Bimini Bay

Project Report

Project 160191

September 29, 2008

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1.0 Executive Summary

The Bimini Bay Project located on North Bimini is a proposed resort development consisting of private single-family and condominium residential housing, hotel and time-share units, a casino, marinas, a golf course, commercial shops and restaurants, swimming and beach facilities, and associated utility infrastructure.

Black & Veatch International (BVI) was contracted by the Government of the Bahamas (GOB) to conduct an impartial, independent evaluation of the Bimini Bay Project to identify the extent to which the GOB previously approved individual aspects of current Phase 1 project development. The GOB also requested that BVI evaluate the extent to which existing development activities have been addressed in environmental assessment (EA) and management plan submittals, as well as the extent to which environmental degradation occurred beyond that described in these environmental submittals. The GOB also specifically requested BVI to examine the potential impacts from and island capacity to accommodate changes proposed in the latest proposed project land use plans.

BVI reviewed documents, conducted interviews, and performed a site visit to investigate and audit the extent of project development, construction activities, and existing site conditions. Based on these actions, BVI prepared this gap analysis report summarizing its analysis and findings; it concludes with recommendations for moving forward with Bimini Bay Resort project development.

The following summarizes the findings of the gap analysis:

Findings of Gap Analysis		
Boundaries of Project Approvals		
Construction within approved areas	No gaps	All current Phase 1 development features and improvements either completed or under construction are within the boundaries of GOB approvals.
Construction activities permitted	Potential gaps	Documentation of necessary permits covering all activities from initiation of construction to present could not be produced for review.
Master land use plan	Gaps	New master plan proposed in 2006 involving proposed exchange of Easter Key lands for additional reclaimed lands possibly agreed to, but property transfers have yet to be made. It differs from the master plan included in the Heads of Agreement (HOA) as well as the master plan approved by the Town Planning Committee.

Findings of Gap Analysis		
Public awareness	Gaps	A lack of transparency and public access to documentation of authorizations of the extent and boundaries of planned project's development activities has created confusion for local residents, Non-Governmental Organizations (NGOs) and even other Government agencies, as evidenced by efforts to establish a Marine Protection Area in North Bimini.
Environmental Management Practices		
Coastal stabilization	No gaps	Construction of concrete walls reinforced with steel rods imbedded in bedrock at the edge of developed areas is appropriate. Future development should incorporate design wave and site stormwater analysis, including utilization of wave and sediment computer modeling, as well as other recommended design elements.
Environmental management	Gaps	No written environmental management plan (EMP) as required under the 2004 HOA. Lack of implementation of numerous common environmental management practices and procedures at the project site.
Environmental Impacts and Degradation		
Extent of environmental degradation beyond what was anticipated	Gaps	Environmental impacts to existing terrestrial and aquatic resources have resulted from Phase 1 activities; however, the significance and extent of these impacts cannot reasonably be determined due to a lack of sufficient baseline data or impact characterization within the project environmental reports.
Impacts of proposed island reconfiguration	Potential gaps	Ability to quantify and compare potential impacts hindered by lack of data on proposed Phase 1 island reconfiguration(s) and associated marina basin and interconnecting waterways, combined with lack of identification, characterization, location, or quantification of specific resources and habitats in the vicinity of the subject island(s).

Findings of Gap Analysis		
Island capacity for further resort development	Potential gaps	Lack of available data on current ecological conditions and physical boundaries and vague conceptual descriptions of proposed golf course design and layout preclude reasonable assessment of island's capacity for further sustainable resort development. However, a fatal flaw assessment finds that potentially 112.5 to 134 acres could be suitable for development of a golf course providing for avoidance of and protective buffers around sensitive environmental resources and habitats.

The report concludes with the following recommendations for consideration in moving forward with Bimini Bay Resort project development:

Recommended Steps Forward

1. RAV Bahamas Ltd. should be immediately required to develop a detailed Environmental Management Plan (EMP) to include both construction-phase and operational-phase issues for all Phase 1 development activities.

2. RAV Bahamas Ltd. should be required to install an open bridge to the existing southernmost artificial island, utilize siltation curtains during all dredging activities, and monitor water quality, turbidity, and sea grasses.

3. Detailed field surveys should be undertaken of the Phase 2 area to identify current baseline conditions, locations, and the extent of all sensitive resources and habitats; the findings should be incorporated into golf course design plans and layouts to ensure avoidance and protection of the identified sensitive resources.

4. Scoping consultations should commence to establish the appropriate content and methodology of a comprehensive Environmental Impact Assessment (EIA) report to be submitted for review and approval as a pre-condition to proceeding with any Phase 2 construction activities.

5. As part of the EIA scoping process, the GOB and RAV Bahamas Ltd. should actively seek mutually acceptable compromises and compatible sustainable design solutions to competing project development and environmental marine preservation objectives.

6. A comprehensive EIA and EMP should be prepared in accordance with the scoping guidance and submitted to the Bahamas Environment, Science & Technology Commission **(**BEST) Commission for review and approval.

7. The final EIA should be made available for public inspection, and public comments should be presented to the Cabinet along with the BEST Commission's recommendations regarding the acceptability of the impacts in deciding whether, and to what extent, to authorize further Phase 2 development.

8. A central repository for all plans, permits, licenses, and approvals should be established at the Island Administrator's office, and should be maintained at the resort for inspections by government staff.

9. A communications forum should be established on North Bimini to provide notice to local residents of the nature and extent of all project development plans, approvals, and authorizations, as well as major project construction activities or events that may temporarily produce increased demands on island infrastructure or services.

10. Review and approval of Phase 2 construction plans should require that appropriate coastal stabilization features, including (at a minimum) design wave and site stormwater analysis, be incorporated before any approvals are issued.

2.0 Introduction

Black & Veatch International (BVI) was contracted by the Government of the Bahamas (GOB) to conduct an impartial, independent evaluation of the Bimini Bay Project to:

- Identify the extent to which individual aspects of current Phase 1 project development were previously approved by the Government,
- Evaluate the extent to which these existing Phase 1 development activities were addressed in the EA and subsequent amendments submitted to the Bahamas Environment, Science & Technology Commission (BEST) Commission in seeking these approvals,
- Assess the extent to which environmental degradation has occurred beyond what was described in these environmental submittals, and
- Recommend what additional baseline surveys, studies, investigations, impact analyses, mitigation measures, and environmental management plans are appropriate and necessary to adequately address past and potential future impacts from completion of both Phases 1 and 2 of the Bimini Bay Project.

In conducting this independent evaluation, BVI accomplished the following:

- Conducted a site audit visit to the Bimini Bay Project to observe the extent of completed and ongoing construction activities, as well as the baseline ecological conditions of undisturbed areas planned to be developed, and through interviews and inspections ascertained what environmental management plans and practices were being implemented as part of the ongoing construction activities.
- Reviewed numerous approval letters and permits issued by agencies and Ministries of the GOB, including Heads of Agreements (HOA), to assess and define the extent of existing and planned future project development components that have been authorized to proceed with construction.
- Reviewed existing project EA reports submitted to BEST to identify the extent to which impacts from completed and ongoing construction activities were included and adequately assessed in these documents.
- Conducted interviews of the developer and its environmental consultants, government officials, local residents, NGOs and other interested parties concerning the history, understanding and concerns (if any) regarding permitting and ongoing development of the project.
- Reviewed design drawings and observed coastal stabilization features to evaluate the sufficiency of these features.
- Reviewed the National Wetlands Subcommittee site visit report and investigated conflict with proposed Marine Protection Area.

- Reviewed habitat mapping from EA reports, observed baseline ecological conditions, and utilized GIS mapping from aerial photographs to estimate available acreage within the Phase 2 area for establishing a golf course, with provisions for avoidance of and protective buffers around sensitive environmental resources.

Based on these document reviews and observations and information obtained from the previously mentioned site visit, BVI has prepared this gap analysis report that summarizes its findings regarding the extent of project development and construction activities that have already been approved, the extent to which these activities have been addressed in EA and EMP submittals, as well as the extent to which environmental degradation occurred beyond that described in these environmental submittals. This report also examines the potential impacts from and island capacity to accommodate planned future resort development, and concludes with recommendations for moving forward with Bimini Bay Resort project development. Specific recommendations are provided for further or additional environmental surveys and analyses that should be undertaken to sufficiently identify and characterize potential environmental impacts from planned future project development activities, as well as mitigation and management practices and monitoring metrics and programs that should be developed and incorporated into a comprehensive project construction and operations environmental management plans and procedures.

The following appendices are also included in this report:

- Appendix A--Maps.
- Appendix B--Bimini Bay Resort Development Features and Authorizations.
- Appendix C--Current Phase 1 Development Photographs.
- Appendix D--Inventory of Bimini Bay Field Studies and Assessments.

3.0 Project Overview

3.1 Project Description

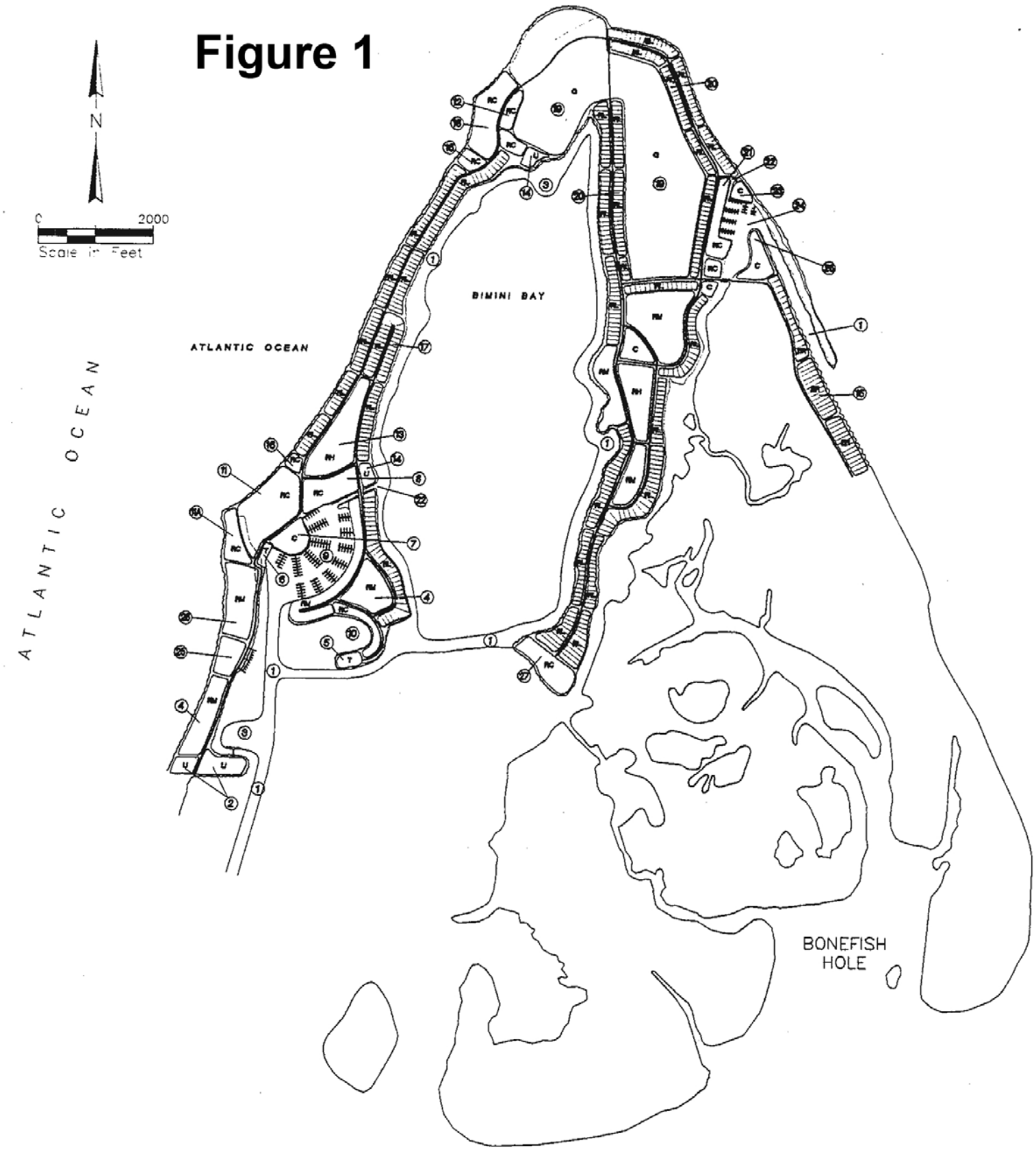
The Bimini Bay Project is located on North Bimini Island. It is a proposed resort development consisting of private singe-family and condominium residential housing, hotel and time-share units, a casino, marinas, a golf course, commercial shops and restaurants, swimming and beach facilities, and associated utility infrastructure. RAV Bahamas Ltd. acquired the property through a quiet title action, and then, in 1997, executed an HOA with the GOB for the planned resort shown on Figure 1. The proposed resort master land use plan has been revised several times over the succeeding 11 years.

Construction of residential housing, commercial village, marinas and infrastructure facilities are nearing completion in the southwestern area of the proposed resort development. RAV Bahamas Ltd. has also completed dredging of an entrance channel from Bimini Harbour, and has initiated dredging of marinas, as well as clearing and filling of areas for the hotel, casino, and residential islands. All of these areas have generally been referenced as Phase 1 of the Bimini Bay Project in various correspondence and permits. Areas north of Phase 1 are designated for further development of residential and golf course facilities. Construction within this area commonly referred to as Phase 2 has yet to begin.

For the purposes of this report, “Phase 1A” consists of those areas where, as of June 2008, construction of residential housing, marinas, and utility infrastructure was already or almost completed. “Phase 1B” consists of those areas that have been at least partially cleared for development of the hotel and casino and where reclamation and development of the nearby residential island is planned. “Phase 2” refers to the development of additional residential lots and golf course north of the hotel site that is planned for construction in the near future.

Refer to Figures 2 and 3 for delineation of the areas referenced as Phases 1A, 1B, and 2.

Figure 1



LEGEND

1 BOAT CHANNEL
2 FUEL DOCK / WAREHOUSES / INCINERATOR / RO PLANT / UTILITIES
3 TURNING BASIN
4 MEDIUM DENSITY HOUSING
5 HELIPORT / SEA PLANE TERMINAL
6 DOCK MASTER / CUSTOMS
7 RETAIL / MEDIUM DENSITY HOUSING
8 SPORTS CENTRE / CONVENTION
9 MARINA (300 SLIPS)
10 WINTER BEACH / CHILDREN'S RESORT
11 HOTEL / CASINO
12 SPORTS CENTRE
13 HIGH DENSITY HOUSING
14 UTILITY AREA
15 LOW DENSITY ESTATE HOUSING – 43 LOTS
16 RESIDENT'S BEACH CLUB
17 LOW DENSITY HOUSING
18 HOTEL
19 GOLF COURSE
20 GOLF COURSE LOW DENSITY HOUSING
21 COMMERCIAL / CONDOMINIUMS
22 FLUSHING CHANNEL
23 RETAIL / ENTERTAINMENT
24 MARINA (100 SLIPS)
25 SALES AND MODEL CENTER WITH 20 SLIP DOCK
26 BOAT DRY STORAGE
27 ECO RESORT
28 HEMINGWAY'S HEAVEN CONDOMINIUM
50 FT. ROW WITH 20 FT. WIDE STREET

LAND USE TYPE

RL LOW DENSITY RESIDENTIAL (SINGLE FAMILY)
RM MEDIUM DENSITY RESIDENSIAL (2 –3 STORY UNITS)
RH HIGH DENSITY RESIDENTIAL (4–5 STORY UNITS)
ER ESTATE LOTS
RC RESORT CENTRE (HOTEL, CONVENTION)
C COMMERCIAL
G GOLF COURSE
U UTILITY
T TRANSPORTATION RELATED

LAND–USE ACREAGE

	ACRES	DENSITY	HEIGHT	UNITS
Residential Low Density	170	75' Frontage		551
Residential Medium Density	100	12 / U / AC	2 – 3 Story	1,200
Residential High Density	30	50 / U / AC	4 – 5 Story	1,500
Estate Residential	15	75' Frontage		28
Estate Residential	6	100' Frontage		15
TOTAL				3,294
Resort Centre	84			
Commercial	20			
Golf	164			
Utility	12			
Transportation	3			
Reclaimed Land	99			

