Draft Environmental Assessment
Proposed Ngarchelong Harbors Improvements and Sand Mining Project

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EXECUTIVE SUMMARY

The proposed project involves two separate but related activities: the first activity is to improve existing harbors and development of marine navigational channels; the second activity is for a sand mining operation to be established in Ngarchelong State.

The harbors improvement project will involve dredging activities to deepen the existing navigational channels leading to the western ports of Oketol and Ollei and create a new navigational channel to Ngerbau Port in the east coast of the State. The project also includes dredging of a previous channel between Ngarkeklau Island and Ngarchelong to facilitate easier access between the east and west coasts of the State.

The sand mining activity will base the operation at Oketol Port and mine sand deposits along the backreef areas on both east and west coast of the State. The use of a barge with a sand pump will be used to collect and transport sand to Oketol Port to be washed and made available for sale.
# Proposed Ngarchelong Harbors Improvements and Sand Mining Project

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1. INTRODUCTION

1.1 Identification of the Applicant
The project proponent for this proposed project is Ngarchelong State Government in joint venture with RAM Corporation, Inc, a Japanese company. The term of this joint venture is 50 years, and both parties will share in the revenue of the sale of processed marine sand. Refer to Appendix 1 – Joint Venture Agreement.

Joint venture agreement was signed in August of 2017, in which RAM will provide all the necessary equipment and machinery needed for the project and provide the initial capital investment to start the sand mining operations. Ngarchelong State will provide areas with suitable marine sand resources and a space for which to base the sand mining operations from.

The Eighteenth Ngarchelong State Assembly passed a resolution in August 2017 in support of the agreement between Ngarchelong State and RAM Corporation. Refer to Appendix 2 – Resolution #18-09.

1.2 EA Preparer
Mr. Kevin Polloi of KJP Consulting prepared this Environmental Assessment (EA) report. Mr. Polloi received a Master’s Degree from the University of Hawaii – Manoa (Department of Urban and Regional Planning) and worked for over 10 years in Hawaii as an environmental planner. Mr. Polloi has extensive experience preparing environmental documentation and permits for various development projects including residential, commercial, airports, harbors, roadways, water and sewer projects.

Mr. Polloi is a NAUI-certified scientific diver, former head of the research department at the Palau International Coral Reef Center and has a broad knowledge of Palau’s marine environments.

1.3 Consultations with EQPB
An initial scoping meeting was held with EQPB staff on January 9, 2018 to discuss the project and get feedback from EQPB on specific concerns that should be addressed in the environmental assessment. On February 24, 2018, EQPB staff visited all the proposed project locations in Ngarchelong. An EQPB lab technician was also on hand to collect baseline water samples at all the sites.
2. PROJECT SCOPE AND DESCRIPTION

2.1 Goal and Objectives
The depth of existing navigational channels to the ports of Oketol and Ollei have become shallow due to coral growth and accumulation of sand and sediment and is now impairing movement of vessels in and out of the ports. Furthermore, the port of Ngerbau has no existing channel and therefore only accessible during high tides. Presently, fishermen and boaters have to time their trips according to the tides. A channel, locally known as Btil a rikl, located between the tip of Babeldaob and the island of Ngerkeklau, historically provided access from the west coast to the east of Ngarchelong. Btil a rikl has become shallow and constricted from the lack of maintenance over the years. The channel is no longer complete and only remnants of this channel exist. Fishermen and boat owners from Ngarchelong will benefit greatly from the proposed harbor and channel improvements.

Palau is currently experiencing an increase in development projects. Construction activities for large and small development projects are either underway or are being planned. It is common knowledge that building supplies are very expensive due to limited supply and the cost of import. The supply of raw materials such as rock aggregate and sand are also limited which exacerbates the already high construction cost. Two local quarries sell sand material between $55 and $62 per cubic yard for “black” crushed basalt sand. There is only one supplier of marine sand which is sold for $86 per cubic yard. The proposed sand mining project will provide additional supply of high quality marine sand which may ultimately lower the price of sand therefore provide some relief from high construction costs.

The goal of the project is to improve access to the three ports in Ngarchelong, improve marine navigation between the east and west side of the State and establish a sand mining operation to be based at Oketol Port.

The objectives are to: 1) Conduct dredging activities to deepen the existing navigational channels leading to the western ports of Oketol and Ollei; 2) Create a new navigational channel to Ngerbau Port in the east coast of the State; 3) Dredge to deepen the Btil a rikl channel between Ngerkeklau Island and Ngarchelong to facilitate easier access between the east and west coasts of the State; and 4) Mine sand deposits along the backreef areas on both east and west coast of the State for commercial sale.

This Environmental Assessment document has been prepared pursuant to PNC Title 24, the Environmental Quality Protection Act, and the rules and regulations promulgated thereunder, to insure that appropriate consideration of environmental consequences is provided in decision making and processing of permit applications. The preparation of this EA was triggered due to the project involving State lands and the project will impact coastal waters.

This document aims to:

- Provide a general description of the biological and physical features of the sites,
- Present baseline results of basic water quality analysis,
- Characterize key marine species compositions both observed during surveys and what has been observed previously at the sites,
- Characterize major substrate types present at the proposed dredge sites,
- Existing uses near at or adjacent to the sites,
- Assess anticipated impacts of the proposed activities at the sites,
- Consider possible alternatives to the proposed actions, and
- Identify proposed measures to mitigate impacts.
2.2 Location of Project
The proposed project site is located in Ngarchelong State. The channel improvement sites include the existing marine navigational channels to Oketol and Ollei Ports, shallow reef areas on the east coast leading to Ngerbau Port, a shallow reef flat area between Ngerkeklau Island and Ngarchelong (locally known as “Btil a rikl). The sand dredging sites include the backreef areas along the east and west coasts of the State. Please refer to Figure 1 below.

2.3 Proposed Activities
The sequence of activities for this project will begin with the harbor and navigational channel improvements. Once the harbor and channel dredging activities have been completed, sand mining operations along the backreef sand flats will begin. The anticipated start date for this project is in July of 2018 or as soon as the environmental permits are secured. The harbor and navigational channel work will take approximately 60 months to complete, while the sand mining operations will follow the 50-year joint venture agreement.

2.4 Port and Navigational Channel Improvements
2.4.1 Oketol Port
**Dredging**
The majority of the existing channel at Oketol Port is still deep enough to accommodate larger vessels with deeper drafts. At the entrance however, the coral growth has made it shallow to the point that it causes a risk to larger vessels at low tide and therefore necessitates deepening. The measured depth of the entrance of the channel at low tide is approximately six (6) feet in some locations. The proposed dredging of the entrance to the channel will follow the original channel width of approximately 100 feet. The length of the shallow area to be dredged is approximately 330 feet. This area of impact is approximately 33,000 ft² (3,066 m²). Refer to Figure 2, below.
Adjacent to the port, the growth of branching corals (*Anacropora* spp. and *Porites* spp.) has made it difficult to navigate boats around the facility. At low tides, these coral colonies are less than two (2) feet from the surface. Along the northern portion of the port, the previous dredging activity was not thoroughly completed therefore the substrate is uneven with the shallow un-dredged areas that pose a hazard for boats during low tides. The proposed activity is to dredge these shallower areas to a depth of 3 meters (at low tide) to provide a safe navigational channel for boat traffic. This area of impact is approximately 163,000 ft² (15,165 m²). Refer to Figure 2.

The estimated volume of dredged material resulting from the dredging activities is approximately 27,860 yd³ (21,300 m³). The dredged material, which is expected to be comprised of mostly coral rubble and sand, will be used as fill material for the proposed baseyard, as explained below.

---

**Land Reclamation**

With Oketol Port being planned as the base of operations for the sand mining venture, the State is proposing to fill an approximately 110,000 ft² (10,000 m²) of shallow intertidal area to create a baseyard for stockpiling of mined sand and for operational facilities including an office building, toilet facilities, water tanks, sand washing equipment and space for heavy equipment. See Figure 3, below.

The source of fill material will be the dredged material from the dredging activities to improve the navigational channels to all the ports. The existing road elevation of the port is between 8 to 10 feet above the adjacent seafloor. The amount of material needed to fill the baseyard area is estimated to be around 44,800 yd³ (32,300 m³).

**Water use**

The operation of the sand mining venture involves washing of the sand once it is brought to land. It is proposed that freshwater for the project will be sourced from the stream upland from Oketol Port. A new dam will be constructed downstream from the existing Tilorch Dam and the water piped to the baseyard and used to rinse the
Proposed Ngarchelong Harbors Improvements and Sand Mining Project

sand. Freshwater tanks will be placed at the baseyard to contain the water to be used for washing the sand. It is estimated that the daily water usage for the facility is approximately 50,000 gallons.

The rinse water effluent will be directed into a retention basin and allowed to percolate into the ground. Effluent will not be discharged directly into adjacent marine waters without being filtered of any solids and sediment first.

![Figure 3. Proposed Filled Area at Oketol Port](image)

**Historic Properties**
As previously stated, the construction of the proposed baseyard will be adjacent to the southern portion of the existing pier at Oketol Port. The existing Oketol Port, even though it has undergone significant alteration, it is still considered a historic property and therefore will require a historical clearance from the Historic Preservation Office.

**2.4.2 Ollei Port**

**Dredging**
The navigational channel leading to Ollei Port has become shallow and requires maintenance dredging to deepen it. Coral growth at the entrance and accumulation of sand into the channel length has made it too shallow making it difficult for large vessels to use the channel, especially during low tide. The existing channel depth at low tide ranges from 6 to 9 feet.

In addition to dredging the existing channel, dredging of additional areas is being proposed. The existing boat mooring area located inland of the port is intertidal and at low tides, boats sit on dry substrate. The dredging of the mooring area and the associated channel will allow boats to leave and return at all tidal conditions. Refer to Figure 4.

