

Glossary of Geological Terms

Carbonate Rock Types:

The pure carbonate rocks are composed of varying admixtures of particles and matrix. Local production of carbonate particles eliminates effective use of grain size and sorting as significant factors as defining features in the vast majority of cases. Therefore, the classification, organization and emphasis of rock types are based dominantly upon the relative abundance of particles and their packing. (Dunham, R. J. 1960), as follows:

- Mudstone** - Mud supported, with less than 10% particles
- Wackestone** - Mud supported, with more than 10% particles
- Packstone** - Particles supported, with more than 10% mud
- Grainstone** - Particles supported, with less than 10% mud

Ooids - A spherical or subspherical rock particle, which has grown by accretion around a nucleus. The nucleus may be inorganic (e.g. sand grain). Their formation depends upon the nuclei being constantly agitated, so that the calcareous material is uniformly deposited. (oolitic)

Peloids - Are large *ooids*, about the size of a garden pea (3-6 mm in diameter). Algae commonly play a significant role in their formation (pelitic).

Bioturbated - Is the reworking of sediments through the various burrowing, boring, and sediment ingesting activities of organisms. *Borers* such as algae, mollusks, and echinoids are capable of penetrating hard surfaces. *Burrowers* such as shrimp, anemones and polychaete worms are capable of excavating unconsolidated particles and *Browsers*, such as sea cucumbers and gastropods ingest sediment in a nonselective manner and extract nutrients from the substrate.

Benthonic - Those animals that live on the sediments on the sea floor, including both mobile and non-mobile forms. The free living (mobile) forms move to their food, whereas the sessile (non-mobile) forms, which may or may not be fixed, wait for their food to come to them. The characteristic of the second group is radial symmetry and complex food gathering organs e.g. Echinodermata: Crinoids (generally fixed), Sea Urchins, Sea Cucumbers, Star Fish, and Brittle Stars.

Facies - The sum total of features of a given environment, which are characteristic of that environment, such as rock type, fossil assemblages and fauna. Facies, which are particularly characterized by their rock type, are referred to as *lithofacies*, whereas those especially characterized by their fauna are called *biofacies*.

Xerophytes - Are plants that structurally adapted for life and growth with a limited water supply. These plants have developed mechanisms that limit transpiration, or provide for the storage of water.

Hydric - Soil that is wet enough to periodically produce anaerobic conditions, thereby influencing the growth of plants.

Hydrophytic - Any plant growing in water or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content.

Karst topography is a three-dimensional landscape shaped by the dissolution of a soluble layer or layers of bedrock, usually carbonate rock such as limestone or dolomite.

Epikarst – the upper surface of karst, consisting of a network of intersecting fissures and cavities that collect and transport surface water and nutrients.