Figure 1
Bimini Bay Land Use Plan

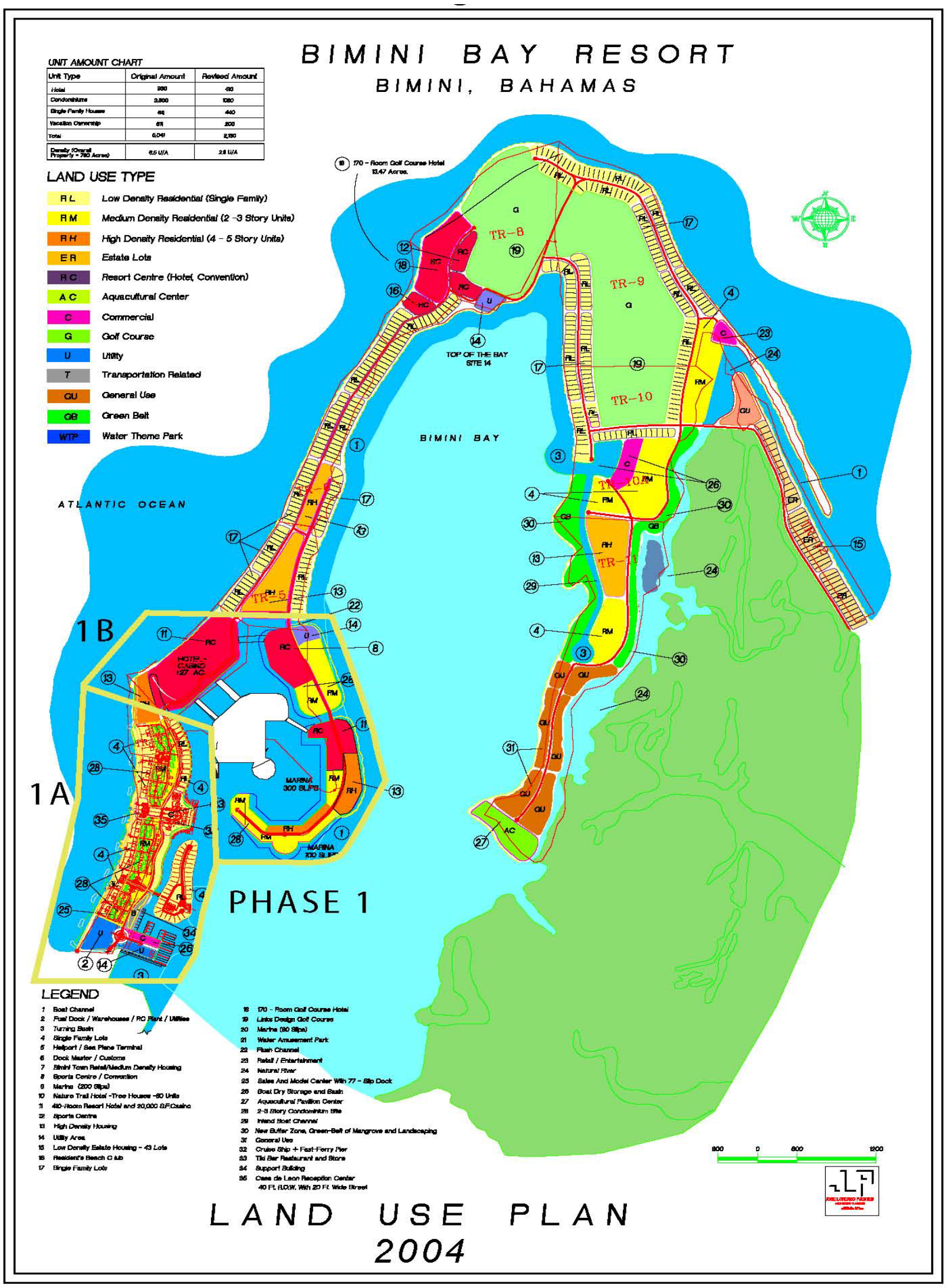


Figure 2
Proposed Phase 1 Area

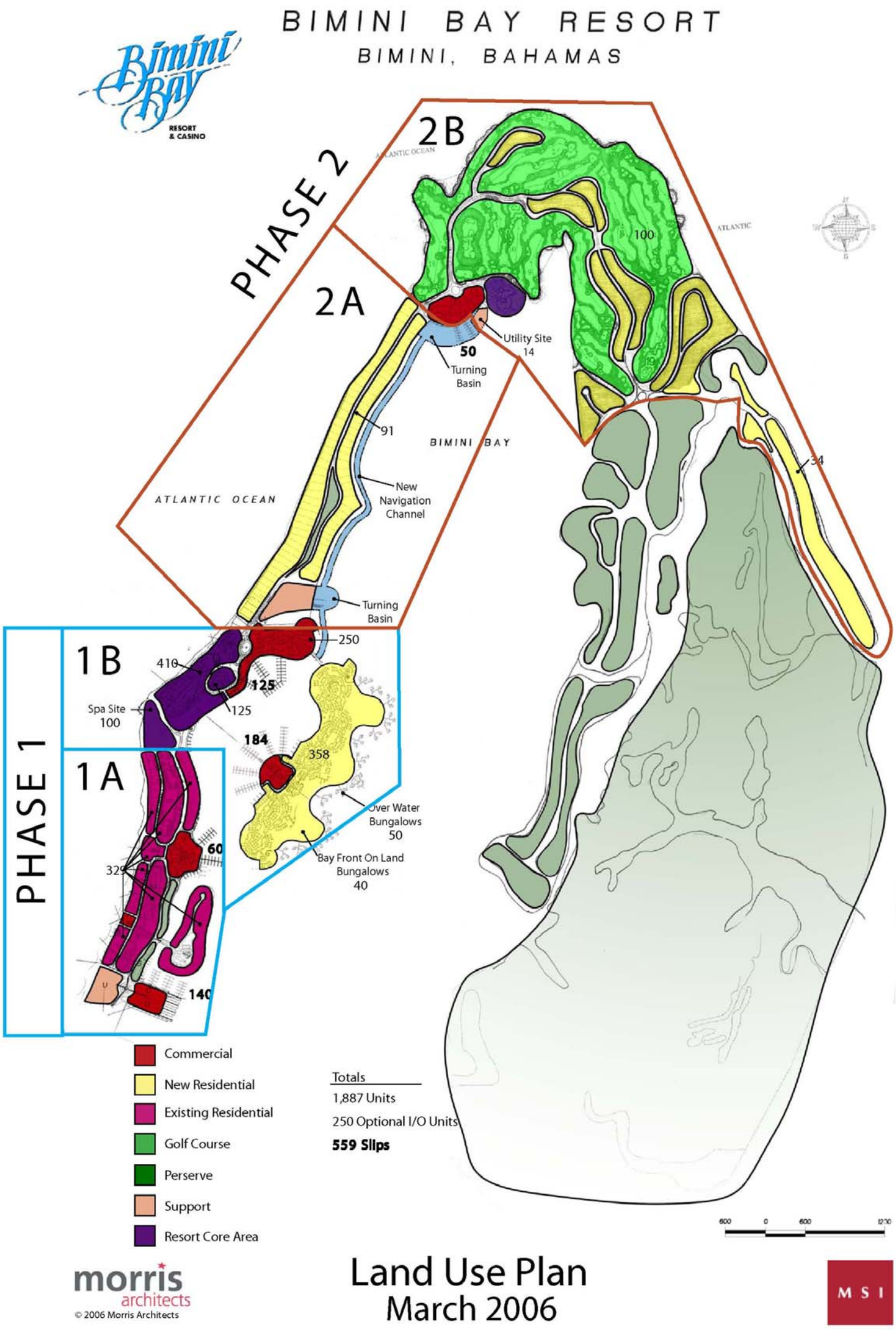


Figure 3
Phase 1 and 2 Areas

3.2 Bimini Bay Project Timeline

The following provides a brief chronological summary of key activities and actions regarding development of the Bimini Bay Resort on the project site:

- **1980s**--Resort development commonly known as the Bimini Bay Project, planned and designed by ROBEX International, obtains approval from the GOB. The project was abandoned after limited construction of residences and electric and plumbing infrastructure were installed.

- **1990s**--Capo Group acquires project development rights and approval from the GOB.

  RAV Bahamas Ltd. acquires ownership of the 700 acre site through quiet title action.

- **1997**--On 7 June, the Commonwealth of the Bahamas signs the Ramsar Convention on Wetlands.

  On 31 July, the GOB and RAV Bahamas Ltd. enter into an HOA for development of a hotel resort on 700 acres of land situated on the northern portion of North Bimini.

  In December, RAV Bahamas Ltd. submits to the BEST Commission an EA of the Bimini Bay Resort and Residential Project prepared by environmental consultant Applied Technology and Management, Inc (ATM).

- **1998**--RAV Bahamas Ltd. commences project development and construction, consisting primarily of site clearing, dredging, fill, and compaction activities.

- **2000**--Efforts to establish a marine protection area in North Bimini, including studies and public consultations, are initiated by the former Department of Fisheries (now Department of Marine Resources).

- **2003**--In response to BEST Commission concerns and recommendations, new turbidity curtains (with suspension cable and anchor) are utilized to control impacts of marina dredging activities, and daily turbidity measurements begin.

  Construction of residential housing structures begins on the project site.

  In December, an amendment to the 1997 EA entitled "Bimini Bay Environmental Studies Program," prepared by ATM, is submitted by RAV Bahamas Ltd. to the BEST Commission.

- **2004**--On 9 June, the GOB and RAV Bahamas Ltd. executed an HOA with numerous revisions of terms and conditions from the original 1997

HOA (refer to summary in Subsection 5.1.1), including new requirement for RAV Bahamas Ltd. to complete "Phase 1" within 5 years.

Installation of marinas begins and construction of housing continues on the project site.

- **2005**--RAV Bahamas Ltd. presents proposed changes in the master development plan to the Government. Changes include converting multiple islands to single large island adjacent to the hotel site.

  The Bahamas National Wetland Committee drafts a National Wetlands Policy and submits it to the Cabinet for endorsement.

  On behalf of the BEST Commission, SENES Consultants conducts an assessment of project approvals and authorizations issued by the GOB, the developer's compliance with conditions of these approvals, environmental impact assessments (EIAs) and studies conducted by the developer, and the environmental impacts resulting from implementation of the project. A report dated September 2005 was provided by SENES to the BEST Commission.

- **2006**--RAV Bahamas Ltd. proposes changes in the master development plan to the Government. Changes proposed included downsizing the project footprint, and shifting development away from the area south of the golf course and west of East Wells (Tracts 10A and 11 comprising approximately 153 acres) in exchange for 49.11 additional acres of island reclamation.

  RAV Bahamas Ltd submits to the BEST Commission a second amendment to the EA dated 20 August 2006, entitled "Bimini Bay Environmental Update" prepared by ATM.

- **2007**--On 31 July, representatives of the Bahamas National Subcommittee on Wetlands conduct a site visit of the Bimini Bay Project and prepare a report summarizing concerns expressed by local residents, observations, and recommendations.

  In September, ATM submits a letter to the BEST Commission outlining key issues to be addressed in two EIA addenda for the Phase 2 of the Bimini Bay Project development, and results from hydraulic modeling of the proposed new island configurations in the North Sound.

- **2008**--On 22 May, BVI is contracted to conduct an independent assessment of the Bimini Bay development project.

  BVI audit team conducts a field visit of the Bimini Bay Resort and North Bimini from 30 June through 3 July..

  BVI's draft report is submitted to the BEST Commission on 22 August..

BVI's final report is submitted to the BEST Commission, GOB, and RAV Bahamas on 29 September 2008.

4.0 Scope of Review

4.1 Documents

The documents listed in Table 4-1 were provided by the BEST Commission to BVI for review and evaluation. The documents listed in Table 4-2 were provided by RAV Bahamas Ltd. to BVI.

Table 4-1
Review Documents Provided by BEST Commission

1	EA prepared by ATM dated December 1997.
2	Bimini Bay Environmental Studies Program, Exhibit A-2 prepared by ATM, dated December 2003.
3	Bimini Bay Environmental Studies Program prepared by ATM, dated December 2003.
4	Crown Lease by Commonwealth of the Bahamas for 5.14 acres of Submerged Land signed 19 May 2005 by RAV Bahamas Ltd. (unsigned by Minister of Lands and Surveys).
5	Lease for 5.14 acres of Submerged Land signed 8 February 2006 by Minister Responsible for Lands and Surveys Perry Christie.
6	Environmental Review of RAV Bahamas Ltd Bimini Bay Resort Project by SENES Consultants Ltd dated September 2005.
7	Bimini Bay Environmental Update prepared by ATM, dated August 20, 2006.
8	Series of letter correspondence between RAV Bahamas Ltd. and the Bahamas Investment Authority dated 24 September 2006, 25 October 2007, 18 December 2007, and 19 December 2007.
9	Excavation Permit No. CPL/91P, dated 21 February 2006.
10	Extract from Conclusions of Meeting of the Cabinet held on Tuesday, 11 July 2006.
11	Letter from Port controller Captain Allens dated 23 February 2007 regarding approval of application 47/03 by Minister of Transport and Aviation.
12	Minute Paper for Prime Minister by Permanent Secretary Ronald Thompson, dated 7 January 2007.
13	Letter from Ministry of Labour & Financial Services to Valentine S. Grimes (Reference MFSI/PRJ/BI/11) dated 1 May 2007 regarding proposed amendment of 2004 HOA.
14	National Wetland Committee site visit report, dated 31 July 2007.
15	Minute paper No. OPM/T&I/3A RAV by Under Secretary Audley Greaves dated 19 November 2007.
16	Application for Sea Bed Lease submitted by Valentine S. Grimes & Co on behalf of RAV Bahamas Ltd., dated 6 November 2007.
17	Letter from Director of Investments to RAV Bahamas Ltd. (Reference OPM/PRJ/Bimini Island/05), dated 18 December 2007.
18	Extract from Minutes of National Economic Council meeting held on Tuesday, 24 April 2007.
19	Extract from Minutes of National Economic Council meeting held on Tuesday, 12 April 2007 (24 January 2008).
20	*Bahamas Journal of Science*, Volume 9, Number 2, May 2002.

Table 4-2
Documents Provided by RAV Bahamas to BVI

1	24 June 2008 letter to Rafael Reyes from Loraine Cox, BEST regarding notice of BVI site visit.
2	4 June 2008 fax from Ashley Saunders to Ronald Thompson, Permanent Secretary, in support of Bimini Bay letter and pages of citizen signatures.
3	31 March 2008 letter to Geraldo Capo from Ronald Thompson, Permanent Secretary regarding approvals to excavate seabed approved in original EIA agreement and to begin development and sale of 90 lots.
4	18 March 2008 letter to Valentine S. Grimes & Co. from R. S. Hardy, Department of Lands and Surveys regarding approval/offer of 5.03 acre seabed lease and request for additional documents.
5	5 March 2008 letter from Rafael Reyes to Interested Parties responding to emails and blog posting about Bimini Bay Project.
6	23 February 2007 letter to Rafael Reyes from Captain Anthony J. Allens, Port Controller regarding approval of project by Docks Committee and Ministry of Transport and Aviation and request to contact the Ministry of Works.
7	29 September 2006 letter to Rafael Reyes from Ambassador Keod Smith regarding recommendation concerning Land Use Master Plan.
8	23 August 2006 letter to Geraldo Capo from Ambassador Keod Smith regarding temporary ancillary construction facilities.
9	21 August 2006 letter to Ambassador Keod Smith from Rafael Reyes seeking response to proposed revised Master Plan.
10	23 March 2006 letter to Prime Minister Christie from Raphael Reyes regarding proposed revised Master Plan.
11	21 February 2006 Permit for Excavation issued to RAV from Director of Physical Planning.
12	Bruce LaFleur & Associates design drawing of seawall, dated 1 June 2005.
13	10 May 2005 letter to Rafael Reyes from Captain Anthony J. Allens, Port Controller regarding acknowledgement of plan for Navigational Aids.
14	3 May 2005 letter from John Duchock, ATM (for RAV) to Donald Cooper, BEST regarding turbidity monitoring reports.
15	15 March 2005 Permit for Excavation issued to RAV from Director of Physical Planning.
16	8 October 2003 letter to Bimini Bay from Captain Anthony J. Allens, Port Controller regarding approval of project by Ministry of Transport and Aviation and request to contact the Ministry of Works and BEST.
17	18 July 2003 fax to Geraldo Capo from Department of Land Planning regarding Approval in Principle of Land Use (specified elements).
18	29 January 2003 letter to Michael Major, Department of Physical Planning from Geraldo Capo regarding request for extension to master plan and excavation permit.
19	6 November 2002 letter from Water and Sewerage Corporation to Bimini Bay Water Limited regarding acceptance of Bimini Desalinated Water Supply proposal.

Table 4-2 (Continued) Documents Provided by RAV Bahamas Ltd. to BVI	
20	21 February 2002 Approval of Revised Master plan and Permit/license for Excavation issued to RAV from Director of Physical Planning.
21	14 July 1999 - License for Excavation issued to RAV from Director of Physical Planning.
22	11 July 1998 letter to Jose Puentes, Capo Group from Michael Major, Department of Physical Planning regarding Approval in Principle of resort development with conditions.
23	Diagram of site development plan over aerial photo (undated).
24	List of Island Contributions from Bimini Bay Resort (undated).
25	Four notebooks of turbidity monitoring reports for 2004-2005 time period.
26	23 December 1998 Supreme Court Registry of RAV Bahamas Ltd.'s owner in fee simple to 685.454 acres on North Bimini and East Wells.
27	21 April 2007 Water and Sewerage Agreement.
28	15 February 2008 correspondence from RAV Bahamas Ltd. Counsel to the Office of the Prime Minister regarding the development of a marina using 5.03a acres of seabed versus 3.93 acres of seabed.
29	1 May 2008 correspondence from the Ministry of Labour & Financial Services regarding the proposed land exchange at North Bimini.

4.2 Site Visit Activities

BVI conducted a site audit visit from June 30 through July 3, 2008. The following summarizes the activities undertaken during this visit:

- **30 June 2008**--Upon arrival at the project site in the early afternoon, group discussions with project construction and environmental manager Rafael Reyes were held at the RAV Bahamas Ltd. construction site office. Objectives and logistics of the site visit were discussed, a history of the project was provided, and past and current development master plans were reviewed.

  The team completed an introductory site tour by four-wheel ATV to familiarize itself with the different features, activities and the extent of ongoing and planned project development.

- **1 July 2008**--In the morning, a boat and pilot provided by RAV Bahamas Ltd. was used to visit several tidal creeks in the North Sound, and the western termini of East Creek and the Bonefish Hole. The marine biologist entered the water using snorkel gear to take photos of fish and the general conditions in the visited tidal creeks. The terrestrial biologist made observations of wildlife and plants, and assisted with the snorkel survey as needed.

Discussions were held with local resident Ashley Saunders regarding the history of the project site and community impacts and benefits from project development to date.

Discussions were held with Mr. Livingston Marshall, independent environmental consultant and former member of Prime Minster Christie's staff, regarding the 2004 amendment of the HOA and efforts to establish a marine protection area in North Bimini during the Christie administration.

Island Administrator Sherrick Ellis was interviewed regarding concerns, issues and attitudes of the local government and Bimini residents about the Bimini Bay Project.

Interviews and discussions with Advanced Technology and Management (ATM) project environmental consultants Steven Peene and Kitty Ziober regarding past environmental studies, as well as the scope and methodology for any ongoing or future EIAs.

The biologists visited the Phase 2 site proposed for development of 91 private resident lots to observe and assess existing terrestrial conditions.

- **2 July 2008**--The proposed golf course and East Wells residential sites were visited to observe and evaluate their existing ecological conditions. Two watercraft were used, one for ocean travel offshore of North Bimini and one a Carolina skiff for approaching shallow areas and to go ashore for meander surveys of habitat and observations of general site conditions.

  Reviews of permits, drawings and other documents were performed at the RAV Bahamas Ltd. construction office.

  Observational inspections of tidal creeks, wetlands and mangroves were undertaken by snorkeling and boat tour in East Creek and the East Wells areas. The boundaries and markings of the navigation channel were also observed from the boat.

- **3 July 2008**--BVI conducted interviews of RAV Bahamas Ltd. staff and provided an exit audit summary at an all day meeting at the RAV Bahamas Ltd. construction office. The exit audit reviewed some preliminary findings and provided recommendations for advancing the project subject to government approval.

4.3 Personal Interviews and Consultations

In addition to discussions and inquiries held with RAV Bahamas Ltd. Project Construction and Environmental Manager Rafael Reyes, and ATM project environmental consultants Steven Peene and Kitty Ziober held during the site visit, BVI contacted

several individuals in government agencies and non-governmental organizations (NGOs) that had direct knowledge of or involvement with the Bimini Bay Project in an attempt to enhance understanding of project history, perceived impacts and competing or conflicting activities and efforts regarding the project site. The individuals listed in the following subsections were interviewed and consulted by BVI.

4.3.1 Bahamas Government

- **Bimini Island Administrator –**Sherrick Ellis interviewed in person at Administrator's office in Bimini on 1 July 2008.

- **Department of Environmental Health Services** –Linda Bowe interviewed in person at DEHS Bimini office on 2 July 2008.

- **Department of Marine Resources** – LaKeshia Anderson interviewed by telephone on 15 August 2008.

- **Department of Physical Planning** – Crestwell Stewart contacted by telephone and fax on 18 September 2008.

- **Bahamas Environment, Science & Technology Commission (BEST)** – Nakira Wilchcombe (former BEST project manager, now with the Grand Bahama Port Authority) interviewed by telephone on 10 September 2008.

4.3.2 NGOs

- **Bahamas National Trust (BNT)** – Eric Carey interviewed by telephone on 22 July 2008.

- **Bahamas Reef Environment and Educational Foundation (BREEF)** – Casuarina McKinney interviewed by telephone on 7 August 2008.

4.4 Other Sources

In addition to the above referenced documents, site visit and interviews, BVI also consulted the following sources in preparing this report:

- *History of Bimini*, Volume I by Ashley Saunders (revised edition published in 2000 by New World Press), and Volume II (revised edition published in 2006).
- Bahamas National Wetlands Policy posted on the BEST Commission Web site.

- NOAA Tide Table Website for the Caribbean Sea [http://www.co-ops.nos.noaa.gov/tides05/tab2ec4.html#112].
- NOAA/NOS Hurricane tracking Web site [http://maps.csc.noaa.gov/hurricanes/].

5.0 Assessment and Analysis

5.1 Approvals and Authorizations

The following is a summary of approvals and authorizations granted for the development of the project based on BVI reviews of copies of HOA, permits, licenses and correspondence to and from government agencies, ministries, and offices. Notations of individual project development features that BVI observed had been or were being completed during Phase 1, or planned for Phase 2, are also provided.

5.1.1 Master Development Plans

The GOB and RAV Bahamas Ltd originally entered into an HOA on 31 July 1997 for the development of a resort on 700 acres of land situated on the northern portion of North Bimini. The HOA set forth requirements and provisions for specific features of the proposed resort, including a hotel, casino, harbour entrance channel, marinas, residential lots, golf course, commercial village, staff housing, waste supply, social contributions and environmental impact studies. A master land use and phased development plan was incorporated by reference; refer to Figure 1.

Approval of a revised project scope was documented in a letter from the Prime Ministers Office signed by Permanent Secretary David Davis to the Gerardo Capo dated 27 May 1998 [Reference OPM/T&I/T/34]. Revisions to the scope included reduced Phase 1 development to no more than 2000 hotel and condominium rooms and single-family homes; a links style golf course that minimizes impact on natural vegetation and run-off to the sea; stopping dredging of the ring channel at the top of the bay in the vicinity of Tract 14 of the approved master, with wooden docks to be constructed over mangroves where they occur along the shoreline adjacent to the channel; limiting building heights to no more than three stories (except for the hotel); and to revisit the size of the proposed European Style Casino once significant progress on the development has been achieved..

