

**1. PROJECT DESCRIPTION****1.1. PROJECT FACT SHEET**

<b>Project Proponent</b>	BBG Greenworld Resources, Inc.		
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<b>Authorized Representative / Contact Person</b>	<b>Rolando F. Fantone</b> <i>Acting President</i> BBG Greenworld Resources, Inc. Address: same as the above Contact Number: 0917-827-7788 E-mail Address: rffantone@yahoo.com		
<b>Authorized Representative for ECC application</b>	<b>Mr. Joel A. Espineli</b> <i>President</i> Philkairos, Inc. JE Business Center, Pinesville Road corner Ortigas Avenue Extension, Taytay, Rizal, 1920 Contact Number: (02) 706-4008 / (02) 727-9005 Email Address: admin@philkairos.com		
<b>Project Name</b>	Proposed Abulug River Desilting and Flood Control Project		
<b>Project Location</b>	Municipality of Abulug, Province of Cagayan		
<b>Project Type</b>	Extraction		
<b>Project Area</b>	Abulug River, Abulug, Cagayan Valley		
<b>Project Capacity</b>	22,524,981.10 cu.m. (Total for Offshore & River Desilting)		
<b>Project Components</b>			
	<b>Description</b>	<b>Quantity</b>	<b>Capacity</b>
	<b>Offshore Desilting</b>		To be subcontracted as desilting at sea requires heavy duty equipment & lots of technical expertise
	Desilting Sea Vessel	1-2	6000 m <sup>3</sup> /hr
	Trans-shipment Conveyor Barge	1	1500-2000MT/hr uploading rate
	Shuttle Conveyor Barge	3-4	1500-2000MT/hr uploading rate, carrying capacity abt 2000-3000 cu.m.
	<b>River Desilting</b>		Based on own equipment & project team
	Desilting Vessel with Water Jet Mechanism or Cutter Head	1	4000m <sup>3</sup> /hr
	HDPE Pipes	1	1.4-2.0 km length
	Conveyor Trans-shipment Barge	1	1500-2000MT/hr uploading rate
	Shuttle Conveyor Barge	2	1500-2000MT/hr uploading rate, carrying capacity abt 2000 cu.m.
	Stockpile Area	1	3.77 million m <sup>3</sup> , equipped with conveyor belts
	Floating Dock	1	Old barge to be tied to shore, to be used as jetty for shuttle barge
	Trommel Screen	4	Capacity 600MT/hr each
	Sand Washer	12	Capacity 200MT/hr each
	Dump Trucks	2	20-30MT each
	Frontloader	4	CAT970 & Bobcat
	Generator Set	3 sets	Sand processing (1800KW), stockpile (800KW), office & other facilities (300KW)

	Magnetic Separators	OPTIONAL: 6	This only applies to river sand dredged from inside the Abulug River. If customers of the river sand require to lower the iron contents of the sand, then the river sand dredged would undergo the magnetic separators. The amount of black sand extracted is expected to be very small. It would be stored in the spoil area.
EIS	New Application		

1.2. PROJECT LOCATION

The proposed Abulug River Desilting and Flood Control Project (herein after referred to as the "Project") of BBG Greenworld Resources Inc., (herein after referred to as the "Proponent") will cover stretches of the Abulug River within the jurisdiction of the Municipality of Abulug, Province of Cagayan (as shown in Figure 1).

