ENVIRONMENTAL MANAGEMENT PLAN

BREAKWATER CONSTRUCTION, EXCAVATION OF YACHT BASIN,
AND DREDGING OF BARGE LANDING AND ACCESS CHANNELS

BIG BELL ISLAND

FEBRUARY 2011

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ENVIRONMENTAL MANAGEMENT PLAN

BIG BELL ISLAND, THE EXUMAS, THE BAHAMAS
FEBRUARY 2011

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XII	Coral Relocation Form
XIII	Big Bell Island Swim Area Safety Plan
XIV	Coral Monitoring Daily Log Sheet

1.0 INTRODUCTION: PURPOSE, SCOPE, AND CONTENT

The Environmental Management Plan (EMP) is a site-specific document, which provides guidelines and information enabling construction staff and project managers to adhere to environmental goals of Big Bell Island. It serves as a reference and training manual, collating all pertinent environmental information about the site and the project along with Best Management Practices (BMP) designed to optimize environmental conditions. The EMP is based on information presented in the Environmental Impact Assessment (EIA) as well as industry wide best management guidelines. While the EIA analyzes the environmental significance of project activities, the EMP describes more specifically how those activities can occur with the least possible impact to natural environments. Should any activity at Big Bell deviate in nature substantially from that described in the EMP, the Bahamian Government and the Bahamas National Trust will be informed of the changes and provided with revised text before such activity occurs.

In general terms an EMP should:

- Describe the site and the planned activities and identify environmental risks associated with these activities.
- Provide clear directions on how environmental risks are to be managed and how to comply with any other requirements.
- Clearly indicate who is responsible for ensuring that environmental risks are managed and that requirements are met.

An EMP is not a static document. It's a working document that changes during the life of a project.

The EMP for Big Bell Island thus aims to ensure that:

- All environmental safeguards are carried out correctly.
- Site activities are well managed.
- Adverse impacts to the environment are minimized.
- The biodiversity of the site is conserved or enhanced.
- The project complies with all relevant legislation.
- The project is monitored for environmental impact.

Figure 1.1 Bell Island

2.0 OVERVIEW OF THE BIG BELL ISLAND PROJECT

The Big Bell Island EMP only applies specifically to the breakwater construction, excavation of yacht basin, and dredging of barge landing and access channels of the project. These activities include clearing, grubbing, excavation, dredging, dewatering, the associated Stormwater Pollution Prevention Plan (SWPPP), and environmental monitoring.

The project described herein consists of a private yacht basin, built in the footprint of a small salt pond and capable of accommodating approximately twenty vessels. The yacht basin will offer sewage pumpout, fueling, electric, and water services. In addition, significant improvements will be made to the existing service dock / barge landing area as well as existing upland structures and the utility and storage area. The channel to the proposed yacht basin will be improved as needed to maintain the safe depth of -14 feet mean low water (MLW). Additional improvements on the island will include modifications and additions to the existing road network.

2.1 PROJECT DESCRIPTION

Yacht Basin

The private yacht basin will be created for vessels up to 50+ meters in length. Depths in the basin will be cut to approximately -14 feet below Mean Low Water (MLW). The basin will be excavated from the shallow salt pond in the southeast corner of the Island. Excavation will be carried out with backhoes. Beach compatible material will be stored and used for beach replenishment. Non-beach compatible material will be utilized to assist in the construction of the protective jetties; though it is likely that a harder rock, possibly acquired in Freeport, will also be used.

Excavation of the yacht basin will be done in the dry to prevent turbidity and tidal fluctuations. Dewatering will be carried out through the utilization of deep well injection, as used successfully at Albany. Basin docks may be concrete floating or fixed. It is likely that both systems will be utilized. Any wood CCA piling used will be wrapped with polyvinyl chloride (PVC) to prevent leaching of preservatives into tidal waters, while extending the life of the pilings. The basin was designed with an optional flushing culvert to be located west of the entrance channel. Modeling exhibited that the flushing culvert would not be needed due to the adequate flushing of the basin within 24 hours.

An access channel initiated off of the southeast most point of the island will be dredged to meet -14 feet MLW. The basin entrance will be protected by the installation of a riprap jetty, constructed with the dredged rock from the basin excavation and/or harder rock from Freeport. This jetty will help divert water flow, thus reducing the possibility of sand accretion within the proposed channel and thereby reducing future maintenance dredging. Where the jetty ties into the natural wall of the basin, sawtooth rock contours or rip-rap will be used to further dissipate wave energy within the basin entrance. The channel will be cut to a minimum of 80 feet at bottom width. Harder rock will be box cut and where overlaying sand is found, edges will be dug at an approximate 10:1 slope away from the channel.

The jetties on Bell Island will feature a centerline-planting shelf. The top of the breakwater will be at +5 feet MSL with a crest width of at least 12 feet, leaving planters approximately 20 feet long, 6 feet wide, and 4 feet deep. The vegetation sources will include the Bell Island Native Plant Nursery, which is described in detail in Section 3.3.1 of Chapter 3. The use of native and island-grown species will reduce aesthetic pollution in the Exumas Park. Salt tolerant plants will be used and drip irrigation will be installed to ensure success.

In an effort to maintain marine safety in the Exumas Park, navigational lights will be placed at the entrance to the yacht and barge landing basins to aid the array of vessels servicing Bell Island. A combination of warning lights at each jetty and buoy placement will also be utilized for safety. A service road will be provided to each jetty for maintenance access. All navigational aids will be maintained in good working order.

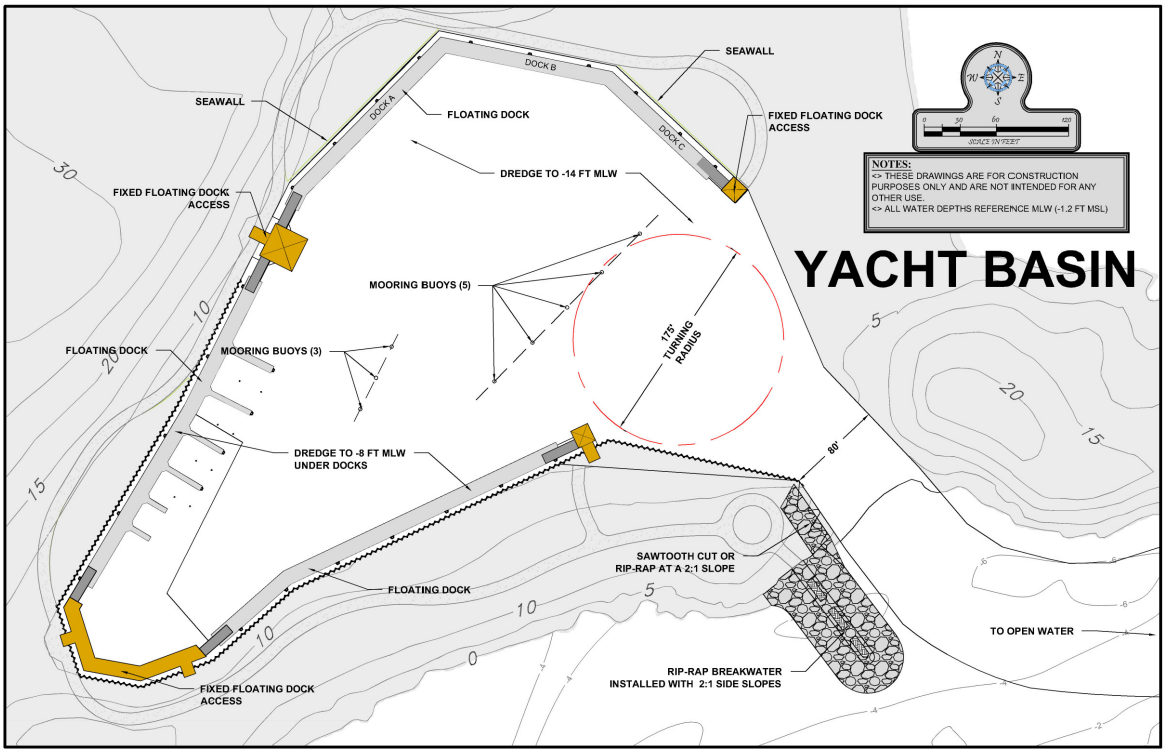


Figure 2.1 Yacht Basin Site Plan (Exhibit 1)

Power will be supplied to the yacht basin by upgrading the existing generators located in the island's utility and storage area. Water needs will be supplied by an upgraded version of the existing reverse osmosis (RO) system, also situated within the utility and storage area. Sewage pumpout will be provided to each of the larger vessels that generate black or grey water. A vacuum system will be used to pump the wastewater into a septic tank located in the vicinity of the basin with an associated deep well, as permitted by Bahamas Water and Sewage Corp. Fueling will be supplied via an underground double walled pipe, originating in the utility area adjacent to the barge landing. More detail on the proposed fueling system is provided in Section 3.7. All details of the fuel storage and transmission line will be reviewed and permitted by The Ministry of Works, Volatile Division. Proper fueling procedures will be posted and followed. This will include identification of emergency shutoff locations and training of all applicable personnel in spill prevention and the proper handling and delivery of fuel to vessels. Personnel will be trained in the use of spill containment booms and clean-up materials, which will be kept on site both at the yacht basin and the barge landing. Vessel repair activities will not take place within the yacht basin.

Service Dock / Barge Landing Improvements

The service dock improvements include the construction of a new marginal dock protected by a breakwater to provide safe mooring. The current configuration of the service dock is not conducive of safe boarding or loading/offloading of materials. The proposed boatlifts will alleviate much of the deterioration of the work fleet; thus, minimizing the need for boat repair while reducing the release of pollutants within the service dock / barge landing area. A protected swimming area will be located northwest of the service dock. A swim area safety plan has been included as Appendix XIII. The reconfigured service dock will be sheltered through the utilization of a natural rock breakwater, extending from the south side of the barge landing, and a small rock outcropping tied into the natural rock shoreline on the north side. The breakwater will feature a centerline planter shelf. The top of the breakwater will be at +6 feet MSL with a crest width of at least 12 feet, leaving planters approximately 20 feet long, 6 feet wide, and 5 feet deep. The vegetation sources will include the Bell Island Native Plant Nursery, which is described in detail in Section 3.3.1 of Chapter 3. Salt tolerant plants will be used and drip irrigation will be installed to ensure success.

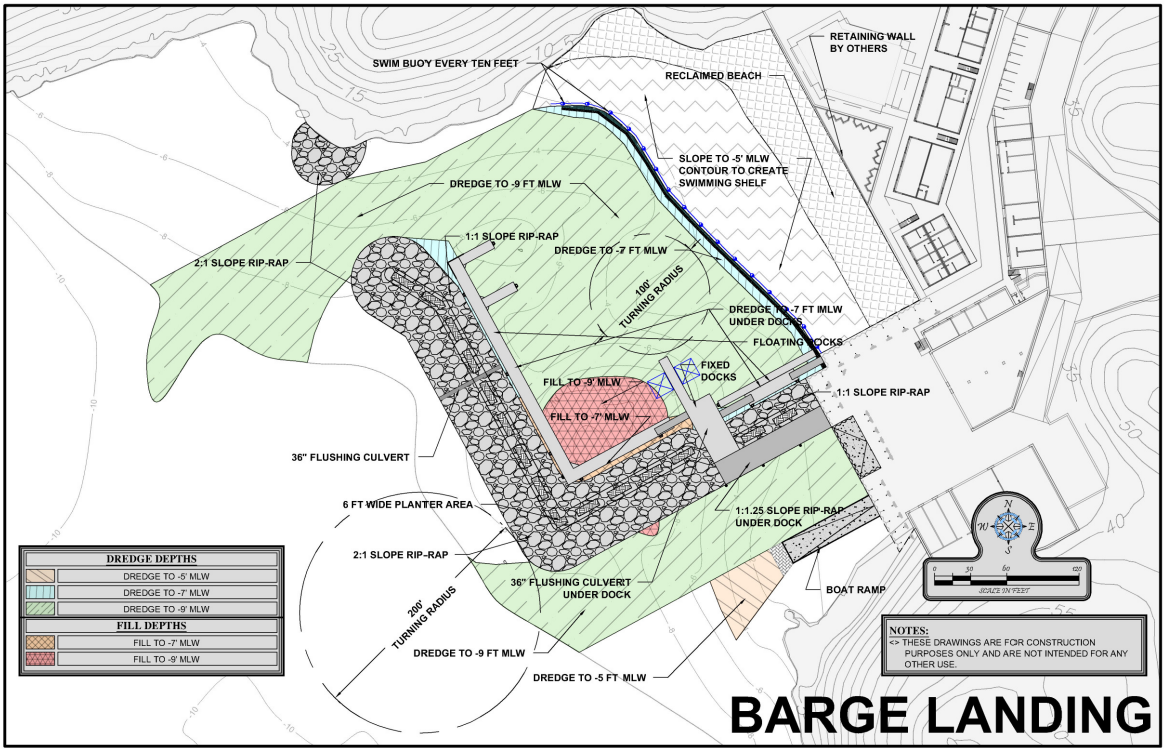


Figure 2.2 Barge Landing Site Plan (Exhibit 2)

The existing barge landing area will be improved by constructing a new concrete landing platform with a 20 foot wide boat ramp situated to the south. The new landing will be cut into the soft rock of the island's rocky shoreline. Existing overwater fuel pumps will be relocated to the protected barge landing area, thus reducing spill potential. In addition to the relocation of the existing pumps, high speed diesel pumps will be incorporated into the fueling system. The

majority of the service dock / barge landing area will be dredged to -9 feet MLW, which is 3 feet shallower than the depth originally proposed in the March 2010 EIA. Some areas will only be dredged to -7 MLW and an existing deep area located in the southwest corner of the dredge area will be filled to -9 MLW to create a contiguous bottom contour, there by improving the flushing capabilities of the protected service dock by eliminating the possiblility of a tidal sump. These reductions in dredge depth decrease the dredge area by 160,520 sq ft and the volume by 30,377 cu yds. With the submission of the final plan, an additional area of dredging adjacent to the breakwater was eliminated and the area in front of the boat ramp was further reduced to -5 ft MLW. This reduced the dredge volume an additional 830.6 cu yds.

Overall the offshore dredging of the Barge Landing area has been reduced by 31,041.8 cu yds less than what was originally submitted in the March 2010 EIA. This equates to a 72% total Barge Landing dredge volume reduction.

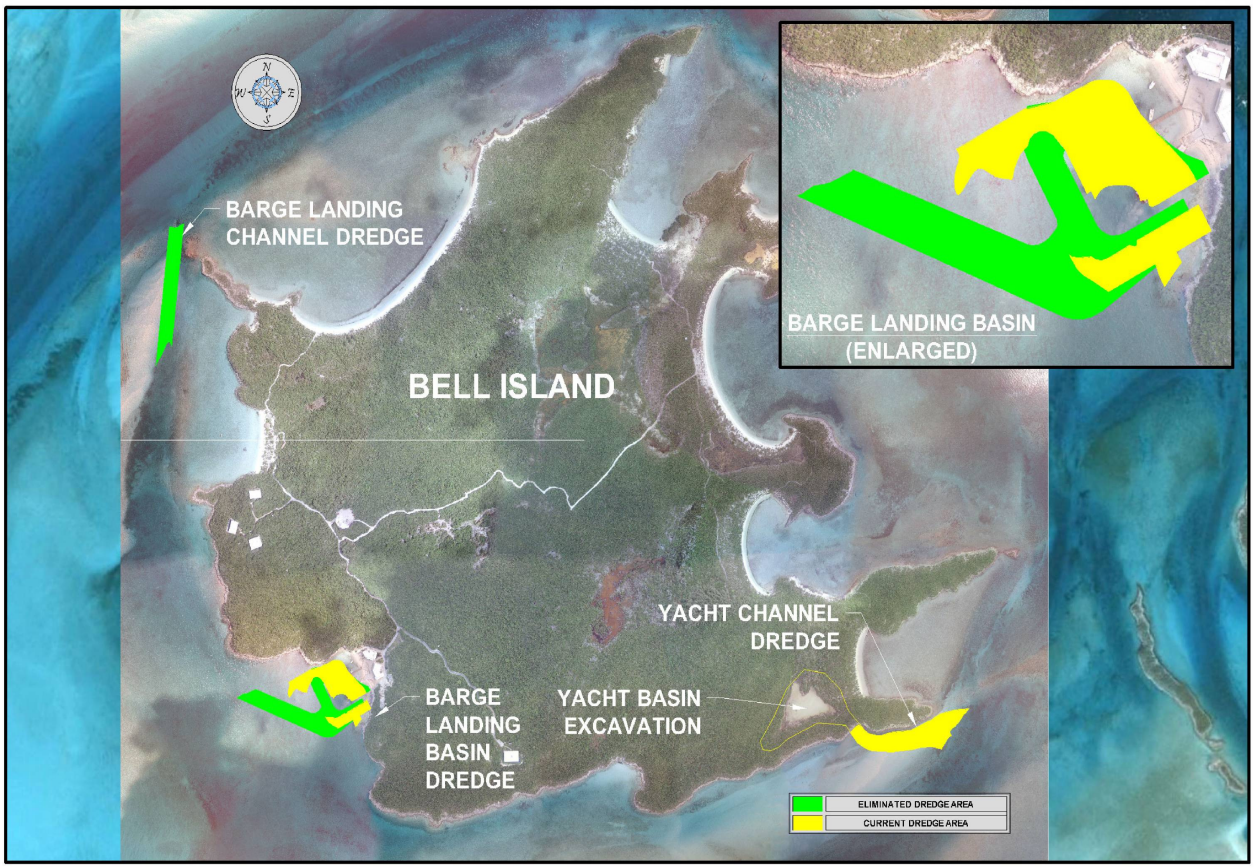


Figure 2.3 Barge Landing Dredge Reductions (Exhibit 3)

2.2 ORGANIZATIONAL CHARTS

Duties and responsibilities associated with the implementation of the EMP fall within several work areas. Key positions and areas of responsibility are shown in the chart below. Project staff and their contact details will be provided as assigned.

Owner / Owner Representative:
Overall responsibility for construction, operations, and implementation of provisions of the EMP and EIA.

Owner Representative – Tom Barbernitz

Environmental Manager:
Implement monitoring, documentation, mitigation, training, and overall compliance with EIA and EMP.

Rochelle Newbold

Environmental and Marine Consultant:
Provide environmental guidelines for monitoring, documentation, mitigation, training, and provide marine construction guidance.

Turrell, Hall & Associates, Inc.
(239-643-0166)
Todd T. Turrell and Tim Hall

Legal Counsel:
Provide legal counsel on all project aspects.

Gail Lockhart Charles & Co.
(242-327-1391)
Gail Lockhart Charles

Engineer of Record:
Bahamian engineer ensuring that all marine construction is compliant with Bahamian code.

N&M Architects Ltd.
(242-327-8495)
Sean Mathews

Marine Construction:
Executing all marine construction related aspects of the EIA and EMP

To be Determined

Upland Earthwork:
All upland construction related aspects of the EIA and EMP

To be Determined

Landscape Architect:
Provide environmentally sensitive landscaping that complies with the EIA and EMP

Raymond Jungles
Rick Joyce

2.3 ENVIRONMENTAL MANAGER

The Environmental Manager (EM) will be responsible for implementation of the Environmental Management Plan for the Bell Island project. This individual will be a part of the management team and will report directly to the Owner's Representative. The Environmental Manager will serve as liaison with relevant experts, government representatives and scientists contracted for various aspects of EMP implementation to ensure reports prepared are of the highest quality and based on sound scientific data. The EM will also be responsible for ensuring that all reports are submitted to the identified Government agencies in a timely manner. The EM will be required to monitor all works carried out under the EMP and if any activity is found to be non compliant with the terms and conditions identified in the EMP, the EM will be responsible for ensuring that all action is taken to correct and stop the issue immediately.

RESPONSIBILITIES:

- Oversight of the implementation of the Environmental Management Plan (EMP) for the Bell Island project as it relates to the breakwater construction, excavation of yacht basin and dredging activities for the project;

- Monitoring of dredging activity as required by the EMP;
  - Ensure that the project work complies with all relevant legislation;
  - Ensure that all environmental safeguards relevant to the work are carried out correctly;
  - Ensure that adverse impacts to the environment are minimized wherever possible;
  - Monitor the work for environmental impacts and ensure required changes are made to limit significant impacts where possible;

- Regular report preparation as required under the EMP and by Government oversight agencies related to environmental standards and any accidents;

- Marine monitoring and data collection;

- Monitoring of any relocated marine species and reporting on their status to BEST in conjunction with relevant experts;

- Training of other staff in project-related environmental issues and their responsibilities under the EMP; and
  - Supervision of relevant staff in conducting required work as identified in the EMP.

3.0 STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

Objectives of a Stormwater Pollution Prevention Plan (SWPPP) are to stabilize the site as soon as possible, protect slopes and channels, minimize impervious areas and promote infiltration, control the site perimeter, protect receiving waters adjacent to the site, follow pollution prevention measures, and minimize the area and duration of exposed soils.

3.1 CONSTRUCTION EROSION AND SEDIMENT CONTROL PLAN

Major land clearing and modification to natural topography, in addition to dredging for marine improvements, can result in the transportation of air and water borne sediment of variable grain size and subsequent deposition in natural areas. In the marine environment, increased turbidity reduces light penetration and hence primary productivity by marine vascular plants such as seagrasses and macro-algae as well as coral species, which rely on food sources in part produced by symbiotic algae. Deposited sediment can smother sedentary marine species and reduce the feeding ability of mobile marine vertebrates. On land, coating of plant leaves with dust and fine debris can reduce both photosynthetic ability and gas exchange.

This section describes and illustrates construction methodology designed to minimize sediment production and control impacts of work on upland portions of the site. Marine activities are described in Chapters 4 and 5 along with details of the turbidity control devices and monitoring planned.

Erosion control and construction impact minimization techniques are as follows:

1. Minimize disturbed areas by delineating construction zones and retaining surrounding native vegetation.
2. Coordinate construction activities to minimize soil exposed at one time.
3. Control stormwater entering and leaving the project with diversion ditches and berms.
4. Stabilize soils promptly after construction has been temporarily or permanently completed with sod, mulch, seeding and/ or planting.
5. Protect slopes with one or a combination of techniques.
6. Establish perimeter controls with silt fencing and/ or sediment barriers.
7. Retain sediment onsite and control dewatering.
8. Establish stabilized construction exits to reduce mud transport.
9. Inspect and maintain sediment erosion controls.

The standard construction sequence is as follows:

1. Mark clearing/grading limits, construction manager / environmental manager to inspect and confirm limits are as planned.
2. Install initial erosion control devices (construction entrance, silt fence etc.). Construction manager to confirm methods are as planned and note any deviations.
3. Clear, grade, fill site as outlined in the site plan, while implementing and maintaining temporary erosion and sediment control practices at the same time.
4. Install permanent erosion protection (impervious surface, landscaping, etc.). Construction manager checks and inspects that all erosion and protection devices are operating.
5. Remove temporary barriers.

12-point checklist:

1. Mark clearing limits (orange construction fence or marking with ribbon).
2. Establish construction access (gravel entrance and access limits).
3. Control flow rates (using pipe, drainage swales, and berms).
4. Install sediment controls (silt fence, sediment traps).
5. Stabilize soils (mulch, hydroseed, straw).
6. Protect slopes (divert water from top of slope, cover with plastic or erosion control blanket).
7. Protect drain inlets (catch basin inserts).
8. Stabilize channels and outlets (cover with grass, rip rap).
9. Control pollutants (maintain equipment to prevent leaks).
10. Control de-watering (pump to sediment trap).
11. Maintain Best Management Practices (BMP's) (weekly maintenance/replacement, preparation for storm events).
12. Manage the project (establish construction schedule, phasing).

Selection and location of specific erosion control methodologies will be finalized in-situ.

3.2 SEDIMENT CONTROL

A variety of methods to manage sediment production and transport are described below. The selection of the best method for a given work element depends on factors such as topography, machinery needed, weather conditions and habitat sensitivity. Prior to work commencing for each phase, selected methods will be clearly marked on final construction plans, such that they are as important a component of the work-site as the final building product.

3.2.1 Silt Fence

A silt fence is a temporary sediment barrier consisting of filter fabric, attached to supporting posts and entrenched into the soil. The toe of this fence should be buried in a shallow trench to prevent sediment run-off below the silt curtain.

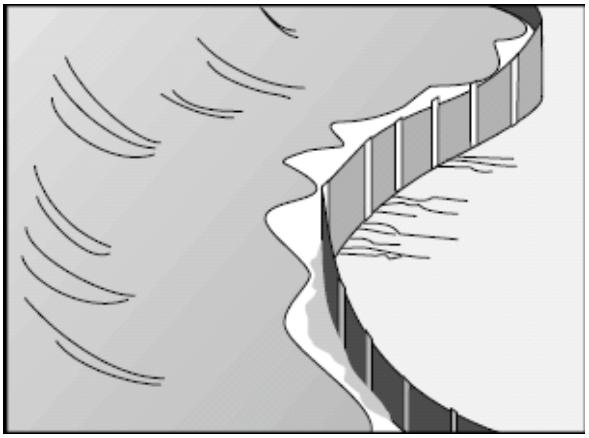


Figure 3.1 Silt Fence Diagram

3.2.2 Berm Barriers

A continuous berm is a temporary diversion dike or sediment barrier. Sediment barriers should be used down slope of disturbed areas. Sediment barriers are intended to create a barrier to slow the "sheet" flow of storm water and allow the sediment to settle out behind the barrier. Sediment barriers should not be used in streams, channels, ditches or around inlets/outlets of culverts. Sediment barriers may be constructed with infill material (soil, sand or aggregate) encased within a geosynthetic fabric, straw wattles and/or sand bags/ hay bales.

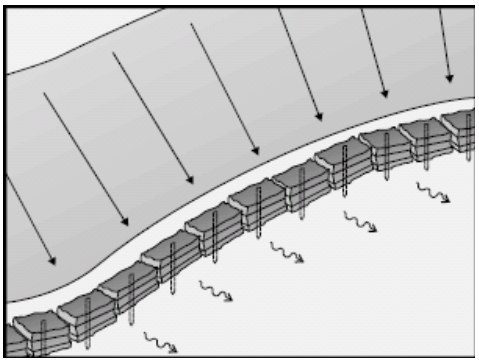


Figure 3.2 Berm/ Sediment Barrier Diagram

3.3.3 Drainage Swales

Drainage swales are temporary ditches (min slope of 0.5% and a maximum of 10%) used to convey concentrated storm water flows away from construction activities into a temporary sediment trap. Swales should be stabilized with erosion protection (see below). Note: swales should be completely stabilized before directing concentrated flows or they themselves will erode.

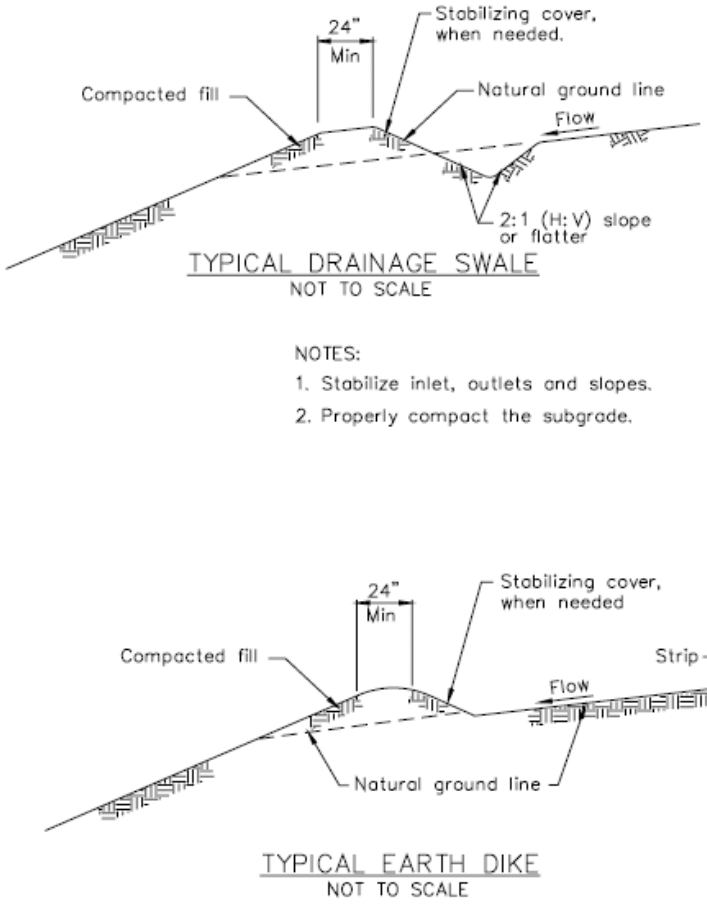


Figure 3.3 Typical Drainage Conveyance Cross-Section

Figure 3.4 Drainage Swale

3.3 SOIL EROSION PROTECTION

Soil erosion protection is applied over the soil surface to reduce erosion from rainfall and wind. It can also used to aid the establishment of vegetation.