Source KES 2007

Table 4-1 Facies Composition and Distribution in the Bahama Banks

Litho-facies	Habitat	Characteristics	Community (Biofacies)
Coralgal	Reef (outer reef of shelf margin)	High diversity community including about 30 coral species: coral frames bound by coralline algae. Niches in frame colonized by mollusks, echinoids, foraminereans, hydrocorallines, annelids, alcyonariains and fish. Spur and groove development. Optimum growth conditions extend from 1 m to 50 m depth. Comprises the windward reefs in the Bahamas.	<i>Aeropora palmata</i>
	Rock pavement	Occurs in back-reef areas, local patch reefs attached to rock bottom covered by blanket of ephemeral lime-sand. Corals (eg <i>Montastrea</i> and <i>Diploria</i>) with gorgonaceans and plexaurid sea-whips. Biota dominated by strongly cemented and encrusting species.	Plexaurid
	Inshore rocky shoreline	Areally restricted and strongly zoned. Dominated by cemented or closely attached biota and includes green algae, coralline algae, sponges barnacles, chitons, gastopods, bivalves, and echinoids. Rather variable depending on tidal range and degree of exposure.	Littorina
	Rock ledges and prominences	Subtidal rock ledges along exposed shorelines. Transitional with Plexaurid community. Many mollusks from the reef and rocky shoreline are found here. Corals include rock pavement species plus the hydrozoan <i>Millepora</i> . Mostly attached and encrusting species.	<i>Millepora</i> .
	Subtidal unstable sand	Found on the outer Bank margin and immediate back reef area. Lime sand only partially stabilized by marine grasses. Bottom is rippled and there is much sediment movement, providing a high stress habitat. The conch <i>Strombus</i> , burrowing bivalves and sand-dollars are the typical fauna	<i>Strombus samba</i>
Oolite and Grape-stone	Vegetation-stabilized sand	Is the most widespread habitat with the most diverse biota. The community develops in the sheltered waters of the back-reef and open lagoonal areas adjacent to the Bank edge. There is about 89% of non-skeletal sand grains in the oolitic facies and about 83% in the grapestone facies. These grains are composed of fecal pellets, mud aggregates, grapestone, and ooids. Green and red algae are common, mollusks are abundant (especially burrowers). Stabilization is either by algae or grass.	<i>Strombus costatus</i>
Oolite	Intertidal, bank-edge unstable oolite	Contemporary oolite is forming and the facies contains about 90% of ooids. These sand shoals provide extremely mobile and grass-free habitats that are localized to actively growing intertidal oolite bars. Almost devoid of biota apart from active burrowing clam <i>Tivela</i> .	<i>Tivela abaconis</i>
Mud and Pellet Mud	Muddy-sand with normal to hyper-salinities	Located away from the shelf edge and transitional to the muddy shorelines and tidal flats. It is transitional between <i>S. costatus</i> and a euryhaline mangrove association. Members of the biota include green algae, grasses, the bryzoan <i>Schizoporella</i> , a coral (<i>Manicina</i>) , a few echinoids, mollusks. and <i>Didemnum</i> , a tunicate.	<i>Didemnum</i>
	Subtidal variable salinity, muddy bottom	Occurs nearshore with a low-diversity salinity-tolerant biota, in areas receiving rain water runoff. The mollusk <i>Ceritidea</i> and <i>Pseudocyrena</i> are present with the non-calcareous alga <i>Batophora</i> , and miliolid and peneroplid foraminiferans.	<i>Ceritidea costata</i>
	Intertidal and supratidal mangrove association	Muddy intertidal shorelines and supratidal flat are colonized by red and black mangrove (<i>Rhizophora mangle</i> and <i>Avicenna nitida</i>). Sheltered marshes, mud flats and lagoonal shores support this community. The sediments are stromatolitic and rich in grazing gastropods, <i>Fasciolaria</i> and <i>Batillaria</i> .	<i>Fasciolaria - Batillaria</i> .

Source: Sedimentary Environments and Facies. (Reading., 1979)

Table 4-2 Bahamas Hurricane and Tropical Storm Frequency 1871 - 1987

Location	May	June	July	Aug	Sept	Oct	Nov	Totals
Bahamas	1/1	0/3	2/3	5/14	25/19	12/15	5/10	50/65
Grand Bahama	1/0	0/0	2/0	0/4	5/3	8/7	2/1	18/15
Great Abaco	0/0	0/1	1/0	1/2	4/1	1/4	1/0	8/8
Andros	0/0	0/0	0/1	3/2	7/2	7/7	1/4	18/16
New Providence	0/0	0/1	2/0	1/1	4/1	2/1	0/2	9/6
Eleuthera	0/0	0/0	2/0	0/4	6/1	0/6	2/2	10/13
Cat Island	0/0	0/1	2/0	1/5	5/3	3/1	0/1	11/11
San Salvador	0/0	0/0	0/0	2/5	3/5	3/2	1/0	10/12
Long Island	0/0	0/0	0/0	1/3	7/2	0/1	1/2	9/8
Great Exuma	0/0	0/0	0/0	1/2	7/1	0/1	1/1	9/5
Rum Cay	0/0	0/0	0/1	1/1	1/0	1/0	1/0	4/2
Samana Cay	0/0	0/0	1/0	2/3	5/1	2/1	1/1	11/6
Crooked Island	0/0	0/0	1/1	1/3	6/1	0/2	1/3	9/10
Ackline	0/0	0/0	1/0	1/3	8/3	1/2	1/5	12/13
Mayaguana	0/0	0/0	1/0	0/2	3/2	2/4	0/1	5/9
Great Inagua	0/0	0/0	0/0	2/0	3/2	2/1	1/2	8/5

