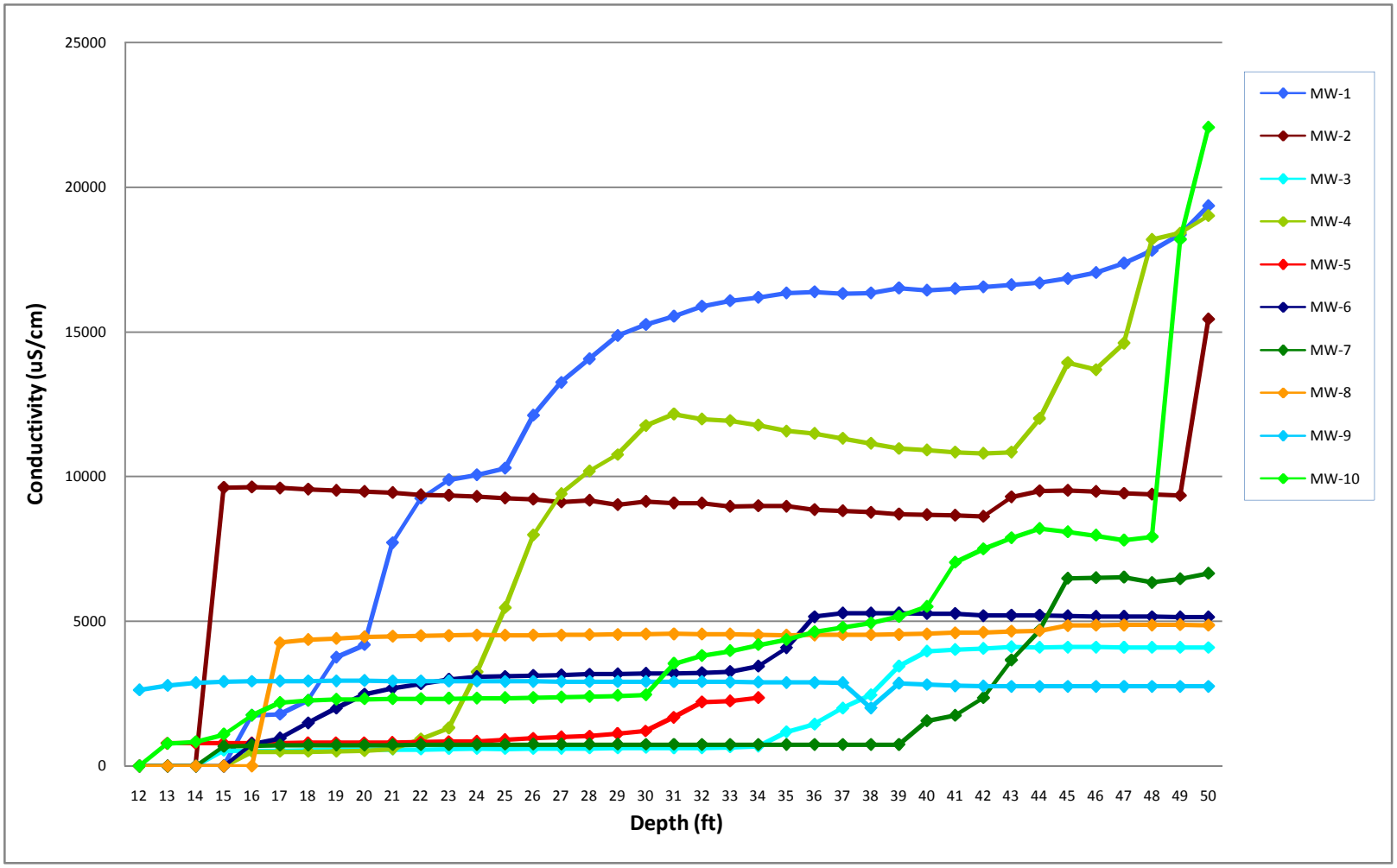
Graph 8
Summary of Salinity Measurements in Groundwater - December 14-17, 2007
Water Resources Assessment
Area 4 Environmental Impact Assessment
Bahama Rock Ltd.
Grand Bahama, Bahamas



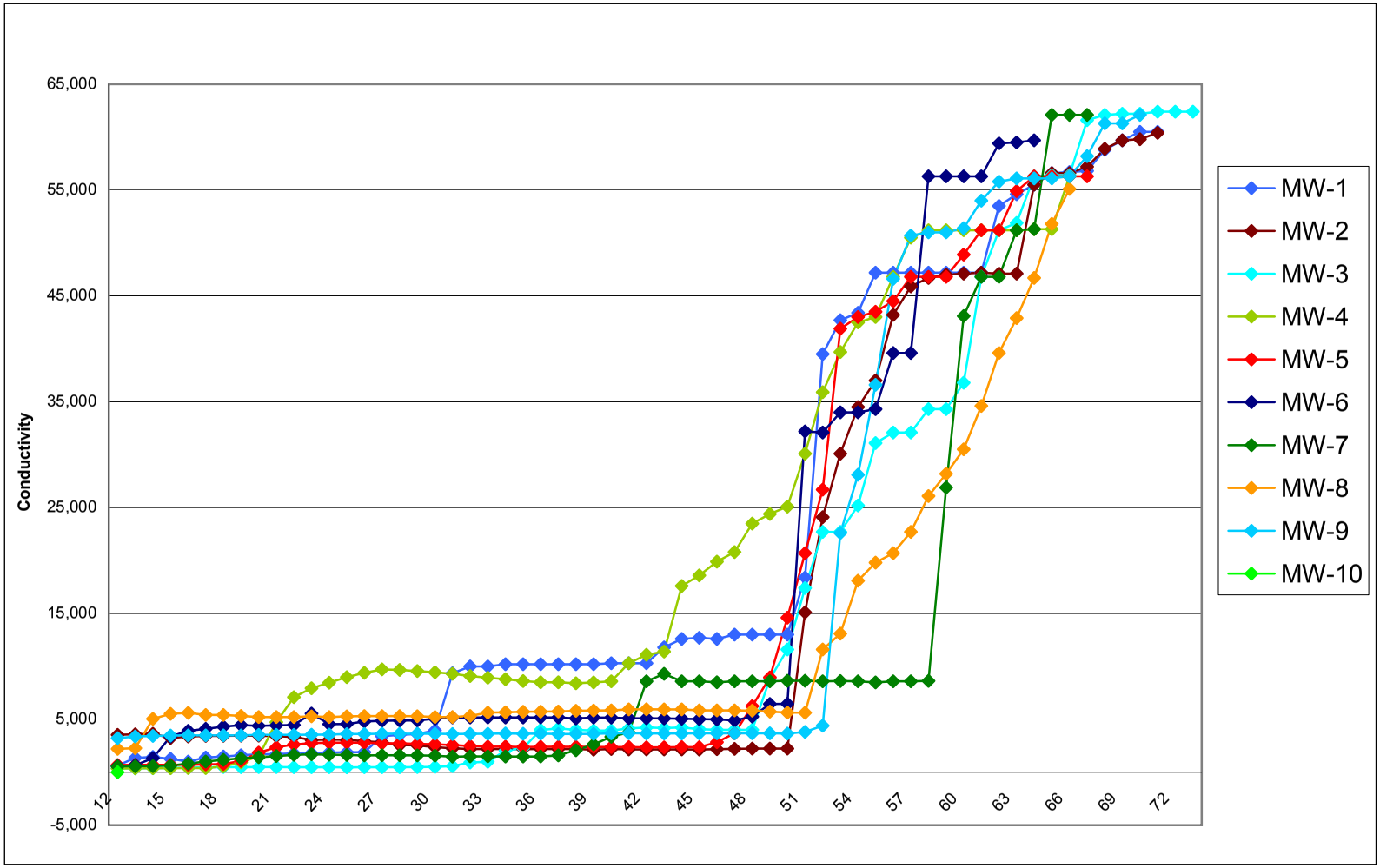
Graph 9
Summary of Salinity Measurements in Groundwater - February 19-20, 2008
Water Resources Assessment
Area 4 Environmental Impact Assessment
Bahama Rock Ltd.
Grand Bahama, Bahamas



Graph 10
Summary of Conductivity Measurements in Groundwater - February 19-20, 2008
Water Resources Assessment
Area 4 Environmental Impact Assessment
Bahama Rock Ltd.
Grand Bahama, Bahamas



Graph 11
Conductivity Values vs Depth - December 6-10, 2007
Water Resources Assessment
Area 4 Environmental Impact Assessment
Bahama Rock Ltd.
Grand Bahama, Bahamas



APPENDICES

APPENDIX A – WATER QUALITY RESULTS – BAHAMA ROCK LTD.

A & S LABORATORIES INCORPORATED

2550 SUCCESS DRIVE, ODESSA, FLORIDA 33556 (727) 375-0388

TEST REPORT

Customer:	Bahama Rock
Attention:	Vernal Philippe
A & S Sample Number:	333206
Date Sampled:	N/A
Date Tested:	1/26/07
Reference:	Area 4A First Trench Sample 1
Plant Location:	N/A

The results of tests performed in accordance with Standard Methods for the Examination of Water and Wastewater are as follows:

Parameter	Specification Limits	Results	Method
pH	N/A	8.71	SM 4500 H
Chlorides as Cl	N/A	334 mg/L	SM 4500Cl
Turbidity	N/A	0.91 NTU	SM 2130B
Specific Conductance	N/A	19,320 umhos/cm	SM 2510B

Very truly yours,

Gregory P. Allen
Laboratory Director

A & S LABORATORIES INCORPORATED

2550 SUCCESS DRIVE, ODESSA, FLORIDA 33556 (727) 375-0388

TEST REPORT

Customer:	Bahama Rock
Attention:	Vernal Philippe
A & S Sample Number:	333207
Date Sampled:	N/A
Date Tested:	1/26/07
Reference:	Area 4B 2nd Trench
Plant Location:	N/A

The results of tests performed in accordance with Standard Methods for the Examination of Water and Wastewater are as follows:

Parameter	Specification Limits	Results	Method
pH	N/A	8.74	SM 4500 H
Chlorides as Cl	N/A	126 mg/L	SM 4500Cl
Turbidity	N/A	1.2 NTU	SM 2130B
Specific Conductance	N/A	17,610 umhos/cm	SM 2510B

Very truly yours,

Gregory P. Allen
Laboratory Director

A & S LABORATORIES INCORPORATED

2550 SUCCESS DRIVE, ODESSA, FLORIDA 33556 (727) 375-0388

TEST REPORT

Customer:	Bahama Rock
Attention:	Vernal Philippe
A & S Sample Number:	333208
Date Sampled:	N/A
Date Tested:	1/26/07
Reference:	Basin Basin 3 (West Channel)
Plant Location:	N/A

The results of tests performed in accordance with Standard Methods for the Examination of Water and Wastewater are as follows:

Parameter	Specification Limits	Results	Method
pH	N/A	8.54	SM 4500 H
Chlorides as Cl	N/A	24,961 mg/L	SM 4500Cl
Turbidity	N/A	1.2 NTU	SM 2130B
Specific Conductance	N/A	67,800 umhos/cm	SM 2510B

Very truly yours,

Gregory P. Allen
Laboratory Director

A & S LABORATORIES INCORPORATED

2550 SUCCESS DRIVE, ODESSA, FLORIDA 33556 (727) 375-0388

TEST REPORT

Customer:	Bahama Rock
Attention:	Vernal Philippe
A & S Sample Number:	333209
Date Sampled:	N/A
Date Tested:	1/26/07
Reference:	1450 Area 3 Excavation Sample 1
Plant Location:	N/A

The results of tests performed in accordance with Standard Methods for the Examination of Water and Wastewater are as follows:

Parameter	Specification Limits	Results	Method
pH	N/A	8.62	SM 4500 H
Chlorides as Cl	N/A	15,923 mg/L	SM 4500Cl
Turbidity	N/A	1.0 NTU	SM 2130B
Specific Conductance	N/A	54,700 umhos/cm	SM 2510B

Very truly yours,

Gregory P. Allen
Laboratory Director

A & S LABORATORIES INCORPORATED

2550 SUCCESS DRIVE, ODESSA, FLORIDA 33556 (727) 375-0388

TEST REPORT

Customer:	Bahama Rock
Attention:	Vernal Philippe
A & S Sample Number:	333230
Date Sampled:	N/A
Date Tested:	4/20/07
Reference:	Area 3B TRENCH SOUTH SIDE OF AREA 3
Plant Location:	N/A

The results of tests performed in accordance with Standard Methods for the Examination of Water and Wastewater are as follows:

Parameter	Specification Limits	Results	Method
pH	N/A	6.75	SM 4500 H
Chlorides as Cl	N/A	693 mg/L	SM 4500Cl
Turbidity	N/A	1.9 NTU	SM 2130B
Specific Conductance	N/A	806 umhos/cm	SM 2510B

Very truly yours,

Gregory P. Allen
Laboratory Director

A & S LABORATORIES INCORPORATED

2550 SUCCESS DRIVE, ODESSA, FLORIDA 33556 (727) 375-0388

TEST REPORT

Customer:	Bahama Rock
Attention:	Vernal Philippe
A & S Sample Number:	333231
Date Sampled:	N/A
Date Tested:	4/20/07
Reference:	Area 4A First Trench Sample 2
Plant Location:	N/A

The results of tests performed in accordance with Standard Methods for the Examination of Water and Wastewater are as follows:

Parameter	Specification Limits	Results	Method
pH	N/A	6.98	SM 4500 H
Chlorides as Cl	N/A	411 mg/L	SM 4500Cl
Turbidity	N/A	0.4 NTU	SM 2130B
Specific Conductance	N/A	1,683 umhos/cm	SM 2510B

Very truly yours,

Gregory P. Allen
Laboratory Director

A & S LABORATORIES INCORPORATED

2550 SUCCESS DRIVE, ODESSA, FLORIDA 33556 (727) 375-0388

TEST REPORT

Customer:	Bahama Rock
Attention:	Vernal Philippe
A & S Sample Number:	333233
Date Sampled:	N/A
Date Tested:	4/20/07
Reference:	Fresh Water POND SOUTH OF PLANT
Plant Location:	N/A

The results of tests performed in accordance with Standard Methods for the Examination of Water and Wastewater are as follows:

Parameter	Specification Limits	Results	Method
pH	N/A	6.75	SM 4500 H
Chlorides as Cl	N/A	17,740 mg/L	SM 4500Cl
Turbidity	N/A	6.0 NTU	SM 2130B
Specific Conductance	N/A	51,300 umhos/cm	SM 2510B

Very truly yours,

Gregory P. Allen
Laboratory Director

A & S LABORATORIES INCORPORATED

2550 SUCCESS DRIVE, ODESSA, FLORIDA 33556 (727) 375-0388

TEST REPORT

Customer:	Bahama Rock
Attention:	Vernal Philippe
A & S Sample Number:	333234
Date Sampled:	N/A
Date Tested:	4/20/07
Reference:	Basin 3 Area 3 Excavation Sample 2
Plant Location:	N/A

The results of tests performed in accordance with Standard Methods for the Examination of Water and Wastewater are as follows:

Parameter	Specification Limits	Results	Method
pH	N/A	6.61	SM 4500 H
Chlorides as Cl	N/A	14,840 mg/L	SM 4500Cl
Turbidity	N/A	0.3 NTU	SM 2130B
Specific Conductance	N/A	55,200 umhos/cm	SM 2510B

Very truly yours,

Gregory P. Allen
Laboratory Director

APPENDIX B – TEST AMERICA WATER QUALITY RESULTS

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

Job Number: 660-19445-1

Job Description: Bahama Rock

For:
Envirologic International LTD.
4631 NW 31st Avenue
#317334
Ft. Lauderdale, FL 33309

Attention: Mr. Lloyd Cheong

Nancy Robertson
Project Manager II
nancy.robertson@testamericainc.com
11/30/2007

Methods: FDEP, DOH Certification #: E84282, E87052. These test results meet all the requirements of NELAC. All questions regarding this test report should be directed to the TestAmerica Project Manager who signed this test report. The estimated uncertainty associated with these reported results is available upon request.

EXECUTIVE SUMMARY - Detections

Client: Envirologic International LTD. Job Number: 660-19445-1

Lab Sample ID / Analyte	Client Sample ID	Result / Qualifier		Reporting Limit	Units	Method
660-19445-1	**MW-4**					
Benzene		1.1		1.0	ug/L	8260B
Naphthalene		3.7	I	5.0	ug/L	8260B
TKN		0.28	V	0.20	mg/L	351.2
pH		6.70	Q		SU	SM 4500 H+ B
Chloride		60		5.0	mg/L	SM4500 Cl-E
Nitrogen, Total		0.28		0.050	mg/L	Total Nitrogen
Total Recoverable						
Barium		0.0079	I	0.010	mg/L	6010B
Iron		0.027	I	0.050	mg/L	6010B
Potassium		1.0		1.0	mg/L	6010B
Magnesium		4.3		0.50	mg/L	6010B
Sodium		38		0.50	mg/L	6010B
660-19445-2	**MW-5**					
Benzene		0.61	I	1.0	ug/L	8260B
Bis(2-ethylhexyl) phthalate		3.2	I	6.0	ug/L	8270C
TKN		0.26	V	0.20	mg/L	351.2
Nitrate Nitrite as N		0.26	I	0.50	mg/L	353.2
pH		6.86	Q		SU	SM 4500 H+ B
Chloride		120		100	mg/L	SM4500 Cl-E
Nitrogen, Total		0.52		0.050	mg/L	Total Nitrogen
Total Recoverable						
Barium		0.010		0.010	mg/L	6010B
Iron		0.061		0.050	mg/L	6010B
Potassium		1.3		1.0	mg/L	6010B
Magnesium		3.8		0.50	mg/L	6010B
Sodium		62		0.50	mg/L	6010B
660-19445-3	**MW-6**					
Bis(2-ethylhexyl) phthalate		3.8	I	6.0	ug/L	8270C
TKN		0.30	V	0.20	mg/L	351.2
Nitrate Nitrite as N		0.20	I	0.50	mg/L	353.2
pH		7.01	Q		SU	SM 4500 H+ B
Chloride		330		100	mg/L	SM4500 Cl-E
Nitrogen, Total		0.50		0.050	mg/L	Total Nitrogen
Total Recoverable						
Barium		0.0060	I	0.010	mg/L	6010B
Iron		0.035	I	0.050	mg/L	6010B
Potassium		6.0		1.0	mg/L	6010B
Magnesium		14		0.50	mg/L	6010B
Sodium		130		5.0	mg/L	6010B

METHOD SUMMARY

Client: Envirologic International LTD. Job Number: 660-19445-1

Description	Lab Location	Method	Preparation Method
Matrix Water			
Volatile Organic Compounds by GC/MS	TAL TAM	SW846 8260B	
Purge-and-Trap	TAL TAM		SW846 5030B
Semivolatile Compounds by Gas Chromatogr	TAL TAM	SW846 8270C	
Continuous Liquid-Liquid Extraction	TAL TAM		SW846 3520C
Inductively Coupled Plasma - Atomic Emission Spectrometry	TAL TAM	SW846 6010B	
Acid Digestion of Waters for Total Recoverable or	TAL TAM		SW846 3005A
Mercury in Liquid Waste (Manual Cold Vapor Technique)	TAL TAM	SW846 7470A	
Mercury in Liquid Waste (Manual Cold Vapor	TAL TAM		SW846 7470A
Nitrogen, Total Kjeldahl (Colorimetric, Semi-Automated Block Digester, AAII)	TAL MOB	MCAWW 351.2	
Nitrogen, Total Kjeldahl (Colorimetric, Semi-Automated	TAL MOB		MCAWW 351.2
Nitrate-Nitrite	TAL TAM	EPA 353.2	
Nitrogen, Nitrate-Nitrite (Colorimetric, Automated,	TAL TAM		MCAWW 353.2
pH	TAL TAM	SM19 SM 4500 H+ B	
Chloride	TAL TAM	SM21 SM4500 Cl-E	
Total Nitrogen	TAL TAM	EPA Total Nitrogen	

Lab References:

TAL MOB = TestAmerica Mobile

TAL TAM = TestAmerica Tampa

Method References:

EPA = US Environmental Protection Agency

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

SM19 = "Standard Methods For The Examination Of Water And Wastewater", 19Th Edition, 1995."

SM21 = Standard Methods For The Examination Of Water And Wastewater, 21st Edition

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

METHOD / ANALYST SUMMARY

Client: Envirologic International LTD. Job Number: 660-19445-1

Method	Analyst	Analyst ID
SW846 8260B	Davidson, Sean	SD
SW846 8270C	Bradley, Butch	BB
SW846 6010B	Fox, Greg	GF
SW846 7470A	Donathan, Mike	MD
MCAWW 351.2	Flanagan, Mike	MF
EPA 353.2	Steward, Tiffany	TS
SM19 SM 4500 H+ B	Kelly, Crystal	KC
SM21 SM4500 Cl-E	Ramos, Salvador	SR
EPA Total Nitrogen	Phan, Qui	QP

SAMPLE SUMMARY

Client: Envirologic International LTD. Job Number: 660-19445-1

Lab Sample ID	Client Sample ID	Client Matrix	Date/Time Sampled	Date/Time Received
660-19445-1	MW-4	Water	11/12/2007 1450	11/13/2007 0930
660-19445-2	MW-5	Water	11/12/2007 1410	11/13/2007 0930
660-19445-3	MW-6	Water	11/12/2007 1320	11/13/2007 0930
660-19445-4	Trip Blank	Water	11/12/2007 0000	11/13/2007 0930

Client: Envirologic International LTD. Job Number: 660-19445-1

Client Sample ID: MW-4

Lab Sample ID: 660-19445-1 Date Sampled: 11/12/2007 1450
Client Matrix: Water Date Received: 11/13/2007 0930

8260B Volatile Organic Compounds by GC/MS

Method: 8260B Analysis Batch: 660-53647 Instrument ID: BVMG GC/MS
Preparation: 5030B Lab File ID: 1GK1824.D
Dilution: 1.0 Initial Weight/Volume: 5 mL
Date Analyzed: 11/19/2007 0027 Final Weight/Volume: 5 mL
Date Prepared: 11/19/2007 0027

Analyte	Result (ug/L)	Qualifier	MDL	PQL
Acetone	9.9	U	9.9	20
Benzene	1.1		0.50	1.0
Bromobenzene	0.58	U	0.58	1.0
Bromoform	0.58	U	0.58	1.0
Bromomethane	2.5	U	2.5	5.0
Carbon disulfide	0.85	U	0.85	1.0
Carbon tetrachloride	0.42	U	0.42	1.0
Chlorobenzene	0.63	U	0.63	1.0
Chlorobromomethane	0.58	U	0.58	1.0
Chlorodibromomethane	0.34	U	0.34	1.0
Chloroethane	2.5	U	2.5	5.0
Chloroform	0.90	U	0.90	1.0
Chloromethane	1.0	U	1.0	4.0
2-Chlorotoluene	0.65	U	0.65	1.0
4-Chlorotoluene	0.52	U	0.52	1.0
cis-1,2-Dichloroethene	0.65	U	0.65	1.0
cis-1,3-Dichloropropene	0.14	U	0.14	1.0
1,2-Dibromo-3-Chloropropane	2.5	U	2.5	5.0
Dibromomethane	0.41	U	0.41	1.0
1,3-Dichlorobenzene	0.64	U	0.64	1.0
1,4-Dichlorobenzene	0.52	U	0.52	1.0
Dichlorobromomethane	0.35	U	0.35	1.0
Dichlorodifluoromethane	2.5	U	2.5	5.0
1,1-Dichloroethane	0.52	U	0.52	1.0
1,2-Dichloroethane	0.57	U	0.57	1.0
1,1-Dichloroethene	0.45	U	0.45	1.0
1,2-Dichloropropane	0.52	U	0.52	1.0
1,3-Dichloropropane	0.39	U	0.39	1.0
2,2-Dichloropropane	0.36	U	0.36	1.0
1,1-Dichloropropene	0.31	U	0.31	1.0
Ethylbenzene	0.44	U	0.44	1.0
Ethylene Dibromide	0.50	U	0.50	1.0
Hexachlorobutadiene	0.40	U	0.40	1.0
2-Hexanone	4.4	U	4.4	10
Isopropylbenzene	0.19	U	0.19	1.0
4-Isopropyltoluene	0.69	U	0.69	1.0
Methylene Chloride	4.0	U	4.0	5.0
2-Butanone (MEK)	8.4	U	8.4	10
4-Methyl-2-pentanone (MIBK)	3.8	U	3.8	10
Methyl tert-butyl ether	0.44	U	0.44	1.0
m-Xylene & p-Xylene	0.60	U	0.60	2.0
Naphthalene	3.7	I	2.5	5.0
n-Butylbenzene	0.67	U	0.67	1.0
N-Propylbenzene	0.59	U	0.59	1.0

Client: Envirologic International LTD. Job Number: 660-19445-1

Client Sample ID: MW-4

Lab Sample ID: 660-19445-1 Date Sampled: 11/12/2007 1450
Client Matrix: Water Date Received: 11/13/2007 0930

8260B Volatile Organic Compounds by GC/MS

Method: 8260B Analysis Batch: 660-53647 Instrument ID: BVMG GC/MS
Preparation: 5030B Lab File ID: 1GK1824.D
Dilution: 1.0 Initial Weight/Volume: 5 mL
Date Analyzed: 11/19/2007 0027 Final Weight/Volume: 5 mL
Date Prepared: 11/19/2007 0027

Analyte	Result (ug/L)	Qualifier	MDL	PQL
o-Xylene	0.50	U	0.50	1.0
sec-Butylbenzene	0.63	U	0.63	1.0
Styrene	0.98	U	0.98	2.0
tert-Butylbenzene	0.84	U	0.84	1.0
1,1,1,2-Tetrachloroethane	0.63	U	0.63	1.0
1,1,2,2-Tetrachloroethane	0.15	U	0.15	1.0
Tetrachloroethene	0.50	U	0.50	1.0
Toluene	0.51	U	0.51	1.0
trans-1,2-Dichloroethene	0.44	U	0.44	1.0
trans-1,3-Dichloropropene	0.14	U	0.14	1.0
1,2,3-Trichlorobenzene	0.77	U	0.77	1.0
1,2,4-Trichlorobenzene	0.58	U	0.58	1.0
1,1,1-Trichloroethane	0.46	U	0.46	1.0
1,1,2-Trichloroethane	0.47	U	0.47	1.0
Trichloroethene	0.50	U	0.50	1.0
Trichlorofluoromethane	2.5	U	2.5	5.0
1,2,3-Trichloropropane	0.18	U	0.18	1.0
1,2,4-Trimethylbenzene	0.86	U	0.86	1.0
1,3,5-Trimethylbenzene	0.54	U	0.54	1.0
Vinyl chloride	0.50	U	0.50	1.0
1,2-Dichlorobenzene	0.44	U	0.44	1.0

Surrogate	%Rec	Acceptance Limits
4-Bromofluorobenzene	79	74 - 126
Dibromofluoromethane	90	70 - 130
Toluene-d8 (Surr)	89	77 - 122

Client: Envirologic International LTD. Job Number: 660-19445-1

Client Sample ID: MW-5

Lab Sample ID: 660-19445-2 Date Sampled: 11/12/2007 1410
Client Matrix: Water Date Received: 11/13/2007 0930

8260B Volatile Organic Compounds by GC/MS

Method: 8260B Analysis Batch: 660-53647 Instrument ID: BVMG GC/MS
Preparation: 5030B Lab File ID: 1GK1825.D
Dilution: 1.0 Initial Weight/Volume: 5 mL
Date Analyzed: 11/19/2007 0052 Final Weight/Volume: 5 mL
Date Prepared: 11/19/2007 0052

Analyte	Result (ug/L)	Qualifier	MDL	PQL
Acetone	9.9	U	9.9	20
Benzene	0.61	I	0.50	1.0
Bromobenzene	0.58	U	0.58	1.0
Bromoform	0.58	U	0.58	1.0
Bromomethane	2.5	U	2.5	5.0
Carbon disulfide	0.85	U	0.85	1.0
Carbon tetrachloride	0.42	U	0.42	1.0
Chlorobenzene	0.63	U	0.63	1.0
Chlorobromomethane	0.58	U	0.58	1.0
Chlorodibromomethane	0.34	U	0.34	1.0
Chloroethane	2.5	U	2.5	5.0
Chloroform	0.90	U	0.90	1.0
Chloromethane	1.0	U	1.0	4.0
2-Chlorotoluene	0.65	U	0.65	1.0
4-Chlorotoluene	0.52	U	0.52	1.0
cis-1,2-Dichloroethene	0.65	U	0.65	1.0
cis-1,3-Dichloropropene	0.14	U	0.14	1.0
1,2-Dibromo-3-Chloropropane	2.5	U	2.5	5.0
Dibromomethane	0.41	U	0.41	1.0
1,3-Dichlorobenzene	0.64	U	0.64	1.0
1,4-Dichlorobenzene	0.52	U	0.52	1.0
Dichlorobromomethane	0.35	U	0.35	1.0
Dichlorodifluoromethane	2.5	U	2.5	5.0
1,1-Dichloroethane	0.52	U	0.52	1.0
1,2-Dichloroethane	0.57	U	0.57	1.0
1,1-Dichloroethene	0.45	U	0.45	1.0
1,2-Dichloropropane	0.52	U	0.52	1.0
1,3-Dichloropropane	0.39	U	0.39	1.0
2,2-Dichloropropane	0.36	U	0.36	1.0
1,1-Dichloropropene	0.31	U	0.31	1.0
Ethylbenzene	0.44	U	0.44	1.0
Ethylene Dibromide	0.50	U	0.50	1.0
Hexachlorobutadiene	0.40	U	0.40	1.0
2-Hexanone	4.4	U	4.4	10
Isopropylbenzene	0.19	U	0.19	1.0
4-Isopropyltoluene	0.69	U	0.69	1.0
Methylene Chloride	4.0	U	4.0	5.0
2-Butanone (MEK)	8.4	U	8.4	10
4-Methyl-2-pentanone (MIBK)	3.8	U	3.8	10
Methyl tert-butyl ether	0.44	U	0.44	1.0
m-Xylene & p-Xylene	0.60	U	0.60	2.0
Naphthalene	2.5	U	2.5	5.0
n-Butylbenzene	0.67	U	0.67	1.0
N-Propylbenzene	0.59	U	0.59	1.0

Client: Envirologic International LTD. Job Number: 660-19445-1

Client Sample ID: MW-5

Lab Sample ID: 660-19445-2 Date Sampled: 11/12/2007 1410
Client Matrix: Water Date Received: 11/13/2007 0930

8260B Volatile Organic Compounds by GC/MS

Method: 8260B Analysis Batch: 660-53647 Instrument ID: BVMG GC/MS
Preparation: 5030B Lab File ID: 1GK1825.D
Dilution: 1.0 Initial Weight/Volume: 5 mL
Date Analyzed: 11/19/2007 0052 Final Weight/Volume: 5 mL
Date Prepared: 11/19/2007 0052

Analyte	Result (ug/L)	Qualifier	MDL	PQL
o-Xylene	0.50	U	0.50	1.0
sec-Butylbenzene	0.63	U	0.63	1.0
Styrene	0.98	U	0.98	2.0
tert-Butylbenzene	0.84	U	0.84	1.0
1,1,1,2-Tetrachloroethane	0.63	U	0.63	1.0
1,1,2,2-Tetrachloroethane	0.15	U	0.15	1.0
Tetrachloroethene	0.50	U	0.50	1.0
Toluene	0.51	U	0.51	1.0
trans-1,2-Dichloroethene	0.44	U	0.44	1.0
trans-1,3-Dichloropropene	0.14	U	0.14	1.0
1,2,3-Trichlorobenzene	0.77	U	0.77	1.0
1,2,4-Trichlorobenzene	0.58	U	0.58	1.0
1,1,1-Trichloroethane	0.46	U	0.46	1.0
1,1,2-Trichloroethane	0.47	U	0.47	1.0
Trichloroethene	0.50	U	0.50	1.0
Trichlorofluoromethane	2.5	U	2.5	5.0
1,2,3-Trichloropropane	0.18	U	0.18	1.0
1,2,4-Trimethylbenzene	0.86	U	0.86	1.0
1,3,5-Trimethylbenzene	0.54	U	0.54	1.0
Vinyl chloride	0.50	U	0.50	1.0
1,2-Dichlorobenzene	0.44	U	0.44	1.0

Surrogate	%Rec	Acceptance Limits
4-Bromofluorobenzene	76	74 - 126
Dibromofluoromethane	93	70 - 130
Toluene-d8 (Surr)	90	77 - 122

Client: Envirologic International LTD. Job Number: 660-19445-1

Client Sample ID: **MW-6**

Lab Sample ID: 660-19445-3 Date Sampled: 11/12/2007 1320
Client Matrix: Water Date Received: 11/13/2007 0930

8260B Volatile Organic Compounds by GC/MS

Method: 8260B Analysis Batch: 660-53647 Instrument ID: BVMG GC/MS
Preparation: 5030B Lab File ID: 1GK1826.D
Dilution: 1.0 Initial Weight/Volume: 5 mL
Date Analyzed: 11/19/2007 0117 Final Weight/Volume: 5 mL
Date Prepared: 11/19/2007 0117

Analyte	Result (ug/L)	Qualifier	MDL	PQL
Acetone	9.9	U	9.9	20
Benzene	0.50	U	0.50	1.0
Bromobenzene	0.58	U	0.58	1.0
Bromoform	0.58	U	0.58	1.0
Bromomethane	2.5	U	2.5	5.0
Carbon disulfide	0.85	U	0.85	1.0
Carbon tetrachloride	0.42	U	0.42	1.0
Chlorobenzene	0.63	U	0.63	1.0
Chlorobromomethane	0.58	U	0.58	1.0
Chlorodibromomethane	0.34	U	0.34	1.0
Chloroethane	2.5	U	2.5	5.0
Chloroform	0.90	U	0.90	1.0
Chloromethane	1.0	U	1.0	4.0
2-Chlorotoluene	0.65	U	0.65	1.0
4-Chlorotoluene	0.52	U	0.52	1.0
cis-1,2-Dichloroethene	0.65	U	0.65	1.0
cis-1,3-Dichloropropene	0.14	U	0.14	1.0
1,2-Dibromo-3-Chloropropane	2.5	U	2.5	5.0
Dibromomethane	0.41	U	0.41	1.0
1,3-Dichlorobenzene	0.64	U	0.64	1.0
1,4-Dichlorobenzene	0.52	U	0.52	1.0
Dichlorobromomethane	0.35	U	0.35	1.0
Dichlorodifluoromethane	2.5	U	2.5	5.0
1,1-Dichloroethane	0.52	U	0.52	1.0
1,2-Dichloroethane	0.57	U	0.57	1.0
1,1-Dichloroethene	0.45	U	0.45	1.0
1,2-Dichloropropane	0.52	U	0.52	1.0
1,3-Dichloropropane	0.39	U	0.39	1.0
2,2-Dichloropropane	0.36	U	0.36	1.0
1,1-Dichloropropene	0.31	U	0.31	1.0
Ethylbenzene	0.44	U	0.44	1.0
Ethylene Dibromide	0.50	U	0.50	1.0
Hexachlorobutadiene	0.40	U	0.40	1.0
2-Hexanone	4.4	U	4.4	10
Isopropylbenzene	0.19	U	0.19	1.0
4-Isopropyltoluene	0.69	U	0.69	1.0
Methylene Chloride	4.0	U	4.0	5.0
2-Butanone (MEK)	8.4	U	8.4	10
4-Methyl-2-pentanone (MIBK)	3.8	U	3.8	10
Methyl tert-butyl ether	0.44	U	0.44	1.0
m-Xylene & p-Xylene	0.60	U	0.60	2.0
Naphthalene	2.5	U	2.5	5.0
n-Butylbenzene	0.67	U	0.67	1.0
N-Propylbenzene	0.59	U	0.59	1.0