3.3.1 Mulches / Seeding / Hydroseeding

Mulching is the application of a protective layer of straw or other suitable material to the soil surface. Mulch can be applied to any site where soil has been disturbed and the protective vegetation has been removed. Materials that may be used for mulching include:

- straw or hay
- compost material
- wood or bark chips
- hydraulically applied grass seed (Hydroseed)

3.3.2 Erosion Control Blankets / Mats

Erosion control blankets are suited for post-construction site stabilization, but may be used for temporary stabilization of highly erosive soils. Erosion control blankets are suitable for steep slopes, stream banks and where vegetation will be slow to establish. These blankets are typically made from straw, coconut fiber, excelsior or synthetic material that is enveloped in plastic, biodegradable netting, jute, polypropylene, and nylon.

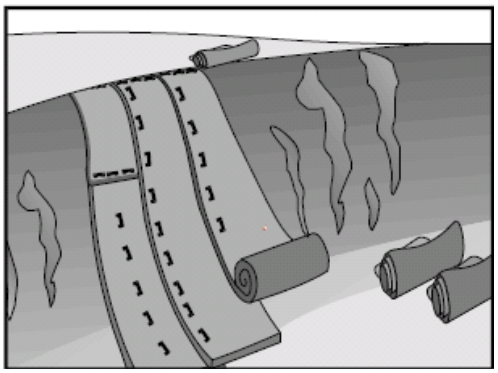


Figure 3.5 Erosion Control Blanket Diagram

3.3.3 Gravel/ Riprap

Gravel and rip rap are used to protect hillsides, drainage channels, stream banks, and pipe outlets from erosion due to surface water flow.

3.3.4 Plastic Sheeting

Plastic sheeting is a temporary method of erosion control. Plastic covering provides immediate, short-term erosion protection to slopes, soil stockpiles and other disturbed areas. Unlike the other erosion protection techniques mentioned above, plastic sheeting shall be removed prior to applying permanent erosion protection.

3.3.5 Establish Vegetation

Planting native vegetation from the onsite Bell Island Native Plant Nursery or other sources will provide the best environmental option for long-term soil erosion protection. The plants from the nursery will be quick to become established because of the lack of an acclimation period. The plant palette of the nursery has focused both on the common, widespread groundcover and midstory species and on more rare, endemic, large canopy, historically significant and valuable trees of the Bahamas. By incorporating transplanted specimens from the nursery the re-created landscape areas at Big Bell will mimic natural landscapes to the greatest extent possible. This will minimize aesthetic pollution and create the optimal environment to encourage wildlife use of the site. Landscaping goals also include minimizing clearing of natural vegetation and eradicating exotic or nuisance plant species.

A brief description of the Big Bell Island Native Plant Nursery was prepared by Rick Joyce and is provided below.

Bell Island Native Plant Nursery (BINPN) Description

To serve a base of operations for all Bell Island environmental and landscape management, a native plant nursery has been designed and constructed. The Bell Island Native Plant Nursery (BINPN) will be a special place on the island serving many functional and scientific purposes.

Taking advantage of a previously disturbed area, the BINPN was sited to reduce impacts to existing island native plant communities and afford wind protection to the plants being grown. A large stand, of near monoculture, *Casuarina* trees were removed from the nursery growing areas. Fingers of the existing native plant communities on the site were strategically retained throughout the nursery site to add plant diversity and beauty.

The BINPN will be three to four (3 - 4) acres in size at completion. Growing areas have been designated for specific growing uses. Those growing related uses include a one hundred feet by twenty-three feet (100’ X 23’) Imperial Builder’s Supply propagation bow greenhouse (Figures 3.6 and 3.7), a large shade growing area that will work as transition from propagation to full sun, large area with groundcover fabric for growing

container plants, shaded orchid house, raised beds for organically grown fruits, vegetables and herbs, horticulture waste compost facility, chicken house and a vermiculture (earthworms) area.

Figure 3.6 Recently Installed BINPN Greenhouse, Interior View

Figure 3.7 Recently Installed BINPN Greenhouse, Exterior View

The nursery site is irrigated using reverse osmosis treated (RO) water. The nursery irrigation system design will be highly efficient, in most cases, placing water on the plant root zones in only the amounts needed to keep the plants in good health. No fresh ground or surface water will be withdrawn from the island to serve the nursery freshwater needs.

For propagation and container growing, a signature of the BINPN will be the growing of specimen native trees. The palette of those trees has focused on more rare, endemic, large canopy, historically significant, and valuable trees of the Bahamas. An ambitious list of native trees species will be grown.

The native trees species being considered to grow as specimens include the following:

- madeira or West Indian mahogany (*Swietenia mahagoni*)
- brasiletto (*Caesalpinia vesicaria*)
- mastic iron-wood or mastic bully (*Mastichodendrom foetidissmum*)
- lignum vitae (*Guaiacum sanctum*)
- silver buttonwood (*Conocarpus erectus var. sericeus*)
- Joe-wood or ironwood (*Jacquinia keyensis*)
- black willow or Jamaican caper (*Capparis cynophallophora*)
- horseflesh (*Lysiloma sabicu*)
- yellow-wood or satin-wood (*Zanthoxylum flavum*)
- fish poison or Jamaica dogwood (*Piscidia piscipula*)
- whitewood (*Drypetes diversifolia*)
- olive-wood (*Cassine xylocarpa*)

Some other specimen trees will be grown specifically to provide and enhance native wildlife food values, such as red mulberries and Barbados cherries.

These native specimen trees grown in the BINPN will be selected for best form and genetics. Culturally, the trees will be grown for their overall long-term strength. This enhanced strength will be achieved through good growing soil, proper nutrition, appropriate irrigation water, structural branch pruning and the development of fibrous root system.

Propagation of native plants will focus on seed collection and germination for several reasons. The collecting and growing of native plant seeds will foster the genetic diversity (biodiversity) that naturally occurs in Bahamian forests. This helps plants have more resistance to pests and diseases. A variety of native plant seeds have been collected for growing in the nursery.

As part of environmental management and restoration of Bell Island, the BINPN will serve to facilitate action. For any project on the island, the BINPN staff has, and will continue to facilitate the salvage (relocating) of native plants. This has already been done on the island and will continue to be done. This includes all native orchids and bromeliads, rare trees or palms that can be reasonably dug from a site and even selected desirable landscape plants around the existing homes.

Native plants and specimen native trees grown in the BINPN will be offered for use for biological restoration on other Exuma islands, especially within the Exuma Land and Sea Park. These trees will afford great biological value to areas that were previously disturbed or are devoid of native tree canopy.

The BINPN staff has consistently removed invasive exotic pest plants from all parts of Bell Island, including the beach areas and even the more difficult to reach areas. These pest plants have included *Casuarina* and Pacific inkberry (*Scaevola taccada*).

The orchid shade house will serve as a place of natural beauty with native and other colorful orchids being grown. Native orchids will be researched and proven propagation techniques will be used to grow more of them. These native orchids will also be offered for reintroduction in appropriate park or garden areas throughout the country that will facilitate appreciation of this awe inspiring, Bahamian natural beauty.

Native orchid genera (genus) targeted for propagation and growing include, but are not limited to:

- *Encyclia* (12 Bahamian species listed in Correll and Correll)
- *Basiphyllaea*
- *Bletia*
- *Calopogon*
- *Campylocentrum*
- *Cattleyopsis*
- *Oeceoclades*
- *Oncidium*
- *Pelexia*
- *Paltythelys*
- *Ponthieva*
- *Spiranthes*
- *Tetramicra*
- *Vanilla*

3.4 SEDIMENT CONTROL INSPECTIONS

Sediment control measures will include a berm barrier coupled with silt fencing of the boundary of the yacht basin in any areas where run-off will not naturally flow into the yacht basin, with seaward portions fenced at the extent of the marked coastal buffer zone. The general boundary is shown on the Basin Dewatering Plan, Exhibit 4.

Prior to construction commencement, all construction personnel will be required to attend an environmental training seminar given by the Environmental Manager (EM) for this project. During construction, the EM will be responsible to perform documented daily inspections and conduct maintenance to ensure that the erosion prevention and sediment control best management practices are functioning properly and no off-site sedimentation is occurring. A weekly summary report will be prepared and sent by facsimile to BEST. While the construction site is active, the contractor, overseen by the EM, will be responsible for conducting inspections on all components of erosion prevention and sediment control plan to ensure functionality.

Construction managers will inspect all silt fences and other erosion and sediment control devices no less than once a week and maintain or replace as necessary. This will be achieved by visual inspection, driving or walking the perimeter of the property or protected area.

Basic guidelines for an inspector to follow

1. Prepare for inspection prior to leaving the main office, by familiarizing with permits, the SWPPP, past reports and inspections, compliance problems, and maintenance records.
2. Inspections will be done in priority areas first.
3. Dress appropriate for the weather and the type of activities occurring on your visits. Bring proper protective gear.
4. Bring logbook, inspection forms, copies of permits and plans and extra pens/pencils.
5. Examine the outside of a construction area from a larger point of view first and examine the construction exit area at that time.
6. Make inspection notes of the time of day, date, ambient conditions before starting.
7. Ensure the construction operator is present while you inspect.
8. Include a general narrative of the construction activity occurring.
9. Check erosion and sediment controls or permanent controls if applicable.
10. Check discharge points from project to surface waters or surface water management system for signs of impacts.
11. Compare SWPPP BMPs with actual site conditions.
12. Inspect disturbed areas not being worked.
13. Inspect final stabilization.
14. Inspect perimeter areas.
15. Take photographs with date and time on the image. Photograph all best practice areas and potential violations. Attach photos to final report and label them.

16. Go over findings with construction management staff and if needed, provide them a list of items to replicate for best practice, or correct if necessary, and the time frame for those replications and/or corrections. Inform them they will be re-inspected.

Inspections of Temporary Sediment Traps/ Ponds

1. Check that the location of sediment traps does not pose a risk to life or property.
2. A sediment trap should be replaced or cleaned out after it reaches one third the design volume.
3. Check the outlet for needed maintenance or replacement.

Inspections of Silt Fencing/ Barrier Protection

1. All silt fences must be placed on all down-gradient perimeters prior to construction commencement, staked on the down hill side.
2. All silt fences must be replaced when sediment reaches one third the height of the fence. Sediment must also then be removed.
3. Torn or worn fencing must be replaced within 24 hours.
4. All fencing must be installed along the contour and trenched 15 centimetres deep with backfill 15 centimetres wide.
5. Soil should be compacted after trenching.
6. Silt fences should not be used on steep slopes. The drainage area must be no greater than 0.25 acre per 100 foot of fence.

Inspections of Diversion Ditches and Berms

1. Check that diversion ditches discharge to stable outlets.
2. Ensure diversion ditches and berms have been seeded and that they are not eroding.
3. Assess if check dams are needed due to high velocity flows.

Inspections of Mats/ Mulches/ Blankets

1. Verify the blanket or mat comes into full contact with the soil.
2. Check the top blanket is trenched-in.
3. Mulch should not be found in concentrated flow areas.
4. Check for erosion in mulched areas.
5. Verify there is a 10-15 centimetres overlap in sections of mats or blankets and that staples are no more than 30 centimetres apart on tops and no more than 61 centimetres apart on the sides and the middle.

Inspections of Construction Exit

1. Look for evidence of sediment tracking offsite.
2. Look for evidence the construction vehicles are using other entry and exit points other than what was designated.
3. Verify if aggregate at the exit needs to be replenished or replaced.
4. The exit area must be a minimum of 15 metres long to remove mud from construction tires.
5. The site must be graded away from construction exit to prevent run-off from leaving the site.

3.5 EXCAVATED AND DREDGED MATERIAL

BMPs will be used for the management of excavated and dredged material. The ideal choice for a particular site should be based on the type of project, the characteristics of the dredged material, technical feasibility, and most importantly the best option to maintain environmental integrity. Some of the spoil material will be incorporated into the materials used for certain aspects of construction on the site and for jetty construction. All grubbed plant debris will be converted to mulch for use around the island.

Excavation materials from the yacht basin will be dewatered either through the utilization of deep well injection or in a settling pond (Figure 3.8) within the basin with dewatering and settlement areas to be progressively moved as excavation proceeds. Both methods have been successfully utilized in the Bahamas. All disposal wells will be designed, installed, and operated in accordance with the requirements of the Water and Sewarage Corporation. If settling basins are used, direct runoff will be contained by berm barriers, temporary swales, and/or geo-textile filtration curtains. Turbidity-laden water will be cleared and cleaned via the settling pond prior to entering open waters. Settling and detention ponds will be designed and constructed to contain run-off. The marina basin works, including the quality of waters being discharged, will be routinely monitored. Twice daily monitoring results, which will be summarized into weekly and monthly reports, will be prepared. Daily log forms are provided as Appendix XI. All logs and reports will be signed by the Environmental manager and provided to the BNT and BEST.

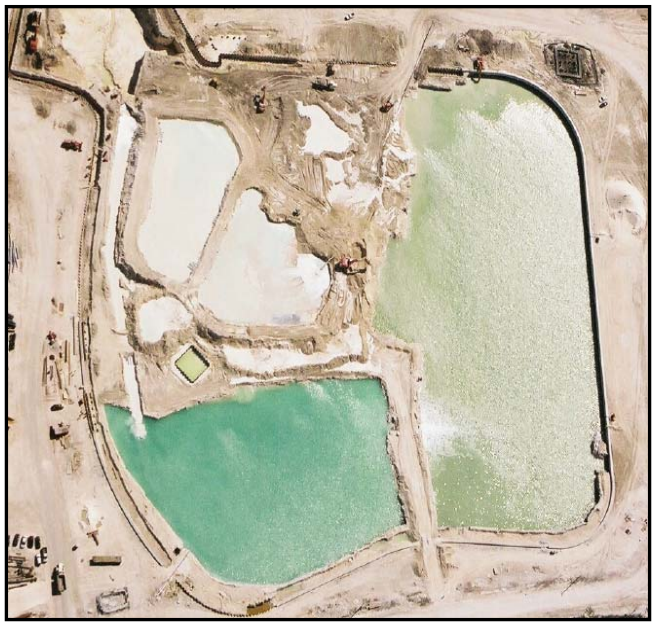


Figure 3.8 Example of Sectioned Dewatering/ Settling Basin

Runoff from the disturbed lands will be prevented through the utilization of geo-textile filtration, riprap cover on slopes down to the berm, and/or plant cover.

Spoil materials may consist of rock, muck, soil, or sand from the yacht basin excavation, barge landing/service dock, and access channel dredging.

Any beach compatible sand that is found in dredge areas will be stored on the beach adjacent to the yacht basin. Here it will be used to build up the existing dune or will be spread out on the beach surface. Areas where dune sand has been added will be stabilized with sea oats and appropriate, native dune vegetation. A protective dune, with a top elevation of 10 ft MSL and 2:1 side slopes, will be created and span the length of the low area on the eastside of the yacht basin and occupy approximately 0.32 acres of costal coppice. This low area could potentially be subject to wave overtopping during hurricanes. The dune will be constructed with a rubble core of natural rock from the basin excavation, topped with 3 feet of beach compatible sand, and planted with native dune vegetation on the beach side and native coppice vegetation on the back side. Dune details are depicted in Figure 3.9.

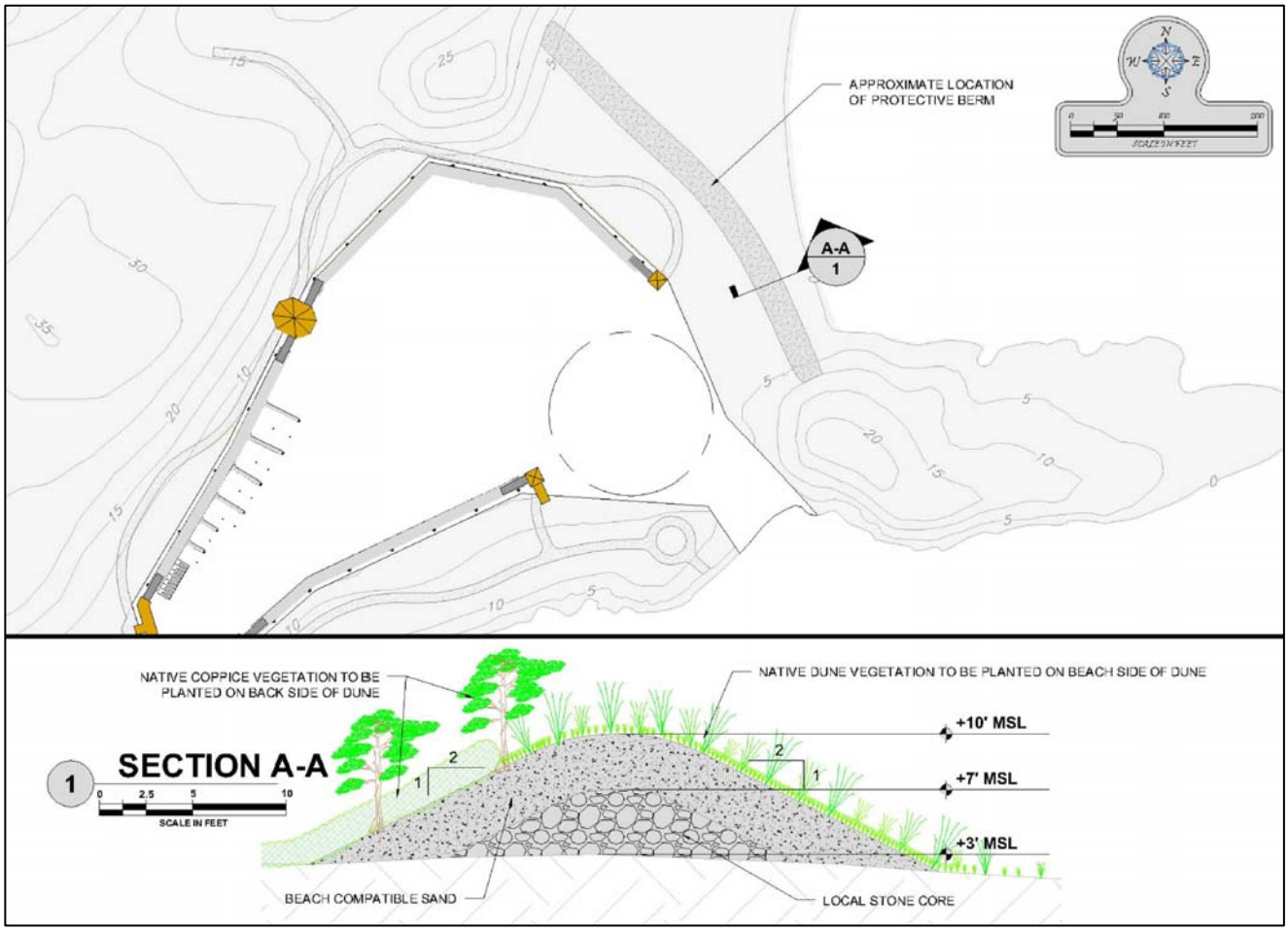


Figure 3.9 Created Dune Plan and Cross-section (Exhibit 9)

Some quantity of muck and marl will be encountered during excavation of the yacht basin. This material will be stockpiled and dried within the basin confines and be mixed with other, less fine, material. Runoff of silt from any stock pile area will be prevented with temporary berm barriers, silt fencing, and/or plastic sheeting as described in sections 3.2 and 3.3. Materials will then be barged to a Government assigned and approved area designated for fill storage.

The bulk of the material to be found in the offshore dredge areas and in the yacht basin will be rocky fill that could be suitable for building sites. That which is not used onsite will be loaded on barges and shipped to a Government assigned and approved area designated for fill storage.

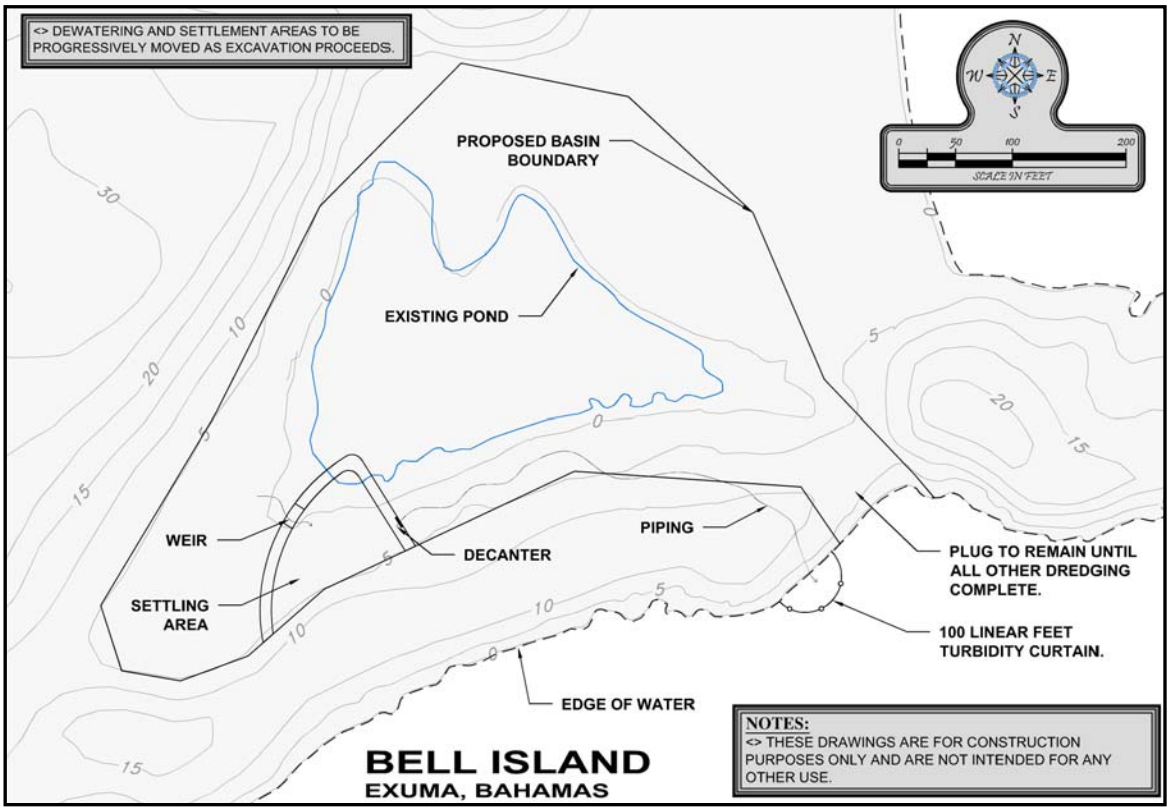


Figure 3.10 Dewatering Plan (Exhibit 4)

3.6 GOOD HOUSEKEEPING BEST MANAGEMENT PRACTICES

3.6.1 Waste Management

General waste management guidelines for solid/ construction waste, sanitary/ septic waste and hazardous materials/ waste are as follows:

Solid Waste

The solid waste management plan will be approved by the DEHS. All solid waste will be incinerated onsite using an EPA approved incinerator. Residual ash will be stored onsite in a container until it can be barged to Nassau for proper disposal at the New Providence Sanitary Landfill.

- Designate trash and bulk waste-collection areas and keep them away from roadways, gutters, waterways and storm drains.
- Recycle materials when possible.
- Segregate waste that can be incinerated from waste that must be taken to a landfill, and provide proper disposal of hazardous material wastes.
- Clean up debris and litter from construction site daily.

Sanitary and Septic Waste

New septic systems will be built to supplement what is already on site, and supplemented with deep well injection as permitted by the Water and Sewerage Corporation. All disposal wells will be designed, installed, and operated in accordance with the requirements of the Water and Sewarage Corporation.

Sewage pumpout will be provided at the yacht basin. A vacuum system will be used to pump the wastewater into a septic tank located in the vicinity of the basin with an associated deep well, as permitted by Bahamas Water and Sewage Corp.

- Provide restroom facilities onsite.
- Maintain restroom facilities.
- Tie-down portable facilities where there are high winds (>30 knots).
- Educate employees on restroom locations.
- Do not discharge or bury the waste onsite.
- Inspect and maintain facilities regularly.

Hazardous Materials and Wastes

Hazardous materials will be stored in a secure locker onsite and will be barged to Nassau for proper disposal at the New Providence Sanitary Landfill.

- Develop and implement employee and subcontractor education for handling, storage, disposal and clean up of hazardous materials/ waste.
- Designate hazardous waste-collection areas onsite.

- Place all hazardous materials in secondary containment.
- Inspect waste containers regularly for labeling and leaks.

3.6.2 Establish Material Staging Areas

All building and hazardous materials that could possibly contaminate stormwater will be stored in safe locations onsite. Secondary containment must also be used in these storage locations. Hazardous materials will always be stored under cover and out of direct sunlight and rain.

Employees will be trained in storage techniques for hazardous materials and inspections will be made regularly by management to ensure the storage guidelines are followed.

3.6.3 Establish a Concrete and Paint Washing Area

A specific location will be designated to catch wash water for evaporation and solids removal. The wash station will be located at least 45 metres from storm drains and water bodies.

Figure 3.11 Concrete Wash Area

Employees and contractors must be made aware of the location of the wash station through both verbal instruction and signage and must understand that it is mandatory they use the wash station.

- ❖ Because concrete wash water can be highly polluted, it is recommended the wash water be allowed to evaporate and then the hardened concrete be recycled.

3.6.4 Establish Proper Equipment/Vehicle Maintenance and Fueling Practices

Establish an equipment/vehicle fueling station that has secondary containment, an emergency fuel spill kit, and security. Equipment/vehicle maintenance should also be done in a location specifically designed to contain any spills. BMPs for fueling and maintenance are:

- All employees and contractors will be trained in proper fueling and maintenance techniques.
- Equipment/vehicles will be inspected regularly for leaks or damage.
- Use drip pans, cloths or sorbent pads when changing vehicle fluids or fueling.
- Collect all spent fluids for either storage or recycling.
- Never over-fill fuel tanks.

- Always return fuel hose nozzles to locked, upright position.
- Never prop the fuel trigger open and leave unattended.

3.6.5 Establish Equipment/Vehicle Washing and Allowable Non-Stormwater Discharge Location

Vehicle/equipment washing will be done in a designated location in the staging yard where wash water can be contained. Vehicle/equipment washing will primarily be done with high-pressure water and no soaps to remove the dirt.

Employees will be made aware of the location of the wash area and that it is mandatory to use this area. Signage will be installed directing personnel to use the location for washing equipment/ vehicles.

Non-stormwater discharges will be routed to sediment detention ponds or basins. Non-stormwater discharges might be vehicle/equipment wash water, water used for dust control, or landscape irrigation.

3.7 FUEL SPILL PREVENTION PLAN

Fuel Supply Management

Application of safe practice in fuel usage will minimize the likelihood of any accidental leak or spill. General guidelines to be followed on Big Bell Island include:

1. Posting operating and safety instructions near any fueling facility.
2. Keeping fuel pumps locked except when in active use.
3. Ensure that clearly marked emergency shut-off switches, communications and spill containment equipment is visible from all fueling areas.
4. Attend to all loading, unloading or fueling events.
5. Have drip pans or pads within sight of any fuel transfer procedure and using funnels plus pads or pans when transferring fuel to portable containers.
6. Ensure responsibility for all portable containers in use at any time and return them to the proper storage location after use.

Fueling Details

Bell Island currently has facilities for the storage and distribution of fuel, which in 2009 were tested and approved by a registered Fuel Contractor. During the construction of the new service area the fuel storage and dispensing systems will be upgraded and will follow Florida Code 62-762, as accepted by The Ministry of Works, Volatile Division and also to meet the requirements of NFPA30 and NFPA30A. Details of the proposed system can be found below:

Dock System Specifics

- Secondary Containment Tanks – All storage tanks will be double walled
- Electronic Leak Detection – A monitoring system will be used with external visual and audible alarms
- Secondary Containment Piping – All underground diesel fuel piping and all dock piping will be fire resistant
- Secondary Containment Fuel Cart & Dispensing – All piping and mechanical fitting for fuel dispensing and fuel cart connections will be installed within a secondary containment sump
- Manual Shut Off Valves – Manual shut off valves will be installed onshore, at transition points, and at connection sumps
- Connection Sump Fire Extinguisher – Each connection sump will have a heat activated fire extinguisher
- Dock Electrical Disconnects – Electrical disconnects will be located at all sources of ignition and stop all pumps within the entire fuel system upon activation
- Submersible Leak Detection – Fuel system submersible pumping units are equipped with mechanical leak detection

- Electronic Shutoffs – All sumps within the entire fuel system will have installed a sensor that will shutoff the flow of fuel if the senor comes in contact with liquid.