Source: Weather and Climate, San Salvador Island, 1996

1/1 First number indicates the number of hurricanes that made landfall in the Bahamas or on an individual island
 Second number indicates the number of tropical storms that made landfall in the Bahamas or on an individual island

Table 4-3 Geologic Time Scale

SUB DIVISIONS				M.Yrs	Bahamas Section
Phanerozoic	Cenozoic Era	Quaternary Period	Holocene Pleistocene	2	
		Tertiary Period	Pliocene Miocene Oligocene Eocene Paleocene	63	?
	Mesozoic Era		Cretaceous	Late Cret. Early Cret.	138
		Jurassic Period		205	
		Triassic Period		240	Basement
	Paleozoic Era	Permian Period		290	
		Carboniferous Period	Pennsylvanian	330	
			Mississippian	360	
		Devonian Period		410	
		Silurian Period		435	
		Ordovician Period		500	
	Cambrian Period		570		
	Protozoic	Late Prot.	Pre Cambrian		
		Middle Prot.			
Early Prot.					

Source: US Geological Survey, 1984

Table 4-4 Stratigraphic Model for Bahamas Geology

Age	Formation	Member	Characteristics
Holocene	Rice Bay	Hanna Bay	Intertidal carbonate facies and eolianites deposited in equilibrium with modern sea-level, beach rock.
		North Point	Consists entirely of eolianites with foreset beds which extend below modern day sea-level. Weakly developed ooids, predominantly peloidal and bioclastic limestones.
Pleistocene	Grotto Beach	Cockburn Town	Subtidal and intertidal carbonate facies overlain by regressive eolianites Eolianites formation, with ooids dominant.
		French Bay	Transgressive eolianites which in some places is marked by an erosional platform on which stillstand fossil corals are found. Ooid limestones dominant.
	Owl's Hole	The eolianites of this unit are predominantly bioclastic limestones. Ooids are rare.	

Source: Carew and Mylroie, 1985

Table 4-5 List of Birds Observed in Vicinity of Marsh Harbour

Bahama Swallow *	Bahama Mockingbird *
Black and White Warbler	Bahama Parrot *
Black-faced Grassquit *	Bahama Yellowthroat *
Bobwhite Quail	Bannaquit *
Catbird	Blue-gray Gnatcatcher
Collared Dove	Brown Pelican
Common Ground Dove	Cape May Warbler
Cuban Emerald *	Clapper Rail
Cuban Pewee *	Common Snipe
Great Egret	Common Yellowthroat
Greater Antillean Bullfinch *	Frigatebird
Hairy Woodpecker	Herring Gull
House Sparrow	Kingfisher
Little Blue Heron	La Sagra's Flycatcher *
Loggerhead Kingbird *	Laughing Gull
Merlin	Lesser Yellowlegs
Moorhen	Northern Parula
Northern Mockingbird	Northern Waterthrush
Olive-capped Warbler *	Orange-winged Amazon
Palm Warbler	Osprey
Pine Warbler	Pied-billed Grebe
Prairie Warbler	Piping Plover
Red-tailed Hawk	Redstart
Smooth-billed Ani *	Red-winged Blackbird
Stripe-headed Tanager *	Ring-billed gull
Thick-billed Vireo *	Ring-necked Duck
Tri-colored Heron	Rock Dove
Turkey Vulture	Royal Tern
West Indian Woodpecker *	Ruddy Turnstone
White-cheeked Pintail *	Spotted Sandpiper
White-crowned Pigeon	Starling
Yellow-bellied Sapsucker	White Ibis
Yellow-rumped Warbler	Yellow Warbler *
Yellow-throated Warbler	Yellow-crowned Night-heron