The proposed width of the channel follows the original 80 feet with a dredged depth of 3 meters at low tide. The estimated volume of dredged material resulting from the dredging activities at Ollei Port is approximately 69,000 yd³ (53,000 m³). Coral rubble material dredged from Ollei Port will be transported to Oketol Port for use as fill
material for the proposed baseyard. Any high quality sand from the site will be transported to Oketol Port to be processed (washed) for sale.

Historic Properties
There is a World War 2 (WWII) Japanese sea plane that sank during the war at the entrance to the channel at Ollei Port. The plane sits upside down at the bottom and is mostly intact with its pontoons lying beside it (see Photo 1, below). Most of the plane can still be seen, however portions of the fuselage has been overgrown by coral and the large wings partially buried by sand. In order to avoid disturbing the plane wreck, the entrance to the channel will be moved slightly inland. An adjacent portion of the shallow reef located to the east of the existing entrance will be dredged to allow for this modified entrance. See Figure 4. The Historic Preservation Office will be consulted regarding this historic property.

Photo 1. Japanese Seaplane Wreck at Ollei Port
2.4.3 Btil a Rikl Channel

Dredging

Btil a rikl is a channel located between Ngerkeklau Island and the tip of Babeldaob. According to an elder from Ollei, Btil a rikl was a man-made channel originally dug by people from the Marianas who lived in the village of Ngetmel prior to the war. A portion of the channel is still evident and characterized by deeper areas on the reef flat with interspersed colonies of massive coral (Porites spp.).

The proposed dredging of this channel will connect the deeper waters on either side of the Btil a rikl area. The proposed length of this channel is approximately 7,900 feet (see Figure 5). The proposed width of the channel is 30 feet (10 meters) with a dredged depth of 10 feet (3 meters) at low tide.

The estimated volume of dredge material from this site is approximately 1,008,574 yd³ (771,110 m³). High quality sand collected from this site will be transported to Oketol and processed (washed) for sale. Coral rubble will be used as fill material for the proposed baseyard.

2.4.4 Ngerkeklau Island Channel

Dredging

An approximately 1,500-foot channel will be dredged from the proposed Btil a rikl channel in a northerly direction towards Ngerkeklau Island (see Figure 5). The purpose of this channel is to provide access to the Ngerkeklau Island at all tidal conditions. School tours, tourists, and residents frequently visit the island. Sometimes these visitors stay overnight. The channel will improve accessibility to the island and increase the level of safety in case an injury occurs on the island and requires immediate medical attention.

Because the beaches at Ngerkeklau are known sea turtle nesting sites, the dredging will terminate approximately 200 feet from the shore to minimize any possible negative impacts to the beach closest to the proposed channel site.

The estimated volume of dredge material from this channel is approximately 120,332 yd³ (9,200 m³). High quality sand collected from this site will be transported to Oketol and processed (washed) for sale. Any coral rubble will be used as fill material for the proposed baseyard.

2.4.5 Ngerbau Port and Associated Channels

Dredging

Ngerbau port, located on the eastern coast of the State currently does not have a channel access to deeper waters. The port is only accessible during high tides. As such, boat traffic and fishing trips have to be timed according to the tidal cycles. The proposed dredging of the port and associated channels on the reef flats will improve this condition.

Dredging activities will take place on two shallow reef flat areas and the near-shore area adjacent to the port (see Figure 6). Similar to the other proposed channel at Btil a rikl, the anticipated width of the channels are 30 ft. (10 m) with a dredged depth of 10 ft. (3 m) at low tide. The estimated volume of dredge material from these channel improvements on the east coast is approximately 78,500 yd³ (60,000 m³).

High quality sand collected from these sites will be transported to Oketol and processed for sale. Coral rubble will be used as fill material for the proposed baseyard.
Figure 5. Btil a rikl and Ngerkeklau Channel Improvements

Figure 6. Ngerbau Channel and Port Improvements
2.5 Sand Mining
After the dredging activities associated with the port and navigational channel improvements have been completed, the project proponents plan to begin mining sand from the backreef areas for commercial sale.

As mentioned in the *Section 2.4.1*, an approximately 110,000 ft² (10,000 m²) intertidal area adjacent to the existing Oketol Port will be filled to provide work space for the sand mining operation. This area will accommodate a stockpile area, space for an office building, equipment for washing the sand, and parking for heavy equipment that will be needed in the baseyard.

During the harbors and navigational channel improvement activities, any good quality sand that is collected will be placed in the temporary sand storage area at Oketol Port. Refer to **Figure 7**, below. The sand will be processed for sale. On-land sand processing activities will be relocated to the permanent baseyard area once it has been filled and constructed. The temporary stockpile area will be restored back to open space.

![Figure 7. Oketol Port Storage Areas](image)

An additional 40,000 ft² (3,716 m²) area located inland from the port will also be used to store equipment and supplies. This State-owned land was a previously used as a solid waste disposal site. The area will be cleared of scrub vegetation and developed as an equipment storage site. See **Figure 7** and **Photo 2**.
2.5.1 Proposed Locations
Two areas were selected for sand mining. The western site on the barrier reef is directly west of Oketol Port and is approximately 4 miles away from the port. The site is located in the shallow area of the backreef and measures approximately 0.75 square miles (1.94 km²). Refer to Figure 8.

The proposed sand mining area on the east coast is in the backreef area seaward of Ngerbau Port (see Figure 9). The eastern site is approximately 0.4 square miles (1.11 km²) in size. The eastern sand mining site is approximately 9.6 miles away from Oketol Port, if travelling by sea. The site is approximately 2.4 miles from Oketol Port if travelling by land.
Proposed Ngarchelong Harbors Improvements and Sand Mining Project

Figure 8. Proposed Sand Mining Areas - West Coast

Figure 9. Proposed Sand Mining Area - East Coast
2.5.2 Equipment and Personnel

The number of workers needed for the project is as follows:

<table>
<thead>
<tr>
<th>Position</th>
<th>Location</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plant Supervisor</td>
<td>Baseyard</td>
<td>1</td>
</tr>
<tr>
<td>Heavy Machinery Operator</td>
<td>Baseyard</td>
<td>1</td>
</tr>
<tr>
<td>Field Supervisor</td>
<td>Ship</td>
<td>1</td>
</tr>
<tr>
<td>Ship Captain</td>
<td>Ship</td>
<td>1</td>
</tr>
<tr>
<td>Heavy Machinery Operator</td>
<td>Ship</td>
<td>1</td>
</tr>
<tr>
<td>Crane Operator</td>
<td>Ship</td>
<td>1</td>
</tr>
<tr>
<td>Diver</td>
<td>Ship</td>
<td>1</td>
</tr>
<tr>
<td>Ship Crew/Workers</td>
<td>Ship</td>
<td>2</td>
</tr>
</tbody>
</table>

The proposed project will be hiring locally-based employees to fill some of the positions, such as the heavy machinery operators and support crew for the ship/barge. Hiring qualified workers currently living in Ngarchelong would be preferred.

The equipment to be used for this project will include the following:

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Size (m)</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tug Boat</td>
<td>8.05×4.56×1.0</td>
<td>1</td>
</tr>
<tr>
<td>Barge</td>
<td>21.9×12.3×1.6</td>
<td>1</td>
</tr>
<tr>
<td>Excavator</td>
<td>9.66×2.99×3.08</td>
<td>2</td>
</tr>
<tr>
<td>Dump Truck (4-Ton)</td>
<td>5.4×2.2×2.7</td>
<td>1</td>
</tr>
<tr>
<td>Marine Crane</td>
<td>4.0×2.0×1.0</td>
<td>1</td>
</tr>
<tr>
<td>Sand Pump (DPF-50T)</td>
<td>1.4×1.1×2.15</td>
<td>2</td>
</tr>
<tr>
<td>Sand Pump (VS-35B-T)</td>
<td>1.65×9.5×1.3</td>
<td>1</td>
</tr>
</tbody>
</table>

The tugboat and barge will be fabricated in Japan and shipped to Palau. See Photo 3 and Figure 10. The barge will be in separate sections and assembled in Palau (See Photo 4). The other equipment will also be shipped to Palau from overseas.
The sand pump (DPF-50T) can be attached onto the end of an excavator and used to pump sand onto the barge. This setup will also be used to “dredge” the soft substrate during the harbor and channel improvements. See Photos 5, 6 and 7. In other instances, the stand alone sand pump (VS-35B-T) will be used in more sensitive areas to minimize negative impacts to the marine environment. See Photos 8 thru 11.
Photos 5, 6 & 7. Sand Pump (DPF-50T)

Photos 8 thru 11. Sand Pump (VS-35B-T)
2.6 Total Area to be Disturbed by the Project
The proposed port and navigational improvements will disturb approximately 0.15 mi² (0.38 km²) of marine area. These marine areas include mud flats, inner reef areas, seagrass beds, reef flats and backreef sand flats.

The total area of the backreef to be used for the sand mining operations is approximately 1.15 mi² (3.05 km²). Refer to Figures 8 and 9. These areas are comprised mainly of sand deposits.

2.7 Volume and Type of Fill Materials
An estimated 1.2 million yards³ (914,000 m³) of dredge material, comprised of coral rubble and sand, will result from the harbor and navigational channel improvements. The coral rubble will be used to reclaim the area adjacent to Oketol Port to allow for the proposed sand stockpile area and sand washing operations. Good quality sand and excess coral rubble will be stockpiled and sold.

In regards to the sand mining areas, assuming that eighty five percent (85%) of these sandy backreef areas have sand resources to a depth of three (3) meters, the total volume of sand at these two locations (east and west) is approximately 7,777,500 m³ or over 10,000,000 yd³.

2.8 Description of Project Phases
2.8.1 Pre Construction Phase
Equipment, including heavy machinery, barge and tugboat will be brought to the site and stored. Prior to any construction activities, all land areas that will be used for equipment staging, temporary stockpile areas and material storage will be protected by appropriate erosion and sedimentation control measures.

2.8.2 Project Phase 1 (Harbor/Channel Dredging and Land Reclamation)
The dredging activities will begin at Oketol Port, followed by Ollei Port, then Btil a rikl channel, and finally the new channels to Ngerbau Port on the east coast.