Fuel Cart Dispensing Unit Specifics

- Manual Shut Off Valve
- Explosion Proof Switch and Box
- Closed Solenoid Valve – The fuel cart will be equipped with a normally closed solenoid valve that when closed will not allow the flow of fuel except when a trained attendant authorizes the unit
- Auto Closing Dispensing Nozzle – The fuel cart will be equipped with a dispensing nozzle that will close automatically without a latch open device.

Vehicle and Equipment Fueling BMP's

- When fueling occurs on-site, designated areas will be used. These areas will be located away from drainage courses, to prevent the run-on of storm water and the runoff of spills.
- Discourage "topping-off" of fuel tanks; an increase in temperature can cause fuel to expand and overflow.
- Always use secondary containment such as a drain pan to catch when fuel spills/leaks.
- Avoid mobile fueling of mobile construction equipment around the site; rather, transport the equipment to designated fueling areas. With the exception of tracked equipment such as bulldozers and perhaps forklifts, most vehicles should be able to travel to a designated area with little lost time.

Vehicle and Equipment Maintenance BMP's

- If maintenance must occur on-site, a designated area will be used and /or a secondary containment, located away from drainage courses, to prevent the run-on of storm water and the runoff of spills.
- Regular inspection of on-site vehicles and equipment for leaks will occur, and repairs made immediately.
- Check incoming vehicles and equipment (including delivery trucks and employee and subcontractor vehicles) for leaking oil and fluids. Leaking vehicles or equipment will not be allowed on-site.
- Always use secondary containment, such as a drain pan or drop cloth, to catch spills or leaks when removing or changing fluids.
- Regularly inspect on-site vehicles and equipment for leaks, and repair immediately.
- Place drip pans or absorbent materials under paving equipment when not in use.
- Use adsorbent materials on small spills rather than hosing down or burying the spill. Remove the adsorbent materials promptly and dispose of properly.

- Promptly transfer used fluids to the proper waste or recycling drums. Do not leave full drip pans or other open containers lying around.
- Keep vehicles and equipment clean; don't allow excessive build-up of oil and grease.
- Oil filters disposed of in trashcans or dumpsters can leak oil and pollute storm water. Place the oil filter in a funnel over a waste oil-recycling drum to drain excess oil before disposal.
- Store cracked batteries in a non-leaking secondary container. Do this with all cracked batteries, even if you think all the acid has drained out. If you drop a battery, treat it as if it is cracked. Put it into the containment area until you are sure it is not leaking.

3.7.1 Spills

a) Uplands

General Guidelines:

1. Clean up leaks and spills immediately.
2. On paved surfaces, clean up spills with as little water as possible. Use a rag for small spills, a damp mop for general cleanup, and absorbent material for larger spills. If the spilled material is hazardous, then the used cleanup materials are also hazardous and must be sent to either a certified laundry (rags) or disposed of as hazardous waste.
3. Never hose down or bury dry material spills. Clean up as much of the material as possible and dispose of properly.
4. Check incoming vehicles and equipment (including delivery trucks and employee and subcontractor vehicles) for leaking oil and fluids. Do not allow leaking vehicles or equipment on-site.

b) Marine

A spill control kit will be located at the barge landing office. The kit will include spill containment boom, fuel absorbent materials, gloves, goggles, Tyvek coveralls, hazardous material disposal bags and containment bags. The storage area should include enough spill-response equipment to contain the greatest potential spill, including a boom large enough to encircle the largest barge anticipated to visit the facility.

Figure 3.12 Typical Absorbent Pad

All spills, no matter how small, need to be cleaned properly. Small spills should be cleaned with designated rags and placed in a portable fireproof container. They should then be placed in the soiled rag

receptacle. If absorbent pads (pigs) have been used to soak spilled oil, place the pads in the marked container for transport to the hazardous waste disposal facility.
For in water spills of diesel fuel deploy booms to contain fuel spilled into the water. Gasoline spills should not be contained with booms due to the high volatility.

Upon discovering a spill every effort will be made to stop the source of the spill and contain the spilled materials. If any danger to the health and/or safety exists from the spill, only those methods which would allow for minimum contact with the spill site area will be undertaken. If the spill consists of gasoline, it is not advised to contain the spill because of its explosion/flammability hazard. The gasoline should be allowed to dissipate.

Signage shall be located on site at both the yacht basin and the service dock / barge landing with the following data for notification in the event of a large spill:

Spill Emergency Contacts:
Local Government: _____
Bahamas National Trust: _____
Royal Bahamas Defense Force: _____
Port Department New Providence: _____
Basin personnel in charge of spills: _____
Emergency clean-up contractor:

Training:

Facility personnel will be properly instructed in the operation and maintenance of all equipment used to prevent oil discharges, as well as the applicable spill prevention regulations. Spill prevention briefings for operations personnel will be conducted monthly, with a quarterly meeting for all facility personnel. Employees will be made aware of where spill response equipment is kept, where the list of contact names is kept and notification procedure, and how the spill response equipment is to be deployed.

All spills should be logged and the following data recorded:
- Location of spill, land and water
- Source of spill
- Time of spill
- Estimated volume of spill
- Nature and potential danger of spilled material
- Anticipated movement of spilled material
- Responsible party name, address, phone number
- Action already taken
- Weather conditions at spill site

Fueling Operations

Checklist for safe fueling:

- Emergency shut off valves located at each pump
- Fuel absorbent pads at all fueling stations
- Marked funnels for oil and gas in the fueling area
- Rags for small spills with dedicated fireproof rag container
- Tray available to go underneath portable fuel containers
- Fire extinguishers available at each of the fueling locations
- Fuel dispensers equipped with back pressure shut off valves

Signs in fueling area:

1. *Smoking Is Prohibited.*
2. *Please Be Sure Vessel Is Securely Moored Before Fueling Begins.*
3. *Engines Must Be Off Prior To Fueling.*
4. *Please Avoid Overfilling Of Tanks; Spills Are Dangerous To You And The Environment.*
5. *All Portable Fuel Tanks Will Be Removed From The Vessel And Filled On The Docks In The Fueling Tray.*
6. *An Emergency Shut Off Switch For The Gasoline Dispenser Is Located* _____
7. *Please Report all Spills, No Matter How Small.*
8. *Please Off Load All Passengers Before Fueling.*
9. *Please Make Sure That You Use The Proper Oil To Gas Ratio.*
10. *If Fueling An Inboard Engine Open The Hatches And Turn On The Blower For Five Minutes. If You Smell Gas Fumes In The Bilge Be Smart Don't Start.*
11. *Please Place All Empty Oil Receptacles In Marked Container.*

Morning activities before fueling begins:

- Ensure fueling area is free of debris and obstructions and that safe fueling materials listed above are in place.
- Visually inspect hoses and supply lines for wear or damage.
- Unlock fueling station.
- Inspect fuel dispenser trays for any signs of fuel leaks. The dispenser tray is the drain location for any failures in the fuel line upstream. If you notice fuel collecting in the tray please notify management. Fixing the problem immediately can save large costs associated with lost fuel and spill cleanup.
- Inspect fuel dispenser trays for water. If water is present, use a hand pump to remove the water to the five-gallon bilge water container. Empty the five-gallon container into the bilge water receptacle.

Special diesel fueling instructions:

- The diesel fueling hose shall be retracted to the diesel dispenser on the uplands after each fueling activity occurs. The nozzle shall be placed upright in the fuel dispenser.

Figure 3.13 Typical Nozzle

Evening fuel activities:

- Secure and lock fuel-dispensing nozzles.
- Using the 5-gallon lidded container marked for used oil containers, carry empty containers to the used oil receptacle. Drain all oil and place empty containers in waste receptacle.
- Using the fireproof container marked for used fuel and oil absorbent pads, carry and dispose of soaked pads to the used fuel and oil absorbent container.
- Using the fireproof container marked for soiled rags, carry soiled rags to the soiled rag receptacle.

Inspections:

1. Fuel tanks will be inspected weekly for leaks and overall soundness.
2. Shell thickness will be tested every other year by an engineer.
3. Tank inventories will be taken daily using sounding stick and conversion table.
4. Above ground piping will be visually inspected every week.
5. Below ground piping will be inspected where the pipe breaks the ground weekly. Corrosion and deterioration of mastic coating will be monitored.

6. Valves, gaskets, flanges will be visually inspected weekly and monitored for leaks or stains.
7. Diked areas will be monitored daily. Accumulated water will be inspected for an oily sheen. Areas will be drained, recording date, time and approximate quantity discharged, noting no oily discharge has been released.
8. Spill prevention equipment will be inventoried monthly or after use and a list of items needing replacement will be submitted to purchasing.

3.7.2 Fuel / Hazardous Material Explosion

The risk of explosion is unlikely at Big Bell Island; areas to be aware of include gasoline and diesel powered vessel engines, fuel facilities and to a lesser extent kitchens and utility facilities. The major hazard from explosives is personal injury, negative environmental impact, or property damage caused by heat, blast, noise, fumes, and flying debris or projectiles from unintentional or inadequately controlled ignition or explosion of such materials. Injuries ranging from minor to fatal could include trauma, lacerations, eye injury, hearing impairment, and burns. Property damage could range from minor to major.

Throughout the construction phase, trained and qualified paramedics will be on site.

a) Uplands

In the case of an explosion, immediately take cover and advise others to do the same.

1. Immediately call Emergency sources and provide detailed information about the location and nature of the fire and or explosion.
2. Stay away from windows.
3. Do not light matches.
4. Move well away from the site of the hazard to a safe location.
5. If a fire appears controllable, promptly direct the charge stream from a fire extinguisher toward the base of the flame.
6. Close all doors to confine the fire, but leave unlocked for firefighter access. If danger from smoke or flame exists or a small fire is not controllable, activate the building alarm and evacuate to your designated evacuation assembly area. Smoke is the greatest danger in a fire, so stay low near the floor where the air is less toxic.
7. Account for all personnel known to be on-site. It is important to stay calm.
8. Administer First Aid if required.
9. Provide any information pertaining to the origin or cause of the fire.
10. If requested, assist emergency crews; otherwise, STAY CLEAR.

Once at the scene, emergency services will set up a command post at a specified setback distance, taking advantage of all possible cover where they can observe the building for

visible smoke or flames, if possible. Firefighters will need to obtain all pertinent information about the status of explosives material in the facility from knowledgeable facility personnel.

After all personnel are safe and accounted for, a cooling-off period will be required before anyone can enter the facility. In general, the more uncertain the hazard, the longer this cooling-off period will be. If smoke or flames are visible, for example, allow at least one hour after the smoke or flames are no longer visible for cooling off. If the alarm occurred at night in an extremely hazardous area, it would be advisable to wait until the next morning. The re-entry team will normally consist of two persons, one of whom should be familiar with the facility and the explosive material. While this person usually will be the facility point of contact, another person (building coordinator, facility manager, or his/her designee) may be assigned by the incident commander. The other person is should be experienced in entry and rescue techniques.

The re-entry team should be equipped with head and face protection, complete sets of flame-resistant clothing, and transceivers or other means of communication. Other necessary equipment may include keys to buildings, flashlights, extinguishers, binoculars, breathing apparatus, safety shoes and fire-fighting boots. The personnel will be provided respiratory protective equipment, as needed. The incident commander will determine at the scene what protective equipment is required.

b) Marine

Boat explosions or those in the vicinity of the basin necessitate similar protocols, with the additional complication of potential fuel spills. In the case of an explosion those in the vicinity should immediately take cover.

1. Fuel cut-off switches should be activated.
2. Locate life vests and life rings and provide to any victims in the water, help them get safely to land.
3. Call emergency services.
4. Administer first aid and CPR if necessary.
5. Activate spill response procedures to contain any leaking fuel.
6. Provide any information pertaining to the origin or cause of the fire.
7. If requested, assist emergency crews; otherwise, STAY CLEAR.

4.0 TURBIDITY CONTROL PLAN

Turbidity refers to how clear the water is. The greater the amount of total suspended solids (TSS) in the water, the murkier it appears and the higher the measured turbidity. The major source of turbidity in open water is typically phytoplankton, but closer to shore, particulates may also be clays and silts from shoreline erosion, resuspended bottom sediments, and organic detritus from wetland and mangrove systems, stream and/or wastewater discharges. Dredging operations, channelization, increased flow rates, floods, or even too many bottom-feeding fish may stir up bottom sediments and increase the cloudiness of the water.

There are three (3) general types of particles: algae, detritus (dead organic material), and silt (inorganic, or mineral, suspended sediment). The algae grow in the water and the detritus comes from dead algae, higher plants, zooplankton, bacteria, fungi, etc. produced within the water column, and from watershed vegetation washed in to the water. Sediment comes largely from shoreline erosion, disturbance activities (dredging, filling, prop-wash, etc.), and from the resuspension of bottom sediments due to wind mixing and other natural phenomena.

High concentrations of particulate matter can modify light penetration, cause shallow lakes and bays to fill in faster, and smother benthic habitats - impacting both organisms and eggs. As particles of silt, clay, and other organic materials settle to the bottom, they can suffocate newly hatched larvae and fill in spaces between rocks which could have been used by aquatic organisms as habitat. Fine particulate material also can clog or damage sensitive gill structures, decrease their resistance to disease, prevent proper egg and larval development, and potentially interfere with particle feeding activities. If light penetration is reduced significantly, macrophyte growth may be decreased which would in turn impact the organisms dependent upon them for food and cover. Reduced photosynthesis can also result in a lower daytime release of oxygen into the water. Effects on phytoplankton growth are complex depending on too many factors to generalize. Very high levels of turbidity for a short period of time may not be significant and may even be less of a problem than a lower level that persists longer.

Turbidity is generally reported in nephelometric turbidity units (NTUs). The term nephelometric refers to the way the instrument estimates how light is scattered by suspended particulate material in the water. The Nephelometer, also called a turbidimeter has a photocell set at 90 degrees to the direction of the light beam to estimate scattered rather than absorbed light. This measurement generally provides a very good correlation with the concentration of particles in the water that affect clarity.

All internal yacht basin excavation and dewatering work will be completed in entirety prior to removing the channel plug, thus separating these activities completely from open seawater. Other dredging activities associated with the project will include the expansion of the barge landing/service dock area and improvements to the access channel for the yacht basin. Containment of sedimentation during work on the barge landing/service dock and access channel areas will be achieved with the use of turbidity curtains (Figure 4.1). Modern manufactured turbidity curtains will be chosen from the curtain details below (Figures 4.2 and 4.3). The Environmental Manager (EM) and trained construction oversight staff will work onsite and directly with the contractors to observe the installation of turbidity curtains and to resolve any anchoring issues.

Figure 4.1 Example of Turbidity Curtain Containing Jetty Construction

The following activities will be done in conjunction with the installation and maintenance of the curtains.

- Identification of the limits of containment relative to proposed excavation areas (further described in Chapter 4.2).
- Visual in-water inspections of the installed curtains and corrective measures enforced for deficiencies found.
- Regular maintenance and replacement of damaged curtains.
- Continuous adjustments of curtains to maximize containment.

These practices have proven themselves successful elsewhere in the Bahamas in limiting movement of silt outside of the construction area. Additionally, prescribed monitoring of turbidity levels will also be engaged to document silt loads related to excavation activities. The EM and contractor will be responsible for continuously monitoring turbidity with shutdown actions taken if testing results exceed prescribed levels.

Due to the sensitivity of the Bell project a protocol was developed that will include three (3) test sites for each tidal direction: 1000m upstream (background), 250m (not to exceed 29 NTUs over background) and 1000m downstream (not to exceed 0 NTUs over background). Sampling will occur every hour. Testing will occur at mid depth or greater to insure resources on the bottom are monitored/protected.

4.0.1 Turbidity Curtains

Turbidity curtains will contain all over-water and in-water work during construction. The following turbidity curtain details are to be referenced when determining the type of curtain during dredging and construction operations.

Lightweight Turbidity Curtain
Application: Calm waters with little current, such as lakes, ponds, canals and shoreline areas.

Specifications
Fabric- Reinforced vinyl high visibility yellow
Connector- Laced together through grommets and load lines bolted together.
Floatation- 6" expanded polystyrene over 9 lbs/Feet buoyancy.
Ballast- ¼" galvanized chain

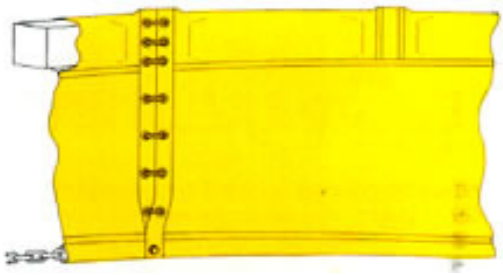


Figure 4.2 Lightweight Turbidity Curtain

Heavyweight Turbidity Curtain
Application: Areas exposed to current, wind and tides.

Specifications
Fabric- High strength nylon reinforced vinyl high visibility yellow (22 oz yd2 weight)
Connector- Snap hooks and rings connect load lines with slotted, reinforced PVC pipe for fabric closure.
Floatation- 12" expanded polystyrene over 29 lbs/Feet buoyancy.
Ballast- 5/16" galvanized wire ropes with heavy vinyl coating.

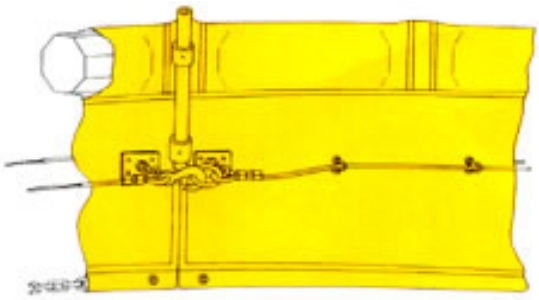


Figure 4.3 Heavyweight Turbidity Curtain

4.1 DREDGING PLAN

The proposed dredging associated with the Bell Island project will be necessary to provide access to the yacht basin and improved barge landing/service dock. The yacht basin access channel has been sited to take advantage of natural deep water, but some dredging will be necessary to accommodate the deeper draft vessels that will be accessing this island. All dredging activities will be mechanically dredged with backhoes and excavators from barges, surrounded by turbidity curtains during all construction activities.

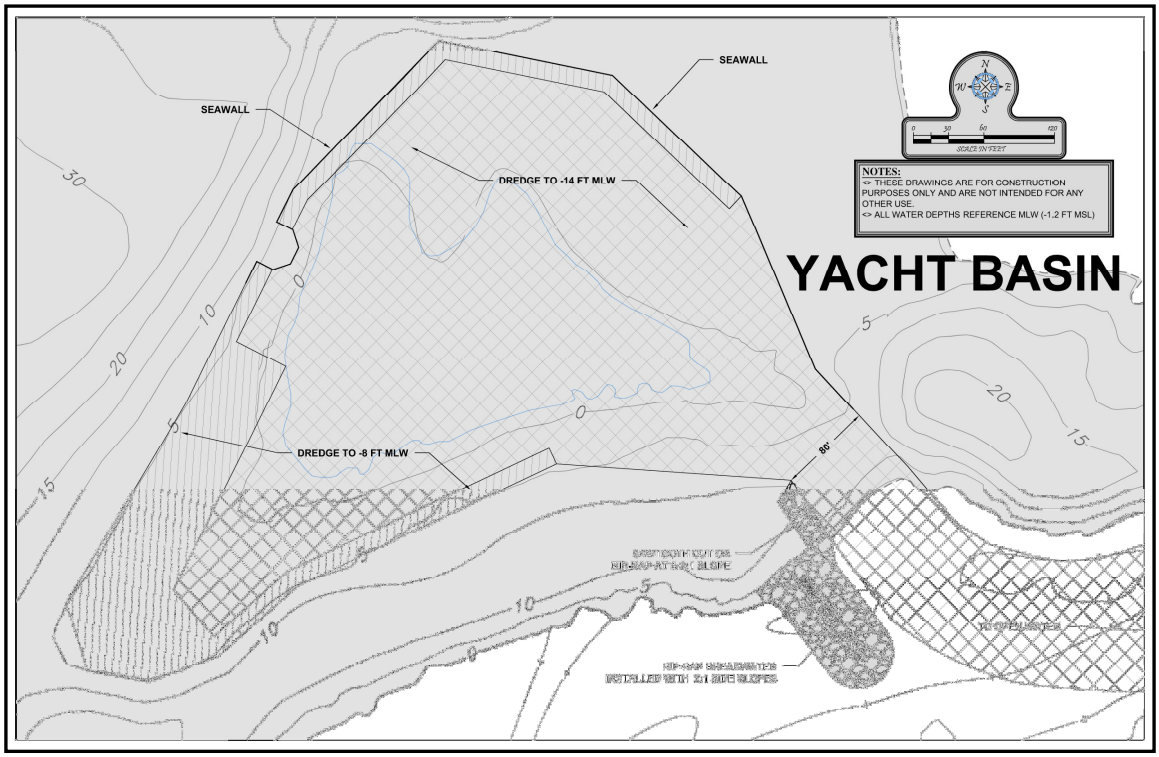


Figure 4.4 Yacht Basin Dredge, Seawall, and Breakwater Plan (Exhibit 5)

The entrance into the basin will be protected by the installation of a rip rap jetty constructed with the dredged rock from the basin excavation and/or harder rock from Freeport. This jetty will help divert water flow, thus reducing the possibility of sand accretion within the proposed channel and thereby reducing future maintenance dredging. Where the jetty ties into the natural wall of the basin, sawtooth rock contours or rip rap will be used to further dissipate wave energy within the entrance of the basin. The channel will be cut to a minimum of 80 feet at bottom width. Harder rock will be box cut and where overlaying sand is found, the edges will be dug at an approximate 10:1 slope away from the channel.

The barge landing breakwaters will be constructed from a local stone core with a minimum of three to five ton armor stones and minimum eight to ten ton toe stones. A 2:1 slope will be used for all portions exposed to open waters. A minimum 1:1 slope will be used for the interior walls. Two (2)- 36 inch flushing culverts will be installed within the breakwater to enhance flushing within the protected basin. The bottom of the culverts will be -5 feet MLW and the invert will be at -2 feet MLW. The breakwater will feature a centerline planter shelf. The top of the breakwater will be at +6 feet MSL with a crest width of at least 12 feet, leaving a planter that varies in width but is approximately 6 feet wide by 5 feet deep. The vegetation source will include the Bell Island Native Plant Nursery, which is described in greater detail in Section 3.3.1 of Chapter 3. Salt tolerant plants will be used and drip irrigation will be installed to ensure success.

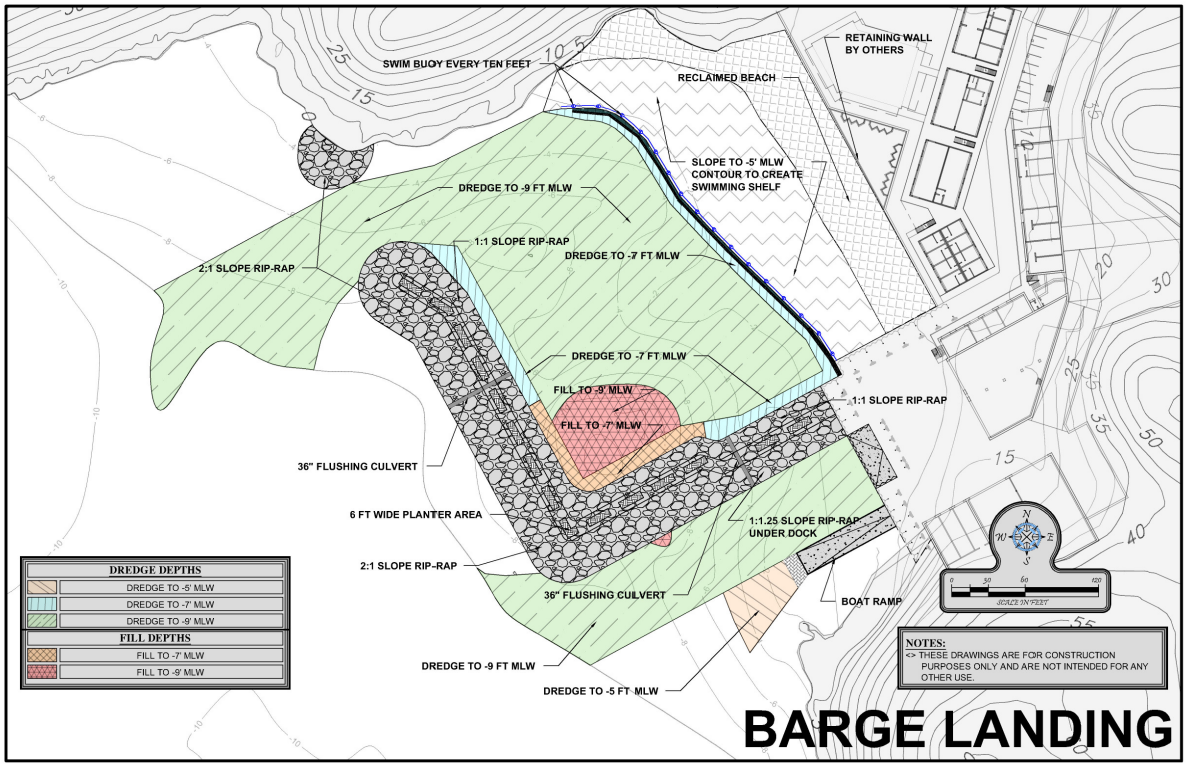


Figure 4.5 Barge Landing Dredge, Seawall, and Breakwater Plan (Exhibit 6)

Should any dredged material be transported back to an upland contained settlement area and allowed to dewater, the runoff will be detained in settling basins until sediments settle out of the water column and clear water can be released back into open water. The dewatering area will be contained within a secondary berm so that in the case of any spillage there is still adequate containment of the dredged material. This will provide response time to address and correct the problem.

Entrance Channel Dredging Sequencing Details

1. Baseline turbidity and water quality measurements taken according to the protocol outlined in Section 4.2.
2. Create a spoil unloading area on approved lands.
3. Deploy turbidity barriers where needed. Inspect curtains daily.
4. Create staging area to station equipment and supplies.
5. Mechanical dredging commences.
6. Turbidity monitoring occurs during all in-water construction activities twice daily or each tidal change, whichever is more restrictive, and to verify results are consistently below thresholds.
7. When off-loading dredge spoil, turbidity curtains will be deployed around barge as needed.
8. Curtains will not be removed until turbidity inside the curtain matches ambient levels.
9. Remove all temporary sediment control devices.
10. Post-dredge survey.
11. Continue with post dredge habitat monitoring as described in Chapter 5.

4.2 TURBIDITY MONITORING

All turbidity measurements should be made at the site in three (3) locations each tidal direction: 1000m upstream (background), 250m (not to exceed 29 NTUs over background) and 1000m downstream (not to exceed 0 NTUs over background). Testing will occur at mid depth or greater to insure resources on the bottom are monitored/protected. Measurements will always be made in the densest part of the plume, outside the turbidity curtains. Sampling will occur hourly.