* Represents variety common to the Bahamas

Source: South Florida Birding Report

Table 4-6 Summary of Marinas in the Abacos

Location	Marina	No. Slips
Green Turtle Cay	Bluff House Club	20
Green Turtle Cay	Green Turtle Club	35
Guana Cay	Guana Beach Resort	22
Hope Town	Hope Town Marina	14
Hope Town	Light House Marina	6
Hope Town	Club Soleil Resort	16
Man-O-War Cay	Man-O-War Marina	60
Marsh Harbour	Conch Inn Resort	75
Marsh Harbour	Great Abaco Beach Hotel	160
Marsh Harbour	Harbour View Marina	36
Marsh Harbour	Marsh Harbour Marina	57
Spanish Cay	Point House Marina	70
Spanish Cay	Spanish Cay Marina	75
Treasure Cay	Treasure Cay Beach Hotel	150
Treasure Cay	Treasure Cay	150
Triple J. Marina	Marsh Harbour	16
Walker's Cay Hotel	Walker's Cay	75

Source: Marinas in the Abacos, 1999

Table 5-1 Saffir Simpson Hurricane Intensity Scale

Category	Winds (mph)	Storm Surge (ft)	Description of Damage
1 - Minimal	74-79	3-5	Damage primarily to shrubbery, trees, foliage, and unanchored homes. No real damage to other structures. Some damage to poorly constructed signs. Low-lying coastal roads inundated, minor pier damage, some small craft in exposed anchorage torn from moorings.
2-Moderate	96-110	6-8	Considerable damage to shrubbery and tree foliage; some trees blown down. Major damage to exposed mobile homes. Extensive damage to poorly constructed signs. Some damage to roofing materials of buildings; some window and door damage. No major damage to buildings. Coast roads and low-lying escape routes inland cut by rising water 2 to 4 hours before arrival of hurricane center. Considerable damage to piers. Marinas flooded. Small craft in unprotected anchorages torn from moorings. Evacuation of some shoreline residences and low-lying areas required.
3-Extensive	111-130	9-12	Foliage torn from trees; large trees blown down. Practically all poorly constructed signs blown down. Some damage to roofing materials of buildings; some wind and door damage. Some structural damage to small buildings. Mobile homes destroyed. Serious flooding at coast and many smaller structures near coast destroyed; larger structures near coast damaged by battering waves and floating debris. Low-lying escape routes inland cut by rising water 3 to 5 hours before hurricane center arrives. Flat terrain 5 feet or less above sea level flooded inland 8 miles or more. Evacuation of low-lying residences within several blocks of shoreline possibly required.
4-Extreme	131-155	13-18	Shrubs and trees blown down; all signs down. Extensive damage to roofing materials, windows and doors. Complete failures of roofs on many small residences. Complete destruction of mobile homes. Flat terrain 10 feet or less above sea level flooded inland as far as 6 miles. Major damage to lower floors of structures near shore due to flooding and battering by waves and floating debris. Low-lying escape routes inland cut by rising water 3 to 5 hours before hurricane center arrives. Major erosion of beaches. Massive evacuation of all residences within 500 yards of shore possibly required, and of single story residences within 2 miles of shore.
5-Catastrophic	> 155	>18	Shrubs and trees blown down; considerable damage to roofs of buildings; all signs down. Very severe and extensive damage to windows and doors. Complete failure of roofs on many residences and industrial buildings. Extensive shattering of glass in windows and doors. Some complete building failures. Small buildings overturned or blown away. Complete destruction of mobile homes. Major damage to lower floors of all structures less than 15 feet above sea level within 500 yards of shore. Low-lying escape routes inland cut by rising water 3 to 5 hours before hurricane center arrives. Massive evacuation of residential areas on low ground within 5 to 10 miles of shore possibly required.

Table 8.1 Impacts Determination Summary

The impact of the construction and operation of the facility is of concern, with respect to continued maintenance of biodiversity of the island and the need to operate and build a facility in an environmentally and ecologically beneficial manner without causing irreparable harm to the ecosystem. The following is a summary of unavoidable negative impacts and project benefits.