Client: Envirologic International LTD. Job Number: 660-19445-1

Client Sample ID: MW-6

Lab Sample ID: 660-19445-3 Date Sampled: 11/12/2007 1320
Client Matrix: Water Date Received: 11/13/2007 0930

8260B Volatile Organic Compounds by GC/MS

Method: 8260B Analysis Batch: 660-53647 Instrument ID: BVMG GC/MS
Preparation: 5030B Lab File ID: 1GK1826.D
Dilution: 1.0 Initial Weight/Volume: 5 mL
Date Analyzed: 11/19/2007 0117 Final Weight/Volume: 5 mL
Date Prepared: 11/19/2007 0117

Analyte	Result (ug/L)	Qualifier	MDL	PQL
o-Xylene	0.50	U	0.50	1.0
sec-Butylbenzene	0.63	U	0.63	1.0
Styrene	0.98	U	0.98	2.0
tert-Butylbenzene	0.84	U	0.84	1.0
1,1,1,2-Tetrachloroethane	0.63	U	0.63	1.0
1,1,2,2-Tetrachloroethane	0.15	U	0.15	1.0
Tetrachloroethene	0.50	U	0.50	1.0
Toluene	0.51	U	0.51	1.0
trans-1,2-Dichloroethene	0.44	U	0.44	1.0
trans-1,3-Dichloropropene	0.14	U	0.14	1.0
1,2,3-Trichlorobenzene	0.77	U	0.77	1.0
1,2,4-Trichlorobenzene	0.58	U	0.58	1.0
1,1,1-Trichloroethane	0.46	U	0.46	1.0
1,1,2-Trichloroethane	0.47	U	0.47	1.0
Trichloroethene	0.50	U	0.50	1.0
Trichlorofluoromethane	2.5	U	2.5	5.0
1,2,3-Trichloropropane	0.18	U	0.18	1.0
1,2,4-Trimethylbenzene	0.86	U	0.86	1.0
1,3,5-Trimethylbenzene	0.54	U	0.54	1.0
Vinyl chloride	0.50	U	0.50	1.0
1,2-Dichlorobenzene	0.44	U	0.44	1.0

Surrogate	%Rec	Acceptance Limits
4-Bromofluorobenzene	79	74 - 126
Dibromofluoromethane	96	70 - 130
Toluene-d8 (Surr)	90	77 - 122

Client: Envirologic International LTD. Job Number: 660-19445-1

Client Sample ID: **Trip Blank**

Lab Sample ID: 660-19445-4 Date Sampled: 11/12/2007 0000
Client Matrix: Water Date Received: 11/13/2007 0930

8260B Volatile Organic Compounds by GC/MS

Method: 8260B Analysis Batch: 660-53647 Instrument ID: BVMG GC/MS
Preparation: 5030B Lab File ID: 1GK1827.D
Dilution: 1.0 Initial Weight/Volume: 5 mL
Date Analyzed: 11/19/2007 0141 Final Weight/Volume: 5 mL
Date Prepared: 11/19/2007 0141

Analyte	Result (ug/L)	Qualifier	MDL	PQL
Acetone	9.9	U	9.9	20
Benzene	0.50	U	0.50	1.0
Bromobenzene	0.58	U	0.58	1.0
Bromoform	0.58	U	0.58	1.0
Bromomethane	2.5	U	2.5	5.0
Carbon disulfide	0.85	U	0.85	1.0
Carbon tetrachloride	0.42	U	0.42	1.0
Chlorobenzene	0.63	U	0.63	1.0
Chlorobromomethane	0.58	U	0.58	1.0
Chlorodibromomethane	0.34	U	0.34	1.0
Chloroethane	2.5	U	2.5	5.0
Chloroform	0.90	U	0.90	1.0
Chloromethane	1.0	U	1.0	4.0
2-Chlorotoluene	0.65	U	0.65	1.0
4-Chlorotoluene	0.52	U	0.52	1.0
cis-1,2-Dichloroethene	0.65	U	0.65	1.0
cis-1,3-Dichloropropene	0.14	U	0.14	1.0
1,2-Dibromo-3-Chloropropane	2.5	U	2.5	5.0
Dibromomethane	0.41	U	0.41	1.0
1,3-Dichlorobenzene	0.64	U	0.64	1.0
1,4-Dichlorobenzene	0.52	U	0.52	1.0
Dichlorobromomethane	0.35	U	0.35	1.0
Dichlorodifluoromethane	2.5	U	2.5	5.0
1,1-Dichloroethane	0.52	U	0.52	1.0
1,2-Dichloroethane	0.57	U	0.57	1.0
1,1-Dichloroethene	0.45	U	0.45	1.0
1,2-Dichloropropane	0.52	U	0.52	1.0
1,3-Dichloropropane	0.39	U	0.39	1.0
2,2-Dichloropropane	0.36	U	0.36	1.0
1,1-Dichloropropene	0.31	U	0.31	1.0
Ethylbenzene	0.44	U	0.44	1.0
Ethylene Dibromide	0.50	U	0.50	1.0
Hexachlorobutadiene	0.40	U	0.40	1.0
2-Hexanone	4.4	U	4.4	10
Isopropylbenzene	0.19	U	0.19	1.0
4-Isopropyltoluene	0.69	U	0.69	1.0
Methylene Chloride	4.0	U	4.0	5.0
2-Butanone (MEK)	8.4	U	8.4	10
4-Methyl-2-pentanone (MIBK)	3.8	U	3.8	10
Methyl tert-butyl ether	0.44	U	0.44	1.0
m-Xylene & p-Xylene	0.60	U	0.60	2.0
Naphthalene	2.5	U	2.5	5.0
n-Butylbenzene	0.67	U	0.67	1.0
N-Propylbenzene	0.59	U	0.59	1.0

Client: Envirologic International LTD. Job Number: 660-19445-1

Client Sample ID: **Trip Blank**

Lab Sample ID: 660-19445-4 Date Sampled: 11/12/2007 0000
Client Matrix: Water Date Received: 11/13/2007 0930

8260B Volatile Organic Compounds by GC/MS

Method: 8260B Analysis Batch: 660-53647 Instrument ID: BVMG GC/MS
Preparation: 5030B Lab File ID: 1GK1827.D
Dilution: 1.0 Initial Weight/Volume: 5 mL
Date Analyzed: 11/19/2007 0141 Final Weight/Volume: 5 mL
Date Prepared: 11/19/2007 0141

Analyte	Result (ug/L)	Qualifier	MDL	PQL
o-Xylene	0.50	U	0.50	1.0
sec-Butylbenzene	0.63	U	0.63	1.0
Styrene	0.98	U	0.98	2.0
tert-Butylbenzene	0.84	U	0.84	1.0
1,1,1,2-Tetrachloroethane	0.63	U	0.63	1.0
1,1,2,2-Tetrachloroethane	0.15	U	0.15	1.0
Tetrachloroethene	0.50	U	0.50	1.0
Toluene	0.51	U	0.51	1.0
trans-1,2-Dichloroethene	0.44	U	0.44	1.0
trans-1,3-Dichloropropene	0.14	U	0.14	1.0
1,2,3-Trichlorobenzene	0.77	U	0.77	1.0
1,2,4-Trichlorobenzene	0.58	U	0.58	1.0
1,1,1-Trichloroethane	0.46	U	0.46	1.0
1,1,2-Trichloroethane	0.47	U	0.47	1.0
Trichloroethene	0.50	U	0.50	1.0
Trichlorofluoromethane	2.5	U	2.5	5.0
1,2,3-Trichloropropane	0.18	U	0.18	1.0
1,2,4-Trimethylbenzene	0.86	U	0.86	1.0
1,3,5-Trimethylbenzene	0.54	U	0.54	1.0
Vinyl chloride	0.50	U	0.50	1.0
1,2-Dichlorobenzene	0.44	U	0.44	1.0

Surrogate	%Rec	Acceptance Limits
4-Bromofluorobenzene	75	74 - 126
Dibromofluoromethane	88	70 - 130
Toluene-d8 (Surr)	86	77 - 122

Client: Envirologic International LTD. Job Number: 660-19445-1

Client Sample ID: MW-4

Lab Sample ID: 660-19445-1 Date Sampled: 11/12/2007 1450
Client Matrix: Water Date Received: 11/13/2007 0930

8270C Semivolatile Compounds by Gas Chromatogr

Method: 8270C Analysis Batch: 660-53847 Instrument ID: BSMC5973
Preparation: 3520C Prep Batch: 660-53512 Lab File ID: 1CK19011.D
Dilution: 1.0 Initial Weight/Volume: 1000 mL
Date Analyzed: 11/19/2007 1510 Final Weight/Volume: 1 mL
Date Prepared: 11/15/2007 1549 Injection Volume: 1 uL

Analyte	Result (ug/L)	Qualifier	MDL	PQL
1,3-Dichlorobenzene	1.1	U	1.1	10
N-Nitrosodimethylamine	2.4	U	2.4	10
Phenol	2.4	U	2.4	10
1,4-Dichlorobenzene	1.2	U	1.2	10
Hexachloroethane	0.85	U	0.85	10
Bis(2-chloroethyl)ether	2.6	U	2.6	10
1,2-Dichlorobenzene	1.1	U	1.1	10
2,2'-oxybis(2-chloropropane)	2.1	U	2.1	10
N-Nitrosodi-n-propylamine	1.9	U	1.9	10
Nitrobenzene	1.9	U	1.9	10
Hexachlorobutadiene	1.0	U	1.0	10
1,2,4-Trichlorobenzene	1.2	U	1.2	10
Isophorone	1.4	U	1.4	10
Naphthalene	1.3	U	1.3	10
Bis(2-chloroethoxy)methane	2.0	U	2.0	10
Dimethyl phthalate	2.5	U	2.5	10
Hexachlorocyclopentadiene	1.2	U	1.2	10
2-Chloronaphthalene	1.6	U	1.6	10
Acenaphthylene	1.8	U	1.8	10
Acenaphthene	1.5	U	1.5	10
2,6-Dinitrotoluene	0.72	U	0.72	10
Fluorene	1.7	U	1.7	10
4-Chlorophenyl phenyl ether	1.8	U	1.8	10
2,4-Dinitrotoluene	0.91	U	0.91	10
Diethyl phthalate	2.5	U	2.5	10
N-Nitrosodiphenylamine	1.6	U	1.6	10
Hexachlorobenzene	1.7	U	1.7	4.0
4-Bromophenyl phenyl ether	1.7	U	1.7	10
Phenanthrene	1.3	U	1.3	10
Anthracene	1.0	U	1.0	10
Di-n-butyl phthalate	2.5	U	2.5	10
Fluoranthene	1.2	U	1.2	10
Pyrene	1.2	U	1.2	10
Butyl benzyl phthalate	1.2	U	1.2	10
Bis(2-ethylhexyl) phthalate	1.3	U	1.3	6.0
Chrysene	1.2	U	1.2	10
Benzo[a]anthracene	1.6	U	1.6	10
3,3'-Dichlorobenzidine	1.6	U	1.6	20
Di-n-octyl phthalate	2.5	U	2.5	10
Benzo[b]fluoranthene	1.6	U	1.6	10
Benzo[k]fluoranthene	1.3	U	1.3	10
Benzo[a]pyrene	0.99	U	0.99	4.0
Indeno[1,2,3-cd]pyrene	1.2	U	1.2	10
Dibenz(a,h)anthracene	1.0	U	1.0	10

Client: Envirologic International LTD. Job Number: 660-19445-1

Client Sample ID: MW-4

Lab Sample ID: 660-19445-1 Date Sampled: 11/12/2007 1450
Client Matrix: Water Date Received: 11/13/2007 0930

8270C Semivolatile Compounds by Gas Chromatogr

Method: 8270C Analysis Batch: 660-53847 Instrument ID: BSMC5973
Preparation: 3520C Prep Batch: 660-53512 Lab File ID: 1CK19011.D
Dilution: 1.0 Initial Weight/Volume: 1000 mL
Date Analyzed: 11/19/2007 1510 Final Weight/Volume: 1 mL
Date Prepared: 11/15/2007 1549 Injection Volume: 1 uL

Analyte	Result (ug/L)	Qualifier	MDL	PQL
Benzo[g,h,i]perylene	1.1	U	1.1	10
2-Chlorophenol	2.1	U	2.1	10
2-Nitrophenol	1.2	U	1.2	10
2,4-Dimethylphenol	1.8	U	1.8	10
2,4-Dichlorophenol	1.8	U	1.8	10
2,4,6-Trichlorophenol	1.9	U	1.9	10
4-Chloro-3-methylphenol	1.7	U	1.7	10
2,4-Dinitrophenol	6.2	U	6.2	50
4,6-Dinitro-2-methylphenol	1.5	U	1.5	50
Pentachlorophenol	1.5	U	1.5	15
4-Nitrophenol	6.2	U	6.2	50
Benzyl alcohol	2.9	U	2.9	10
2-Methylphenol	2.3	U	2.3	10
Benzoic acid	12	U	12	50
4-Chloroaniline	2.1	U	2.1	20
2-Methylnaphthalene	1.6	U	1.6	10
2,4,5-Trichlorophenol	2.1	U	2.1	10
2-Nitroaniline	1.4	U	1.4	50
3-Nitroaniline	1.2	U	1.2	50
Dibenzofuran	1.6	U	1.6	10
4-Nitroaniline	1.4	U	1.4	50
3 & 4 Methylphenol	2.4	U	2.4	10
1-Methylnaphthalene	1.3	U	1.3	10

Surrogate	%Rec	Acceptance Limits
2-Fluorophenol	46	29 - 121
Nitrobenzene-d5	65	34 - 130
Phenol-d5	42	25 - 128
2-Fluorobiphenyl	78	36 - 124
Terphenyl-d14	56	14 - 148
2,4,6-Tribromophenol	70	29 - 143

Client: Envirologic International LTD. Job Number: 660-19445-1

Client Sample ID: MW-5

Lab Sample ID: 660-19445-2 Date Sampled: 11/12/2007 1410
Client Matrix: Water Date Received: 11/13/2007 0930

8270C Semivolatile Compounds by Gas Chromatogr

Method: 8270C Analysis Batch: 660-53847 Instrument ID: BSMC5973
Preparation: 3520C Prep Batch: 660-53512 Lab File ID: 1CK19012.D
Dilution: 1.0 Initial Weight/Volume: 1000 mL
Date Analyzed: 11/19/2007 1531 Final Weight/Volume: 1 mL
Date Prepared: 11/15/2007 1549 Injection Volume: 1 uL

Analyte	Result (ug/L)	Qualifier	MDL	PQL
1,3-Dichlorobenzene	1.1	U	1.1	10
N-Nitrosodimethylamine	2.4	U	2.4	10
Phenol	2.4	U	2.4	10
1,4-Dichlorobenzene	1.2	U	1.2	10
Hexachloroethane	0.85	U	0.85	10
Bis(2-chloroethyl)ether	2.6	U	2.6	10
1,2-Dichlorobenzene	1.1	U	1.1	10
2,2'-oxybis(2-chloropropane)	2.1	U	2.1	10
N-Nitrosodi-n-propylamine	1.9	U	1.9	10
Nitrobenzene	1.9	U	1.9	10
Hexachlorobutadiene	1.0	U	1.0	10
1,2,4-Trichlorobenzene	1.2	U	1.2	10
Isophorone	1.4	U	1.4	10
Naphthalene	1.3	U	1.3	10
Bis(2-chloroethoxy)methane	2.0	U	2.0	10
Dimethyl phthalate	2.5	U	2.5	10
Hexachlorocyclopentadiene	1.2	U	1.2	10
2-Chloronaphthalene	1.6	U	1.6	10
Acenaphthylene	1.8	U	1.8	10
Acenaphthene	1.5	U	1.5	10
2,6-Dinitrotoluene	0.72	U	0.72	10
Fluorene	1.7	U	1.7	10
4-Chlorophenyl phenyl ether	1.8	U	1.8	10
2,4-Dinitrotoluene	0.91	U	0.91	10
Diethyl phthalate	2.5	U	2.5	10
N-Nitrosodiphenylamine	1.6	U	1.6	10
Hexachlorobenzene	1.7	U	1.7	4.0
4-Bromophenyl phenyl ether	1.7	U	1.7	10
Phenanthrene	1.3	U	1.3	10
Anthracene	1.0	U	1.0	10
Di-n-butyl phthalate	2.5	U	2.5	10
Fluoranthene	1.2	U	1.2	10
Pyrene	1.2	U	1.2	10
Butyl benzyl phthalate	1.2	U	1.2	10
Bis(2-ethylhexyl) phthalate	3.2	I	1.3	6.0
Chrysene	1.2	U	1.2	10
Benzo[a]anthracene	1.6	U	1.6	10
3,3'-Dichlorobenzidine	1.6	U	1.6	20
Di-n-octyl phthalate	2.5	U	2.5	10
Benzo[b]fluoranthene	1.6	U	1.6	10
Benzo[k]fluoranthene	1.3	U	1.3	10
Benzo[a]pyrene	0.99	U	0.99	4.0
Indeno[1,2,3-cd]pyrene	1.2	U	1.2	10
Dibenz(a,h)anthracene	1.0	U	1.0	10

Client: Envirologic International LTD. Job Number: 660-19445-1

Client Sample ID: MW-5

Lab Sample ID: 660-19445-2 Date Sampled: 11/12/2007 1410
Client Matrix: Water Date Received: 11/13/2007 0930

8270C Semivolatile Compounds by Gas Chromatogr

Method: 8270C Analysis Batch: 660-53847 Instrument ID: BSMC5973
Preparation: 3520C Prep Batch: 660-53512 Lab File ID: 1CK19012.D
Dilution: 1.0 Initial Weight/Volume: 1000 mL
Date Analyzed: 11/19/2007 1531 Final Weight/Volume: 1 mL
Date Prepared: 11/15/2007 1549 Injection Volume: 1 uL

Analyte	Result (ug/L)	Qualifier	MDL	PQL
Benzo[g,h,i]perylene	1.1	U	1.1	10
2-Chlorophenol	2.1	U	2.1	10
2-Nitrophenol	1.2	U	1.2	10
2,4-Dimethylphenol	1.8	U	1.8	10
2,4-Dichlorophenol	1.8	U	1.8	10
2,4,6-Trichlorophenol	1.9	U	1.9	10
4-Chloro-3-methylphenol	1.7	U	1.7	10
2,4-Dinitrophenol	6.2	U	6.2	50
4,6-Dinitro-2-methylphenol	1.5	U	1.5	50
Pentachlorophenol	1.5	U	1.5	15
4-Nitrophenol	6.2	U	6.2	50
Benzyl alcohol	2.9	U	2.9	10
2-Methylphenol	2.3	U	2.3	10
Benzoic acid	12	U	12	50
4-Chloroaniline	2.1	U	2.1	20
2-Methylnaphthalene	1.6	U	1.6	10
2,4,5-Trichlorophenol	2.1	U	2.1	10
2-Nitroaniline	1.4	U	1.4	50
3-Nitroaniline	1.2	U	1.2	50
Dibenzofuran	1.6	U	1.6	10
4-Nitroaniline	1.4	U	1.4	50
3 & 4 Methylphenol	2.4	U	2.4	10
1-Methylnaphthalene	1.3	U	1.3	10

Surrogate	%Rec	Acceptance Limits
2-Fluorophenol	39	29 - 121
Nitrobenzene-d5	53	34 - 130
Phenol-d5	39	25 - 128
2-Fluorobiphenyl	59	36 - 124
Terphenyl-d14	59	14 - 148
2,4,6-Tribromophenol	56	29 - 143

Client: Envirologic International LTD. Job Number: 660-19445-1

Client Sample ID: MW-6

Lab Sample ID: 660-19445-3 Date Sampled: 11/12/2007 1320
Client Matrix: Water Date Received: 11/13/2007 0930

8270C Semivolatile Compounds by Gas Chromatogr

Method: 8270C Analysis Batch: 660-53847 Instrument ID: BSMC5973
Preparation: 3520C Prep Batch: 660-53512 Lab File ID: 1CK19013.D
Dilution: 1.0 Initial Weight/Volume: 1000 mL
Date Analyzed: 11/19/2007 1551 Final Weight/Volume: 1 mL
Date Prepared: 11/15/2007 1549 Injection Volume: 1 uL

Analyte	Result (ug/L)	Qualifier	MDL	PQL
1,3-Dichlorobenzene	1.1	U	1.1	10
N-Nitrosodimethylamine	2.4	U	2.4	10
Phenol	2.4	U	2.4	10
1,4-Dichlorobenzene	1.2	U	1.2	10
Hexachloroethane	0.85	U	0.85	10
Bis(2-chloroethyl)ether	2.6	U	2.6	10
1,2-Dichlorobenzene	1.1	U	1.1	10
2,2'-oxybis(2-chloropropane)	2.1	U	2.1	10
N-Nitrosodi-n-propylamine	1.9	U	1.9	10
Nitrobenzene	1.9	U	1.9	10
Hexachlorobutadiene	1.0	U	1.0	10
1,2,4-Trichlorobenzene	1.2	U	1.2	10
Isophorone	1.4	U	1.4	10
Naphthalene	1.3	U	1.3	10
Bis(2-chloroethoxy)methane	2.0	U	2.0	10
Dimethyl phthalate	2.5	U	2.5	10
Hexachlorocyclopentadiene	1.2	U	1.2	10
2-Chloronaphthalene	1.6	U	1.6	10
Acenaphthylene	1.8	U	1.8	10
Acenaphthene	1.5	U	1.5	10
2,6-Dinitrotoluene	0.72	U	0.72	10
Fluorene	1.7	U	1.7	10
4-Chlorophenyl phenyl ether	1.8	U	1.8	10
2,4-Dinitrotoluene	0.91	U	0.91	10
Diethyl phthalate	2.5	U	2.5	10
N-Nitrosodiphenylamine	1.6	U	1.6	10
Hexachlorobenzene	1.7	U	1.7	4.0
4-Bromophenyl phenyl ether	1.7	U	1.7	10
Phenanthrene	1.3	U	1.3	10
Anthracene	1.0	U	1.0	10
Di-n-butyl phthalate	2.5	U	2.5	10
Fluoranthene	1.2	U	1.2	10
Pyrene	1.2	U	1.2	10
Butyl benzyl phthalate	1.2	U	1.2	10
Bis(2-ethylhexyl) phthalate	3.8	I	1.3	6.0
Chrysene	1.2	U	1.2	10
Benzo[a]anthracene	1.6	U	1.6	10
3,3'-Dichlorobenzidine	1.6	U	1.6	20
Di-n-octyl phthalate	2.5	U	2.5	10
Benzo[b]fluoranthene	1.6	U	1.6	10
Benzo[k]fluoranthene	1.3	U	1.3	10
Benzo[a]pyrene	0.99	U	0.99	4.0
Indeno[1,2,3-cd]pyrene	1.2	U	1.2	10
Dibenz(a,h)anthracene	1.0	U	1.0	10

Client: Envirologic International LTD. Job Number: 660-19445-1

Client Sample ID: MW-6

Lab Sample ID: 660-19445-3 Date Sampled: 11/12/2007 1320
Client Matrix: Water Date Received: 11/13/2007 0930

8270C Semivolatile Compounds by Gas Chromatogr

Method: 8270C Analysis Batch: 660-53847 Instrument ID: BSMC5973
Preparation: 3520C Prep Batch: 660-53512 Lab File ID: 1CK19013.D
Dilution: 1.0 Initial Weight/Volume: 1000 mL
Date Analyzed: 11/19/2007 1551 Final Weight/Volume: 1 mL
Date Prepared: 11/15/2007 1549 Injection Volume: 1 uL

Analyte	Result (ug/L)	Qualifier	MDL	PQL
Benzo[g,h,i]perylene	1.1	U	1.1	10
2-Chlorophenol	2.1	U	2.1	10
2-Nitrophenol	1.2	U	1.2	10
2,4-Dimethylphenol	1.8	U	1.8	10
2,4-Dichlorophenol	1.8	U	1.8	10
2,4,6-Trichlorophenol	1.9	U	1.9	10
4-Chloro-3-methylphenol	1.7	U	1.7	10
2,4-Dinitrophenol	6.2	U	6.2	50
4,6-Dinitro-2-methylphenol	1.5	U	1.5	50
Pentachlorophenol	1.5	U	1.5	15
4-Nitrophenol	6.2	U	6.2	50
Benzyl alcohol	2.9	U	2.9	10
2-Methylphenol	2.3	U	2.3	10
Benzoic acid	12	U	12	50
4-Chloroaniline	2.1	U	2.1	20
2-Methylnaphthalene	1.6	U	1.6	10
2,4,5-Trichlorophenol	2.1	U	2.1	10
2-Nitroaniline	1.4	U	1.4	50
3-Nitroaniline	1.2	U	1.2	50
Dibenzofuran	1.6	U	1.6	10
4-Nitroaniline	1.4	U	1.4	50
3 & 4 Methylphenol	2.4	U	2.4	10
1-Methylnaphthalene	1.3	U	1.3	10

Surrogate	%Rec	Acceptance Limits
2-Fluorophenol	39	29 - 121
Nitrobenzene-d5	53	34 - 130
Phenol-d5	38	25 - 128
2-Fluorobiphenyl	64	36 - 124
Terphenyl-d14	35	14 - 148
2,4,6-Tribromophenol	50	29 - 143

Client: Envirologic International LTD. Job Number: 660-19445-1

Client Sample ID: MW-4

Lab Sample ID: 660-19445-1 Date Sampled: 11/12/2007 1450
Client Matrix: Water Date Received: 11/13/2007 0930

6010B Inductively Coupled Plasma - Atomic Emission Spectrometry-Total Recoverable

Method: 6010B Analysis Batch: 660-53961 Instrument ID: TJA ICP TRACE
Preparation: 3005A Prep Batch: 660-53786 Lab File ID: 7K26A
Dilution: 1.0 Initial Weight/Volume: 50 mL
Date Analyzed: 11/26/2007 1204 Final Weight/Volume: 50 mL
Date Prepared: 11/21/2007 0646

Analyte	Result (mg/L)	Qualifier	MDL	PQL
Silver	0.0019	U	0.0019	0.010
Arsenic	0.0048	U	0.0048	0.010
Barium	0.0079	I	0.0012	0.010
Cadmium	0.00071	U	0.00071	0.0050
Chromium	0.0017	U	0.0017	0.010
Lead	0.0016	U	0.0016	0.0050
Selenium	0.0059	U	0.0059	0.010
Iron	0.027	I	0.022	0.050
Potassium	1.0		0.19	1.0
Magnesium	4.3		0.11	0.50
Sodium	38		0.31	0.50

7470A Mercury in Liquid Waste (Manual Cold Vapor Technique)

Method: 7470A Analysis Batch: 660-53571 Instrument ID: HydraAA Mercury
Preparation: 7470A Prep Batch: 660-53534 Lab File ID: N/A
Dilution: 1.0 Initial Weight/Volume: 50.0 mL
Date Analyzed: 11/16/2007 1516 Final Weight/Volume: 50.0 mL
Date Prepared: 11/16/2007 0725

Analyte	Result (mg/L)	Qualifier	MDL	PQL
Mercury	0.000072	U	0.000072	0.00020

Client: Envirologic International LTD. Job Number: 660-19445-1

Client Sample ID: MW-5

Lab Sample ID: 660-19445-2 Date Sampled: 11/12/2007 1410
Client Matrix: Water Date Received: 11/13/2007 0930

6010B Inductively Coupled Plasma - Atomic Emission Spectrometry-Total Recoverable

Method: 6010B Analysis Batch: 660-53961 Instrument ID: TJA ICP TRACE
Preparation: 3005A Prep Batch: 660-53786 Lab File ID: 7K26A
Dilution: 1.0 Initial Weight/Volume: 50 mL
Date Analyzed: 11/26/2007 1210 Final Weight/Volume: 50 mL
Date Prepared: 11/21/2007 0646

Analyte	Result (mg/L)	Qualifier	MDL	PQL
Silver	0.0019	U	0.0019	0.010
Arsenic	0.0048	U	0.0048	0.010
Barium	0.010		0.0012	0.010
Cadmium	0.00071	U	0.00071	0.0050
Chromium	0.0017	U	0.0017	0.010
Lead	0.0016	U	0.0016	0.0050
Selenium	0.0059	U	0.0059	0.010
Iron	0.061		0.022	0.050
Potassium	1.3		0.19	1.0
Magnesium	3.8		0.11	0.50
Sodium	62		0.31	0.50

7470A Mercury in Liquid Waste (Manual Cold Vapor Technique)

Method: 7470A Analysis Batch: 660-53571 Instrument ID: HydraAA Mercury
Preparation: 7470A Prep Batch: 660-53534 Lab File ID: N/A
Dilution: 1.0 Initial Weight/Volume: 50.0 mL
Date Analyzed: 11/16/2007 1518 Final Weight/Volume: 50.0 mL
Date Prepared: 11/16/2007 0725

Analyte	Result (mg/L)	Qualifier	MDL	PQL
Mercury	0.000072	U	0.000072	0.00020

Client: Envirologic International LTD. Job Number: 660-19445-1

Client Sample ID: MW-6

Lab Sample ID: 660-19445-3 Date Sampled: 11/12/2007 1320
Client Matrix: Water Date Received: 11/13/2007 0930

6010B Inductively Coupled Plasma - Atomic Emission Spectrometry-Total Recoverable

Method: 6010B Analysis Batch: 660-53961 Instrument ID: TJA ICP TRACE
Preparation: 3005A Prep Batch: 660-53786 Lab File ID: 7K26A
Dilution: 1.0 Initial Weight/Volume: 50 mL
Date Analyzed: 11/26/2007 1216 Final Weight/Volume: 50 mL
Date Prepared: 11/21/2007 0646

Analyte	Result (mg/L)	Qualifier	MDL	PQL
Silver	0.0019	U	0.0019	0.010
Arsenic	0.0048	U	0.0048	0.010
Barium	0.0060	I	0.0012	0.010
Cadmium	0.00071	U	0.00071	0.0050
Chromium	0.0017	U	0.0017	0.010
Lead	0.0016	U	0.0016	0.0050
Selenium	0.0059	U	0.0059	0.010
Iron	0.035	I	0.022	0.050
Potassium	6.0		0.19	1.0
Magnesium	14		0.11	0.50

Method: 6010B Analysis Batch: 660-53961 Instrument ID: TJA ICP TRACE
Preparation: 3005A Prep Batch: 660-53786 Lab File ID: 7K26A
Dilution: 10 Initial Weight/Volume: 50 mL
Date Analyzed: 11/26/2007 1239 Final Weight/Volume: 50 mL
Date Prepared: 11/21/2007 0646

Analyte	Result (mg/L)	Qualifier	MDL	PQL
Sodium	130		3.1	5.0

7470A Mercury in Liquid Waste (Manual Cold Vapor Technique)

Method: 7470A Analysis Batch: 660-53571 Instrument ID: HydraAA Mercury
Preparation: 7470A Prep Batch: 660-53534 Lab File ID: N/A
Dilution: 1.0 Initial Weight/Volume: 50.0 mL
Date Analyzed: 11/16/2007 1519 Final Weight/Volume: 50.0 mL
Date Prepared: 11/16/2007 0725

Analyte	Result (mg/L)	Qualifier	MDL	PQL
Mercury	0.000072	U	0.000072	0.00020

General Chemistry

Client Sample ID: MW-4

Lab Sample ID: 660-19445-1 Date Sampled: 11/12/2007 1450
Client Matrix: Water Date Received: 11/13/2007 0930

Analyte	Result	Qual	Units	MDL	PQL	Dil	Method
TKN	0.28	V	mg/L	0.040	0.20	1.0	351.2
	Anly Batch: 700-44583	Date Analyzed		11/28/2007 1544			
	Prep Batch: 700-44556	Date Prepared:		11/27/2007 1740			
Nitrate Nitrite as N	0.10	U	mg/L	0.10	0.50	1.0	353.2
	Anly Batch: 660-53983	Date Analyzed		11/26/2007 1109			
		Date Prepared:		11/26/2007 1109			
Nitrogen, Total	0.28		mg/L	0.010	0.050	1.0	Total Nitrogen
	Anly Batch: 660-54206	Date Analyzed		11/30/2007 1151			
Chloride	60		mg/L	3.0	5.0	1.0	SM4500 Cl-E
	Anly Batch: 660-53495	Date Analyzed		11/15/2007 1338			

Analyte	Result	Qual	Units	Dil	Method
pH	6.70	Q	SU	1.0	SM 4500 H+ B
	Anly Batch: 660-53478	Date Analyzed		11/13/2007 1153	

Client Sample ID: MW-5

Lab Sample ID: 660-19445-2 Date Sampled: 11/12/2007 1410
Client Matrix: Water Date Received: 11/13/2007 0930

Analyte	Result	Qual	Units	MDL	PQL	Dil	Method
TKN	0.26	V	mg/L	0.040	0.20	1.0	351.2
	Anly Batch: 700-44583	Date Analyzed		11/28/2007 1545			
	Prep Batch: 700-44556	Date Prepared:		11/27/2007 1740			
Nitrate Nitrite as N	0.26	I	mg/L	0.10	0.50	1.0	353.2
	Anly Batch: 660-53983	Date Analyzed		11/26/2007 1109			
		Date Prepared:		11/26/2007 1109			
Nitrogen, Total	0.52		mg/L	0.010	0.050	1.0	Total Nitrogen
	Anly Batch: 660-54206	Date Analyzed		11/30/2007 1151			
Chloride	120		mg/L	60	100	20	SM4500 Cl-E
	Anly Batch: 660-53495	Date Analyzed		11/15/2007 1435			

Analyte	Result	Qual	Units	Dil	Method
pH	6.86	Q	SU	1.0	SM 4500 H+ B
	Anly Batch: 660-53478	Date Analyzed		11/13/2007 1153	

General Chemistry

Client Sample ID: MW-6

Lab Sample ID: 660-19445-3 Date Sampled: 11/12/2007 1320
Client Matrix: Water Date Received: 11/13/2007 0930

Analyte	Result	Qual	Units	MDL	PQL	Dil	Method
TKN	0.30	V	mg/L	0.040	0.20	1.0	351.2
	Anly Batch: 700-44583	Date Analyzed		11/28/2007 1546			
	Prep Batch: 700-44556	Date Prepared:		11/27/2007 1740			
Nitrate Nitrite as N	0.20	I	mg/L	0.10	0.50	1.0	353.2
	Anly Batch: 660-53983	Date Analyzed		11/26/2007 1109			
		Date Prepared:		11/26/2007 1109			
Nitrogen, Total	0.50		mg/L	0.010	0.050	1.0	Total Nitrogen
	Anly Batch: 660-54206	Date Analyzed		11/30/2007 1151			
Chloride	330		mg/L	60	100	20	SM4500 Cl-E
	Anly Batch: 660-53495	Date Analyzed		11/15/2007 1436			

Analyte	Result	Qual	Units	Dil	Method
pH	7.01	Q	SU	1.0	SM 4500 H+ B
	Anly Batch: 660-53478	Date Analyzed		11/13/2007 1153	

DATA REPORTING QUALIFIERS

Client: Envirologic International LTD. Job Number: 660-19445-1

Lab Section	Qualifier	Description
GC/MS VOA		
	U	Indicates that the compound was analyzed for but not detected.
	I	The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.
GC/MS Semi VOA		
	U	Indicates that the compound was analyzed for but not detected.
	I	The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.
Metals		
	U	Indicates that the compound was analyzed for but not detected.
	I	The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.
General Chemistry		
	J3	Estimated value; value may not be accurate. Spike recovery or RPD outside of criteria.
	U	Indicates that the compound was analyzed for but not detected.
	V	Indicates the analyte was detected in both the sample and the associated method blank.
	Q	Sample held beyond the accepted holding time.
	I	The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.