According to a Department of Physical Planning letter dated 11 July 1998, Approval in Principle was granted at a 5 August 1998 Town Planning Committee meeting subject to several conditions, including termination of channel dredging at Tract No. 14 of the master land use plan, constructing wooden docks over mangroves located along the shoreline adjacent to the channel, and construction of a “Links Golf Course” which would minimize the impact on natural vegetation and prevent run-off into the sea. Subsequent meetings of the Town Planning Committee on 12 July 2002 and 15 July 2003 referenced in Department of Physical Planning correspondence granted Approval in Principle to land use in Phase 1 of the project.

The HOA was revised and amended on 9 June 2004, wherein numerous provisions and conditions of the original 1997 HOA were replaced or changed. In addition to revising the minimum number or size of hotel rooms, marina slips and casino floor space, substantive changes were made to expand the golf course from “at least 9 holes” to an

18 hole links style course, providing water supply to residents of North Bimini, and submission of environmental management plans. Additionally, the master development plan was revised and approved, as shown on Figure 2.

RAV Bahamas Ltd. subsequently presented a series of proposed revisions to the master development plan to the Government. In 2005, a proposal to convert multiple islands adjacent to the hotel site to single large was presented. In 2006, additional proposed revisions to the master plan included downsizing the project footprint by shifting development away from the area south of the golf course and west of East Wells (Tracts 10A and 11 comprising approximately 153 acres) in exchange for 49.11 additional acres to enable reclamation of the single large island proposed in 2005. The 2006 proposed revised master plan is shown on Figure 3. A comparison of the 2004 and 2006 plan footprints is shown on Figure 4.

The proposed revisions were presented and discussed in a meeting of the Cabinet on 11 July 2006. In addition to the master land use revisions and exchange of land, proposals for improvements to the Bimini airport, health clinic, primary school facilities, employee housing and ferry boat floating docks were presented for consideration. In 2007, the Ministry of Labour and Financial Services presented memorandum NEC(07)50 to the National Economic Council regarding the proposed revisions. According to an extract of minutes from meetings of the National Economic Council held on April 12 and 24, 2007, the Council agreed to an amendment of the Master Land Use Plan, overall reduction of 2130 to 1187 resort units, and exchange of land in the East Wells area for land to be reclaimed near the planned hotel site, with RAV Bahamas Ltd. paying $10,000 per acre for the reclaimed land. Consideration of the extent and funding of the other proposed community improvements were recommended for further consideration by the Ministry of Works and Immigration and the Ministry of Education, Science and Technology. The results of these meetings were communicated to RAV Bahamas Ltd. by letter dated 1 May 2007 from the Ministry of Labour and Financial Services to their legal counsel Valentine S. Grimes.

The Bahamas Investment Authority issued a letter dated 24 September 2007 to RAV Bahamas Ltd. [Reference No. PRJ/BIMINI ISLANDS/05] asking for confirmation of project development activities discussed in an Office of the Prime Minister meeting held on 21 September 2007. Among other things, the Investment Authority letter sought confirmation that all dredging of the channel and removal of mangroves would be suspended pending completion of an environmental review, and that the golf course would be limited to hard lands and would not be expanded beyond 9 holes in Phase 1. The Bahamas Investment Authority re-asserted that the proposed golf course should be limited to 9 holes in a subsequent letter dated 18 December 2007. A subsequent letter from the Office of the Prime Minister dated 31 March 2008 signed by Permanent Secretary Ronald Thompson advised that RAV Bahamas Ltd. would be allowed to excavate the portion of the channel (subject to necessary permits) that was approved in the original EIA agreement, and that the company would be permitted to begin development and sale of the additional 90 lots up to the to of the bay in the Phase 2 area (refer to the area designated 2A on Figure 3).

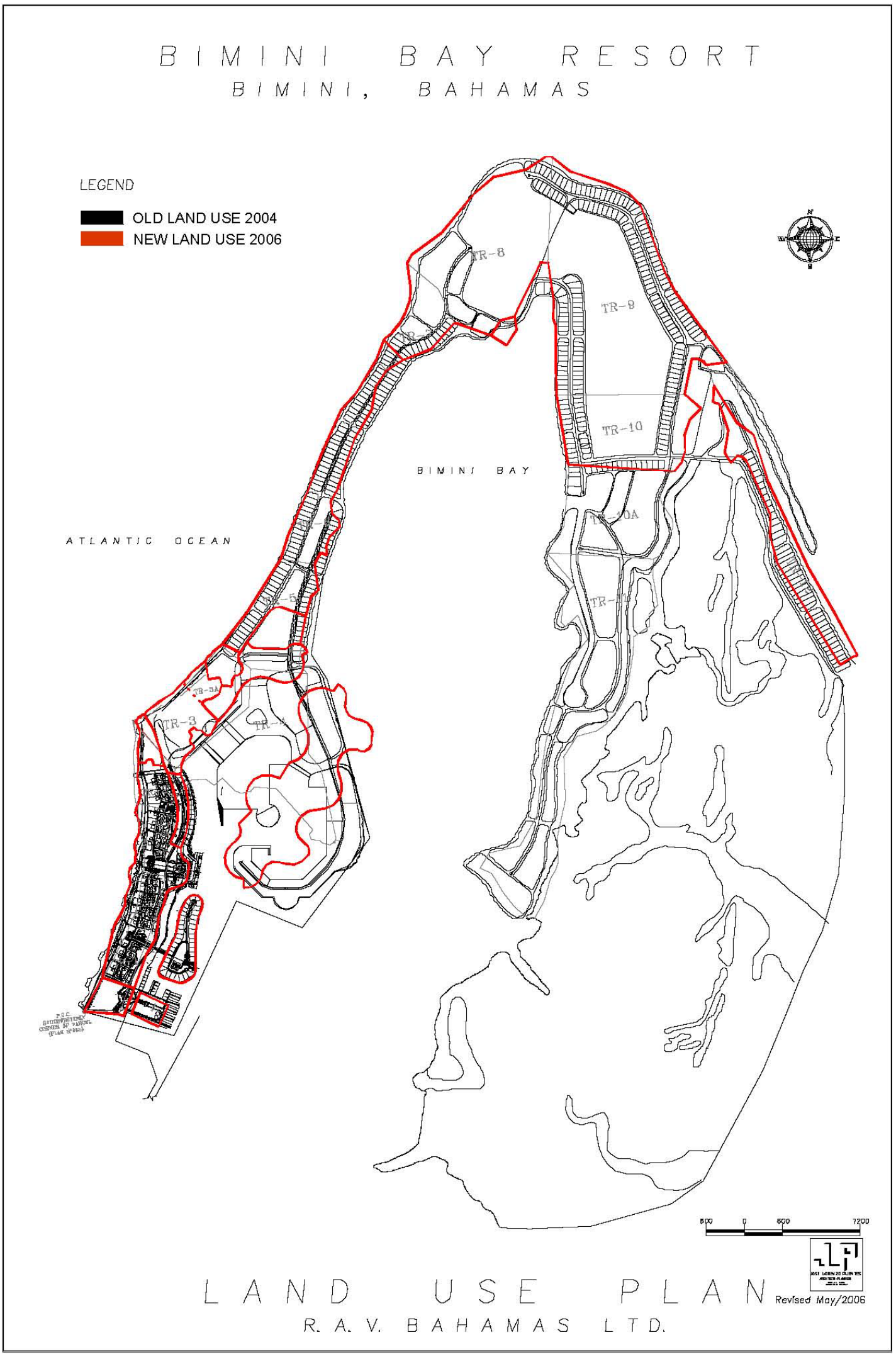


Figure 4
Comparison of 2004 and 2006 Plan Footprints

BVI observed during the site visit that two marinas had been completed and that most of the residential housing in the Phase 1A area was nearing completion. Dredging of the channel to the Bimini harbour entrance as well as the areas around the marinas had also been completed. The commercial village near the resort entrance was constructed and shops were being opened. The desalination plant, water storage tanks and wastewater treatment tanks were completed and in operation, and the sludge drying beds were under construction at the utility site. In the Phase 1B area, the site where the hotel is planned had been cleared and compacted. Construction staging and equipment storage areas and employee housing were occupying a portion of Mosquito Point. No further significant land disturbance from project development was observed north of the hotel and construction staging area during the site visit.

5.1.2 Permits

A centralized, complete storage of government licenses and compliance records was not available at Bimini Bay for review by BVI. RAV Bahamas Ltd. was unable to provide records for all of the GOB permits and approvals obtained and used since 1997.

Similarly, there apparently is no one source or repository in the GOB where copies or even references to all permits and approvals granted to the Bimini Bay Project could be accessed.

Accordingly, the assessment of permits, approvals, and authorizations was based on the review and evaluation of individual licenses and agency correspondence provided for examination. Refer to Table 5-1 for specific details.

5.1.2.1 Dredge and Fill

Licenses to excavate or landfill were issued by the Director of Physical Planning to RAV Bahamas Ltd. pursuant to Section 7 of the Conservation and Protection of Physical Landscape of the Bahamas Act of 1997. License No. CPL/91L issued for individual 12 month periods on July 14, 1999, February 21, 2002, March 15, 2005 and February 21, 2006 were reviewed. Each license had an approved plan attached delineating the areas approved for excavation and landfilling. Conditions for landfilled areas include maintaining a finished elevation of 6 feet above mean sea level, installation of appropriate bulk heading or revetment, revegetation of soils to prevent soil erosion and blight, and submission of a landscaping plan within three months of license issuance. Conditions of excavation included installation of turbidity curtains, as well as conditions to conduct turbidity and water quality monitoring and submit reports to the BEST Commission included in the 2005 and 2006 licenses.

There were several gaps in periods covered by the licenses provided for review. These include a 19 month period between 14 July 2000 and 21 February 2002, a 25 month period between 21 February 2003 and 15 March 2005, and the period since 21 February 2007. RAV Bahamas Ltd. advised that permits had been obtained every year for

Table 5-1
Department of Physical Planning Approvals and Applications Pending for RAV Bahamas Ltd.
(Bimini Bay Project) at North Bimini

Date	Application No.	Details of Proposal	Date of TPC of DPP Decision	Comments/Conditions
	OPM/T&I/T/24	Master Plan covering properties up to Utility Site 14 at the top of Bimini Bay	27 May 1998	See conditions outlined in letter dated 27 May 1998
	AP/134/72	Master Plan covering properties up to Utility Site 14 at the top of Bimini Bay	5 August 1998	See conditions outlined in letter dated 11 July 1998
	CPL/91P	Original application to dredge channel in Bimini Bay and land reclamation	14 July 1999	Permit has been renewed on an annual basis subject to conditions (a) through (l). Note: application for renewal to 2008 is currently pending
	AP/134/72	Revised Master Plan Phase 1 comprising Subphases 1A through 1D	15 July 2003	Approval has been renewed on an annual basis
5.2.03	MOW/SUB/136/5/15	Subdivision Plan for Phase 1 comprising Subphases 1A through 1D	24.7.03	Acceptance in Principle granted for Phase 1 Subdivision
	MOW/SUB/136/5/15	Subdivision Plan for Phase 1 comprising Subphases 1A through 1D	30.1.04	Final Subdivision Approval granted for sale of lots in Phase 1 Subdivision
27.4.06	AP/134/72	Proposal to include Bimini Bay Village Time-Share site (16.36 acres) and Bimini Bay Village Central services & Infrastructure support 2 sites (8.4 acres) as part of Phase 1 Master Plan	12.9.06	See conditions of Approval in Principle in letter dated 5 October 2006
17.7.00	BP03383	Hotel/Housing/Casino comprising 24,000 square feet	9.8.00	Referred by District Council
21.3.03	BP03497	Condominiums/Houses	8.4.03	Referred by District Council
21.3.03	BP03498	Condominiums	8.4.03	Referred by District Council
15.7.03	BP03511	Seawall comprising 2,644 lineal feet	9.9.03	Referred by District Council
15.11.04	BP03555	Beach club	7.12.04	Referred by District Council
15.11.04	BP03556	Restaurant and Fisherman's Village	7.12.04	Referred by District Council
15.11.04	BP03557	Entrance Gate	7.12.04	Referred by District Council
17.9.07	BP03700*	Residence	29.11.07	Referred by District Council
17.9.07	BP03701*	Residence	29.11.07	Referred by District Council
17.9.07	BP03703*	Residence	29.11.07	Referred by District Council
26.9.07	BP03705*	Residence	29.11.07	Referred by District Council

Complied by: M.L. Major / C. B. Zonicle 26 September 2007.

dredging activities, which have been ongoing on a near continuous basis throughout project development, but could not provide copies of permits for the noted gaps. Turbidity monitoring reports provided by RAV Bahamas Ltd. indicate that dredging was conducted during the February 2002 to March 2005 gaps in permit coverage. It further appears that landscaping plans were never submitted within 3 months of issuance of each license.

It was also noted that by letter dated 24 September 2007 the Bahamas Investment Authority had instructed RAV Bahamas Ltd. to halt all channel dredging while the environmental review is underway. However, a subsequent letter from the Office of the Prime Minister dated 31 March 2008 signed by Permanent Secretary Ronald Thompson advised that RAV Bahamas Ltd. would be allowed to excavate the portion of the channel (subject to necessary permits) that was approved in the original EIA agreement. No dredging activities were observed or underway during the BVI site visit.

5.1.2.2 Marinas

Crown Lease Number 1081 of 5.14 acres of submerged land for development of the marina at the southernmost edge of the project was signed by RAV Bahamas on 19 May 2005 and 8 February 2006 by the Hon. Perry Christie as Minster Responsible for Lands and Surveys. This lease was granted for a period of 21 years and provided for a yearly rental of $41,512.36. It also provided for execution of a new lease of 3.93 acres once the marina planned to the north of the subject lease in Parcel B is completed.

By letter dated 6 November 2006 from Valentine S. Grimes acting on behalf of RAV Bahamas Ltd, an application for a Seabed Lease for 5.03 acres (1.13 acres more than the 3.93 acres noted in the previous lease) for the second marina was made to Prime Minister Hon. Hubert Ingraham. Approval of the expanded marina and offer of a seabed lease on the same terms as those set forth in Crown Lease number 1081 was communicated by letter dated 18 March 2008 from the Department of Lands and Surveys to Valentine S. Grimes.

A copy of this second lease was not provided to BVI for review. According to the 18 March 2008 approval letter, RAV Bahamas Ltd. was to have provided a survey plan delineating the 5.03 acres to the Department of Lands and Surveys as well as a dock layout plan to the Port Department.

Approvals from the Minister of Transport and Aviation communicated by letter from the Port Department to RAV Bahamas Ltd., dated 23 February 2007, and signed by Port Controller Captain Anthony Allens were provided for BVI review; however, the specific activity or project feature being approved was not expressly identified. This letter did reference favorable consideration by the Docks Committee, as well as location of second marina, which by inference would appear to relate to the proposed marina layout plan. The letter advised contacting the Ministry of Works to obtain necessary permits. A similar letter dated 8 October 2003 was also provided to BVI that did not expressly

reference the Docks Committee, and also advised notifying the BEST Commission in addition to the Ministry of Works as to the commencement date.

BVI observed that two marinas had been constructed and were in operation during the site visit.

5.1.2.3 Buildings

BVI was provided a collection of detailed engineering drawings for review while at the project construction office, many with government agency stamps indicating their review and approval. These included the following:

- Water distribution and wastewater drawings stamped by the Water & Sewage Corporation Engineering and Planning section.
- Wastewater treatment facilities layout stamped by the District Council, Bimini Islands.
- Dock Plans stamped by the District Council, Bimini Islands.
- Entrance gate plans stamped by the Ministry of Public Works, Department of Health Services, Department of Physical Planning, and Minister of Works & Lands.
- Residence plans stamped by the Department of Environmental Health Services, and Department of Physical Planning.
- Plat 2004 – Dept. of Lands and Surveys.
- Drainage maps, paving plans, and curb plans stamped by the District Council, Bimini Islands.
- Plumbing and electrical drawings stamped by the District Council, Bimini Islands.

5.2 Environmental Impacts and Management

BVI reviewed the EIAs and studies provided by RAV Bahamas Ltd. to the BEST Commission, and attempted to compare their predicted impacts or characterization of losses to actual impacts and that could be observed or inferred from Phase 1A and B construction activities, as well as future planned Phase 2 development. BVI also took note of mitigation measures and environmental management plans and practices described in these environmental submittals and observed during the site visit to be implemented in ongoing Phase 1 activities and future Phase 2 development plans.

5.2.1 Impact Assessments

An initial EA of the Bimini Bay Resort and Residential Project dated December 1997 was prepared by environmental consultant Applied Technology and Management, Inc (ATM). This EA provided a summary of baseline environmental conditions based on

field assessments and studies conducted when the project was originally proposed and approved for the subject site during the 1980's, and some follow-up confirmation field surveys conducted by M.A. Roessler Associates in December 1992 and November 1997. It also provided a description of the project development plans at the time, and anticipated resulting impacts to ecological resources and human community on Bimini. Separate reports on demographic data, transportation, solid waste, geology, inlet and the Roessler biological assessment were provided as attachments to this EA.

An amendment to 1997 EA entitled "Bimini Bay Environmental Studies Program" was prepared by ATM in 2003. This amendment consisted of six individual studies requested and agreed to by the BEST Commission in early 2003. The six studies included provided the following:

- An assessment of the extent to which project construction activities had resulted in adverse impacts on mangroves in the Bimini lagoon.
- An assessment of coastal conditions focused on determining any project induced impacts from existing work.
- An assessment of project dredging impacts on fisheries in the Bimini lagoon.
- Hydrodynamic modeling to assess potential changes to water quality, flushing, and salinity of the Bimini lagoon from dredging activities and shoreline alterations.
- Description of new excavation practices, turbidity curtains design and anchoring techniques, and ongoing turbidity monitoring program.
- A supplemental EA for the new man-made island and marine commercial center features that were not addressed in the original 1997 EA.

A second EA amendment dated August 20, 2006 was produced by ATM to cover proposed changes to the 2004 Master Plan in shoreline geometry, excavation footprints and development densities. It focused on changes resulting from reconfiguration of the series of small man-made residential islands into one large man-made island at the northern end of the Phase 1 area, and provided updates to the previous hydrodynamic modeling study. No assessment of potential impacts from proposed changes in development plans in the Phase 2 area were included in this second amendment.

Characterizations of baseline conditions in the EA and subsequent amendments were based on research of previous studies and various field surveys where the methodologies were not always described or explained. A summary table of the surveys and studies documented in the project EA and amendments is included in Appendix D of this report. Unfortunately, criteria used to characterize impacts (e.g., extent, intensity, duration and frequency, risk, reversibility, etc.) were not formally incorporated into the EA and subsequent amendments. Direct and indirect impacts were described in general quantitative and qualitative terms, and cumulative impacts were not addressed at all. Available monitoring data was limited to a few years of turbidity and water quality

reports. Accordingly, determination of the extent to which impacts from completed and ongoing construction activities were accurately predicted or adequately assessed could only be based on BVI's review of these documents and "snap-shot in time" observations from the site visit.

Impacts occur as three basic types, impacts to the physical environment (abiotic; e.g., erosion and sedimentation), impacts to the natural environment (biotic; e.g., mangrove removal), or socioeconomic impacts (e.g., changes in land use).