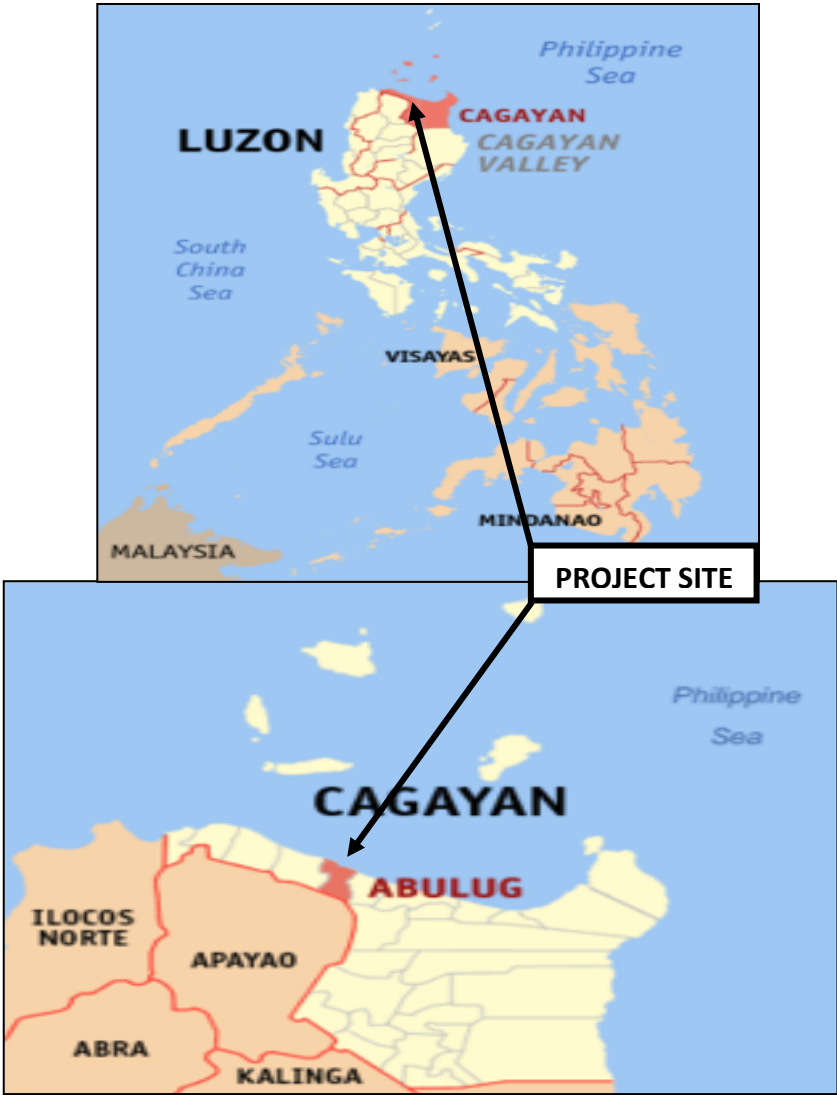


Figure 1: Location Map of the Project Site

The Project will cover a 3.5 kilometer stretch of Abulug River main channel tributary with an extension of 2.0 kilometers off-shore for: a) accessibility to the project site, b) smoothening the flow of the river water into the sea, and c) facilitating transportation of the desilted materials from the stockpile/processing site at shore to the ocean vessels at anchorage **(as shown in Figure 2)**. It is within the jurisdiction of the Municipality of Abulug, Province of Cagayan. Sta.0+000 is reckoned at the river mouth of the Abulug River main channel.

The Project covers the barangays that straddle the banks of the Abulug River in the Municipality of Abulug. These include Barangays Alinunu, Dana-ili, Sto Tomas, Poblacion Centro and Siguiran. The Abulug River, which drains into the Babuyan Channel, has a total drainage/catchment area of 3,372 sq. km, river length of 175 km and average riverbed slope of 1/146.



**Figure 2: Abulug River Main Channel Tributary**



**Figure 3: Aerial Photo of the Project Site**  
(Taken at the mouth of the river, going inward of Abulug River)



**Figure 4: Aerial Photo of the Project Site**  
(Taken at the mouth of the river, showing the left portion of Abulug River)





**Figure 5: Aerial Photo of the Project Site  
(Taken at the mouth of the river, going seaward)**



**Figure 6: Aerial Photos of the Project Site  
(Taken at the mouth of the river, showing the right portion of Abulug River)**

### 1.3. DIRECT AND INDIRECT IMPACT AREAS

Based on Annex 2-2 of the Revised Procedural Manual (RPM), Sec 3.a, the Direct Impact Area (DIA) is defined as “the area where all project facilities are proposed to be constructed/situated and where all operations are proposed to be undertaken”. In accordance with the definition cited therewith, the DIA is the 2km offshore area from the mouth of Abulug River and 3.5km inside the Abulug river delta, to the northern tip of the Grandia Island.

On the other hand, Indirect Impact Areas (IIA) are areas located immediately outside the coverage of the project facilities, operations and activities. Specifically, these are the communities/barangays outside the project area that will be affected by the Project. These impacts can be assumed or determined using indirect data, maps, and information from key informant interviews. The Indirect Impact Areas are those which may experience and affected by the residual effect of the flood control and desilting operation, such as but not limited to generation of noise due to the desilting activity and usage of heavy equipment and machineries. Below shows the initial delineation of the project impact areas (**Figure 7**).