Client: Envirologic International LTD. Job Number: 660-19445-1

Method Blank - Batch: 660-53647

Method: 8260B
Preparation: 5030B

Lab Sample ID: MB 660-53647/1
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 11/18/2007 1635
Date Prepared: 11/18/2007 1635

Analysis Batch: 660-53647
Prep Batch: N/A
Units: ug/L

Instrument ID: BVMG GC/MS
Lab File ID: 1GK1805.D
Initial Weight/Volume: 5 mL
Final Weight/Volume: 5 mL

Analyte	Result	Qual	MDL	PQL
Acetone	9.9	U	9.9	20
Benzene	0.50	U	0.50	1.0
Bromobenzene	0.58	U	0.58	1.0
Bromoform	0.58	U	0.58	1.0
Bromomethane	2.5	U	2.5	5.0
Carbon disulfide	0.85	U	0.85	1.0
Carbon tetrachloride	0.42	U	0.42	1.0
Chlorobenzene	0.63	U	0.63	1.0
Chlorobromomethane	0.58	U	0.58	1.0
Chlorodibromomethane	0.34	U	0.34	1.0
Chloroethane	2.5	U	2.5	5.0
Chloroform	0.90	U	0.90	1.0
Chloromethane	1.0	U	1.0	4.0
2-Chlorotoluene	0.65	U	0.65	1.0
4-Chlorotoluene	0.52	U	0.52	1.0
cis-1,2-Dichloroethene	0.65	U	0.65	1.0
cis-1,3-Dichloropropene	0.14	U	0.14	1.0
1,2-Dibromo-3-Chloropropane	2.5	U	2.5	5.0
Dibromomethane	0.41	U	0.41	1.0
1,3-Dichlorobenzene	0.64	U	0.64	1.0
1,4-Dichlorobenzene	0.52	U	0.52	1.0
Dichlorobromomethane	0.35	U	0.35	1.0
Dichlorodifluoromethane	2.5	U	2.5	5.0
1,1-Dichloroethane	0.52	U	0.52	1.0
1,2-Dichloroethane	0.57	U	0.57	1.0
1,1-Dichloroethene	0.45	U	0.45	1.0
1,2-Dichloropropane	0.52	U	0.52	1.0
1,3-Dichloropropane	0.39	U	0.39	1.0
2,2-Dichloropropane	0.36	U	0.36	1.0
1,1-Dichloropropene	0.31	U	0.31	1.0
Ethylbenzene	0.44	U	0.44	1.0
Ethylene Dibromide	0.50	U	0.50	1.0
Hexachlorobutadiene	0.40	U	0.40	1.0
2-Hexanone	4.4	U	4.4	10
Isopropylbenzene	0.19	U	0.19	1.0
4-Isopropyltoluene	0.69	U	0.69	1.0
Methylene Chloride	4.0	U	4.0	5.0
2-Butanone (MEK)	8.4	U	8.4	10
4-Methyl-2-pentanone (MIBK)	3.8	U	3.8	10
Methyl tert-butyl ether	0.44	U	0.44	1.0
m-Xylene & p-Xylene	0.60	U	0.60	2.0

Calculations are performed before rounding to avoid round-off errors in calculated results.

Client: Envirologic International LTD. Job Number: 660-19445-1

Method Blank - Batch: 660-53647

Method: 8260B
Preparation: 5030B

Lab Sample ID: MB 660-53647/1
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 11/18/2007 1635
Date Prepared: 11/18/2007 1635

Analysis Batch: 660-53647
Prep Batch: N/A
Units: ug/L

Instrument ID: BVMG GC/MS
Lab File ID: 1GK1805.D
Initial Weight/Volume: 5 mL
Final Weight/Volume: 5 mL

Analyte	Result	Qual	MDL	PQL
Naphthalene	2.5	U	2.5	5.0
n-Butylbenzene	0.67	U	0.67	1.0
N-Propylbenzene	0.59	U	0.59	1.0
o-Xylene	0.50	U	0.50	1.0
sec-Butylbenzene	0.63	U	0.63	1.0
Styrene	0.98	U	0.98	2.0
tert-Butylbenzene	0.84	U	0.84	1.0
1,1,1,2-Tetrachloroethane	0.63	U	0.63	1.0
1,1,2,2-Tetrachloroethane	0.15	U	0.15	1.0
Tetrachloroethene	0.50	U	0.50	1.0
Toluene	0.51	U	0.51	1.0
trans-1,2-Dichloroethene	0.44	U	0.44	1.0
trans-1,3-Dichloropropene	0.14	U	0.14	1.0
1,2,3-Trichlorobenzene	0.77	U	0.77	1.0
1,2,4-Trichlorobenzene	0.58	U	0.58	1.0
1,1,1-Trichloroethane	0.46	U	0.46	1.0
1,1,2-Trichloroethane	0.47	U	0.47	1.0
Trichloroethene	0.50	U	0.50	1.0
Trichlorofluoromethane	2.5	U	2.5	5.0
1,2,3-Trichloropropane	0.18	U	0.18	1.0
1,2,4-Trimethylbenzene	0.86	U	0.86	1.0
1,3,5-Trimethylbenzene	0.54	U	0.54	1.0
Vinyl chloride	0.50	U	0.50	1.0
1,2-Dichlorobenzene	0.44	U	0.44	1.0

Surrogate	% Rec	Acceptance Limits
4-Bromofluorobenzene	76	74 - 126
Dibromofluoromethane	108	70 - 130
Toluene-d8 (Surr)	98	77 - 122

Calculations are performed before rounding to avoid round-off errors in calculated results.

Client: Envirologic International LTD. Job Number: 660-19445-1

Lab Control Spike/
Lab Control Spike Duplicate Recovery Report - Batch: 660-53647

Method: 8260B
Preparation: 5030B

LCS Lab Sample ID: LCS 660-53647/2
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 11/18/2007 1700
Date Prepared: 11/18/2007 1700

Analysis Batch: 660-53647
Prep Batch: N/A
Units: ug/L

Instrument ID: BVMG GC/MS
Lab File ID: 1GK1806.D
Initial Weight/Volume: 5 mL
Final Weight/Volume: 5 mL

LCSD Lab Sample ID: LCSD 660-53647/7
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 11/18/2007 1725
Date Prepared: 11/18/2007 1725

Analysis Batch: 660-53647
Prep Batch: N/A
Units: ug/L

Instrument ID: BVMG GC/MS
Lab File ID: 1GK1807.D
Initial Weight/Volume: 5 mL
Final Weight/Volume: 5 mL

	% Rec.						
Analyte	LCS	LCSD	Limit	RPD	RPD Limit	LCS Qual	LCSD Qual
Benzene	125	124	62 - 135	1	37		
Chlorobenzene	113	111	72 - 127	1	22		
1,1-Dichloroethene	103	99	46 - 147	4	30		
Toluene	115	115	68 - 131	1	33		
Trichloroethene	125	122	56 - 143	3	35		

Calculations are performed before rounding to avoid round-off errors in calculated results.

Client: Envirologic International LTD. Job Number: 660-19445-1

Method Blank - Batch: 660-53512

Method: 8270C
Preparation: 3520C

Lab Sample ID: MB 660-53512/1-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 11/19/2007 1408
Date Prepared: 11/15/2007 1549

Analysis Batch: 660-53847
Prep Batch: 660-53512
Units: ug/L

Instrument ID: BSMC5973
Lab File ID: 1CK19008.D
Initial Weight/Volume: 1000 mL
Final Weight/Volume: 1 mL
Injection Volume: 1 uL

Analyte	Result	Qual	MDL	PQL
1,3-Dichlorobenzene	1.1	U	1.1	10
N-Nitrosodimethylamine	2.4	U	2.4	10
Phenol	2.4	U	2.4	10
1,4-Dichlorobenzene	1.2	U	1.2	10
Hexachloroethane	0.85	U	0.85	10
Bis(2-chloroethyl)ether	2.6	U	2.6	10
1,2-Dichlorobenzene	1.1	U	1.1	10
2,2'-oxybis(2-chloropropane)	2.1	U	2.1	10
N-Nitrosodi-n-propylamine	1.9	U	1.9	10
Nitrobenzene	1.9	U	1.9	10
Hexachlorobutadiene	1.0	U	1.0	10
1,2,4-Trichlorobenzene	1.2	U	1.2	10
Isophorone	1.4	U	1.4	10
Naphthalene	1.3	U	1.3	10
Bis(2-chloroethoxy)methane	2.0	U	2.0	10
Dimethyl phthalate	2.5	U	2.5	10
Hexachlorocyclopentadiene	1.2	U	1.2	10
2-Chloronaphthalene	1.6	U	1.6	10
Acenaphthylene	1.8	U	1.8	10
Acenaphthene	1.5	U	1.5	10
2,6-Dinitrotoluene	0.72	U	0.72	10
Fluorene	1.7	U	1.7	10
4-Chlorophenyl phenyl ether	1.8	U	1.8	10
2,4-Dinitrotoluene	0.91	U	0.91	10
Diethyl phthalate	2.5	U	2.5	10
N-Nitrosodiphenylamine	1.6	U	1.6	10
Hexachlorobenzene	1.7	U	1.7	4.0
4-Bromophenyl phenyl ether	1.7	U	1.7	10
Phenanthrene	1.3	U	1.3	10
Anthracene	1.0	U	1.0	10
Di-n-butyl phthalate	2.5	U	2.5	10
Fluoranthene	1.2	U	1.2	10
Pyrene	1.2	U	1.2	10
Butyl benzyl phthalate	1.2	U	1.2	10
Bis(2-ethylhexyl) phthalate	1.3	U	1.3	6.0
Chrysene	1.2	U	1.2	10
Benzo[a]anthracene	1.6	U	1.6	10
3,3'-Dichlorobenzidine	1.6	U	1.6	20
Di-n-octyl phthalate	2.5	U	2.5	10
Benzo[b]fluoranthene	1.6	U	1.6	10
Benzo[k]fluoranthene	1.3	U	1.3	10

Calculations are performed before rounding to avoid round-off errors in calculated results.

Client: Envirologic International LTD. Job Number: 660-19445-1

Method Blank - Batch: 660-53512

Method: 8270C
Preparation: 3520C

Lab Sample ID: MB 660-53512/1-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 11/19/2007 1408
Date Prepared: 11/15/2007 1549

Analysis Batch: 660-53847
Prep Batch: 660-53512
Units: ug/L

Instrument ID: BSMC5973
Lab File ID: 1CK19008.D
Initial Weight/Volume: 1000 mL
Final Weight/Volume: 1 mL
Injection Volume: 1 uL

Analyte	Result	Qual	MDL	PQL
Benzo[a]pyrene	0.99	U	0.99	4.0
Indeno[1,2,3-cd]pyrene	1.2	U	1.2	10
Dibenz(a,h)anthracene	1.0	U	1.0	10
Benzo[g,h,i]perylene	1.1	U	1.1	10
2-Chlorophenol	2.1	U	2.1	10
2-Nitrophenol	1.2	U	1.2	10
2,4-Dimethylphenol	1.8	U	1.8	10
2,4-Dichlorophenol	1.8	U	1.8	10
2,4,6-Trichlorophenol	1.9	U	1.9	10
4-Chloro-3-methylphenol	1.7	U	1.7	10
2,4-Dinitrophenol	6.2	U	6.2	50
4,6-Dinitro-2-methylphenol	1.5	U	1.5	50
Pentachlorophenol	1.5	U	1.5	15
4-Nitrophenol	6.2	U	6.2	50
Benzyl alcohol	2.9	U	2.9	10
2-Methylphenol	2.3	U	2.3	10
Benzoic acid	12	U	12	50
4-Chloroaniline	2.1	U	2.1	20
2-Methylnaphthalene	1.6	U	1.6	10
2,4,5-Trichlorophenol	2.1	U	2.1	10
2-Nitroaniline	1.4	U	1.4	50
3-Nitroaniline	1.2	U	1.2	50
Dibenzofuran	1.6	U	1.6	10
4-Nitroaniline	1.4	U	1.4	50
3 & 4 Methylphenol	2.4	U	2.4	10
1-Methylnaphthalene	1.3	U	1.3	10

Surrogate	% Rec	Acceptance Limits
2-Fluorophenol	45	29 - 121
Nitrobenzene-d5	47	34 - 130
Phenol-d5	43	25 - 128
2-Fluorobiphenyl	60	36 - 124
Terphenyl-d14	70	14 - 148
2,4,6-Tribromophenol	62	29 - 143

Calculations are performed before rounding to avoid round-off errors in calculated results.

Client: Envirologic International LTD. Job Number: 660-19445-1

Lab Control Spike/
Lab Control Spike Duplicate Recovery Report - Batch: 660-53512

Method: 8270C
Preparation: 3520C

LCS Lab Sample ID:	LCS 660-53512/2-A	Analysis Batch:	660-53847	Instrument ID:	BSMC5973
Client Matrix:	Water	Prep Batch:	660-53512	Lab File ID:	1CK19009.D
Dilution:	1.0	Units:	ug/L	Initial Weight/Volume:	1000 mL
Date Analyzed:	11/19/2007 1429			Final Weight/Volume:	1 mL
Date Prepared:	11/15/2007 1549			Injection Volume:	1 uL

LCSD Lab Sample ID:	LCSD 660-53512/3-A	Analysis Batch:	660-53847	Instrument ID:	BSMC5973
Client Matrix:	Water	Prep Batch:	660-53512	Lab File ID:	1CK19010.D
Dilution:	1.0	Units:	ug/L	Initial Weight/Volume:	1000 mL
Date Analyzed:	11/19/2007 1449			Final Weight/Volume:	1 mL
Date Prepared:	11/15/2007 1549			Injection Volume:	1 uL

	% Rec.						
Analyte	LCS	LCSD	Limit	RPD	RPD Limit	LCS Qual	LCSD Qual
Phenol	49	47	33 - 122	6	36		
1,4-Dichlorobenzene	61	49	27 - 130	21	31		
N-Nitrosodi-n-propylamine	71	58	31 - 138	21	30		
1,2,4-Trichlorobenzene	62	51	28 - 110	20	28		
Acenaphthene	69	58	36 - 121	17	35		
2,4-Dinitrotoluene	72	64	37 - 129	12	32		
Pyrene	78	64	31 - 139	20	42		
2-Chlorophenol	67	58	38 - 115	15	34		
4-Chloro-3-methylphenol	66	58	34 - 126	13	31		
Pentachlorophenol	70	61	19 - 148	13	33		
4-Nitrophenol	54	56	12 - 143	3	44		

Calculations are performed before rounding to avoid round-off errors in calculated results.

Client: Envirologic International LTD. Job Number: 660-19445-1

Matrix Spike/
Matrix Spike Duplicate Recovery Report - Batch: 660-53512

Method: 8270C
Preparation: 3520C

MS Lab Sample ID:	660-19476-S-7-B MS	Analysis Batch: 660-53847	Instrument ID: BSMC5973
Client Matrix:	Water	Prep Batch: 660-53512	Lab File ID: 1CK19019.D
Dilution:	1.0		Initial Weight/Volume: 1000 mL
Date Analyzed:	11/19/2007 1755		Final Weight/Volume: 1 mL
Date Prepared:	11/15/2007 1549		Injection Volume: 1 uL

MSD Lab Sample ID:	660-19476-P-7-C MSD	Analysis Batch: 660-53847	Instrument ID: BSMC5973
Client Matrix:	Water	Prep Batch: 660-53512	Lab File ID: 1CK19020.D
Dilution:	1.0		Initial Weight/Volume: 1000 mL
Date Analyzed:	11/19/2007 1815		Final Weight/Volume: 1 mL
Date Prepared:	11/15/2007 1549		Injection Volume: 1 uL

	% Rec.						
Analyte	MS	MSD	Limit	RPD	RPD Limit	MS Qual	MSD Qual
Phenol	68	71	33 - 122	5	36		
1,4-Dichlorobenzene	80	89	27 - 130	10	31		
N-Nitrosodi-n-propylamine	93	97	31 - 138	4	30		
1,2,4-Trichlorobenzene	84	92	28 - 110	10	28		
Acenaphthene	97	104	36 - 121	7	35		
2,4-Dinitrotoluene	107	109	37 - 129	2	32		
Pyrene	92	97	31 - 139	5	42		
2-Chlorophenol	80	83	38 - 115	4	34		
4-Chloro-3-methylphenol	80	83	34 - 126	4	31		
Pentachlorophenol	84	85	19 - 148	1	33		
4-Nitrophenol	76	77	12 - 143	2	44		

Calculations are performed before rounding to avoid round-off errors in calculated results.

Client: Envirologic International LTD. Job Number: 660-19445-1

Method Blank - Batch: 660-53786

Method: 6010B
Preparation: 3005A
Total Recoverable

Lab Sample ID: MB 660-53786/1-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 11/26/2007 0926
Date Prepared: 11/21/2007 0646

Analysis Batch: 660-53961
Prep Batch: 660-53786
Units: mg/L

Instrument ID: TJA ICP TRACE
Lab File ID: 7K26A
Initial Weight/Volume: 50 mL
Final Weight/Volume: 50 mL

Analyte	Result	Qual	MDL	PQL
Silver	0.0019	U	0.0019	0.010
Arsenic	0.0048	U	0.0048	0.010
Barium	0.0012	U	0.0012	0.010
Cadmium	0.00071	U	0.00071	0.0050
Chromium	0.0017	U	0.0017	0.010
Lead	0.0016	U	0.0016	0.0050
Selenium	0.0059	U	0.0059	0.010
Iron	0.022	U	0.022	0.050
Potassium	0.19	U	0.19	1.0
Magnesium	0.11	U	0.11	0.50
Sodium	0.31	U	0.31	0.50

Calculations are performed before rounding to avoid round-off errors in calculated results.

Client: Envirologic International LTD. Job Number: 660-19445-1

Lab Control Spike/
Lab Control Spike Duplicate Recovery Report - Batch: 660-53786

Method: 6010B
Preparation: 3005A
Total Recoverable

LCS Lab Sample ID: LCS 660-53786/2-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 11/26/2007 0934
Date Prepared: 11/21/2007 0646

Analysis Batch: 660-53961
Prep Batch: 660-53786
Units: mg/L

Instrument ID: TJA ICP TRACE
Lab File ID: 7K26A
Initial Weight/Volume: 50 mL
Final Weight/Volume: 50 mL

LCSD Lab Sample ID: LCSD 660-53786/3-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 11/26/2007 0939
Date Prepared: 11/21/2007 0646

Analysis Batch: 660-53961
Prep Batch: 660-53786
Units: mg/L

Instrument ID: TJA ICP TRACE
Lab File ID: 7K26A
Initial Weight/Volume: 50 mL
Final Weight/Volume: 50 mL

Analyte	% Rec. LCS	% Rec. LCSD	Limit	RPD	RPD Limit	LCS Qual	LCSD Qual
Silver	102	101	75 - 125	1	20		
Arsenic	101	101	75 - 125	0	20		
Barium	101	100	75 - 125	1	20		
Cadmium	100	101	75 - 125	1	20		
Chromium	104	104	75 - 125	0	20		
Lead	101	101	75 - 125	0	20		
Selenium	101	101	75 - 125	0	20		
Iron	107	106	75 - 125	1	20		
Potassium	102	98	75 - 125	4	20		
Magnesium	101	100	75 - 125	1	20		
Sodium	104	102	75 - 125	2	20		

Calculations are performed before rounding to avoid round-off errors in calculated results.

Client: Envirologic International LTD. Job Number: 660-19445-1

Matrix Spike/
Matrix Spike Duplicate Recovery Report - Batch: 660-53786

Method: 6010B
Preparation: 3005A
Total Recoverable

MS Lab Sample ID:	660-19583-F-1-B MS	Analysis Batch: 660-53961	Instrument ID: TJA ICP TRACE
Client Matrix:	Water	Prep Batch: 660-53786	Lab File ID: 7K26A
Dilution:	1.0		Initial Weight/Volume: 50 mL
Date Analyzed:	11/26/2007 1127		Final Weight/Volume: 50 mL
Date Prepared:	11/21/2007 0646		

MSD Lab Sample ID:	660-19583-F-1-C MSD	Analysis Batch: 660-53961	Instrument ID: TJA ICP TRACE
Client Matrix:	Water	Prep Batch: 660-53786	Lab File ID: 7K26A
Dilution:	1.0		Initial Weight/Volume: 50 mL
Date Analyzed:	11/26/2007 1133		Final Weight/Volume: 50 mL
Date Prepared:	11/21/2007 0646		

	% Rec.						
Analyte	MS	MSD	Limit	RPD	RPD Limit	MS Qual	MSD Qual
Silver	104	104	75 - 125	0	20		
Arsenic	103	103	75 - 125	0	20		
Barium	101	101	75 - 125	0	20		
Cadmium	101	101	75 - 125	0	20		
Chromium	104	105	75 - 125	0	20		
Lead	102	103	75 - 125	0	20		
Selenium	103	104	75 - 125	1	20		
Iron	106	108	75 - 125	2	20		
Potassium	109	111	75 - 125	1	20		
Magnesium	105	106	75 - 125	0	20		
Sodium	117	121	75 - 125	1	20		

Calculations are performed before rounding to avoid round-off errors in calculated results.

Client: Envirologic International LTD. Job Number: 660-19445-1

Method Blank - Batch: 660-53534

Method: 7470A
Preparation: 7470A

Lab Sample ID: MB 660-53534/1-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 11/16/2007 1446
Date Prepared: 11/16/2007 0725

Analysis Batch: 660-53571
Prep Batch: 660-53534
Units: mg/L

Instrument ID: HydraAA Mercury Analyzer
Lab File ID: N/A
Initial Weight/Volume: 50.0 mL
Final Weight/Volume: 50.0 mL

Analyte	Result	Qual	MDL	PQL
Mercury	0.000072	U	0.000072	0.00020

Lab Control Spike/
Lab Control Spike Duplicate Recovery Report - Batch: 660-53534

Method: 7470A
Preparation: 7470A

LCS Lab Sample ID: LCS 660-53534/2-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 11/16/2007 1448
Date Prepared: 11/16/2007 0725

Analysis Batch: 660-53571
Prep Batch: 660-53534
Units: mg/L

Instrument ID: HydraAA Mercury Analyzer
Lab File ID: N/A
Initial Weight/Volume: 50.0 mL
Final Weight/Volume: 50.0 mL

LCSD Lab Sample ID: LCSD 660-53534/3-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 11/16/2007 1449
Date Prepared: 11/16/2007 0725

Analysis Batch: 660-53571
Prep Batch: 660-53534
Units: mg/L

Instrument ID: HydraAA Mercury Analyz
Lab File ID: N/A
Initial Weight/Volume: 50.0 mL
Final Weight/Volume: 50.0 mL

Analyte	% Rec. LCS	% Rec. LCSD	Limit	RPD	RPD Limit	LCS Qual	LCSD Qual
Mercury	105	108	80 - 120	2	20		

Calculations are performed before rounding to avoid round-off errors in calculated results.

Client: Envirologic International LTD. Job Number: 660-19445-1

Matrix Spike/
Matrix Spike Duplicate Recovery Report - Batch: 660-53534

Method: 7470A
Preparation: 7470A

MS Lab Sample ID:	640-14005-D-1-B MS	Analysis Batch: 660-53571	Instrument ID: HydraAA Mercury Analyze
Client Matrix:	Water	Prep Batch: 660-53534	Lab File ID: N/A
Dilution:	1.0		Initial Weight/Volume: 50.0 mL
Date Analyzed:	11/16/2007 1455		Final Weight/Volume: 50.0 mL
Date Prepared:	11/16/2007 0725		

MSD Lab Sample ID:	640-14005-D-1-C MSD	Analysis Batch: 660-53571	Instrument ID: HydraAA Mercury Analyzer
Client Matrix:	Water	Prep Batch: 660-53534	Lab File ID: N/A
Dilution:	1.0		Initial Weight/Volume: 50.0 mL
Date Analyzed:	11/16/2007 1457		Final Weight/Volume: 50.0 mL
Date Prepared:	11/16/2007 0725		

	% Rec.						
Analyte	MS	MSD	Limit	RPD	RPD Limit	MS Qual	MSD Qual
Mercury	106	105	80 - 120	1	20		

Calculations are performed before rounding to avoid round-off errors in calculated results.

Client: Envirologic International LTD. Job Number: 660-19445-1

Method Blank - Batch: 700-44556

Method: 351.2
Preparation: 351.2

Lab Sample ID: MB 700-44556/1-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 11/28/2007 1535
Date Prepared: 11/27/2007 1740

Analysis Batch: 700-44583
Prep Batch: 700-44556
Units: mg/L

Instrument ID: QUICKCHEM 8000
Lab File ID: TK112807.FDT
Initial Weight/Volume: 20 mL
Final Weight/Volume: 20 mL

Analyte	Result	Qual	MDL	PQL
TKN	0.076	I	0.040	0.20

Lab Control Spike/
Lab Control Spike Duplicate Recovery Report - Batch: 700-44556

Method: 351.2
Preparation: 351.2

LCS Lab Sample ID: LCS 700-44556/2-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 11/28/2007 1537
Date Prepared: 11/27/2007 1740

Analysis Batch: 700-44583
Prep Batch: 700-44556
Units: mg/L

Instrument ID: QUICKCHEM 8000
Lab File ID: TK112807.FDT
Initial Weight/Volume: 20 mL
Final Weight/Volume: 20 mL

LCSD Lab Sample ID: LCSD 700-44556/3-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 11/28/2007 1538
Date Prepared: 11/27/2007 1740

Analysis Batch: 700-44583
Prep Batch: 700-44556
Units: mg/L

Instrument ID: QUICKCHEM 8000
Lab File ID: TK112807.FDT
Initial Weight/Volume: 20 mL
Final Weight/Volume: 20 mL

Analyte	% Rec. LCS	% Rec. LCSD	Limit	RPD	RPD Limit	LCS Qual	LCSD Qual
TKN	100	95	75 - 125	5	40		

Calculations are performed before rounding to avoid round-off errors in calculated results.

Client: Envirologic International LTD. Job Number: 660-19445-1

Method Blank - Batch: 660-53983

Method: 353.2
Preparation: 353.2

Lab Sample ID: MB 660-53983/1
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 11/26/2007 1109
Date Prepared: 11/26/2007 1109

Analysis Batch: 660-53983
Prep Batch: N/A
Units: mg/L

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 50 mL
Final Weight/Volume: 50 mL

Analyte	Result	Qual	MDL	PQL
Nitrate Nitrite as N	0.10	U	0.10	0.50

Lab Control Spike/
Lab Control Spike Duplicate Recovery Report - Batch: 660-53983

Method: 353.2
Preparation: 353.2

LCS Lab Sample ID: LCS 660-53983/2
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 11/26/2007 1109
Date Prepared: 11/26/2007 1109

Analysis Batch: 660-53983
Prep Batch: N/A
Units: mg/L

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 100 mL
Final Weight/Volume: 100 mL

LCSD Lab Sample ID: LCSD 660-53983/3
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 11/26/2007 1109
Date Prepared: 11/26/2007 1109

Analysis Batch: 660-53983
Prep Batch: N/A
Units: mg/L

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 100 mL
Final Weight/Volume: 100 mL

Analyte	% Rec. LCS	% Rec. LCSD	Limit	RPD	RPD Limit	LCS Qual	LCSD Qual
Nitrate Nitrite as N	98	97	90 - 110	0	30		

Calculations are performed before rounding to avoid round-off errors in calculated results.

Client: Envirologic International LTD. Job Number: 660-19445-1

Matrix Spike/
Matrix Spike Duplicate Recovery Report - Batch: 660-53983

Method: 353.2
Preparation: 353.2

MS Lab Sample ID:	660-19445-1	Analysis Batch:	660-53983	Instrument ID:	No Equipment Assigned
Client Matrix:	Water	Prep Batch:	N/A	Lab File ID:	N/A
Dilution:	1.0			Initial Weight/Volume:	50 mL
Date Analyzed:	11/26/2007 1109			Final Weight/Volume:	50 mL
Date Prepared:	11/26/2007 1109				

MSD Lab Sample ID:	660-19445-1	Analysis Batch:	660-53983	Instrument ID:	No Equipment Assigned
Client Matrix:	Water	Prep Batch:	N/A	Lab File ID:	N/A
Dilution:	1.0			Initial Weight/Volume:	50 mL
Date Analyzed:	11/26/2007 1109			Final Weight/Volume:	50 mL
Date Prepared:	11/26/2007 1109				

	% Rec.						
Analyte	MS	MSD	Limit	RPD	RPD Limit	MS Qual	MSD Qual
Nitrate Nitrite as N	94	108	90 - 110	14	30		

Calculations are performed before rounding to avoid round-off errors in calculated results.

Client: Envirologic International LTD. Job Number: 660-19445-1

Method Blank - Batch: 660-53478

Method: SM 4500 H+ B
Preparation: N/A

Lab Sample ID: MB 660-53478/1
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 11/13/2007 1153
Date Prepared: N/A

Analysis Batch: 660-53478
Prep Batch: N/A
Units: SU

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: mL
Final Weight/Volume: 10 mL

Analyte	Result	Qual	NONE	NONE
pH	6.13			

Lab Control Spike - Batch: 660-53478

Method: SM 4500 H+ B
Preparation: N/A

Lab Sample ID: LCS 660-53478/2
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 11/13/2007 1153
Date Prepared: N/A

Analysis Batch: 660-53478
Prep Batch: N/A
Units: SU

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: mL
Final Weight/Volume: 10 mL

Analyte	Spike Amount	Result	% Rec.	Limit	Qual
pH	6.00	6.000	100	98 - 102	

Calculations are performed before rounding to avoid round-off errors in calculated results.

Client: Envirologic International LTD. Job Number: 660-19445-1

Method Blank - Batch: 660-53495

Method: SM4500 Cl-E
Preparation: N/A

Lab Sample ID: MB 660-53495/1
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 11/15/2007 1331
Date Prepared: N/A

Analysis Batch: 660-53495
Prep Batch: N/A
Units: mg/L

Instrument ID: Seal Autoanalyzer
Lab File ID: N/A
Initial Weight/Volume: mL
Final Weight/Volume: 2 mL

Analyte	Result	Qual	MDL	PQL
Chloride	3.0	U	3.0	5.0

Lab Control Spike/
Lab Control Spike Duplicate Recovery Report - Batch: 660-53495

Method: SM4500 Cl-E
Preparation: N/A

LCS Lab Sample ID: LCS 660-53495/2
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 11/15/2007 1332
Date Prepared: N/A

Analysis Batch: 660-53495
Prep Batch: N/A
Units: mg/L

Instrument ID: Seal Autoanalyzer
Lab File ID: N/A
Initial Weight/Volume: mL
Final Weight/Volume: 2 mL

LCSD Lab Sample ID: LCSD 660-53495/3
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 11/15/2007 1333
Date Prepared: N/A

Analysis Batch: 660-53495
Prep Batch: N/A
Units: mg/L

Instrument ID: Seal Autoanalyzer
Lab File ID: N/A
Initial Weight/Volume: mL
Final Weight/Volume: 2 mL

Analyte	% Rec. LCS	% Rec. LCSD	Limit	RPD	RPD Limit	LCS Qual	LCSD Qual
Chloride	102	103	90 - 110	1	30		

Calculations are performed before rounding to avoid round-off errors in calculated results.

Client: Envirologic International LTD. Job Number: 660-19445-1

Matrix Spike/
Matrix Spike Duplicate Recovery Report - Batch: 660-53495

Method: SM4500 Cl-E
Preparation: N/A

MS Lab Sample ID:	660-19133-E-1 MS	Analysis Batch: 660-53495	Instrument ID: Seal Autoanalyzer
Client Matrix:	Water	Prep Batch: N/A	Lab File ID: N/A
Dilution:	100		Initial Weight/Volume: mL
Date Analyzed:	11/15/2007 1434		Final Weight/Volume: 2 mL
Date Prepared:	N/A		

MSD Lab Sample ID:	660-19133-E-1 MSD	Analysis Batch: 660-53495	Instrument ID: Seal Autoanalyzer
Client Matrix:	Water	Prep Batch: N/A	Lab File ID: N/A
Dilution:	100		Initial Weight/Volume: mL
Date Analyzed:	11/15/2007 1435		Final Weight/Volume: 2 mL
Date Prepared:	N/A		

	% Rec.						
Analyte	MS	MSD	Limit	RPD	RPD Limit	MS Qual	MSD Qual
Chloride	67	179	90 - 110	3	30	J3	J3

Calculations are performed before rounding to avoid round-off errors in calculated results.

Serial Number 42736

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

SEVERN TRENT **STL** 660-19445

STL Tampa
6712 Benjamin Road, Suite 100
Tampa, FL 33634
Website: www.stl-inc.com
Phone: (813) 885-7427
Fax: (813) 885-7049

Alternate Laboratory Name/Location
Phone:
Fax:

11/30/2007

PROJECT REFERENCE	PROJECT NO.	PROJECT LOCATION (STATE)
Bahama Rock		BS
SAMPLER'S SIGNATURE	P.O. NUMBER	CONTRACT NO.
L Cheong		
CLIENT (SITE) PM	CLIENT PHONE	CLIENT FAX
LLOYD CHEONG	(242) 351-2490	(242) 351-9605
CLIENT NAME	CLIENT E-MAIL	
Bahama Rock		
CLIENT ADDRESS		
Walker's Cay Hwy, Freeport, G.B.I		
COMPANY CONTRACTING THIS WORK (if applicable)		
Envirologic International Ltd.		

MATRIX TYPE (COMPOSITE (C) OR GRAB (G) INDICATE): AQUEOUS (WATER), SOLID OR SEMISOLID, AIR, NONAQUEOUS LIQUID (OIL, SOLVENT,...)