5.2.2 Observed Phase 1 Impacts

The chief environmental concerns related to Phase 1 include the following impacts (reported in various documents and observed during the July 2008 site visit):

- Dredging of the navigation channel and marina basins produced sedimentation resulting in reduced cover by sea grasses, which further resulted in alteration of benthic habitats and communities dependent on sea grasses. Suspended sediment also increased turbidity and reduced microflora and microfauna productivity (abiotic impacts).
- Removal of mangroves and other vegetation resulted in habitat loss.
- Clearing, filling and grading of lands produced changes in physical environment that likely increased impervious surface, elevated soil temperatures, increased salinity, and decreased redox potential (abiotic impacts).
- Construction of the man-made island resulted in loss or conversion of habitat, and changes in hydrodynamic flushing, and increased impervious surface that will produce run-off to the sea (biotic and abiotic impacts).
- Construction of resident and transient housing and associated infrastructure (streets, utilities, waste management) generated changes to land use and aesthetics (socioeconomic impacts).
- Infrastructure improvements (e.g., potable water, transportation, and energy) produced both adverse and beneficial cumulative impacts (abiotic, biotic and socioeconomic impacts).
- Poor management of stormwater runoff likely caused reduced water quality from inflows of contaminants and nutrients (abiotic impacts).
- Use of pesticides and mechanical removal of invasive and non-native species likely produced adverse effects on water quality because of changed vegetative cover (abiotic and biotic impacts).

5.2.2.1 Terrestrial Impacts

Many areas of the Phase 1 project site were impacted by activities preceding the July 2008 site visit, as described above. In particular regard to terrestrial impacts, there has been a loss of wildlife habitat. Clearing for hotel construction has caused a significant loss of natural vegetation in the hotel vicinity. Presumably, hotel landscaping would replace some lost vegetation. However, the proximity of the hotel to frequent human activity would limit recovery of use by those wildlife species that require segregation from humans, while species tolerant of humans would colonize the newly created habitat. Nonetheless, since the portion of North Bimini that includes the hotel site has been urbanized, particularly south of the hotel site, this may not be a significant wildlife impact.

According to available information, the hotel site before development began was a mixture of disturbed or cultivated land, marshy area near the bay (Mosquito Point) and exposed coastal rock or coral (Paradise Point). Information on wildlife resources before construction began is generally anecdotal, but based on similar habitats elsewhere on Bimini, it is unlikely that the proposed hotel/casino site represented a unique wildlife resource before clearing began. The loss of mangrove in the area – estimated to be around 17.4 acres in the EA amendments - is important, but primarily for reasons of maintaining a stable shoreline, which could be provided by other means such as seawalls or re-established mangroves in selected areas. Earlier attempts to drain the marshy area, probably a tidal flat wetland, had already disturbed the area and resulted in a lowering of the water table, in an attempt to reduce the mosquito population.

Anticipated beneficial impacts from hotel construction and by extension the 91 lots to be constructed along the western coast, include removing stands of an invasive species (Australian pine or *Casuarina* sp.), preservation of coastal vegetation where feasible, and landscaping using native species to the extent possible

5.2.2.2 Marine and Fisheries Impacts

Permits issued for Phase 1 allowed destruction of mangrove and sea grass habitats by dredge-and-fill. The effects of mangrove destruction on the Bimini lagoonal ecosystem can be partly understood by considering the following components and linkages:

1. Intertidal Mangroves – Sunlight, water and nutrients are converted into plant biomass by mangroves (predominantly red mangrove, *Rhizophora mangle*) and attached forms of algae, with the latter being most important in places where sunlight reaches wet or immersed surfaces (mud, sand, mangrove roots).

2. Intertidal Prey – Small organisms (small fishes, shrimps, crabs, worms) consume mangrove and algal biomass that is either living or is in a partially decomposed state.

3. Tidal Interactions Between Predator and Prey – The outgoing tide forces some intertidal prey organisms to move from the tidal floodplain into deeper, subtidal waters within tidal creeks and at the fringe of the mangrove forest, where they are preyed upon by juvenile gray (mangrove) snappers (*Lutjanus griseus*), juvenile grunts (*Haemulon flavolineatum*, *H. sciurus*) and other fishes. Juvenile snappers and grunts, in turn, are vulnerable to larger predators (great barracuda, sharks, jacks) if they leave the protection of the red mangrove roots. Other species, such as the abundant yellowfin mojarra (*Gerres cinereus*), are less dependent on protective structure, and move back and forth among different types of shallow-water habitat (tidal floodplains, tidal creeks, sea grass beds, open sand bottom), and are preyed upon by larger predators such as juvenile lemon sharks (*Negaprion brevirostris*) in the process.

Subtidal mangrove roots that are exposed to drainage from intertidal mangroves are therefore essential habitat for juvenile gray snappers, grunts and similar species in the Bimini lagoonal complex. All adult gray snappers found on reefs, wrecks and other deeper-water habitats were at one time entirely dependent on shallow-water nursery habitats for their survival. Because Bimini is relatively isolated on the western Great Bahama Bank, destruction of this type of nursery habitat is likely to exert widespread influence on reef-fish communities in the area.

The sea grass beds destroyed or damaged by dredging during Phase 1 had nursery function similar to that of mangroves, in that sea grass beds provide refuge from predation and contribute to the foundation of the food web, largely though associated epiphytes and benthic algae growing on sea grass-stabilized sediment. Sea grasses (dominated by *Thalassia testudinum*) and the larger types of algae (*Laurencia*, *Polysiphonia*, *Halimeda*, *Penicillus*, *Rhipocephalus*, etc.) provide refuge from predation, whereas smaller algae (benthic and epiphytic microalgae) contribute substantially to the foundation of the local aquatic food web. Bonefish (*Albula* spp.) and queen conch (*Strombus gigus*) are dependent on healthy sea grass beds as juveniles and adults. In the absence of variation in harvesting and natural mortality, the time-averaged loss of productivity by these species can be expected to be proportionate to the loss of habitat caused by Phase 1.

Sea grasses, epiphytes, and benthic algae cannot completely recolonize dredged areas because total light attenuation has been increased by increasing the depth. Reduced light levels at depth inhibit or outright prevent the growth of these plants. Growth of sea grasses and larger benthic algae has also been diminished in the shallows along the perimeter of dredged locations, most likely due to disturbance during dredging and subsequent increased wave energy from boat wakes. Turbidity associated with dredging has increased light attenuation locally and in any areas where turbidity was not adequately contained. Sedimentation of suspended inorganic particles associated with dredging also has disrupted benthic habitats via burial of existing benthic communities and changes in the thickness of unconsolidated sediments.

The creation of a dredged channel leading to North Sound likely increased the encounter rate between large sharks and the juvenile lemon sharks that use North Sound and the Western Lagoon as nursery habitat. These interactions are not likely to be apparent during the day, as some larger sharks (notably tiger sharks, *Galeocerdo cuvier*) use nighttime high tides to invade shallows where they prey on smaller sharks. Workers at the Bimini Biological Research Station have documented use of North Sound by the smalltooth sawfish (*Pristis pectinata*), an endangered species.

5.2.2.3 Community Impacts

The Bimini Bay Resort development project has produced several positive socioeconomic impacts and beneficial contributions to the residents and community of North Bimini. New infrastructure improvements to North Bimini provided by RAV Bahamas Ltd. have enhanced the quality of life in this community. A listing of the social and community improvements that RAV Bahamas Ltd. has indicated a commitment to complete are contained within Section 4.1 of this report. These include supplying potable water to the entire island of North Bimini from the project's reverse osmosis water treatment plant, and construction of a 5 acre lighted community recreational complex in Bailey Town that is nearing completion. RAV Bahamas Ltd. has also purchased a firefighting truck capable of pumping salt water to provide firefighting capabilities to all of North Bimini; this truck has been delivered to the island. However, as of June 2008, it was awaiting customs clearance before being put into use.

Year-round employment opportunities are being made available to Bahamians and Biminites in the resort operations areas (residential, restaurant, reception, marina, commercial shops, and other hospitality services). Hospitality training and apprenticeship programs are being provided through the recognized Johnson & Wales curriculum.

The increase in road traffic resulting from additional visitors to North Bimini from the resort is being mitigated by restricting homeowners to using golf carts for transportation, and utilization of only those golf carts licensed by the Island administration. Local residents are currently allowed to enter the resort and have unrestricted access to the beaches and other areas north of the Phase 1A area.

RAV Bahamas Ltd. has also provided charitable donations of books, computers, musical instruments and college scholarships to local schools and pupils. It is also understood that paint was donated to 60 residences and businesses on North Bimini and that RAV Bahamas Ltd. sponsored the cleanup and removal of abandoned cars and a barge from the island.

5.2.2.4 Man-Made Island Reconfiguration Impacts

The major change between the 2004 master plan and the updated 2006 master plan in the Phase 1 area is the reconfiguration of the northern man-made island. The August 2006 EA amendment (2006 EA Update) generated by ATM states the 2004 Master Plan shows

three separate islands covering 80.7 acres, along with several marina basins with interconnecting waterways and a navigation channel running along the bayside of the proposed islands. In contrast, the 2006 master plan shows one large island covering 63.5 acres, along with one interior marina basin and no bayside navigation access. The 2006 Master Plan also includes provisions for 50 overwater bungalows of 2800 square feet apiece. Refer to Figure 5 for the 2006 EA Update's representation of the 2004 Master Plan man-made island configuration versus the 2006 Master Plan man-made island reconfiguration.

The reconfiguration of the island has effects on marina configuration, the amount and areas of dredging, flushing characteristics of the bay and water quality.

The 2004 master plan included three islands with a combined area of 80.7 acres while the updated plan had one large island of 63.5 acres and 50 overwater homes. Considering both the area of the island and the areas to be dredged as impacted land, the new plan has about 40 less impacted acres. Although the 2006 EA Update states that it is anticipated that the piles used for the overwater homes would be treated timber, no details were provided on construction methods or materials or on the associated impacts except that the homes would shade the sea bottom.

The reconfiguration of the island also changed the configurations of the marinas in the Phase 1 area. The total number of slips would be decreased by 50 from 559 to 509 during Phase 1. However, 50 slips would be added to later phases. In addition, the size of the largest yachts would be increased from 120 to 150 feet and the mega-yacht marina increased in size from 32 to 60 slips. No further information was provided on the potential effects of these changes.

The 2004 master plan anticipated the need to excavate about 2,500,000 cubic yards (cy) of material. It is estimated that about 1,450,000 cy have already been excavated and that an additional 3,600,000 cy will be excavated. This means the total amount of excavated material will be more than double the amount originally planned. The increased amount is the result of two changes; the depth of excavation is now 15 feet as opposed to 10 to 12 feet and the reconfiguration of the island has resulted in a larger basin. The additional excavation will produce increased turbidity over a longer period of time than previously expected. It appears that the modeling conducted to determine impacts of dredging was not updated to account for the changes proposed in the 2006 master plan. As previously noted herein, some sea grass beds have already been negatively affected by dredging. BMPs including silt curtains and monitoring will need to be implemented to minimize the negative effects of dredging.

Hydrodynamic and water quality modeling were conducted to determine the effects of the proposed project on circulation, flushing and water quality in Bimini Bay. The original modeling report was included in the document as Appendix A. Results of additional modeling to reflect the new master plan were included as Appendix B. This additional modeling simulated all of the hydrodynamic and water quality parameters considered in the analysis for the 2004 plan. The updated modeling included all changes proposed in

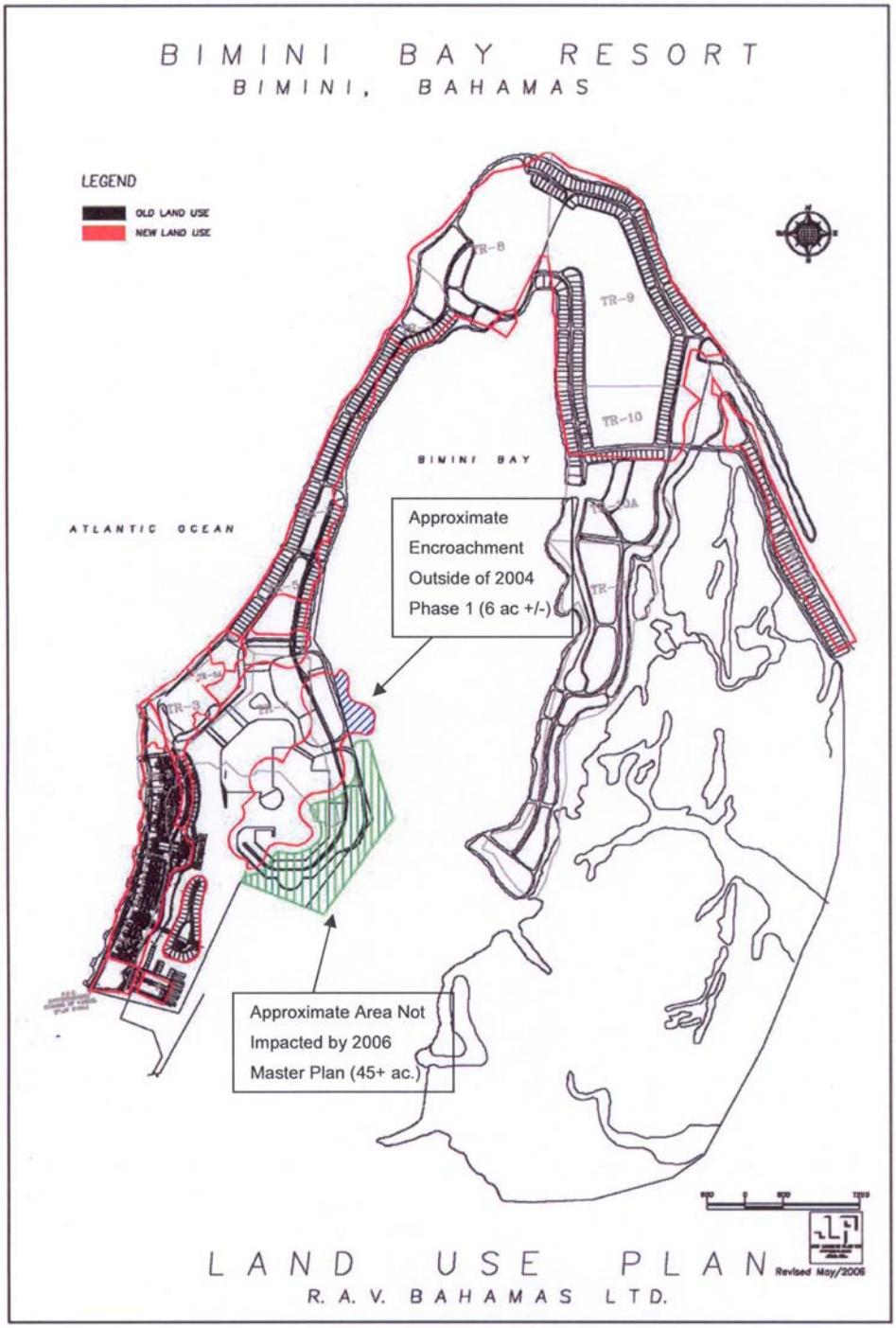


Figure 5
EA Update's Master Plan Comparison

the 2006 plan, which in addition to the reconfiguration of the island included changes to the planned Phase 2 areas including a smaller canal system in the northern portion of the bay, no infilling of mangroves in the East Wells area and no dredging in East Creek. As a result, the modeling results cumulatively incorporates all of these changes, and does not distinguish between the changes caused only by the island reconfiguration from the other changes to the Phase 2 plans.

To determine the effects of the proposed changes in the master plan, the post-construction conditions for the 2004 and 2006 plans were compared. Changes in expected impacts (2004 versus 2006 plans) are listed below:

- Velocities in some areas are further reduced over the 2004 plan. This appears to be primarily due to deeper dredged areas.
- Although temperatures generally increase with the project, it appears that changes in temperature from pre-project conditions are not as great in the 2006 plan as in the 2004 plan.
- DO concentrations tend to be somewhat less with the 2006 plan. Under both plans, there are areas where DO concentrations would increase over pre-project conditions. However, with the 2006 plan, there is a greater area where DO concentrations would decrease, although slightly, over pre-project conditions.
- Flushing characteristics of the bay are better under the updated plan.

Overall, it appears that reconfiguration of the northern man-made island would result in a somewhat better marine environmental conditions than that proposed in the 2004 master plan. The total bay area impacted by this feature would be reduced and flushing characteristics would be improved. However, not all changes would be positive. Proposed dredging is now about double the original plan although the increase is due to both a larger basin and deeper depths.

Alternatively, the three-island configuration will result in greater total bulkhead/revetment length, providing hardened shoreline that can serve as additional subtidal fish habitat within the dredged-and-filled area. The newly constructed bulkheads and floating docks in the marina are presently being used as fish habitat, as indicated by the snappers, grunts, damselfish, angelfish, etc., that can be readily observed there. This habitat use is a side effect of the development which by no means offsets the damage to natural habitats, and the assemblage of species that uses hardened shorelines, docks and pilings, because habitat is different from the assemblage that uses natural shorelines. Nevertheless, fishes and invertebrates in the North Sound that depend on hard structures such as mangrove prop roots for protection from predators are periodically flushed from these refuges by the falling tide as a result of the naturally shallow slope of most shoreline areas in North Sound. The presence of hardened structures in deeper, subtidal water is therefore an asset that has local contextual importance.

Finally, the nature and scale of impacts to and losses of existing marine habitat from the reconfigured man-made island cannot be accurately quantified. The 2006 EA Update only generally states that the majority of the impact linked to the man-made island's construction will be the loss of mangroves, sea grass and other bay bottom benthic communities, but does not provide any specific characterization of these resources, nor does it identify the locations or quantify the number or extent of these resources and habitats. Similarly, neither the 1997 EA nor the 2003 amendment provide any specific identification, characterization, location, quantification of specific resources and habitats in the vicinity of the subject island(s), other than to provide a general description of the habitat existing on Mosquito Point. Therefore, to quantify the potential impact of the reconfigured island, the location, type, and quality of marine communities expected to be impacted by both the 2004 or 2006 Master Plan must be determined. Once this study is completed, RAV Bahamas Ltd. will be able to conclusively state the net benefit or detriment of the man-made island's reconfiguration on the bay's ecology.

5.2.3 Phase 2 Impacts

Based on the master land use plan and design concept as of July 2008, Phase 2 development is anticipated to include the following key impacts:

- Grading and cut/fill for golf course development, including construction of clubhouse, maintenance facilities and stormwater management system will likely result in habitat conversion and habitat loss, changes to the physical environment, including soil and water quality changes, light level changes, aesthetic changes, and loss of recreational opportunities that are dependent on existing conditions; (abiotic, biotic and socioeconomic impacts).
- Dredging of extended navigational channel and landfill activities will cause alteration of benthic habitat, turbidity and water quality impacts.
- Removal of existing mangrove habitat for the golf course development, particularly in tidal creek areas will result in habitat loss, changes to physical environment, and changes to water quality from sedimentation, as well as reduction of hydrologic connectivity in intertidal lands (biotic and abiotic impacts).
- Uncontrolled runoff and erosion will produce adverse water quality and sedimentation impacts to the North Sound (abiotic impacts).
- Construction of a residential areas involving vegetation clearing and infrastructure improvements will likely result in habitat loss or conversion, as well as water quality impacts (biotic and abiotic impacts).
- Golf course operation, especially the use of fertilizers, herbicides or pesticides, will impact the water quality of surface waters, the freshwater lens and sources of irrigation water. Reuse water, brackish water or stormwater runoff could introduce nutrients and other contaminants that adversely impact water quality; (abiotic and biotic impacts).

- Installation and operation of lighting systems may produce nesting sea turtle impacts from lights at night during the nesting season (approximately May to October), as well as possibly attracting hatchling turtles who use moonlight to navigate to water, possibly increasing mortality; (biotic impacts).

5.2.4 Mitigation and Management Practices

The following is a summary of the mitigation measures and environmental management plans and practices observed to have been implemented during Phase 1 project development.

5.2.4.1 Phase 1 Mitigation Measures

Measures observed by BVI to have been implemented to mitigate potential impacts from construction of Phase 1 included the following:

- Reported use of turbidity curtains and earthen berm barrier to mitigate sedimentation and turbidity impacts from dredging activities.
- Installation of seawalls to provide coastal stabilization.
- Landscaping of developed areas with predominately native plants.