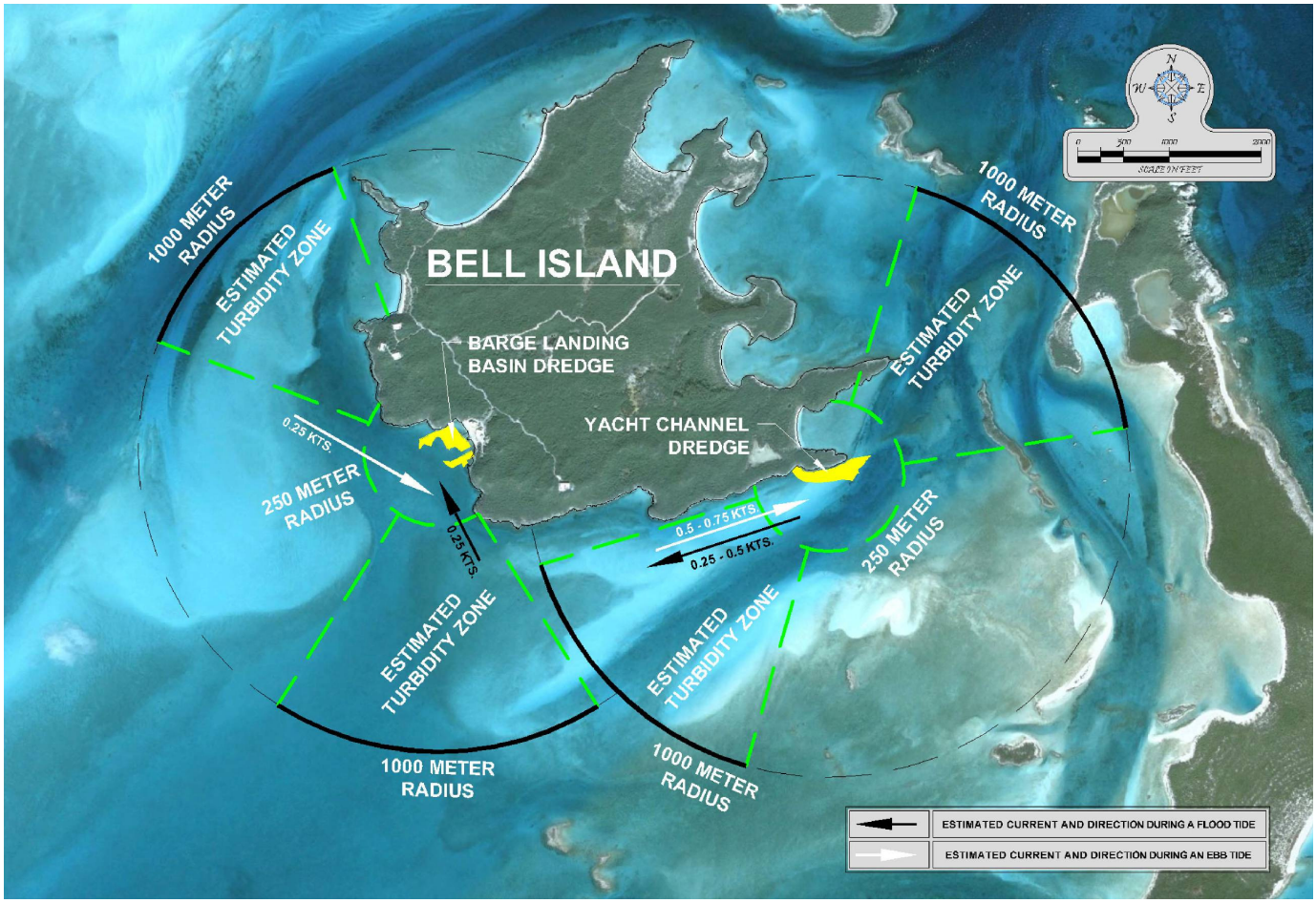


Figure 4.6 Turbidity Sampling Map (Exhibit 7)

Prior to Construction

Two (2) weeks and one (1) week prior to the start of construction, measurements should be made to establish background levels of turbidity. Those background results should be sent to the Ministry of the Environment and BEST one (1) week prior to construction commencement.

During Construction

Turbidity measurements will be made by the Environmental Manager, using a turbidity meter that is calibrated daily to manufacturer's standards and zeroed at the start of each measurement event. Turbidity monitoring will be performed during all in-water work, both for initial construction and maintenance events. The measurements should be recorded, analyzed and the results submitted to the Ministry of the Environment weekly for reference.

During construction of the marine structures and dredging work, measurements should be made according to the following schedule:

- Testing hourly at the commencement of dredge activity daily.

If turbidity readings are found to exceed 29 NTUs above background levels at the 250m testing site or exceed 0 NTUs above background levels at the 1000m testing site, all work ceases immediately and remedial actions such as redeployment of turbidity control devices, or modification of dredge methodology, will be put in place.

The dredge and barge shall be contained within a surrounding turbidity curtain during all dredging activities. The turbidity curtain shall only be lifted or removed when turbidity at the dredge location returns to background levels. When the dredge turbidity has subsided, the barge will be moved to off-load the spoil. Before off-loading commences the barge will again be surrounded by turbidity curtain. Spoil will then be off-loaded to a location contained by an earthen berm to be utilized at a later date. Before removing the turbidity curtain, the turbidity inside the curtain must return to ambient conditions.

The turbidity monitoring schedule for all in-water construction can be found on the following page under Table 4-1.

Table 4-1: Turbidity Monitoring Schedule

2 Weeks Before Construction	Get background turbidity samples from marina entrances, beach renourishment zones and marina basin.
1 Week Before Construction	Check background turbidity readings again.
1 Week Before Construction	Send background turbidity readings to Ministry of the Environment and BEST.
(During Const.) Hourly	Testing to occur hourly during construction. Will not exceed 29 NTUs at 250m and 0 NTUs at 1000m above background.
(During Const.) Daily	Inspect turbidity curtains in-water and barriers on adjacent uplands. Inspect dewatering basin during dredge operations.
(During Const.) Weekly	Provide summary report of turbidity monitoring to the Ministry of the Environment and BEST.
(Post-Const.) Weekly for 1 Month	Continue turbidity testing once a week for 1 month following completion of in-water activity.

After Construction

After the completion of the marine construction, measurements will be made for weekly period of one (1) month.

The Bahamas National Trust (BNT) and BEST will be welcome to review all records and to participate and observe testing and monitoring procedures.

Turbidity monitoring will be performed for all dredging work, both for initial construction and future maintenance events.

5.0 CONCH RELOCATION METHODOLOGY

There has been heightened concern regarding impacts to queen conch (*Eustrombus gigas*) populations within the general vicinity of the project's dredge limits. As a result, a third party, Craig Dahlgren, PhD, was hired to perform an independent conch survey. Dahlgren's report concluded it was unlikely that the proposed dredging activities would have a significant impact on conch populations in the area around Bell Island. As a precautionary measure however, to ensure adequate protection for *Eustrombus gigas*, this relocation methodology for construction was prepared.

Prior to the commencement of daily dredge activities, the immediate dredge area will be surveyed by divers in transects, spaced only a few feet apart and will include at least two sweep of the impact footprint. Any conch identified in the dredge vicinity and extending 100m beyond will be collected in a mesh dive bag and brought back to the boat. Each specimen will be measured, the species identified, photographed, and the data recorded using the *Conch Relocation Report Forms*, provided as Appendix 8. The conch will then be temporarily placed in a container filled with ambient seawater and equipped with an aerator. Upon inspection of the entire dredge area, or when the container is ¼ full of conch, they will then be transported outside of the 250m radial boundary as depicted below. Each individual conch specimen will be placed by hand in a similar substrate from which it was collected, as a means to further guarantee the success of the relocation. Conch reporting forms will be submitted with the other environmental monitoring reports to BEST and the BNT.

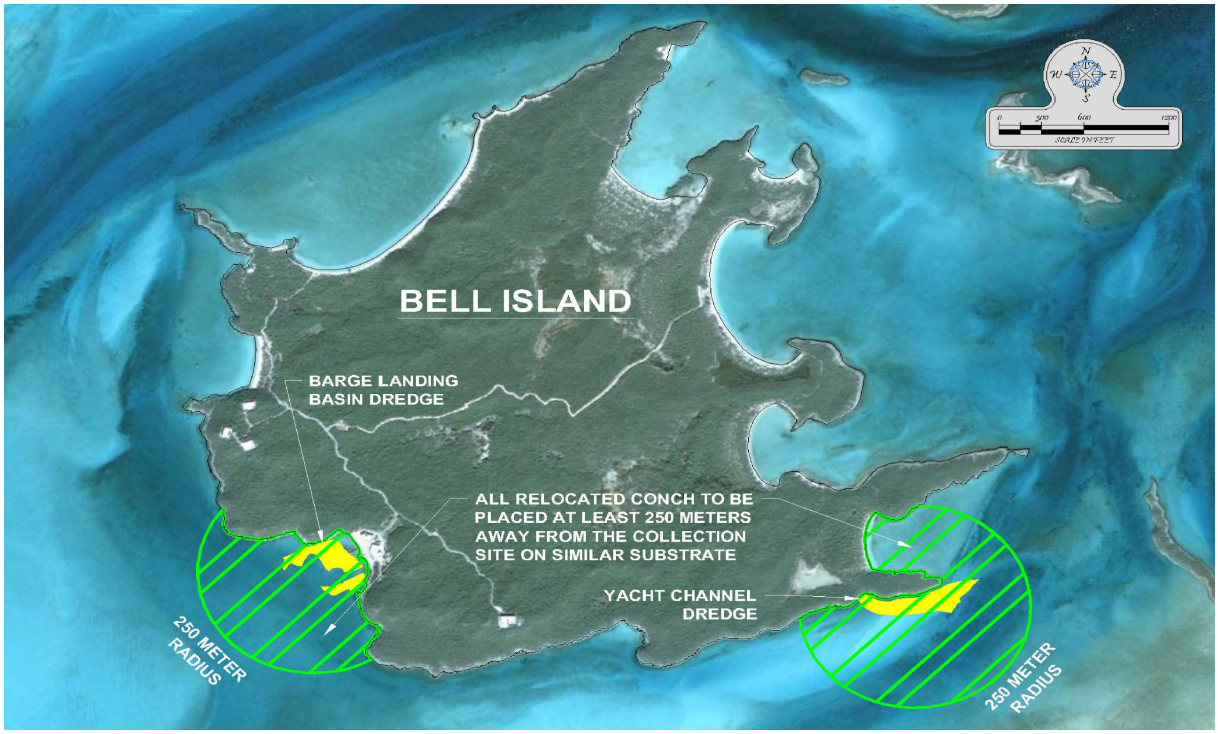


Figure 5.1 Conch Relocation Map (Exhibit 8)

5.1 RELOCATION OF SIGNIFICANT CORALS AND ASSEMBLAGES

Based on biological surveys by Dr. Craig Dalhgren, patch reefs and channel reefs within the 250m radius impact zones and in the Estimated Turbidity Zones contain some of the biological resources that are most likely to be impacted by dredging activities. Live corals in reef areas within dredging zones will be relocated. The general location of the coral resources that are planned for relocation can be found at the western origin of the yacht basin channel, as shown in Exhibit 10. Dr. Dalhgren also recommended that live corals on reefs that will not be directly impacted but may be likely to see high sedimentation from dredging, should also be either relocated or afforded increased protection from dredge impacts. It is important to note that while relocation of living corals can minimize loss of reef building corals, it is likely that the reef structure (i.e., fish habitat) may still be lost since much of the structure within patch reef habitats at present are dead coral heads, which may be difficult to relocate based on their size and the fact that boring organisms may have weakened the reef's framework and will likely cause it to fall apart if moved. In these cases options that will minimize dredging impacts may be deemed more effective at maintaining the ecosystem than transplanting corals. These options consist of reducing sediment loads reaching these sites by employing additional turbidity curtains to surround the resources. This procedure will most likely be utilized between the north edge of the yacht basin channel and the rocky shoreline to prevent sedimentation from settling on the resources. If a reef structure is to be removed from an area, large rubble pieces from the dredging operation may also provide a similar structure for fish and, if positioned properly and colonized by corals, may supplement transplanting efforts by fulfilling a similar function to patch reefs. When transplanting corals, several suitable areas (e.g., areas with similar environmental conditions to where corals are currently growing in the impact zones) exist around Bell Island but specific sites will be examined in detail prior to translocation efforts. Patch reefs and channel reefs in impact areas and estimated turbidity zones affected by dredging activities will be monitored and changes documented and compared to nearby control reefs to assess impacts of dredging activity on the biological resources in these areas. If it is determined that activities are impacting the resources, work will be stopped and the issues addressed.

There are a number of steps that will have to be undertaken in carrying out a coral relocation activity. These include:

i. Undertaking a grid of the donor area.

ii. Grid the relocation site in order to match coral relocation areas based on the grid of the donor site.

iii. Take detailed pictures of the area and produce a composite photograph. This can then be laminated and distributed to persons doing the relocation. This will ensure that corals are placed in the right area and in the right formation based on the original grids taken.

iv. The donor and the relocation sites should have similar conditions, i.e. depth, light, wave movement etc.

v. A suitable method of anchoring the coral has to be utilized according to the type of substrate encountered. In this particular case most of the substrate is hard coral rock. Either marine epoxy or marine cement can be used in this case. These will both result in less impact, while providing the best conditions for survival, especially against toppling.

vi. There are two methods that are recommended for the removal of corals. The first option being chisel, hammer, and/or crowbar to chip away at the base of the coral. This method is used primarily in the case of smaller corals. The second method is by using a hydraulic diamond chain saw to remove the larger coral heads.

vii. Steel cages will be used in the transportation of the corals from the donor site to the relocation site. These cages will be lined with foam to minimize the movement and possible abrasion of the corals. These cages will be moved through the use of lift bags. While being moved the baskets should always remain submerged in the water. The use of lift bags facilitates easier and smoother movement of the corals.

viii. The relocation site should be prepared to receive corals. The sand should be removed to expose bare rock for the coral substrate to be attached. This could be achieved with a small suction dredge.

ix. Once the corals have been relocated, they will be monitored daily to ensure that no impacts occur during dredging and construction activities. In the post construction phase, monitoring should take place quarterly monitoring for two years. The monitoring will include still pictures.

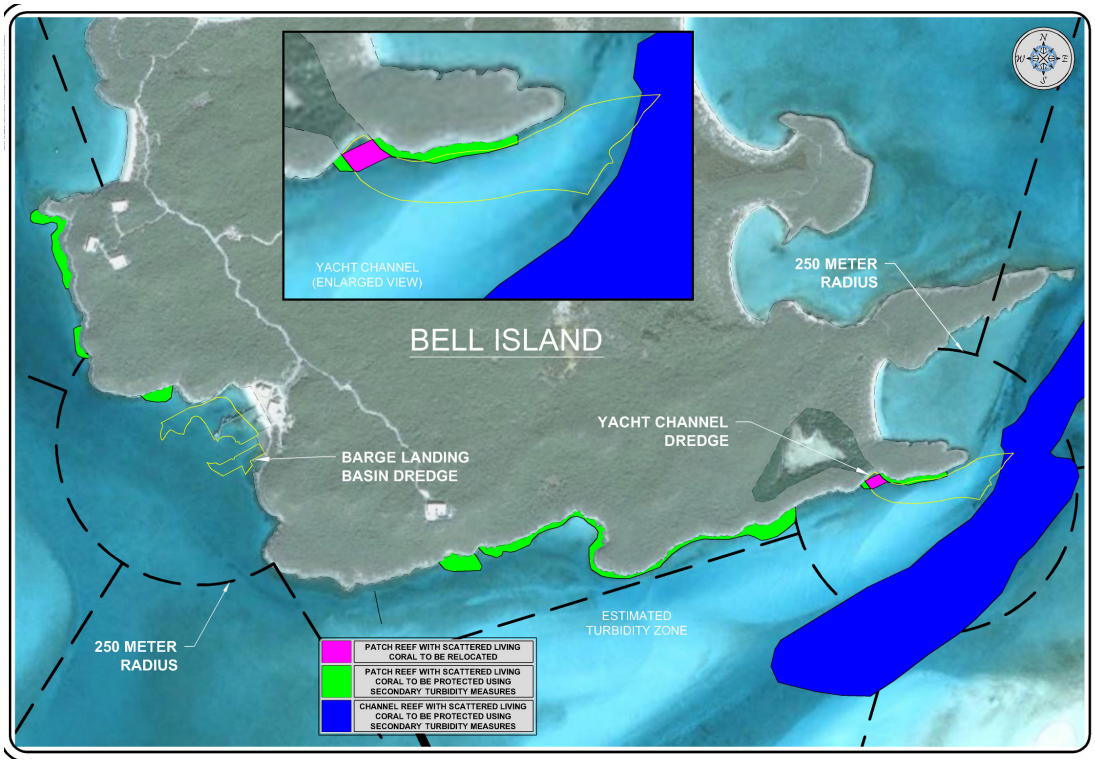


Figure 5.2 Coral Protection Plan (Exhibit 10)

Literature Used and Web Resources

Florida Guide to Writing a Waste Minimization Plan
http://www.dep.state.fl.us/waste/quick_topics/publications/shw/HWRegulation/Binder1_waste_min_guide.pdf

Florida Storm Water Prevention Plan for Marinas
http://www.dep.state.fl.us/law/Documents/Grants/CMP/pdf/StormwaterPlan-Final.pdf

EPA Spill Prevention, Control and Countermeasures Checklist for Construction activities
http://www.epa.gov/reg3hwmd/oil/spcc/review.pdf

EPA Storm Water Pollution Prevention Plan Checklist for Construction Activities
http://www.dot.state.tx.us/publications/environmental_affairs/pollution_prevention.pdf

40 CFR Part 112
Oil Pollution Prevention and Response; Non-Transportation-Related Onshore and Offshore Facilities; Final Rule

World Bank, 1998, Pollution Prevention and Abatement Handbook
http://www.ifc.org/ifcext/enviro.nsf/AttachmentsByTitle/gui_genenv_WB/$FILE/genenv_PPAH.pdf

Environmental Protection Agency, 1992, Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices
http://cfpub1.epa.gov/npdes/docs.cfm?document_type_id=1&view=Policy%20and%20Guidance%20Documents&program_id=6&sort=name

Kruczynski, W.K., 1999, Water Quality Concerns in the Florida Keys, Florida Keys National Marine Sanctuary
http://floridakeys.noaa.gov/research_monitoring/wqpp_white_paper.pdf

F.A.C. 62-302.530, Criteria for Surface Water Quality Classifications
http://www.epa.gov/waterscience/wqs/fl/fl_4_62-302t.pdf

Subcommittee on the Management and Mitigation of Acoustic Impacts on Marine Mammals: 2004, DRAFT
http://www.mmc.gov/sound/plenary4/pdf/mandmdraftreport.pdf

California Stormwater BMP Handbook: Construction, 2003
http://www.cabmphandbooks.com/Documents/Construction/WM-6.pdf

City of Solvang, California, 2006, Material and Hazardous Waste Storage

http://www.cityofsolvang.com/PDF/08-MaterialHazWaste.pdf

OSHA Regulations: Hazardous Waste Operations and Emergency Response. - 1910.120 http://www.osha.gov/pls/oshaweb/owastand.display_standard_group?p_toc_level=1&p_part_number=1910

Environment Protection Authority, New South Wales 2002, Environmental Management Plan for Landscaping Works, http://www.environment.nsw.gov.au/resources/siteguide.pdf

Foundation for Environmental Education, 2006, Awards for Improving the Coastal Environment: The example of the Blue Flag, http://www.blueflag.org/publicattachment/FEE_Manual_ENG_FINAL.pdf

Blue Flag Marina Certification: Commonwealth of the Bahamas www.onecaribbean.org/information/documentdownload.php?rowid=3676

Larimer, W. , NC Marine Trades Services, North Carolina Marina / Boatyard Hurricane Preparations http://www.ncwaterways.com/BusinessAssistance/Regulatory/Waterfront/Hurricane-preparedness-plan.PDF

SBTDC-Marine Trades Services, 2003, Best Management Practices Manual for North Carolina Marinas http://www.nccoastalmanagement.net/Marinas/NC%20Marina%20BMP%20Manual.pdf

Bahamas Environment Science and Technology Commission, 2006, Guidelines for the Preparation of Environmental Impact Assessments for Industrial Ports and Commercial Boat Harbours

Bahamas Environment Science and Technology Commission, 2006, Guidelines for the Preparation of Environmental Impact Assessments for Housing Developments

Bahamas Environment Science and Technology Commission, 2006, Housing Developments: Impacts, Mitigation Measures, and Evaluation & Monitoring Requirements

Chapter 5 Specific Resources

Berg, Jr, CJ and RA Glazer, 1995. Stock assessment of a large marine gastropod (*Strombus gigas*) using randomized and stratified towed-diver censusing. - Rapp, P.-v. Réun. Cons. int. Explor. Mer, 199:247–258.

Bohnsack, J.A., and S.P. Bannerot. 1986. A stationary visual census technique for quantitatively assessing community structure of coral reef fishes. NOAA Technical Report NMFS 41, U.S. Dept of Commerce, 15 pp.

Jaap, WC 2000. Coral reef restoration. Ecolog. Engineer., 15 (3-4) 345-364.

Loya, Y (1978). Plotless and transect methods. In: Stoddart, D.R., Johannes R. E. (eds.) Coral reefs: research methods. U.N.E.S.C.O.

Tansley, A.G. & Chip, T.F. 1926. Aims and methods in the study of vegetation. London.

Zieman, JC. 1974. Methods for the study of the growth and production of the turtle grass, *Thalassia testudinum* König. Aquaculture 4: 139-143.

Water Quality References

M Karydis 2009. Eutrophication assessment of coastal water based on indicators: A literature review. Global NEST J. 11(4), 373-390.

Boyer, JN, JW Fourqurean, RD Jones 1999. Seasonal and long-term trends in the water quality of Florida Bay (1989–1997). Estuaries and Coasts, 22(2), 417-430.

http://www.dep.state.fl.us/waste/quick_topics/publications/pss/pcp/site/guidaace7.pdf

Yde, M, E De Wulf, S De Maeyer-Cleempoel, D Quaghebeur 1982. Coprostanol and bacterial indicators of faecal pollution in the Scheldt estuary. Bull. Environmental Contamination and Toxicology, 28 (2) 129-134.

Pierce, RH, RC Brown 1984. Coprostanol distribution from sewage discharge into Sarasota Bay, Florida Bull. Environmental Contamination and Toxicology 32(1), 75-79.

Mudge, SM AS Ball 2006. Sewage In: *Environmental Forensics: A Contaminant Specific Approach* Eds. Morrison, R. and Murphy, B. Elsevier, pp533.

http://www.turnerdesigns.com/t2/doc/appnotes/S-0080.pdf

http://nature.thecompass.com/8tb/sampling/

EA Cioffi, GL Goblick 1999. Fluorescent whitening agents as facile anthropogenic pollution indicators in estuarine and surface water. Division of Environmental Chemistry Preprints of Extended Abstracts, 39(2).

Laboratory URL's

DIN & chl *a*: http://serc.fiu.edu/wqmnetwork/

hydrocarbons: http://www.southernanalyticallabs.com/

http://www.mote.org/index.php?submenu=SCIENCE&src=gendocs&ref=Ecotoxicology_landing page_New&category=Ecotoxicology

EXHIBIT 1

YACHT BASIN SITE PLAN

YACHT BASIN

SEAWALL

SEAWALL

DOCK A

DOCK B

DOCK C

FLOATING DOCK

FIXED FLOATING DOCK ACCESS

FIXED FLOATING DOCK ACCESS

DREDGE TO -14 FT MLW

MOORING BUOYS (5)

MOORING BUOYS (3)

FLOATING DOCK

175' TURNING RADIUS

80'

DREDGE TO -8 FT MLW UNDER DOCKS

FLOATING DOCK

SAWTOOTH CUT OR RIP-RAP AT A 2:1 SLOPE

TO OPEN WATER

RIP-RAP BREAKWATER INSTALLED WITH 2:1 SIDE SLOPES

FIXED FLOATING DOCK ACCESS

N

W

E

S

0 30 60 120

SCALE IN FEET

NOTES:

<> THESE DRAWINGS ARE FOR CONSTRUCTION PURPOSES ONLY AND ARE NOT INTENDED FOR ANY OTHER USE.

<> ALL WATER DEPTHS REFERENCE MLW (-1.2 FT MSL)

EXHIBIT 2

BARGE LANDING SITE PLAN

SWIM BUOY EVERY TEN FEET

RETAINING WALL
BY OTHERS

RECLAIMED BEACH

SLOPE TO -5' MLW
CONTOUR TO CREATE
SWIMMING SHELF

DREDGE TO -9 FT MLW

1:1 SLOPE RIP-RAP

2:1 SLOPE RIP-RAP

DREDGE TO -7 FT MLW

100'
TURNING RADIUS

DREDGE TO -7 FT MLW
UNDER DOCKS

FLOATING DOCKS

FIXED
DOCKS

FILL TO -9' MLW

FILL TO -7' MLW

1:1 SLOPE RIP-RAP

36" FLUSHING CULVERT

6 FT WIDE PLANTER AREA

1:1.25 SLOPE RIP-RAP
UNDER DOCK

2:1 SLOPE RIP-RAP

36" FLUSHING CULVERT
UNDER DOCK

BOAT RAMP

200'
TURNING RADIUS

DREDGE TO -9 FT MLW

DREDGE TO -5 FT MLW

DREDGE DEPTHS
DREDGE TO -5' MLW
DREDGE TO -7' MLW
DREDGE TO -9' MLW
FILL DEPTHS
FILL TO -7' MLW
FILL TO -9' MLW

N
W E
S

0 30 60 120
SCALE IN FEET

NOTES:
<> THESE DRAWINGS ARE FOR CONSTRUCTION PURPOSES ONLY AND ARE NOT INTENDED FOR ANY OTHER USE.