I. Land Use	Impact determination	Description
Be compatible with existing land use?	Potential Significant Beneficial Impact	The project is located in undeveloped Crown Land, consisting of Pine Forest Upland. The generation of reliable power is of benefit to the people of Abaco
Be compatible with zoning and other land use requirements?	Potentially Significant Beneficial Impact	The proposed industrial land use is consistent with the development of Wilson City during the 1906-1916 lumber era and the subsequent sugar use between 1950 and 1970 in the site vicinity
Be compatible with environmental laws, regulations applicable to the project or required of the proponent?	Potentially Adverse impact	It is BEC's policy and position to operate the facility in accordance with Bahamas environmental rules and regulations, with the goal of promoting and ensuring good environmental and ecological stewardship.
Include unique or unusual landforms in the immediate project area (project foot print)?	No Impact	No unique or unusual landforms are located within the project footprint. Not applicable to project
Include unique or unusual landforms in the immediate project area (surrounding area)?	No Impact	No unique or unusual landforms are located in project vicinity. Not applicable to project

II. Geology	Impact determination	Description
Include activities such as construction that will disturb the soil.eg. (excavation) ?	Potentially Adverse impact	Site clearing of trees in conflict with the project and excavation for the engine foundation is required. At the completion of improvements, the site will be landscaped and graded.
Result in subsidence of the land	No Impact	Not anticipated.
Influence land slides or mud flows	No Impact	Site consists of Lucayan Limestone, generally considered to be hard and stable. Not applicable to project
Be located in a seismically active area	No Impact	No record of seismic activity in the area. Not applicable to project

Table 8.1 Impacts Determination Summary

III. Water Quality	Impact determination	Description
Alter the quality, amount, direction, or rate of flow of groundwater?	No Impact	Seepage (or loss) from island aquifers is towards the sea. No alteration to groundwater flow is anticipated by proposed groundwater use.
Affect any municipal or private drinking water supplies?	Potentially adverse Impact	Withdrawals from the Lake City-Marsh Harbour aquifer are located at Spring City and Marsh Harbour airport. The project will access its water for cooling purposes from adjacent and below the aquifer. As such no impacts are anticipated, based upon both the distance of other users and the projects withdrawal source from outside the aquifer field.
Alter the exposure of certain sensitive receptors to water pollutants ?	Potentially Adverse Impact	BEC proposes to inject used water into the brine layer below the aquifer. This method of disposal is the most cost effective method for water disposal. Implementation of monitoring programs and operation of the facility in accordance with its design criteria will reduce or eliminate any potential adverse impacts
Alter the drainage flow/patterns or absorption rates of surface water ?	Potentially Adverse Impact	The site will be graded, asphalted and landscaped. Surface flow regimes across the site will be altered. Storm water flow will be directed to onsite appurtenance via oil/water separators prior to discharge. The loss of drainage via infiltration will not impact areas or ecology adjacent to the site and site water management is beneficial to the project.
Occur within a floodplain?	No Impact	Not located in a flood plain, but as with all of the island, is susceptible to tropical storms
Result in discharge to surface water (both fresh and saltwater) and alter surface water quality	No Impact	No surface water discharges are proposed for the project. Potentially Adverse Impact
Result in siltation to surface water (both freshwater and marine water areas) ?	Potentially Adverse Impact	A potential for increase sedimentation is anticipated during the construction phase of the dock and pipeline. Both are anticipated to be of local significance and short duration. The impacts will be minimized by use of BMPs, during construction, incorporating the use of silt curtains, buoys, and sedimentation barriers.