**Table 1: Impact Areas of the Proposed Project**

Area Classification	Area Coverage
<b>Direct Impact Areas (DIA)</b>	<b>In terms of biophysical impact:</b> <ul style="list-style-type: none"> <li>➤ The 2 km offshore area from the mouth of Abulug River and the 3.5 km inside the Abulug river delta, to the northern tip of the Grandia Island</li> </ul>
	<b>In terms of socio-cultural impact:</b> <ul style="list-style-type: none"> <li>➤ Brgys. Alinunu, Poblacion Centro, Siguiran, Dana-Ili and Sto.Tomas are the primary beneficiaries of the Social Development and Management Programs (SDMP).</li> </ul>
<b>Indirect Impact Areas (IIA)</b>	<b>In terms of biophysical impact:</b> <ul style="list-style-type: none"> <li>➤ The adjacent barangays within the 1km radius outside the Direct Impact Area.</li> </ul>
	<b>In terms of socio-cultural impact:</b> <ul style="list-style-type: none"> <li>➤ Adjacent barangays other than the primary beneficiaries of the SDMP that will benefit from potential revenues and taxes of the project.</li> </ul>

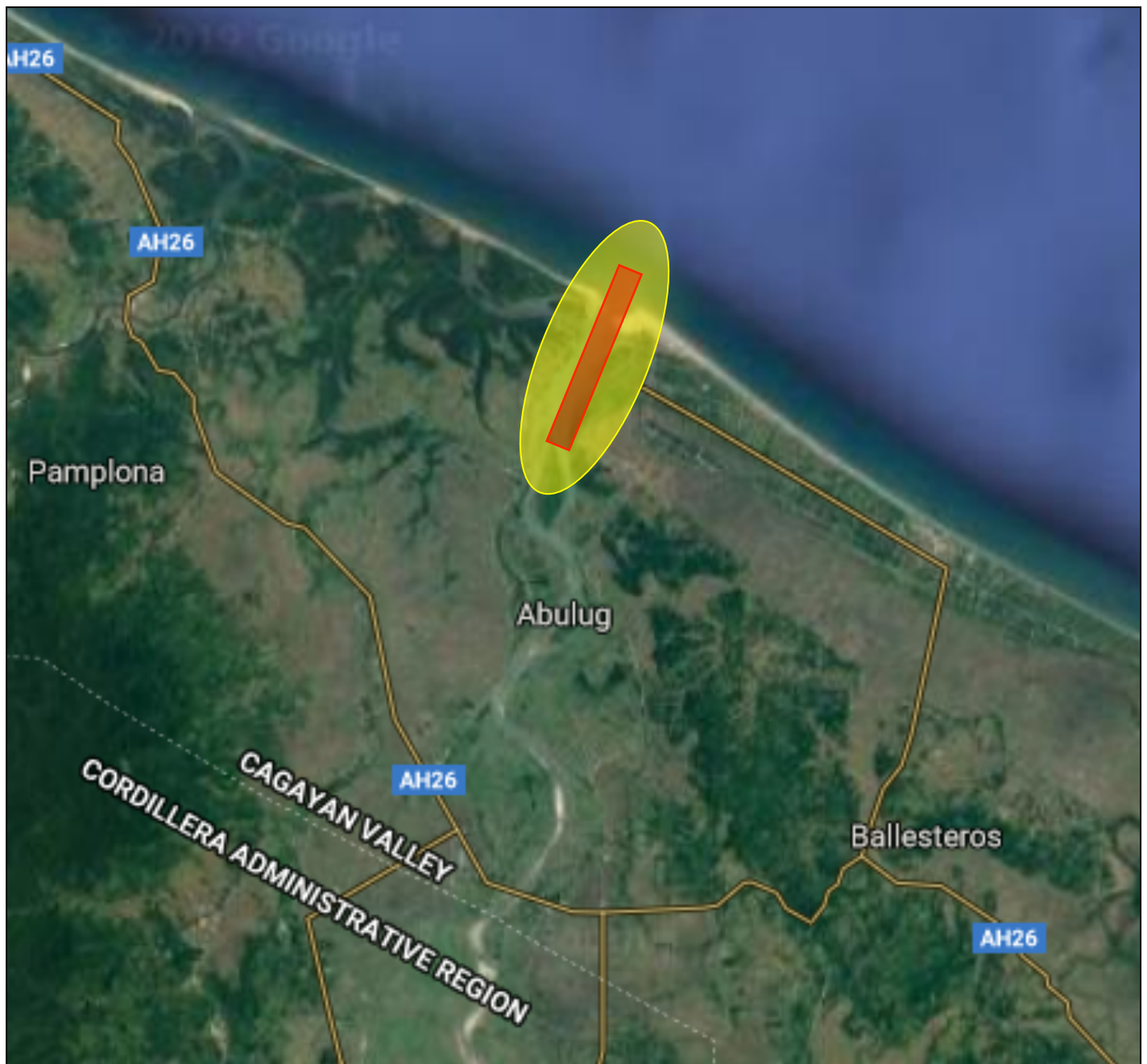
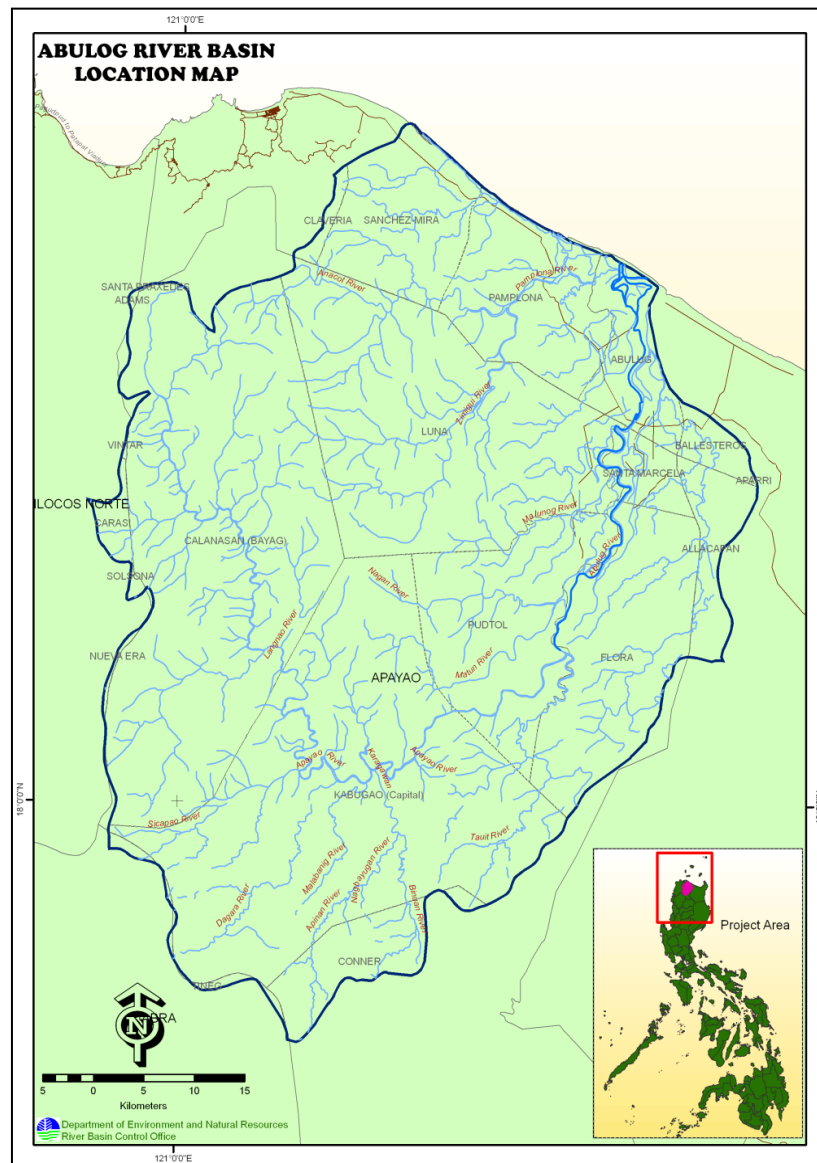