BARGE LANDING

EXHIBIT 3

BARGE LANDING
DREDGE REDUCTIONS

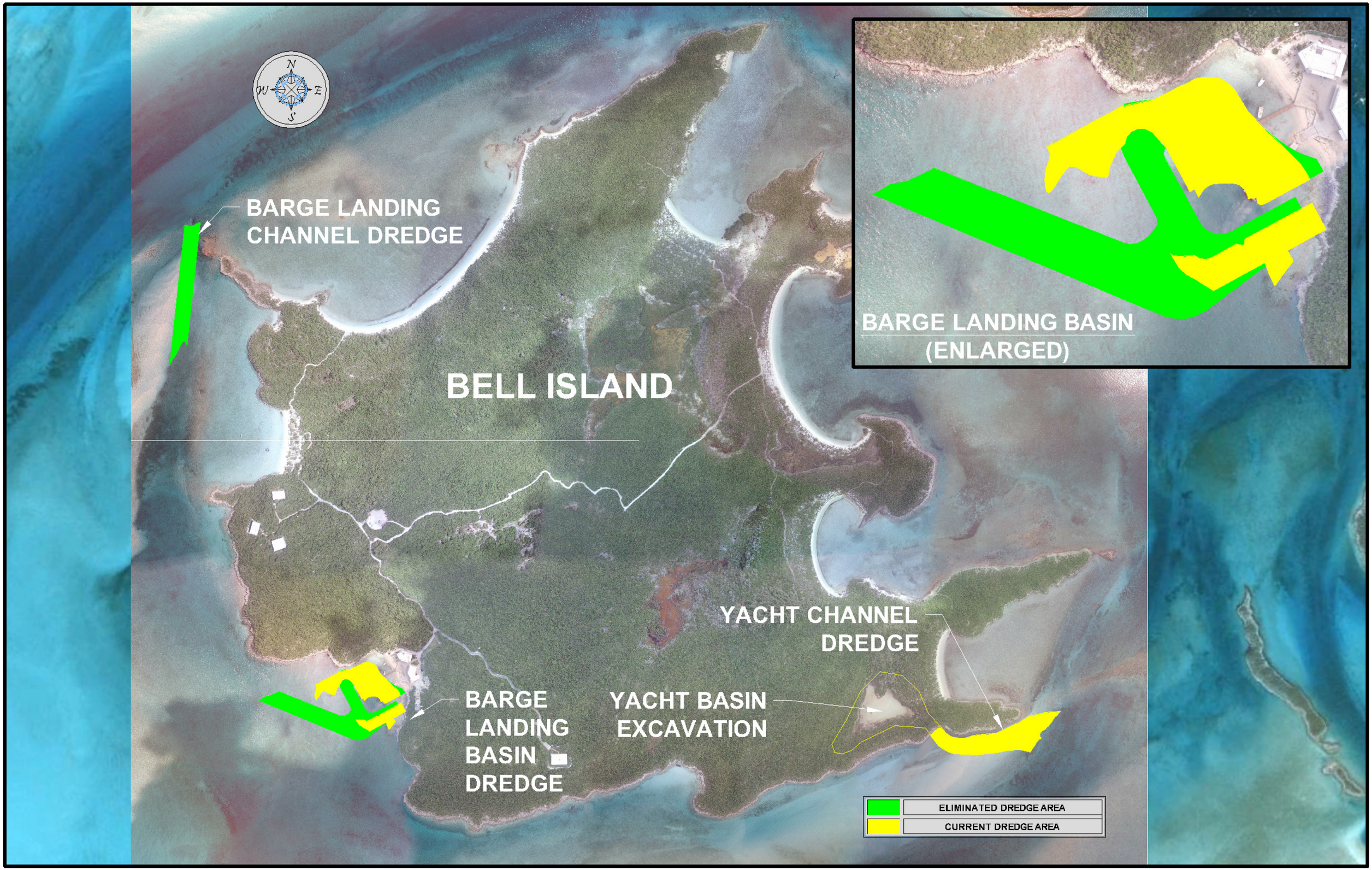

BARGE LANDING
CHANNEL DREDGE
BELL ISLAND
BARGE LANDING BASIN
(ENLARGED)
YACHT CHANNEL
DREDGE
BARGE
LANDING
BASIN
DREDGE
YACHT BASIN
EXCAVATION
ELIMINATED DREDGE AREA
CURRENT DREDGE AREA

EXHIBIT 4

DEWATERING PLAN

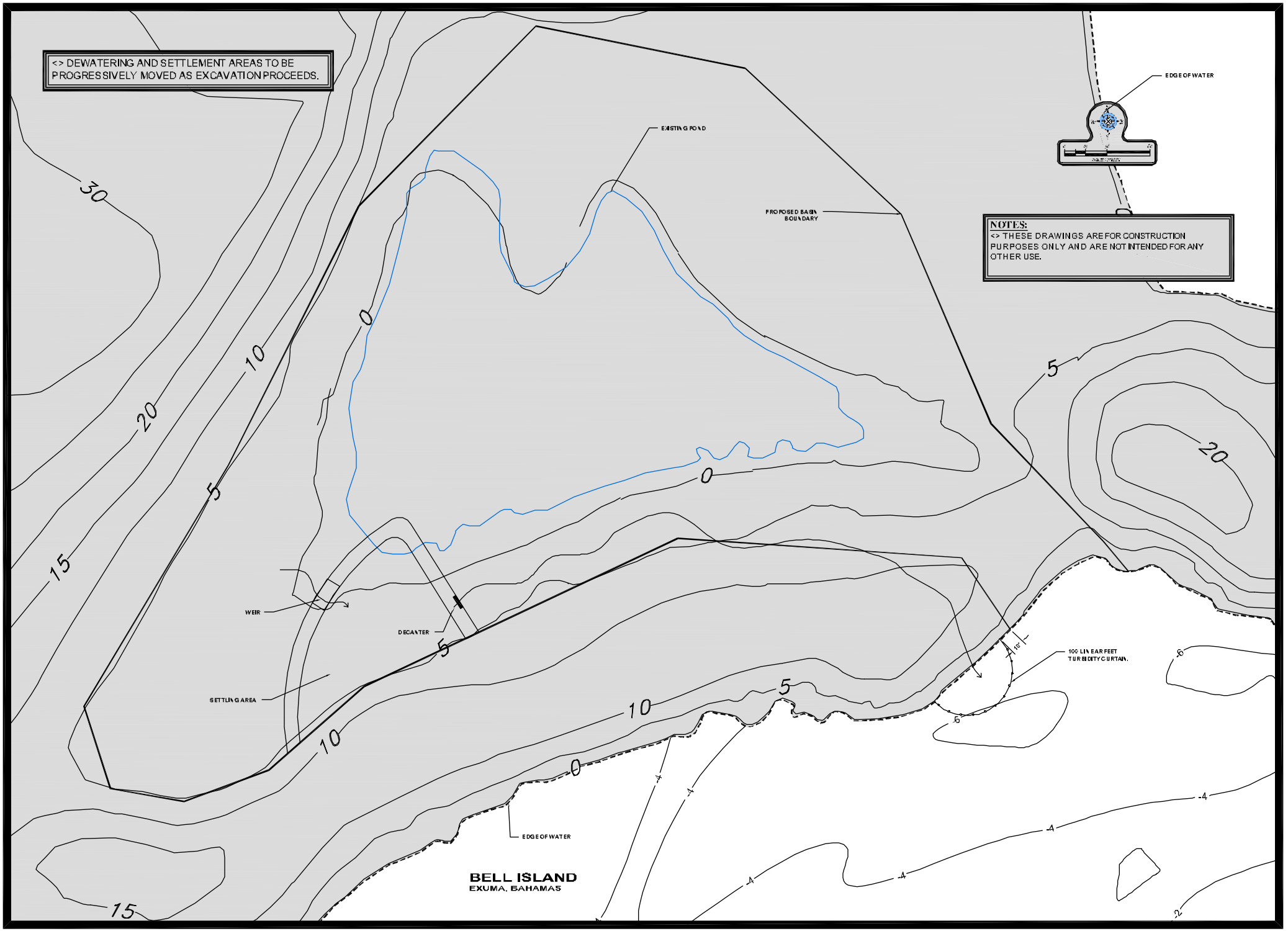

<> DEWATERING AND SETTLEMENT AREAS TO BE PROGRESSIVELY MOVED AS EXCAVATION PROCEEDS.
EDGE OF WATER
EXISTING POND
PROPOSED BASIN BOUNDARY
NOTES:
<> THESE DRAWINGS ARE FOR CONSTRUCTION PURPOSES ONLY AND ARE NOT INTENDED FOR ANY OTHER USE.
WEIR
DECANTER
SETTLING AREA
100 LINEAR FEET TURBIDITY CURTAIN.
EDGE OF WATER
BELL ISLAND
EXUMA, BAHAMAS

EXHIBIT 5

YACHT BASIN DREDGE, SEAWALL, AND BREAKWATER PLAN

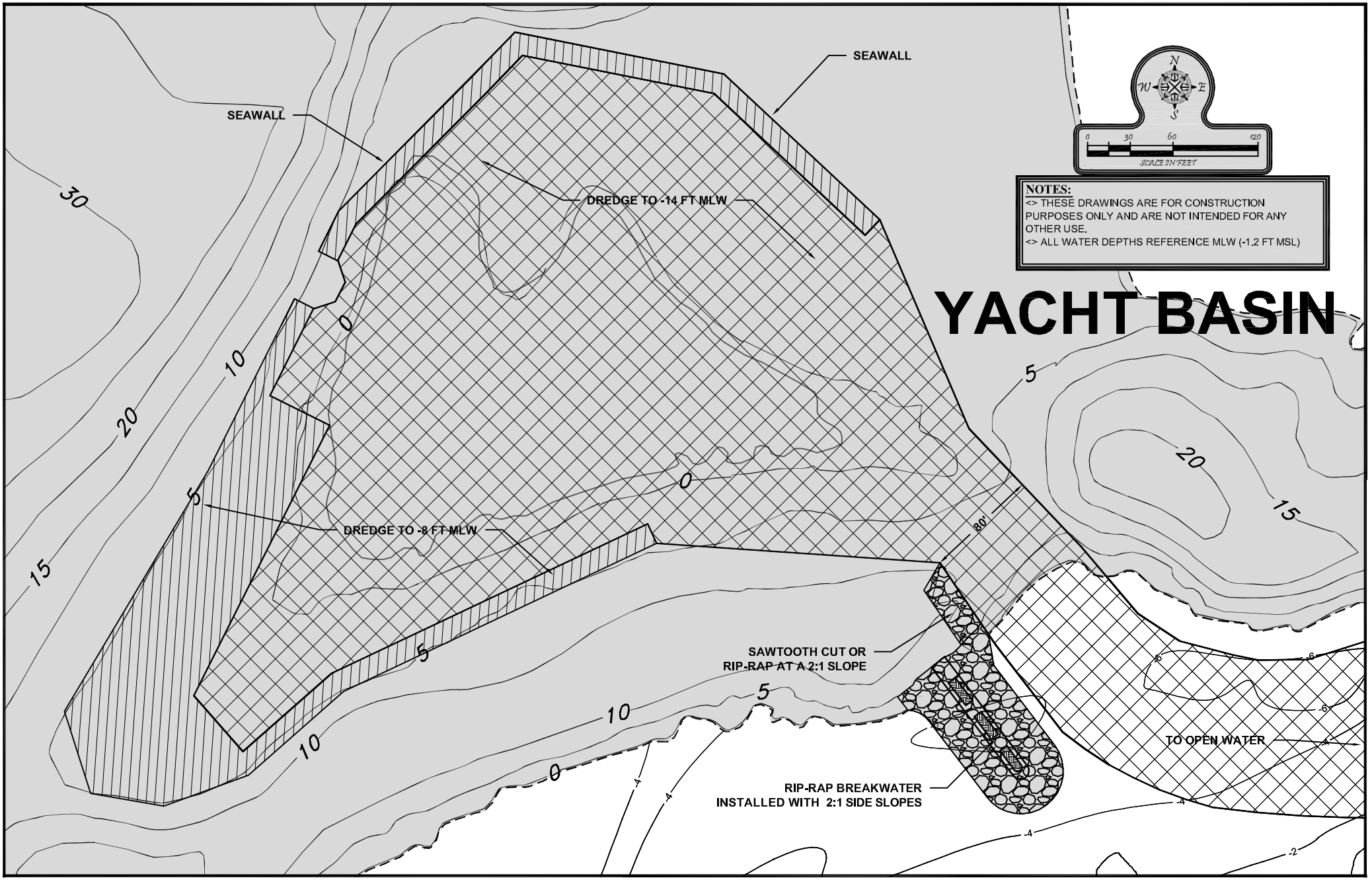
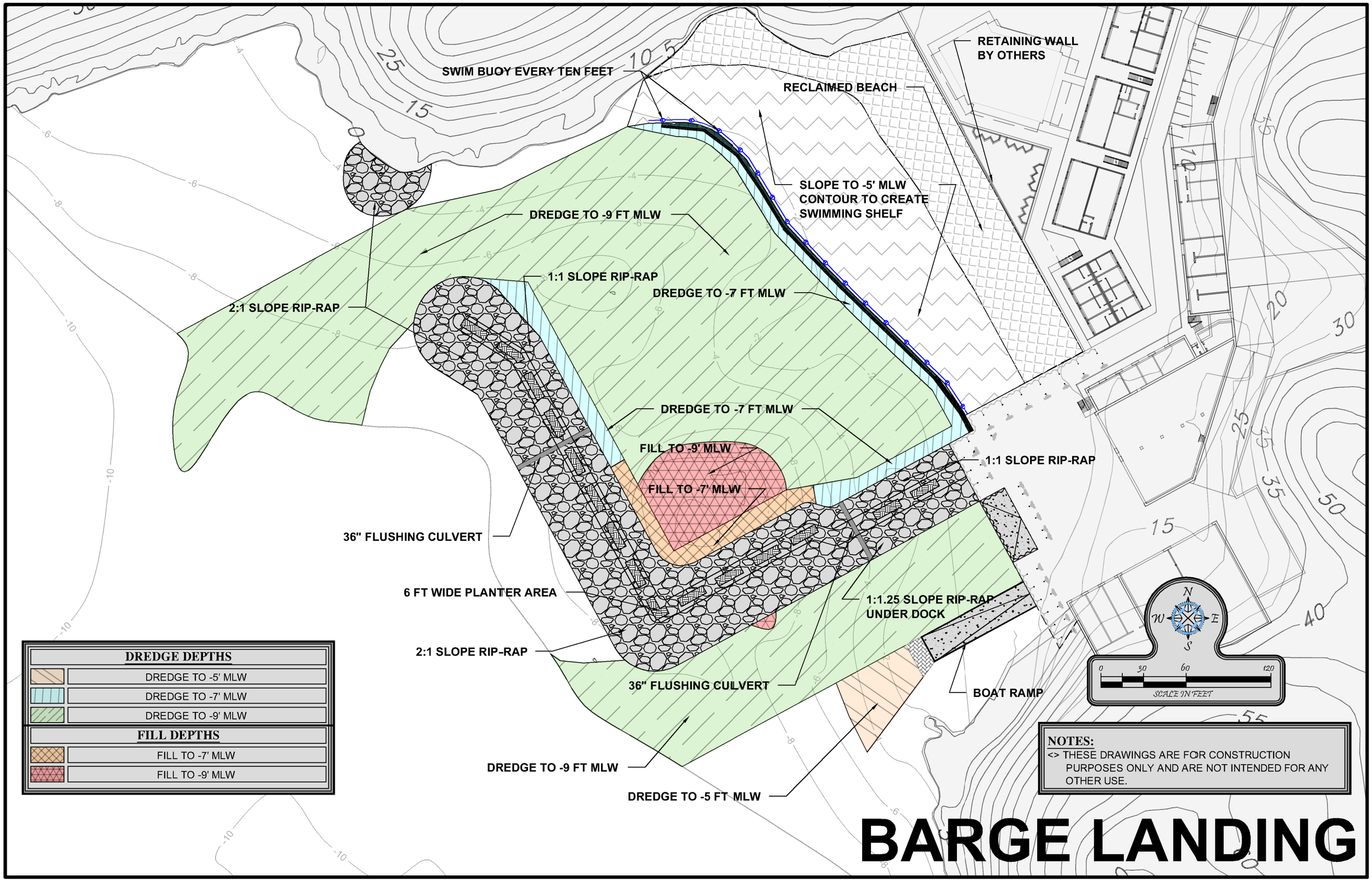

SEAWALL
SEAWALL
DREDGE TO -14 FT MLW
DREDGE TO -8 FT MLW
80'
SAWTOOTH CUT OR
RIP-RAP AT A 2:1 SLOPE
RIP-RAP BREAKWATER
INSTALLED WITH 2:1 SIDE SLOPES
TO OPEN WATER
N
W
E
S
0
30
60
120
SCALE IN FEET
NOTES:
<> THESE DRAWINGS ARE FOR CONSTRUCTION PURPOSES ONLY AND ARE NOT INTENDED FOR ANY OTHER USE.
<> ALL WATER DEPTHS REFERENCE MLW (-1.2 FT MSL)
YACHT BASIN

EXHIBIT 6

BARGE LANDING DREDGE, SEAWALL, AND BREAKWATER PLAN



DREDGE DEPTHS
DREDGE TO -5' MLW
DREDGE TO -7' MLW
DREDGE TO -9' MLW
FILL DEPTHS
FILL TO -7' MLW
FILL TO -9' MLW

NOTES:

<> THESE DRAWINGS ARE FOR CONSTRUCTION PURPOSES ONLY AND ARE NOT INTENDED FOR ANY OTHER USE.

BARGE LANDING

EXHIBIT 7

TURBIDITY SAMPLING MAP

BELL ISLAND

TURBIDITY SAMPLING MAP

BELL ISLAND

1000 METER RADIUS

ESTIMATED TURBIDITY ZONE

1000 METER RADIUS

ESTIMATED TURBIDITY ZONE

BARGE LANDING BASIN DREDGE

YACHT CHANNEL DREDGE

0.25 KTS.

250 METER RADIUS

0.25 KTS.

0.5 - 0.75 KTS.

0.25 - 0.5 KTS.

250 METER RADIUS

ESTIMATED TURBIDITY ZONE

ESTIMATED TURBIDITY ZONE

1000 METER RADIUS

1000 METER RADIUS

N

W

E

S

0 500 1000 2000

SCALE IN FEET

ESTIMATED CURRENT AND DIRECTION DURING A FLOOD TIDE

ESTIMATED CURRENT AND DIRECTION DURING AN EBB TIDE

TURRELL, HALL & ASSOCIATES, INC.
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Naples, FL 34104-3732
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email: tunaj@turrell-associates.com

TAB NAME:	REVISIONS:
TURBIDITY	#####
	#####

DRAWN BY:	REVIEWED BY:
BCH	TTT
PROJECT #:	SHEET:
0929	1OF1
DATE:	
01-13-2010	
SCALE:	
1:1000	

P:\0929 big bell island\drawing\gis\EMP Exhibits\HA-0929-EMP-TURBIDITY_SAMPLE.dwg TURBIDITY 1/27/2011

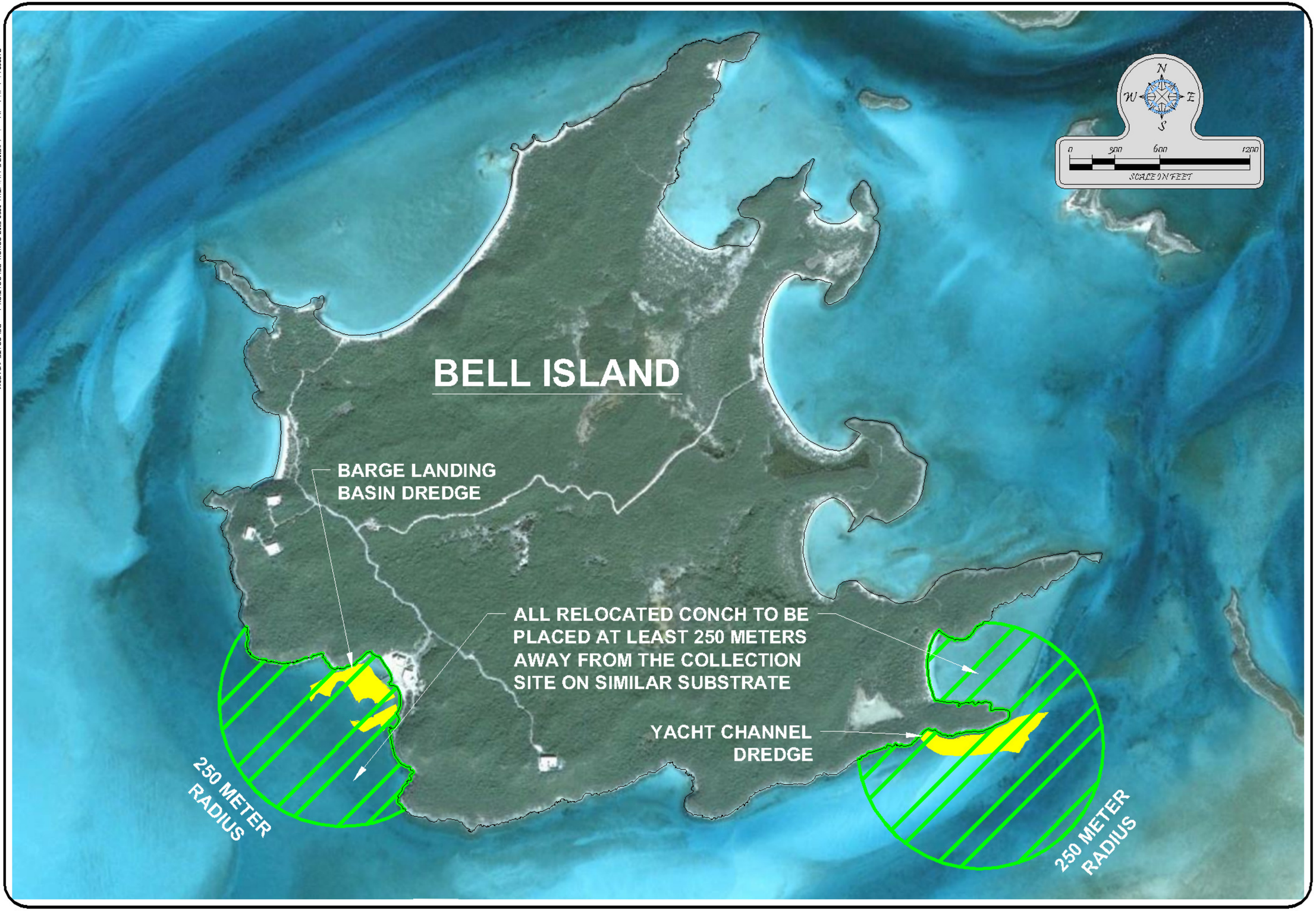
EXHIBIT 8

CONCH RELOCATION MAP

P:\0929 big bell island\drawing\gis\EMP Exhibits\THA-0929-EMP-CONCH_RELOCATION.dwg RELOCATE 1/24/2011

BELL ISLAND

CONCH RELOCATION MAP



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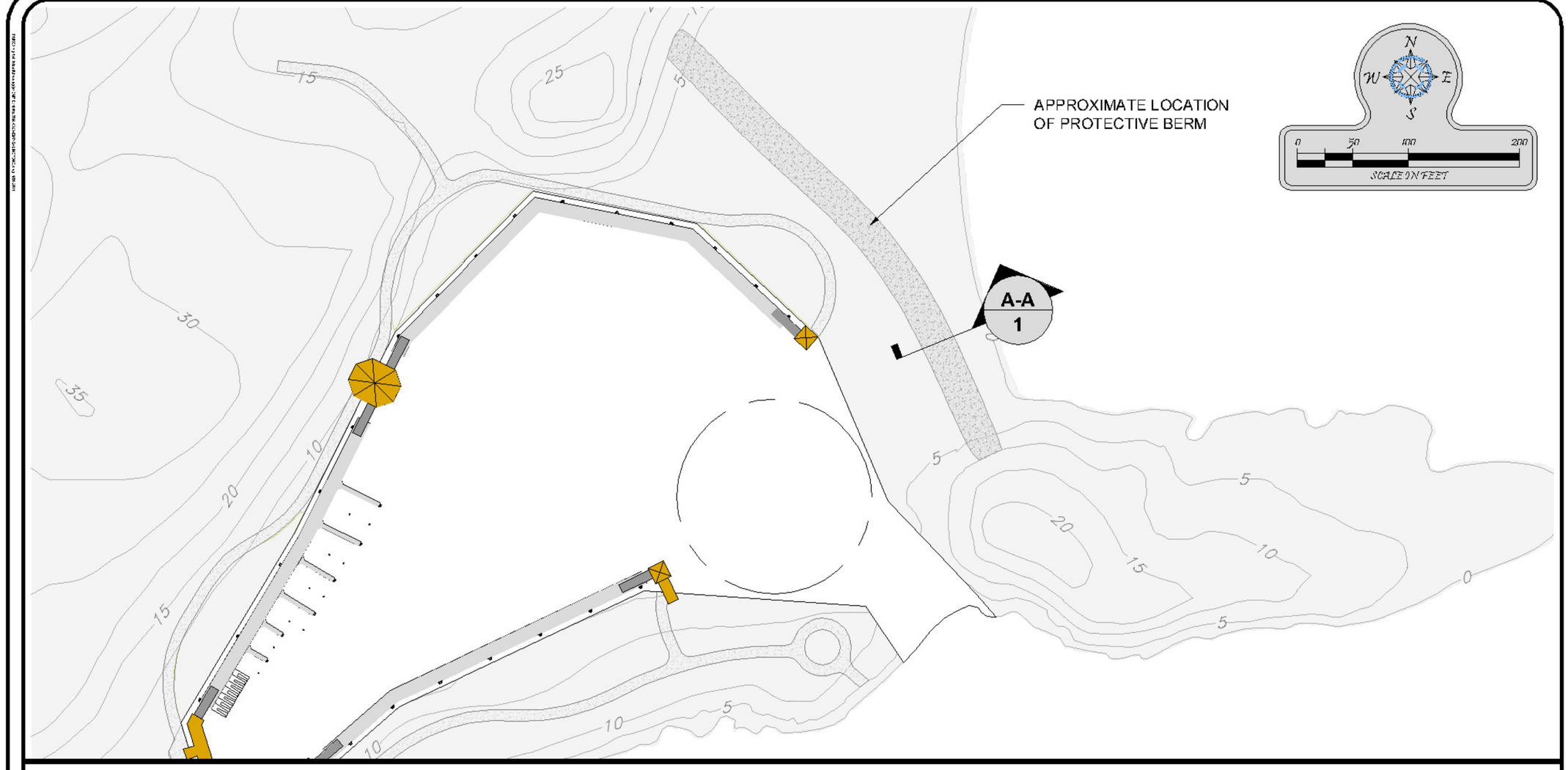
TAB NAME:	REVISIONS:
RELOCATE	#####
	#####

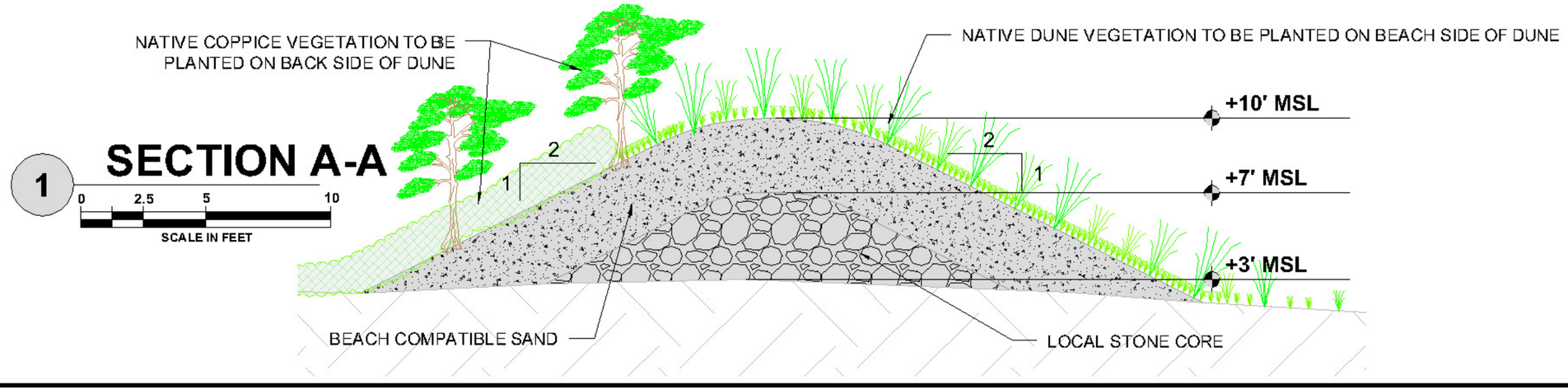
DRAWN BY:	REVIEWED BY:
BCH	TTT
PROJECT #:	SHEET:
0929	1
DATE:	
01-17-2011	
SCALE:	
1:600	

EXHIBIT 9

CREATED DUNE PLAN
&
CROSS SECTION

BELL ISLAND
PROTECTIVE DUNE





1 **SECTION A-A**

0 2.5 5 10

SCALE IN FEET

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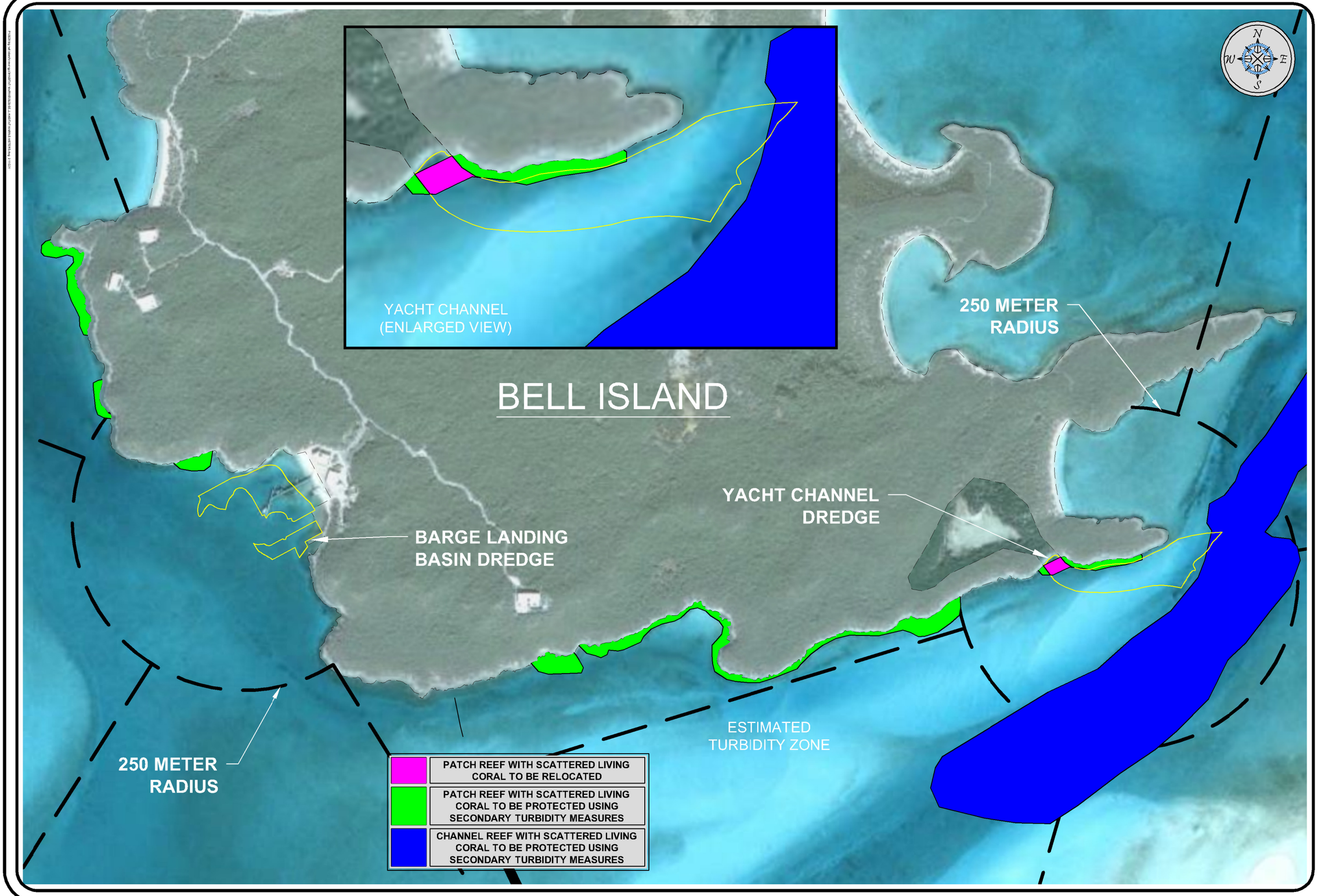
email: turrill-associates.com

DRAWN BY:	BCB
PROJECT:	0929
DATE:	01-25-2011
SCALE:	N/A
LAYOUT:	HURRICANE
REVIEWED BY:	TTT
SHEET	7

EXHIBIT 10

CORAL PROTECTION PLAN



BELL ISLAND
CORAL PROTECTION PLAN

TURRELL, HALL & ASSOCIATES, INC.
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Naples, FL 34104-3772
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REVISED BY:	DATE:	CHANGED
N/A	N/A	N/A
N/A	N/A	N/A
N/A	N/A	N/A
N/A	N/A	N/A
N/A	N/A	N/A
N/A	N/A	N/A
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N/A	N/A	N/A
N/A	N/A	N/A

DRAWN BY:	BCB
PROJECT:	0929
DATE:	02-11-2011
SCALE:	N/A
LAYOUT:	CORAL (2)
REVIEWED BY:	TTT
SHEET:	1

EXHIBIT 11

HABITAT ANALYSIS EXHIBITS FOR IMPACT AREAS FOR CRAIG DAHLGREN, PHD

HABITAT ANALYSIS EXHIBITS FOR IMPACT AREAS
FOR
CRAIG DAHLGREN, PHD
FEB. 18, 2011

The information contain in this supplement dated February 18th 2011 draws on information provided in the main body of the Dalhgren report dated January 27, 2011, and provided as Appendix VII. The table and exhibits to follow were prepared to assist in the description of the marine resources observed in the vicinity of the Yacht Basin and Barge Landing dredge areas of the Bell Island project. The exhibits illustrate individual locations of corals and conch habitat with corresponding photographs; while the table further describes the attributes of each of these locations. The table directly relates to the locations identified in the Yacht Basin Dredge Impact exhibit and the Barge Basin Dredge Impact exhibit.