REQUIRED ANALYSIS: Total nitrogen 353.2, 351.2, TN; Total Metals Mercury; 8260; 8270 - SIM; Chloride, pH; SG

SAMPLE DATE	SAMPLE TIME	SAMPLE IDENTIFICATION	AQUEOUS (WATER)	Total nitrogen 353.2, 351.2, TN (H2SO4)	Total Metals Mercury (HNO3)	8260 (HCl)	8270 - SIM (none)	Chloride, pH (none)	SG	REMARKS
Nov 12	2:50	MW-4	✓	1	1	3	2	1		
Nov 12	2:10	MW-5	✓	1	1	3	2	1		
Nov 12	1:20	MW-6	✓	1	1	3	2	1		
		Trip Blank	✓			2				

NUMBER OF CONTAINERS SUBMITTED

PAGE 1 OF 1

STANDARD REPORT DELIVERY ○
DATE DUE _____
EXPEDITED REPORT DELIVERY (SURCHARGE) ○
DATE DUE _____
NUMBER OF COOLERS SUBMITTED PER SHIPMENT:

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME
	10/16/07	1720	L Cheong Nov 13	Nov 13	1700			
RECEIVED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME
L. Cheong	11/9/07	1000		11-13-07	0930			

LABORATORY USE ONLY

RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE	TIME	CUSTODY INTACT	CUSTODY SEAL NO.	STL TAMPA LOG NO.	LABORATORY REMARKS
	11-13-07	0930	YES ○ NO ○		660-19445	4° cooler temp

Page 44 of 46

STL8240-660 (12/02)

Login Sample Receipt Check List

Client: Envirologic International LTD. Job Number: 660-19445-1

Login Number: 19445 **List Source: TestAmerica Tampa**
Creator: Volz, Charles
List Number: 1

Question	T / F/ NA	Comment
Radioactivity either was not measured or, if measured, is at or below background	N/A	
The cooler's custody seal, if present, is intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	True	
If necessary, staff have been informed of any short hold time or quick TAT needs	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	

Login Sample Receipt Check List

Client: Envirologic International LTD. Job Number: 660-19445-1

Login Number: 19445 **List Source: TestAmerica Mobile**
Creator: Isbell, Glenn **List Creation: 11/14/07 10:10 AM**
List Number: 1

Question	T / F/ NA	Comment
Radioactivity either was not measured or, if measured, is at or below background	True	
The cooler's custody seal, if present, is intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	1.9 C
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	N/A	
If necessary, staff have been informed of any short hold time or quick TAT needs	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	

APPENDIX C – PRIVATE WELL SURVEY INFORMATION SHEETS

APPENDIX D – 2003 LETTER FROM GRAND BAHAMA UTILITY COMPANY

APPENDIX E - REFERENCES

REFERENCES

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APPENDIX B

WATER RESOURCES ASSESSMENT REPORT ADDENDUM – 2008

ADDENDUM I

WATER RESOURCES ASSESSMENT
and
GROUNDWATER MODELING REPORT

Prepared for:

BAHAMA ROCK LTD. – AREA 4 PROJECT
Freeport, Grand Bahama Island

Prepared by:

R. C. Minning & Associates, Inc.
Treasure Island, Florida

August 28, 2008

Table of Contents

1.0 Freshwater Lens..... 2
2.0 Discussion 4
3.0 Private Well Survey..... 5

Tables

Table A-1: July 21, 2008 Summary of Salinity and Conductivity in Groundwater
Table A-2: August 5, 2008 Summary of Salinity and Conductivity in Groundwater
Table A-3: August 18, 2008 Summary of Salinity and Conductivity in Groundwater
Table A-4: August 19, 2008 Summary of Salinity and Conductivity in Groundwater
Table A-5: Grand Bahama Airport Rainfall Data, Jan 2008 – August 20, 2008
Table A-6: Precipitation Summary
Table A-7: August 6, 2008 Summary of Salinity and Conductivity from Private Wells

Figures

Figure A-A: Plan view of Freshwater Lens - 7/21/2008
Figure A-B: Cross Section View of Freshwater Lens A-A' - 7/21/2008
Figure A-C: Cross Section View of Freshwater Lens B-B' - 7/21/2008
Figure A-D: Plan View of Freshwater Lens - 8/05/2008
Figure A-E: Cross Section View of Freshwater Lens A-A' - 8/05/2008
Figure A-F: Cross Section View of Freshwater Lens B-B' - 8/05/08
Figure A-G: Plan view of Freshwater Lens - 8/18/2008
Figure A-H: Cross Section View of Freshwater Lens A-A' - 8/18/2008
Figure A-I: Cross Section View of Freshwater Lens B-B' - 8/18/08
Figure A-J: Plan view of Freshwater Lens - 8/19/2008
Figure A-K: Cross Section View of Freshwater Lens A-A' - 8/19/2008
Figure A-L: Cross Section View of Freshwater Lens B-B' - 8/19/08
Figure A-M: Approximate Locations of Private Wells (August 6, 2008)

1.0 Freshwater Lens

Monitoring of the freshwater lens in the vicinity of Area 4 has continued with four measuring events taking place on July 21, 2008, August 5, 2008, August 18, 2008 and August 19, 2008. During each monitoring event, conductivity and salinity measurements were made in each of the ten (10) permanent monitor wells that had been installed as part of the water resources assessment for the Area 4 Environmental Impact Assessment. The measurements were again made at one (1)-foot intervals to a depth of 50 feet in each monitor well using a YSI – Model 30 meter. The data have been developed in tabular, graphic and figure form and are presented as: **Tables A-1**, **A-2**, **A-3** and **A-4**; **Graphs A-1** through **A-10**; and, **Figures A-A** through **A-L**.

The criterion for delineating freshwater remains the same as for the original report, i.e., an overall salinity concentration of 0 – 699 ppm; and a conductivity value less than 1,300 uS/cm.

Figures A-A, A-B and **A-C** present the plan view, east-west cross section and north-south cross section, respectively, for the July 21, 2008 monitoring event. A freshwater lens is present with the long axis running through Area 4 over an approximate east-west distance of 5,480 feet between the five (5) foot thickness contour line. Since the exact boundary or area where the freshwater lens interfaces with the brackish water is not known, no zero (0) contour line was plotted. The width of the lens (north-south) was about 3,760 feet, and the thickness is about 17 feet as measured in MW-3. Rainfall for the 30 day period prior to the measurements was 4.59 inches.

Figures A-D, A-E and **A-F** present the plan view, east-west cross section and north-south cross section, respectively, for the August 5, 2008 monitoring event. A freshwater lens is present with the long axis running along the southern boundary of Area 4 over an approximate east-west distance of 6,000 feet between the five (5) foot thickness contour line. Again, since the exact boundary or area where the freshwater lens interfaces with the brackish water is not known, no zero (0) contour line was plotted. The width of the lens (north-south) was about 3,200 feet, and the thickness is about 18 feet as measured in MW-3. Rainfall for the 30 day period prior to the measurements was 3.83 inches.

Figures A-G, A-H and **A-I** present the plan view, east-west cross section and north-south cross section, respectively, for the August 18, 2008 monitoring event. The freshwater lens persists with the long axis running parallel to and just south of Area 4's southern boundary over an approximate east-west distance of 5,440 feet between the five (5) foot thickness contour line. Again, since the exact boundary or area where the freshwater lens interfaces with the brackish water is not known, no zero (0) contour line was plotted. The width of the lens (north-south) was about 3,360 feet, and the thickness is about 20 feet as measured in MW-3. Rainfall for the 30 day period prior to the measurements was 5.98 inches with 3.37 inches coming on August 18th after the readings had been made. Note that the August 18, 2008 measurements do not reflect the precipitation falling in the evening due to Tropical Storm Fay.

Figures A-J, A-K and **A-L** present the plan view, east-west cross section and north-south cross section, respectively, for the August 19, 2008 monitoring event. The freshwater lens has expanded considerably with the long axis running south of Area 4's southern boundary over an approximate east-west distance of 8,400 feet between the five (5) foot thickness contour line. Again, since the exact boundary or area where the freshwater lens interfaces with the brackish water is not known, no zero (0) contour line was plotted. The width of the lens (north-south) was about 4,080 feet, and the thickness was about 28 feet as measured in MW-7. Rainfall for the 30 day period prior to the measurements was 9.66 inches with 6.29 inches of that coming in a 24-hour period (late on August 18th to early on August 19th). The expansion of the freshwater lens is in direct response to the high intensity rainfall associated with Tropical Storm Fay.

2.0 Discussion

A comparison of the data from all seven (7) monitoring events to date (November 6-13, 2007, December 10-17, 2007, February 19-20, 2008, July 21, 2008, August 5, 2008, August 18, 2008 and August 19, 2008) continue to demonstrate the dynamic nature of the freshwater lens. A comparison will also demonstrate the response of the freshwater lens to periods of precipitation. The following table summarizes the precipitation totals for 30-days prior to the measurements made during each monitoring event.

TABLE A-6
PRECIPITATION SUMMARY

Figure	Date	Total Precipitation 30-days prior to measurements	Comments
2 H	**11/6-13/2007**	**4.08 inches**	
2 K	**12/10-17/2007**	**1.33 inches**	
2 N	**2/19-20/2008**	**3.93 inches**	**2.60 inches on 2/13/08**
A-A	**7/21/2008**	**4.59 inches**	
A-D	**8/05/2008**	**3.83 inches**	
A-G	**8/18/2008**	**5.98 inches**	**Measurements taken prior to 2.61 inches of precipitation.**
A-J	**8/19/2008**	**9.66 inches**	**6.29 inches of precipitation on 8/18-19, 2008.**

Figure 2 K in the original Water Resources Assessment and Groundwater Modeling Report (WRA-GMR) portrays the smallest freshwater lens for the monitoring period which correlates well with the lowest precipitation for the 30-days prior to the measurements. In contrast, Figure A-J shows the largest freshwater lens for the monitoring period which is directly attributable to the 6.29 inches of precipitation received in the 24-hours prior to the measurements due to Tropical Storm Fay. As stated in the original WRA-GMR: *"There will be periods of time during any particular season or year when due to changes in precipitation rates, seasonal conditions (rainy v dry), and climatic events (tropical storms or hurricanes), the size and shape (thickness and extent) of the freshwater lens will be smaller or larger than as measured in November and December 2007 and February 2008, and as predicted by the model."* The data collected during the July and August 2008 monitoring events continue to support those relationships.

3.0 Private Well Survey

A Private Well monitoring event was conducted on August 6, 2008. The well locations are shown in **Figure A-M** and the data summarized in **Table A-7**. The results are consistent with the configuration of the freshwater lens as shown in **Figure A-D**. Note that the well belonging to

Mr. Kevin Fox had a salinity concentration of 3.1 parts per thousand (3,100 ppm), and Mr. Jeff Green's well had a salinity concentration of 0.8 parts per thousand (800 ppm). Based on the configuration of the freshwater lens as portrayed in **Figure A-D**, a freshwater lens was present in the vicinity of these wells. Mr. Fox notes that he obtains water from Mr. Green across the street at times due to the higher salinity in the water supply from his well. A possible explanation could be that these wells are cased and/or the intakes are too deep thus drawing water from the transition zone between the freshwater lens and the underlying salt water.

Table A-1
Summary of Salinity and Conductivity in Groundwater
July 21, 2008
Water Resource Assessment
Area 4 Environmental Impact Assessment
Bahama Rock Ltd.
Grand Bahama, Bahamas

	MW-1		MW-2		MW-3		MW-4		MW-5		MW-6		MW-7		MW-8		MW-9		MW-10	
Depth (ft.)	Conductivity (us/cm)	Salinity (ppt.)	Conductivity (us/cm)	Salinity (ppt.)	Conductivity (us/cm)	Salinity (ppt.)	Conductivity (us/cm)	Salinity (ppt.)	Conductivity (us/cm)	Salinity (ppt.)	Conductivity (us/cm)	Salinity (ppt.)	Conductivity (us/cm)	Salinity (ppt.)	Conductivity (us/cm)	Salinity (ppt.)	Conductivity (us/cm)	Salinity (ppt.)	Conductivity (us/cm)	Salinity (ppt.)
12	0	0	0	0	0	0	0	0			0	0	0	0	0	0	4660	2.5	1558	0.5
13	0	0	0	0	801	0.4	0	0			0	0	0	0	0	0	4652	2.5	3098	0.6
14	0	0	8640	4.8	797	0.4	0	0			0	0	0	0	0	0	4653	2.5	4951	1.6
15	957	0.5	8,590	4.8	801	0.4	0	0			723	0.3	828	0.4	0	0	4663	2.5	5940	2.6
16	1,820	0.9	8,570	4.8	801	0.4	590	0.3			735	0.4	821	0.4	6890	3.7	4664	2.5	6230	3.2
17	1,794	0.9	8,550	4.8	800	0.4	571	0.3			772	0.4	829	0.4	6770	3.7	4666	2.5	6230	3.4
18	1,707	0.9	8,520	4.8	799	0.4	571	0.3			805	0.4	859	0.6	6650	3.6	4667	2.5	6350	3.4
19	1,738	0.9	8,510	4.7	800	0.4	576	0.3			843	0.4	1280	0.7	6660	3.6	4678	2.5	6410	3.4
20	1,807	0.9	8,430	4.7	799	0.4	579	0.3			885	0.4	1418	0.7	6600	3.6	4697	2.5	6420	3.5
21	2,274	1.2	8,390	4.7	799	0.4	579	0.3			913	0.4	1404	0.7	6590	3.6	4707	2.5	6440	3.5
22	2,592	1.3	8,320	4.6	797	0.4	579	0.3			932	0.5	1349	0.7	6530	3.5	4722	2.5	6460	3.5
23	2,538	1.3	8,310	4.6	796	0.4	578	0.3			952	0.5	1385	0.7	6440	3.5	4734	2.5	65400	3.5
24	2,845	1.5	8,240	4.6	793	0.4	584	0.3			1061	0.5	1447	0.7	6440	3.5	4744	2.5	6590	3.5
25	2,901	1.6	8,160	4.5	791	0.4	627	0.3			1234	0.6	1458	0.7	6410	3.5	4750	2.5	6590	3.6
26	3,006	1.7	8,120	4.5	790	0.4	756	0.4			1700	0.9	1466	0.7	6320	3.4	4770	2.5	6660	3.6
27	3,149	1.7	8,100	4.5	797	0.4	1594	0.8			2107	1.1	1469	0.7	6320	3.4	4778	2.5	6290	3.7
28	3,231	1.7	8,040	4.5	850	0.4	1838	0.9			2350	1.2	1470	0.7	6280	3.4	4779	2.5	7310	4
29	3,900	2.0	8,320	4.7	959	0.5	3291	1.7			3030	1.6	1473	0.7	6160	3.3	4778	2.5	7430	4.1
30	4,421	2.4	8,440	4.7	1102	0.5	7170	4.0			4090	2.2	1473	0.7	6240	3.4	4790	2.5	7430	4.1
31	4,546	2.4	8,640	4.8	1251	0.6	9060	5.1			4750	2.5	1474	0.7	6,220	3.4	4793	2.5	7430	4.1
32	4,813	2.6	8,720	4.9	1318	0.7	9720	5.5			5870	3.2	1466	0.7	6,200	3.3	4805	2.5	7430	4.1
33	5,910	3.3	8,970	5.0	1836	0.9	10020	5.6			6290	3.4	1462	0.7	6,170	3.3	4790	2.6	7420	4.1
34	13,710	8.1	8,990	5.0	2184	1.1	10630	6.0			6,430	3.5	1460	0.7	6,160	3.3	4,793	2.5	7,420	4.1
35	13,440	7.8	8,990	5.0	3134	1.6	11060	6.4			6,490	3.5	1460	0.7	6,130	3.3	4,805	2.6	7,420	4.1
36	13,280	7.7	8,990	5.0	7,040	3.8	11440	6.5			6,500	3.5	1452	0.7	6,110	3.3	4,797	2.5	7,420	4.1
37	13,400	7.8	9,010	5.0	7,160	3.9	11,430	6.5			6,510	3.5	1,452	0.7	6,070	3.3	4,807	2.5	7,430	4.1
38	13,430	7.8	9,000	5.0	7,130	3.9	11,420	6.5			6,520	3.5	1,456	0.7	6,070	3.3	4,822	2.5	7,440	4.1
39	13,460	7.8	8,970	5.0	7,060	3.9	11,420	6.5			6,500	3.5	1,459	0.7	6,030	3.2	4,809	2.5	7,470	4.1
40	13,470	7.8	8,920	5.0	7,240	4.0	11,400	6.5			6,500	3.5	1,464	0.7	5,980	3.2	4,809	2.5	7,410	4.1
41	13,490	7.8	8,920	5.0	7,780	4.3	11,430	6.5			6,500	3.5	1,472	0.7	5,960	3.2	4,816	2.5	7,430	4.1
42	13,500	7.8	8,920	5.0	8,350	4.6	11,360	6.5			6,500	3.5	2,049	1.1	5,980	3.2	4,873	2.5	7,430	4.1
43	13,600	7.9	8,890	5.0	8,440	4.7	11,380	6.5			6,480	3.5	7,080	3.9	5,930	3.2	4,878	2.5	7,440	4.1
44	13,540	7.9	8,880	5.0	8,470	4.7	1,110	6.8			6,480	3.5	7,950	4.4	5,930	3.2	4,878	2.5	8,020	4.4
45	13,750	7.9	8,880	4.9	8,490	4.7	15,860	9.3			6,500	3.5	9,440	5.4	5,250	2.8	4,848	2.5	9,450	5.3
46	16,200	9.6	8,710	4.9	8,840	4.9	16,080	9.4			6,650	3.6	9,760	5.5	5,170	2.8	4,861	2.5	12,110	6.9
47	16,280	9.6	8,680	4.8	11,270	6.2	15,440	9.1			6,650	3.6	9,660	5.4	5,180	2.8	4,857	2.5	13,630	7.8
48	16,250	9.6	8,580	4.8	13,190	7.5	21,130	12.7			6,720	3.7	9,330	5.2	5,190	2.8	4,853	2.5	14,920	8.6
49	16,410	9.7	8,570	4.8	13,510	7.7	21,400	12.8			6,680	3.7	9,450	5.3	6,000	3.2	4,844	2.5	16,490	9.6
50	16,430	9.7	14,000	8.1	14,140	8.1	21,830	13.1			7,230	4	9,450	5.3	6,750	3.7	4,853	2.5	18,260	10.5

Notes - Measured from Top of Casing All wells sampled July 21. 2008
Well MW-5 vandalized and obstruction in well at 11.0 feet

Table A-2
Summary of Salinity and Conductivity in Groundwater
August 5, 2008
Water Resource Assessment
Area 4 Environmental Impact Assessment
Bahama rock Ltd.
Grand Bahama, Bahamas

	MW-1		MW-2		MW-3		MW-4		MW-5		MW-6		MW-7		MW-8		MW-9		MW-10	
Depth (ft.)	Conductivity (us/cm)	Salinity (ppt.)	Conductivity (us/cm)	Salinity (ppt.)	Conductivity (us/cm)	Salinity (ppt.)	Conductivity (us/cm)	Salinity (ppt.)	Conductivity (us/cm)	Salinity (ppt.)	Conductivity (us/cm)	Salinity (ppt.)	Conductivity (us/cm)	Salinity (ppt.)	Conductivity (us/cm)	Salinity (ppt.)	Conductivity (us/cm)	Salinity (ppt.)	Conductivity (us/cm)	Salinity (ppt.)
12	0	0	0	0	0	0	0	0	1011	0.5	0	0	0	0	0	0	5910	3.1	0	0
13	0	0	0	0	0	0	0	0	981	0.5	0	0	0	0	0	0	5940	3.2	1225	0.6
14	0	0	9910	5.6	791	0.4	0	0	994	0.5	0	0	803.00	0.4	0	0	5990	3.2	7220	4.4
15	7640	4.2	9,980	5.6	808	0.4	0	0	1016	0.5	704	0.3	789	0.4	0	0	6010	3.2	9160	5.1
16	7,580	4.2	10,010	5.7	813	0.4	0	0	1035	0.5	683	0.3	793	0.4	6540	3.6	6020	3.2	9170	5.1
17	7,550	4.2	10,080	5.7	814	0.4	513	0.2	1103	0.5	689	0.3	801	0.4	7940	4.3	6030	3.2	9150	5.1
18	8,560	4.8	10,150	5.7	806	0.4	514	0.2	1198	0.6	707	0.3	987	0.5	8000	4.4	6040	3.2	9150	5.1
19	12,840	7.4	10,190	5.8	803	0.4	516	0.3	1259	0.6	716	0.3	1725	0.9	8010	4.4	6050	3.3	9150	5.1
20	14,820	8.7	10,240	5.8	795	0.4	522	0.3	1437	0.7	724	0.4	1945	1.0	8020	4.4	6060	3.3	9140	5.1
21	17,450	10.4	10,250	5.8	794	0.4	528	0.3	1599	1.0	736	0.4	1976	1.0	8160	4.5	6060	3.3	9250	5.1
22	18,600	11.1	10,290	5.8	795	0.4	544	0.3	1986	1.0	748	0.4	2008	1.0	8230	4.5	6060	3.3	9140	5.1
23	19,000	11.4	10,320	5.8	795	0.4	554	0.3	2244	1.2	750	0.4	2010	1.0	8280	4.5	6060	3.3	9140	5.1
24	19,380	11.6	10,360	5.9	794	0.4	571	0.3	2558	1.3	758	0.4	2042	1.0	8330	4.6	6100	3.3	9120	5.1
25	20,010	11.9	10,390	5.9	791	0.4	576	0.3	2976	1.6	766	0.4	2505	1.0	8360	4.6	6120	3.3	9120	5.0
26	20,040	12.1	10,480	5.9	789	0.4	581	0.3	3331	1.7	776	0.4	2503	1.0	8410	4.6	6140	3.3	9100	5.0
27	20,040	12.0	10,560	6.0	788	0.4	612	0.3	3380	1.8	789	0.4	2604	1.0	8460	4.7	6160	3.3	9100	5.0
28	19,460	11.7	10,610	6.0	787	0.4	1,236	0.6	3387	1.8	798	0.4	2503	1.0	8500	4.7	6160	3.3	9100	5.0
29	19,730	11.8	10,560	6.0	795	0.4	1,590	1.2	3450	1.8	816	0.4	2500	1.0	8530	4.7	6180	3.3	9100	5.0
30	19,990	12.0	10,700	6.1	960	0.5	2,399	2.8	3498	1.8	864	0.4	2035	1.0	8580	4.7	6180	3.3	9100	5.0
31	20,030	12.0	10,810	6.1	1165	0.6	5,280	5.1	3,517	1.8	1,100	0.5	2032	1.0	8,650	4.8	6180	3.3	9090	5.0
32	20,310	12.2	10,980	6.2	1383	0.7	9,110	6.1	3,535	1.9	1,934	1.0	2030	1.0	8,690	4.8	6190	3.3	9060	5.0
33	20,900	12.6	11,060	6.3	1890	1.0	10,780	6.4	3,537	1.9	5310	2.9	2040	1.0	8,710	4.8	6200	3.3	9030	5.0
34	22,790	13.8	11,090	6.3	2464	1.3	11,290	6.5	3,537	1.9	6,000	3.2	2063	1.0	8,760	4.8	6190	3.3	9020	5.0
35	23,080	14.1	11,080	6.3	4000	2.2	11,490	7.1	3,539	1.9	6,060	3.3	2081	1.1	8,810	4.9	6,190	3.3	8,970	5.0
36	23,260	14.2	11,140	6.3	7,330	4.0	12,350	7.3	3,541	1.9	6,080	3.3	6260	3.4	8,840	4.9	6,200	3.3	8,960	5.0
37	23,320	14.2	11,160	6.4	7,840	4.3	12,780	7.4	3,532	1.9	6,080	3.3	14,430	8.6	8,920	4.9	6,200	3.3	8,930	4.9
38	23,340	14.2	11,170	6.4	790	4.3	12,970	7.5	3,541	1.9	6,090	3.3	15,140	8.8	8,940	4.9	6,180	3.3	8,900	4.9
39	23,380	14.2	11,190	6.4	8,010	4.3	13,050	7.5	3,539	1.9	6,090	3.3	15,170	8.8	8,950	5.0	6,190	3.3	8,800	4.9
40	23,410	14.3	11,220	6.4	8,010	4.4	13,080	7.5	3,532	1.9	6,090	3.3	15,190	8.8	9,010	5.0	5,980	3.2	87,800	4.8
41	23,450	14.3	11,250	6.4	9,050	4.9	13,090	7.5	3,514	1.8	6,080	3.3	15,190	8.8	9,040	5.0	5,980	3.2	8,770	4.8
42	23,480	14.3	11,420	7.1	9,610	5.3	13,130	7.5	3,490	1.8	6,090	3.3	15,190	8.8	9,060	5.0	5,910	3.0	8,780	4.8
43	23,390	14.3	12,410	8.1	9,780	5.4	13,250	7.6	3,466	1.8	6,080	3.3	15,160	8.8	9,060	5.0	5,930	3.2	8,780	4.9
44	22,200	13.5	14,020	8.2	9,830	5.5	13,820	7.8	3,492	1.8	6,090	3.3	15,190	8.8	9,130	5.0	6,300	3.3	11,330	6.4
45	21,250	12.8	14,180	8.5	9,910	5.5	17,680	10.4	3,501	1.8	6,130	3.3	15,160	8.8	9,220	5.2	6,330	3.4	12,420	7.1
46	20,850	12.6	14,600	8.7	10,430	5.9	18,000	10.5	3,540	1.9	6,260	3.4	15,200	8.8	9,500	5.4	6,780	3.6	17,640	10.3
47	20,850	12.6	14,990	8.9	12,070	6.7	19,200	11.2	3,773	2.0	6,370	3.5	15,200	8.8	9,480	5.4	7,420	4.0	19,640	11.6
48	20,930	12.6	15,210	9.6	13,320	7.6	22,590	13.6	7,340	4.0	6,400	3.5	15,240	8.9	9,940	5.5	7,710	4.4	22,870	13.9
49	20,840	12.6	16,210	12.6	13,630	7.8	22,890	13.8	11,600	6.6	6,410	3.5	15,340	8.9	10,630	6.0	11,250	6.3	29,520	18.1
50	22,260	13.6	20,590	14.1	13,700	7.9	23,280	14.1	16,800	9.8	6,420	3.5	15,630	8.8	11,000	6.2	23,600	14.2	34,960	22.5

Notes - Measured from Top of Casing
Well MW-5 vandalized and obstruction in well at 11.0 feet
retrieved 3 ft long 2X4 wood plank out of borehole

Table A-3
Summary of Salinity and Conductivity in Groundwater
August 18, 2008
Water Resource Assessment
Area 4 Environmental Impact Assessment
Bahama Rock Ltd.
Grand Bahama, Bahamas

	MW-1		MW-2		MW-3		MW-4		MW-5		MW-6		MW-7		MW-8		MW-9		MW-10	
Depth (ft.)	Conductivity (us/cm)	Salinity (ppt.)	Conductivity (us/cm)	Salinity (ppt.)	Conductivity (us/cm)	Salinity (ppt.)	Conductivity (us/cm)	Salinity (ppt.)	Conductivity (us/cm)	Salinity (ppt.)	Conductivity (us/cm)	Salinity (ppt.)	Conductivity (us/cm)	Salinity (ppt.)	Conductivity (us/cm)	Salinity (ppt.)	Conductivity (us/cm)	Salinity (ppt.)	Conductivity (us/cm)	Salinity (ppt.)
11	0	0	0	0	0	0	0	0	826	0.4	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	826	0.4	0	0	0	0	0	0	5470	2.9	493.1	0.2
13	0	0	0	0	824	0.4	0	0	828	0.4	0	0	0	0	0	0	5470	2.9	1165	0.6
14	0	0	9650	5.4	790	0.4	0	0	832	0.4	947	0.5	959	0.5	0	0	5470	2.9	3664	1.9
15	2110	1.1	9,650	5.4	791	0.4	0	0	834	0.4	981	0.5	979	0.5	0	0	5470	2.9	4226	2.2
16	2,098	1.1	9,700	5.5	792	0.4	494.8	0.2	847	0.4	1223	0.6	1006	0.5	7470	4.1	5460	2.9	4715	2.5
17	1,032	1.0	9,650	5.4	792	0.4	495.4	0.2	863	0.4	1456	0.7	1012	0.5	7570	4.1	5460	2.9	5310	2.8
18	1,965	1.0	9,620	5.4	794	0.4	496.3	0.2	904	0.4	1834	0.9	1128	0.6	7610	4.2	5460	2.9	5680	3.0
19	2,022	1.1	9,580	5.4	794	0.4	5..	0.2	977	0.5	2299	1.2	1374	0.7	7600	4.1	5460	2.9	5830	3.1
20	2,183	1.1	9,540	5.4	788	0.4	519	0.2	1060	0.5	2582	1.3	1423	0.7	75100	4.1	5460	2.9	5920	3.2
21	4,512	2.5	9,490	5.3	784	0.4	542	0.3	1365	0.7	2808	1.4	1427	0.7	7540	4.1	5450	2.9	5950	3.2
22	3,427	1.8	9,440	5.3	781	0.4	547	0.3	1748	0.8	2990	1.6	1430	0.7	7480	4.1	6060	2.9	6000	3.2
23	3,800	2.0	9,380	5.3	781	0.4	565	0.3	2416	1.2	3517	1.8	1429	0.7	7440	4.0	5460	2.9	6020	3.2
24	4,073	2.2	9,210	5.2	780	0.4	584	0.3	3232	1.7	4299	2.3	1430	0.7	7410	4.0	5450	2.9	6050	3.2
25	4,290	2.3	9,250	5.2	780	0.4	643	0.3	3529	1.9	4778	2.5	1427	0.7	7390	4.0	5440	2.9	6080	3.2
26	4,506	2.4	9,240	5.2	780	0.4	699	0.3	3620	1.9	5020	2.7	1429	0.7	7400	4.0	5420	2.9	6080	3.3
27	4,677	2.5	9,250	5.2	781	0.4	1591	0.8	3718	2.0	5250	3	1428	0.7	7290	4.0	5420	2.9	6140	3.3
28	4,720	2.5	9,500	5.3	798	0.4	2,342	1.2	3786	2.0	5580	3.2	1427	0.7	7310	4.0	5400	2.9	6190	3.3
29	5,502	2.9	9,730	5.5	926	0.5	4,293	2.3	3820	2.0	5850	3.3	1427	0.7	7250	4.0	5400	2.9	6250	3.3
30	5,730	3.1	9,940	5.6	1057	0.5	7,821	4.6	3838	2.0	6010	3.3	1427	0.7	7200	3.9	5400	2.9	6330	3.4
31	6,080	3.3	10,010	5.6	1144	0.6	9,170	5.1	3,842	2.0	6,360	3.3	1427	0.7	7,150	3.9	5380	2.9	6430	3.5
32	6,160	3.4	10,050	5.7	1259	0.6	9,780	5.5	3,840	2.0	7,840	4.4	1426	0.7	7,150	3.9	5390	2.9	6530	3.5
33	8,670	4.9	10,150	5.7	1753	0.9	10,300	5.8	3,834	2.0	7910	4.4	1427	0.7	7,130	3.9	5380	2.9	6810	3.7
34	15,750	9.4	10,160	5.7	2138	1.1	10,990	6.2	3,830	2.0	7,920	4.4	1425	0.7	7,080	3.8	5360	2.9	7100	3.9
35	16,690	9.9	10,180	5.8	3588	1.4	11,500	6.5	3,827	2.0	7,920	4.4	1427	0.7	7,070	3.8	5360	2.9	7,330	4.0
36	16,790	9.9	10,160	5.7	7,560	4.1	12,300	7.0	3,830	2.0	7,910	4.3	1427	0.7	7,050	3.8	5,350	2.9	7,450	4.1
37	16,900	10.0	10,110	5.7	7,720	4.2	12,540	7.2	3,830	2.0	7,980	4.3	1,427	0.7	7,020	3.8	5,350	2.9	7,680	4.2
38	16,940	10.0	10,080	5.7	7,720	4.2	12,580	7.2	3,830	2.0	7,860	4.3	1,425	0.7	7,020	3.8	5,360	2.9	7,880	4.3
39	16,980	10.0	10,070	5.7	7,720	4.2	12,590	7.2	3,825	2.0	7,860	4.3	1,432	0.7	6,970	3.8	5,400	2.9	8,070	4.4
40	16,970	10.0	9,970	5.6	7,750	4.3	12,640	7.2	3,827	2.0	7,860	4.3	3,556	8.8	6,940	3.7	5,260	2.9	8,220	4.5
41	16,940	10.0	9,950	5.6	8,480	4.7	12,660	7.2	3,838	2.0	7,860	4.3	11,460	1.9	6,890	3.7	5,250	2.8	8,400	4.6
42	16,940	10.0	9,940	5.6	9,340	5.2	12,650	7.2	3,835	2.1	7,860	4.3	11,850	6.5	6,870	3.7	5,180	2.8	8,540	4.7
43	16,920	10.0	10,460	5.9	9,480	5.3	12,840	7.3	3,921	2.1	7,860	4.3	12,000	6.8	6,840	3.7	5,120	2.7	8,820	4.9
44	16,920	10.0	10,460	5.9	9,540	5.3	13,600	7.8	3,940	2.1	7,880	4.4	12,430	6.9	6,550	3.5	4,940	2.6	9,100	5
45	17,010	10.0	10,460	5.9	9,550	5.3	18,660	11.1	3,982	2.1	7,920	4.4	13,380	7.1	5,960	3.2	4,900	2.6	9,350	5.2
46	18,250	10.0	10,500	5.9	9,900	5.5	18,940	11.2	7,120	3.9	7,930	4.4	13,230	7.6	5,780	3.0	4,860	2.6	9,470	5.3
47	18,770	11.2	10,570	6	13,090	7.4	20,180	12	9,720	5.5	8,010	4.4	13,180	7.6	6,990	3.8	4,810	2.5	10,590	5.9
48	18,670	11.2	10,540	6	15,000	8.6	25,660	15.6	13,120	7.5	8,010	4.5	13,180	7.6	9,190	5.1	4,980	2.6	12,480	7.1
49	18,840	11.2	10,540	6	15,500	9	25,810	15.7	17,110	10	8,420	4.6	13,180	7.6	9,630	5.3	5,780	3.1	1,360	7.8
50	18,840	11.2	17,650	10.5	16,110	9.4	26,120	15.9	34,480	21.6	8,430	4.6	13,120	7.6	9,610	5.3	18,200	10.6	15,310	8.8

Notes - Measured from Top of Casing
Rainfall weekend and scattered showers in morning Tropical Storm Fay

Table A-4
Summary of Salinity and Conductivity in Groundwater
August 19, 2008
Water Resource Assessment
Area 4 Environmental Impact Assessment
Bahama Rock Ltd.
Grand Bahama, Bahamas