Table 8.1 Impacts Determination Summary

IV. Biological Resources	Impact determination	Description
Affect globally, regionally, or locally rare plant or animal species of their habitats?	Potentially Adverse Impact	25-acres of pine habitat will be lost to the project. Tree removal as required by the project will be conducted with permit approval. No evidence of species of interest is located within the confines of the project footprint. Exotic and opportunistic flora along the pipeline route and dock head will be removed.
Affect the overall biodiversity of the affected ecosystem(s)?	Potentially Adverse Impact	Little or no impact are anticipated to fauna e.g. birds, which are mobile and will relocate. Other animals (if any) will also relocate into the adjacent areas of undisturbed Crown Land and further south to the Abaco National Park
Affect coral reef communities?	No Impact	The project is located 2 miles from the coast; as such no coral reef impacts (if any) are anticipated. In addition, dock construction will result in impacts that are local and of short duration (if any). Not applicable to project
Affect Mangroves?	Potentially Adverse Impact	During pipeline trenching and installation the use of silt curtains and sedimentation barriers is required of the BMP to reduce and/or eliminates potential impacts to the mangrove area that intercepts the pipeline route. Of concern are the mangroves at Spencer's Bight
Affect sea grass beds ?	No Impact	No sea grass was observed proximal to Wilson City dock. Not applicable to project
Affect dunes?	No Impact	Not applicable to project
Affect other sensitive coastal environments (e.g. parks, wildlife refuge, and marine sanctuaries)?	Potentially Adverse Impact	The proposed industrial use of the dock has raised concerns of impacts to the sensitive environments in the Sea of Abaco. These concerns are mitigated by implementation of EMPs and BMPs, for the power plant and the operation of commerce in accordance with Bahamas Maritime Authority mandates. The power needs of Abaco outweigh any potential local adverse impacts (if any). However, Significant Adverse Impact is a concern should a discharge occur adjacent to Pelican Cay National Park.
Affect freshwater, riparian, or other coastal wetlands (i.e. Non-mangrove areas, such as salt marshes)?	No Impact	No salt marshes present. Not applicable to project
Affect Upland habitats?	Potentially Adverse Impact	25-acres of pine habitat will be lost to the project. Caribbean Pine removal as required by the project will be conducted with permit approval.

Table 8.1 Impacts Determination Summary

Affect protected areas (e.g. Parks, wildlife refuges, marine sanctuaries)?	Potentially Adverse Impact	No impacts are anticipated to Abaco National Park located 23-miles to the south. No direct impact to Pelican Cays Land and Sea Park, and Black Sound Cay National Reserve, are anticipated. However, it is acknowledged that commercial ships using North Bar Channel to enter the Sea of Abaco will traverse PSLSP and is a concern to FRIENDS. See section 8.0 of this report
Affect fish, shellfish or other commercially important marine species?	Potentially Adverse Impact	It has been suggested that the industrial use of the dock to service the power plant, has the potential to impact the ecosystem in the Sea of Abaco. However, the offshore concerns are mitigated through the mandates of the Bahamas Maritime Authority. Section 8.0 of this report

V. Air Quality	Impact determination	Description
Alter the local air quality directly (e.g. from construction activities, or the nature of the project)?	Potentially Adverse Impact	Any potential impacts during construction or operation are mitigated by the remote location of the site and the distance from the closest potentially sensitive receptor.
Alter the local air quality indirectly (e.g. from an increase in cars, boats, parking lots)?	Potentially Adverse Impact	Fugitive emissions are anticipated during construction. These are anticipated to be localized and of short duration. Indirect impacts should be no greater than currently experienced at Marsh Harbour, from which the operations personnel will be relocated.
Alter the exposure level of certain sensitive receptors to air pollutants?	Potentially Adverse Impact	The pollutants of potential concern are sulfur dioxide (SO ₂), oxides of nitrogen (NO _x), and carbon dioxide (CO ₂). Smoke and carbon monoxide (CO), are not a concern for new and state of the art diesel engines. The remote location of the site, effective atmospheric dispersal and the distance of the closest sensitive receptor mitigate any potential adverse emissions.

Table 8.1 Impacts Determination Summary

VI. Cultural Resources	Impact determination	Description
Disturb known archeological resources?	Potentially Significant Beneficial Impact	The project is located in pine uplands and no impacts to known archeological resources. Not applicable to project. However, construction of the new road will make the ruins at Wilson City accessible to cultural investigators and preservationist, and therefore a potential beneficial impact.
Likely disturb undiscovered archeological resources?	Potentially Significant Beneficial Impact	The project is located in pine uplands, and no impacts to known archeological resources. Not applicable to project. However, construction of the new road will make the ruins at Wilson City accessible to cultural investigators and preservationist, and therefore a potential beneficial
Disturb historical resources and places of historical significance?	Potentially Significant Beneficial Impact	The project is located in pine uplands, and no impacts to known archeological resources. Not applicable to project. However, construction of the new road will make the ruins at Wilson City accessible to cultural investigators and preservationist, and therefore a potential beneficial
Disturb religious resources and /or affect the current or future use of those resources?	Potentially Significant Beneficial Impact	The project is located in pine uplands, on former crown lands and no impacts to known archeological resources. Not applicable to project. However, construction of the new road will make the ruins at Wilson City accessible to cultural investigators and preservationist, and therefore a potential beneficial