Prior to any disturbance activities, silt curtains and other applicable erosion control measures will be deployed to prevent suspended sediments from entering the surrounding waters.

Silt fences will be deployed around the baseyard fill area to contain any suspended solids during fill activities. Once the level of fill is high enough, the seaward edge of the fill area will be protected through the use of large boulders, rip rap or concrete.

During dredging activities silt fences will be deployed around the active dredge site. Once the barge has been filled, the silt curtains will remain in place until the suspended sediments have resettled to the bottom. Only then will the barge be allowed to transport the dredged material to Oketol Port for unloading.

As mentioned previously, any good quality sand that is collected will be unloaded at the temporary stockpile area and processed for sale.

2.8.3 Project Phase 2 (Baseyard Construction and Sand Mining)
Once the permanent baseyard area has been filled and the edges protected, machinery, sand washing equipment, water tanks, office buildings and other necessary appurtenances will be moved to this area.

The temporary stockpile area will be restored back to open space.

Sand from the sand mining areas will be offloaded at the permanent baseyard. The barge is able to mine 130 yd³ (100 m³) of sand per trip. The sand will be washed and stockpiled for sale.
2.9 Project Schedule/Duration of Activity
The harbor improvements and land reclamation portion of the project is expected to last 60 months. The construction of buildings and other structures at the baseyard is expected to last 3 months. Sand mining activities on the backreef areas will commence after the baseyard is ready and will continue for the 50-year duration of the joint venture agreement.

2.10 Project Cost
The total project cost is estimated at **$1.8 Million (USD)**. Below is the cost breakdown for the project cost.

<table>
<thead>
<tr>
<th>Item</th>
<th>JPY</th>
<th>USD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shipbuilding (barge &amp; tug boat)</td>
<td>100,000,000</td>
<td>904,900.00</td>
</tr>
<tr>
<td>Vehicles (excavators, dump truck)</td>
<td>20,000,000</td>
<td>180,980.00</td>
</tr>
<tr>
<td>Sand Pumps</td>
<td>15,000,000</td>
<td>135,735.00</td>
</tr>
<tr>
<td>Other Equipment</td>
<td>30,000,000</td>
<td>271,470.00</td>
</tr>
<tr>
<td>Transportation Cost from Japan</td>
<td>30,000,000</td>
<td>271,470.00</td>
</tr>
<tr>
<td>Field Survey Cost</td>
<td>5,000,000</td>
<td>45,245.00</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>200,000,000</strong></td>
<td><strong>1,809,800.00</strong></td>
</tr>
</tbody>
</table>
3. ALTERNATIVES

3.1 The “No Action” Alternative
The “No Action” alternative would result in the sites remaining undisturbed.

Harbors and Navigational Channel Improvements
“No Action” would mean that the navigational channels leading to Oketol and Ollei Ports would remain unimproved with the shallow sections continuing to hinder navigation of larger vessel in and out of the ports. The mooring area at the interior of Ollei Port would continue to be intertidal and boat owners and fishermen would be limited to moving their boats only during higher tides.

The navigational channel at Btil a rikl would remain shallow and the area passable only during higher tides. Access to Ngerkeklau Island would be only possible during higher tides as well. Similarly, Ngerbau Port would remain only accessible during higher tides. Ngerbau fishermen and boat owners will continue to time their boat trips according to tidal conditions.

Sand Mining
In regards to the sand mining activities, the “No Action” alternative would mean that the proposed backreef areas on the west and east coast of the State would remain undisturbed. The State will not gain at least an estimated $378,000 per year (initially) from the sale of marine sand. RAM Corporation would lose the money already invested in constructing the barge, tug boat and other costs associated with the proposed project.

Outcome
This “No Action” alternative would, therefore, adversely affect access from the existing ports to the ocean. It would jeopardize the passage of vessels to and from these harbors. It will also continue to hinder the operations of the State Rangers in their surveillance and rescue operations.

The sand mining operations is an integral part of the harbor improvements activity. If the agreement between the Ngarchelong State and RAM Corporation for sand mining operations does not come to fruition, then the mining equipment will not be used, resulting in no work to improve the channels to the existing ports. Additionally, Ngarchelong State will not realize the additional income from the sale of sand and therefore will continue to rely solely on the National Government for budgetary funds.

It is for these reasons that the “No Action” alternative is rejected.

3.2. Alternative Sites
Harbors and Navigational Channel Improvements
No alternative locations were considered for dredging, because the proposed project is maintenance of existing harbors and is, thus, site specific. The proposed channel widths for Oketol and Ollei Ports will follow the original widths. The proposed channels at Btil a rikl and the channels leading to Ngerbau Port will be 30 ft. (10 m) wide 10 ft. (3 m) deep. The extent of dredging was closely examined, and the minimal depth and area of dredging required to keep the channels and ports in good operation was selected. Narrower and shallower channels will result in more frequent maintenance dredging.

Sand Mining
Several alternative locations in Ngarchelong State for mining sand were evaluated. Sandy areas further north, the area between the islands of Ngerchur and Ngerkeklau and the inner reef flats were considered but rejected. Mining sandy backreef areas further north would encumber additional cost due to the greater distance. The greater distance would also pose hazardous situations should sudden extreme weather conditions occur. The slow-moving barge and tugboat would not be able to quickly return to port. The sandy shallow area between islands of
Ngerchur and Ngerkeklau was not chosen because of its proximity to the islands and the potential negative impacts to nesting sea turtles and the use of this area for recreation.

The inner reef flats also potentially hold sand resources, however these areas also contain vast seagrass beds which are important feeding habitats for endangered dugongs and sea turtles. The seagrass beds are also important fishing grounds for Ngarchelon residents.

It is for these reasons that the aforementioned alternative sites were rejected.

3.3 Alternative Methodology to Stabilize the Shoreline for the Proposed Fill Area (Baseyard)

There are several alternatives being considered to stabilize the shoreline of the fill area. The use of large boulders to create a rip rap wall is one alternative. Another alternative is to use precast concrete walls to stabilize the shoreline. The third alternative is using interlocking metal sheet piles driven into the substrate to create the stabilized shoreline along the perimeter of the fill area. Assessing these structural design options are intended to permanently stabilize the shoreline of the future baseyard.

The use of large boulder to create an embankment was chosen as the method of construction due to economic reasons. The other options are too cost prohibitive and/or not readily available. The boulders can be sourced locally from quarries and coral boulders taken from the dredging sites. The western edge of the baseyard will be a vertical concrete surface to allow proper mooring of the barge.
4. DESCRIPTION OF ENVIRONMENTAL SETTING

4.1 Physical Environment

4.1.1 Project Vicinity

The proposed project site includes multiple marine areas in Ngarchelong State and described in Section 4. The sites include marine areas in existing harbors, reef flats, seagrass beds and sandy areas along the backreefs. Refer to Figures 2 thru 9. The project will also utilize land areas around Oketol Port as shown in Figure 7.

4.2 Assessment Methodology Used for the Project

Several site visits were conducted to assess existing physical and biological conditions at all the sites. Between December 2017 and January 2018 underwater visual surveys were conducted along the proposed marine sites. Visual observations of the substrate and any mobile organisms were conducted at each site. Percent cover of coral and/or seagrass was estimated at each site. Photographs were taken of the site and surrounding areas to document existing site conditions.

On January 24, 2018, during a site visit to all the sites, water samples were taken by staff of the EQPB Laboratory. Time of sampling began around 9:30 am on an incoming tide. The highest tide of 5.4 feet that day occurred at 12:03 pm. Please refer to Figure 10 for the approximate locations of the sampling points. The samples were placed in a cooler with ice and transported to the EQPB laboratory for analysis.

4.2.1 Marine Methodology

1. Tested water quality for Enterococci bacteria, salinity and turbidity for three sample locations.
2. Snorkeled and documented marine life along the length of the proposed harbors improvement (dredge) sites.
3. Snorkeled and documented marine life and substrate type in the proposed sand mining areas.

The results of the marine surveys begin on Section 4.3.2.

4.2.2 Stream Assessment

The proposed location of the dam is located downstream of the existing Tilorch Dam. The proposed dam will be constructed at the exit of the stream culvert that crosses under the road across the turnoff to Surangel’s residence.

On the day of the stream assessment, there was very little stream flow due to lack of rain. The estimated flow was around 28,000 gallons per day for that day. The water clarity was very good.

There were no fish or other aquatic fauna observed along this stretch of the stream.

4.3 Biological Environment

4.3.1 Water Quality Standards

Water quality standards were taken from The Environmental Quality Protection Act, Chapter 1. The classification of coastal recognizes two classes of coastal waters: Class A is water used as recreational activities. Class B pertains to water used for commercial purposes.

The coastal waters immediately adjacent to the existing harbors in Ngarchelong are classified as Class B waters. All other areas are classified as either Class AA or A.

<table>
<thead>
<tr>
<th>Coastal Water Quality Standards</th>
<th>Turbidity (in NTU)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class AA and A</td>
<td>greater than 1 NTU</td>
</tr>
<tr>
<td>Class B</td>
<td>greater than 2 NTU</td>
</tr>
</tbody>
</table>
Table 1. EQPB Water Quality Results. Refer to Figure 10 for Sampling Locations

Water samples for laboratory testing were collected on January 24, 2018 between 9:30 and 11:30 am during an incoming tide. The high tide that day of 5.4 ft. occurred at 12:03 pm. The samples were collected by EQPB staff during a site visit. The samples were placed in a cooler with ice and transported to the EQPB laboratory for analysis.

A. Ngerbau Dock
B. Oketol Channel towards Dock
C. Oketol Sand Mining West
D. Channel between Ollei and Ngerkeklau
E. Ollei Channel towards Dock
F. East Sand Mining to Ngerbau Dock

Please refer to Figure 11 below for the approximate locations of the sampling points.
4.3.2 Marine

Oketol Port

The existing navigational channel at Oketol Port was last improved in 1988 by the Kawasaki Company. A marine survey was conducted on December 17, 2017 to ascertain the condition of the navigational channel and marine fauna within the proposed site at Oketol Port. It was discovered that only portions of the existing channel will require dredging (see Figure 2).