	MW-1		MW-2		MW-3		MW-4		MW-5		MW-6		MW-7		MW-8		MW-9		MW-10	
Depth (ft.)	Conductivity (us/cm)	Salinity (ppt.)	Conductivity (us/cm)	Salinity (ppt.)	Conductivity (us/cm)	Salinity (ppt.)	Conductivity (us/cm)	Salinity (ppt.)	Conductivity (us/cm)	Salinity (ppt.)	Conductivity (us/cm)	Salinity (ppt.)	Conductivity (us/cm)	Salinity (ppt.)	Conductivity (us/cm)	Salinity (ppt.)	Conductivity (us/cm)	Salinity (ppt.)	Conductivity (us/cm)	Salinity (ppt.)
10	0	0	0	0	0	0	0	0	318.9	0.2	0	0	0	0	0	0	0		0	0
11	0	0	0	0	0	0	0	0	332.7	0.2	0	0	0	0	0	0	0	0	189.5	0.1
12	0	0	0	0	753	0.4	0	0	369.9	0.2	0	0	0	0	0	0	2842	1.4	186.5	0.1
13	0	0	997	0.5	754	0.4	0	0	400.4	0.2	0	0	713	0.3	0	0	3205	1.7	191	0.1
14	1856	0.9	1286	0.6	756	0.4	0	0	415.8	0.2	90.3	0.0	701	0.3	0	0	3281	1.7	451.9	0.2
15	1833	0.9	936	0.4	748	0.4	499	0.2	419.6	0.2	90.3	0.0	736	0.4	121.7	0.1	3305	1.7	644	0.3
16	1,780	0.9	1,510	0.8	755	0.4	498	0.2	426.1	0.2	90.7	0.0	756	0.4	2049	1.0	3256	1.7	1820	0.9
17	1,630	0.8	1,615	0.8	788	0.4	492	0.2	433.8	0.2	90.8	0.0	772	0.4	3546	1.9	3293	1.7	1818	0.9
18	1,575	0.8	1,646	0.8	809	0.4	491	0.2	437.4	0.2	91.0	0.0	777	0.4	4920	2.6	3297	1.7	1852	0.9
19	1,524	0.8	1,560	0.8	798	0.4	489	0.2	444.2	0.2	91.0	0.0	783	0.4	5200	2.8	3298	1.7	1858	0.9
20	1,593	0.8	1,608	0.8	812	0.4	488	0.2	460.2	0.2	91.0	0.0	786	0.4	5600	3.0	3298	1.7	1859	0.9
21	1,733	0.9	1,624	0.8	828	0.4	498	0.2	461.9	0.2	91.5	0.0	787	0.4	5780	3.1	3292	1.7	1858	0.9
22	1,803	0.9	1,646	0.8	809	0.4	510	0.2	470.3	0.2	91.1	0.0	788	0.4	5790	3.1	3298	1.7	1856	0.9
23	1,863	0.9	1,644	0.8	803	0.4	517	0.3	486.1	0.2	91.2	0.0	788	0.4	5750	3.1	3296	1.7	1856	0.9
24	1,946	1.0	1,629	0.8	787	0.4	525	0.3	494.4	0.2	92.9	0.0	786	0.4	5700	3.1	3298	1.7	1858	0.9
25	2,008	1.0	1,639	0.8	775	0.4	531	0.3	511	0.2	95.8	0.1	783	0.4	5620	3.0	3298	1.7	1861	0.9
26	2,029	1.0	1,630	0.8	745	0.4	543	0.3	522	0.3	98.5	0.1	783	0.4	5590	3.0	3298	1.7	1862	0.9
27	2,062	1.1	1,627	0.8	732	0.4	552	0.3	541	0.3	103.9	0.1	781	0.4	5550	3.0	3299	1.7	6190	0.9
28	2,106	1.1	1,619	0.8	713	0.3	556	0.3	561	0.3	106	0.1	779	0.4	5530	3.0	3300	1.7	1863	0.9
29	4,680	2.6	1,616	0.8	711	0.3	563	0.3	603	0.3	107.6	0.1	776	0.4	5550	2.9	3296	1.7	1863	0.9
30	3,436	1.8	1,608	0.8	717	0.3	570	0.3	627	0.3	114.4	0.1	770	0.4	5450	2.9	3297	1.7	1863	0.9
31	3,644	1.9	1,586	0.8	716	0.3	579	0.3	715	0.3	115	0.1	765	0.4	5,430	2.9	3294	1.7	1865	0.9
32	3,867	2.1	1,591	0.8	719	0.3	630	0.3	1,798	0.9	119	0.1	760	0.4	5,420	2.9	3294	1.7	1867	0.9
33	5,110	2.8	1,587	0.8	727	0.4	727	0.4	1,779	0.9	176.7	0.1	756	0.4	5,380	2.9	3296	1.7	1867	0.9
34	6,570	3.6	1,578	0.8	787	0.4	1,127	0.6	2,108	1.1	1,493	0.7	754	0.4	5,390	2.9	3296	1.7	1,873	0.9
35	6,570	3.6	1,511	0.8	1216	0.6	1,500	0.8	1,971	1.0	2,757	1.4	762	0.4	5,400	2.9	3295	1.7	1,878	0.9
36	6,790	3.7	1,458	0.7	1,729	0.9	1,768	0.9	1,985	1.0	3,499	1.8	790	0.4	5,370	2.9	3,292	1.7	1,928	1.0
37	6,950	3.9	1,472	0.7	1,900	1	6,210	3.3	2,008	1.0	3,678	1.9	813	0.4	5,320	2.8	3,290	1.7	1,962	1.0
38	7,100	3.9	1,467	0.7	2,500	1.3	6,270	3.6	2,022	1.0	3,520	1.9	884	0.4	5,310	2.8	3,289	1.7	2,065	1.1
39	7,040	3.9	1,483	0.7	3,525	1.8	6,500	3.5	2,039	1.0	3,516	1.8	903	0.4	5,260	2.8	3,267	1.7	2,327	1.2
40	7,090	3.9	1,485	0.7	3,190	1.6	6,400	3.5	2,053	1.0	3,449	1.8	857	0.4	5,230	2.8	3,832	1.5	3,378	1.8
41	7,100	3.9	1,488	0.7	3,145	1.6	6,430	3.5	2,066	1.1	3,458	1.8	1,437	0.9	5,220	2.8	2,847	1.4	3,769	2.0
42	7,100	3.9	1,487	0.7	3,118	1.6	6,380	3.5	2,070	1.1	3,450	1.8	1,848	1.3	5,230	2.8	2,808	1.5	3,826	2.0
43	7,110	3.9	1,487	0.7	3,106	1.6	6,380	3.5	2,089	1.1	3,396	1.8	2,413	0.8	5,180	2.8	2,837	1.5	3,898	2.0
44	7,260	4.0	1,487	0.7	3,106	1.6	6,390	3.5	2,091	1.1	3,393	1.8	1,550	1.4	5,020	2.7	2,827	1.5	3,868	2.0
45	7,630	4.7	1,487	0.7	3,112	1.6	6,380	3.5	2,094	1.1	3,374	1.8	2,764	2.3	4,730	2.5	2,823	1.4	3,861	2.0
46	11,870	6.8	1,487	0.7	3,117	1.6	6,380	3.5	2,095	1.1	3,376	1.8	4,244	2.3	4,128	2.1	2,815	1.4	3,873	2.0
47	11,390	6.5	1,490	0.7	3,126	1.6	6,370	3.5	2,095	1.1	3,367	1.8	4,272	2.3	4,271	2.2	2,806	1.4	3,875	2.0
48	11,880	6.8	1,492	0.7	3,130	1.6	6,370	3.5	2,095	1.1	3,364	1.8	4,213	2.3	4,339	2.3	2,798	1.4	3,879	2.0
49	11,620	6.7	1,494	0.7	3,130	1.6	6,360	3.5	2,104	1.1	3,356	1.7	4,266	2.3	5,640	3.0	2,803	1.4	3,877	2.0
50	11,600	6.7	1,498	0.8	3,130	1.6	6,360	3.5	14,220	8.3	3,352	1.7	4,367	2.3	6,560	3.5	2,795	1.4	3878	2.0

Notes - Measured from Top of Casing
Heavy Rainfall evening August 18 and early morning August 19, 2008 Tropical Storm Fay
MW-6 in low spot water draining into annulus of unsealed well.

Table A-5
Rainfall Records Jan - Aug 20, 2008
Grand Bahama Airport
Station 78062 (MYGF)
Freeport, Grand Bahama
Bahamas

RAINFALL RECORDS 2008

Station 78062 (MYGF) FREEPORT, G.B. **Number** **Year** 2008
Island GRAND BAHAMA **Lat** 26.5°N **Long** 78.8°W **Alt** 7'

DATE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
01	0.24						0.10					
02				0.03	T	T	0.13					
03	T		0.38				TR	0.57				
04	T	0.07						TR				
05			2.21	0.34	0.06		0.72	0.16				
06		T	0.14	1.33		0.02	0.04	0.14				
07				0.02			0.07	0.43				
08	0.04		0.08			0.02		0.11				
09	0.16	0.41			0.11		TR	0.04				
10			T			0.06						
11			0.33		0.02	0.46						
12		0.10	0.08			0.06	0.03					
13		2.60		0.22			1.57					
14			0.28	0.60		T	1.02	0.03				
15				T		1.51	0.20	0.07				
16				T		TR		1.01				
17							0.04	0.70				
18						T	0.02	2.61				
19		0.23				0.17		3.68				
20	0.01	T	0.51			T		0.33				
21	T	0.01				T						
22	0.04		0.69			0.65						
23	0.05		1.01				0.10					
24		0.44	0.49				TR					
25		0.39					0.01					
26	0.02	0.79				TR						
27	0.41											
28				0.32								
29												
30												
31												
Total	**0.97**	**5.04**	**6.20**	**2.86**	**0.19**	**2.95**	**4.05**	**9.88**	**0.00**	**0.00**	**0.00**	**0.00**
Trace	*3*	*2*	*1*	*2*	*1*	*5*	*0*	*0*	*0*	*0*	*0*	*0*
Rain Days	*8*	*9*	*11*	*7*	*3*	*8*	*13*	*13*	*0*	*0*	*0*	*0*
Total Days	**11**	**11**	**12**	**9**	**4**	**13**	**13**	**13**	**0**	**0**	**0**	**0**
Date	**0.41 24TH**	**2.60 28TH**	**2.21 23RD**	**1.33 10TH**	**0.11 07TH**	**1.51 29TH**	**1.57 04TH**	**3.68 28TH**	**0.00 26TH**	**0.00 01ST**	**0.00**	**0.00 25TH**

Envirologic's Notes: Aug 20th reading at 8:00am result. Readings taken every six hours.
August 18th -19th Tropical Storm Fay

Table A-7
Summary of Salinity and Condutivity from Private wells
August 6, 2008
Water Resource Assessment
Area 4 Environmental Impact Assesment
Bahama rock Ltd.
Grand Bahama, Bahamas

Envirologic International Limited
Environmental and Geotechnical Consulting Services
West Atlantic Drive
Freeport, Grand Bahama Island
Bahamas

Private Well Sample Results
August 6, 2008

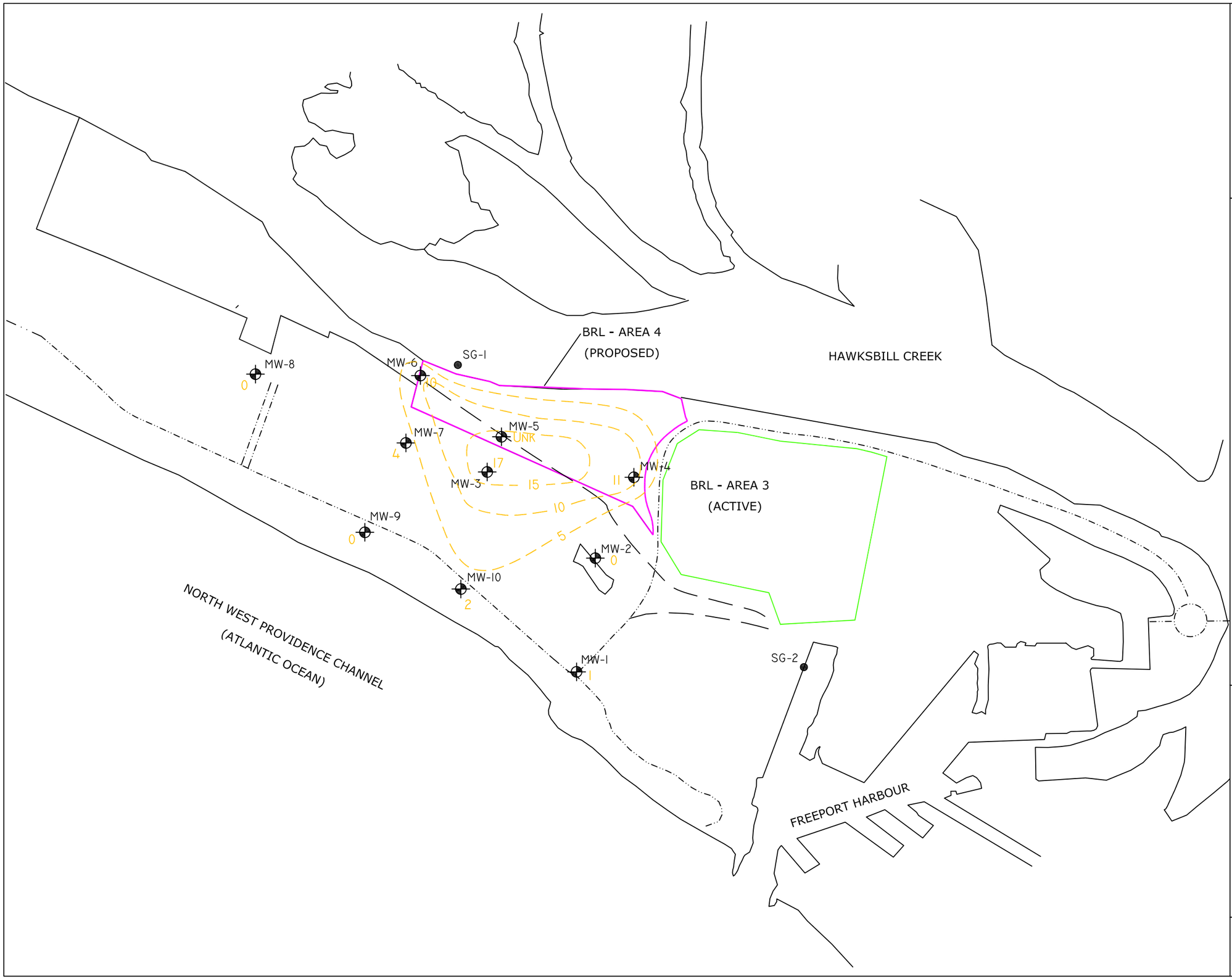
Number	Settlement	Address	Resident	City	Private	Both	Conductivity us/cm	Salinity(ppt)
1	Bartlett Hill	JRS R-13	Olive Spencer		X		889	0.4
2	Bartlett Hill	JRS R-14	Myrtle Williams		X		1081	0.5
3	Bartlett Hill	JRS - 6 Center	Claudia Bain	X	X	X	906	0.4
4	Pinedale	I-95 C-34	Keva Garland		X		766	0.4
5	Pinedale	EMRHS 2nd Street L-3	Jackie Hall		X		846	0.4
6	Pinedale	I-95 L-29	Paul Forbes		X		1172	0.5
7	Pinedale	I-95 Corner-opp. play ground	Mr. Romer		X		1150	0.5
8	Hanna Hill	Andros Town - 1St. & Lane 1	Wellington Stuart		X		1004	0.5
9	Hanna Hill	Jack Smith Road	Alfred Bethel	X	X	X	NAH	NAH
10	Hanna Hill	Andros Town - R1 Lane 2	Jennifer Louistean		X		985	0.4
11	Hanna Hill	Andros Town - First Street	Jeff Green		X		1608	0.8
12	Hanna Hill	Andros Town - First Street	Kevin Fox		X		6150	3.1
13	Hanna Hill	Sapodilla Road	Mrs, Blackey?		X		1239	0.5

Notes:

JRS - JSR- John Rolle Street
Private Well Only
Private Well and City Water

August 6, 2008 Notes:

Claudia Bain City Water and Hand Pump Water from pump is turbid
Madame Blackey - Hand pump in front of residence (Not at Home)
Kevin Fox - Gets water from Mr. Green across the street at times due to higher salinity



N

0 1000 2000 4000 feet

SCALE

FIGURE A-A

LEGEND

MW-1 - GROUNDWATER MONITOR WELL

- MAJOR ROADS/HIGHWAYS

- ACCESS ROADS

- OUTLINE OF BRL - AREA 3 (ACTIVE)

- OUTLINE OF BRL - AREA 4 (PROPOSED)

SG-2 - SURFACE WATER STAFF GAUGE

- FRESHWATER LENS THICKNESS CONTOUR

FIGURE A-A

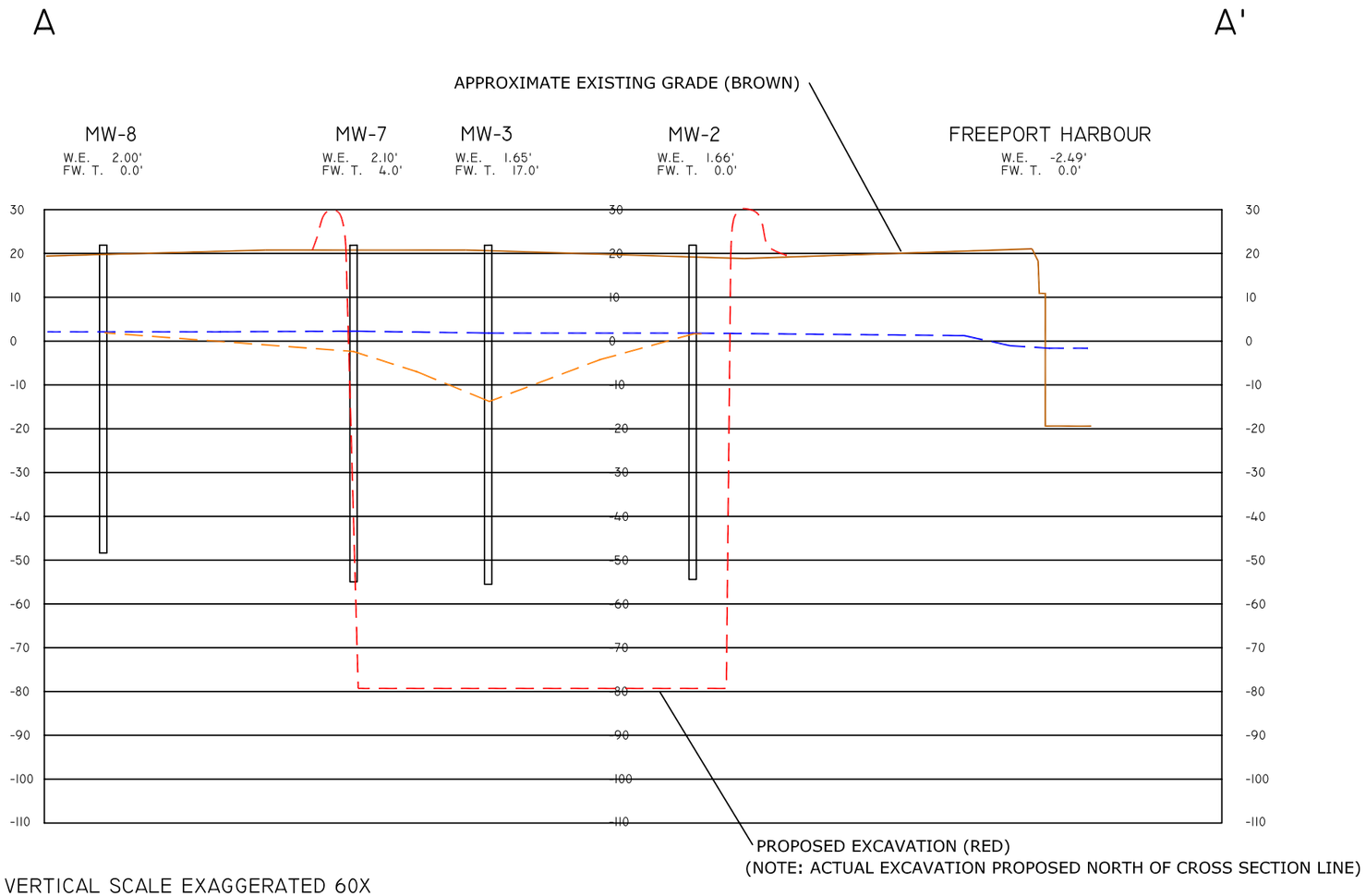
PLAN VIEW OF FRESHWATER LENS - 7/21/2008

BAHAMA ROCK, Ltd.

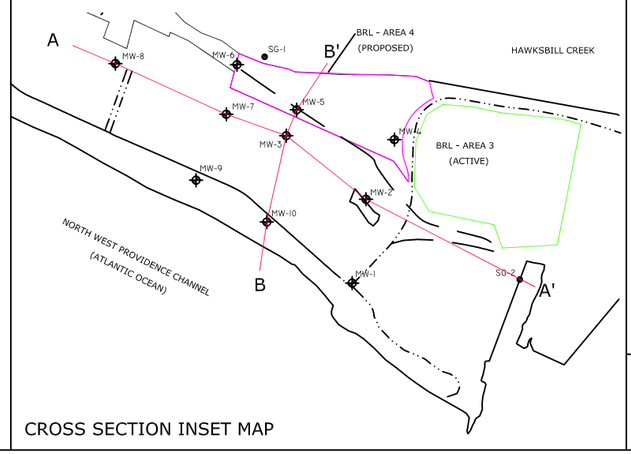
Water Resources Assessment - AREA 4 EIA

Grand Bahama, Bahamas

RCMA



VERTICAL SCALE EXAGGERATED 60X



CROSS SECTION INSET MAP

0 1000 2000 4000 feet

SCALE

FIGURE A-B

LEGEND

MW-1 - GROUNDWATER MONITOR WELL

- GROUND ELEVATION

- APPROXIMATE WATER TABLE ELEVATION

- APPROXIMATE FRESH-SALTWATER INTERFACE (BASED ON JULY 21, 2008)

- PROPOSED EXCAVATION LIMITS - BRL AREA 4 EXCAVATION PLANS

W.E. - MEASURED WATER ELEVATION

FW. T. - MEASURED FRESHWATER THICKNESS

FIGURE A-B

CROSS SECTION VIEW OF FRESHWATER LENS A-A' 7/21/2008

BAHAMA ROCK, Ltd.

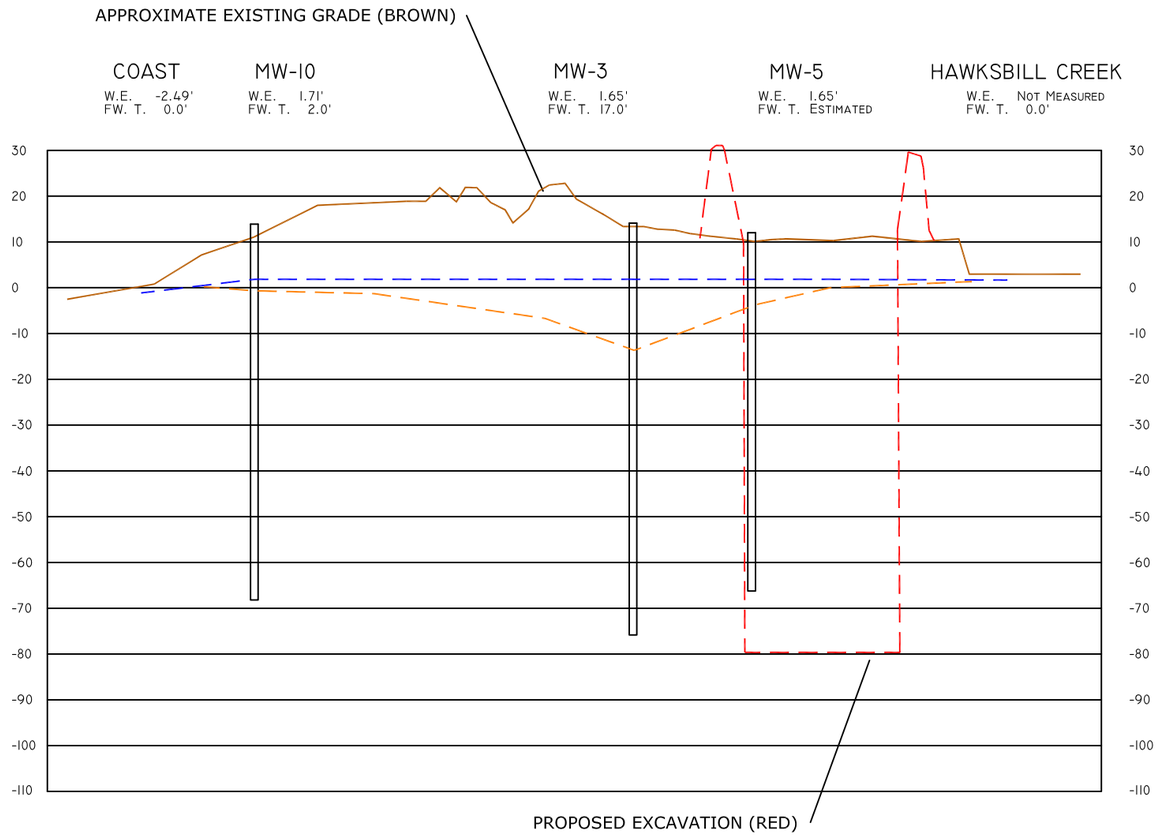
Water Resources Assessment - AREA 4 EIA

Grand Bahama, Bahamas

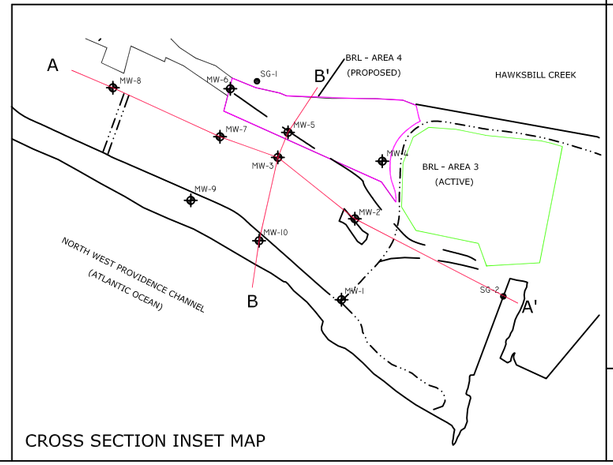
RCMA

B

B'



VERTICAL SCALE EXAGGERATED 30X



CROSS SECTION INSET MAP

0 500 1000 2000 feet

SCALE

FIGURE A-C

LEGEND

MW-1 - GROUNDWATER MONITOR WELL

- GROUND ELEVATION

- APPROXIMATE WATER TABLE ELEVATION

- APPROXIMATE FRESH-SALTWATER INTERFACE (BASED ON 7/21/2008)

- PROPOSED EXCAVATION LIMITS - BRL AREA 4 EXCAVATION PLANS

W.E. - MEASURED WATER ELEVATION

FW. T. - MEASURED FRESHWATER THICKNESS

FIGURE A-C

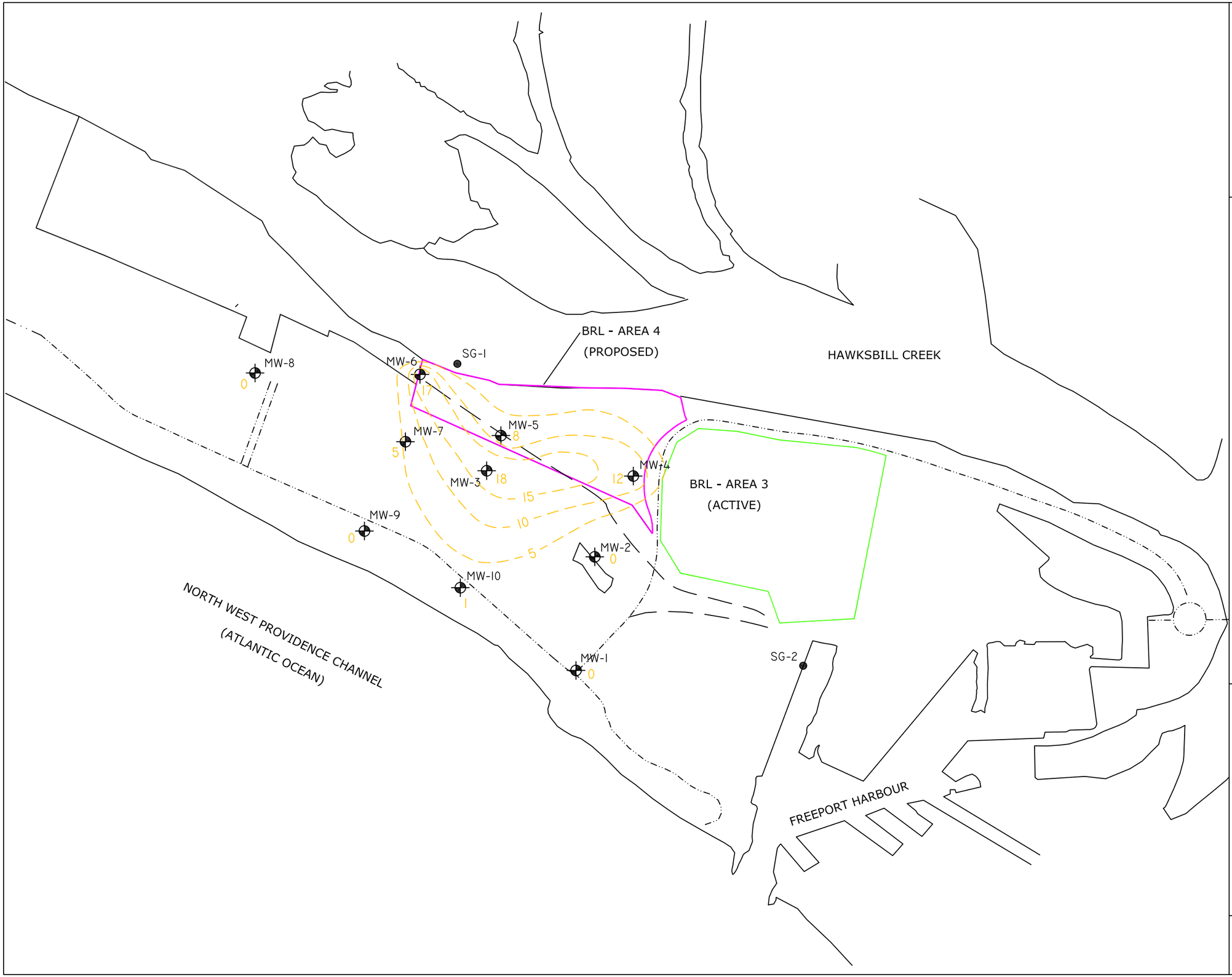
CROSS SECTION VIEW OF FRESHWATER LENS B-B' 7/21/2008

BAHAMA ROCK, Ltd.

Water Resources Assessment - AREA 4 EIA

Grand Bahama, Bahamas

RCMA



N

0 1000 2000 4000 feet

SCALE

FIGURE A-D

LEGEND

MW-1 - GROUNDWATER MONITOR WELL

- MAJOR ROADS/HIGHWAYS

- ACCESS ROADS

- OUTLINE OF BRL - AREA 3 (ACTIVE)

- OUTLINE OF BRL - AREA 4 (PROPOSED)

SG-2 - SURFACE WATER STAFF GAUGE

- FRESHWATER LENS THICKNESS CONTOUR

FIGURE A-D

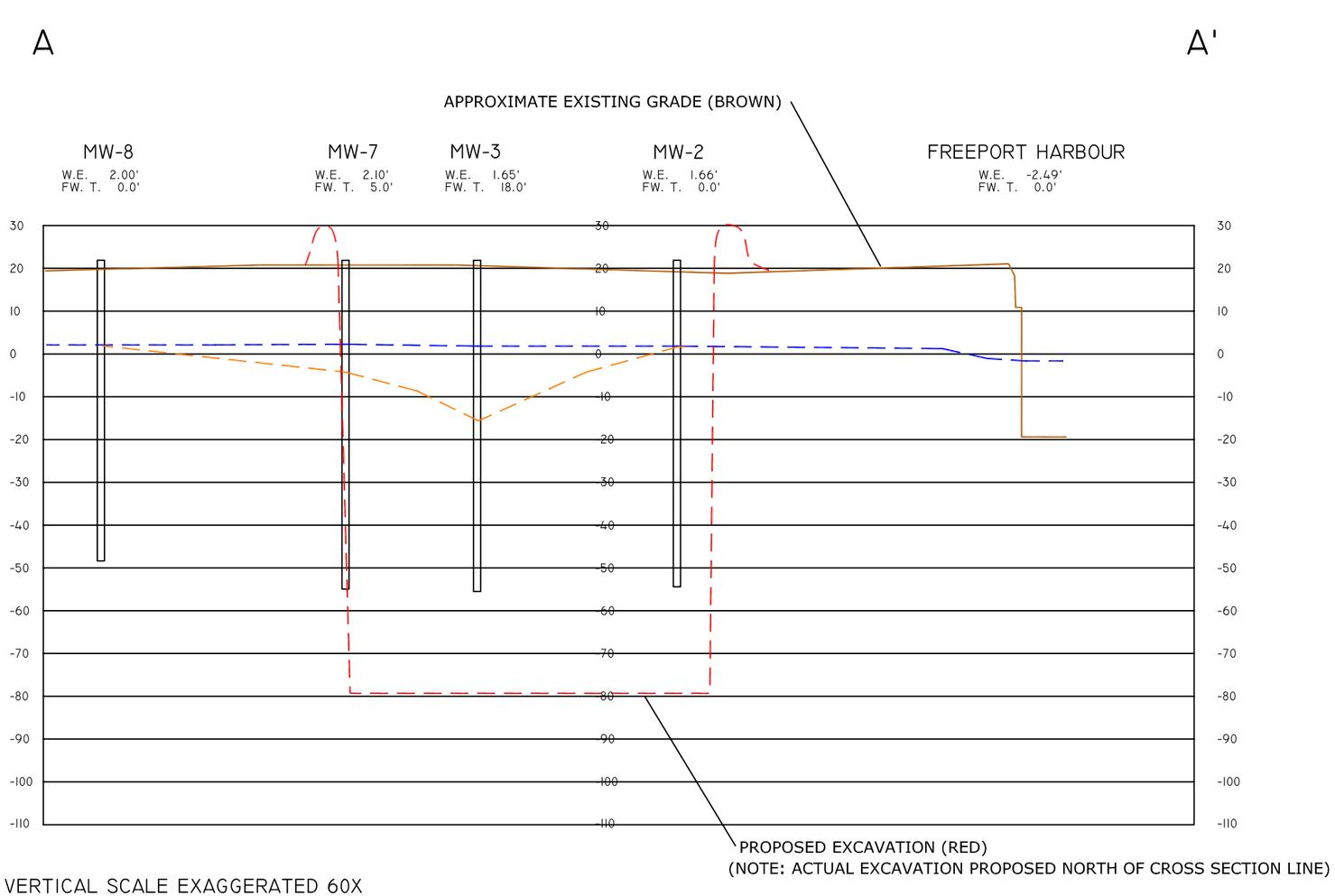
PLAN VIEW OF FRESHWATER LENS - 8/05/2008

BAHAMA ROCK, Ltd.

Water Resources Assessment - AREA 4 EIA

Grand Bahama, Bahamas

RCMA



VERTICAL SCALE EXAGGERATED 60X

0 1000 2000 4000 feet

SCALE

FIGURE A-E

LEGEND

MW-1 - GROUNDWATER MONITOR WELL

- GROUND ELEVATION

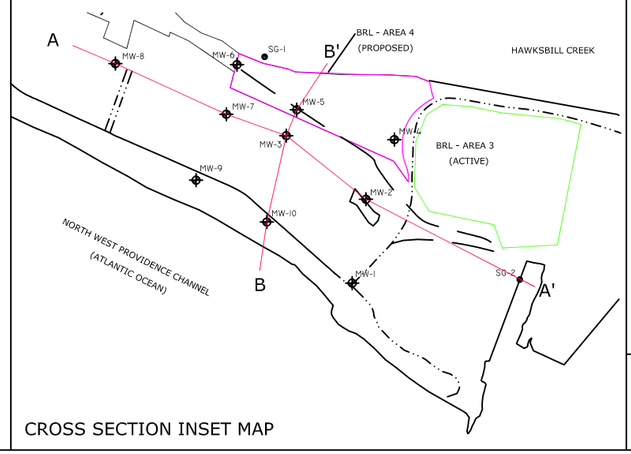
- APPROXIMATE WATER TABLE ELEVATION

- APPROXIMATE FRESH-SALTWATER INTERFACE (BASED ON AUGUST 5, 2008)

- PROPOSED EXCAVATION LIMITS - BRL AREA 4 EXCAVATION PLANS

W.E. - MEASURED WATER ELEVATION

FW. T. - MEASURED FRESHWATER THICKNESS



CROSS SECTION INSET MAP

FIGURE A-E

CROSS SECTION VIEW OF FRESHWATER LENS A-A' 8/05/2008

BAHAMA ROCK, Ltd.