The data presented in the table is an excerpt from the information on the following pages:

- Pages 5-8 discuss the various habitats present. This information can be found on the exhibit through the pictures represented.
- Pages 11-12 discuss the Benthic communities and the percent of coral reef colonies
- Page 4 explains Sea Grass Habitat - Spares to Medium density depicted as BL4a, 4b and 5
- Page 5 discusses Hardbottom Habitat shown as BL6 and YB4
- Page 6 describes Patch Reef Habitat illustrated as BL 2 and YB 2

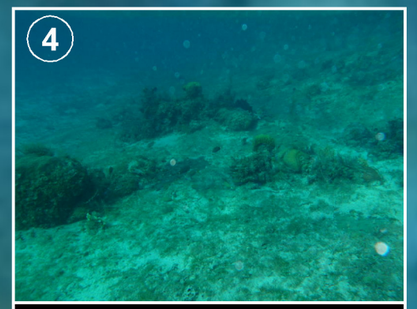
PHOTO #	MAJOR SPECIES OBSERVED	GPS (UTM-WGS 1984 datum, Zone 18 North, Meter)		% COVER LIVE CORAL	VIABILITY	MEAN SIZE	ACTION TO BE TAKEN
		X	Y				
YB 1	*Montastraea annularis, Montastraea faveolata, Porites astreoides, Porites porites*	342672.523	2688530.5322	9	87%	13 cm	Relocation (to included prominent corals where the channel is to cut into the basin)
YB 2	*Montastraea annularis*	342474.4707	2688433.6699	27	80%	42 cm	Preservation
YB 3	*Montastraea faveolata, Porites astreoides, Porites porites*	342646.3256	2688515.3483	2	92%	13 cm	Relocation
YB 4	*Porites astreoides, Montastraea annularis, Porites porites, Siderastrea siderea, Diploria labrynthiformes.*	342708.1514	2688530.0086	2	94%	13 cm	Relocation
BL 1	*Montastraea annularis, M. faveolata*	341581.1025	2688559.8838	9	83%	26 cm	Relocation
BL 2	*Diploria labrynthiformes*	341606.3265	2688459.0207	5	80%	30 cm	Preservation
BL 3	*Siderastrea siderea*	341570.5925	2688524.6868	5	83%	26 cm	Relocation
BL 6	*Manicina areolata*	341512.2619	2688663.3736	1	95%	5 cm	Relocation
SEAGRASS HABITATS				**% COVER**	**SHOOT COUNT**	**BLADE LENGTH**	
BL 4a	*Thalassia testudinum*	341402.9577	2688589.3022	5-10	66/m^2	3-10 cm	Part of Conch Relocation Plan
BL 4b	*Thalassia testudinum*	341545.3684	2688560.4092	5-10	66/m^2	3-10 cm	Lost
BL 5	*Thalassia testudinum, Strombus gigas*	341441.3193	2688472.1539	20	72/m^2	5-15	Part of Conch Relocation Plan

CORALS – VIABILITY = Mean % Living Tissue on Individual Colonies
MEAN SIZE = Mean diameter of Individual Colonies

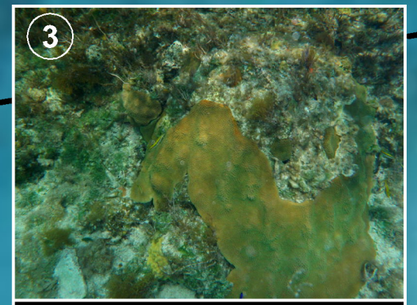
BELL ISLAND

YACHT CHANNEL DREDGE

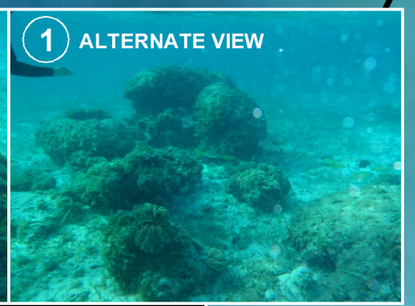
250 METER RADIUS



Porites astreoides, Montastraea annularis, Porites porites, Siderastrea siderea, & Diploria labrynthiformes



Montastraea faveolata, Porites astreoides, Porites porites



Montastraea annularis, Montastraea faveolata, Porites astreoides, Porites porites

Montastraea annularis

BELL ISLAND
YACHT BASIN DREDGE IMPACT

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REVISED BY:	DATE:	CHANGED
N/A	N/A	N/A
N/A	N/A	N/A
N/A	N/A	N/A
N/A	N/A	N/A
N/A	N/A	N/A
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N/A	N/A	N/A
N/A	N/A	N/A

DRAWN BY:	BCB
PROJECT:	0929
DATE:	02-17-2011
SCALE:	N/A
LAYOUT:	YACHTBASIN
REVIEWED BY:	TTT
SHEET:	1

BELL ISLAND

BARGE LANDING
DREDGE

250 METER
RADIUS

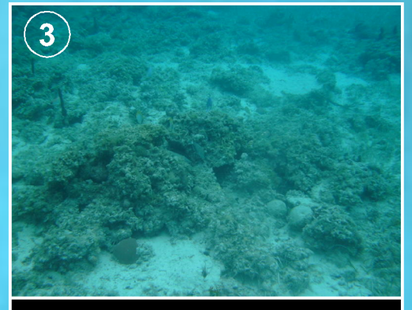
1

Montastraea spp.

2

Diploria labrynthiformes

3



Siderastrea siderea and others

4a 4b

Thalassia testudinum

5

Thalassia testudinum, Strombus gigas

6

small corals e.g., Manicina areolata

BELL ISLAND
BARGE LANDING DREDGE IMPACT

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REVISED BY:	DATE:	CHANGED
N/A	N/A	N/A
N/A	N/A	N/A
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N/A	N/A	N/A

DRAWN BY: BCB
REVIEWED BY: TTT
PROJECT: 0929
SHEET: 1
DATE: 02-17-2011
SCALE: N/A
LAYOUT: BARGELANDING

APPENDIX I

ACCIDENT REPORT FORM

Big Bell Island
SUPERVISOR'S ACCIDENT REPORT

Supervisor's Name (print or Type)	Position/Title	Work Phone #	Location
Claimant's Name	Position/Title	Work Phone #	Location

1. Date of accident	Time of accident:		
2. Supervisor notified:	Time of notification:		
Note: If medical treatment was provided, obtain a written work-release before the claimant returns to work.			
3. Location of accident:			
4. Was the claimant on duty at time of incident?			Yes ☐ No ☐
5. How did the accident happen? (State specific job being done; machinery, tools, or object involved; other contributing factors.)			
6. What was the employee doing immediately before the accident occurred?			
7. Describe the nature of the injury:			
8. Was the accident caused by a non-UI employee or faulty equipment?			Yes ☐ No ☐
9. What mechanical guards or other safeguards were provided?		Were they being used?	Yes ☐ No ☐
10. Were there any witnesses? Yes ☐ No ☐ Please list names, positions, and phone numbers:			
11. Does the claimant have any illness or prior injuries related to this injury that you are aware of? If so, describe:			Yes ☐ No ☐

12. Are you aware of any non-work related factors or conditions that may have contributed to this injury/illness? Yes ☐ No ☐

13. Did the claimant leave work? Date: Time: Yes ☐ No ☐

14. Did the claimant return to work? Date: Full time ☐ Part time ☐ Yes ☐ No ☐

15. Do you know when the claimant will be able to return to work? Date: Yes ☐ No ☐

16. Has the claimant been in touch with you since the injury? Yes ☐ No ☐

17. Have you tried to contact the claimant? Yes ☐ No ☐

18. Is any time loss or restricted duty expected (or has it already occurred) due to this injury? Yes ☐ No ☐

19. Classify the claimant's normal physical job activity: (How much bending, stooping, lifting, etc. is required.)

None (0%): ☐ Occasionally (1%-33%): ☐ Frequently (34%-66%): ☐ Continuously (67%-100%): ☐

20. If the claimant's abilities to perform normal job tasks are limited, what can be done to modify the job?

21. **What corrective actions have been taken to prevent similar accidents?**

22. Additional comments/information:

This report has been reviewed by:

SUPERVISOR'S SIGNATURE **DATE**

EMPLYOEE'S SIGNATURE **DATE**

APPENDIX II

CONSTRUCTION MONITORING FORM

Big Bell Island Construction Monitoring

Person Compiling Report: Date: Report #:

MARINE OBSERVATIONS
Construction status:
Contractors currently working:
Complete turbidity monitoring logs attached:
List of deviations with dates:
Describe any alterations or additions to sediment control methods:
List any emergency incidents such as accidents, equipment malfunctions, fuel or chemical spills for the current monitoring period:
Inspection of material storage areas:
Vehicle and equipment notes (service required, emissions and noise control operating satisfactorily):
Brief description of habitat impacts to date:
Marine mitigation status:
Habitat creation and colonization:
Other observations / comments
Photos attached:

Big Bell Island Construction Monitoring

Person Compiling Report: Date: Report #:

Terrestrial OBSERVATIONS
Construction status:
Contractors currently working:
Sediment control inspection (list any observed blow-throughs or other malfunctions):
Describe any alterations or additions to sediment control methods:
List any emergency incidents such as accidents, equipment malfunctions, fuel or chemical spills for the current monitoring period:
Inspection of material storage areas:
Inspection of waste holding areas:
Vehicle and equipment notes (service required, emissions and noise control operating satisfactorily):
Brief description of habitat impacts to date:
Terrestrial mitigation status:
Buffers/ Preserves/ Restoration:
Exotic Plant Removal:
Other observations / comments
Photos attached:

APPENDIX III

ENVIRONMENTAL CONSTRUCTION MONITORING FORM

BIG BELL ISLAND ENVIRONMENTAL CONSTRUCTION MONITORING FORM

Name: Date: Report #

MARINE OBSERVATIONS
Construction status:
Contractors currently working:
Turbidity logs attached:
Any deviations and date:
Describe alterations to sediment control methodology:
Any emergencies, incidents, accidents, equipment malfunctions or spills:
Material storage areas inspection:
Vehicle and equipment notes (maintenance required, emissions and noise control satisfactorily operating):
Habitat impacts to-date:
Habitat creation, colonization and survivorship:
Environmental Education and Signage:
Photos attached:

BIG BELL ISLAND ENVIRONMENTAL CONSTRUCTION MONITORING FORM

Name: Date: Report #

TERRESTRIAL OBSERVATIONS
Construction status:
Contractors currently working:
Sediment control inspection (list any blow-throughs, repairs, malfunctions):
Describe alterations to sediment control methodology:
Any emergencies, incidents, accidents, equipment malfunctions or spills:
Material storage areas inspection:
Waste holding area inspection:
Vehicle and equipment notes (maintenance required, emissions and noise control satisfactorily operating):
Habitat impacts to-date:
Habitat creation, colonization and survivorship (buffers and preserves):
Exotic maintenance:
Photos attached:

APPENDIX IV

INCIDENT REPORTING FORM

BIG BELL ISLAND INCIDENT REPORT RECORD		
Date:		
Form Completed By:	*Print*	*Sign*
Shift Supervisor/Witness:	*Print*	*Sign*
Location:		
Event Description:		
Action Taken:		
Checklist	*YES*	*NO*
Hazardous Materials Involved		
Fuel Spillage		
Sediment and Erosion Compromise		
Turbidity Increase		
Unplanned Clearing		
Loss of rare or sensitive species		
Emergency Services Involved		
Environmental Managers Notified		

APPENDIX V

PPE GUIDELINES AND INSPECTION FORM

BIG BELL ISLAND
PERSONAL PROTECTIVE EQUIPMENT GUIDELINES AND INSPECTION FORM

Type of Activity	Level of Protection Required	Present/ Operational?	Date

Excerpted from 29 CFR 1910.120

Part A. Personal protective equipment is divided into four categories based on the degree of protection afforded. (See Part B of this appendix for further explanation of Levels A, B, C, and D hazards.)

I. Level A-- To be selected when the greatest level of skin, respiratory, and eye protection is required. The following constitute Level A equipment; it may be used as appropriate;

1. Positive pressure, full face-piece self-contained breathing apparatus (SCBA), or positive pressure supplied air respirator with escape SCBA, approved by the National Institute for Occupational Safety and Health (NIOSH).
2. Totally-encapsulating chemical-protective suit.
3. Coveralls.
4. Long underwear.

5. Gloves, outer, chemical-resistant.
6. Gloves, inner, chemical-resistant.
7. Boots, chemical-resistant, steel toe and shank.
8. Hard hat (under suit).
9. Disposable protective suit, gloves and boots (depending on suit construction, may be worn over totally-encapsulating suit).

II. Level B--The highest level of respiratory protection is necessary but a lesser level of skin protection is needed. The following constitute Level B equipment; it may be used as appropriate.

1. Positive pressure, full-face piece self-contained breathing apparatus (SCBA), or positive pressure supplied air respirator with escape SCBA (NIOSH approved).
2. Hooded chemical-resistant clothing (overalls and long-sleeved jacket; coveralls; one or two-piece chemical-splash suit; disposable chemical-resistant overalls).
3. Coveralls.
4. Gloves, outer, chemical-resistant.
5. Gloves, inner, chemical-resistant.
6. Boots, outer, chemical-resistant steel toe and shank.
7. Boot-covers, outer, chemical-resistant (disposable).
8. Hard hat.
9. Face shield.

III. Level C--The concentration(s) and type(s) of airborne substance(s) is known and the criteria for using air purifying respirators are met. The following constitute Level C equipment; it may be used as appropriate.

1. Full-face or half-mask, air purifying respirators (NIOSH approved).
2. Hooded chemical-resistant clothing (overalls; two-piece chemical-splash suit; disposable chemical-resistant overalls).
3. Coveralls.
4. Gloves, outer, chemical-resistant.
5. Gloves, inner, chemical-resistant.
6. Boots (outer), chemical-resistant steel toe and shank.
7. Boot-covers, outer, chemical-resistant (disposable)
8. Hard hat.
9. Escape mask.
10. Face shield.

IV. Level D--A work uniform affording minimal protection, used for nuisance contamination only. The following constitute Level D equipment; it may be used as appropriate:

1. Coveralls.
2. Gloves.
3. Boots/shoes, chemical-resistant steel toe and shank.
4. Boots, outer, chemical-resistant (disposable).
5. Safety glasses or chemical splash goggles.
6. Hard hat.
7. Escape mask.
8. Face shield.

Part B. The types of hazards for which levels A, B, C, and D protection are appropriate are described below:

I. Level A--Level A protection should be used when:

1. The hazardous substance has been identified and requires the highest level of protection for skin, eyes, and the respiratory system based on either the measured (or potential for) high concentration of atmospheric vapors, gases, or particulates; or the site operations and work functions involve a high potential for splash, immersion, or exposure to unexpected vapors, gases, or particulates of materials that are harmful to skin or capable of being absorbed through the skin;
2. Substances with a high degree of hazard to the skin are known or suspected to be present, and skin contact is possible; or
3. Operations are being conducted in confined, poorly ventilated areas, and the absence of conditions requiring Level A has not yet been determined.

II. Level B--Level B protection should be used when:

1. The type and atmospheric concentration of substances have been identified and require a high level of respiratory protection, but less skin protection;
2. The atmosphere contains less than 19.5 percent oxygen; or
3. The presence of incompletely identified vapors or gases is indicated by a direct-reading organic vapor detection instrument, but vapors and gases are not suspected of containing high levels of chemicals harmful to skin or capable of being absorbed through the skin.

Note: This involves atmospheres with IDLH concentrations of specific substances that present severe inhalation hazards and that do not represent a severe skin hazard; or that do not meet the criteria for use of air-purifying respirators.

III. Level C--Level C protection should be used when:

1. The atmospheric contaminants, liquid splashes, or other direct contact will not adversely affect or be absorbed through any exposed skin;
2. The types of air contaminants have been identified, concentrations measured, and an air-purifying respirator is available that can remove the contaminants; and
3. All criteria for the use of air-purifying respirators are met.

IV. Level D--Level D protection should be used when:

1. The atmosphere contains no known hazard; and
2. Work functions preclude splashes, immersion, or the potential for unexpected inhalation of or contact with hazardous levels of any chemicals.

Note: As stated before, combinations of personal protective equipment other than those described for Levels A, B, C, and D protection may be more appropriate and may be used to provide the proper level of protection.

APPENDIX VI

SWPPP MONITORING INSPECTION FORM

BIG BELL ISLAND
SWPPP INSPECTION FORM

Name and Inspector Title: _____
Time: _____
Date: _____
Ambient Conditions: _____
Is this a Regular/Pre-storm/During storm/Post-storm inspection event?: _____
Has it rained since last inspection? _____
Duration and rainfall amount? _____

CONSTRUCTION OBSERVATIONS		
Construction area location and description:		
Contractors currently working? Work occurring:		
BMP Activity Description/ Implemented?	**Corrective Action**	**Corrective Action Date/ Person Responsible**
Perimeter controls in place and construction exit clear of tracked debris?		
Stormwater discharge points not eroding and free of debris?		
Erosion and sediment controls all in place(permanent controls if applicable)?		
Are all wetlands and resources protected?		
Describe alterations to sediment control methodology:		
Any emergencies, incidents, accidents, equipment malfunctions or spills?		
Waste management practices according to BMPs?		

BIG BELL ISLAND
SWPPP INSPECTION FORM

Equipment and vehicle washing practices according to BMPs?		
Concrete and paint washing practices according to BMPs?		
Describe disturbed areas not being worked currently and whether they have been stabilized:		
Describe final or temporary stabilization methods:		
Wetted perimeters:		
Controls around storm drain inlets and flow into inlets normal?		
Turbidity testing (if applicable):		
Fire system operational:		
Photos attached:		

BIG BELL ISLAND
SWPPP INSPECTION FORM

Name and Inspector Title: _____
Time: _____
Date: _____
Ambient Conditions: _____
Is this a Regular/Pre-storm/During storm/Post-storm inspection event?: _____
Has it rained since last inspection? _____
Duration and rainfall amount? _____

POST-CONSTRUCTION (OPERATIONAL) OBSERVATIONS		
Inspection area location and description:		
Contractors currently working? Work occurring:		
BMP Activity Description/ Implemented?	**Corrective Action**	**Corrective Action Date/ Person Responsible**
Stormwater discharge points not eroding and free of debris?		
Permanent Erosion and sediment controls all in place and functioning?		
Are all wetlands and resources protected by fencing/ buffers?		
Describe alterations to sediment control methodology:		
Any emergencies, incidents, accidents, equipment malfunctions or spills?		
Material storage practices following BMPs?		
Vehicle fueling practices according to BMPs?		
Waste management practices according to BMPs?		

BIG BELL ISLAND
SWPPP INSPECTION FORM

Equipment and vehicle washing practices according to BMPs?		
Concrete and paint washing practices according to BMPs?		
Describe disturbed areas not being worked currently and whether they have been stabilized:		
Describe final or temporary stabilization methods:		
Required signage in place?		
Fire system operational?		
Hazardous materials/ waste management		
Storage of materials according to BMPs?		
Material/waste labeling and MSDS sheets available?		
Hazardous waste disposal methods?		
Photos attached:		

APPENDIX VII

TURBIDITY MONITORING REPORT

Big Bell Island
Turbidity Monitoring Report

Site Conditions:

Date: _____
Time: _____
Weather: _____ (Clear, Partly Cloudy, Cloudy, Rain)
Wind: _____ (Speed and Direction)
High Tide: _____
Low Tide: _____

Sample #1

Station No. ____	NTU	Time	Sample Depth (50% of total)
Background	_____	_____	_____
Compliance	_____	_____	_____
Difference	_____	_____	_____

W.F. Velocity _____ (knots)

Sample #2

Station No. ____	NTU	Time	Sample Depth (50% of total)
Background	_____	_____	_____
Compliance	_____	_____	_____
Difference	_____	_____	_____

W.F. Velocity _____ (knots)

Comments:

Sampled by: (Print / Sign) _____

Equipment used to sample Turbidity: _____

APPENDIX VIII

CONCH RELOCATION REPORT FORM

Big Bell Island
Conch Relocation Report Form

Site Conditions:

Date: _____
Time: _____
Weather: _____ (Clear, Partly Cloudy, Cloudy, Rain)
Wind: _____ (Speed and Direction) Sampled by: _____
Tide: _____
Water Temp: _____

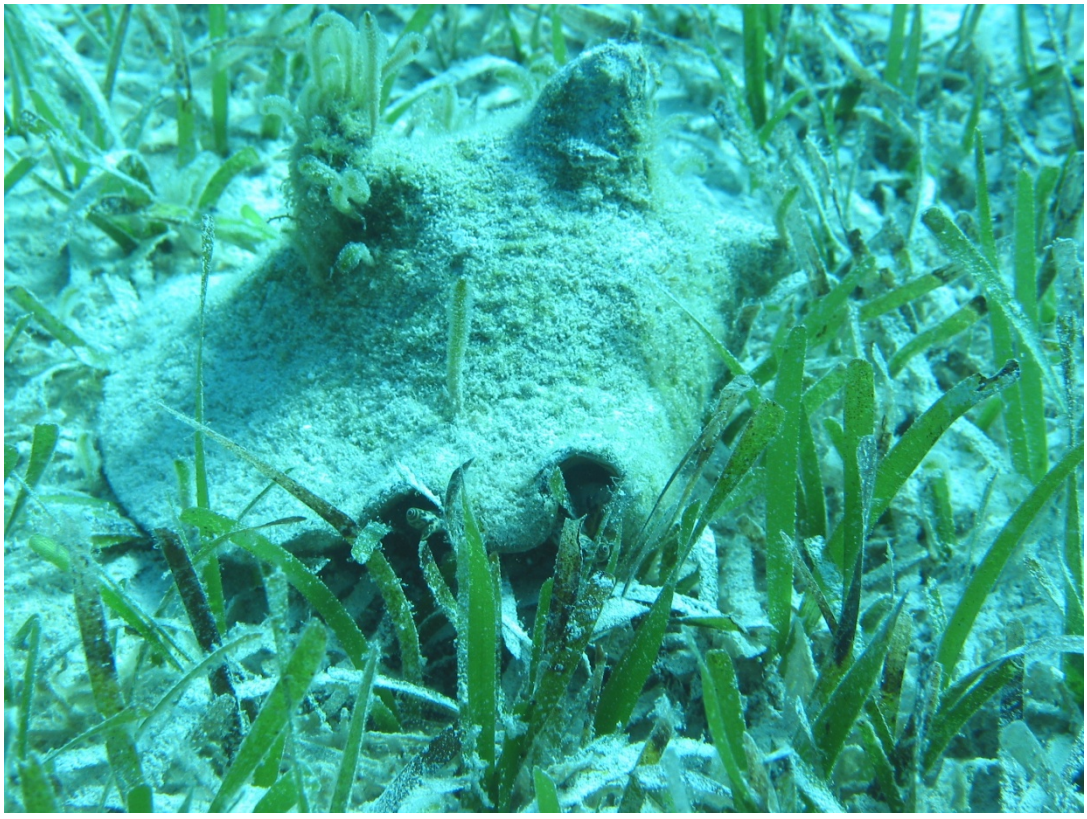
Specimen #										
Length (mm)										
Width (mm)										
Time of Capture										
Capture Substrate										
Approx Capture depth (ft)										
Time of Release										
Approx Release depth (ft)										
Release Substrate										
Note of Interest										

* Substrate – (sand / seagrass / hardbottom)

APPENDIX IX

BELL ISLAND CONCH SURVEY
CRAIG DAHLGREN, PHD

Bell Island Conch Survey



August 2010

by

Craig Dahlgren, PhD

1.1 Executive Summary

The Exuma Cays Land and Sea Park serves as an important refuge for conch populations and the high densities of conch inside the park support conch fisheries outside the park. Balancing conservation of key resources like queen conch and various activities that occur within the park is important and must be done with caution to avoid negative impacts that threaten the status of key resources. Previous studies have indicated important conch nursery areas around Bell Island, so proposed dredging activities around the island must be evaluated with caution and using the strongest available science. Thus, a survey of conch populations was conducted around Bell Island in August 2010. This survey found conch populations to be healthy around Bell Island and identified several key areas for conch populations around Bell Island. While juvenile and adult conch were found to use several of the areas proposed for dredging, none of the proposed dredging areas appeared to be among the most important sites for conch. Thus, dredging impacts are expected to be low on conch populations in the Bell Island area. Because the proposed dredging areas may serve as corridors for conch movement, however, several precautionary measures should be taken, including (1) the frequent translocation of conch from dredgeing areas to nearby conch areas during dredging activities; (2) ensuring the dredged channel allows conch to move through the area; and (3) extended monitoring of conch populations in the area.

1.2 Background

The Exuma Cays Land and Sea Park (hereafter referred to as the Exuma Park) has a long and distinguished history and serves as a model for marine conservation in the Caribbean. Managed as a no-take marine reserve since the mid 1980's, it serves as a critical refuge for marine resources in The Bahamas. The Exuma Cays Land and Sea Park is well documented as being an important area for queen conch, *Eustrombus gigas* (previously known as *Strombus gigas*), playing a major role in replenishing conch stocks throughout the Exuma Sound region. Over 15 years ago, studies by Alan Stoner and his colleagues demonstrated that adult conch densities within the Exuma Park were typically 2-3 times greater than in similar habitats outside the park (Stoner et al. 1998). The relatively high densities of conch inside the Exuma Park is particularly important, since conch populations undergo what is known to scientists as an "Allee effect", whereby reproductive output depends to a great extent on the density of conch in an area. For queen conch, successful reproduction occurs when adult conch densities exceed approximately 50 conch per hectare (mating is not observed at <56 conch per hectare and spawning doesn't occur at <48 conch per hectare; Stoner and Ray-Culp 2000). At numbers lower than this, there is little to no reproduction occurring. Because of the high densities of conch in the Exuma Park compared to surrounding areas, the Exuma Park produces more conch larvae than surrounding areas (Stoner et al. 1998). There is direct evidence for this in the number of newly hatched conch larvae captured in plankton net tows within Exuma Park versus outside the park. Larval conch hatched from eggs inside the park, however, are carried by currents to other parts of Exuma Sound where they may replenish stocks that are available to fishers. Thus, protecting conch within the Exuma Park is essential

for preserving the ecological integrity of the Exuma Park and supporting conch fisheries outside the park.