The outer entrance to the channel has become shallow due to coral growth. Portions of the channel at this location are only 5 feet deep at low tide (0.5 feet low tide). The center of the channel entrance is dominated by branching coral (*Porites rus* and *P. cylindrica*) with interspersed colonies of massive corals species (*Porites spp.*). The coral cover at this location is approximately 60 percent. Refer to Photo 11, below.
At the outer entrance, both sides of the channel as it gets shallower, corals become sparse with only massive corals present. The substrate is comprised of sand and coral rubble in locations not covered by corals. Fish observed at the site included schools of small Bluefin trevally - *Oreidel* (*Caranx melampygus*), humpback snapper - *Keremlal* (*Lutjanus gibbus*) and Indian mackerel - *Smach* (*Rastrelliger kanagurta*).

The middle portion of the channel ranges from 35 to 50 feet deep and comprised mainly of sand and soft sediment deposits. The existing depth is adequate and therefore will not require and dredging. Fish were not observed in the central portion of the channel due to poor visibility.

Adjacent to the western end of the port are large stands of *Anacropora sp.*, a branching coral species that often grows in protected muddy inner lagoons. These stands of *Anacropora* have proliferated into the channel at the end of the port and now hinder movement of even small boats. Colonies of branching *Acropora* are also present next to the port. The coral colonies are only 1 to 2 feet from the surface during low tides (0.5 feet low tide).

At the location where the filling of the intertidal area will occur for the proposed baseyard, the coral cover is sparse at less than 10 percent cover. The remainder of the substrate is sediment and coral rubble. The coral species found at the site include small massive species (*Porites sp.*), and branching species (*Pocillopora sp.* and *Acropora sp.*). There are also sparsely scattered Tape Seagrass (*Enhalus acoroides*) growing in the general vicinity of the proposed baseyard location. See Photo 12.

![Photo 12](image)

No bird species were observed during the site visits, however it is likely that herons and other shorebirds could visit the site during low tides.

**Ollei Port**

At the entrance to the channel leading to Ollei Port shown in Figure 4, the channel bottom is dominated by branching and massive corals species with coverage at approximately 70 percent at the center of the channel. Species present include massive *Porites* species, and branching corals including *Acropora sp.* and *Porites cylindrica*. The depth at this location is approximately 6 feet at low tide (0.5 feet low tide).
As you proceed into the channel, the coral cover drops dramatically and the substrate becomes sandy. Sparse coral colonies tend to be clustered along the shallower edges of the channel and include both massive and branching coral species. Tape Seagrass (*Enhalus acoroides*) also occur sparsely in the shallower edges of the channel.

Fish observed at the entrance of the channel includes juvenile humpback snapper - Keremlal (*Lutjanus gibbus*), juvenile Humphead Wrasse - *Ngimr* (*Cheilinus undulatus*), juvenile Humphead Parrotfish - *Berdebed* (*Bolbometopon muricatum*), Scribbled Snapper - *Korriu* (*Lethrinus rivulatus*), Lined Surgeonfish - *Belai* (*Acanthurus lineatus*), Thumbprint Emperor - *Itotech* (*Lethrinus harak*), and Longnose Emperor (*Lethrinus olivaceus*).

Immediately adjacent to the existing port, the substrate is comprised of finer marine sediment with seagrass along the southern edge of the harbor. The existing shallow area to be dredged along the southern and western edge of the port (boat mooring area) is comprised mainly of sand and Tape Seagrass (*Enhalus acoroides*). The seagrass cover at this location ranges from approximately 20 to 30 percent. No live corals occur at this location. See Photos 13 and 14.
Btil a Riki
The proposed dredging of the Btil a rikl channel will shorten the travel distance between the east and west coast by approximately 4 miles. Boats will no longer have to go around Ngerchur Island during low tides. The length of the proposed Btil a rikl channel is roughly 1.5 miles. Refer to Figure 5.

Beginning from the western entrance to the proposed channel, massive corals occur along the shallow reef slope. Coral cover drops dramatically to less than 5 percent once you reach the reef crest. This is mostly due to the constant wave action that prevents corals from becoming established. The substrate at the reef crest is mostly hard calcareous rock and continues for approximately 400 feet. As you continue inland, the hard-bottomed reef crest transitions into a mostly coral rubble substrate with very little growth of corals or plant life. This rubbly area is approximately 500 feet in length. The remnant of the original channel is then encountered and is approximately 3.5 feet in depth at low tide and varies from 30 to 50 feet in width. The channel continues for about 2,800 feet and opens into a larger area where the channel is no longer defined. Continuing towards the east, the alignment cuts through a seagrass-dominated area (mainly Turtle Grass, *Thalassia hemprichii*) that is approximately 700 feet in length, after which it becomes sandy-bottomed until its termination at the deeper lagoon on the east coast.

The original channel, because of its depth (3.5-feet deep at low tide) contains intermittent patches of the Tape Seagrass (*Enhalus acoroides*) and scattered massive coral colonies (*Porites sp.*).

Curryfish – *Ngims* (*Stichopus vastus*) were seldom observed at this location. A large stingray was also observed in the area.

Ngerkeklau Channel Area
The proposed dredging of the channel from the Btil a rikl channel to Ngerkeklau Island is approximately 1,700 feet in length and is shown in Figure 5. The proposed alignment is in a north-south direction and cuts across an area that is generally sandy-bottomed with interspersed seagrass beds consisting primarily of Turtle Grass (*Thalassia hemprichii*).

Thumbprint Emperor - *Itotech* (*Lethrinus harak*) were observed at this location.
Eastern Reef Flat Areas (Navigational Channels)
The two reef flat areas that are part of the Ngerbau Harbor improvements shown in Figure 6 are dominated by coral rubble and sand. Along the slopes, there are coral colonies that are mostly sub-massive coral species. On the reef flat along the proposed alignments, sparse colonies of small massive corals (Porites sp.) are observed. There are very few seagrass occurring at these locations, but the calcareous seaweed (Halimeda sp.) is observed as well as the green algae (Caulerpa sp.).

The sea cucumber, Euas (Holothuria atra) was observed occasionally at these sites. Fish seen at these locations included schools of Brassy Chub – Komud (Kyphosus vaigiensis), Blackstreak Surgeonfish – Esengel (Acanthurus nigricauda), Pacific Longnose Parrotfish – Ngyaoch (Hipposcarus longiceps), Lined Rabbitfish – Kelsebuul (Siganus lineatus), Dusky Rabbitfish – Beduut (Siganus fuscescens), and juvenile Humpback Red Snapper – Keremlal (Lutjanus gibbus).

Ngerbau Port
The proposed alignment at Ngerbau Port as you approach it from the ocean side, generally follows the original channel into the Port. This channel is comprised mainly of sand and mud. The alignment occurs within a seagrass bed approximately 2,500 feet in length. This seagrass bed is comprised of Turtle Grass (Thalassia hemprichii) and Tape Seagrass (Enhalus acoroides). Tape Seagrass becomes more dominant as you get closer to the mangrove fringe. See Photo 15.

Fish found inside the seagrass bed included small Blacktail Snapper - Reall (Lutjanus fulvus), Thumbprint Emperor - Itotech (Lethrinus harak), Orange-striped Emperor - Chudech (Lethrinus obsoletus) and gobies - benguk. A stingray was also observed in the general area.

Inside the port mooring area, the substrate is sand mixed with mud and devoid of any plant life, except for the mangrove fringe that borders the port to the north. The substrate closest to land becomes hard basalt in certain locations. Refer to Photo 16.

Sand Mining Areas (East and West)
The sand mining areas along the backreef areas on the east and west coast of the State is primarily comprised of sand flat substrate with very little to no coral colonies present (see Photo 18, below). Coral colonies begin to occur as you get closer to the reef crest where harder substrate is present or along the drop off into the lagoon. The sandy backreef areas are known foraging habitats for stingrays and some fish species that feed on invertebrates. Large Tiger sharks are sometimes found in these areas, probably searching for prey such as stingrays and turtles.
Proposed Ngarchelong Harbors Improvements and Sand Mining Project

Photo 16. View From End of Ngerbau Port Facing North

Photo 17. View of Ngerbau Port Mooring Area Facing East
4.3.3 Terrestrial

Temporary Stockpile Area
While the permanent baseyard and stockpile area is being filled, a portion of the existing Oketol area will be utilized to stockpile any good quality sand that is dredged from the harbor/channel improvement project. This temporary area is currently a grassed open area adjacent to the basketball court. Refer to Figure 7.

In addition to the grass at the site, small coconut trees and other small landscape plants are present along the northern edge of the site. A small “summer house” structure sits on the southern edge of the site.

Inland Storage Area
A 40,000 ft² area located inland from Oketol Port owned by the State will also be used as a storage area for the proposed project. Refer to Figure 7. The area was previously used as a solid waste disposal site. The area is overgrown with scrub vegetation including grass, White Leadtree – *Telengtund* (*Leucaena leucocephala*), and *Kebeas* (*Merremia peltata*). Refer to Photo 2. The site will be cleared of vegetation, leveled with fill material and used for equipment storage.

4.4 Existing Uses Nearby

4.4.1 Cultural Use
The near-shore marine environment around Ngarchelong State is still used extensively for harvesting marine products such as fish, sea cucumbers, clams and other shellfish, either for personal consumption or for sale at local markets. A socio-economic assessment was conducted for the project and is described in Section 5.8.

4.4.2 Residential Use
The locations where the project activities will take place are not close to existing residences. The Blue Marlin tour company has a facility at Oketol Port with a full time employee who works and resides at the facility. The
port of Ollei has one residence and convenient store at the site. Ngerbau Port does not have a permanent residence at the facility.

4.4.3 Commercial and Industrial Use
Oketol Port has an existing tour company facility (Blue Marlin). Ollei Port also has a tour company facility (Impac Tours). Impac Tours also operates a gas station at Ollei Port. The Northern Reef Fisheries Cooperative has an office building adjacent to the Ngarchelong State Rangers’ office building at Ollei Port. The Ngarchelong State Rangers currently use Ollei Port as their base of operations. Ngarchelong State Ranger boats moored in the existing inland mooring area are not able to be used when the tide is out.