Additional mitigation actions and activities in the form of social and community improvements observed to have been implemented as of June 2008 include the following:

- Supplying potable water to all residents and businesses in North Bimini from the project's reverse osmosis water treatment plant.
- Purchase/provision of a fire fighting truck capable of pumping salt water (on island but awaiting customs clearance).
- Construction of 5 acre lighted recreational complex (nearing completion).

RAV Bahamas Ltd. issued a 5 March 2008 letter to interested parties in which it asserts that the project has brought economic benefits to the island of Bimini, including increased tourism and employment of 200 Bahamians. Specifically, RAV Bahamas Ltd. claims that it hosted 15 scheduled events in 2007 and played a large role in more than 2,300 tourists visiting the island over the 2007 Labor Day weekend, with approximately 1,500 of those 2,300 tourists staying at the Bimini Bay Resort and Marina.

In addition to and including the above, RAV Bahamas Ltd. indicated intentions to complete a variety of environmental and social mitigation activities. These activities include the following:

- Reducing the approved density of the overall project from 2,130 units to approximately 1,877 units.

- Constructing an additional wing of the Bimini clinic to allow more beds.
- Payment of the salary of a qualified full-time doctor who would provide service to residents of Bimini as well as to transient residents of the island.
- Payment of the salary of a qualified part-time Dentist who would visit the island twice a month in order to provide service to residents of Bimini as well as to transient residents of the island.
- Cooperate with the Government with respect to local school facilities to implement a more advanced learning educational program would be made possible by using computer science to expedite and improve the learning ability of the local children to the standard of the United States.
- Construction of a primary school on land in North Bimini to accommodate 250 children.
- Cooperate with the Government in the establishment of an adult vocational learning system in the hotel industries that would teach and train adults who are desirous of improving themselves.
- Undertake the construction of all infrastructure and construction of a multi-housing community together with a commercial site. The units would be sold to Bimini Bay Bahamian workers at affordable prices, with certain covenants and conditions that would be provided to full-time employees of the Bimini Bay Resort.
- Create with the Government a Joint Committee to evaluate forthcoming entrepreneur opportunities for Biminites.
- Provide water to the residents of North Bimini.

As noted above, most of the mitigation for permanent losses of resources and ongoing environmental impacts is provided in the form of socioeconomic/community benefits and environmental management practices. Mitigation for permanent losses can be provided "in kind" by establishing preserves where the same or similar species and habitats are created and spared from impacts or destruction from future development through conservation measures. In this regard, RAV Bahamas Ltd. has offered to transfer to the GOB the title to lands in and around Easter Key and East Creek (Tracts 10-A and 11 on Figure 5), which comprise approximately 153 acres of primarily mangroves and tidal flats that could potentially be incorporated into a preserve (such as the proposed Marine Protection Area discussed below in Section 5.4). BVI recommends a formal delineation of existing resources and the suitability for creating and expanding habitats in this 153 acre area should be undertaken. The results and findings of these investigations should be used to determine and confirm whether in-kind mitigation of impacts from Phase 1 as well as any future Phase 2 resort development could be reasonably achieved by the proposed exchange.

Furthermore, development and implementation of a comprehensive EMP to prevent, control, and minimize potentially environmentally detrimental construction and

operational activities will provide mitigation for Phase 1 impacts. The recommended content of this environmental plan is outlined in Subsection 6.2.1 of this report.

5.2.4.2 Environmental Management Plans and Practices

No evidence of written procedures for environmental management and monitoring of site construction activities were provided or apparent to BVI during this review. References to an EMP were noted in some correspondence, but it was confirmed by both RAV Bahamas Ltd and ATM that a written EMP had not been developed to date.

Based on inquiries and observations during the site visit, BVI determined the following:

- No written procedures for minimization of sediment discharge to the bay or ocean from stormwater runoff from on-land construction areas (including cleared areas, grading activities, construction sites, and areas awaiting final landscaping or paving) could be produced for inspection. No adverse impacts associated with management of stormwater runoff were readily apparent; however, no extended heavy precipitation event occurred during the site visit. Large areas barren of vegetation that presented opportunities for soil loss and erosion during a heavy rainstorm were observed. Some protective berms and lower areas that may tend to trap runoff water were noted; however, not all construction areas had obvious stormwater runoff prevention and management design features (such as soil berms, silt fencing or retention ponds) in place to minimize potential erosion and washout of soil to adjacent waterways.
- No written procedures for chemicals management (delivery, storage and use of supplies such as fuel, oils, paints, batteries, cleaning supplies, and related materials) to minimize any possible spillage or other losses to the ground or to waterways could be produced for inspection. Secondary containment was provided for some of the fuel supplies used at the site, and no evidence of actual spillage of chemicals or fuels, such as stained ground or distressed vegetation, was observed during the site visit. No outside storage of paints or other construction-related chemicals, nor unloading of bulk fuel was observed during the site visit.
- No written procedures for selection and use of fertilizers, herbicides, or other landscaping chemicals to minimize losses to the ocean and bay could be produced for inspection. Landscaping was in progress during the visit. Although no bulk usage of landscaping chemicals was observed, plans or procedures to avoid spillage or over-application of landscaping chemicals and careful selection of chemicals that are environmentally-appropriate for the area could not be confirmed.
- No written procedures for responsible management of solid wastes and debris, as well as removal of scrap and retired equipment/materials, could be produced for inspection. A significant accumulation of scrap and discarded materials was observed during the site visit, as well as a large

amount of scrap metal that had been loaded onto a barge that RAV Bahamas Ltd. explained was to be shipped to a recycler in Freeport, Grand Bahamas.

- No written procedures for the management of sanitary wastes and odours at the project wastewater treatment facility were available for inspection. Installation of wastewater treatment sludge drying beds had begun but had not been completed by the time of the site visit.
- No written procedures for the management of vehicle/equipment use, storage, fueling and maintenance were available for inspection.
- Other than turbidity monitoring reports, no records of ongoing environmental monitoring or inspections could be produced for review.

5.3 Coastal Stabilization

The following is a summary of BVI's evaluation of the sufficiency of project coastal stabilization features based on observations during the site visit and a review of design drawings, independent research, and industry experience.

5.3.1 Baseline Coastal Conditions

The project's interior (eastern and southern) shoreline borders Bimini lagoonal complex, which generally forms the central area of North Bimini. Water depths in the bay range between 0 and 20 feet, depending on time of tidal fluctuation and location. Tidal range averages 2.4 feet with spring tidal range of 2.9 feet and a mean tidal elevation of 1.3 feet. These are based on the tide gauge listed as North Bimini in NOAA Tidal Station records. General water depth in the bay is 18 inches to 4 feet, except navigation channels, which are approximately 15 feet deeper than the surrounding areas.

On the western and northern shore, beach materials generally consist of loose or compacted sands and decomposing limestone or loosely cemented sandstone. In places, larger rocks have been placed as a temporary revetment, but these are not formally considered coastal protection. Where beach is absent, the shoreline generally consists of eroded vertical limestone or soft sandstone outcroppings and tidal shoals that are occasionally exposed during low tide. Long-term beach and near-shore profile (transect) data collection was not available so erosion rates are unknown. Beaches viewed on the field trip appear narrow with a noticeable slope. Beach material sediment distribution is unknown but major constituents have generally been identified.

Wave action in Bimini lagoonal complex is reduced relative to the ocean-side coastline and generally was less than 1 foot during the July 2008 site visit, except for boat wakes in navigation channels. Wind may significantly affect water depths and local waves, creating a seiche that fully exposes portions of the bay. This appears to be more prevalent north-south than east-west, although wind direction generally is eastward. The eastern side of Bimini is primarily mangrove swamps, which are exposed or shoaling during low tides. Wave action along the western coast of North Bimini appears to be

more erosive than on the eastern portion of East Bimini, in large part because the western coast is sparsely vegetated. The western coast is mainly sandy beaches interrupted by rocky outcrops, while the eastern coast is predominantly mangroves, chiefly red mangrove.

Mangroves are the primary vegetation along both the ocean and bay sides of eastern North Bimini (Easter Key and East Wells). Mangrove swamps adequately prevent erosion of the shoreline without intervention.

Topography on North Bimini is at a very low elevation (on the order of 5 to10 feet above mean sea level), and the risk from tropical storm and hurricane flooding appears significant.

Significant tropical storm and hurricane impacts in the Bahamas have been documented historically. Bimini has been hit by at least 10 hurricanes in the last 100 years. Hurricane and tropical storm tracks between 1990 and 2007 within 150 miles of the western Bahamas are presented on Figure 6. Economic risk and damages include flooding generated by short-term high intensity precipitation, wind, wave action, and sea surge.

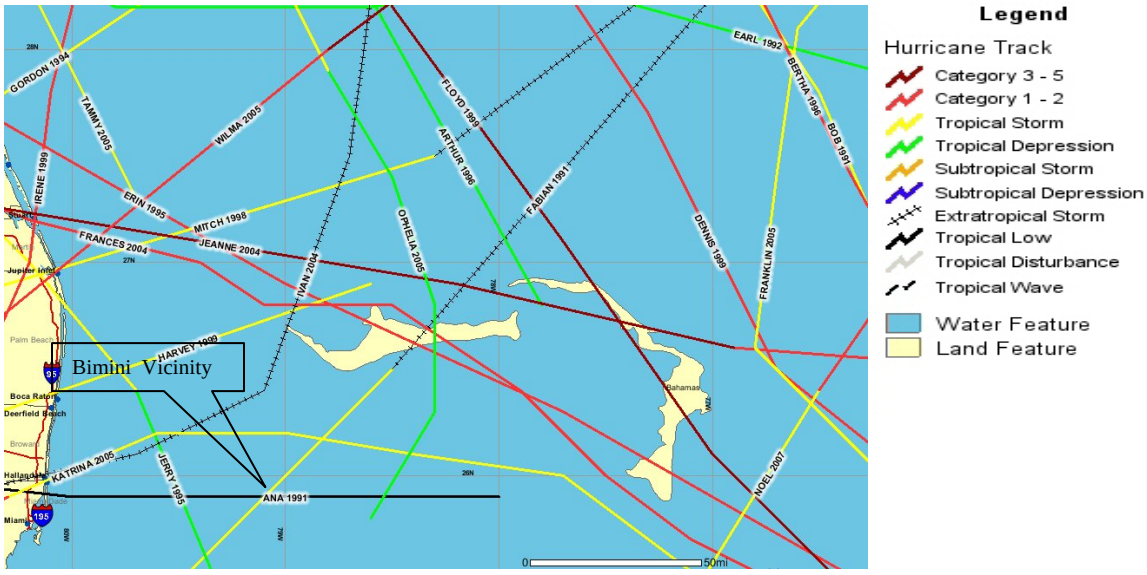


Figure 6
Hurricane and Tropical Storm Paths near the Bahamas (1990 - 2007)

5.3.2 Project Development Coastal Stabilization

Dredge material from the navigation channel and the two marina basins has been used to augment the Phase 1A development, and is being stockpiled for use in creating additional land on the hotel site, the 91 lots area, and the golf course. Dredge material consists of silty sands, sands, cap rock, oolitic and coralline limestone and moderately cemented sandstone. Man-made land is formed by dumping dredge material inside an encapsulated

area and compressing the soil to approximately 90 percent compaction. Once formed, man-made land appears to be impermeable and runoff may be increased. However, the formation of gullies and rills was not observed in portions of the site left exposed to weather for several years.

The project coastal stabilization approach seems to be largely confined to the construction of concrete walls reinforced with steel rods imbedded in bedrock at the edge of developed areas. All existing coastal protective structures have been integrated into bedrock by excavation of a trench and drilling for pilings followed by pouring of concrete walls. Deadman supports for the walls extend landward and are buried by approximately four feet of compacted backfill.

The selection of concrete seawalls for marina, residential, and coastal protection appears typical (refer to photos from the field trip below) and not inappropriate for the environment. Expectation of submergence from flooding, wave action, surge or possible harbor seiching is normal and materials selected will continue to function without damage if backfill remains intact and footings (described as rock trenches) remain sound.

If founded on rock, these seawalls should not be prone to foundation failure; however, long-term deterioration from exposure to salt, sunlight, waves, temporary submergence, impact damage (in the marina), and general weathering will occur.

It could not be determined to what extent (if any) wave climatology was included as a stabilization structure design input. Furthermore, no mitigation measures to minimize spread of suspended sediments and control turbidity, such as utilizing floating sediment curtains, were observed during construction and installation of coastal stabilization walls during the site visit.

The concrete retaining walls in use provide stabilization and are commonly used elsewhere where coastal protection is needed before “soft” engineering with vegetation is possible. However, the existing concrete in some places is already showing signs of wear

and rust from the reinforcing steel inside the wall crusting the concrete surface. This is particularly apparent near the general service marina and may be the result of boat collisions. Nonetheless, erosion of the man-made land and fill material on graded land has not been substantial and coastal protection is generally functional. Despite some lapses, sedimentation in the bay has not been widespread. Localized disturbance will be overcome in time by natural processes as vegetation recovers. Where feasible, consideration of other shore protection approaches that incorporate bioengineered and ecologically sustainable elements to help control turbidity and siltation, improve water quality, increase infiltration, and enhance the visual coastal environment would be beneficial to the Bimini Bay Project.

5.3.3 Considerations and Recommendations

- Land filling - Improved infiltration can be engineered into man-made land with better material placement and inclusion of granular material to act as connective channels for surface water infiltration. Dredged material placement that includes coralline limestone and moderately cemented sandstone can act as an in situ binding agent, decreasing porosity and diminishing infiltration; this is good for building construction but not supportive of surface vegetation. Final surface design of man-made land should therefore consider vegetation use and supportive infiltration groundwater and vadose zone storage. Consideration of vegetation to cover long-term storage of dredge material prior to final use should be incorporated into overall dredge material use plans.
- Alternative long-term use of dredge material for beach nourishment purposes (if compatible), or bay habitat creation, could be considered.
- Coastal stabilization construction practices should include floating sediment curtains to minimize the spread of suspended sediments and to control turbidity.
- Structural integrity and control of rust damage of reinforcing steel within the seawalls may be improved with epoxy type surface treatment. Other design elements that are important are at least a 3 inch cover of concrete over reinforcing steel members and epoxy coverage of all reinforcing steel cut ends.

Typical Design Specification for Marine Reinforcing Steel Protection
Reinforcing steel shall be ASTM A615 Gr. 60 epoxy coated. The repairing of damaged, cut, or abraded surfaces of the epoxy coating shall be done with the epoxy material of the same type used for the initial application, or other material recommended for this purpose by the manufacturer of the coating materials and approved by the owner. Repair coatings shall be applied in accordance with the manufacturer's printed instructions and directions. The coating shall be readily applied without thinning. If thinning is desired by the contractor, additional coats may be required to achieve the specified film thickness. Thinning shall not be performed without the prior approval of the Engineer.

5.4 National Wetlands Committee Policy and Subcommittee Site Visit Report

The Bahamas National Wetland Committee serves an advisory role to the BEST Commission on implementation of policies and programs to fulfill national obligations as a signatory part to the Ramsar Convention on Wetlands. Working together, the BEST Commission and the National Wetland Committee had developed the Bahamas National Wetlands Policy, which is posted on the BEST Commission Web site.

The Bahamas National Wetland Policy notes that coastal wetlands, including tidal creeks, sustain most forms of marine life that are important to the economy of the Bahamas and provide natural flood control and coastline protection by absorbing water, trapping sediment, and by stabilizing the shoreline (p. 2). While each development may bring benefits such as jobs or services, it also brings the potential for increased flood damage and loss of habitat for fisheries and wildlife if not done in an environmentally conscience way (p. 3). As wetlands are degraded or lost, they lose their natural capacity to absorb water, retain sediment and protect the shoreline, therefore increasing the threat of flooding. While wetlands will not prevent damage due to hurricane events, they do offer a natural means of defense and remediation (p. 4).

A subcommittee of the National Wetlands Committee, led by John Bowleg and consisting of representatives of the BEST Commission, Department of Marine Resources, Department of Environmental Health Services, Office of the Attorney General, Bahamas Reef Environment and Educational Foundation (BREEF), Nature Conservancy, and the Bahamas National Trust (BNT) made a visit to Bimini on July 31, 2007 and prepared a summary site visit report that was submitted to the Office of the Prime Minister. A copy of this report was provided to and reviewed by BVI.

The subcommittee report explained that the purpose of this visit was to (1) identify areas that should be considered "Protected Wetlands" and (2) investigate ongoing project activities that were reported by email messages to be affecting wetlands and mangroves.

According to the report, a meeting with local residents in Bailey Town, North Bimini was held, in which residents expressed the following concerns:

1. Lack of communication from central and local government regarding the status of approvals and future development plans of the Bimini Bay Project.
2. Lack of awareness and understanding of the land-space granted to the Bimini Bay Project and whether the development exceeds the size of the land-space needed.
3. Restricted entry onto the Bimini Bay Project site and access to beaches and Eastern Wells by local residents.
4. Social and economic impacts, both positive and adverse, to neighboring communities from Bimini Bay visitors, including the following:

- Access to and support of local businesses and restaurants.
- Traffic congestion from an increase in motor vehicles.
- Influx of foreign workers.

5. Destruction and permanent loss of mangroves from project development.

BVI inquired about these issues during interviews with the Island Administrator, RAV Bahamas Ltd., NGOs, and in random informal conversations with Bimini residents. Summary comments are provided below:

1&2. There was a universal agreement that lack of communication from the government has hindered any informed awareness or real understanding of the extent of the land granted to RAV Bahamas Ltd. for development of the Bimini Bay Project.

3. BVI did take note of project site security measures, which required visitors to obtain wrist bands from the Bimini Bay office before being allowed access to some residential, pool, and restaurant areas. BVI also observed unrestricted vehicle access being allowed to beaches and areas beyond the Phase 1 development.

4. In discussions with the Island Administrator, traffic was being managed by restricting off-resort transportation to a limited number of licensed golf carts, and that resort visitors were supporting local businesses and restaurants. The Administrator also opined that adequate and fair employment opportunities were being provided by the project to local residents.

5. Finally, there was a general, shared concern amongst the residents and Island Administrator over the potential permanent loss of mangroves from continued project development.

The subcommittee report also stated that subcommittee members toured the northern and northeastern coast of Bimini by boat to observe and record existing plant and animal species and to determine the function of these ecosystems.

The report concluded with several recommendations, including the following:

- Limiting the extent of development to just north of Paradise Point.
- Discontinuing all reclamation and dredging activities in the lagoon and mangrove areas.
- Discontinuing all dredging until a complete assessment is carried out and proper permits are approved.
- Revising the project land use plan to downsize the development to minimize adverse environmental impacts.

- Informing the Local Administrator of project developments in order for him to provide general information to local residents.
- Implementing a fully operational wetlands monitoring program.
- Having the developer produce a report documenting granted approvals.
- Sharing information on authorizations granted under HOA and permits with relevant groups.
- Having the GOB declare the boundaries of proposed Marine Protected Areas (MPAs), and having the Department of Marine Resources conduct public consultations on implementation plans for these MPAs.

An email message from Grant Johnson, proprietor of the Bimini Sands resort on South Bimini (and assumed competitor to the Bimini Bay Resort) was attached to this report, along with some information on mangroves downloaded from the Bimini Biological Field Station (University of Miami Shark Lab).

Without commenting specifically on the subcommittee report recommendations, BVI did attempt to determine to what extent efforts to establish the proposed MPA in North Bimini would affect or conflict with future project development plans and authorizations. Based on interviews of individuals involved in the MPA efforts, it was found that, in the late 1990s, several scientists had undertaken surveys to identify areas with a unique or sensitive diversity of habitat in the Bahamas, and recommended a list of 35 sites for consideration in establishing conservation preserves. Initial screening by the Ministry of Agriculture and Fisheries (now Marine Resources) produced a list of 13 candidate sites, from which five were selected and approved by the Cabinet for further consideration and establishment.

Public consultations through Town Meetings were conducted by the Department of Marine Resources and BREEF on Bimini to communicate and discuss the proposed boundaries and management of the MPA in North Bimini. During these consultations, Bimini residents raised concerns over plans to establish a “no take” MPA. As a result, plans were revised to restrict fishing within the MPA to “catch and release” only.