Protecting this valuable resource inside the park must be balanced against uses of private land holdings and public resources in the park and various activities that may affect conch stocks there. Of greatest importance is the protection of conch stocks from fishing, since fishers have been shown to have the greatest impact on conch stocks throughout the Caribbean. Also of importance is preserving key habitats for conch, including adult breeding areas, juvenile nursery areas, and corridors that conch use as they move from nurseries to adult habitats. Earlier work by Stoner and others shows that key features of nursery habitats include medium density seagrass beds with high algal production in tidal flow fields that supply large amounts of larvae (e.g., Ray and Stoner 1995, Stoner 2003). Adult habitat use is more general, but includes shallow seagrass beds and deeper (10-20m) areas.

In the summer of 2010, concern was expressed over the potential impact that proposed dredging activities in several locations around Bell Island might have on conch populations. Earlier work by Stoner et al. (1994) documented several important juvenile conch nurseries around Bell Island, so assessing the impact on dredging to these nurseries and adult populations is necessary to insure that any dredging activity does not impact conch populations in the Exuma Park. To assess the potential impact, qualitative surveys of habitats and quantitative surveys of conch populations were conducted around the proposed dredging sites and nearby control sites. These surveys were conducted in August 2010 and their results are described in detail below.

1.3 Surveys

Visual assessments of habitats and conch densities were conducted in 10 different areas, including 3 within and 2 nearby the primary proposed dredging area on the eastern side of Bell Island (Dredge Site 1, Fig. 1), the proposed “barge channel” dredge site (Dredge Site 2) on the west side of Bell Island and three nearby sites, and the area of the current Bell Island Dock that is also proposed for dredging. Each survey entailed getting GPS coordinates for the survey site, measuring water depth, describing the habitat, and documenting conch density in the area. To document conch densities, conch were visually surveyed by a snorkeler from the surface and all juvenile and adult queen conch were counted (separately) and any other strombids (e.g., milk conch, *Strombus costatus*) in the area were also counted. Juvenile queen conch were considered to be any queen conch whose shell did not have a well defined flared lip. Adult queen conch included any conch with a well defined flared lip, regardless of shell thickness. In addition, several queen conch from each site were collected and measured for shell length, which ranged from 6-19 cm for juveniles and 18-29 cm for adults.

Figure 1. Google Earth Satellite image of Bell Island showing location of survey sites. Note that sites in the Dredge 1 area, nearby Control sites (1&2), and Beach sites (1-3) mark the approximate center of multiple replicate transect surveys. Sites in the Dredge 2 area mark the start of drift surveys and Dredge site 3 marks the center of towed diver surveys.

Surveys of conch density varied based on conditions. Where conditions allowed, four surveys were conducted at each site, with replicate 30 m long surveys being conducted with the current, against the current and in each direction perpendicular to the current. Survey widths varied based on the number of conch observed. In areas of low conch density it was necessary to do surveys that were 8m wide in order to count any conch. In areas where conch densities were high, it was necessary to shorten the width of surveys to 2 m to make sure that all conch in the survey band could be counted (often exceeding 100 conch per survey). In places and times when the current was too strong to conduct transect surveys, drift surveys were conducted and the length of the drift and width of the survey were recorded to determine density. While these different techniques may skew comparisons somewhat between sites where different methods were used; however, the purpose of these surveys was not to enable direct comparisons among sites, but to most effectively determine conch densities within each site so that the relative value of the site for conch populations could be assessed.

1.4 Results & Recommendations

Dredge site 1 – this site along the southeastern tip of Bell Island includes a large sand bar in water depths of 2-3 m (approximately 6 to 10 feet) with sand depths of up to 80 cm. At the outer margin of the bar, there are areas of sparse to medium density seagrass and hardbottom in 3-4 m of water. Inshore from the bar is an area of sparse to medium density seagrass in approximately 2.5 m of water. While the sand bar itself (the primary area to be impacted by dredging) had a fairly low conch density (0.1 conch per $100m^2$), the surrounding seagrass areas had some juvenile and adult conch present (Fig. 2). These densities, however, were approximately average for the area around Bell Island for adult conch and were below average densities for juvenile conch (Fig. 2).

In addition to the proposed dredging area, two nearby areas were surveyed for conch. The first was across the channel from the proposed dredge site to the seagrass bank to the southeast. This area was an extremely productive juvenile conch nursery with densities exceeding 160 juvenile queen conch per $100m^2$. While no adult conch were seen in this area, the productivity of the juvenile nursery was impressive. The second "control" area surveyed near the first dredge site was in the bay immediately to the north of the proposed dredge site. Apparently this area was being considered as an alternate dredging site at one time. While conch densities at this site were somewhat lower than that in the immediate area of the proposed dredge site, the conch populations were similar (similar size and juvenile:adult ratio) to that in the proposed dredge site.

Dredge site 2 – This dredge site includes a sand bar off the Northwest corner of Bell Island. The sandbar is in similar water depths (2-3m) as the previous dredge site, but currents were stronger during the survey period, so three drift surveys were conducted along the top of the bar and along the inner and outer margins of the bar. The drift survey along the top of the bar found juvenile conch densities to be on the order of 0.4 per $100m^2$, with sizes between 6cm and 9 cm shell length. No adult conch were observed on the bar. Adult conch were observed along the inner margin of the bar along the sand and hardbottom habitat, and a few juveniles and adults were observed on the outer margin.

For comparison, conch were also surveyed in three areas along the Northwest facing shore of Bell Island. Each of these areas were near shore along beaches and rocky shores. Conch densities in each of these areas were higher than in the proposed dredging area, including one area where adult conch densities were highest for Bell Island (Fig. 2), and all three areas had higher juvenile conch densities than any of the proposed dredge areas (although much lower than the juvenile conch nursery across the channel from Dredge site 1).

Dredge site 3 – This area was offshore from the existing dock area on Bell Island's southwestern facing shore. The habitat consisted of sparse seagrass in water depths of 3-4m. Transect surveys were conducted in this area, but revealed no conch, so a snorkeler was towed behind a boat for approximately 150 m to see if any conch were in the area. During the towed survey, 2 adult and three juvenile conch were observed for densities of 0.17 and 0.25 conch per $100m^2$, respectively. These densities were among the lowest reported from the Bell Island area. This site is likely to be of very low importance to conch populations in the area.

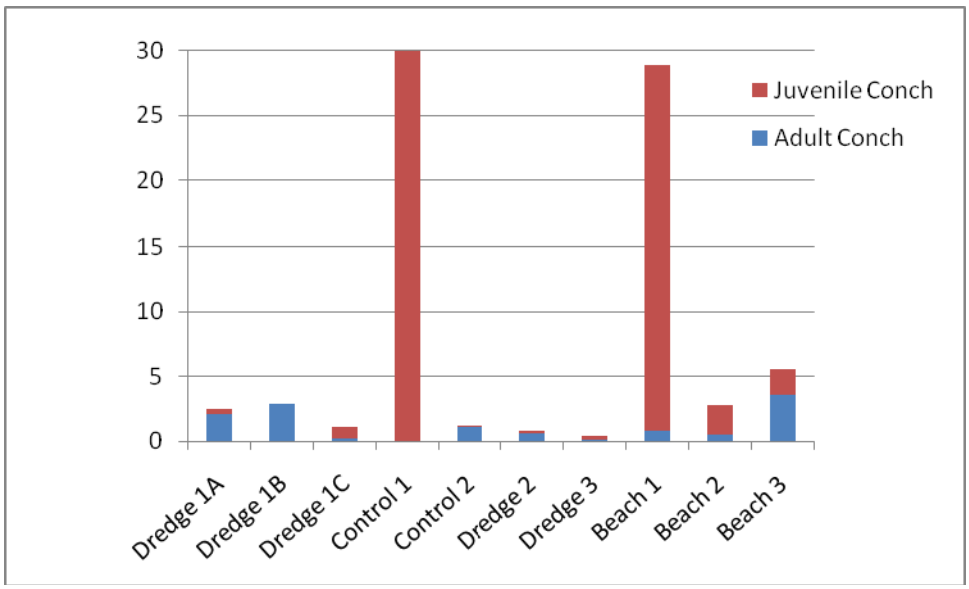


Figure 2. Average juvenile (red) and adult (blue) queen conch density (no. per 100m^2) at each site surveyed. Note that Conch density for Control 1 was abridged to better represent all sites on one graph. Actual density of juvenile conch at Control 2 was 167 conch per 100m^2.

Based on the results of surveys, all areas surveyed around Bell Island contained some conch. While this is uncommon throughout The Bahamas, it is fairly typical for sparse to medium density seagrass areas around cays within the Exuma Park. Based on the density and size distribution of conch observed, none of the proposed dredge areas contained important juvenile nursery areas. This is in agreement with earlier work by Stoner et al. (1994), which showed juvenile nurseries near Bell Island to be located to the Southwest of Bell Island and near the area where we found juvenile conch aggregations at Control 1.

Control 1 appears to be the most important nursery area near Bell Island and was near the area documented by Stoner et al. (1994). Based on the tidal currents and flow field around Bell Island, it is unlikely that the habitat or conch populations in this area will be affected by dredging. Beach 1 near proposed dredge site 2 also appears to be a productive conch nursery area (although densities were only about 1/6 of the other nursery area), but again, this area is not likely to see much negative effects from dredging. The observation of small juveniles on the sand bar at dredge site 2 suggests that it may serve as a settlement area or refuge for early juvenile conch, however, the low densities of juveniles found on the bar and in its immediate vicinity, suggests that it is not likely to be a major contributor to conch populations in the area, and this habitat type is not the most productive conch nursery (Stoner 2003).

Adult conch were observed at nearly every site and at densities that often exceeded the 50 per hectare density required for reproduction to occur (when converted to no. conch per hectare, adult densities from the August 2010 surveys ranged exceeded 50 per hectare at all sites except the nursery site at Control 1, Dredge 3, and Dredge 1C). No evidence of reproduction was observed, however (e.g., mating behavior or egg masses). It should be noted, however that August is the month when reproductive activity begins to decline in the Bahamas (Stoner et al. 1992) Based on the habitat type and the densities

of adults, it seems that the channels near proposed Dredge sites 1 & 2 are likely to be corridors for conch movement from nearshore seagrass beds to deeper spawning areas, rather than areas where conch spend a much time feeding or mating. Furthermore, adult conch densities on the sand bars where the majority of dredging activity is proposed is lower than in the deeper seagrass areas immediately adjacent to the bars, so the impact of dredging sand bar areas is likely to be minimal to adult conch. Because these areas may serve as corridors, however, dredging must be conducted in a way that does not affect conch as they pass through the area, and the resulting dredged channel must all conch to move through the area (see recommendations 1 and 2 below).

The results from these surveys were similar to other surveys conducted in the Exuma Park by Stoner and colleagues (1987-1995) and by Dahlgren and colleagues (2003, 2007 unpublished data). For example, Stoner et al. (1998) reported conch densities of up to 50 adult conch per hectare near Warderick Wells at depths less than 10 meters, but densities were much higher at deeper depths. With the exception of the conch nursery to the southeast of Bell Island, other sites had densities that were about average for the park. The nursery to the southeast of Bell Island had densities well above average and typical for some of the more productive juvenile conch areas within the Exuma Park.

Based on these results, it is unlikely that the proposed dredging activities will have a significant impact on conch populations in the area around Bell Island. Nevertheless, the following precautionary measures are recommended:

1. Prior to dredging, any conch in the immediate dredge area should be translocated to nearby areas unaffected by dredging. Translocation sites need only be a short distance away (~100m) from the dredge sites to sites outside of any sediment plume from dredging. Translocation sites should be in areas where conch occur at approximately the same size/reproductive status (i.e., juvenile or adult) as the conch being moved. Since at least 2 of the dredge areas are suspected to be movement corridors in which conch are likely to pass through, translocations should be done on a frequent basis.

2. Dredging, particularly at sites 1 and 2 that may serve as corridors for conch to move from inshore nursery and adult seagrass beds to offshore spawning areas, should be done in such a way that minimizes impact to conch movement. Because conch are prone to falling down vertical walls and are not able to climb up them, at least one or 2 margins of the dredged channel should be flush with the natural seafloor or provide gentle slopes that conch may use to move through the dredged area.

3. Dredging impacts should be monitored at the completion of dredging activities and for at a year or more afterwards to determine if dredging has impacted conch populations.

APPENDIX X

HURRICANE PREPAREDNESS PLAN (HPP)

Big Bell Island

HURRICANE PREPAREDNESS PLAN (HPP)

Prepared for:

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Big Bell Island

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January 24, 2011

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ATTACHMENTS

A Checklists
B List of Suppliers
C Emergency Communication Log
D Emergency Contacts
E Damage Assessment Report

FIGURES

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1.0 HURRICANE PREPAREDNESS GUIDELINES

Hurricane season in the Bahamas is June 1st until November 30th. When there is a threat from a Hurricane, the Bahamian Government advises when preparations should be complete and if a curfew will be in effect. During the initiation of the Hurricane Preparedness Plan staff may be required to come to work in order to assist in the securing of the site. The Bell Island Property Manager will notify staff of what their duties are during the preliminary stages of the Plan.

In the event that a Hurricane occurs, and staff leaves the Island, it is imperative that staff makes contact with the Bell Island Manager within _____ (determined by Island Manager) of the storm passing, to inform them of their safety and intentions with regards to resuming work.

This is a mandatory requirement whether you are on or off-island.

The actual time frame for instituting the various levels of alert described in this plan will be decided by local conditions. The National Weather Service's Hurricane "Warning" and "Watch" are only good as general benchmark points.

1.1 Emergency Planning for Employees

There are some procedures you can put in place before a disaster, but you should also understand what people need to recover after a disaster. It is possible that staff will need time to ensure the well being of their family members, but getting back to work is important to the personal recovery of people who have experienced disasters. It is important to re-establish routines, when possible.

1. Two-way communication is central before, during and after a disaster.

    - Include emergency preparedness information on company intranet, periodic employee emails, and other internal communications tools.

    - Consider setting up a telephone calling tree, an email alert, or a call-in voice recording to communicate with employees in an emergency.

    - Designate an out-of-town phone number where employees can leave an "I'm Okay" message in a catastrophic disaster.

    - Maintain open communications where co-workers are free to bring questions and concerns to company leadership.

    - Ensure you have established staff members who are responsible for communicating regularly to employees.

2. Talk to co-workers with disabilities. If you have employees with disabilities ask about what assistance is needed. People with disabilities typically know what assistance they will need in an emergency.

    - Identify co-workers in your organization with special needs.

    - Engage people with disabilities in emergency planning.

- Ask about communications difficulties, physical limitations, equipment instructions, and medication procedures.

3. Frequently review and practice what you intend to do during and after an emergency with drills and exercises.

4. Involve co-workers in emergency planning. One of the best methods of assuring recovery is to provide for your co-workers' well being. Communicate regularly with employees before, during, and after an incident.

    - Involve co-workers from all levels in emergency planning.

    - Use staff meetings and other internal communications tools to communicate emergency plans and procedures.

    - Set up procedures to warn employees. Plan how you will communicate with people who are hearing-impaired or have other disabilities or who do not speak English.

    - Keep a record of employee emergency contact information with other important documents in your emergency kit and at an off-site location.

5. Practice the plan with co-workers. Go beyond planning and frequently practice what you intend to do during a disaster. Drills and exercises will help you prepare.

    - Conduct regularly scheduled education and training seminars.

    - Include preparedness training in new employee orientation programs.

    - Do tabletop exercises with members of the emergency management team.

    - Schedule walk-through drills where the emergency management team and response team actually perform their designated emergency functions. This activity generally involves additional people and is more thorough than a tabletop exercise.

    - Practice evacuating and sheltering. Have all personnel walk the evacuation route to a designated area where procedures for accounting for all personnel are tested. Practice your "shelter-in-place" plan.

    - Evaluate and revise processes and procedures based on lessons learned in training and exercise.

    - Keep training records.

6. Promote Family and Individual Preparedness.

    - Encourage your employees and their families to: Get a Kit, Make a Plan, and Be Informed. Go to www.ready.gov for more information.

- Consider how workers will communicate with family members in case they are separated from one another or injured. Have staff prepare a "Family Communications Plan" from the www.ready.gov site.

1.2 Personal Preparation for a Hurricane

Take photos inside and outside of all facilities (including items of value) before and after the storm, and if you have to purchase items after a storm, keep receipts for insurance purposes.

You might be confined to your workplace during a storm event, so a list of supplies can be found in Appendix A- RECOMMENDED STORM SUPPLIES. In addition to general storm supplies, a first aid kit should always be ready for storm season. A list of recommended first aid supplies to be kept on hand can be found near the end of Append A.

Safety and Evacuation Tips

- Follow weather reports (2-3 times daily)
- Make sure you know where your nearest shelter is located
- Make travel plans with friends & neighbors if you have no transportation – travel in daylight if possible & shut off utilities
- Check your car battery
- Lock and secure your premises before leaving
- Close storm shutters and doors
- Take all loose items indoors
- Fill gas tanks in vehicles and boats
- During a hurricane remain indoors, away from windows and listen to your radio for updates
- Once the storm has passed, advise relatives of your safety
- Boil water before consuming

Persons are also asked **NOT** to bring pets, alcohol, illegal drugs, cooking equipment, furniture and weapons to an official shelter. Cots and air mattresses may not be allowed because of limited space.

Remain calm and do not leave the shelter until all clear is advised.

A management team of trained civil servants and volunteers are in charge of the Bahamas shelters.

2.0 CONTACT INFORMATION

BELL ISLAND

	OFFICE	CELL
Island Manager- Tom Barbernitz	(305) 735-8628	(242) 376-6353
(head of hurricane control and information center)		
Marine Manager- Captain Andrew Gallagher	(305) 735-8628	(910) 616-1088
Environmental Compliance Officer- Rochelle Newbold		(242) 376-3351

Emergency: 919 or 911

National Emergency Management Agency (NEMA):
Commander Stephen Russell (242) 322-6081/5
National Disaster Director
National Emergency Management Agency
Cabinet Office, P.O. Box N-7145
Nassau, The Bahamas
Office Email: nema@bahamas.gov.bs
Website: NEMA Bahamas

Police:
Corporal Kevin Rolle, Royal Bahamas Police Force (242) 355-3100
(Black Point, Exumas)

Local Radio Stations

_____

_____

Local Television Channels
Channel 13 Broadcasting Corporation of the Bahamas
Channel 11 Cable Bahamas

VHF
Channel 16 Emergency Channel

2.1 Official Government Hurricane Shelters

Williams Town
St. Mary's Anglican Church

Forbes Hill
St. Peter's Baptist Church

Harry Cay/ Ferry
Church of God

Hartswel and Rolle Town
Mount Carmel Baptist Church

George Town
Anglican Community Center
Resource Center
St. Theresa's Catholic Church

Hermitage
Baptist Church

Moss Town
St. John's Anglican Church

Ramsey
Ebenezer Baptist Church

Mt. Thompson
Mount Hermon Baptist Church

Forest
Palestine Church

Farmers Hill
Ebenezer Baptist Church

Roker's Point & Hart's
St. Margaret's Anglican Church

Steventon
Zion Baptist Church

Rolleville
Ebenezer Baptist Church
St. Michael's Anglican Church

Stuart Manor
Mt. Sinai Baptist Church

Barraterre
Ebenezer Baptist Church

Farmers Cay
St. Mary's Union Baptist Church

Black Point
Black Point All Age School

Staniel Cay
Public School

General locations of the hurricane shelters closer to Bell Island are found below in Figures 2-1 and 2-2.

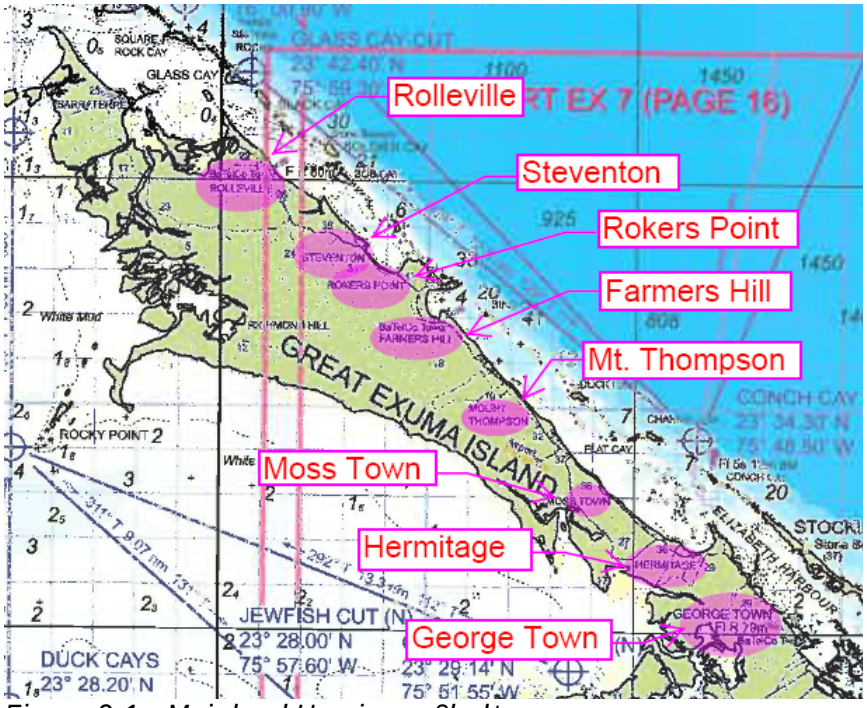

Figure 2-1: Mainland Hurricane Shelters

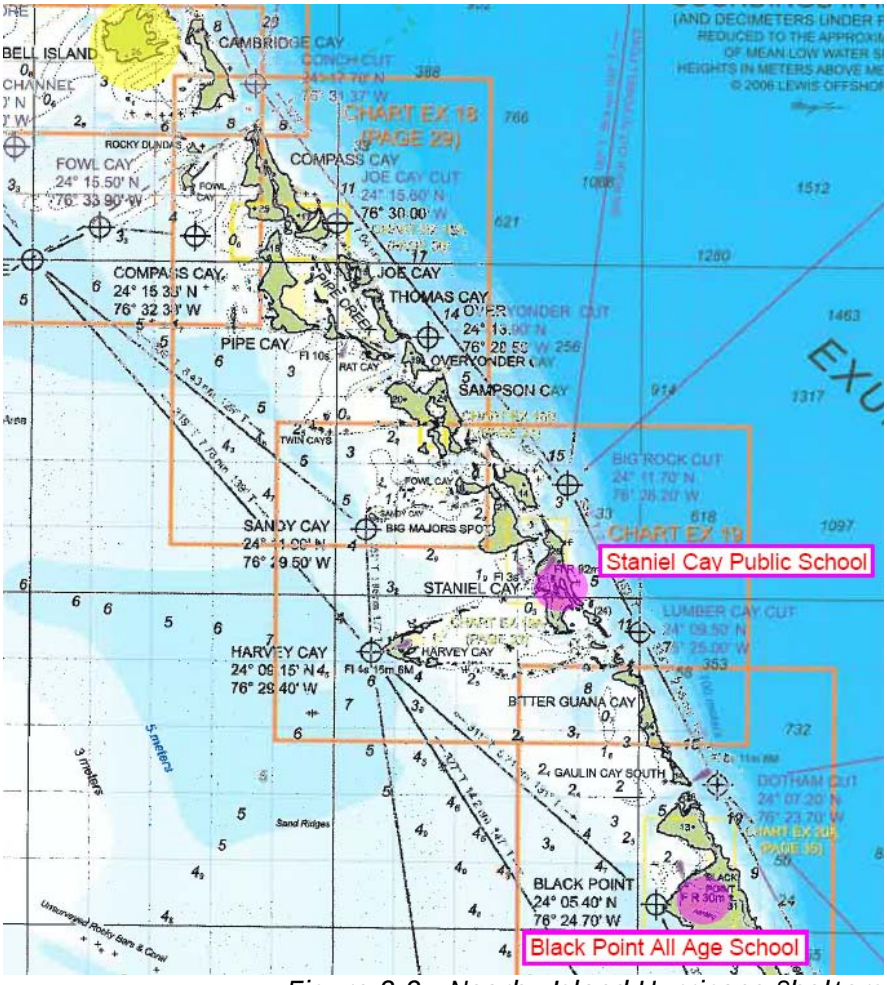

Figure 2-2: Nearby Island Hurricane Shelters

3.0 TERMINOLOGY OF WEATHER CONDITIONS

The National Weather Service is responsible for issuing weather warnings to the public. The National Hurricane Center in Miami, Florida, provides hourly update of storm conditions during storm seasons (summer and fall). Severe weather warnings are issued, using the following terms:

Severe Thunderstorm indicates the possibility of frequent lighting and/or damaging winds of greater than 50 miles per hour (mph), hail 3/4-inch or more in diameter (about the size of a dime), and heavy rain.

Severe Thunderstorm Watch indicates the possibility of tornadoes, thunderstorms, frequent lighting, hail, and winds greater than 75 mph.

Tornado Watch means that tornados are expected to develop.

T*ornado Warning* means that a tornado has actually been sighted in the area, or is indicated by radar.

Tropical Storm is defined as an area of low pressure with a definite eye and counter clockwise winds of 39-74 mph. It may develop into a hurricane in a very short period of time.

Tropical Storm Watch is an announcement that specific coastal areas may be under possible threat from a Tropical Storm within 36 hours.

Tropical Storm Warning is an announcement that Tropical Storm conditions, including sustained winds up to 73 mph, are expected in specific coastal areas within 24 hours.

Hurricane is defined as a storm with pronounced rotary circulation (Note: counterclockwise to the Northern Hemisphere and clockwise in the Southern Hemisphere), winds exceeding 74 mph (at times exceeding 150 mph). Normally accompanied by torrential rains and flooding. The majority of hurricanes occur from mid-June to mid-November.

These winds are quite dramatic and deadly, however; the storms also have other damaging characteristics. Torrential rains that accompany hurricanes can accumulate in excess of 12 inches. When a hurricane makes landfall, bands of wind and rain cross the coastline and frequently spawn tornados.

Another characteristic of a hurricane, as it makes landfall, is the destruction caused by abnormally high tides, called a *storm surge*. Because the atmospheric pressure in a hurricane is quite low, often setting record lows, the oceans tend to rise. Waves created by the winds, when encountering shallow waters, tend to grow in height.

Hurricane Watch implies that hurricane conditions are a real possibility but are not eminent.

Hurricane Warning implies that hurricane conditions are expected within 24 hours. The emergency Coordinator should monitor the storm advisories issued by the National Weather Service (NOAA) and decide if the conditions warrant a shutdown. Precautions should be taken and appropriate actions implemented as soon as a hurricane warning has been announced.

Storm Surge can result in great damage to facilities, even if the hurricane is at some distance away from the coast. The force of winds can push waves toward the shore causing significantly higher water levels at the coastline. The resulting flooding can cause considerable damage, even to properties which are in areas where wind damage is negligible, and severe damage to those properties in areas that are directly hit by hurricane force winds.

The Saffir-Simpson Hurricane Scale is a 1-5 rating based on the hurricane's present intensity. This is used to give an estimate of the potential property damage and flooding expected along the coast from a hurricane landfall. Wind speed is the determining factor in the scale, as storm surge values are highly dependent on the slope of the continental shelf and the shape of the coastline, in the landfall region. Note that all winds are using the U.S. 1-minute average.

Table 3-1: Saffir-Simpson Hurricane Scale

Hurricane Category	Winds	Storm Surge
1	74-95 mph/ 64-82 knots/ 119-153 kmph	4-5 ft above norm
2	96-110 mph/ 83-95 knots/ 154-177 kmph	6-8 ft above norm
3	111-130 mph/ 96-113 knots/ 178-209 kmph	9-12 ft above norm
4	131-155 mph/ 114-135 knots/ 210-249 kmph	13-18 ft above norm
5	> 155 mph/ 135 knots/ 249 kmph	>18 ft above norm

Category One Hurricane:
No real damage to building structures. Damage primarily to unanchored mobile homes, shrubbery, and trees. Some damage to poorly constructed signs. Also, some coastal road flooding and minor pier damage.