VII. Energy	Impact determination	Description
Be consistent with existing energy conservation plans?	Potentially Significant Beneficial Impact	The Bahamas is a member of the Caribbean Renewable Energy program, which seeks to identify sustainable renewable energy resources, such as wind. However, the size of the Bahamian economy and its immediate needs dictates the reliance of oil fired electricity generation. Noting the high cost of fuel imports, efficiencies in fuel use are required by replacement of old generators and continued evaluation of alternative fuels
Involve renewable resources	No Impact	Not applicable to project
Involve non-renewable resources (e.g. mineral) that could be of future value to the region?	No Impact	Not applicable to project

Table 8.1 Impacts Determination Summary

VII. Socioeconomics	Impact determination	Description
Directly or indirectly result in increased population growth in the project vicinity?	Potentially Significant Beneficial Impact	The operation of the power plant may increase the economic opportunities for vicinity vendors, however the lack of vicinity infrastructure will not result in an increase in population growth. Abutting and adjacent lands are crown land and are undeveloped.
Affect unemployment/job availability?	Potentially Significant Beneficial Impact	The presence of the power plant will increase the potential for both skilled and unskilled labor, although it is anticipated that relocated staff from Marsh Harbour will fill the majority of positions.
Directly or indirectly result in additional (i.e., non-project related) economic growth in the project vicinity)?	Potentially Significant Beneficial Impact	Potential indirect impact as an economic center might occur as local vendors seek to service the power plant, based in part on its remote location, and the distance of Spring City and Marsh Harbour
Affect local housing availability?	No Impact	No housing developments are adjacent to the property. Not applicable to project
Displace or otherwise affect existing housing developments, especially involving minority and low-income communities?	No Impact	No housing developments are adjacent to the property. Not applicable to project
Impact public health and safety due to the intentional; or unintentional release of hazardous substances, flammable liquids, toxic pollutants, etc?	Potentially Adverse Impact	No impacts to public safety are anticipated. In the event of an unintentional fuel release at the plant, all minor spills will be located within the confines of the project boundaries and will be mitigated through the use of BMPs and SPCC. In the event of an unintentional release at the dock, spill containment protocols will be used and, emergency response contractors mobilized in the event of a catastrophic event.
Impact worker health and safety due to the intentional; or unintentional release of hazardous substances, flammable liquids, toxic pollutants, etc?	Potentially Adverse Impact	Worker occupational health & safety was not specifically addressed in this EIA. However, the construction vendor will be required to have available and implement a Health & Safety Plan for construction. During the operation of the plant, work practices will be in accordance with established BEC protocols, and will require operators to use personal protective equipment commensurate with their job hazard assessment.

Table 8.1 Impacts Determination Summary

IX. Community Service	Impact determination	Description
Affect availability of, or demand for, fire protection services?	Potentially Adverse Impact	In the case of a small fire, fire containment will be performed by plant personnel, with the use of available extinguisher providing there is no risk of injury. In the event of an uncontrollable fire, the Marsh Harbour fire department is a volunteer force that would be severely stressed to manage a fuel-based fire.
Affect availability of, or demand for, police protection services?	No Impact	No demand for police protection services is anticipated. Not applicable to project
Affect availability of, or demand for, medical and health care services?	No Impact	The demand for medical services will be no greater than that currently required for Marsh Harbour power station. Not applicable to project
Affect availability of, or demand for, public water services, including municipal wastewater supplies and storm water drainage	No Impact	All water use and disposal systems will be located onsite and are purpose built to satisfy the needs of the project. No demands or access to public systems is required or anticipated. Not applicable to project
Affect availability of, or demand for, public waste water services	No Impact	All water use and disposal systems will be located onsite and are purpose built to satisfy the needs of the project. No demands or access to public systems is required or anticipated. Not applicable to project
Affect availability of, or demand for, schools and related educational support services?	No Impact	Not applicable to project
Affect availability of, or demand for, communication systems?	No Impact	Not applicable to project
Affect availability of, or demand for, power	Potential Significant Beneficial Impact	The objective of the project is to provide reliable and affordable electricity to support the needs and economy of the Abacos
Affect availability of, or demand for, solid waste disposal services	No Impact	An onsite incinerator will satisfy all of the solid waste disposal needs of the project. No subcontracted disposal service is anticipated.