As of August 2008, the Ministry of Agriculture and Marine Resources had yet to formally submit the North Bimini MPA to Cabinet for official designation. Ultimately, a Parliamentary Decree must be issued to legally establish the MPA.

A map of the boundaries of the proposed North Bimini MPA is shown on Figure 7. These proposed boundaries overlap and encompass most of the Phase 2 (essentially all of Phase 2B) of the Bimini Bay Resort development area authorized under the HOA. Based on interviews with Department of Marine Resources, BNT, and BREEF staff, the boundaries of the proposed MPA were established without knowledge of the geographic

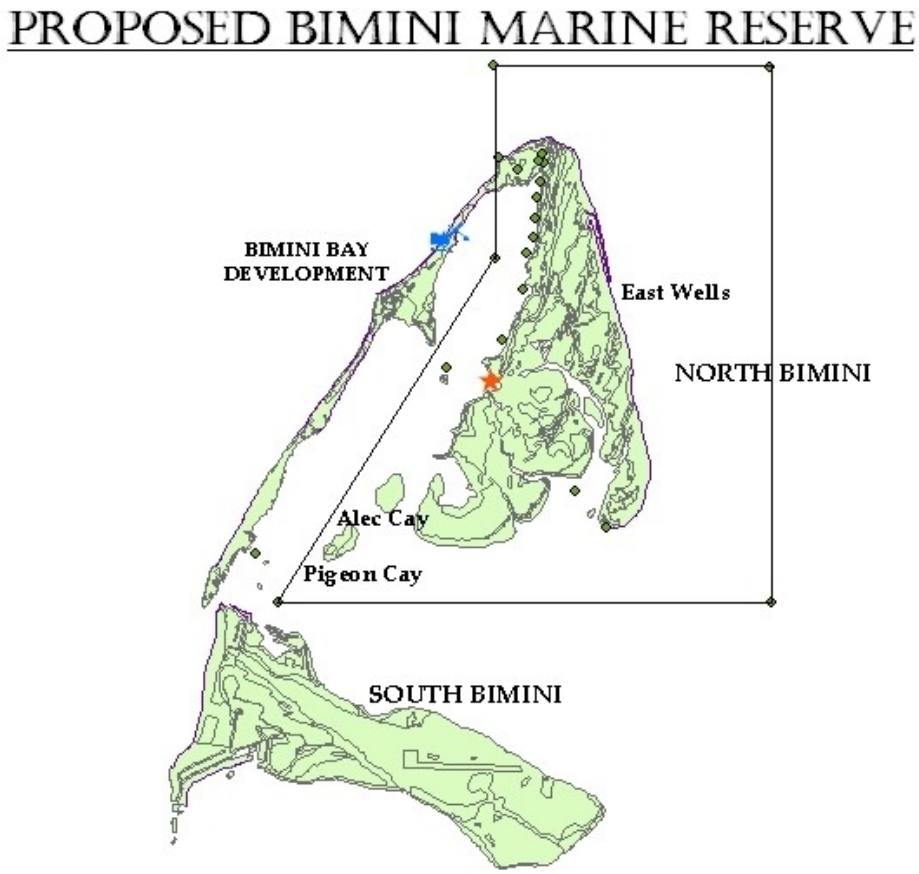


Figure 7
Boundaries of the Proposed North Bimini MPA

extent of development authorized for the Bimini Bay Resort. Furthermore, no ground-proofing field surveys were undertaken by these entities to determine and map the condition and extent of the existing sensitive ecological resources when establishing these boundaries.

5.5 Feasibility of Further Phase 2 Development

Concerns have been raised as to whether North Bimini island has the capacity to accommodate further resort development beyond the Bimini Bay Phase 1 boundaries. While RAV Bahamas Ltd. and the Government have executed an HOA for a 700 acre development (including a Phase 2 area on lands adjoining the northern and eastern shores of the North Sound), conditions of subsequent governmental approvals and correspondence (including the Town Planning Committee Approval in Principle) limit current development activities to within the designated Phase 1 area. However, authorization (subject to necessary permits) to begin excavation of the proposed channel and development of residential lots in the Phase 2A area (refer to Figure 3) was recently provided by an Office of Prime Minister letter dated 31 March 2008.

A particular feature of interest and debate is the golf course proposed to be located on the northern portion of North Bimini island. The 2004 HOA currently provides for "an eighteen-hole links-style golf course," which is a revision from the original 1997 HOA provision for "at least Nine (9) holes." The Bahamas Investment Authority has subsequently, by letter dated 24 September 2007, advised RAV Bahamas Ltd. that "Phase 1 approval included a nine (9) hole golf course" and that "there shall be no expansion of this component and the golf course will be limited to hard lands."

5.5.1 Assessing Island Capacity for Further Resort Development

Currently, none of the Phase 2 area has been disturbed by development activities, other than some limited survey work. The master land use plan from the 2004 revised HOA (Figure 2) indicates that planned Phase 2 development would include commercial, marina, utility, golf course, and residential land uses. The subsequent 2006 master land use plan (Figure 3) reflects a proposed scaling back of development to include these same land uses, but with less density and within a smaller footprint that precludes development within 153 acres situated between the eastern shore of North Sound and East Creek to be donated to the Government.

To evaluate the sustainable feasibility for further Phase 2 development, at a minimum, (1) the amount (size) of available land must be ascertained, (2) existing physical and ecological conditions of this land must be determined, (3) the proposed uses and development of the subject land, including all construction and operational activities, must be sufficiently defined, and (4) existing socioeconomic conditions as well as reasonable growth projections for Bimini must also be considered.

Insufficient information exists in the documents provided to BVI to provide an informed evaluation of the island's present and future capacity to accommodate the proposed resort development build-out.

The descriptions of physical and ecological conditions of North Bimini island provided in the 1997 EA and subsequent amendments are limited and dated. The resource assessment in the 1997 EA appears to rely heavily upon (and only offer observational confirmation of) documented findings of previous field studies, the most recent being in a 1983 report of field investigations on North Bimini conducted over 3 days in December 1982. Although ATM has advised BVI that a new EA amendment has been developed addressing the Phase 2A residential development, it has yet to be formally provided to BEST, and does not address the remaining Phase 2B development areas.

Definitions of Phase 2 development plans and activities are similarly limited. While cursory descriptions and maps of planned land uses were set forth in the 1997 EA, the density, layout and nature of these uses and activities have since changed several times. The latest proposed 2006 land use plan is only conceptual at this point. RAV Bahamas Ltd. advised BVI that while a layout of residential lots to be developed in the Phase 2A area is available for review, plans for development beyond this point were still fluid, and detailed descriptions and plans showing land uses, features, locations, elevations and infrastructure for Phase 2B areas have yet to be developed, and/or could not be provided to BVI for review.

The lack of available data on current ecological conditions and physical boundaries of North Bimini island, combined with the vague conceptual descriptions of Phase 2B development plans, must be enhanced and improved before any consideration of present and future socioeconomic impacts can be undertaken, and a reasonably measurable assessment of potential sustainability for further resort development can be provided.

5.5.2 Golf Course Footprint Fatal Flaw Assessment

In the absence of sufficient data to conduct the resort capacity assessment, BVI attempted to conduct a "fatal flaw" assessment to determine whether the existing physical and ecological conditions of the island offer sufficient space to support construction and operation of the primary feature of the Phase 2B development plans – an 18 hole golf course. In performing this fatal flaw assessment, BVI focused on the general region between foredune and the shoreline of the sound in the Phase 2B area that could potentially be developed as golf course in a sustainable manner, provided the appropriate design precautions and mitigation is incorporated to limit environmental impacts.

5.5.2.1 Suitability of Habitats and Sensitive Resources

Based on the habitat maps and descriptions in the EA and subsequent amendment reports by ATM, the most dominant habitat in the Phase 2B area designated for golf course development has been characterized as either "stunted" or "severely stunted" mangroves. The implication is that these areas are less healthy, less desirable for preservation than

what are called "healthy" mangroves in the ATM reports. The observed stunted condition likely occurs because of soil nutrient deficiencies and should not be mistaken as an indication of illness in the absence of a specific stressor (e.g., insect infestation). Nevertheless, these areas are suitable candidates for golf course tees, fairways and greens provided that sufficient buffers to adjacent mangroves and dune vegetation along the shoreline of the sound or ocean, as well as along the boundaries of adjacent "healthy" (primarily red) mangrove habitats, are incorporated into the overall course design. The buffer areas to adjacent shorelines and mangroves should be 50 feet wide at a minimum, with a 100 foot buffer width being recommended wherever feasible.

Mangroves and other vegetation in tidal creek and pond areas should be retained to the maximum extent possible, along with the above recommended buffer widths. Portions of tidal flow that generally are exposed during low tide and are shallower than 6 inches during high tide may be used for golf course construction. Locations immediately adjacent to these areas that retain more than 6 inches of water at any time should be avoided as well as preventing blockage of tidal flow into and out of these areas.

A tidal creek extending north through the mid-section of the so-called Tip (herein referred to as "North Creek") should be retained as well as the mangroves surrounding it, even if stunted. This creek serves as an important fish nursery and needs to retain its hydrologic connectivity with the sound as well as providing a tangle of mangrove roots to provide escape and nursery cover for fish and other aquatic organisms. A sufficiently wide buffer zone should be retained around this North Creek area, to be established based on an on-the-ground survey to determine the extent of tidal flow through the area, extending 100 feet back from the upper limit of high tide, if possible.

Additionally, the portion of the North Sound land area fronting the ocean should be retained in its present form as much as possible to allow dune vegetation to persist and stabilize the beach. The most important area is the foredune, the point immediately above the beach where Sea Oats (*Uniola paniculata*) and other vegetation can establish. The beach is a more dynamic environment, subject to wave action during low or high tides and storms, while the foredune is generally more stable and hospitable to vegetation. The existing beach should be retained and allowed to wax and wane naturally, perhaps as a golf course amenity for public access.

Easter Key and East Creek should be avoided altogether since these areas are unique natural resources that cannot be easily replaced. These areas should be considered the farthest eastward or southern extent of the golf course and a suitable vegetative buffer retained to prevent degradation of them. A minimum buffer width of 100 feet is recommended. Where tidal wetlands occur in these areas, they should be retained intact.

5.5.2.2 Estimated Footprint of Suitable Land for Development

BVI utilized GIS mapping from aerial photographs to estimate the acreage available for establishing a golf course within the Phase 2B area (Figure 3). BVI then digitized and incorporated habitat maps from the 1997 EA as well as findings from its own

observational field investigations conducted during the site visit to identify locations of sensitive environmental resources within this available Phase 2B golf course area, as well as to provide for avoidance of and protective buffers around these sensitive environmental resources. Since specific design and layout of the proposed golf course was not available, guidance from the US Environmental Protection Agency and best industry practices for construction and operation of golf courses were also considered in evaluating the available footprint for development of a golf course in this area.

A total of approximately 276.6 acres of land exists in the Phase 2B area that is available for golf course development. A map of this area is shown on Figure 8, which also outlines the most sensitive resources that should be avoided – namely the existing red mangroves, natural ponds with mangroves, and North Creek tidal floodplain area. Figure 8 also depicts buffer areas around these sensitive resources, along with 100 foot buffers around the North Sound and the ocean shoreline (which encompass sensitive foredune and sea oats habitats). Altogether, these sensitive features amount to approximately 142.67 to 164.13 acres, depending on whether a 50 foot or 100 foot buffer is provided around the red mangrove areas. Avoidance of these sensitive resources would leave 112.5 to 133.93 acres available for development of a golf course.

Whether this provides sufficient space to accommodate the desired 18 hole golf course will depend upon the type of course and design layout to be developed. Eighteen hole golf facilities in the United States average about 150 to 200 acres of land, according to the US Environmental Protection Agency by reference to the Golf Course Superintendents Association of America. A typical urban course is only 110 to 120 acres, while courses in resort areas may be 170 to 190 acres.

5.5.2.3 Layout Design and Mitigation Recommendations

Golf course layout and design should utilize existing vegetation and habitat features wherever appropriate and feasible. Existing wetlands in the golf course area, mainly at the upper limits of tidal flows, should be retained either as golf course hazards or as part of the rough. Eradication or control of invasive non-native species should be part of the golf course management. In particular, Australian pine should be considered for removal. The existing plant community identified as “whiteland” should be retained as much as possible. This area is notable for native hardwoods and other plant species and represents a significant habitat on Bimini. A unique soil chemistry and extreme soil nutrient deficiency in this area of old foredunes produces a significant and relatively rare ecosystem. Careful and selective removal of some shrubs or trees for golf course purposes may be possible. However, replacement of the sterile sand with turf may cause changes to the existing plant community. Linear ponds between the whiteland sand ridges should be investigated for unique species before disturbance. If any are present, the ponds should be avoided and existing conditions be retained to the extent possible.

Reducing impacts to mangroves in the golf course area may best be accomplished by retaining the highest quality mangroves, tidal ponds and creeks as rough areas, hazards or preserved areas. Other general impact reductions can be obtained by using a links-style

Figure 8
Phase 2B Area Available for Golf Course Development

course design (minimal bunkers, minimal fertilizer and pesticide use, and generally longer grass beside fairways) to minimize freshwater and fertilizer runoff into the sound, and by using a high-salinity tolerant turfgrass, such as paspalum mangrove establishment techniques should be considered to expand the mangroves into the sound – which would in essence extend the "buffer" into the water. However, because this would mean a conversion of the existing habitat, a thorough ecological assessment would be required in advance of any such work to determine what species or ecosystems would be affected and to what degree. Furthermore, mangrove establishment can require many years before reaching a successful conclusion, so appropriate performance standards should be developed as part of an adaptive management program including regular monitoring to ensure that the mangroves adequately provide the desired functions.

In summary, assuming an 18-hole golf course can be designed to fit into the 112.5 to 134 acre footprint given the constraints discussed above and shown on Figure 8, it appears that the Phase 2B area could potentially accommodate the proposed golf course feature. However, significant limitations to avoid environmental impacts will make course design a challenging and sensitive matter. For example, improper disposal of untreated stormwater or irrigation effluent into either the sound or the ocean would alter chemical, physical, and biological conditions, most likely resulting in degradation of important resources, such as mangroves and other vegetation, commercial fisheries and their food supply, water quality, visual appeal and economic uses of the land or water.

6.0 Findings and Recommendations

6.1 Findings and Determinations of Gaps

Based on the foregoing described assessment of the Bimini Bay Resort development from a review of documents, interviews of individuals, site observations and other research, BVI presents to the GOB findings and gap determinations regarding (1) the extent to which individual aspects of current Phase 1 project development were previously approved by the Government, (2) the extent to which these existing Phase 1 development activities were addressed in the EA and EMP reports and submittals, and (3) the extent to which environmental degradation has occurred beyond what was described in these environmental submittals.

A table of the evolution and approvals of key project features is included in Appendix B:

1. **Boundaries of Project Approvals**--It appears that all of the current project Phase 1 development features and improvements that either have been completed or are under construction are within the bounds of what was previously approved by the GOB in the 1997 and 2004 HOAs, as well as the Town Planning Committee land use Approvals in Principle of 5 August 1998, 17 January 2002 and 18 July 2003. Correspondence from the Department of Physical Planning indicates that Town Planning Committee expressly limited its land use approvals to only the Phase 1 areas on the 1997 and 2004 master development plans (refer to Figures 1 and 2).

   RAV Bahamas Ltd. has completed dredging of an entrance channel to the Bimini harbour entrance as well as two marinas at the resort. A majority of the residential housing in the Phase 1A area has been constructed or is nearing completion. A commercial village near the resort entrance has been constructed and shops are now being opened. The desalination plant, water storage tanks and wastewater treatment tanks were completed and in operation, and the sludge drying beds are under construction at the utility site. The site where the hotel and casino are planned has been cleared, and construction staging and employee housing are occupying a portion of Mosquito Point at the northern edge of the approved Phase 1 area. All of these features and activities were represented in master land use plans attached to the above described Government approvals.

   All of the construction and improvements undertaken to date appear to be within the approved Phase 1 development areas. No site clearing, dredging or construction activities, or disturbances appear to have begun in the areas designated as Phase 2 on the approved master development plans. This is demonstrated on Map 1 of Appendix A, where approved development plans are overlain onto a recent aerial photo of the project site. Accordingly, there do not appear to be any gaps between approved

Phase 1 master plan and land use and the extent of current construction and development activities on the project site.

Based on the documentation provided for review, there are some possible gaps in the coverage of construction activities under valid licenses and permits throughout Phase 1 development. Not all of the requisite permits and licenses issued by the various governmental agencies could be produced for BVI inspection. In particular, there were three periods of time, ranging from 18 to 25 months, in which excavation and landfill licenses could not be produced for review. The fact that neither RAV Bahamas Ltd. nor the Government has a central repository for records or copies of all licenses and approvals issued to the project presents significant challenges to both entities in confirming permit coverage and compliance and, therefore, presents a major procedural gap in this area.

With regard to future development plans, it is understood that RAV Bahamas Ltd. has acquired, through quiet title action, ownership of the approximately 700 acre property shown in its master development plans of 1997 and 2004 (refer to Figures 1 and 2). In 2006, RAV Bahamas Ltd. proposed to donate approximately 153 acres south of the proposed golf course and west of East Wells to the Government in exchange for 49.11 additional acres of reclaimed land in the Phase 1B area. It appears that in 2007, the National Economic Council agreed to the proposed exchange of land for the additional reclaimed lands to be sold at $10,000 per acre. BVI was not provided, and did not review, any deeds or other documentation of property ownership or land transfers or transactions, and therefore cannot confirm if there are any gaps in ownership and approved future development plans.

Finally, there is a major gap in public knowledge or access to documentation of the extent and boundaries of the planned project development and those areas and activities that have been granted Government approvals and authorizations to proceed. This gap has created confusion and appears to be the source of significant concern for local residents, NGOs, and even within central and local governmental agencies. This is evidenced by seemingly conflicting efforts to establish a Marine Protection Area in areas of North Bimini that have been undertaken by Government agencies and NGOs since the signing of the original HOA and 1998 Town Planning Committee land use Approval in Principle.

2. **Environmental Assessments and Management Plans**--Article XI of the 1997 HOA required submittal of an Environmental Impact Study prepared in accordance with applicable government guidelines. This condition was replaced in the 2004 amended HOA to further require that the Developer (RAV Bahamas Ltd.) submit environmental management plans prepared

in accordance with applicable government guidelines, provide additional environmental studies from time to time as deemed necessary as the project progresses, and appoint a representative to meet with the government to develop environmental procedures and programs to be implemented to allow the development to proceed as mutually agreed.

An EA prepared by ATM, dated December 1997, was submitted to the BEST Commission that described the project development as envisioned at that time, as well as baseline conditions of ecological resources existing within the project boundaries. Subsequent environmental studies were periodically provided to address specific aspects or changes in development plans as the project progressed. However, a written EMP was apparently never developed or submitted by RAV Bahamas Ltd. The absence of an EMP represents a significant gap in what was previously required for the subject project, as well as what is current industry practice in major resort development projects.

The extent to which existing Phase 1 development activities were adequately addressed and resulting impacts were reasonably predicted in the EA and subsequent amendments is not conclusive. The project EIAs and amendments performed to date do not provide sufficient baseline data or characterization of impacts according to any defined criteria to allow BVI to make an informed evaluation of the extent to which environmental degradation has occurred beyond what was described in these environmental submittals.

With regard to future Phase 2 development plans, due to the evolution of project land use plans and lack of current detail definition of design features to be developed, the current EA and supplements do not provide a sufficient basis upon which the BEST Commission can adequately assess the potential and likely degree of future environmental impacts. Similarly, the lack of recent baseline data and design details prevents BVI from making any informed finding or determination whether the island can reasonably accommodate all the planned Phase 2 improvements. No detail surveys of terrestrial and aquatic species in the Phase 2B proposed golf course and residential development areas have been undertaken for at least 10 years.