Other than a visitor center currently being constructed, Ngerbau Port does not have any existing commercial or industrial facilities.

4.4.4 Utilities
Existing utilities at the Oketol site includes water and electricity. There are no wastewater facilities (sanitary sewer lines) that service the site.

4.5 Soils
According the U.S. Department of Agriculture – Natural Resources Conservation Service, the soil types found at the Oketol site includes the following:

Inland Storage Area – (614) Babelthuap-Ngardmau-Typic Udorthents undifferentiated group, 12 to 30 percent slopes. This soil type is typically found on hilly areas of Babeldoab. The soil is deep and has moderate permeability due to the high percentage of rock fragment in its composition.

(608) Aimeliik silt loam, bedded tuff substratum, 30 to 50 percent slopes. This soil type is typically found at the toeslopes, footslopes, shoulders, summits, backslopes of hills. The soil is very deep and has high permeability.

Oketol Port – (654) Orthents-Urban land complex, 0 to 50 percent slopes. This soil type is characterized by human-transported material derived from either saprolitic volcanic rocks or limestone. This soil is typically densely covered with buildings and other impermeable surfaces or has been highly modified by earthmoving activities.

It should be noted that the proposed inland storage area was previously used as a solid waste disposal site, therefore the underlying soil has been covered with waste and capped with imported soil.

As described earlier, Oketol port is a man-made pier that is comprised of coral rock rip rap and fill material. The area includes a paved roadway, a basketball court and a concrete building. Refer to Figure 11 – Soil Map, below.
Figure 11. Soil Map
5. IMPACT ASSESSMENT
This section focuses in detail the anticipated physical, biological, health, and social impacts listed below, and include proposed mitigations measures:

1. Direct Impact
2. Water Quality
3. Endangered Species and Seabirds
4. Introduced Species
5. Sewage and Solid Waste
6. Traffic and Noise
7. Aesthetics and Long Term Planning
8. Social Impacts

5.1. Direct Impact

*Harbor Improvements – Dredging*

The proposed dredging at Oketol, Ollei and Ngerbau Ports are necessary improvements to facilitate boat traffic in and out of these ports. The proposed dredging will occur within existing navigational channels (Oketol and Ollei) and additional dredging activities such as the boat mooring area in Ollei Port and the new channels to Ngerbau Port are needed to improve navigation of boats at all tidal levels.

Direct impacts from this proposed dredging activity will be on areas with rubble, sand, seagrass and reef habitats. The direct impacts will primarily result from dredging of the substrate to provide a channel with adequate water depth for boat traffic. The approximate areas at each project site that will be directly impacted are as follows:

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>MARINE HABITAT IMPACTED (m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oketol</td>
<td>18,231</td>
</tr>
<tr>
<td>Ollei</td>
<td>22,928</td>
</tr>
<tr>
<td>Btil a rikl Channel/Ngerkeklau Is.</td>
<td>28,630</td>
</tr>
<tr>
<td>Ngerbau Navigational Channels</td>
<td>19,922</td>
</tr>
</tbody>
</table>

*Harbor Improvements – Land Reclamation*

As previously mentioned, the proposed fill activities at Oketol Port is needed to provide an area to accommodate a base of operations for the sand mining venture. A roughly 10,200 square meter area along the south side of the existing Oketol pier will be filled with the dredged marine material taken during the navigational channel improvements. It is estimated that approximately 44,800 yd³ (32,300 m³) of fill material will be needed to fill the proposed site to be at the same level with the existing road (pier) surface.

*Sand Mining*

Direct impacts resulting from the proposed mining of sand at the designated backreef areas will primarily be the removal of accumulated sand deposits in the area. The substrate at these areas is predominantly sand with very few coral colonies.

*Mitigation Measures*

During dredging activities, silt curtains will be deployed around the active work area prior to any disturbance. The silt curtains will be anchored so that it remains in place throughout the duration of the dredging activity. During the placement of the silt curtain, divers will inspect the area around the anticipated dredging site to make sure that the placement of the silt curtain anchors does not result in unnecessary harm to surrounding plant and animal life.

The proposed fill area at Oketol Port will be enclosed by silt curtains to prevent suspended sediment from leaving the immediate work area. Throughout the duration of the harbors improvements project, strict sediment control
practices must be implemented to protect the reefs, seagrass beds and lagoon from an excess of sediment from the dredging and fill activities proposed for all the sites. The project proponent will provide an erosion and sediment control plan (ESCP) that will be reviewed and approved by the EQPB. The sediment control plan will include a schedule of regular inspection, maintenance and repair of silt curtains. Extra precaution is required as portions of the sites during spring tides when tidal currents are strong in the channels. The silt fences need to be reinforced and maintained according to the direction of the water flow. Additionally, dredging activities may be timed during these times of strong currents to only occur during slack tides.

Land-based construction activities at the temporary stockpile areas and the inland storage area will be conducted in accordance with Palau National Code (PNC), Title 24, Chapter 1 - Earthmoving Regulations. At the least, installation of applicable erosion and sedimentation control measures will be installed prior to any land disturbance. A more thorough list of sediment control measures and BMPs will be included in the ESCP to be submitted to EQPB for review and approval.

For the sand mining activities, in addition to the established buffer zone around the entire sand mining areas, further sediment control measures and best management practices (BMPs) will be implemented to minimize the potential for suspended sediments to negatively affect surrounding marine areas. Measures include deployment of silt curtains around the active sand mining area, visual surveys of the immediate surrounding prior to starting mining operations, and suspension of mining activities during rough water conditions.

No long-term negative impacts are anticipated from the activities associated with the harbors improvement portion of this project. The sand mining operation will be operated in accordance with EQPB regulations and adhere to stringent standard operating procedures, including an EQPB-approved ESCP to minimize potential negative impacts to the surrounding environment. It is anticipated that the proposed sand mining operations will not result in any significant negative impacts to the marine environment and the State of Ngarchelong.

5.2. Water Quality
As mentioned previously in Section 4.3.1, the existing water quality classifications at the project sites include both Class B and Class A or AA. It is the objective that in Class A/AA waters, use for recreational purposes and aesthetic enjoyment shall not be limited in any way.

The uses to be protected in Class B waters are small boat harbors, commercial and industrial shipping, bait fishing, compatible recreation, over-water commercial or residential structures for recreational or domestic use, the support and propagation of aquatic life, and aesthetic enjoyment. “It is the objective for this class of waters that discharge of any pollutant be controlled to the maximum extent possible and that sewage and industrial effluent receive the highest degree of treatment practicable under existing technological and economic conditions, and shall be compatible with the standards established for this class.” (EQPB, 2013).

The proposed sand mining areas along the eastern and western backreef areas of the State will only be possible when the existing water classification is amended through a reclassification request from the State to EQPB. The Ngarchelong State Government will be working with EQPB on a regulatory amendment process to reclassify the existing water classification of the identified sand mining areas from Class A or AA to Class BB to allow the proposed sand mining activities to take place.

Mitigation Measures
The project proponent will ensure that the disturbed areas will be kept to the minimum necessary to accomplish the intended activities. Land-based construction activities will be protected through the use of silt fences, earth berms, plastic sheeting or any other applicable erosion control measures to ensure that stormwater effluent is treated prior to leaving the active work areas. Mitigation measures specified in Section 5.1 – Direct Impacts, also applies to this section, including the implementation of an EQPB-approved ESCP.
The applicant will ensure that all petroleum products and construction-related chemicals are properly stored and disposed of in accordance with EQPB regulations. Fueling of on-site machinery will utilize a spill pan placed below the fuel tank to contain any fuel that is accidentally spilled during refueling. In the event of a spill of fuel, oil or other hazardous material, the entire spill will be cleaned up immediately. Spills on land in excess of 50 gallons and/or spills of any quantity that enters and surface waters shall be reported to EQPB immediately. Spill cleanup kits shall be kept on-site and staff will be trained to use these kits should an accidental spill occurs at the work site.

As mentioned in the previous section (Section 5.1), the proposed fill area at Oketol Port and the active dredging areas will be enclosed by silt curtains to prevent suspended sediment from leaving the immediate work area. Additionally, safeguards at portions of the proposed channel dredge sites will be in place during spring tides. Silt fences will be reinforced and anchored properly to accommodate strong current conditions. Additionally, dredging activities may be timed to only occur at slack tides during these times of strong currents.

Sediment control measures will comprise mainly of silt curtains placed around the active sand mining area to contain suspended sand particles from being carried by currents outside the active mining area. The designated sand mining areas of the State will include a buffer zone of at least 100 feet (30m) along the entire boundary to allow suspended sand particles to settle to the sandy substrate and not coral colonies or other substratum beyond the sand mining area. The proposed areas for sand mining on the west and east coast of the State include only sandy bottom sites as indicated in Figures 8 and 9. The buffer zone will be located within these sandy bottom areas.

Erosion and sediment control measures need to be monitored on a daily basis and modified according to changing conditions on site. The frequency of inspections would be dependent on weather conditions and the effectiveness of the implemented measures based on visual surveys and the results of the monthly water quality measurements. If water quality parameters are unsatisfactory, the applied erosion control measures will be modified to address point sources of pollution identified on site under the guidance and approval of EQPB, the project proponent and the contractor.

A monitoring program for water quality of the adjacent marine areas will be implemented for the duration of this project. Regular water quality sampling will take place to ensure that sediment control measures are working effectively. The project proponent will work with EQPB to develop a water quality monitoring program. The project proponent will retain a biologist or engineer for the duration of the harbors improvements portion of the project to conduct the water quality monitoring, ensure compliance of permit conditions and collect water samples for analysis.