Category Two Hurricane:
Storm surge generally 6-8 feet above normal. Some roofing material, door, and window damage of buildings. Considerable damage to shrubbery and trees with some trees blown down. Considerable damage to mobile homes, poorly constructed signs, and piers. Coastal and low-lying escape routes flood 2-4 hours before arrival of the hurricane center. Small craft in unprotected anchorages break moorings.

Category Three Hurricane:
Storm surge generally 9-12 feet above normal. Some structural damage to small residences and utility buildings with a minor amount of curtain wall failures. Damage to shrubbery and trees with foliage blown off trees and large trees blown down. Mobile homes and poorly constructed signs are destroyed. Low-lying escape routes are cut by rising water 3-5 hours before arrival of the center of the hurricane. Flooding near the coast destroys smaller structures with larger structures damaged by battering from floating debris. Terrain continuously lower than 5 feet above mean sea level may be flooded inland 8 miles (13 km) or more. Evacuation of low-lying residences with several blocks of the shoreline may be required.

Category Four Hurricane:
Storm surge generally 13-18 feet above normal. More extensive curtain wall failures with some complete roof structure failures on small residences. Shrubs, trees, and all signs are blown down. Complete destruction of mobile homes. Extensive damage to doors and windows. Low-lying escape routes may be cut by rising water 3-5 hours before arrival of the center of the hurricane. Major damage to lower floors of structures near the shore. Terrain lower than 10 feet above sea level may be flooded requiring massive evacuation of residential areas as far inland as 6 miles (10 km).

Category Five Hurricane:
Complete roof failure on many residences and industrial buildings. Some complete building failures with small utility buildings blown over or away. All shrubs, trees, and signs blown down. Complete destruction of mobile homes. Severe and extensive window and door damage. Low-lying escape routes are cut by rising water 3-5 hours before arrival of the center of the hurricane. Major damage to lower floors of all structures located less than 15 feet above sea level and within 500 yards of the shoreline. Massive evacuation of residential areas on low ground within 5-10 miles (8-16 km) of the shoreline may be required.

4.0 BELL ISLAND MANAGER- ACTIONS AS FIELD CHIEF DURING STORM EVENTS

1. Activate the Hurricane Control Center. Call key staff and set shift duty, if required.

2. Activate designated Facility Field Chief (Tom Barbernitz), to be in charge of all operations at the specific site, if standard operating procedures do not already establish it.

3. Keep employees and all staff/contractors informed of the situation, and of actions being taken. Advise employees on what they should or should not do. Issue clear and simple instructions to staff. Review checklists of facility Emergency Services Actions.

4. Mobilize employees and other resources to extent required.

5. Ensure that Control Center staff establishes and maintains activity logs: Emergency Service Activities, Estimates of Damage, Personnel and Equipment Utilized, Mutual Aid or Assistance Requested/Provided, Financial Expenditures, Reports Provided, and others. **Continue activity logs until emergency is officially terminated.**

6. Decide on tactics to be used, in accordance with appropriate checklists of facility emergency services actions and employee instructions.

7. Obtain periodic disaster situation reports, as situation develops. Evaluate emergency situation reports and determine critical problem areas.

8. Determine needs for resources, and availability. Determine whether outside assistance is needed. As necessary, request mutual aid, government assistance, policy or military support, etc., according to pre-arranged procedures. Make specific requests, such as number of persons for security, rescue, feeding teams, etc., or specific equipment, such as sandbags, pumps, etc.

8. Coordinate all activities with local government Emergency Operating Center or National Hurricane Authority. Keep informed concerning the following:

    a) Type of hurricane and/or disaster.
    b) Anticipated time of disaster to occur, or threatens to occur.
    c) Actions to be taken.
    d) Facility areas and numbers of people involved.
    e) Estimates of potential casualties and extent of potential damage.
    f) Type and amount of assistance required.

9. Provide continuing direction and coordination:

    a) Maintain close surveillance of disaster situation.
    b) Rely on Control Center and key field personnel to carry out emergency operations if needed.
    c) Call staff meeting, as necessary, for coordination of situation and decision making.
    d) Continue liaison and coordination with other mutual aid facilities involved.

5.0 PRE-STORM PROCEDURES

A *Hurricane Watch* is issued when a storm threatens to hit the area within 24 to 36 hours.

When the weather bureau issues a hurricane watch, the Bell Island Hurricane Control Center should move into action. Each department head should take the preliminary action outlined in Appendix A, so all departments are ready if the storm continues on the established course.

Pre-planning activities should be verified by each department head as they are completed. This should be logged on the respective activity checklist.

Bell Island intends to have no boats in-harbour during any hurricane event, if possible. The barge landing basin has been engineered to withstand a low-category hurricane, however the boats within this basin are typically of small enough size to trailer out and safely secure on the upland. The yacht basin was designed to withstand a moderate hurricane event.

Tropical storm protocol for Bell Island requiresr small boats to be securely stored on the uplands, while yachts are to be secured to basin and upland storm anchors within the yacht basin. If a hurricane is anticipated, then the yachts are to leave the harbour and travel out of the storm's path to safe anchorage either in the Bahamas or elsewhere. Storm intensity monitoring by the Island Manager will be a critical aspect of the planning and preparation for the marine fleet.

Floating Dock Anchoring (Only to be used in Tropical Storm Scenarios)
Dock lines on a floating dock do not need to be as long as those on fixed docks since the dock and boat rise together with tidal surges. Piling height should be more than seven or eight feet to accommodate a tidal surge without having boats and docks float away in an extreme surge situation.

Boats On Lifts
Boats on lifts statistically do not fare well in hurricanes. Remove boats from lifts if at all possible before the storm's arrival and secure them on the uplands.

For specific guidelines on what to accomplish before storm arrival 96 hours out, 72 hours out, 48 hours out, 24 hours out and 12 hours out, please reference checklists in Appendix A.

Heavy Equipment Procedures

1. *Wheel and Track Equipment*: The construction manager shall decide a safe area for storage of this equipment during a hurricane. Any attachments should be tied down or loaded into a container. Each piece of equipment should be topped off with fuel and the brake set.

2. *Trucks and baskets:* The construction manager shall decide a safe area for the storage of this equipment. Trucks should be topped off with fuel and the brakes set.

3. *Other gear:* Any loose equipment or loose gear should be moved indoors or secured to remain outside. All drums of oil, hydraulic fluid, solvents, or other liquid stored in drums should be moved to a safe location to prevent leakage or spillage.

4. Equipment should be used as windbreak to protect containers and jobsite trailers.

5. *Rental Equipment* should be returned or companies notified to remove their equipment for the jobsite.

6. *Barges* should be moved to the lee of the island or a nearby island, depending on storm direction and projected path, and anchored appropriately.

Marina

1. Store all water sports equipment, Jet skis etc inside container.
2. Moor/anchor watercraft at designated area.
3. Dredging equipment should be relocated to designated safe area.
4. Cranes boomed down and tied down.
5. Any turbidity screen should be removed from water and stored properly.
6. To be reinstalled after storm passes.

6.0 POST-STORM PROCEDURES

The primary concern of Bell Island is the safety of personnel, their families, and property. Before recovery actions are initiated and normal activities are resumed, Management shall survey all personnel in order to determine their status (i.e. their health, safety, and welfare).

Secondary concern will be to ascertain the condition of the jobsites, building, and equipment.

6.1 Damage Assessment Protocol

Following a hurricane, after the Emergency Management Authority has declared the ALL CLEAR, designated staff will proceed to the island to survey for damage assessment as part of a Damage Assessment Team (DAT).

IMPORTANT: In traveling to the facility, and in making the damage assessment survey, personal safety is of primary importance. Safety factors will be determine when and how to proceed. Proceed With Caution.

Buildings
A DAT team leader (Tom Barbernitz) will document their findings in the Damage Assessment Form (Attachment E) and report it via fax, telephone or hand delivery to the island owners as soon as practical, within the bounds of safety and caution. One form will be used for each facility on-island.

The Island Manager will tabulate the information and notify the insurance company for reimbursement as soon as possible.

Contingency Plan
Additional members may be added to the DAT to compensate for the damages. The DAT will proceed to the affected areas to conduct damage assessment surveys following steps outlined in Ch. 6.2 below. Employees who themselves live in devastated areas maybe excused from responding. The DAT Leader will assign replacements.

In the event that the hurricane is headed directly for Bell Island, a different site will be utilized. The DAT Leader will announce the site selected prior to impact via a telephone recall.

6.2 Instructions for Completing the Damage Assessment Form (Attachment E)

1. Survey damaged buildings, docks, and equipment. Instruct the Engineering Staff to make temporary repairs that will limit losses from the heavy rain that follows a passing storm.

2. Document all problems observed in Attachment E.

3. Include the approximate percentage of damage for each category.

4. Include all other problems noted.

5. Give a brief statement of problems in comment section.

6. Coordinate through the facility office the cleaning of areas and the claims adjustments.

7. Make sure that the latest weather information is available to staff and have them follow the procedures below:

    - Avoid areas subject to sudden flooding.
    - Do not attempt to cross water that is deeper than the level of your knees.
    - Do not attempt to drive over flooded roads.

6.3 Logging All Emergency Communications (Attachment C)

Before, during and after, communications and documentation is key to a successful recovery. During an event, there is a high level of stress and a good possibility of making important decisions on the run. It is highly **IMPORTANT to document all communication transactions.** This ensures accountability and identifies any communications flaws**.**

An Emergency Log Form has been developed to document sequence of events by different parties. This form will be completed by anyone identified by management that has a role in the continuity of operation of this island. Attachment F procedures are as follows.

- Upon notification, initiate form.
- Document all incoming (I) and outgoing (O) phone calls.
- Include the dates and times of each conversation.
- Include a brief summary of the conversation.
- Upon termination of event, return form ASAP to the Main Office.

Attachment C will be used to document all communication transactions relevant to the event. From beginning to the end, or as instructed by management. Upon termination of an event, all form will be collected and sent to the Main Office for record keeping.

6.4 After the Flood Waters Recede

1. Dispose of fresh food that has come in contact with water.

2. Have drinking water tested for possible contamination.

3. Do not handle live electrical equipment in wet areas.

4. Check and clean electrical equipment before returning it to service.

5. Use flashlights, not open flame lanterns, to examine flooded sections where flammable gases may be trapped.

6. Report broken utility lines to the appropriate authorities.

7. Start clean-up and salvage operations.

8. Maintain communications with the corporate office, local Insurance Company Loss Prevention Department, and the claims adjustment organization.

6.5 Recovery Procedures

1. Activate Recovery Procedures.

2. Set up recovery command center and communication systems with disaster recovery team.

3. Project Managers will meet at jobsites to assess and photo-document all damage as soon as practical.

4. Any and all calls regarding site status from sources from outside the island will be directed to the owners, if they don't pertain to immediate clean-up or help requested.

5. The DAT is to confer and determine allocation of resources for clean up where needed.

6. Any serious damage is to be reported to the DAT Leader immediately.

Jobsite

1. Have any serious structural damage reviewed by a Structural Engineer as soon as possible.

2. Have any serious soil displacement or damage reviewed by a Geotechnical Engineer as soon as possible.

3. Temporary shoring of suspected structural damage may be implemented prior to engineering inspection, but extreme caution is to be used.

7.0 FLOODS

Before a Flood

To prepare for a flood, you should:

- Elevate the furnace, water heater, and electric panel if susceptible to flooding
- Construct barriers (levees, beams, floodwalls) to stop floodwater from entering the building.
- Listen to the radio or television for information.

If you must prepare to evacuate, you should do the following:

- Secure your home. If you have time, bring in outdoor furniture. Move essential items to an upper floor.
- Turn off utilities at the main switches or valves if instructed to do so. Disconnect electrical appliances. Do not touch electrical equipment if you are wet or standing in water.

Home Evacuation Tips

- Do not walk through moving water. Six inches of moving water can make you fall. If you have to walk in water, walk where the water is not moving. Use a stick to check the firmness of the ground in front of you.
- Do not drive into flooded areas. If floodwaters rise around your car, abandon the car and move to higher ground if you can do so safely. You and the vehicle can be quickly swept away.

Driving Flood Facts

The following are important points to remember when driving in flood conditions:

- Six inches of water will reach the bottom of most passenger cars causing loss of control and possible stalling.
- One foot of water will float many vehicles.
- Two feet of rushing water can carry away most vehicles including sport utility vehicles (SUV's) and pick-ups.

After a Flood

The following are guidelines for the period following a flood:

- Listen for news reports to learn whether the community's water supply is safe to drink.

- Avoid floodwaters; water may be contaminated by oil, gasoline, or raw sewage. Water may also be electrically charged from underground or downed power lines.
- Avoid moving water.
- Be aware of areas where floodwaters have receded. Roads may have weakened and could collapse under the weight of a car.
- Stay away from downed power lines, and report them to the power company.
- Return only when authorities indicate it is safe.
- Stay out of any building if it is surrounded by floodwaters.
- Use extreme caution when entering buildings; there may be hidden damage, particularly in foundations.
- Service damaged sewage systems if needed. They are a serious health hazard.
- Clean and disinfect everything that got wet. Mud left from floodwater can contain sewage and chemicals.

8.0 DOCK CHECKLIST

Equipment To Be Kept Onboard All Boats:

- chafing gear
- fenders
- two sufficient anchors with 300' or more oversized line
- flashlight with spare batteries
- battery-operated radio

Check Monthly:

- exterior lights operable
- auto bilge pump operating (check battery)
- hatches are watertight
- power and electric gear operating
- engine battery charged
- flashlight battery charged
- radio batteries charged

Docked Boat Preparations:

- strip all removable items, including spare rigging
- clear self-bailing cockpit drains
- close all through-hull fittings
- set chafing gear where lines will rub (chocks, cross lines, deck edge, dock edge etc.)
- remove portable fuel and oil storage containers
- remove ship papers
- shut off fuel tanks
- leave anchor light on
- leave auto bilge pump on

- check openings to ensure boat is watertight
- set and check storm anchors
- consider attaching 3 sets of bow and stern spring lines
- consider attaching lines to cleats at a 45 degree angle
- consider tying your boat between two piers or along a pier and anchored off one side

ATTACHMENT A

CHECKLISTS

96 HOURS PRIOR TO STORM ARRIVAL

Activity Description	Responsibility	Initial
Contact marine operators to ready vessels per Hurricane Preparedness Plan, confirm insurance coverage and obtain copies of all coverage		
Inspect entire marina for potential trouble and secure marina equipment		
Have recycling containers picked up		
Collect dock line, shackles, thimbles and chain in office		
Advise various managers and visitors/guests on storm progress		
Determine how many employees will be able to work during the storm		
Contact or contract a crane truck for replacing high items such as masts and picking up heavy items to move or boats to return to water (if applicable)		
Assure adequate or extra spill equipment on hand in case of boat leakages.		
To avoid last minute confusion, check continually to see that dead limbs, coconuts, etc., and other tree debris are removed from the trees and grounds		

72 HOURS PRIOR TO STORM ARRIVAL

Activity Description	Responsibility	Initial
Ensure marine operators are taking protective measures		
Monitor NOAA weather station and/or internet reports		
Coordinate volunteers, act as home base where employees can report completed storm preparation tasks, and coordinate needed supplies, tools and labor		
Continue working with customers and caretakers		
Process mail and paperwork, back-up computers, delay orders of materials due to be shipped		
Inform dock staff of vessels unable to be readied by customers/ caretakers		
Cover and tape windows		
Ready work boat, fill with gas, dock lines, anchor, operate dewatering pumps, and refill gas tanks		
Check flash lights and radios		
Run chainsaw, refill gas container and have 2 new blades on hand		
Remove all blowables (signs, chairs, trashcans), and remove small dry storage boats (dinghies, kayaks, canoes, wave runners, etc.)		
Fuel all boats		
Pump sewage out of all boats		`
Install storm shutters or plywood over low level windows		
Begin securing all small boats on the upland, and antennas, sails and masts		
Coordinate with suppliers for resupply of critical items as soon as possible after storm		

48 HOURS PRIOR TO STORM ARRIVAL

Activity Description	Responsibility	Initial
Inform staff of their work schedule for storm period and have them ready their personal residences		
Continue to prepare vessels		
Move office equipment and records away from windows or to another site and cover with plastic, keeping things off the ground		
Make sure there are batteries, food and water (1 gal/day/person) for recovery workers, along with emergency cash		
Secure marine area from non-essential traffic and remove any vehicles		
Check for any loose debris that could become airborne		
Alert Security Officer		
Check Staff Roster and determine non-essential employees		
Update contact Information for all employees and distribute		
Halt deliveries		
Empty all dumpsters and secure		
Check Generators for operation and fuel		
Determine if generators will be shut down		
Check all vehicles for operation and fuel		
Check all heavy equipment for operation and fuel.		
Check water supply and storage		
Check for First Aid Kits		
Check Fire Extinguishers		
Central location for flashlights, batteries, VHF radios		
Radios on charge		
Cell Phones on charge		
Begin IT backups		
Hard hats, axes, heavy duty bolt cutters, sledge hammers, wire cable and heavy duty hooks (to attach to vehicles to haul debris)		
Inspect and prepare emergency equipment (i.e. chainsaws, portable generators, compressors, etc.)		
Locate plastic sheeting and bags to protect computer equipment		
Fill and place sandbags as needed		
Close fuel supply valves		
Move all emergency equipment and tools out of flood level		
Install storm shutters on building		
Take down satellite dish		
If storm is anticipated to become a hurricane, or is already a hurricane, then remove the yacht fleet from Bell Island to a safe anchorage, out of the storm's path		
Inform staff of their work schedule for storm period and have them ready their personal residences		
Move office equipment and records away from windows or to another site and cover with plastic, keeping things off the ground		
Make sure there are batteries, food and water (1 gal/day/person) for recovery workers, along with emergency cash		
Move any marine construction equipment to the lee of the island or another island depending on storm direction and path		
Any construction equipment that can remain on the upland should be relocated to the interior, away from waves and marine resources		

24 HOURS PRIOR TO STORM ARRIVAL

Activity Description	Responsibility	Initial
Notify the staff that the hurricane will hit soon		
Continue to follow the storm's progress by monitoring the radio		
Coordinate the activities of the department managers making preparation for the storm		
Check emergency generator, emergency lights, tools, and supplies		
Disconnect power to all low-lying areas		
Arrange for proper emergency shut down of R.O. Plant and all generators per manufacturer instruction		
Secure all rooftop and lower level doors		
Begin sand bagging areas that are subject to flooding		
Collect foul weather gear including life jackets		
Re-check vessel in marine areas and construction barges		
Confirm supply of food and water for people onsite (1 gal water/person/day)		
Confirm staff evacuation		
Shut off water, sewer and electricity to docks		
Take pictures of the facility and preparation conditions		
Test run generators under load		
Double check 48 hour checklist		
Prepare office and employee area for shutdown		
Move portable generators to strategic locations		
Top off fuel in all vehicles		
Charge and/or fuel all UTV's		
Load supplies and material into containers		
Determine evacuation time		
After site is secured, send personnel home		

24 HOURS PRIOR: MARINE AREAS

Activity Description	Responsibility	Initial
Re-check vessel readiness of marine area and on vessels stored on upland		
Confirm staff evacuation		
Shut off water, sewer and electricity to docks		
Take pictures of the facility and preparation conditions		
Double check 48 hour checklist		

12 HOURS PRIOR TO STORM ARRIVAL

Activity Description	Responsibility	Initial
Copy all important files and move them to a safe place		
Elevate and cover all computer and electrical equipment		
Photograph contents of offices and safe room		
Unplug all electrical items		
Recheck 24/48 hour lists		
Prepare for closing office		
Close and lock containers		
Staff will be authorized to go home		
Shut down generators if necessary		
Management will make the final securing check		

RECOMMENDED STORM FIRST AID SUPPLIES

Item	Responsibility	Initial
(3) weeks of prescription medications and over-the-counter medications used		
(20) Adhesive bandages, various sizes		
5” x 9” sterile dressing		
Conforming roller gauze bandage		
(2) Triangular bandages		
(2) 3x 3 sterile gauze pads		
(2) 4x 4 sterile gauze pads		
Roll 3” cohesive bandage		
(2) Germicidal hand wipes or waterless alcohol-based hand sanitizer		
(2) Pair large medical grade non-latex gloves		
Adhesive tape, 2” width		
Anti-bacterial ointment and (6) antiseptic wipes		
Cold pack		
Scissors (small, personal) and Tweezers		
CPR breathing barrier, such as a face shield		
Mosquito repellent		
Pain relievers (Aspirin, Tylenol, Motrin, prescription, etc.)		
Sun block		

WHAT TO BRING TO A SHELTER

Item	Responsibility	Initial
3-4 days supply of food and drink that does not need cooking		
Can opener (non-electric)		
3-4 days supply of water (one gallon per day per person)		
First aid kit that includes prescription medications and glasses		
Special needs items for infants, if applicable (formula, bottles and diapers etc)		
Special needs items for elderly or disabled family members (if applicable)		
If you have small children, do not forget to bring at least one of their favorite foods (e.g. breakfast cereal) and something to keep them occupied		
Bedding (sleeping bags, pillows)		
Battery powered radio, flashlight and extra batteries		
A change of clothes		
Extra set of car keys, credit cards, cash		
Passports and important family papers		
Reading materials and quiet games to help pass time and keep children occupied		

*Persons are also asked **NOT** to bring pets, alcohol, illegal drugs, cooking equipment, furniture and weapons to an official shelter. Cots and air mattresses may not be allowed because of limited space. Remain calm and do not leave the shelter until all clear is advised.*

RECOMMENDED STORM SUPPLIES

Item	Responsibility	Initial
Emergency "space" blanket and extra blankets/sleeping bags and pillows		
Paper plates and cups, plastic utensils		
Non-electric can opener		
Personal hygiene items, including a toothbrush, toothpaste, comb, brush, soap, contact lens supplies, and feminine supplies		
Plastic garbage bags and ties (for personal sanitation uses)		
Include at least one complete change of clothing and footwear, including a long sleeved shirt and long pants, as well as closed-toed shoes or boots		
If you wear glasses, keep an extra pair with your workplace disaster supplies		
Flash lights with extra batteries, candles and matches		
Battery powered radio and extra batteries		
Enough non-perishable food to sustain you for at least two weeks (three meals/day) is suggested. Select foods that require no refrigeration, preparation or cooking, and little or no water. (Ready-to-eat canned meals, meats, fruits, and vegetables. Canned juices. High-energy foods (granola bars, energy bars, etc.)		
Keep at least one gallon of water available per person, per day, or more if you are on medications that require water or that increase thirst. Store water in plastic containers such as soft drink bottles. Avoid using containers that will decompose or break, such as milk cartons or glass bottles		
Medications- Include usual non-prescription medications that you take, including pain relievers, stomach remedies, etc. If you use prescription medications, keep at least three days supply of these medications at your workplace. Consult with your physician or pharmacist how these medications should be stored, and your employer about storage concerns		
Cash (if power is lost, ATM's, banks and other businesses off-island may be closed and those open may not accept checks or credit cards)		
Home repair items such as nails, hammer, screw drivers, drills, screening, wrench, pliers, etc.		
Cleaning supplies (mops, buckets, disinfectants, towels etc)		
Toilet paper and moist towlettes		
Cell phone charger		
Passport and other important family documents (insurance policies, bank account records, etc.) stored in sealable plastic bags/waterproof containers		
Pet supplies i.e. food, drinking water containers, leads, poop bags/newspapers, toys, medications etc.		
Household non-scented chlorine bleach and a medicine dropper (9 parts water: 1 part bleach- for disinfectant, or 16 drops bleach: 1 gallon water for emergency water treatment).		
Fire extinguisher		
Whistle to signal for help		
Charcoal/lighter fluid and cooler		
Extra sets of critical keys		
Reading materials		

ATTACHMENT B

LIST OF SUPPLIERS

COMPANY	POC	PHONE	FAX	SERVICE

ATTACHMENT C

<u>EMERGENCY COMMUNICATION LOG</u>

Point of Contact:			Incident/ Event:
Office:			Site:
DATE	TIME	(I) Incoming or (O) Outgoing	COMMENTS/ RESPONSE

ATTACHMENT D

EMERGENCY CONTACTS

Entity	Phone Number	Contact
City		
Power Company		
Landline Phone Company		
Cell Phone Company		
Insurer		
Electrician		
Plumber		
Contractor		
Other		

	Phone
EMS	
Fire	
Police	
Medical Facility	

ATTACHMENT E

DAMAGE ASSESSMENT FORM
(Use one sheet per building/structure)

Accessibility	Easy	Difficult	Impossible	Comments
To the site/building				
Utilities	**None**	**Limited**	**Available**	**Comments**
Water				
Sewage				
Electric				
Phone				
Fuel				
Resources	**None**	**Minor**	**Major**	**Comments**
Building condition				
Windows				
Doors				
Walls				
Ceiling				
Roof				
Office Space	**None**	**Minor**	**Major**	**Comments**
Work areas/Flooring				
Storage rooms				
Meeting rooms				
Hallways				
Restrooms				
Office Equipment	**None**	**Minor**	**Major**	**Comments**
Furniture/ Flooring				
Records/ Files				
Computers/ Printers				
Copiers/ Fax/ Phone				
Supplies				
Vehicles/ Carts				
Other				
Construction Equipment	**None**	**Minor**	**Major**	**Comments**
Earth moving				
Dredges				
Barges				
Backhoe/ digging				
Other				

APPENDIX XI

TURBIDITY DAILY LOG SHEET

TURBIDITY DAILY LOG SHEET

COLLECTOR'S NAME:			DATE:			
LOCATION	TIME	TURBIDITY (PPM)	WATER TEMP. (°F)	WIND SPEED (MPH)	WIND DIRECTION	TIDE (HIGH/LOW) TIME

APPENDIX XII

CORAL RELOCATION FORM

Big Bell Island
Coral Relocation Report Form

Site Conditions:

Date: _____
Time: _____
Weather: _____ (Clear, Partly Cloudy, Cloudy, Rain)
Wind: _____ (Speed and Direction) Sampled by: _____
Tide: _____
Water Temp: _____

Specimen and Photo ID #										
Length (cm)										
Width (cm)										
Time of Removal										
Integrity										
Typical current energy										
Removal approx depth (ft)										
Time of Reattachment										
Reattachment approx depth (ft)										
Typical current energy										
Note of Interest										

* Integrity – (whole / piece of larger coral)

APPENDIX XIII

SWIM AREA SAFETY PLAN

Big Bell Island Swim Area Safety Plan

Boat Operator Guidelines

Most propeller strike accidents result from operator error. Victims include swimmers, boat operators, or passengers. Most propeller accidents can be prevented by following basic safe boating practices.

Be aware and stay outside of the swimming boundary, marked with blue and white buoys.

- Maintain a proper lookout. The primary cause of propeller strike accidents is operator inattention.
- Make sure the engine is off so that the propeller is not rotating when passengers are boarding or leaving a boat.
- Never start a boat with the engine in gear.
- Slow down when approaching congested areas and anchorages. In congested areas, always be alert for swimmers and divers.
- Learn to recognize warning buoys that mark swimming and hazardous areas.
- Keep the boat away from marked swimming and diving areas. Become familiar with the red and white or blue and white diver-down flags signaling that divers are below the surface.
- Make sure that passengers are seated properly before getting underway. Some operators of larger boats with several passengers have caused injuries by putting the engine in gear while people were still swimming or diving from the boat.
- Never ride on a seat back, gunwale, transom, or bow.

Swimmer Guidelines

Pay attention and stay within the swimming boundary, marked with blue and white buoys.

- Because it is almost impossible for boat operators to spot a swimmer, swimmers should:
    - Not swim outside of designated or safe areas.
    - Swim only in waters where they can be seen by boaters.

- Inflatable toys can be easily punctured and lose air. Wind can push a toy out of a user's reach. Users should be sure they don't drift too far from shore. Inflatable toys are not a substitute for supervision—always watch children who use these toys.
- Swimmers should know their ability and never exceed it. Never dive into unknown depths.
- Never swim alone.

APPENDIX XIV

CORAL MONITORING DAILY LOG SHEET

CORAL MONITORING DAILY LOG SHEET

COLLECTOR'S NAME:			DATE:			
SPECIMEN #	TIME	% OF LIVE CORAL	TURBIDITY (PPM)	CURRENT (KTS)	WATER TEMP. (^{o}F)	TIDE (HIGH/LOW) TIME