3. **Environmental Impacts and Degradation--**As previously mentioned, the project EIAs and amendments performed to date do not provide sufficient baseline data or characterization of impacts according to any defined criteria to allow BVI to make an informed evaluation of the extent to which environmental degradation has occurred beyond what was described in these environmental submittals.

The 1997 EA provided that "the mangrove community that will be directly impacted by the project consists primarily of stunted red mangroves that are less than 6 feet in height. Removal of these mangroves will eliminate 390 acres of the mangrove community adjacent to the North Sound" (p. 89). It further notes as a secondary affect "the removal of the stunted mangroves from the areas adjacent to the North Sound will have an adverse affect upon the fish population in this area" (p. 90). The 1997 EA predicted direct effects from construction and loss of mangroves on finfish and shellfish populations are expected to be minimal, but noted that indirect effects on Bimini fisheries are exceedingly difficult to predict. The 1997 EA did not address predicted direct or indirect impacts to sea grasses or other submerged aquatic vegetation and habitat.

Based on the habitat maps included in the 1997 EA, it can be concluded that most of the Phase 1A development has taken place in previously disturbed areas dominated by stands of invasive Australian pine trees. However, site clearing in the Phase 1B area appears to have resulted in the conversion of previously marshy lands and removal of mostly red mangroves and stunted species of red, black and white mangroves. The 2003 EA supplement estimated that over 17 acres of mangroves had been removed or filled by July 2003. Information on wildlife resources in the Phase 1 area before construction began is generally anecdotal, but it probably did not represent a unique wildlife resource before clearing began.

Historical reports of turbidity and sedimentation generated from dredging activities indicate that significant impacts to water quality and aquatic habitat have occurred in the North Sound. This was confirmed in the findings of the 2003 EA supplemental report that reported approximately 57 acres of Thalassia habitat had been significantly impacted without recovery, with an additional 480 acres observed as having what was described as minor impacts with recovery. Utilization of new turbidity curtains and ongoing turbidity and water quality monitoring since 2003 have likely served to reduce these impacts.

Based on the master development plan and described resort development features and activities, the GOB apparently had knowledge and awareness of the potential extent of loss and degradation of mangroves resources that would result from the authorizations it granted to RAV Bahamas Ltd. in the 1997 HOA and amended 2004 HOA. It is not as clear whether resulting impacts to water quality and aquatic habitat could have reasonably been expected from the documentation provided to the Government in seeking these land use and construction activity approvals.

6.2 Recommendations Going Forward

The following are BVI's recommendations for consideration in moving forward with Bimini Bay Resort project development:

1. As soon as possible, RAV Bahamas Ltd. should be required to develop a detailed EMP to include both construction-phase and operational-phase issues for all Phase 1 development activities. This EMP should be submitted to the BEST Commission for review, comments, and approval, and should continue to be a "living document" guiding environmental management practices throughout the operation of the resort.

2. RAV Bahamas Ltd. should be required to maintain and improve marine environment conditions during completion of Phase 1 construction activities, including installing an open bridge to the existing southernmost artificial island, utilizing siltation curtains during all dredging activities, and monitoring water quality, turbidity, and sea grasses.

3. RAV Bahamas Ltd. should be required to provide an analysis of the capacity of North Bimini to accommodate further Phase 2 sustainable development. In particular, if Phase 2 is intended to include a golf course feature, detailed field surveys should be undertaken to identify current baseline conditions, locations and extent of all sensitive resources and habitats in the proposed golf course area. The results of these field surveys should be provided to the BEST Commission, and sufficient avoidance and protection of the identified sensitive resources should be incorporated into the development of all golf course design plans and layouts.

4. RAV Bahamas Ltd. should be required to prepare and submit a comprehensive EIA report to the BEST Commission for review and approval before proceeding with any Phase 2 construction activities. Scoping consultations with the BEST Commission should be performed as soon as possible to establish the appropriate scope, content, and methodology of this EIA report.

5. As part of the Phase 2 EIA scoping process, the GOB and RAV Bahamas Ltd. should actively engage in a good faith dialogue to seek mutually acceptable compromises and compatible sustainable design solutions to competing project development, environmental preservation and land use objectives. At the conclusion of these discussions, the Government should advise RAV Bahamas Ltd. of its intentions regarding establishment of a Marine Protection Area in North Bimini.

6. A comprehensive EIA should be prepared in accordance with the guidance and direction provided in the scoping meeting and submitted to the BEST

Commission for review and approval. An EMP for Phase 2 construction and operational activities should also be submitted for review and approval after all EIA review questions and issues are resolved with the BEST Commission.

7. The final EIA incorporating all revisions from review comments and evolution of project designs should be posted on the BEST Commission's Web site and made available for public inspection at the offices of the Ministry of the Environment. Public comment should be solicited for a reasonable time period through email, written correspondence, and verbal statements at hearings. These comments should be considered and presented to the Cabinet along with the BEST Commission's recommendations regarding the acceptability of the impacts and authorization to proceed with Phase 2 development.

8. A central repository for all plans, permits, licenses, and approvals should be established at the central government Island Administrator's office, and copies of all these authorizations as well as applications, environmental studies, and monitoring records should be maintained at the resort for inspections by government staff.

9. A communications forum should be established on North Bimini for providing notice to local residents of the nature and extent of all project development plans, approvals and authorizations, as well as major construction activities or events at the project that may temporarily produce increased demands on island infrastructure or services.

10. Review and approval of Phase 2 construction plans should require that appropriate coastal stabilization features, including (at a minimum) design wave and site stormwater analysis, be incorporated before any approvals are issued.

More specific recommendations associated with the previous steps are provided in the following subsections.

6.2.1 Environmental Management Plans and Practices

RAV Bahamas Ltd. should develop, as soon as possible, a detailed EMP to include both construction-phase and operational-phase issues. The content of these EMPs should incorporate all applicable elements outlined in BEST Guidelines. A recommended outline of minimum contents is provided in Table 6-1. The EMP should be designed to demonstrate responsible environmental management to any internal or external reviewer including representatives of RAV Bahamas Ltd., the Bahamas Government, citizen groups, NGOs, investors and customers of Bimini Bay Resort.

Table 6-1
Bimini Bay Resort Environmental Management Plans
Recommended Contents

Construction Activities EMP

Identification of environmental operations
Environmental policies and strategies
Construction resource usage (including such items as water, fuel, and materials)
Planned mitigation measures

- Dredging turbidity protection
- Construction erosion and sediment control
- Beach/shore protection
- Management of Chemicals/fuels/vehicles

Pollution prevention/waste minimization
Waste handling
Response to potential accidents, malfunctions, spills
Emergency preparedness
Staff Responsibilities during construction (including contractors)
Training (including contractors)
Communication program
Inspections, audits, corrective action, and plan revisions

Operations/General EMP

Identification of environmental operations/environmental aspects of facility and project
Summary of applicable environmental regulatory bodies and standards
Environmental policies, goals and strategies
Resource usage (including such items as water, fuel, and materials)
Continuing land management

- Stormwater management
- Landscaping operations (including fertilizer and pesticide management)

Marina management
Pollution prevention/waste minimization
Waste handling
Response to potential accidents, malfunctions, spills
Emergency preparedness
Environmental monitoring program
Staffing and responsibilities
Training
Communication program
Inspections, audits, corrective action, and plan revisions
Community relations
Reporting – internal, public, and government

Resort areas and activity-specific management practices that should be considered during the development of these EMPs include the following:

Hotel/Casino

- Maintain stormwater runoff controls to control surface discharges to ocean or bay.
- Monitor water use and waste management for possible improvements.
- Develop and implement a recycling program for paper products, plastics and other materials as appropriate to reduce overall waste. Encourage participation by guests and employees through education and advocacy programs.
- Establish composting program for trimmed landscaping materials (grass, trimmed branches, leaves, etc.). Make compost available to Bahamians for personal use in gardens, etc.

Marinas

- Develop and implement a spill prevention and pollution cleanup plan.
- Obtain and maintain Blue Flag Marina status.
- Consider environmentally-friendly maintenance procedures to remove barnacles and other attached aquatic life from floating docks.
- Develop and implement management plan to reduce use by predators using the navigation channel to hunt in marinas (e.g., sharks and rays).
- Develop a sustainable dredging management plan with material re-use or beach nourishment if compatible.

Commercial Zone

- Develop and implement a recycling program for paper products, plastics and other materials as appropriate to reduce overall waste. Encourage participation by guests and employees through education and advocacy programs.
- Encourage use of non-disposable utensils and other items (e.g., washroom towels) to the extent possible to reduce overall waste.

Golf Course

- Develop and implement plan to monitor and reduce fertilizer, herbicide and pesticide use throughout the course.
- Continue to maintain stormwater systems to prevent uncontrolled discharges to ocean or bay.

- Encourage use of course for alternative uses (e.g., walking trails on cart paths at pre-arranged times when golf course use is reduced; scheduled bird-watching opportunities).

East Wells Residential Development

- Maintain stormwater runoff controls to control surface discharges to ocean or bay.
- Monitor beaches for use by sea turtles and mangroves for use by Bimini Boa.
- Establish marked walking trails in non-sensitive areas for public access. Fence off or otherwise block access to more sensitive areas.
- Develop and implement a recycling program for paper products, plastics and other materials as appropriate to reduce overall waste.
- Encourage participation by guests and employees through education and advocacy programs.

Construction Staging Areas

- Minimize the outdoor storage of solid wastes, construction debris and retired/discarded equipment, which would be beneficial in reducing possible stormwater runoff pollution and minimizing visual pollution (negative aesthetics).

6.2.2 Marine Environment

RAV Bahamas Ltd. should proceed with plans to install an open bridge to the existing artificial island to improve current patterns and flushing effects around the residential island and marina area. Siltation curtains should be deployed and turbidity monitoring conducted during all excavation/dredging activities, even when dredging behind earthen berms, in accordance with the governmental licenses and agreements. Monitoring of water quality, turbidity, and sea grasses should be continued through construction and for a sufficiently long period of resort operations to demonstrate that mitigation measures and island/lagoon design are achieving the results modeled and represented in the environmental studies and approvals. .

6.2.3 Golf Course Layout and Design

RAV Bahamas Ltd. should undertake an analysis of the capacity of North Bimini to accommodate further Phase 2 sustainable development by conducting new detailed field surveys of the existing physical and ecological conditions of the areas to be developed, including an on-the-ground survey to determine the extent of tidal flow through the North Creek area. Consideration should be given to inviting representatives of the Government and NGOs to observe and participate in these detailed field surveys. Once the existing

resources and habitats have been identified, characterized, and mapped, the suitability of these lands for further development should be undertaken based on the proposed uses and development of the subject land (including all construction and operational activities) and existing socioeconomic conditions as well as reasonable growth projections for Bimini.

In particular, the proposed development of a golf course in the Phase 2B area should involve consideration and incorporation of the findings of the detailed field surveys and land suitability determination into the proposed course design and layout.

Golf course layout and design should utilize existing vegetation and habitat features wherever appropriate and feasible. Existing wetlands, mainly at the upper limits of tidal flows, should be retained either as golf course hazards or as part of the rough. Reducing impacts to sensitive habitats in the golf course area should be accomplished by retaining the highest quality mangroves, tidal ponds, and creeks as rough areas, hazards, or preserved areas. Buffer areas to these mangroves, ponds and creeks, as well as adjacent shorelines, should be incorporated into the course layout, providing for a 50 foot wide buffer at a minimum, with a 100 foot buffer width being recommended. A minimum 100 foot buffer width is recommended for all shorelines and around the tidal extent of North Creek.

Other golf course impact reductions can be achieved by using a links-style course design (minimal bunkers, minimal fertilizer and pesticide use, and generally longer grass beside fairways) to minimize freshwater and fertilizer runoff into the sound, and by using a high-salinity tolerant turfgrass, such as paspalum. Mangrove establishment techniques should be considered to expand the mangroves into the sound. Eradication or control of invasive non-native species should also be part of the golf course management.

6.2.4 Marine Protection Area

Development designs for Phase 2 of the project should consider, and to the extent practicable accommodate, concerns regarding the potential loss of wetlands and mangrove habitats, as well as establishment of the proposed marine protection area (MPA). The tidal creek and associated tidal floodplain near North Point as well as areas in North Sound should be considered for inclusion in the MPA (refer to Figure 7 and the North Creek Map in Appendix A). The tidal creek near North Point was identified as having considerable subtidal prop-root structure that received tidal runoff from the mangrove-dominated floodplain, making it singularly important as gray (mangrove) snapper nursery habitat. Intensive use of this tidal creek by juvenile gray snappers was photographically documented during the site visit. Preservation of sensitive marine resources and sensible project development are not necessarily conflicting and mutually exclusive of each other. BVI encourages RAV Bahamas Ltd. and the GOB to actively engage in a good faith dialogue to seek mutually acceptable compromises and compatible sustainable design solutions to these competing project development, environmental preservation and land use objectives.

6.2.5 Environmental Impact Assessment

RAV Bahamas Ltd. should prepare and submit a comprehensive EIA to the BEST Commission for review and approval before proceeding with any Phase 2 construction activities. This comprehensive EIA should incorporate baseline conditions from the previous 1997 EA and subsequent amendments and updates of existing baseline ecological conditions for all Phase 2 project development areas; set forth a current description of planned project development construction and operation design and activities; assess potential impacts to Phase 2 areas from the described planned development activities; characterize these potential impacts in accordance with criteria pre-approved by the BEST Commission; and identify and address all available feasible mitigation, monitoring and management measures that can be implemented to reduce or avoid the identified potential adverse impacts. Refer to the following:

- In addition to the **baseline studies** recommended in BEST's General EIA Guidance, consideration of project-specific assessments and surveys should be made of the following:
  - Mangroves and wetlands in the proposed golf course areas to identify all the species, functions and hydrologic connectivity to North Sound and classify the wetlands in accordance with the criteria set forth in the National Wetlands Policy. Detailed mapping of species should be provided for use in golf course design optimization.
  - Natural tidal attenuation along the North Sound shoreline should be calculated to allow present hydrologic connectivity conditions to be used as a baseline for detecting future changes – particularly in the tidal floodplain associated with the tidal creek at the north end of North Sound. Hydrologic connectivity should be measured at varying lateral and landward distances from this tidal creek. All measurements should be made under representative tidal conditions. Water-level recorders should be used to monitor at least one complete tidal cycle to allow correction for tidal-phase differences among locations.
  - Stable isotopes that are naturally recorded within aquatic plants should be surveyed to determine chlorophyll levels and nutrient influences throughout the Bimini lagoonal complex. These chemical fingerprints could be used to produce a map of the relative influence of different nutrient sources (sewerage, fertilizer, and atmosphere) in different parts of the lagoonal complex. Future repetition of this mapping can be used to identify the cause of any increase in chlorophyll a concentration, should this occur.
  - Water quality monitoring of the freshwater lens to determine the preconstruction baseline quality and parameters.

- Performance of a cultural resources survey to identify the potential presence of archaeological resources and historical properties onsite that will be directly affected by the resort development.

- Transportation study to determine the existing traffic loads and capacity of North Bimini road system.

- The **project description** should include design information and alternatives considered, such as golf course site selection and layout design that minimizes earthmoving and filling, retains and incorporates existing landforms (e.g., dunes, mangroves, native plant stands), minimizes erosive steep slopes, utilizing more grassy hollows than sand bunkers to enhance stormwater drainage management, and selection of plant and grass species that allows use of less fertilizer and brackish water for irrigation and reduces maintenance costs and impacts. Additionally, description of coastal stabilization features should identify wave and still water elevation design values.

- **Analysis and characterization of impacts** should be based on defined measurable criteria (e.g., extent, intensity, duration and frequency, risk, reversibility, etc.). Direct and indirect impacts should be assessed, as well as cumulative impacts for long-term management and disposal of solid wastes in Bimini, as well as air quality and noise impacts from future power generation requirements for the project and Bimini.

- Consideration of the following **mitigation and management measures** should be addressed in the EIA:

  - Retaining mangroves with high hydrologic connectivity to North Sound, particularly near any tidal creeks (hydrologic connectivity can be calculated as the tidal range at any given point within the tidal floodplain divided by the tidal range in adjacent open waters).

  - Establishing buffer areas (recommend minimum of 100 feet) adjacent to mangroves and installing boardwalks or similar structures for access to/from boat slips outside of the mangrove shoreline areas.

  - Retaining selected stands of native plant species wherever possible (e.g., mangroves, freshwater or brackish wetlands, dunes and beaches, etc.).

  - Incorporating natural landforms and plant communities into the golf course design to minimize intensely managed areas, and maintaining existing dune/beach/mangrove ecosystems to the maximum feasible extent.

- Controlling use of fertilizers, herbicides, and pesticides on golf course areas.

- Recovery of stormwater and irrigation water on the golf course by a drainage system for treatment and reuse rather than allowing discharge to the ocean or the bay.

- Minimizing land clearing to active construction areas, and re-vegetating developed areas as quickly as possible.

- Applying water or other surfactants to cleared and construction areas for fugitive dust control as needed to maintain air quality and limit dust settling on adjacent water.

- Ensuring that effluent from concrete washing or other activities does not enter the ocean or bay.

- Establishing landscaping in completed areas as quickly as possible to stabilize soils and re-establish aesthetic appearance and, where feasible, including features attractive to wildlife, such as arbors with flowering vines.

- Developing long-term plans to use any dredge material (tested as clean and not polluted) as beach nourishment material when suitable locations with similar sediment characteristics are available and man-made island building is complete. Seek other alternative uses for dredge spoil where possible (habitat creation, for example).

- If lighting is used for evening play, consider using shielding light from the ocean or bay areas, particularly if turtles are known to be nesting anywhere near the course, and cordoning off beach nesting areas to prohibit public access until hatchlings leave the area.

- **Monitoring programs** should be proposed in this EIA, including consideration of the following:

  - Monitoring of marine habitat to track the presence of valued finfish and shellfish species and habitats such as sea grasses to serve as a metric of fisheries habitat and recovery/resiliency of the sea grass.

  - Monitoring chlorophyll throughout the Bimini lagoonal complex to determine if long-term nutrient enrichment is occurring as the result of Bimini Bay Resort development (i.e., nutrients from general landscaping and land/marina sewerage sources).

  - Monitoring of subsurface water quality to detect potential impacts to the freshwater lens from project development activities.

- Monitoring of terrestrial habitats for the presence of threatened, endangered, or protected species, and monitoring of mangroves to assess survival and impacts from project activities, and invasive species to ensure proper maintenance measures are being taken.

- Monitoring and inspection of the shoreline on an annual basis to document potential project-related changes and sufficiency of coastal protection features.

- Monitoring of traffic loads and transportation capacities to determine the adequacy of proposed island traffic mitigation measures.

Once submitted to the BEST Commission, the EIA should be made available for public review and comment. It is recommended that it be posted on the BEST Web site and its posting be advertised in the local newspaper or otherwise communicated to Bimini residents. The procedures for filing public comments, as well as the key steps of the EIA review and approval process, should also be clearly communicated to all Bimini residents, interested parties, and Bahamians.

6.2.6 Permits and Compliance Records

A central repository for all project development master plans, permits, licenses, and approvals should be established at the central government Island Administrator's office. This can be accomplished by mandating that all permit applications, approvals, and related correspondence be copied to the Island Administrator, who should be required to maintain these files and use them to advise residents and other interested Bahamians of the extent of plans and approvals when requested or as otherwise deemed appropriate. Similarly, RAV Bahamas Ltd. should maintain a complete set of records at the resort to demonstrate compliance with each governmental permit/approval requirement. This could include any files, notes, logs, photos, or other records associated with each requirement, action, communication, and decision, as applicable. The BEST Commission or other appropriate agency should periodically have staff visit this repository as well as the resort to audit and confirm that all necessary permits and approvals have been issued for the ongoing activities, as well as to determine that compliance with all of the conditions of these permits and approvals is being achieved and maintained.