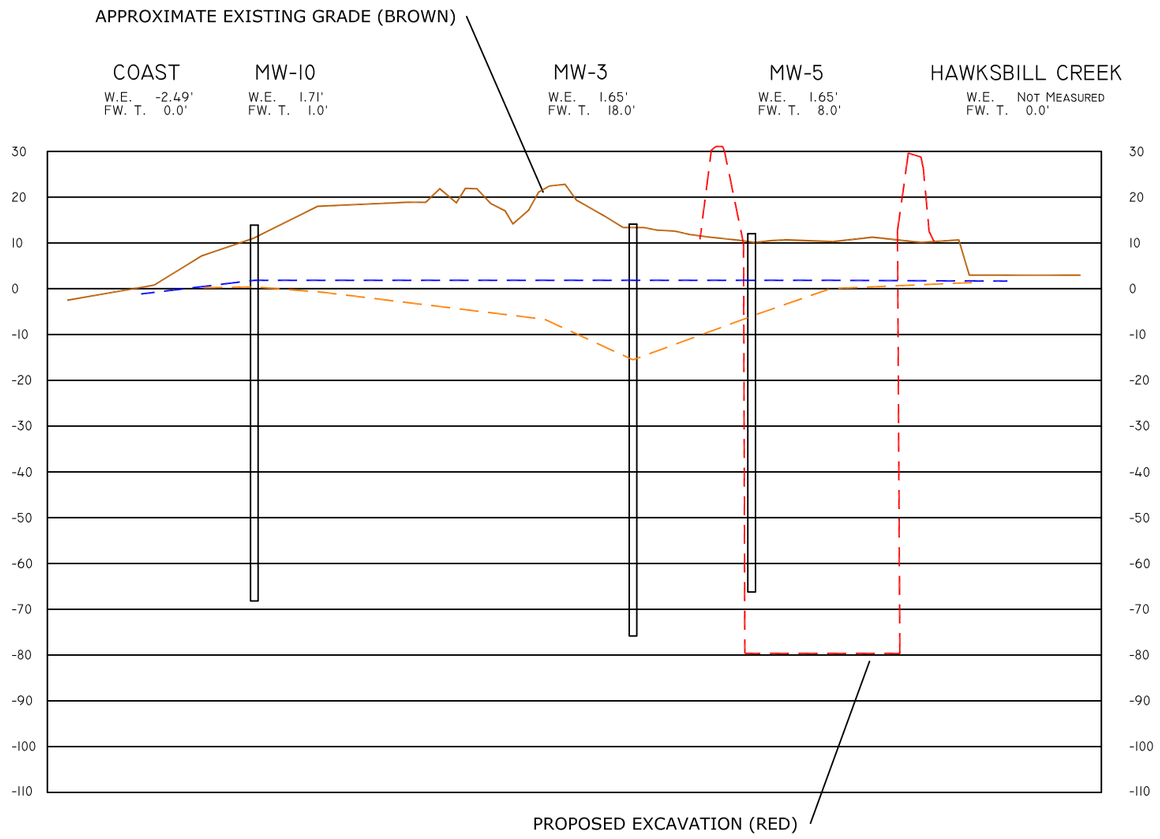
Water Resources Assessment - AREA 4 EIA

Grand Bahama, Bahamas

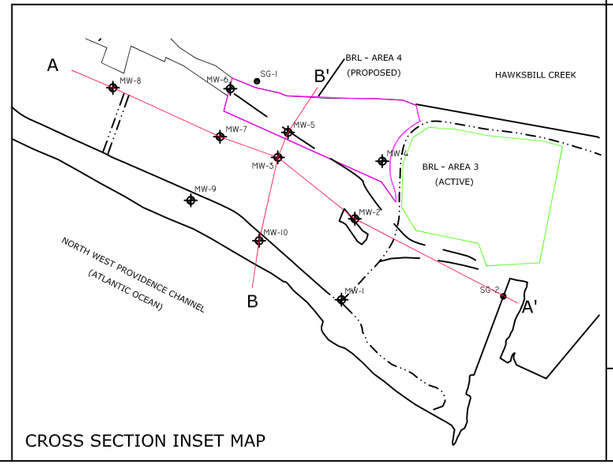
RCMA

B

B'



VERTICAL SCALE EXAGGERATED 30X



CROSS SECTION INSET MAP

0 500 1000 2000 feet

SCALE

FIGURE A-F

LEGEND

MW-1 - GROUNDWATER MONITOR WELL

- GROUND ELEVATION

- APPROXIMATE WATER TABLE ELEVATION

- APPROXIMATE FRESH-SALTWATER INTERFACE (BASED ON 8/05/2008)

- PROPOSED EXCAVATION LIMITS - BRL AREA 4 EXCAVATION PLANS

W.E. - MEASURED WATER ELEVATION

FW. T. - MEASURED FRESHWATER THICKNESS

FIGURE A-F

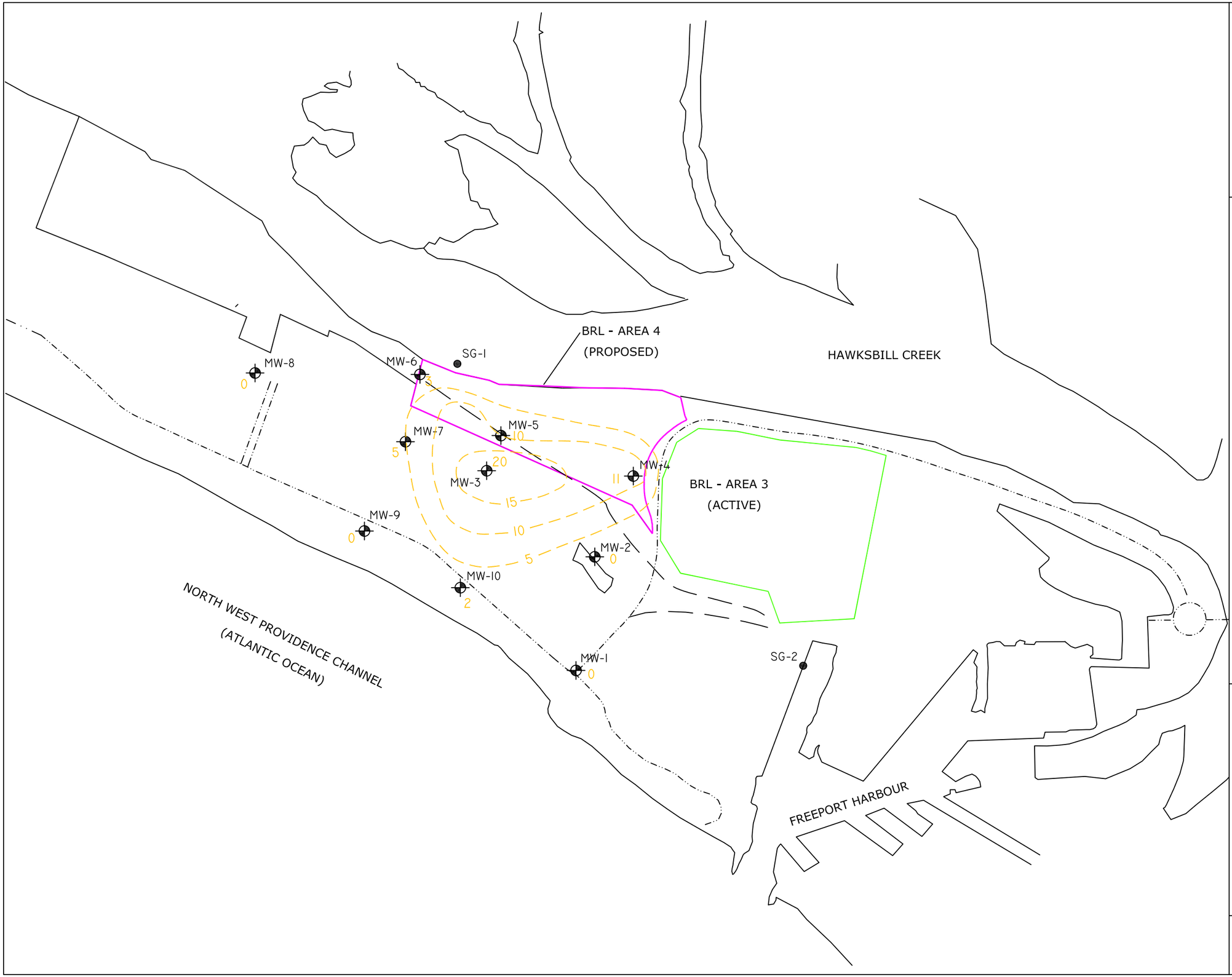
CROSS SECTION VIEW OF FRESHWATER LENS B-B' 8/05/2008

BAHAMA ROCK, Ltd.

Water Resources Assessment - AREA 4 EIA

Grand Bahama, Bahamas

RCMA



N

0 1000 2000 4000 feet

SCALE

FIGURE A-G

LEGEND

MW-1 - GROUNDWATER MONITOR WELL

- MAJOR ROADS/HIGHWAYS

- ACCESS ROADS

- OUTLINE OF BRL - AREA 3 (ACTIVE)

- OUTLINE OF BRL - AREA 4 (PROPOSED)

SG-2 - SURFACE WATER STAFF GAUGE

- FRESHWATER LENS THICKNESS CONTOUR

FIGURE A-G

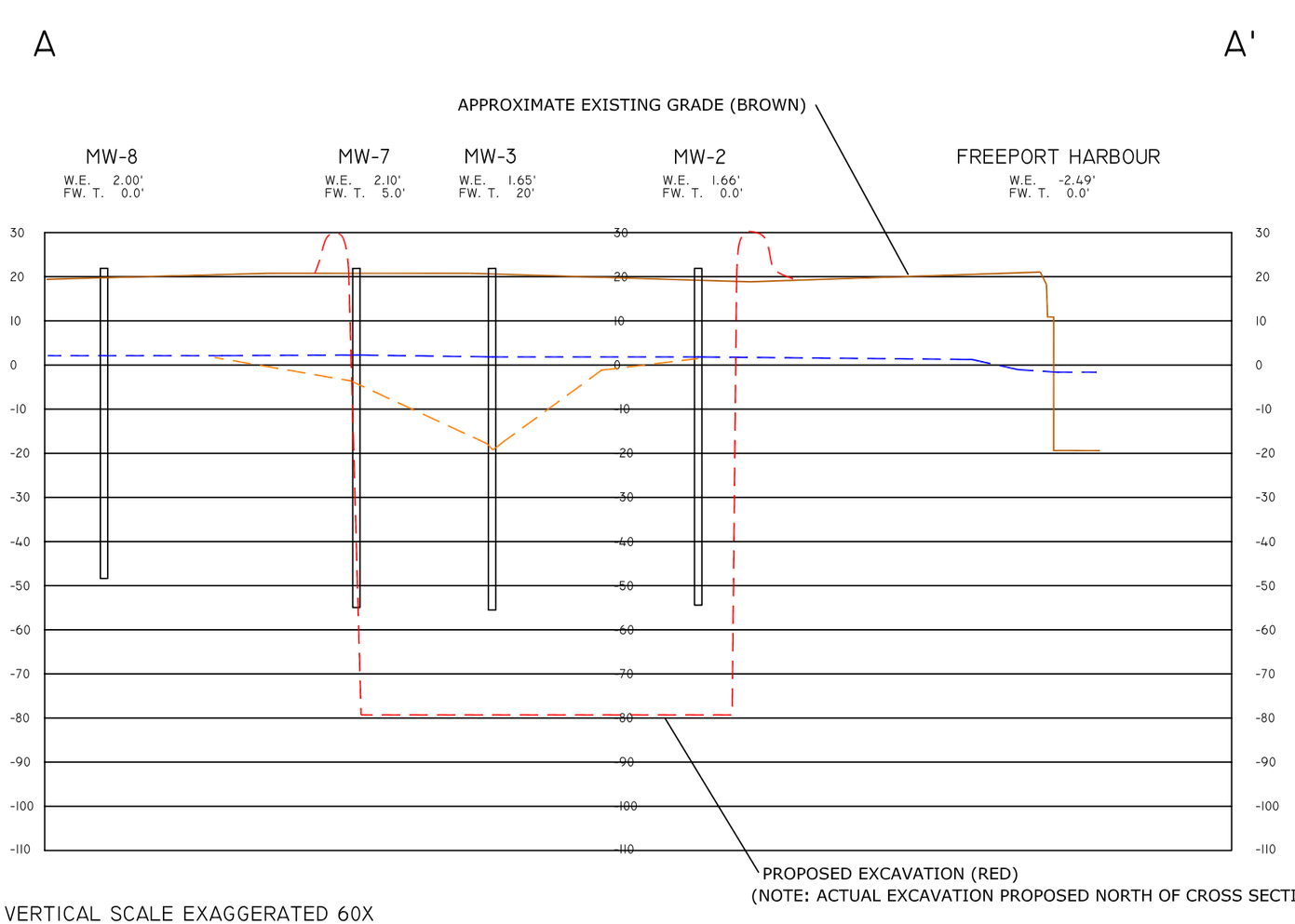
PLAN VIEW OF FRESHWATER LENS - 8/18/2008

BAHAMA ROCK, Ltd.

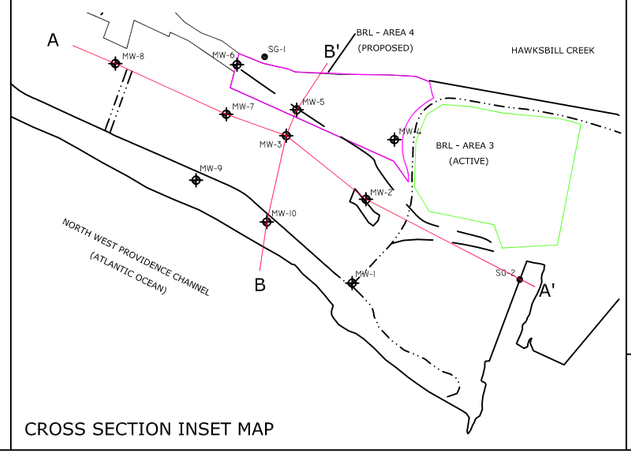
Water Resources Assessment - AREA 4 EIA

Grand Bahama, Bahamas

RCMA



VERTICAL SCALE EXAGGERATED 60X



CROSS SECTION INSET MAP

0 1000 2000 4000 feet

SCALE

FIGURE A-H

LEGEND

MW-1 - GROUNDWATER MONITOR WELL

- GROUND ELEVATION

- APPROXIMATE WATER TABLE ELEVATION

- APPROXIMATE FRESH-SALTWATER INTERFACE (BASED ON AUGUST 18, 2008)

- PROPOSED EXCAVATION LIMITS - BRL AREA 4 EXCAVATION PLANS

W.E. - MEASURED WATER ELEVATION

FW. T. - MEASURED FRESHWATER THICKNESS

FIGURE A-H

CROSS SECTION VIEW OF FRESHWATER LENS A-A' 8/18/2008

BAHAMA ROCK, Ltd.

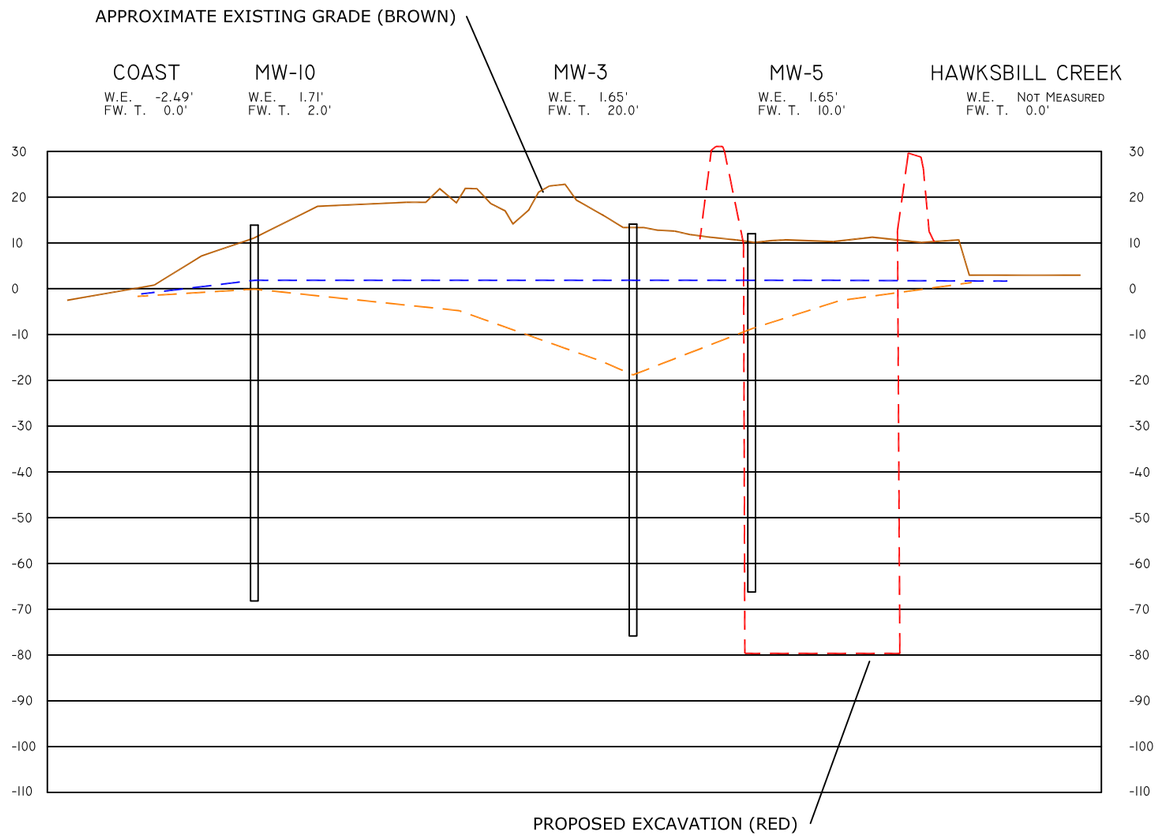
Water Resources Assessment - AREA 4 EIA

Grand Bahama, Bahamas

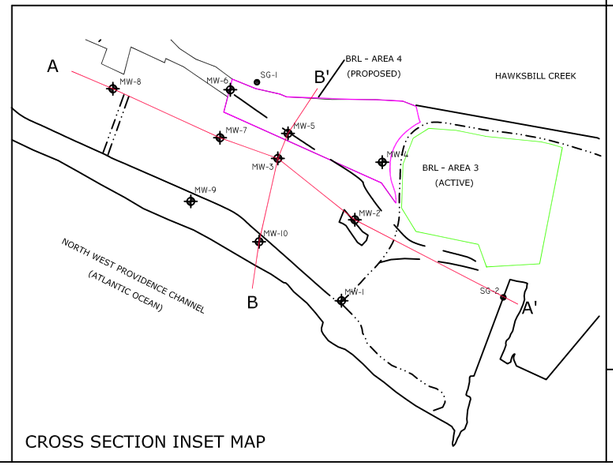
RCMA

B

B'



VERTICAL SCALE EXAGGERATED 30X



CROSS SECTION INSET MAP

0 500 1000 2000 feet

SCALE

FIGURE A-I

LEGEND

MW-1 - GROUNDWATER MONITOR WELL

- GROUND ELEVATION

- APPROXIMATE WATER TABLE ELEVATION

- APPROXIMATE FRESH-SALTWATER INTERFACE (BASED ON 8/18/2008)

- PROPOSED EXCAVATION LIMITS - BRL AREA 4 EXCAVATION PLANS

W.E. - MEASURED WATER ELEVATION

FW. T. - MEASURED FRESHWATER THICKNESS

FIGURE A-I

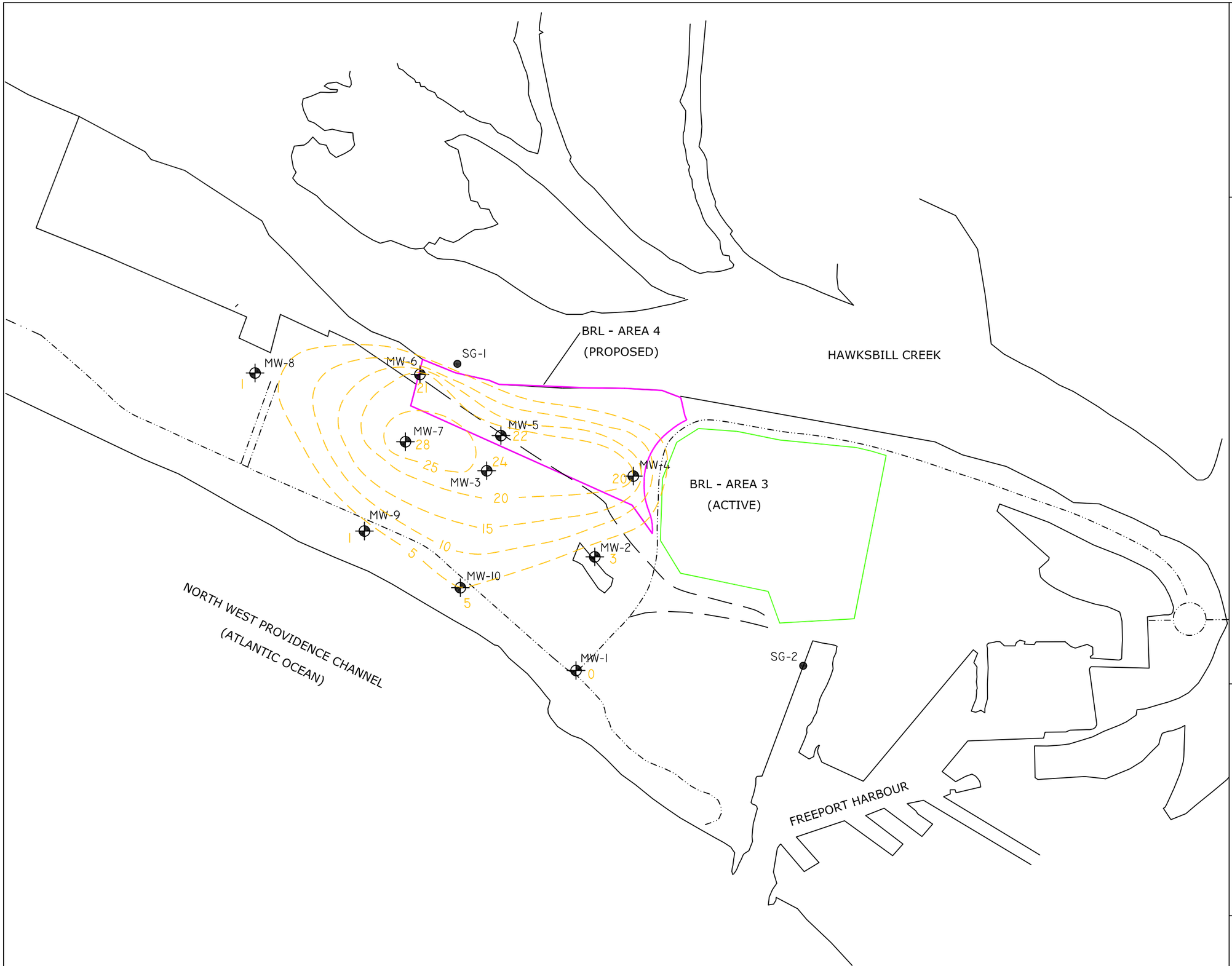
CROSS SECTION VIEW OF FRESHWATER LENS B-B' 8/18/2008

BAHAMA ROCK, Ltd.

Water Resources Assessment - AREA 4 EIA

Grand Bahama, Bahamas

RCMA



N

0 1000 2000 4000 feet

SCALE

FIGURE A-J

LEGEND

MW-1 - GROUNDWATER MONITOR WELL

- MAJOR ROADS/HIGHWAYS

- ACCESS ROADS

- OUTLINE OF BRL - AREA 3 (ACTIVE)

- OUTLINE OF BRL - AREA 4 (PROPOSED)

SG-2 - SURFACE WATER STAFF GAUGE

- FRESHWATER LENS THICKNESS CONTOUR

FIGURE A-J

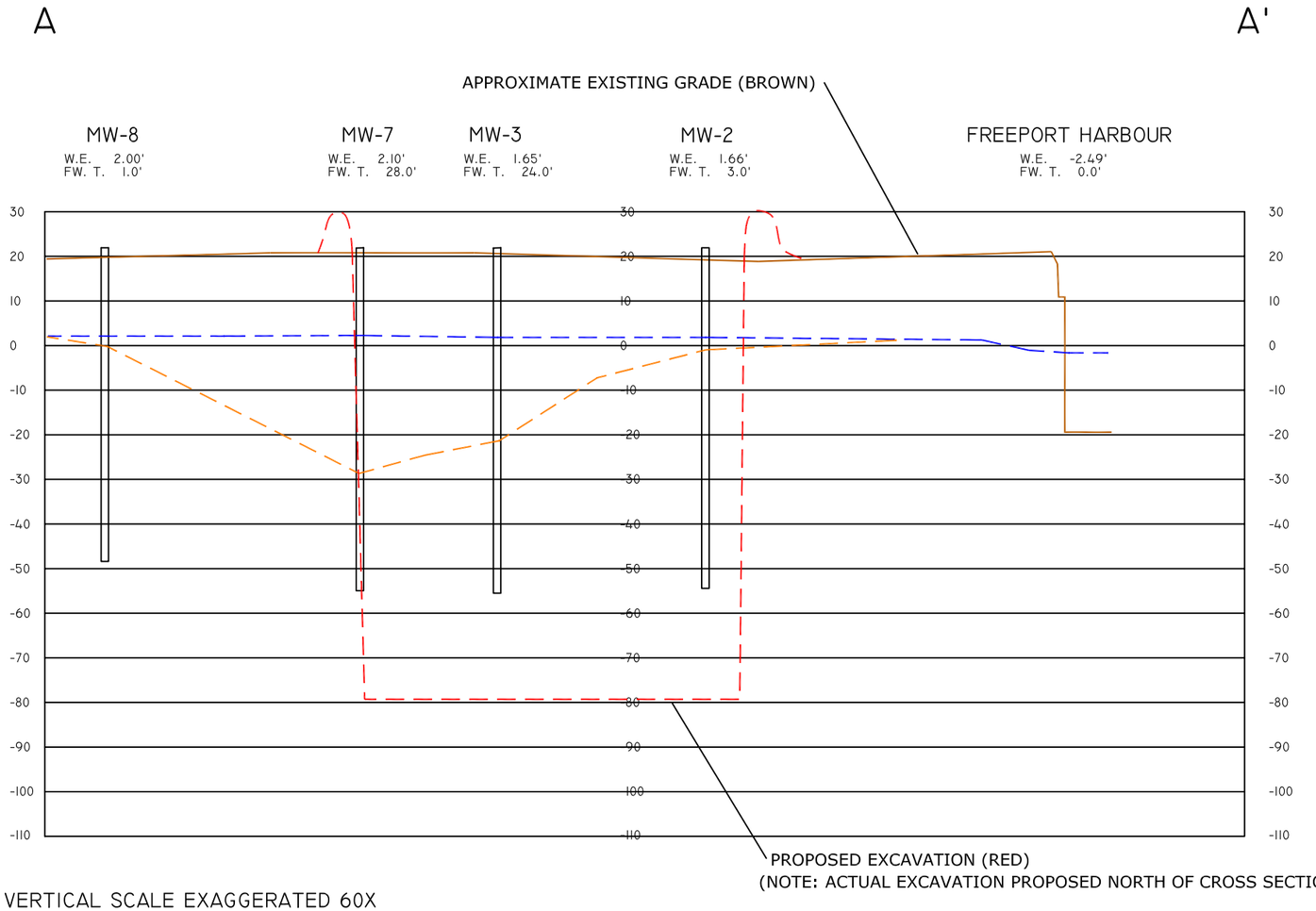
PLAN VIEW OF FRESHWATER LENS - 8/19/2008

BAHAMA ROCK, Ltd.

Water Resources Assessment - AREA 4 EIA

Grand Bahama, Bahamas

RCMA



VERTICAL SCALE EXAGGERATED 60X

0 1000 2000 4000 feet

SCALE

FIGURE A-K

LEGEND

MW-1 - GROUNDWATER MONITOR WELL

- GROUND ELEVATION

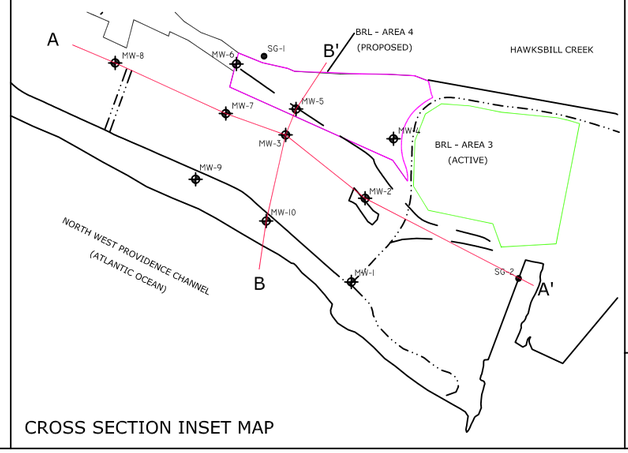
- APPROXIMATE WATER TABLE ELEVATION

- APPROXIMATE FRESH-SALTWATER INTERFACE (BASED ON AUGUST 19, 2008)

- PROPOSED EXCAVATION LIMITS - BRL AREA 4 EXCAVATION PLANS

W.E. - MEASURED WATER ELEVATION

FW. T. - MEASURED FRESHWATER THICKNESS



CROSS SECTION INSET MAP

FIGURE A-K

CROSS SECTION VIEW OF FRESHWATER LENS A-A' 8/19/2008

BAHAMA ROCK, Ltd.

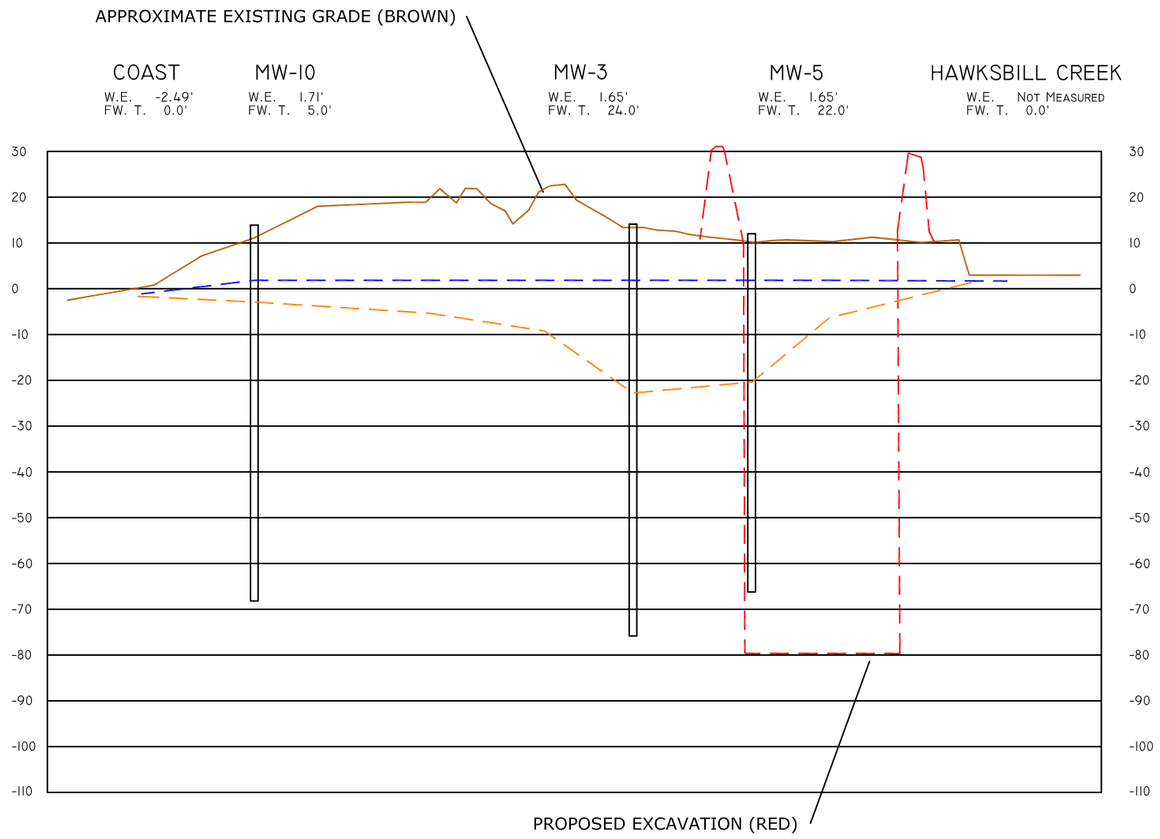
Water Resources Assessment - AREA 4 EIA

Grand Bahama, Bahamas

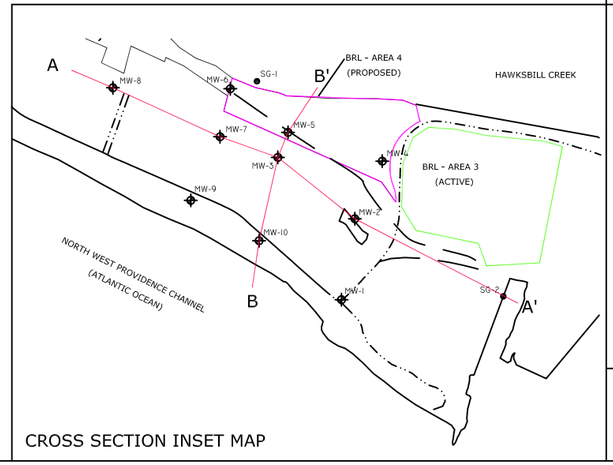
RCMA

B

B'



VERTICAL SCALE EXAGGERATED 30X



CROSS SECTION INSET MAP

0 500 1000 2000 feet

SCALE

FIGURE A-L

LEGEND

MW-1 - GROUNDWATER MONITOR WELL

- GROUND ELEVATION

- APPROXIMATE WATER TABLE ELEVATION

- APPROXIMATE FRESH-SALTWATER INTERFACE (BASED ON 8/19/2008)

- PROPOSED EXCAVATION LIMITS - BRL AREA 4 EXCAVATION PLANS

W.E. - MEASURED WATER ELEVATION

FW. T. - MEASURED FRESHWATER THICKNESS

FIGURE A-L

CROSS SECTION VIEW OF FRESHWATER LENS B-B' 8/19/2008

BAHAMA ROCK, Ltd.

Water Resources Assessment - AREA 4 EIA

Grand Bahama, Bahamas

RCMA

Hawksbill Creek
Pinedale
EMR-High School
K. Garland
P. Forbes
Romer
J. Hall
Hanna Hill
Blackey?
J. Green
J. Louistean
Bartlett Hill
K. Fox
W. Stuart
C. Bain
Harbour West
M. Williams
O. Spencer
Bahama Rock
Bahama Cement
FIGURE A-M
Water Resources Assessment
Bahama Rock Ltd.
Approximate Locations of Private Wells Sampled (August 6, 2008)
Aerial Photograph Source: Bahamas Government April 2005
Legend
- Private Well
- Private Well and City Water

APPENDIX C

DRILLERS LOGS

BCC. Martin Marietta

BRON

BRON LTD.

BORING LOG

Project No.:	
Report No.:	1
Boring:	MW 1

ELEVATION (FT)	DEPTH (FT)	STANDARD PEN. TEST ASTM D-1586			W.T.	GRAPHIC LOG	SOILS DESCRIPTION AND REMARKS	RECOVERY (IN)	RECOVERY (%)	LAB DATA		
		SAMPLE NUMBER	BLOWS/ 6 IN.	N VALUE						NM (%)	DRY DENSITY (PCF)	
	0 5	1	CORE sample				Sandstone Rock Limestone	51"	85%			RQD. 65%.
	5 10	2	CORE sample				Limestone	60"	100%			RQD. 80%.
	10 15	3	CORE sample				Limestone (Fragmented Rock)	60"	100%			RQD. 33%.
	15 20	4	CORE sample				Limestone	57"	95%			RQD 66%.
	20 25	5	CORE sample				Limestone	54"	90%			RQD. 20%.
	25 30	6	CORE sample				Limestone	60"	100%			RQD. 45%.
	30 35	7	CORE sample				Limestone	54"	90%			RQD. 50%.
	35 40	8	CORE sample				Limestone	60"	100%			RQD. 75%.
	40 45	9	CORE sample				Limestone	60"	100%			RQD 80%.