Table 8.1 Impacts Determination Summary

X. Aesthetics	Impact determination	Description
Result in objectionable odors to surrounding areas?	Potentially Adverse Impact	The combustion of heavy fuel oil will result in a potentially objectionable odor. However, the closest sensitive receptor is more than seven miles from the site, and no impacts are anticipated at Spring City
Affect local noise standards (or existing conditions)?	Potentially Adverse Impact	Based upon the remoteness of the site, any potential noise exceedance beyond the site's property line is mitigated by the distance of the closest sensitive receptor
Affect scenic views?	Potentially Adverse Impact	The presence of the large facility is mitigated by its location, and the presence of the pine forest, which will mute the impacts of the facility.
Create light or glare?	Potentially Adverse Impact	The facility will operate 24 hours per day, 7 days per week. Adequate lighting is required to ensure the health and safety of the operators. The light is not however to be of a magnitude that will create a glare, although elevated locations, such as the exhaust stack may be fitted with safety lights. The facility may be visible from the Sea of Abaco.

XI. Recreation	Impact determination	Description
Affect the quality of land-based recreational opportunities?	Potentially Significant Beneficial Impact	Proposed improvements to Wilson City Road, and construction of the dock, will increase the potential for land based recreational opportunities, provides access to the Wilson City cultural resource.
Affect the quality of water-based recreational opportunities?	Potentially Significant Beneficial Impact	Proposed improvements to Wilson City Road, and construction of the dock, will increase the potential for water based recreational opportunities, who access the water from the bays proximal to the dock
Increase the demand for recreational facilities or opportunities?	No Impact	Not applicable to project
Affect the quantity or quality of open space?	Potentially Adverse Impact	Loss of 25 acres of pine upland is an unavoidable consequence of the project. However, the removal of this land, will not impact the quality of the remaining crown lands or the land protected by Abaco National Park

Table 8.1 Impacts Determination Summary

XII. Transportation	Impact determination	Description
Affect the local roadway infrastructure directly or indirectly (i.e. congestion/quality)?	Potentially Adverse Impact	Some increase in local traffic use should be anticipated as a direct consequence of the project.
Affect the local waterway infrastructure directly or indirectly (i.e. congestion/quality)?	Potentially Significant Beneficial Impact	The frequency of commercial docking use is anticipated to be no more than three times per week, subsequent to the completion of the plant. And no greater than existing commercial shipping providers servicing the vicinity settlements and cays.
Alter emergency access to the project area and surrounding areas (i.e. during natural disaster events)?	Potentially Significant Beneficial Impact	In the event of a natural disaster, construction of the dock may make the facility indispensable for disaster relief efforts.
Create hazards for pedestrians, bicyclist, commercial boats, pleasure craft etc.?	Potentially Adverse Impact	No terrestrial hazards are anticipated, although concern has been raised with respect to pleasure craft and commercial shipping. The dictates of the Bahamas Maritime Authority, which include mandates designed to reduce the potential for collision, will mitigate offshore concerns.
Affect the likelihood of transportation accidents, including oil spills, highway collisions?	Potentially Significant Beneficial Impact	The benefit of the fuel pipeline will eliminate the potential for overland transportation accidents and spills, and highway collisions.

Source: KES 2008

DEFINITIONS

Potentially significant Beneficial impact – Indicates that there is substantial evidence that an effect is significant and beneficial

Potentially Beneficial impact – Indicates that there is evidence that an effect is beneficial, but the evidence is not substantial and/or the beneficial impact is not significant

No Impact – Indicates that the impact does not apply to the project

Potentially Adverse Impact – Indicates that there is evidence that an effect is adverse, but the evidence is not substantial and /or the adverse impact is not significant.

Potentially significant Adverse impact – Indicates that there is substantial evidence that an effect is significant and adverse