6.2.7 Public Awareness

A communications forum should be established to provide notice to local Bimini residents of the nature and extent of all project approvals and authorizations issued by the GOB. Consideration should also be given to using this (or a similar) communications forum to provide notice of major construction activities or events at the project that may temporarily produce increased demands on island infrastructure or services (water supply, road traffic, boat traffic, beach access, etc.). The Island Administrator's office

could serve as the primary source for notice information through its retention of project master plans, permits, licenses, and approvals (previously recommended), and should make copies of these documents available for inspection by residents and the public upon request.

6.2.8 Coastal Stabilization

Coastal protection for future Phase 2 development should incorporate design wave and site stormwater analysis, including utilization of wave and sediment computer modeling to better understand coastal sediment movement and better define relationships between pocket beaches and open beaches. Reference to project wave and still water elevation design values and wave climatology should be provided, including local wave climatology; design wave characteristics (wave heights, periods, return frequency, and direction); basic meteorology (monthly average, low, high, and annual maximum and minimum temperature, barometric pressure, wind speed, wind direction, and precipitation); sources of fill and constituents, quantity, grain size distribution, and storage plans for any dredged materials; and specifications for reinforcing steel and concrete mix and placement for all marine installations.

Appendix A
Maps

Extent of Current Phase 1 Development

North Creek Map

Location of a tidal creek referred to as "North Creek" near the northern tip of North Bimini.

General extent of North Creek's tidal floodplain, as estimated from visual inspection of this satellite photo. Ground-truthing would be required to verify or improve this areal delimitation.

Appendix B
Bimini Bay Resort Development Features and Authorizations

Feature	1997 HOA	2004 HOA	2006 Proposed Revision	June 2008 Status	Permits
Hotel and Casino	No less than 200 rooms Approximate 10,000 sq. ft. American Style Casino	No less than 250 rooms Approximate 10,000 sq. ft. American Style Casino	410 room Conrad Hilton Hotel	Site preparation under way, but no structures are under construction. Agreement in place with Conrad Hilton. Seeking contract with recognized casino operator.	Town Planning Committee Approval in Principle of 5 August 1998 limited the number of hotel, condo and residential units in Phase 1 to no more than 2,000 rooms. Maximum height of hotel not to exceed 7 stories.
Navigation Channel and Marinas	Construction of a navigation channel from Bimini harbour entrance No less than 150 boat slips for rent and/or sale	Construction of a navigation channel from Bimini harbour entrance – approximately 1.5 miles long, 15 feet deep and 120 feet wide. No less than 150 slips for rent and/or sale Government to facilitate lease to Developer for submerged land for a period of 21 years with option to renew for three successive 21 year periods	Construction of a Channel and turning Basin as previously approved up to site 14 in the northern most end of Bimini Bay of the original Approved master Plan 559 Marina slips inclusive of the 140 existing slips Construction of a swing Bridge and turning basin to provide access to the Hotel warehousing and supply facilities.	Channel installation from harbor to project site Tract #4 completed. 240 to 250 boat slips installed	Town Planning Committee Approval in Principle of 5 August 1998 conditioned on termination of dredging in the ring channel at the top of Bimini Bay (Utility site #14), and all adjacent wooden docks to be constructed over mangroves. Licenses to Excavate or Landfill (valid for 12-months) issued by the Director of Physical Planning on 14 July 1999, 21 February 2002, 15 March 2005, and 21 February 2006.
Residential Lots	No less than 78 lots • Lots to contain 2 to 3 bedroom residences • Residences contain NLT 1,200 square feet No less than 75 condominiums • Condominiums to range from 1, 2, or 3 bedroom	No less than 70 lots • Lots to contain 2 to 3 bedroom residences • Residences contain NLT 1,200 square feet	• 50 Over Water Bungalows • 125 Time Share or Condo Units at Developers discretion • 250 Time Share Units on the Commercial Site • 358 Conduct Units placed on the Island across from the Contrad Hotel Site • 40 Bay Front on land Bungalows • 100 Space Site Condo Units • 91 Single Family Homes; Beach and Bay Front lots • 34 Estate Site Beach Homes located on *Track 12* • 100 Golf Course Condo Units and Homes • 329 units condo homes currently completed or under construction	76 single family residence parcels to be developed in Phase 1A 59 single family residences constructed, 7 additional parcels sold	Town Planning Committee Approval of 11 July 1998 limited the number of hotel, condo and residential units in Phase 1 to no more than 2,000 rooms. Subsequent 15 July 2003 Town Planning Committee Approval in Principle provided for 22 ocean, 32 island and 60 bayside lots zoned for single family residential use in Phase 1.
Golf Course	At least 9 holes	18 hole links style golf course	18 hole Golf Course	Planning for 18 hole course under way with Robert Trent Jones design team. No physical construction or site preparation has begun. (Phase 2 activity)	Town Planning Committee Approval in Principle of 5 August 1998 to construct a “Links Golf Course”

Feature	1997 HOA	2004 HOA	2006 Proposed Revision	June 2008 Status	Permits
Commercial Center	The Commercial Center is to include, but not be limited to: • Shops • Boutique • Deli • Mini Mart • Health Spa • Marine Shop • Liquor Store • Medical Center	The Commercial Center shall include, but not be limited to: • Shops • Boutique • Deli • Mini Mart • Health Spa • Marine Shop • Liquor Store • Medical Center First preference for operation shall be given to Bahamians on a leasehold basis in accordance with National Investment Policy.	Commercial Sites	Commercial village constructed and shops opening near resort entrance/ferry dock. So far includes: • Shops • Deli • Mini Mart/Marine Shop/Liquor Store	
Labour Employment	Phase 1 Construction: 300 employees Phase 1 Operation: 450 employees Developer to make every effort to fill all jobs with Bahamian citizens.	Phase 1 Construction: 100 employees Phase 1 Operation: 300 employees		Current construction workforce between 210 – 270. Current operational workforce 230 with July pool opening. 175-185 Bahamanians on current operations staff, of which 80 are from Bimini.	
Staff Housing	Housing for approximately 200 employees on site Bahamian developers will be encouraged to construct housing for approximately 650 employees in Bimini Islands.	Housing for approximately 200 employees on site, provided that should the Government desire, the Developer will work with relevant agencies with respect to the provision of alternative housing off-site. Bahamian developers will be encouraged to construct housing for approximately 650 employees in Bimini Islands.		Housing for approximately 240 construction and operation staff erected and inhabited. Still seeking property off-site for employee housing.	
Expenditures	NLT $100 Million for Phase 1			Invested over $110 million to date on Phase 1	
Water Supply	Acceptable sewage disposal Water supply and disposal Garbage systems	Acceptable sewage collection and treatment system Suitable and acceptable water supply system by the construction of a desalination plant. Provisions for supplying water for the residents of North Bimini.	Utility Sites	Reverse osmosis desalination water supply facility installed and operating. Original capacity of 250,000 gallons per day (gpd) has been expanded to 300,000 gpd. Facility is supplying potable water to residents of North Bimini.	Water and Sewerage Corporation, by letter dated 6 November2002, accepts the proposed date, price, and quantity for the supply of desalinated water to Bimini under a Build Own Operate (BOD) agreement.

Feature	1997 HOA	2004 HOA	2006 Proposed Revision	June 2008 Status	Permits
Structure Heights		No structure to exceed four stories in height above ground level.		No structure erected onsite exceeds four stories. One three-story housing complex.	Town Planning Committee Approval in Principle of 5 August 1998 limited buildings (except hotel) to maximum height of three stories
Transportation	Roads, waterways, pathways, and green ways to service the Resort	The Project is a designated "golf cart" community.		Car traffic is restricted, although locals are allowed to drive onsite to access beaches. Resort owners and workers use golf carts for transportation.	
Environmental Studies and Management	Developer is to submit an Environmental Impact Study	Developer to conduct additional environmental studies as deemed necessary by the Government. Developer to submit an EMP		Original 1997 environmental assessment amended by subsequent studies dated December 2003 and August 2006. No EMP developed or submitted to date.	
Social Contribution	Developer to create list of Bahamian suppliers of quality goods and materials Developer to utilize and promote the suppliers as well as incorporate and/or use local culture and artists in the continuing operations of the Resort, and without prejudice to the generality of the foregoing to: • Invite local professions in the design and construction phases of the resort • Utilize Bahamian art • Provide market place for straw works and local handicraft • Utilize Bahamian cuisine, local farm produce and marine products • Involve local entertainers and musicians • Make available to Bahamians opportunities for the operations of shops, water sports, recreational and entertainment within the Resorts • Make information available to Bahamian licensed Realtors • Utilize Bahamian owned transportation methods for transporting guests to and from locations on Bimini.	1997 HOA amended to add the following provisions: • Developer to pay for the construction of primary school to accommodate 250 children • Developer to donate a fire truck capable of fighting a fire in a four-story structure. • Developer to provide multi-disciplinary on-the-job technical skills training and apprenticeship programs.		Primary school construction has yet to commence. Fire truck on island, awaiting customs clearance. Technical training and apprenticeship programs provided through Johnson & Wales curriculum. Other community contributions include: • Construction of 5 acre lighted recreational complex under way • Books, computers, musical instruments and college scholarships donated to local schools & pupils • Junk cars and barge removal • Painting of 60 residences and business in North Bimini • Christmas toys and turkey donations to local residents	

Appendix C
Site Visit Photographs of Resort Development Conditions

Extent of Current Phase 1 Development

Construction Site

Photo 1
Staff residences (left) and construction office (right). Facing southwest.

Photo 2
Additional staff residence, facing east.

Photo 3

Staff residence, construction office and hotel staging warehouse viewed from the top of a large dredge mount. Facing southeast.

Photo 4

Large dredge mound on the hotel site.

Photo 5

View of hotel area and excavation equipment, north end of Phase I boundary, facing northeast.

Photo 6

View of incinerator area, north end of Phase I boundary, facing northwest.

Photo 7

Excavation area behind dredge wall. Note shallow elevation relative to water at high tide.

Photo 8

Another view of dredge wall, during low tide.

Photo 9

Roll-on roll-off dock.

Coastal Stabilization

Photo 10

East seawall of north of marina.

Photo 11

Closer view of east seawall in marina.

Photo 12

View of uncompleted seawall near causeway to island (facing east).

Photo 13

View of shoreline and causeway leading to the made island on the left (facing south).

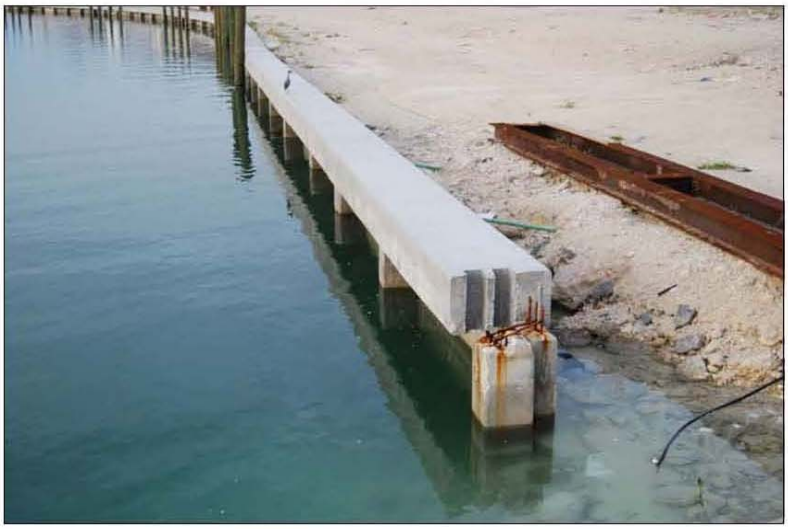


Photo 14

Closer view of seawall at made island.

Photo 15

Seawall under construction south of made island causeway. Facing south.

Photo 16

View of made island seawall, facing west.

Photo 17

Southeast portion of made island approaching marina.

Photo 18

View of western side of Bimini Bay Resort from ocean, facing east.

Photo 19

View of western coast without seawall, facing east.

Photo 20

Old seawall under construction, now abandoned.

Photo 21

View of beach with seawall and rocky outcropings, facing east.

Photo 22

Closer view of rocky beach area.

Phase 2 Area

Photo 23

Typical view of 91 lots area, ocean on right, facing south.

Photo 24

View of 91 lots coast from ocean, facing east. Hotel site is white area on the right.

Photo 25

View of upper beach area on golf course site. Facing northwest.

Photo 26

Vegetated dunes at the golf course site. Facing northeast.

Photo 27

Typical view of vegetation on the golf course site. Facing south.

Photo 28

White mangrove at golf course site.

Photo 29

Sea oats on dunes at golf course site.

Photo 30

Australian pine
(Casuarina equisetifolia)

Photo 31

View of North Creek during end of ebb tide, looking downstream. Shallow (<0.3 m) sand bottom is at lower right, submerged aquatic vegetation is at lower left, and deeper channel (>1 m) is near red mangrove (*Rhizophora mangle*) prop roots to the upper left (E. Peebles photo).

Photo 32

North Creek shoreline. Aquatic animals in the intertidal zone are forced into the creek channel by falling tides – note the exposed mud shoreline and intertidal prop roots (E. Peebles photo).

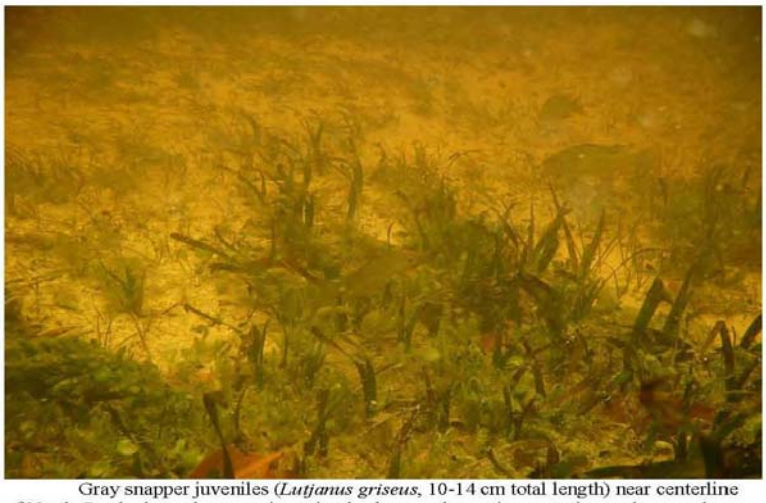
Photo 33

Gray snapper juveniles (*Lutjanus griseus*, 10-18 cm total length) at edge of North Creek channel near low tide, congregating in relatively deep water under overhanging red mangroves (E. Peebles photo).

Photo 34

Gray snapper juveiles (*Lutjanus griseus*, 10-18 cm total length) at edge of North Creek channel near low tide, congregating among subtidal red mangrove prop roots. Young gray snappers within prop roots were observed feeding on intertidal organisms washed into the channel by the falling tide (E. Peebles photo).

Photo 35



Gray snapper juveniles (*Lutjanus griseus*, 10-14 cm total length) near centerline of North Creek channel, occupying mixed submerged aquatic vegetation and macroalgae (E. Peebles photo).

Infrastructure

Photo 36

View of salt-water capable fire truck, parked on resort property and available to the Island.

Photo 37

Rear view of fire truck showing pumping apparatus.

Photo 38

Reverse osmosis plant.

Photo 39

View of wastewater treatment tanks at utility plant.

Photo 40

Unfinished sludge drying beds at sewage treatment plant.

Photo 41

Ball field constructed by Bimini Bay Resort for island residents.

Appendix D
Inventory of Bimini Bay Field Studies and Assessments

Inventory of Bimini Bay Field Studies and Assessments			
Subject	**Field Survey**	**Study**	**Details**
Aquatic/Coastal			
Fisheries	X		Information gathered from the Department of Fisheries of the Bahamas Ministry of Agriculture and Fisheries and presented data reported as landings for commercial purposes for the period of 1987 -1996. June 18-20 and July 22-25, 2003 field studies conducted to assess Impacts of Dredging on the Fisheries of the Bimini Lagoon. Study performed by snorkeling transects through most areas of the bay and reviewed impacts of dredging on fisheries habitat.
Game Fish - Bone Fish			No study or survey completed to date. Lack of information prevented the 1997 EA from predicting the potential future impacts on the Bone Fish from the proposed project.
Deepwater Navigation Access	X		1960s study by Harrison, Byrne, Boon and Moncure. Detailed study of the existing navigation channel between North and South Bimini. ATM conducted field observations during the development of the 1997 EA and did not note significant changes from the 1960s study.
Mangroves	X		June 21-22, 2003 field studies conducted to determine and document the extent to which construction activities associated with the Bimini Bay development resulted in adverse impacts to mangroves. Concluded that mangroves that were directly impacted were within the approved Phase 1 and that impacts to mangroves outside the Phase 1 area appeared minimal.
Coastal Conditions	X		Assessment focused on determining any project-induced impacts on coastal conditions from existing work. A network of survey monuments along the shoreline for future use in monitoring changes.

Inventory of Bimini Bay Field Studies and Assessments			
Subject	**Field Survey**	**Study**	**Details**
Water Quality	X		July 12 -29, 2003 continuous gages installed to record water level, temperature, DO, salinity, and currents at several locations throughout Bimini Bay. Discrete water quality and sediment samples were also taken. In 2006, ATM developed a hydrodynamic, sediment transport and water quality model with a specific focus on the immediate vicinity of the areas affected by Phase 1 and evaluated baywide impacts associated with future development alternatives.
Marine Habitat	X		June 18-20 and July 22-25, 2003 field studies aid in determination of impacts of the man-made island and peninsula on marine environment/sea grass. Study consisted of snorkeling transects through most areas of the Bay.
Current Patterns and Sediment Transport	X		Investigations of Local Current Patters and Potential Island Effects on Sediment Transport. Included: (1) WQMAP Modeling – simulation of hydrodynamic and water quality conditions observed in Bimini Bay, and (2) in July 2003 the deployment of continuous monitoring stations (for 1 month) collecting water chemistry samples and sediment quality samples.
General Ecological Review	X		1983 - Cursory investigation of the project property completed by Tropical Bio-Industries, Inc. October 1997 - Follow-up assessment completed by M. Roessler and G. Braun.
Terrestrial			
Threatened and Endangered Species			No study or survey completed to date. The follow-up assessment conducted in October 1997 states that no endangered animals were observed; however, it is probably that the site has resident populations of *Specotyto cuniculeria (*the burrowing owl) and the *Epicrates* spp. (Bimini boa constrictor). No indication of additional studies to confirm the endangered species presence or absence from the site.

Inventory of Bimini Bay Field Studies and Assessments			
Subject	**Field Survey**	**Study**	**Details**
Upland Habitat	X		October 13-16, 1997 survey conducted to identify upland vegetation Involved visiting North Bimini, the aquatic, and wetland and upland areas around the airport on South Bimini. Study investigated the mangrove, whiteland, sand scrub, Uniola strand, and coastal rock on North Bimini and mangrove, blackland and developed areas on South Bimini.
Hydrology	X		In 2003, the existing hydrodynamic and water quality models developed during the original impacts assessment were updated to reflect the proposed changes
Historical and Archaeological			No study or survey completed to date.
Socioeconomic			
Traffic	X		1980s Roadway Transportation System Study for Bimini Bay. Actual date of study is not clear. August 2006 Bimini Bay Environmental Update by ATM states that a transportation study was not performed to adequately assess the impact of Phase 1 infrastructure changes on pedestrian and vehicular access.
Demographic	X		Demographic and Social Characteristics data gathered from 1990 Census.
Air Quality			No study or survey completed to date.
Water Resources			No study or survey completed to date.
Utilities			
Wastewater			No study or survey completed to date.
Solid Waste	X		April 10, 1986 Preliminary Solid Waste Study for Bimini Bay
Irrigation			No study or survey completed to date.
Hazardous Materials			No study or survey completed to date.
Soil and Dredged Material	X		1985 Soil investigation of Bimini Bay June 2003 Boring of in situ dredged materials was conducted to aid in determining the acceptability of dredged materials for use in land reclamation.
(a) 1997 EA largely relies on studies, assessments and the results of planning efforts that were conducted for the project when originally proposed and approved for the subject site during the 1980s.			