Lead Driller Name: Cesar Pacheco

Signature: Cesar Pacheco

Bec. Martin Marietta.

BRON

BRON LTD.

BORING LOG

Project No.:

Report No.: 1A

Boring: MW-1

ELEVATION (FT)	DEPTH (FT)	STANDARD PEN. TEST ASTM D-2586 SAMPLE NUMBER	BLOWS/ 6 IN	N VALUE	W.T.	GRAPHIC LOG	SOILS DESCRIPTION AND REMARKS	RECOVERY (IN)	RECOVERY (%)	LAB DATA NM (%)	LAB DATA DRY DENSITY (PCF)	
	45 50	10	CORE Sample				Limestone	57"	95%			RQD. 55%
	50 55	11	CORE Sample				Limestone coraline	60"	100%			RQD. 85%
	55 60	12	CORE Sample				coraline Limestone	60"	100%			RQD 45%
	60 65	13	CORE Sample				Limestone coraline	60"	100%			RQD 45%
	65 70	14	CORE Sample.				coraline Limestone	60"	100%			RQD 75%

Lead Driller Name: Cesar Pacheco

Signature: Cesar Pacheco

BCC. Martin Marietta.

BRON

BRON LTD.
BORING LOG

Project No.:	
Report No.:	2
Boring:	MW-1

ELEVATION (FT)	DEPTH (FT)	STANDARD PEN. TEST ASTM D-1586 SAMPLE NUMBER	BLOWS/6 IN	N VALUE	W.T. 7FT	GRAPHIC LOG	SOILS DESCRIPTION AND REMARKS	RECOVERY (IN)	RECOVERY (%)	LAB DATA NM (%)	LAB DATA DRY DENSITY (PCF)	
	70 75	15	Core Sample				Coraline. Limestone	51"	85%			RQD. 50%
	75 80	16	Core Sample				Limestone	57	95%			RQD 55%
	80 85	17	Core Sample				Limestone (Fragmented Rock)	42"	70%			
	85 90	18	Core Sample				Limestone (Fragmented Rock)	60"	100%			RQD 25%
	90 95	19	Core Sample				Limestone (Fragmented Rock)	57"	95%			
	95 100	20	Core Sample				Limestone (Fragmented Rock)	15"	25%			

Lead Driller Name: Cesar Pacheco

Signature: Cesar Pacheco.

BCC. Martin Marietta.

BRON

BRON LTD.

BORING LOG

Project No.:	
Report No.:	1
Boring:	MW-2

ELEVATION (FT)	DEPTH (FT)	STANDARD PEN. TEST ASTM D-1586			W.T.	GRAPHIC LOG	SOILS DESCRIPTION AND REMARKS	RECOVERY (IN)	RECOVERY (%)	LAB DATA		
		SAMPLE NUMBER	BLOWS/6 IN.	N VALUE						NM (%)	DRY DENSITY (PCF)	
	0 5	1	CORE Sample				Limestone and Sandstone Rock	54"	90%			RQD 36%.
	5 10	2	CORE Sample				Sandstone Rock	36"	60%			RQD 10%.
	10 15	3	CORE Sample				Sandstone Rock	45"	75%			RQD 20%.
	15 20	4	CORE Sample				Sandstone Rock	33"	55%			RQD. 0
	20 25	5	CORE Sample				Sandstone Rock	60"	100%			RQD. 45%.
	25 30	6	CORE Sample				Sandstone Rock	55"	91%.			RQD 50%.
	30 35	7	CORE Sample				Sandstone Rock	60"	100%.			RQD 50%.
	35 40	8	CORE Sample				Sandstone Rock Limestone (cave)	30"	50%			RQD 0
	40 45	9	CORE Sample				Limestone (cave)	30"	50%			RQD 15%.

Lead Driller Name: Cesar Pacheco

Signature: Cesar Pacheco.

BCC Marin Marietta

BRON

BRON LTD.

BORING LOG

Project No.:

Report No.: 2

Boring: MW-2

ELEVATION (FT)	DEPTH (FT)	STANDARD PEN. TEST ASTM D-1586 SAMPLE NUMBER	BLOWS/6 IN.	N VALUE	W.T. 21FT	GRAPHIC LOG	SOILS DESCRIPTION AND REMARKS	RECOVERY (IN)	RECOVERY (%)	LAB DATA NM (%)	LAB DATA DRY DENSITY (PCF)	
	45 50	10	CORE Sample				Limestone Sandstone Rock	60"	100%			RQD 45%.
	50 55	11	CORE Sample				Limestone.	36"	60%			RQD. 30%
	55 60	12	CORE Sample				Sandstone Rock Limestone.	45"	75%			RQD. 20%
	60 65	13	CORE Sample				Limestone (Fragmented Rock)	39"	65%			
	65 70	14	CORE Sample				Limestone Quartz	48"	80%			RQD 25%
	70 75	15	CORE Sample				Limestone Coraline.	60"	100%			RQD 60%
	75 80	16	CORE Sample				Limestone	30"	50%			RQD 30%
	80 85	17	CORE Sample				Limestone	60"	100%			RQD. 90%
	85 90	18	CORE Sample				Limestone (Fragmented Rock)	48"	80%			

Lead Driller Name: Cesar Pacheco

Signature: Cesar Pacheco

Bcc Martin Marietta.

BRON

BRON LTD.

BORING LOG

Project No.:	
Report No.:	3
Boring:	MW-2

ELEVATION (FT)	DEPTH (FT)	STANDARD PEN. TEST ASTM D-1586			W.T. 21 FT	GRAPHIC LOG	SOILS DESCRIPTION AND REMARKS	RECOVERY (IN)	RECOVERY (%)	LAB DATA	
		SAMPLE NUMBER	BLOWS/ 6 IN.	N VALUE						NM (%)	DRY DENSITY (PCF)
	90 95	19	Core Sample				Limestone (Cavern)	18"	30%		
	95 100	20	Core Sample				Limestone (Cavern)	30"	50%		

Lead Driller Name: Cesar Pacheco

Signature: Cesar Pacheco

BRON	BRON LTD. BORING LOG	Project No.:	BCC-Martin Marieta
		Report No.:	1
		Boring:	MW 3

ELEVATION (FT)	DEPTH (FT)	STANDARD PEN. TEST ASTM D-1586			W.T 11ft.	GRAPHIC LOG	SOILS DESCRIPTION AND REMARKS	RECOVERY (IN)	RECOVERY (%)	LAB DATA		RQD
		SAMPLE NUMBER	BLOWS/ 6 IN.	N VALUE						NM (%)	DRY DENSITY (PCF)	
	0 5	1	Core sample				Limestone Fragmented rock	42”	70%			20%
	5 10	2	Core sample				Limestone Fragmented rock	39”	65%			25%
	10 15	3	Core sample				Limestone Fragmented rock	36”	60%			15%
	15 20	4	Core sample				Limestone Fragmented rock	39”	65%			20%
	20 25	5	Core sample				Limestone Fragmented rock	24”	40%			
	25 30	6	Core sample				Limestone Fragmented rock	27”	45%			
	30 35	7	Core sample				Limestone Fragmented rock	36”	60%			20%
	35 40	8	Core sample				Limestone Fragmented rock	36”	60%			10%
	40 45	9	Core sample				Limestone	60”	100%			65%

Lead Driller Name: Cesar Pacheco

Signature:

BRON	BRON LTD. BORING LOG	Project No.:	BCC Martin Marietta
		Report No.:	1A
		Boring:	MW 3

ELEVATION (FT)	DEPTH (FT)	STANDARD PEN. TEST ASTM D-1586			W.T 11ft.	GRAPHIC LOG	SOILS DESCRIPTION AND REMARKS	RECOVERY (IN)	RECOVERY (%)	LAB DATA		RQD
		SAMPLE NUMBER	BLOWS/ 6 IN.	N VALUE						NM (%)	DRY DENSITY (PCF)	
	45 50	10	Core sample				Limestone	57”	95%			60%
	50 55	11	Core sample				Limestone	54”	90%			70%
	55 60	12	Core sample				Limestone	60”	100%			60%
	60 65	13	Core sample				Limestone	60”	100%			65%

Lead Driller Name: Cesar Pacheco

Signature:

APPENDIX D

LETTER FROM PRINCIPAL JONES

EIGHT MILE ROCK HIGH SCHOOL
P. O. BOX F- 42595
Martin Town, Eight Mile Rock
Grand Bahama, Bahamas
Tel: (242) 727- 4404 OR 348-3781/2 Fax: (242) 348-1235

Mr. Lloyd Cheong
Environmental Geologist/Chemist
Envirologic International

18 December, 2023

Re: Bahama Rock Ground Water Survey

To Whom It May Concern:

It was our pleasure to work with you on this project which covered two days in the afterschool hours.

Our students had quite the adventure took this on as important field research. They were pleased to hear that Bahama Rock may lend some assistance to the community in perhaps testing the well water for drinking. Of course they were interested in the money as most of them are currently paying for BJC and BGCSE examinations.

For the actual survey, especially in the Hepburn town area, we were surprised at the number of hand pumps, as this area is closer to the sea shore. Houses closer to the road appeared to have city water while those further from the road had pumps which were used for drinking. In the Bartlett Hill and Hanna Hill area, more persons had city water as there were more paved roads.

It was interesting for the students and the teachers to meet parents and children in the communities in places where we would not normally have visited. Parents were proud of the students as they did the survey wearing their school uniform. We are inspired to conduct a Social Survey of sorts, in the New Year to engage Parents in the surrounding communities.

Thanks Again!

Principal Jones

APPENDIX E

PRIVATE WELL SURVEY

Private Well Survey

Date----------

Settlement ----------

Resident----------

Person Contacted----------

Address----------

City Water ---------- **Private Well (PW)**-------- PW - Use: Drinking Water _____
Bathing _____
Other _____

Both----------

Notes:----------

Student_____ Teacher_____

Private Well Survey

Number	Location	Private well	City Water	Coment
1	Hepburn Town	1		
2	Hepburn Town	1		
3	Hepburn Town		1	
4	Bartlett Hill	1		Bathing
5	Hepburn Town	1		Other
6	Hepburn Town	1		
7	No Adress	1		
8	Hepburn Town	1		
9	Hepburn Town	1		
10	Hepburn Town	1		Bath
11	Hepburn Town	1		
12	Hepburn Town Corner		1	
13	Hepburn Town	1		
14	Hepburn Town	1		Drinking/Bath
15	Hepburn Town	1		Drinking/Bath
16	Harbour West	1		Drinking/Bath/Other
17	Harbour West	1		Drinking/Bath
18	Harbour West	1		Drinking/Bath/Other
19	Hepburn Town		1	
20	Hepburn Town		1	
21	Bartlett Hill	1	1	Both Private and City
22	Hepburn Town	1	1	Both Private and City
23	Hannah Hill	1	1	Both Private and City
24	Bartlett Hill	1	1	Both Private and City
25	Hannah Hill	1	1	Both Private and City
26	Hepburn Town	1	1	Both Private and City
27	Bartlett Hill	1	1	Both Private and City
28	Bartlett Hill	1	1	Both Private and City
29	Hepburn Town	1	1	Both Private and City
30	Hepburn Town	1		
31	Bartlett Hill	1		
32	Hepburn Town	1	1	Other Use
33	Hepburn Town	1		Other Use
34	Hepburn Town	1		
35	Harbour West	**1**	1	well not in use
Total		**31**		

BAHAMA ROCK LIMITED

Freeport, Bahamas

WATER RESOURCES ASSESSMENT

ADDENDUM

Prepared by

R. C. Minning & Associates, Inc.

10218 Tarpon Drive, Treasure Island, FL 33706

January 2024

A January 15, 2024, report on the Water Resources Assessment (WRA) for the proposed Bahama Rock Ltd. (BRL) development of the Bahama Cement Company (BCC) property has been prepared and submitted to BRL. The report presents the findings of an investigation into the potential impacts that the mining of a 256-acre portion of the BCC property could have on a freshwater lens located to the northwest. During the time the assessment was being conducted, BRL was actively engaged in the drilling and coring of the limestone bedrock to determine its quality. Twenty-four (24) boreholes were drilled and cored of which four (4) were left open, i.e., not plugged for use in the water resource assessment. The drilling/coring was done by BRON under the supervision of Mr. Dustan Charles, Associate Principal. Their locations are shown as Rock Quality Borings (RQB) in the attached Figure 1 together with the monitor wells and private wells that were used.

On January 17 and 18, 2024, groundwater salinity profiles were taken in each of the four (4) RQBs with a YSI Model 30 temperature/conductivity/meter. The measurements were made to a depth of 50 ft in RQBs 1, 3 and 4, and to 45 ft in RQB-2. The results are presented in the attached Table 1. No freshwater was detected in RQBs 1 and 3, and a one (1) foot thick layer was found in RQB-2. A sixteen-foot (16) thick freshwater layer was measured in RQB-4 which appeared anomalous considering there was virtually no freshwater in the adjacent boreholes and monitor wells. Subsequent communication with Mr. Charles revealed that approximately 1,500 gallons of water from a cistern on the BCC property were used during the drilling/coring of RQB-4 (BRON number BCC-C023). The source of the water in the cistern was reported to be rainwater which explains the anomalous sixteen (16) foot thick freshwater interval.

The information and analysis presented in this Addendum together with the January 15, 2024 WRA report confirm that there is no usable freshwater lens beneath or adjacent to the BCC property. Further, the future advancement of sea water into the 256 acre BCC parcel will have no effect on the freshwater resources in the area.

TABLE 1
RQB WELL SALINITY PROFILES
BAHAMA ROCK, Ltd.
WATER RESOURCES ASSESSMENT ADDENDUM - BCC AREA
GRAND BAHAMA, BAHAMAS

Rock Quality Borings (RQB)

	Jan 17,2024	Jan 17,2024	Jan 17,2024	Jan 18,2024
DTW	17.72'	16.44'	15.50'	17.34'
Feet	RQB -1	RQB-2	RQB-3	RQB-4
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16		0.2	7.5	
17		12.5	12.9	0.4
18	3.4	13.7	16.8	0.4
19	4.7	15.0	17.3	0.4
20	5.5	15.0	17.4	0.4
21	5.6	15.0	17.4	0.4
22	5.6	15.0	17.2	0.4
23	5.6	15.0	17.0	0.4
24	5.6	15.0	16.4	0.4
25	5.6	15.0	15.3	0.4
26	5.5	15.0	15.0	0.4
27	5.5	15.0	14.2	0.4
28	5.4	15.0	13.8	0.4
29	5.4	15.0	13.9	0.4
30	5.5	15.0	13.8	0.4
31	5.6	15.0	13.3	0.4
32	5.7	15.0	12.8	0.5
33	5.7	14.9	13.0	0.5
34	5.8	14.9	17.7	1.0
35	5.8	14.9	21.1	1.5
36	8.2	14.9	21.5	3.2
37	18.3	14.8	20.1	8.7
38	19.1	14.8	20.0	9.0
39	19.1	14.8	19.9	9.0
40	18.5	14.8	19.9	8.9
41	18.9	14.8	19.7	8.7
42	18.9	14.8	19.7	8.6
43	18.5	15	19.6	8.5
44	18.6	14.4	19.6	8.4
45	18.6	16.5	19.5	8.6
46	18.5		19.5	9.1
47	18.7		19.4	9.2
48	18.3		19.4	9.3
49	18.9		19.4	9.4
50	19.2		19.4	9.5

N

0 1000 2000 4000 feet

SCALE

FIGURE 1

LEGEND

MW-1 - GROUNDWATER MONITORING WELL

RQB-1 - SURFACE WATER STAFF GAUGE

PW-DR - PRIVATE WELL

SG-1 - SURFACE WATER STAFF GAUGE

- MAJOR ROADS/HIGHWAYS

FIGURE 1

MONITOR & PRIVATE WELL & ROCK QUALITY BORING LOCATIONS

BAHAMA ROCK, Ltd.

Water Resources Assessment - BCC Area

ADDENDUM - REPORT

Grand Bahama, Bahamas

RCMA

APPENDIX G – AMMC HISTORICAL REPORT

Site Visit Report for Bahama Rock Property, Industrial Park, Freeport, Grand Bahama

Dr. Grace Turner
Antiquities, Monuments & Museum Corporation
25 August 2023

Introduction

This archaeological site visit was conducted July 6-7, 2023. The archaeology survey team included Dr. Grace Turner, D'Andre Rolle, and Ian Martin along with Scott Johnson of BRON who led the archaeology team to the areas where there were sections of dry stone walls. The team surveyed three or four sections of dry stone walls.

Site Survey

The wall sections are surrounded by native vegetation which indicates that this area has not been cleared in at least 100 years. Dry stone walls were commonly constructed throughout The Bahama Islands since at least the 1780s when loyalist immigrants from Britain's former American colonies established cotton plantations in The Bahamas. These walls, or fences served to separate agricultural areas, keep out wandering animals, and delineate property boundaries. The following images show several sections of the dry stone walls:

Historical Assessment

The walls were constructed for a purpose. In the late 19th and early 20th centuries sisal plantations was a major agricultural enterprise on most Bahamian islands. However, on Grand Bahama lumber production was the main industry during this period. The endemic Caribbean Pine (*Pinus caribaea*, variant: *bahamensis*) is the dominant vegetation in the area. No sisal plants were noted in the area, as is usual in areas where sisal had previously been grown. A 1928 plan of this area shows Grand Bahama Properties Ltd (this company was first licensed in 1901) at the western edge of this area and a number of individual grantees (see a portion of the plan below):

Although I was able to identify the general area where the current Bahama Rock property would be located in relation to this plan, I was unable to identify the specific area and who would have controlled the property in the early 1900s. Nevertheless, it is apparent that most, if not all of these property owners likely engaged in some level of lumber production. It is my assessment that the dry stone walls were originally associated with lumber production. The traditional construction of this type stone wall, without the use of any lime or concrete mortar, would have become less common by the 1940s when new technologies and different industries became more prevalent in Grand Bahama.

Recommendations

There are several different sections of dry stone walls on this property. Though these walls are historic and were likely constructed more than 100 years ago, it is difficult to associate them with a specific property owner and associated commercial activity. This makes it challenging to make a strong argument to preserve such structures when there is new development.

APPENDIX H – FLUSHING STUDY

TECHNICAL MEMORANDUM

Date| Nov. 22, 2023
Project |2022.042
Title | Martin Marietta Modelling Study – Harbour Flushing Modelling

Harbour Flushing Assessment

1. INTRODUCTION

This technical memorandum presents the results of the ***Harbour Flushing Modelling Study*** of the Freeport Harbour for the present condition and in the future with completion of the proposed harbour expansion & aggregate mining project, in support of the Project Environmental Impact Assessment (EIA).

The harbour expansion & aggregate mining project plans to dredge / excavate an area of approx. 238.7 Acres, excluding the northern project area that will not be connected to the harbor basin. The proposed expansion will increase the harbour surface water area by 37.5% compared to the present condition, including the recently opened new basin on the eastern side, as shown in Figure 1-1.

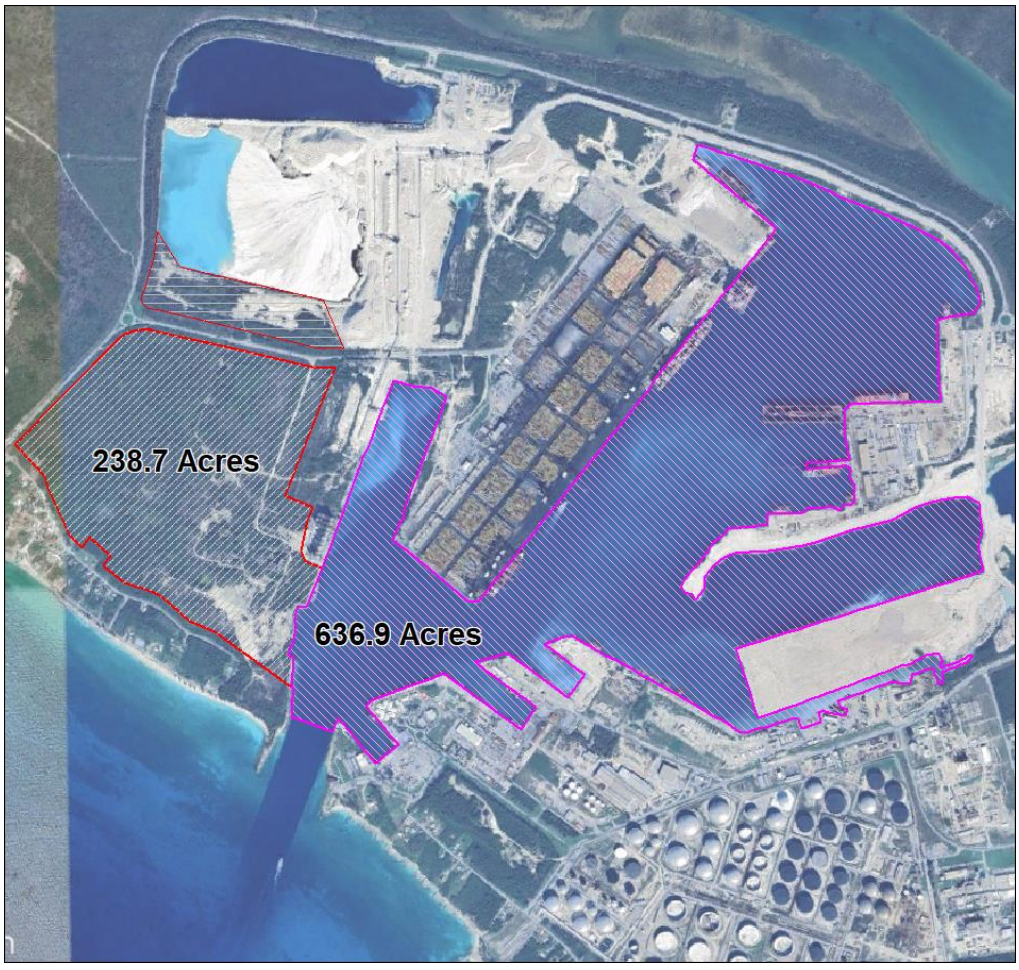


Figure 1-1: Proposed Harbour Expansion & Aggregate Mining Plan (delineated by red line)

The scope of this study is to conduct hydrodynamic and water flushing modelling to quantify water exchange of the harbour with coastal open water.

The objective of this study is to investigate the flushing performance of the proposed harbour expansion under various tide and wind conditions, to ensure turbidity and other pollutants within the confines of the proposed dredged harbour to remain inside the project area, as well as to ensure that the new harbour expansion and associated facility does not experience stagnation or water quality degradation, which could be harmful to marine life in the coastal area outside the harbour.

This study follows the PIANC guideline of "flushing time" – the time required to reduce initial pollutant concentrations within a semi-enclosed waterbody to a prescribed value. The general goal is to reach the e-folding value (1/e = 36.8% of initial tracer concentration, e=2.71828) in four days (PIANC, 2008). This criterion is consistent with the recommendation of the US Environmental Protection Agency (EPA, 2001), which recommends a complete water exchange of a basin in four days as "good", and exchange of water in ten 10 days as "fair", and "poor" if longer time was required, as shown in Table 1-1 below.

Table 1-1: US Environmental Protection Agency (EPA) Recommended Flushing Classifications

Flushing Time	Flushing Condition Classification
< =4 days	"Good"
< =10 days	"Fair"
> 10 days	"Poor"

Hydrodynamic modeling is required by DEPP for the approval of the harbour expansion project. The DEPP flushing criteria of a 90% reduction in 24 hours may apply. However, DEPP does not provide further guidance literature related to the design or extent of these investigations.

2. STUDY METHODOLOGY

2.1 Modelling Software

The 2D modelling was conducted with application of the state-of-art MIKE21 flexible mesh hydrodynamic and advection-dispersion modules (MIKE 21 HD/ADfm). MIKE 21 HD/ADfm is a modelling system for 2D free-surface flows and mass transportation. It is based on the numerical solution of the two-dimensional incompressible Reynolds averaged Navier-Stokes equations invoking the assumptions of *Boussinesq* and of hydrostatic pressure, and the advection-dispersion equation. The model consists of continuity, momentum, mass conservation, temperature, salinity and density equations and it is closed by a turbulent closure scheme. It simulates water level variations and flows and associated mass transport processes in response to a variety of forcing functions in lakes, estuaries and coastal regions. The effects and facilities include:

- bottom shear stress
- wind shear stress
- barometric pressure gradients
- Coriolis force
- momentum dispersion
- sources and sinks
- evaporation
- flooding and drying
- wave radiation stresses

The spatial discretization of the primitive equations is performed using a cell-centered finite volume method. The spatial domain is discretized by subdivision of the continuum into non-overlapping flexible unstructured elements/cells that can be triangles or quadrilateral elements. Unlike traditional grid models, the flexible mesh model can have areas of increased resolution within a single mesh file.

An explicit scheme is used for time integration.

MIKE 21 HD/ADfm is applicable to the simulation of hydraulic and environmental phenomena in lakes, estuaries, bays, coastal areas and seas.

2.2 Modelling Domains and Mesh Resolutions

The hydrodynamic model setup for this project consists of two models:

1. Regional Model
2. Local Model

A regional model covering the entire Bahamas and its adjacent waters to fully simulate the tides and wind driven currents with islands effects included (Figure 2-1) for providing open boundary condition to the local model. The resolution of the regional Bahamas model ranges from 2km in

open ocean to 500m offshore the project site and other islands, channels, and shallow areas. It is essential to resolve the island shoreline and bathymetric features for accurate simulation of tidal wave propagation.

A fine resolution local model of the Freeport with detailed shoreline bathymetric features that are important to the hydrodynamics and water exchange/flushing simulations in the project area (Figure 2-2). The local model resolution is up to 20m to resolve the approach channel (about 160m wide) and entrance and harbor basins. The local models have been setup for both the present and future conditions for assessing the impact of the project.

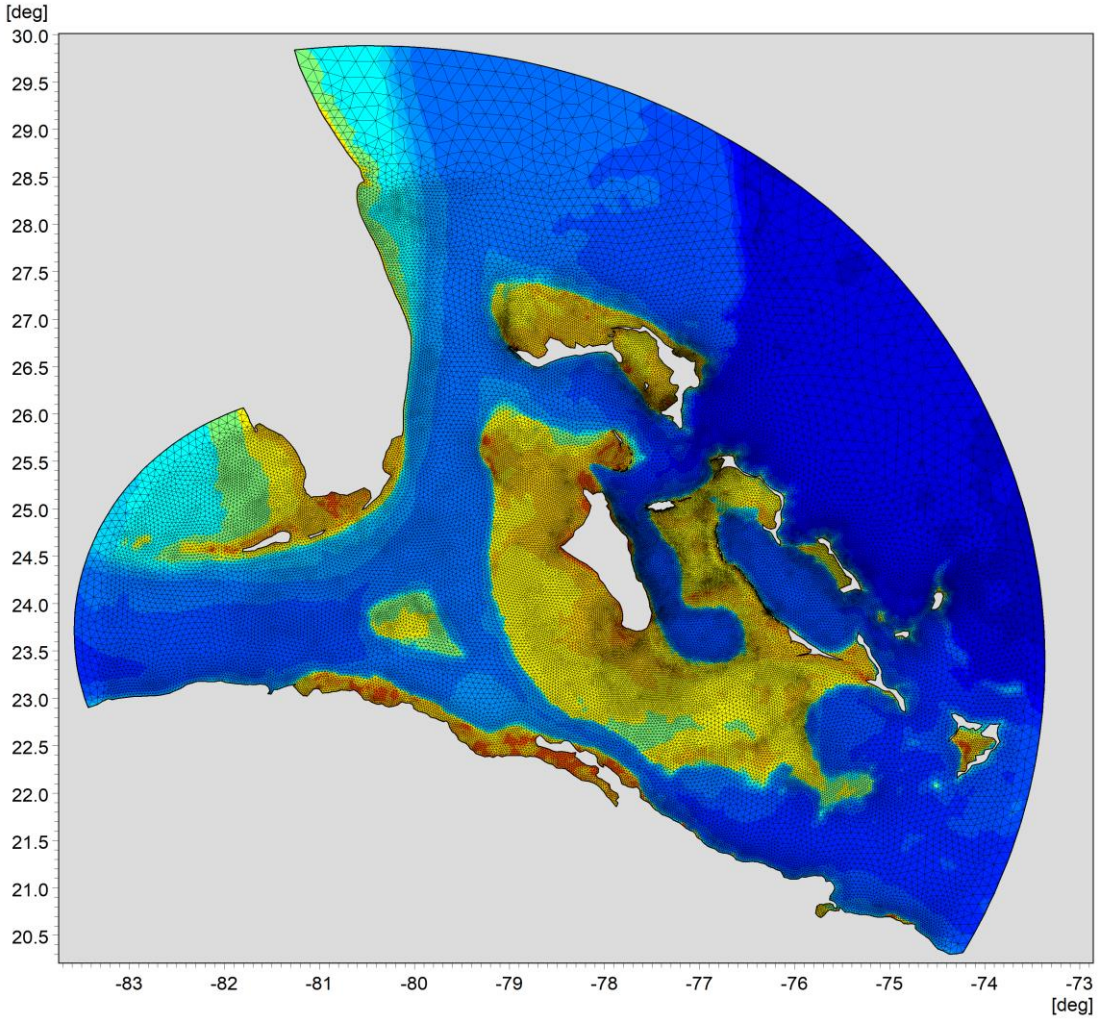


Figure 2-1: Regional Bahamas Model Domain and Mesh with Bathymetry

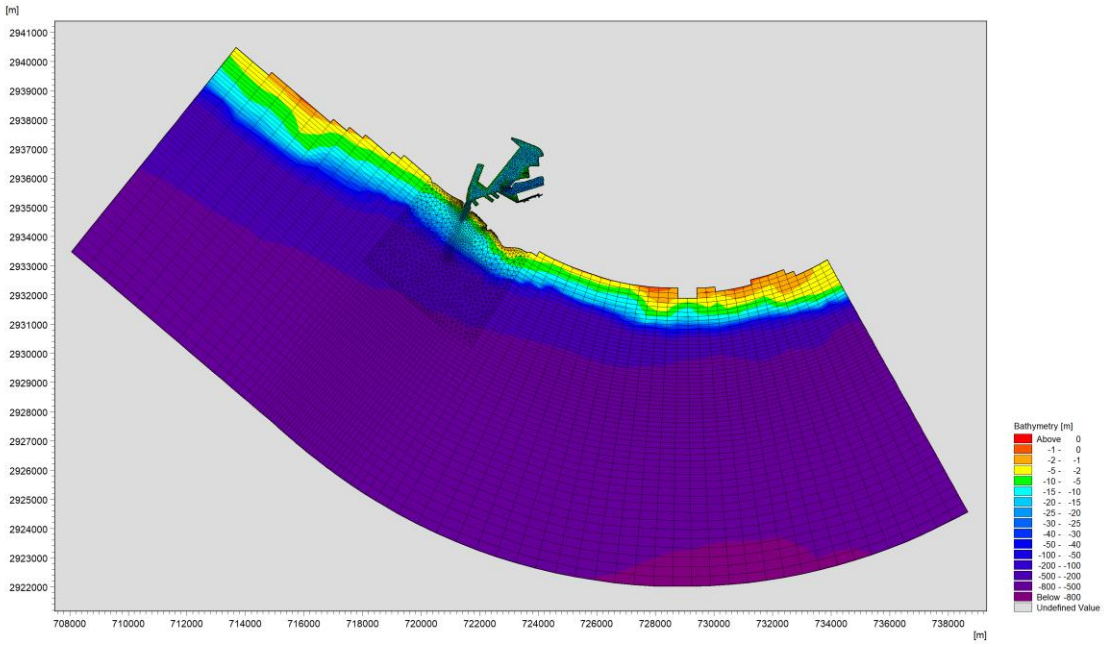


Figure 2-2: Local Freeport Model Domain and Mesh with Bathymetry

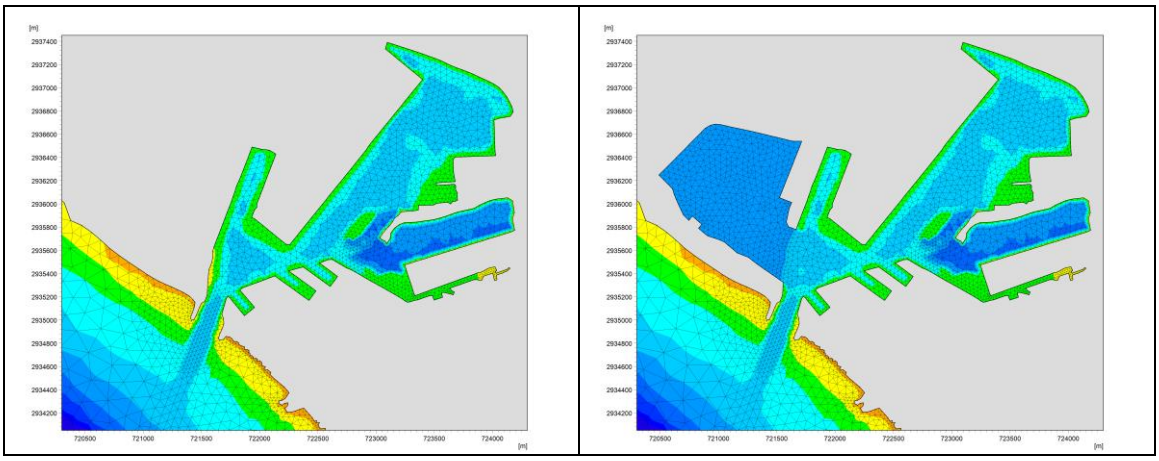


Figure 2-3: Zoom View of Local Freeport Harbour Model - Present (left) and Future (right)

2.3 Bathymetry

The bathymetry for the models is based on the following sources:

- Digital C-Map charts, which is supplemented with local charts (Figure 2-4);
- Bathymetric survey conducted by BRON covering the approach channel and surrounding coastal areas (Figure 2-5);
- Client-supplied Hydrographic Survey drawings of Freeport Harbour (only covering the new east harbour basin (Figure 2-5); and

- Planned dredging/excavation depth of the project harbour expansion area. A dredged depth of 80 ft (24.4 m) was considered in this study. It was assumed the 80 ft dredged depth is referenced to Chart Datum, which is the MLLW.

It should be noted that the proposed dredged depth of ~24 m (80 ft) is below the current Freeport Harbour entrance channel and the area adjacent to the proposed harbour expansion, which is ~ 15-16 m. This would represent the worst-case scenario for the purpose of this study.