In regards to the harbors improvement activities, once the dredging activities are complete, it is expected that water quality in these areas will return to preconstruction conditions. No long-term negative impacts are anticipated from the activities associated with the harbors improvement portion of this project. As stated in the previous section, the sand mining operation will be operated in accordance with EQPB regulations and adhere to stringent standard operating procedures, including an EQPB-approved ESCP to minimize potential negative impacts to the surrounding environment.

5.3. Endangered Species and Seabirds
Two marine species that are considered endangered are known to inhabit and feed in the general area of the project sites. Marine turtles such as the Hawksbill Turtle – Ngasech (Eretmochelys imbricata) and the Green Turtle – Melob (Chelonia mydas) are found in general vicinity of the proposed project sites. Green turtles feed on the abundant seagrass in the inner reef and sleep in the deeper lagoons.

Dugongs – Mesekiu (Dugong dugon) are also observed in the seagrass beds of Ngarchelong State. The dugongs feed on the seagrass beds along the inner reef of the State.
The anticipated short-term impact to dugongs and turtles of the proposed project will be noise and disturbance resulting from dredging activities related to the channel improvements. Long-term impacts to dugongs and turtles will be the loss of feeding habitat as a result of the dredging of the channel improvements. The seagrass beds most affected by the channel improvements include the Btil a rikl Channel, Ngerkeklau Channel and Ngerbau Port Channel.

According to the National Oceanic and Atmospheric Administration (NOAA) benthic habitat map of Palau, there is approximately 8.38 km² (2,070 acres) of seagrass beds in the State of Ngarchelong. The estimated amount of seagrass area that will be impacted from the proposed channel improvements at Btil a rikl Channel (8,988 m²), Ngerkeklau (2,500 m²) and Ngerbau Port (6,950 m²) will be approximately 18,440 m². This represents approximately 0.2% of the total seagrass bed areas of the State.

During low tides, seabirds such as the Night Heron – *Melebaob* (*Nycticorax caledonicus*), Little Pied Cormorant – *Deroech* (*Microcarbo melanoleucos*) and other resident coastal birds can be observed in the shallow intertidal areas. According to Dr. Alan Olsen, the field ornithologist at the Belau National Museum, the shallow reef areas of Ngarchelong are not important habitat for migratory seabirds. The nearest important habitats are located further south closer to Ngiwal State.

**Mitigation Measures**

Mitigation measures for proposed project will include the following:

- A visual survey of surrounding waters immediately adjacent to the barge will be conducted to make sure that there are no dugongs, turtles or other wildlife near the work area.
- Silt curtains will be deployed around the immediate work area to contain suspended sand particles.
- The silt curtains will be observed constantly. Should excessive suspended sand/sediment is seen outside the silt curtain, work will cease immediately and the silt curtains will be adjusted or repaired before work is allowed to continue.
- Work will occur only during daylight hours to minimize nighttime feeding of dugongs.

As stated earlier, the area of seagrass beds impacted by this proposed project represents approximately 0.2% of the total area of seagrass beds in the State. It is anticipated that this project will not result in significant negative impacts to endangered species occurring in the marine area of the State.

5.4. Introduced Species

Introduction of foreign species of plants or animals can be a serious problem in Palau. The only species of concern was found at the inland storage area. The forest area surrounding this former solid waste was covered with *Kebeas* (*Merremia peltata*). As part of the work to develop this site as a storage area, this invasive species will be removed from the site.

The machinery and equipment that will be imported from outside will be brand new and not pose a threat of introducing foreign plants or animal species.

The proposed project is not anticipated to result in introduction of foreign species of plants or animals therefore no mitigation measures are proposed.

5.5. Sewage and Solid Waste

Ngarchelong currently does not have a sewage treatment facility, therefore the toilet facility to be built on-site at Oketol Port will utilize an on-site sewage disposal system (septic tank and leach field). The toilet facility will be designed to accommodate the 9 full-time employees and additional users who visit Oketol port. The design of the toilet facility will be included in the Toilet Facilities and Wastewater Disposal System Permit application to be
submitted to EQPB. Prior to the construction of the toilet facility, temporary portable toilets will be utilized. A private contractor will be hired to regularly maintain these portable toilets.

Solid waste produced from construction activities and the subsequent operation of the mining facility will be stored in approved waste containers on site. Solid waste will be regularly collected by the Ngarchelong State Sanitation Department. Any potentially hazardous waste material will be properly contained and disposed of at an EQPB-permitted waste disposal facility.

The proposed project is not anticipated to result in significant impacts to solid waste facilities. The design of the on-site toilet facility will be reviewed and approved by EQPB and therefore is not anticipated to result in significant negative impact to the surrounding surface waters of Oketol Port.

5.6. Air Quality, Traffic and Noise

The existing air quality at Oketol Port may be considered excellent. The port’s location away from land and lack of tall structures and vegetation allows for uninterrupted breezes to pass through the facility. Potential impacts to air quality at the site will be from exhaust generated by heavy equipment during construction and the subsequent operation of the sand mining facility. Intermittent generation of exhaust will be from dump truck arriving and leaving the baseyard to load sand.

Existing traffic to Oketol Port is mainly small cars and trucks of visitors to the port and larger vans and buses carrying tourists to the Blue Marlin tour facility. The proposed mining facility will result in larger dump trucks arriving and leaving the port to carry sand for construction purposes.

The normal operation of the mining facility will involve the use of heavy equipment such as dump trucks, and excavators. These heavy equipment will produce noise levels higher than the existing conditions. Dump trucks, coming from Koror or other parts of Babeldaob, to pick up sand from the facility and leaving will also temporarily increase noise levels.

In regards to the improvements of the harbors and navigational channels, this is not anticipated to increase the amount of vehicle and boat traffic in the area. The improvements will only facilitate the movement of existing boats moored at their respectable ports. Because of this, no mitigation measures are proposed for this particular portion of the project.

Mitigation Measures
Construction activities are expected to have little to no impact since the project will be of limited duration. During construction, fugitive dust is expected to be generated. Fugitive dust will be controlled with regular wetting of the soil by the contractor. In the long-term, mining operations may result in an increase in emissions from equipment and machinery however, improved operational efficiencies, equipment, and technology, as well as the use of cleaner burning fuels and adherence to air pollution controls and regulations would help to offset the increased emissions. Construction and operational impacts are not expected to be significant.

During construction, erection of signs and traffic management will be initiated to minimize impacts to the regular traffic. The operation of the facility will be from 8am to 5pm and therefore will not result in increased traffic and noise levels early in the morning and later in the afternoon. The facility will also be closed one day a week so that residents and visitors can utilize the port for leisure purposes.

The existing level of traffic at Oketol Port and Ngarchelelong in general is very low. Given the times of operation of the proposed sand mining facility, the project is not anticipated to result in significant impacts to the existing traffic volumes and noise levels at or near the project site.
5.7. Aesthetics and Long-Term Planning

The existing view at the site is of a mud flat and reef flat area next to Oketol Port (see Photo 12). The view after the project is complete and operational will add a filled portion of the mud flat and a sand mining facility. The most visible feature of the facility will be the stockpile of white sand waiting to be washed and transported to other places. Structures on site will include an office building and multiple freshwater tanks.

For all near-shore developments, it is imperative that sea level rise and the effects of global warming be seriously considered. The national and state governments have to prepare and execute plans to mitigate and adapt to this global phenomenon.

Mitigation Measures

Although the proposed sand mining facility at Oketol Port will alter the existing view of the area, is will not significantly diminish the view of the ocean and surrounding landscape. A port is an area that supports marine-related commercial and industrial activities. The proposed sand mining operation is an acceptable use at Oketol Port.

The design of the rip rap retaining wall and other structures will be able to withstand the predicted climate change impacts. The construction of the retaining wall will be solid enough to withstand strong storm events. The area will be filled to the same level of the existing pier to mitigate for possible flooding during storm events. The office building construction will include the use of hurricane clips and other reinforcement measures to strengthen the structure to better withstand high wind events.

5.8. Social Impact – Cultural, Economic and Political

A socio-economic survey was conducted as part of this project. Fourteen (14) interviews were conducted with individuals regarding the project. These individuals included artisanal fishers, State government representatives, State enforcement agency, State employees, and private business people in the State. All these interviewees had close relationship with the ports. The interviews were based on a prepared questionnaire. Refer to Appendix 3 – Socio-Economic Survey Questionnaire.

In addition to the questionnaire, comments were also received during three (3) public hearings in the State at the different locations.

Overall, there was overwhelming support for the project. The majority of the interviewees were very pleased about the possibility of improving the ports and navigational channels. Some of the interviewees stated that they have been waiting a long time to have the ability to come in and out of the ports (particularly Ollei and Ngerbau) at any time regardless of the tidal condition. Some commented that the additional funds that the State government receives from the sale of sand will allow for improvements in infrastructure and services to Ngarchelrong residents.

Other positive impacts offered by interviewees and community members included the following:

- Saving of fuel from not having to travel around Ngerchur Island to reach the opposite coast;
- Port and channel improvements could lead to more tourism-based businesses opening up in the State;
- The port improvements will facilitate easier and more effective surveillance and search and rescue operations of the State Rangers;
- Easier access to sand for local construction projects; and
- The dredging at the channel entrance in Oketol will allow for better flushing of the channel and therefore improve water clarity around the port.
Concerns expressed by the interviewees and community members about the proposed project included the following:

- The project needs to be done right so that “politics” does not ruin or influence the project;
- The project needs to offer equal benefits to all residents, i.e. no favoritism;
- Potential negative impacts to cultural practice of gleaning on the reef flat;
- Potential negative impacts to invertebrates (corals, clams and sea cucumbers) in the impacted area;
- Several residents of the eastern villages were concerned about the impact to a particular sea cucumber (*Sekesaker*) which they harvest in the seagrass area near Ngerbau Port; and
- Concerns raised regarding the potential negative impacts to sea turtles and dugongs.

**Mitigation Measures**

To address the concern of “politics” ruining the project and favoritism, the mining company will be run independent of the State and therefore will not be influenced by the whim of the State leadership. The goal of the venture is to make a profit to pay off the initial capital investment. It will be in the interest of the State to make sure that company succeeds so that the State can receive its share of the earnings.