Figure 7: Direct Impact Area (Red) and Indirect Impact Areas (Yellow)

#### 1.4. PROJECT RATIONALE

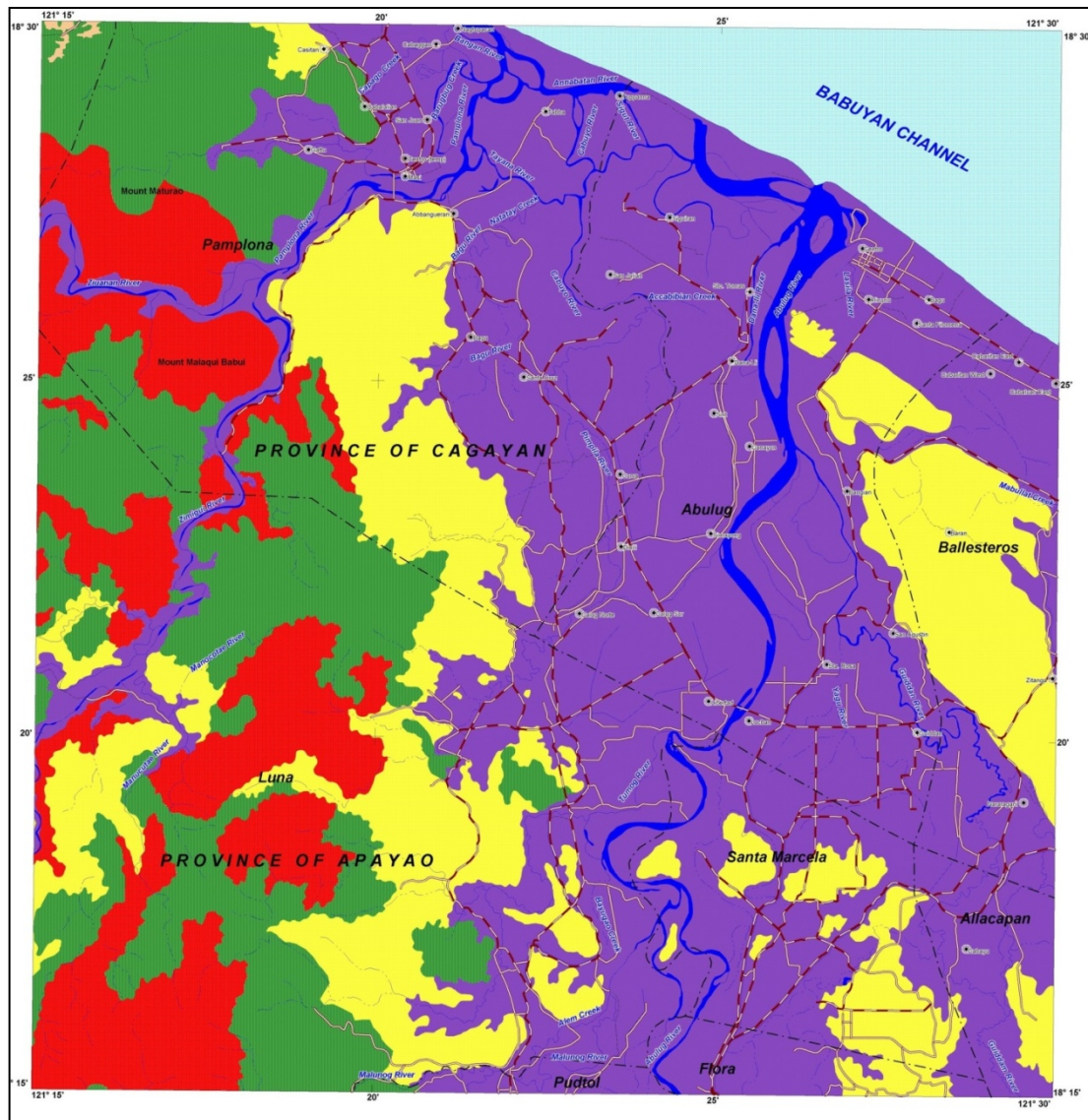
The Abulug River Basin (**Figure 8**) is the second largest river basin in the Cagayan Region next to the Cagayan River (the largest river basin in the country). Its watershed is located in the Cordillera traversing the Provinces of Apayao, Kalinga and Mountain Province. The watershed is dubbed as the watershed cradle of Northern Luzon. However, recent years have shown the dwindling forest cover and denudation of various parts of the watershed. The denuded condition increases the sediment production in the area which are then transported towards the downstream areas. In terms of climatic conditions, the river basin belongs to the Type-III climate in which the seasons are not very pronounced, relatively dry from November to April and wet during the rest of the year. Annual rainfall as high as 4,000 mm are recorded in mountainous areas, whereas 2,000 mm are recorded on the north plain.



**Figure 8: Location of Abulug River Basin (DENR-RBCO, 2010)**



Intense and long-duration rainfall coupled by the sediment production, transport and deposition in the downstream area of the river basin is considered as the main cause of flooding in the area. Based on the geohazard map (**Figure 9**), prepared by the Department of Environment and Natural Resources - Mines and Geosciences Bureau (DENR-MGB), the adjoining areas of Abulug River especially in the downstream are highly susceptible to flooding, i.e., areas with flood heights higher than one (1) meter.