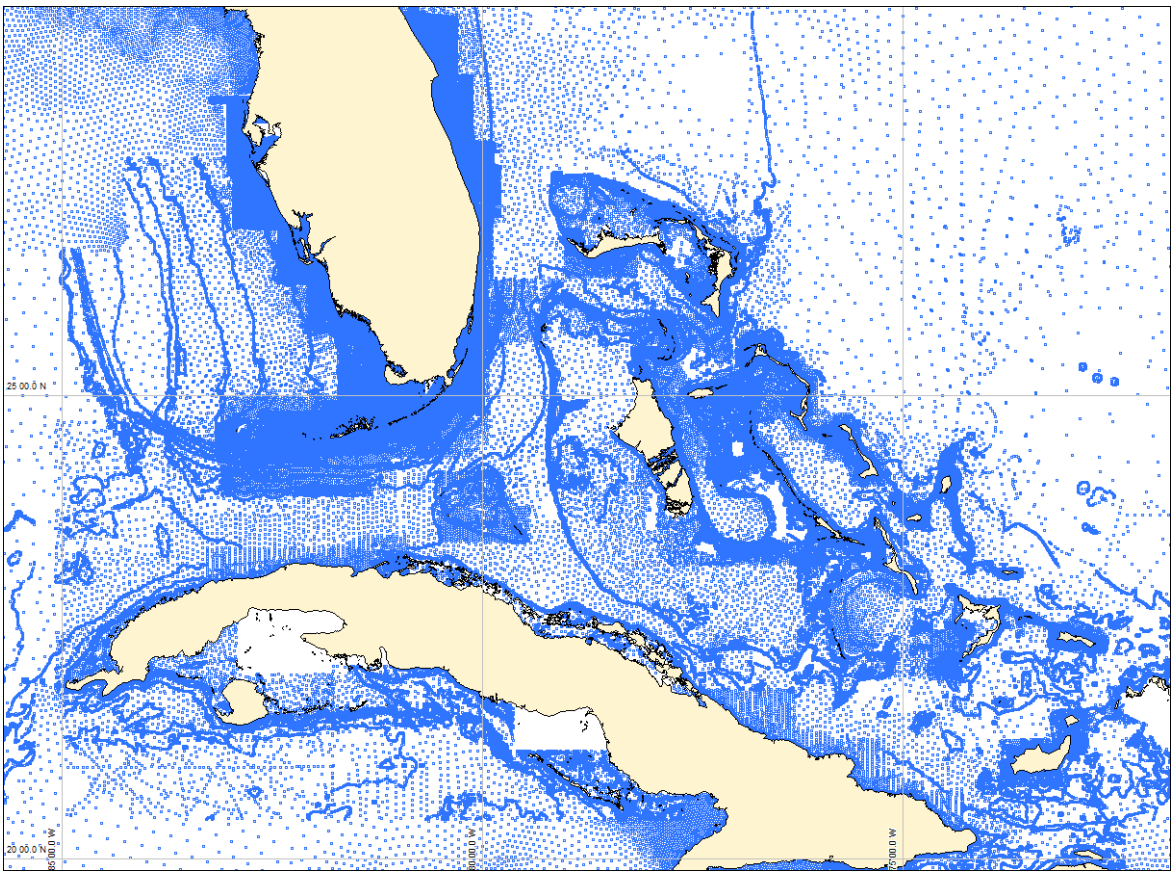


Figure 2-4: C-Map Data for the Region

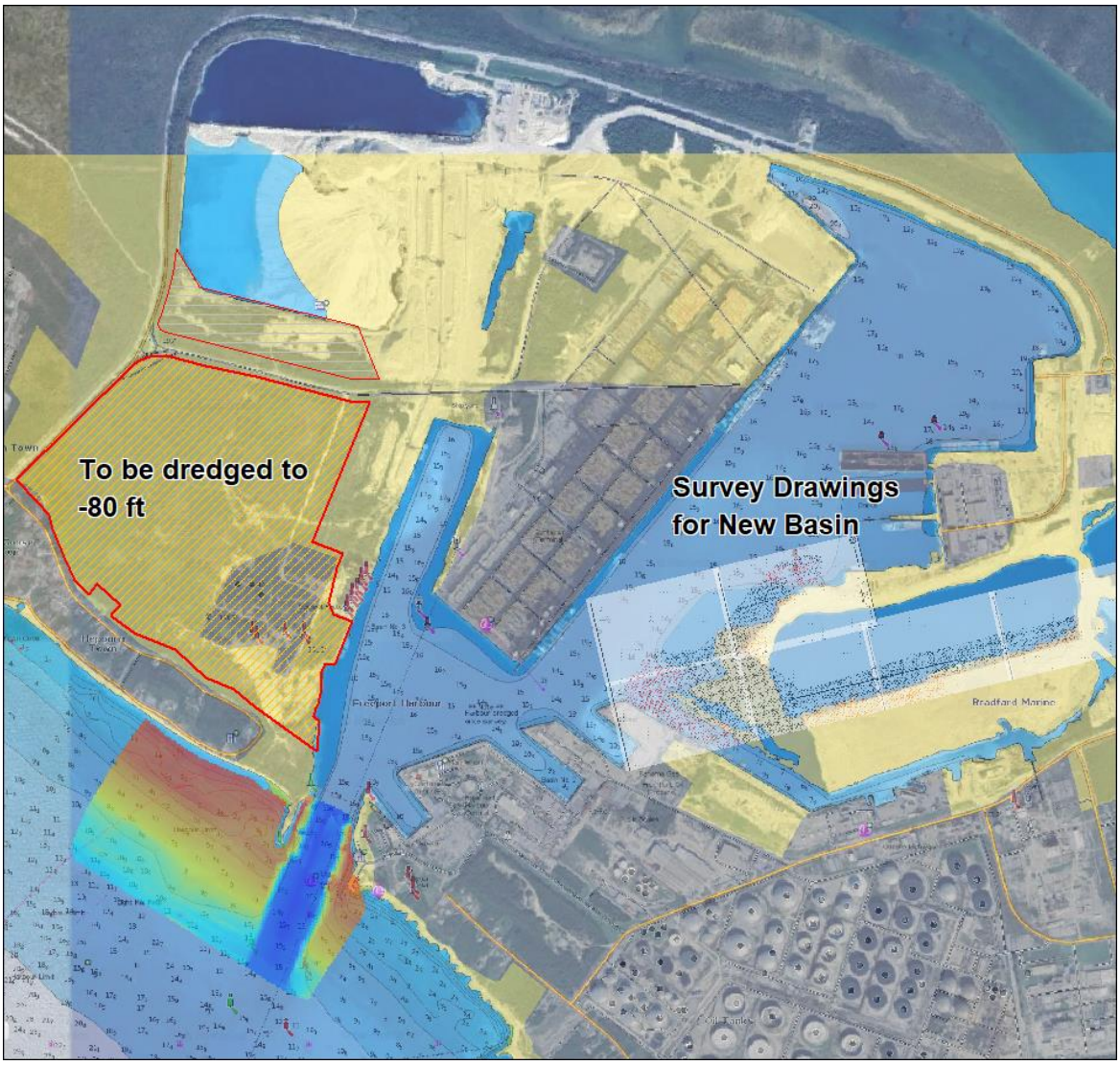


Figure 2-5: compiled bathymetry from hydrographic charts, *in situ* surveys and planned dredging

2.4 Model Boundary Condition

Water level variations along the 2 open boundaries of the regional Bahamas model were tidal levels predicted with DTU10 global tidal database, and atmospheric pressure correction. It should be noted that the model setup for this study is a 2-D barotropic model (i.e., two-dimension, vertically integrated body of water). The baroclinic effect, due to sea water density gradient, is not included in the simulation.

The boundary condition inputs to local model were extracted from the regional model.

For AD (Advection-Dispersion) simulations, the tracer concentrations at the boundaries were specified as "0" when water flows into the model – when water flows out of the model, the concentration is calculated by the model. The open boundaries of the local model is specified sufficiently far from the Freeport, so that the flushing modelling results are not influenced by the boundary condition.

2.5 Initial Conditions and Modelling Scenarios

The hydrodynamic model was '*warmed up*' from a stationary status before the AD modelling started. This is known as a 'hot start'. The saved results from the HD model were used as the initial conditions of the AD model.

The flushing simulation starts at a higher high water (HHW) of a spring tide, with an initial tracer concentration of 100% inside the harbour basins and a tracer concentration of 0% outside the habour.

For this study, two (2) scenarios have been simulated, representing the present condition as the baseline (i.e., existing Freeport Harbour configuration), and the future condition with the planned dredging/excavation completed and the dredged basin connected to the existing basin.

Figure 2-6 illustrates the defined tracer concentration areas for each flushing scenario at the start of model simulation.

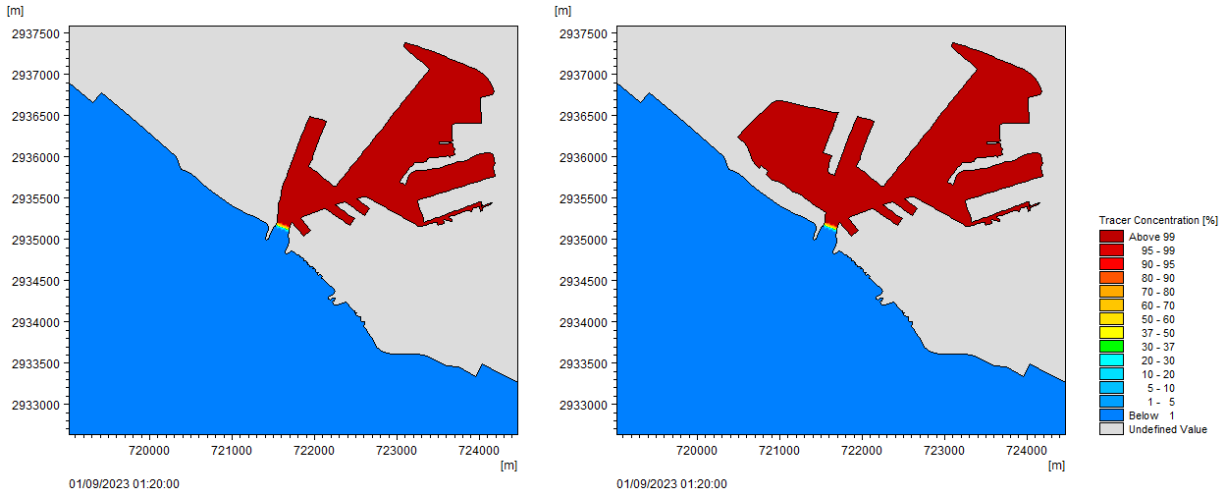


Figure 2-6: Modelling Scenarios (left: Present, right: Future) and Initial Tracer Distribution

3. Model Calibration and Validation

Model calibration was conducted during the development of the model, with the goal of producing a model which provides a realistic representation of the hydrodynamic processes within the study area. Calibration and validation processes are essential to model development. Both procedures make use of measured field data to compare the model results.

Calibration is achieved by fine tuning key model parameters. Model calibration is generally undertaken using the most reliable dataset; data with less confidence are used for secondary calibration, validation or a qualitative assessment of model performance. The quality of the tidal gauge data inside the harbour provided excellent data (after quality control to remove high frequency variation (BRON, 2023)). This data was used for model calibration. The locations of the tide gauge and ADCP deployment location is show in Figure 3-1.

Figure 3-1: Tidal Gauge and ADCP Deployment Locations

Model calibration against the water level data recorded by BRON is show in Figure 3-2. As shown, excellent agreement has been achieved between the model results and the measurements.

Figure 3-3 shows the comparison of the model results against the ADCP measured data (current speed and direction). Visual assessment on model validation (Figure 3-3) indicates that the model also reproduces the ADCP measured depth-averaged currents reasonably well.

This confirms that the model would represent the amount of water flowing in and out the harbour basin accurately. Therefore, the flushing results are reliable since it is mainly controlled by the water exchange between the harbor basin and the outside coastal water.

As shown, the model successfully illustrates the prevailing ebbing current toward the northwest (Figure 3-4) and weaker flooding current towards southeast (Figure 3-5).

Given that the tracer disperses rapidly when flowing out from the harbour to open water, the significance of the current outside the harbor in the open coastal water becomes less critical.

As shown, the model accurately reproduces the more important aspect of water exchange between the harbor basin and the open coastal water.

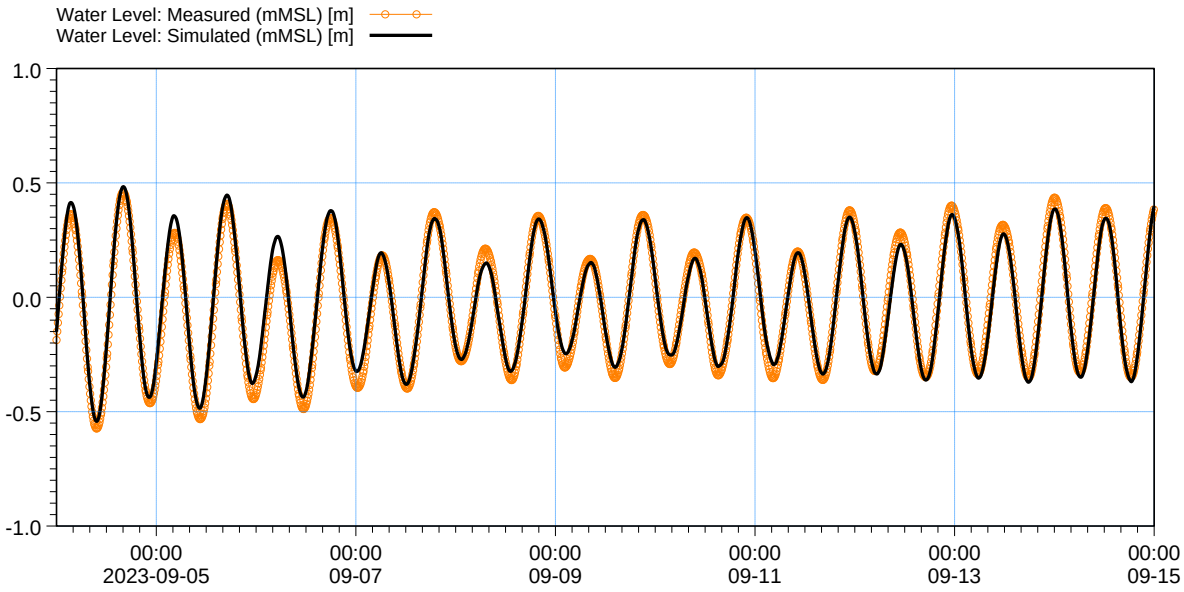


Figure 3-2: Model Calibration – Water Level Variation inside the Freeport

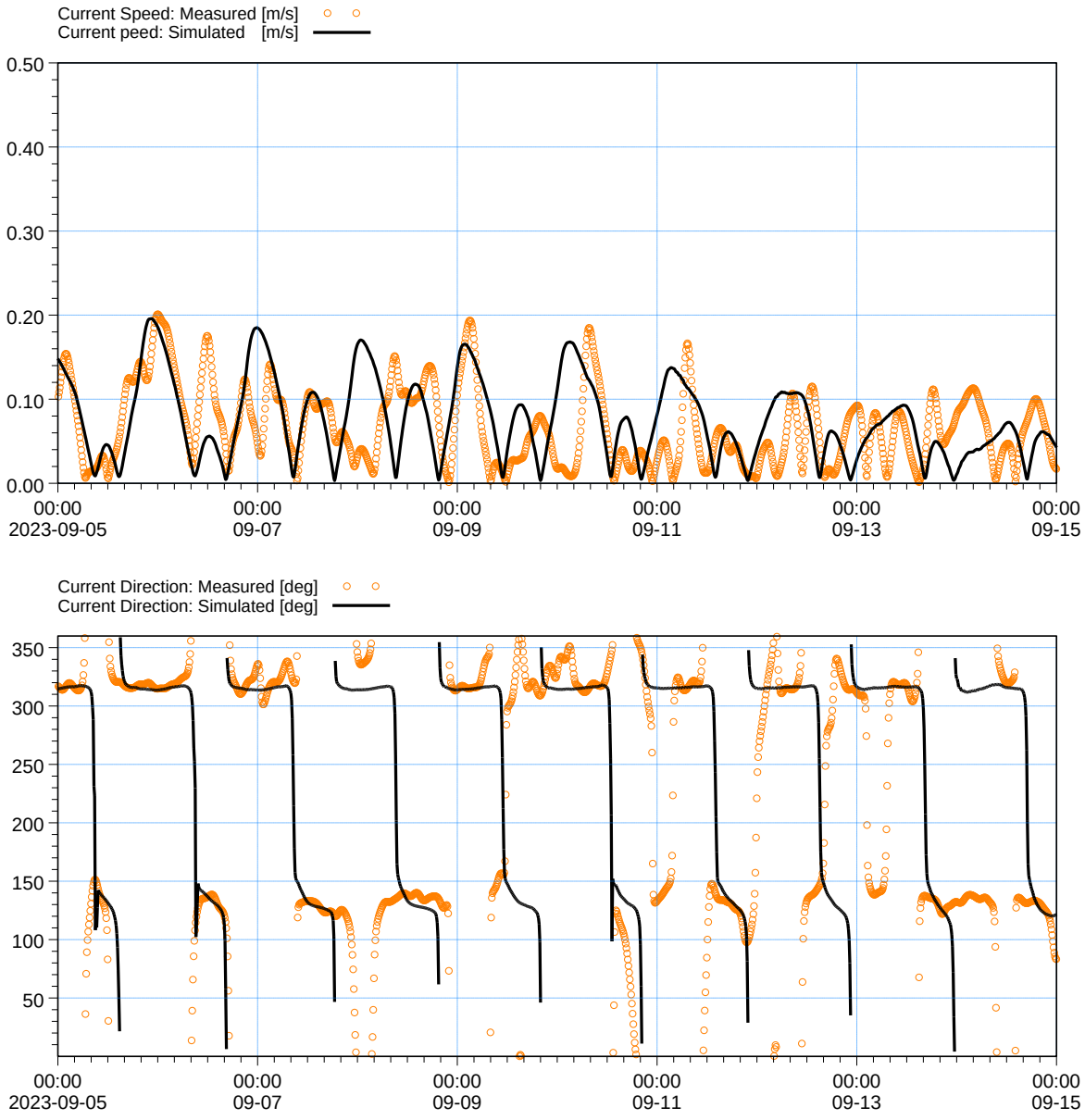


Figure 3-3: Model Validation – Simulated and ADCP measured Current Speed and Direction

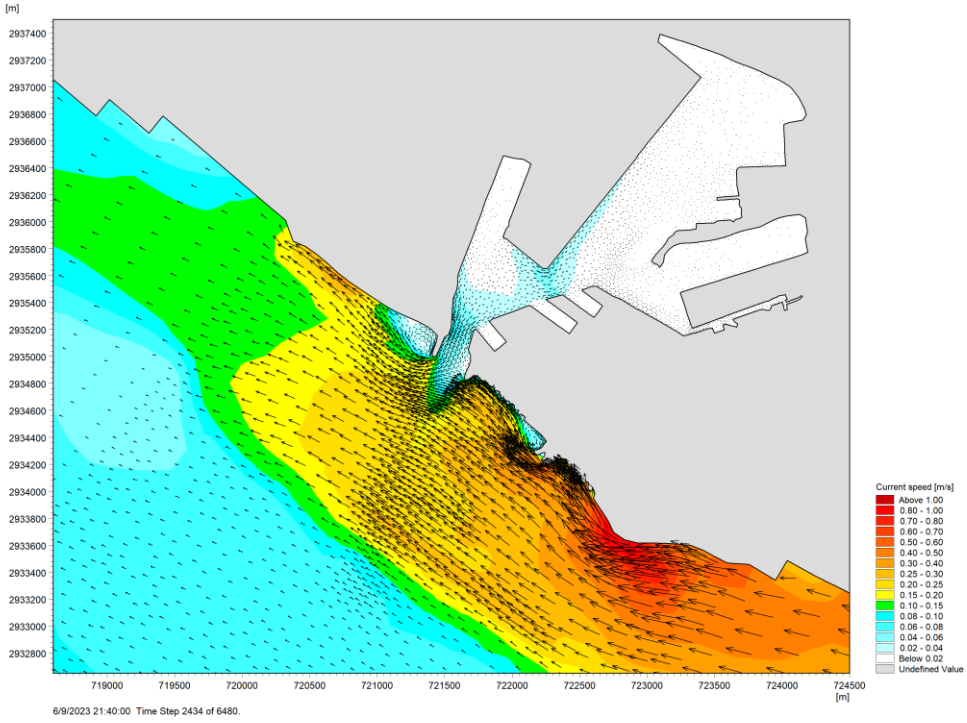


Figure 3-4: Typical Ebbing Current

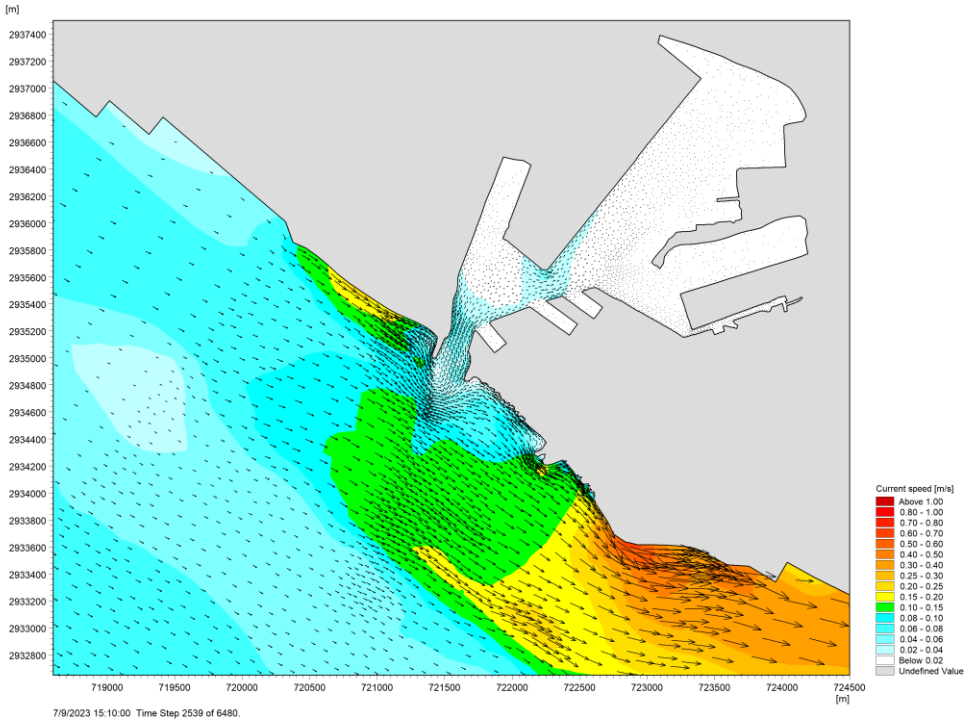
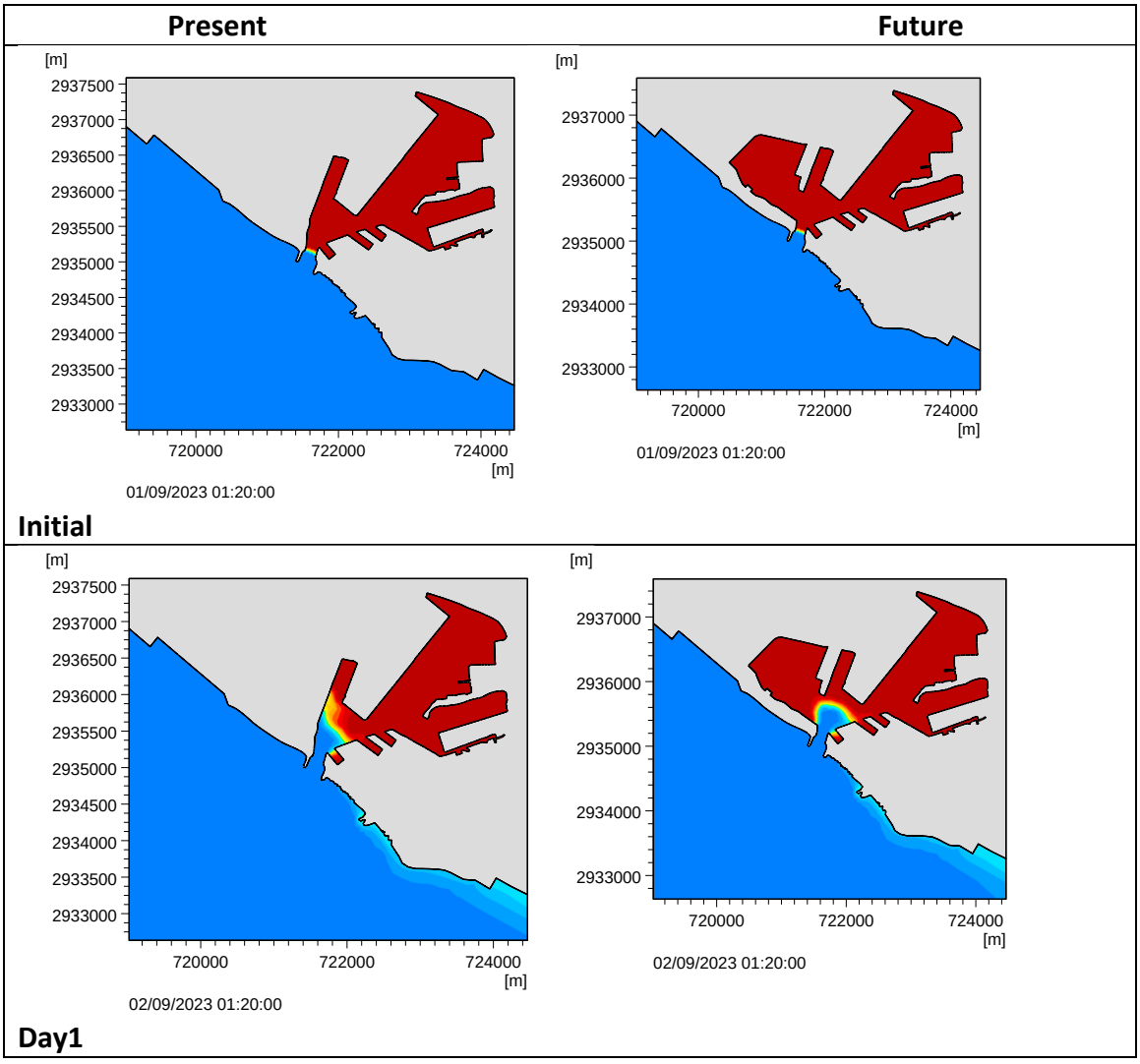


Figure 3-5: Typical Flooding Current

4. FLUSHING ASSESSMENT

Flushing assessment was performed by simulating tracer initially uniformly distributed inside the harbour basin as 100% concentration. Outside the harbour entrance, the initial tracer concentration is specified as 0%. Harbour tracer's mean-concentration is calculated at 10 minutes time intervals. The model simulation was carried out for the period from 24/08/2023 to 06/10/2023 (44 days), which coincides with the field measurements period.

The simulations start from the higher highwater of a spring tide to maximum tracer amount for a conservative estimation. The tracer concentration distribution at the beginning, 1 day, 1 week, 2 weeks, and 1 month for present and future conditions are illustrated below (Figure 4-1).



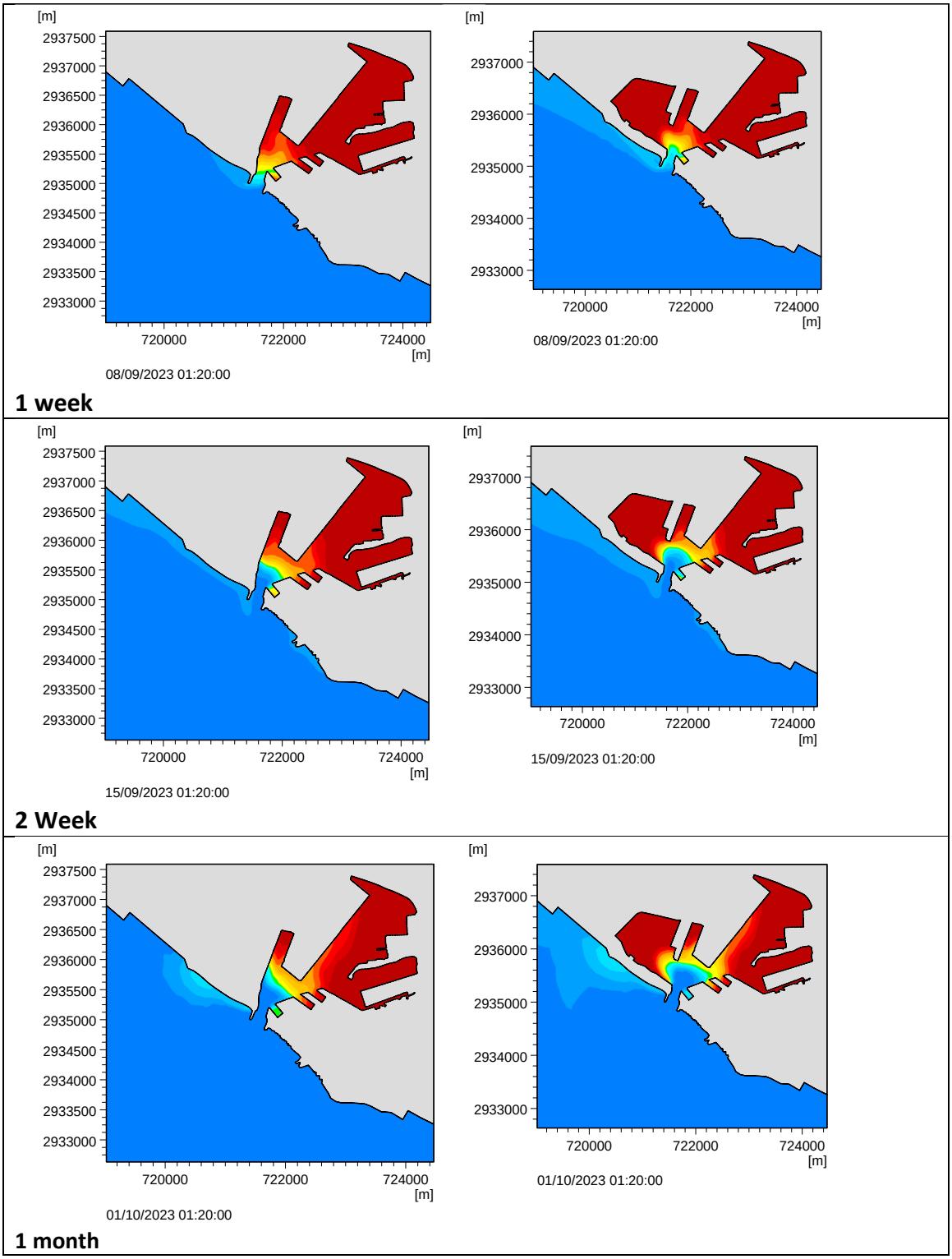


Figure 4-1: Model Results - Tracer Dispersion for indicated periods.

The variations of average tracer concentrations at present (existing) and in the future harbour expansion configurations are compared in Figure 4-2.

The flushing is very slow for both cases of present and in the future project settings. In one month, only 11.2% of the water in the harbor basin will be flushed out at present harbour configuration.

With the completion of the proposed dredging, the flushing in a month duration will slightly increase to 12.4%, which indicates a minor improvement to the harbor flushing due to the proposed harbour expansion.

The improvement can be explained by the 37.5% increase of harbour water surface, which will lead to an increase of tidal prism/water exchange in a tidal cycle. However, the proposed dredging will also add to the total water volume of the harbor. The two factors balance each other, resulting in a minor improvement in harbour flushing.

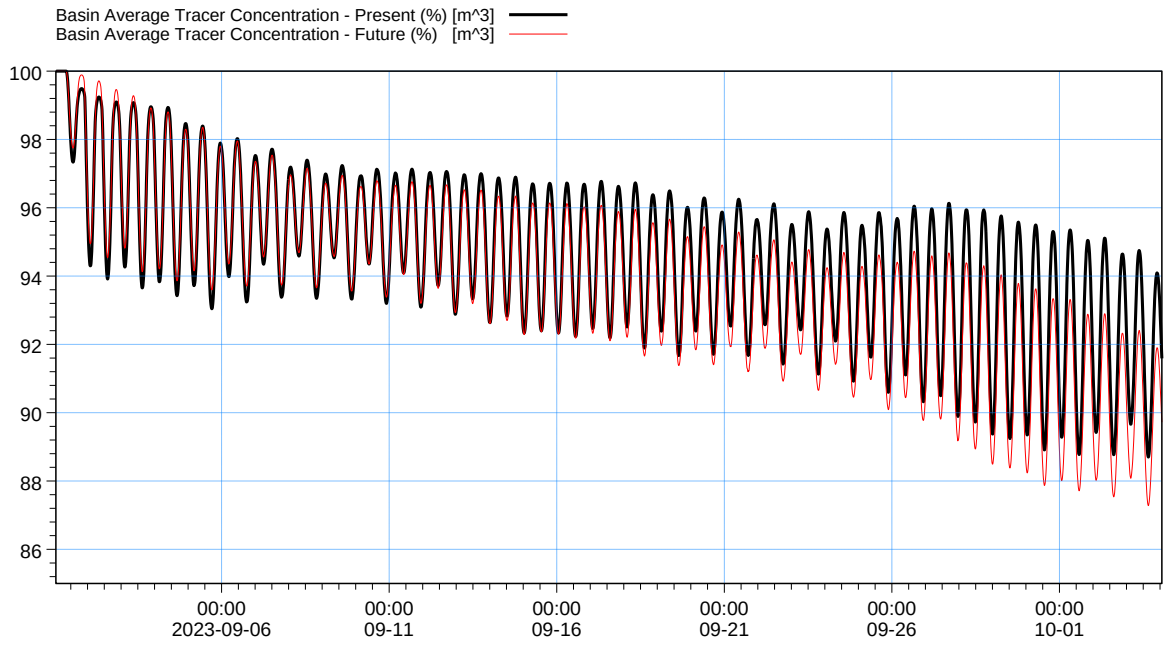


Figure 4-2: Comparison of Basin Averaged Tracer Concentrations – Present vs. Future

6. SUMMARY AND DISCUSSION

Two-dimensional hydrodynamic and transport models of Freeport Harbour coastal area was developed to assess the flushing of the harbour under current configuration and the proposed harbour expansion project. The Freeport Harbour is connected to open coastal water with a narrow entrance (a dredged navigation channel).

The model of the existing condition was calibrated and validated with water level and ADCP current data measured by BRON for this study (23/08/2023 to 06/10/2023).

Two (2) flushing modelling scenarios were conducted:

1) **Present condition**: to establish a baseline for comparison with future conditions;
2) **Future condition**: with the proposed 238.7 acres of dredging/excavation to expand the harbor. The dredging depth is assumed to be 80 ft from Chart Datum.

The findings of the numerical modelling are summarized as follows:

- Flushing is very poor for both the existing Freeport Harbour configuration and the proposed harbour expansion project. Neither the existing basin nor the expanded basin appears to meet EPA guidelines or DEPP's flushing criteria of a 90% reduction within 24 hours. This is due to the fact that the harbour is only open to coastal water by a narrow entrance.
- The proposed dredging/harbour expansion will lead to a minor improvement to the flushing.
- It appears that the expansion has little effect on the flushing of the harbour basin. It also suggests that turbidity will be contained within the site and not have adverse effects on the marine ecosystem outside the basin.

It should be noted that poor flushing is not the only criterion for bad water quality in enclosed water bodies since it relates purely to the advection and dispersion patterns of water in the system. Water quality is often determined not only by these physical processes but often by the various chemical, biological, and ecological processes taking place within an aquatic ecosystem [USACE, 1993], while flushing is a good indicator of the potential water quality and provides a valuable tool for evaluating and improving circulation in complex coastal areas.

7. REFERENCES

[1] BRON, 2023, Freeport Extreme Water Level Study.

[2] PIANC, 2008. "Protecting Water Quality in Internal marinas." Report N°98, Recreational Navigation Commission Working Group 98, Brussels.

[3] US EPA, 2001. "National Management Measures Guidance to Control Nonpoint Source Pollution from Internal marinas and Recreational Boating." Office of Water, Washington D.C.