In regards to cultural activities on the reef flat and seagrass areas, the project will not impact reef flat areas that are good gleaning areas. As for the impact to seagrass areas, the seagrass areas that will be converted into navigational channels represent approximately 0.2% of the total seagrass area of the State.

A meeting with fishers from Ngerbau was held to discuss their concerns on the initial proposed alignment of the channel leading into Ngerbau Port. It was agreed that the alignment be altered to minimize storm surge into the mooring area. The realigned channel also avoids the main gleaning area for *sekesaker* sea cucumber.

As for potential impacts to sea turtles and dugongs, please refer to **Section 5.3. Endangered Species and Seabirds** for mitigation measures for these species.

Concerning impacts to historic properties, the project site in Ollei Port has been altered to avoid any direct impact to the sunken Japanese seaplane located near the entrance to the channel. The Historic Preservation Office (HPO) will be consulted regarding the WWII seaplane and any other potential impacts to historic properties within the project areas. A historic clearance will be sought from the HPO for this project.

This project is expected to have no significant negative cultural, economic and political impacts. On the contrary, the project is expected to result in positive benefits to cultural practices and economic stability of the State. The project will improve the harbors and navigational channels and promote a better fishing and tourism industry in the State. It will help improve the Ngarchelong State Rangers in their surveillance and search and rescue operations. The profits derived from the sale of the mined sand will provide additional funds to the State so that it can improve infrastructure and services to its residents.

**5.9. Cumulative Impact**

This project involves dredging activities to improve existing harbor facilities in Ngarchelong State. Additional navigational channels are also planned to provide better access to and from these harbors. The sand mining activities are expected to remain in the designated areas on the east and west side of the State. The proposed project in and of itself is not expected to result in impacts greater than what has been evaluated in this section of the document.

The improved harbors and channels are not intended to result in additional actions or activities beyond improving accessibility to the harbor facilities of the State. The potential cumulative impact resulting from the sand mining operations is better accessibility for sand material for construction purposes, however this impact to Palau’s construction industry is beyond the scope of this study.
6. SIGNIFICANCE CRITERIA

In accordance with the provisions set forth in PNC Title 24, the Environmental Quality Protection Act, and the rules and regulations promulgated thereunder, this Draft EA has preliminarily determined that the project will have no significant adverse impact to air and water quality, existing utilities, noise, archaeological or cultural sites, or wildlife habitat. All anticipated impacts will be temporary and will not adversely impact the environmental quality of the area.

According to the Significance Criteria:
1. Involves an irrevocable commitment to loss or destruction of any natural or cultural resource;
The proposed project is not anticipated to adversely impact any natural or cultural resources. The sites for the harbors and navigational channels improvements will be kept to the minimum necessary to accomplish the proposed activities. The portion of the seagrass beds to be impacted, which are important fishing grounds and feeding habitat for endangered dugongs and turtles, represents only 0.2% of the total area of seagrass in the State. Once the channel improvements are complete, there will be no further disturbance activities in these areas. Besides the WWII seaplane wreck, no other significant archaeological or cultural sites are anticipated to be discovered. However, in the unlikely event that any cultural or historic resources, work will immediately cease and the HPO will be consulted. The HPO will furnish further instructions regarding the treatment of the find and the conditions when work may resume.

2. Curtails the range of beneficial uses of the environment;
The proposed harbor improvement activities will facilitate the long term use of the existing harbor facilities and will not curtail existing surrounding land uses. The sand mining operations will temporarily occupy an existing open space at Oketol Port for stockpiling dredged sand during the harbor improvements. Once the permanent baseyard has been constructed, all mining activities will be relocated to and confined to the baseyard and not intrude into the other spaces at the port. The temporary stockpile area will be restored back to open space.

3. Conflicts with the Republic of Palau’s long-term environmental policies or goals and guidelines;
The proposed project is consistent with the environmental policies, goals and guidelines as delineated in PNC Title 24, the Environmental Quality Protection Act, and the rules and regulations promulgated thereunder, and as documented in this EA. The goal of the proposed project is to improve accessibility and safety to existing harbors of Ngarchelon State and provide valuable raw materials to support the construction industry and further the development of Ngarchelon State and the Republic of Palau.

4. Substantially affects the economic or social welfare of the community;
The proposed project is expected to have beneficial effect on the social and economic welfare of the Ngarchelon community. In general, the planned harbor and channel improvements will serve to meet the level of service needs for the existing harbors. These improvements will result in increased safety and convenience for boaters in the State. Further, these improvements will aid the Ngarchelon State Rangers in their surveillance and search and rescue operations. The proposed improvements project will not, by itself, stimulate economic growth and welfare. It will, however, accommodate current and future uses associated with the operation of the three ports in Ngarchelon State.

The proposed sand mining operation is anticipated to result in additional funds for the Ngarchelon State government in the form of profit sharing from the joint venture agreement. These additional funds will allow the State to better serve its citizens. Additionally, the mined sand will also be available to Ngarchelon residents at a discounted cost.

5. Substantially affects public health;
The proposed project will be developed in accordance with EQPB rules and regulations governing public safety and health. Potential sources of adverse impacts have been identified and appropriate mitigative measures
developed. The primary public health concerns are anticipated to involve water quality, noise, and traffic impacts. However, it is expected that these impacts will be either minimized or brought to negligible levels by the appropriate use of the mitigation measures described in this document.

6. Involves substantial secondary impacts, such as population changes or effects on public facilities or infrastructure;

The proposed project will not, by itself, stimulate unexpected changes in population. It will, however, accommodate current and future use of the ports by residents and visitors to the State. The sand mining operations will be situated in a reclaimed area at Oketol Port and will not impede the current use of the port. The personnel needed for the sand mining operation will be nine (9) persons, some of which may already be residents of the State. Therefore the proposed project is not expected to result in adverse effects to population changes or effects on public facilities.

7. Involves a substantial degradation of environmental quality;

The proposed project will be developed in accordance with the environmental policies of EQPB. The analysis provided in this EA indicates that no substantial environmental degradation is anticipated or expected.

8. Is individually limited but cumulatively has considerable effect upon the environment or involves a commitment for larger actions;

The proposed harbors and navigational channel improvements project addresses the need for waterway improvements and represents the State’s commitment to maintaining efficient and safe transportation infrastructure. It is being developed as an effort to maintain and upgrade the existing ports to meet current and future service demands.

The proposed sand mining operations will be limited to the identified sand mining areas and the baseyard/storage facilities planned for Oketol Port. These areas will be adequate to meet the needs of the mining operations. The additional availability of marine sand for the construction industry may result in a lower price, however development and construction activities in Palau will still require approval from EQPB (and other agencies) and not solely dependent on the price of raw materials. The proposed project will not by itself, involve a commitment for larger actions.

9. Substantially affects a rare, threatened, or endangered species, or its habitat;

The direct impact to seagrass beds, which are sea turtle and dugong feeding grounds, is very small compared to the total seagrass habitat within Ngarchelong State. The area of seagrass beds that will be impacted by channel improvements is approximately 18,440 m², which is about 0.2% of the total seagrass area of the State. The impact is limited in scope and once the channel improvements are complete, the noise levels and human activity in the areas will return to pre-construction conditions.

10. Detrimentally affects air or water quality or ambient noise levels;

Any potential for adverse impacts to air, water quality, or noise levels will be addressed by use of appropriate mitigative measures as described in this EA.

11. Affects an environmentally sensitive area such as a flood plain, erosion-prone area, geologically hazardous land, estuary, lagoon, reef area, mangrove swamp fresh water, or coastal waters;

The proposed project will be located in multiple areas. Some areas are already in use as access channels to existing boat harbors. The area to be reclaimed for the baseyard is an intertidal mudflat adjacent to the existing port that has very little coral and seagrass cover.

The impact to existing seagrass beds as a result of channel improvements is limited in scale and the proposed sand mining areas contain only sand with very little to no coral habitat.
7. REFERENCES


Republic of Palau. PNC Title 24, the Environmental Quality Protection Act.


APPENDIX 1

Joint Venture Agreement
JOINT VENTURE AGREEMENT

This Agreement is entered into by and between RAM Corporation P.O. Box 10107, Palau, PW 96940 ("RAM") and Ngarchelong State Government P.O. Box 1504, Palau, PW ("NSG").

RECITALS

a. RAM desires to engage in a commercial sand mining operation in the waters of Ngarchelong State.

b. NSG has the need for mined sand and for a new source of revenue to support its programs.

c. RAM and NSG desires to form a joint venture for the foregoing purposes under the terms and conditions set forth herein.

Now, therefore, in consideration of the mutual covenants set forth herein, the sufficiency of which is acknowledged, the parties agree as follows:

1. Scope and description. The parties hereby create a joint venture to mine sand in the marine waters of Ngarchelong State for sale for profit. The joint venture shall be conducted under the name of _____________________.

2. Contribution. The parties shall contribute to the joint venture as follows:

(i) RAM:
(a) All dredging machines, barges, and other machinery, equipment, tools, vessels and vehicles that are necessary or desirable to carry out the sand mining operation. Legal title to such property shall remain in RAM; and
(b) All cash expenditures required in order to establish and fully license the sand mining operation.

(ii) NSG:
(a) All Palau government licenses, approvals, and permits, including but not limited to an earthmoving permit from the Palau Environmental Quality Protection Board and any required clearances from the Palau Historic Preservation Office as may be necessary to conduct the sand mining operation; provided, however, that RAM shall pay all fees and expenses incurred in obtaining such licenses, and permits, including the costs of any environmental studies or assessments as may be required for such purpose;
(b) A suitable marine site or sites of size and conditions acceptable to RAM for the mining of sand, to be provided free of charge to the joint venture;
(c) Suitable, safe, secure, and convenient dockside mooring facilities acceptable to RAM for the machinery and equipment utilized by the joint venture for the sand mining operation, to be provided free of charge to the joint venture;

(d) A suitable, safe, and secure, and convenient site, acceptable to RAM, of not less than 10,000 square meters, to be utilized for the joint venture’s sand stockpile, to be provided free of charge to the joint venture.

3. **Conduct of joint venture.** RAM shall be responsible for the management of the joint venture’s business. RAM shall consult with NSG, represented by its Governor and as requested, concerning the management of such business.

4. **Term; approval of Legislature.** The term of this Agreement shall be fifty (50) years, commencing the later of (i) the date of the approval hereof by the Ngarchelong State Legislature in accordance with Article VII, Section 9 of the Ngarchelong Constitution, which approval shall be obtained by NSG as soon as is reasonably practicable, or (ii) the date of the grant of a Foreign Investment Approval Certificate to RAM by the Foreign Investment Board as provided by Section 5 below.

5. **Foreign Investment Approval Certificate.** RAM shall apply and obtain a Foreign Investment Approval Certificate from the Palau Foreign Investment Board to enable it to engage in the joint venture and sand mining operation provided for by this Agreement. NSG shall provide reasonable support for such application.

6. **Apportionment of profits.** The net profits earned by the joint venture, calculated on a fiscal year basis, shall be divided between the parties as follows: sixty-five percent (65%) to RAM, and thirty-five percent (35%) to NSG. In the determination of net profits, the depreciation of the physical assets provided by RAM and utilized by the joint venture hereunder shall be treated as an expense of the joint venture. Such depreciation shall be calculated in accordance with generally accepted accounting principles. Not later than ninety (90) days prior to each ten (10) year anniversary of the commencement date of the term hereof, the parties may meet to discuss the progress and terms of this joint venture and the prospects of pursuing any other future business activities through the joint venture.

7. **Losses.** RAM shall cover, as necessary, any fiscal year net losses of the joint venture once the joint venture and actual mining operations commence, and the amounts of any such sums actually expended by RAM shall be reimbursed from future fiscal year profits.

8. **NSG sand purchases; sales for Ngarchelon projects.** NSG will be able to purchase mined sand produced by the proposed joint venture at a discounted rate to be agreed by the parties.

9. **Records and accounting.** RAM shall maintain or cause to be maintained a complete set of records, statements, and accounts concerning the total operation of the joint venture, in which books shall be entered, fully and accurately, each transaction pertaining to the venture. All the books will be open at all times for inspection and examination by NSG or its agent. The fiscal year of the joint venture shall commence on ___________ and close on ___________ of
each year of operation. All accounting based on fiscal year figures shall be completed within thirty (30) days after the close of the fiscal year.

10. **Assignments and transfers.** Neither party shall assign or transfer its rights or duties in the joint venture without the express written consent of the other party. Any transfer or assignment made without the consent of the other party shall not relieve the transferor or assignor of his or her duties or obligations under this agreement.

11. **Time of essence.** Time is of the essence of this Agreement and the performance of the parties’ respective obligations hereunder.

12. **Authority.** Each party warrants that it has full legal authority to enter into this Agreement, and that, other than is expressly provided herein, there are no further actions or approvals required by law or otherwise in order for it to be bound by the Agreement and to render its required performance hereunder.

13. **Interpretation.** This Agreement shall be exclusively interpreted, construed and enforced under the laws of the Republic of Palau. The parties hereby consent to such governing law. This Agreement is executed in, and shall be exclusively controlled by; and interpreted according to the English language and shall be construed fairly, with no inference drawn against the drafting party.

14. **Additional documents.** Each party agrees at the request of another party, or its agents or attorney(s), to execute any and all additional documents reasonably necessary to perfect and/or otherwise effect this Agreement’s provisions.

15. **Entire Agreement.** This Agreement sets forth the parties’ entire Agreement and understandings regarding the subject matter herein and merges, supersedes, terminates and replaces all of the parties’ prior Agreements, writings, commitments, discussions and understandings with regard thereto. Its terms are contractual and not a mere recital, and it shall not be amended, modified or superseded unless in a writing signed by the parties.

16. **Binding effect.** This Agreement shall bind, and inure to the benefit of, the parties, and the parties’ respective heirs, assigns, successors-in-interest, and legal representatives, subject to any and all assignment restrictions set forth herein. The foregoing notwithstanding, this Agreement is not a third party beneficiary contract and shall not be construed to be for any third party’s benefit, and no third party shall have any claim or right of action hereunder.

17. **Waiver.** No delay, omission or failure to exercise any right or remedy provided for in this Agreement shall be deemed to be a waiver thereof or an assenting to the event giving rise to such remedy, but every such right or remedy may be exercised as the party exercising such right or remedy deems expedient. All such remedies shall be cumulative and non-exclusive.

18. **Notices.** Any notice required by this Agreement or given in connection with it shall be in writing to the respective address set forth above and effective on confirmed delivery to the
appropriate party by personal delivery or three (3) business days after being sent via first class mail postage prepaid.

19. **Effect of partial invalidity.** The invalidity of any portion of this Agreement will not and shall not be deemed to affect the validity of any other provision. In the event that any provision of this Agreement is held to be invalid, the parties agree that the remaining provisions shall be deemed to be in full force and effect as if they had been executed by both parties subsequent to the expungement of the invalid provision.

20. **Attorney fees.** In the event that any action is filed in relation to this Agreement or between of the parties hereto, the unsuccessful party shall be liable for, in addition to all the sums that any party may be called on to pay, a reasonable sum of the successful party’s attorney fees.

21. **Paragraph headings.** The titles to the paragraphs of this Agreement are solely for the convenience of the parties and shall not be used to explain modify, simplify, or aid in the interpretation of the provisions of this agreement.

22. **Understanding.** Each party has: (A) read and understands this Agreement and agrees to all of its terms and conditions; (B) independently evaluated the desirability of entering into this Agreement and is not relying on any representation, guarantee or statement not set forth herein; and (C) been afforded the opportunity to consult legal counsel with respect to its rights and obligations set forth in this Agreement (and has accepted or refused such counsel) and accordingly has negotiated this Agreement.

IN WITNESS WHEREOF, the parties hereto have set their respective hands hereunto on the date(s) set forth below.

**NGARCHELONG STATE GOVERNMENT**

Browny Salvador
Governor
Date: **August 8, 2017**

**RAM CORPORATION**

Michinori Shimizu
President
Date: **August 8, 2017**
APPENDIX 2

18th Ngarchelong State Assembly Resolution
A RESOLUTION

To confirm, approve, and acknowledge the collective efforts from the Office of the Governor of Ngarchelong State, The Eighteenth Ngarchelong State Assembly and RAM Corporation to enter into this Joint Venture Agreement to seek ways to improve the economy in Ngarchelong State through commercial sand mining operations.

INTRODUCED BY: Assemblyman Jason Ngiratrang

DATE INTRODUCED: August 10, 2017

ASSEMBLY ACTION

DATE INTRODUCED: August 10, 2017
REFERRER TO: None
STAND. COMM. REP. NO: None
ADOPTION OF COMM. REP: None
RESOLUTION ADOPTION: August 10, 2017

[Signature]
Imengel Mai
Assembly Clerk
EIGHTEENTH NGARCHELONG STATE ASSEMBLY
SIXTH SPECIAL SESSION, AUGUST, 2017

A RESOLUTION

To confirm, approve, and acknowledge the collective efforts from the Office of the Governor of Ngarchelong State, The Eighteenth Ngarchelong State Assembly and RAM Corporation to enter into this Joint Venture Agreement to seek ways to improve the economy in Ngarchelong State through commercial sand mining operations.

BE IT RESOLVED BY THE PEOPLE OF THE STATE OF NGARCHELONG REPRESENTED IN THE ASSEMBLY.

1. WHEREAS, the 18th Ngarchelong State Assembly recognizes that the owner of RAM Corporation, Michinori Shimizu, and the Governor of Ngarchelong State, Browny Salvador, have signed a Joint Venture Agreement dated August 8, 2017; and

2. WHEREAS, in consideration for the generosity set forth by RAM Corporation, the 18th Ngarchelong State Assembly recognizes and approves the terms stated in the Joint Venture Agreement signed by both parties and supports said agreement in its entirety; and

3. WHEREAS, the 18th Ngarchelong State Assembly agrees with the Governor and urges all parties involved to undertake to the best of their abilities to ensure a solid revenue source to the State is achieved and employment opportunities are created for the people of Ngarchelong State; and

4. WHEREAS, the docks within Ngarchelon State are in need of dredging to allow for more access and possibilities of utilization by more vessels of all sizes; and

5. WHEREAS, the 18th Ngarchelon State Assembly recognizes the need for sand aggregate to the construction industry throughout Palau and see the significant financial benefit to Ngarchelon State and its residents, to include shall receiving a discount on the purchase of said aggregate; and

NOW THEREFORE, BE IT RESOLVED, that the 18th Ngarchelon State Assembly through this Sixth Special Session on August, 2017, hereby affirms the entire
agreement entered into between RAM Corporation and the Ngarchelong State Government;

BE IT FURTHER RESOLVED, that certified copies of this Resolution be transmitted to the Governor of Ngarchelong State, Chief Uong Er Etei, RAM Corporation, and the Delegate of Ngarchelong State to the House of Delegates, 10th Olbiil Era Kelulau.

Adopted: August 10, 2017

Attested by:

[Signature]

Ichad ra Butelbai Mathias Erbai
Speaker

Authenticating Signature:

[Signature]

Imengel Mai
Assembly Clerk
APPENDIX 3
Socio-Economic Survey Questionnaire
Ngarchelong Harbors Improvement and Sand Mining Project
Socio-economic Survey

NAME:____________________________________    DATE:__________________

1. Are you aware of this proposed harbors improvement and sand mining project?

2. What is your connection to (or use of) the harbor (Oketol/Ollei/Ngerbau)?

3. How often do you utilize the harbor facility?

4. What do you anticipate as potential positive impacts of this project to you?

5. What do you anticipate as potential positive impacts of this project to the community/State?

6. What do you anticipate as potential negative impacts of this project to you?

7. What do you anticipate as potential negative impacts of this project to the community/State?

8. Do you have any other comments to offer regarding this proposed project?