**Figure 9: Abulug Quadrangle Geohazard Map (MGB, 2011) showing areas with high susceptibility to flooding (shaded violet) and areas with high landslide susceptibility (red) and moderate landslide susceptibility (green) and low landslide susceptibility (yellow).**

Aside from overflowing of the main channel of Abulug River leading to flooding of adjoining areas, various stretches of the river is also severely eroded by the flood flows especially in outer part of the river bends.

Flooding has been a recurring problem along the flood plains of Abulug River especially along its lower reaches where constrictions due to sand bar built ups and decreased discharge capacity due to the heavily-silted nature of the river channel occurs. The asymmetrical nature of the River has drastically reduced its discharge capacity (flow rate) causing perennial and large-scale flooding and riverbank erosion in the Municipality of Abulug. The phenomena led to the loss of vast tracts of land, damages to agricultural products, loss of business opportunities and destruction and/or damages to infrastructures, buildings and houses equating to significant economic losses.

## 1.5. PROJECT ALTERNATIVES

### 1.5.1. Project Impact Analysis

Desiltation operations are site specific, because such activities can only be undertaken in bodies of water in which increased amounts of sand, mud and other sediments are present. The Project is targeted to increase the flood conveyance capacity of the downstream stretch of Abulug River by increasing the river's cross-section by desilting works. The flood inundation area is drastically reduced as shown in the following figures of without and with improvement scenarios (**Figures 10 and 11**).



**Figure 10: Inundation Area without improvement**



**Figure 11: Inundation Area with improvement**

The Project also involves offshore desilting for establishing a 2.0 km channel (700 m width) from the river mouth to allow access of the desilting vessels and barges to the Abulug River and for smoothening the flow of river water into the sea. It is expected to complement the proposed fish port in the Municipality of Abulug, the subject of House Bill No. 653 under the Sixteenth Congress introduced by Rep. Baby Aline Vargas-Alfonso. The proposed fish port is expected to improve the income of the fishfolks in the locality.

### 1.5.2. Design Analysis

#### a). Flood Runoff Analysis

Flood runoff analysis was conducted using the Hydrologic Engineering Center – Hydrologic Modeling System (HMS) software considering the catchment of the Abulug River Basin is more than 100 sq. km. To comply with the updated DPWH guidelines, a 100-year return period design discharge was determined thru the analysis and then utilized in the succeeding flow/hydraulic analysis.

#### b). Hydraulic Analysis

Flood simulation was conducted using one-dimensional flow analysis, i.e., Hydrologic Engineering Center-River Analysis System (HEC-RAS) software. The analysis uses non-uniform flow conditions wherein river/creek cross-section data are obtained from the hydrographic/topographic and cross-section survey.

**c). Scouring Analysis**

Scouring analysis was conducted to determine the probable impact of the desilting activities to existing river structures. This is to ensure that the alignment/location of the desilting activities will be at a distance that will not damage existing riverbanks/structures.

**d). Sediment Transport Analysis**

Sediment transport analysis was conducted to evaluate the current channel capacity of Abulug River to carry the incoming sediment load. The level of sediment transport (continuity) analysis includes the Dynamic Method of:

- Sediment continuity
- Sediment routing

**1.5.3. Geotechnical Investigation**

Based on the geotechnical information collected, it is seen that the riverbed materials to be desilted are mainly composed of poorly graded sand. This shows the adequacy of the equipment and methodology to be used in the Project. The borehole is located along the Abulug River at Brgy. Sto. Tomas, in the Municipality of Abulug.

**1.6. PROJECT COMPONENTS**

The table below shows the equipment, which shall be utilized by the Project. (Table 2)

**Table 2: Summary of Major Components**

Description	Quantity	Capacity
<b>Offshore Desilting</b>		To be subcontracted as desilting at sea requires heavy duty equipment & lots of technical expertise Kind of vessels to be used would be listed below, capacity of vessel & no. of vessels are subject to negotiation with the subcontractor.
Desilting Sea Vessel	1-2	6000 m <sup>3</sup> /hr
Trans-shipment Conveyor Barge	1	1500-2000 MT/hr uploading rate
Shuttle Conveyor Barge	3-4	1500-2000 MT/hr uploading rate, carrying capacity abt 2000 - 3000 cu.m.
<b>River Desilting</b>		Based on own equipment & project team
Desilting Vessel with Water Jet Mechanism or Cutter Head	1	4000 m <sup>3</sup> /hr
HDPE Pipes	1	1.4-2.0 km length
Conveyor Trans-shipment Barge	1	1500-2000 MT/hr uploading rate
Shuttle Conveyor Barge	2	1500-2000 MT/hr uploading rate, carrying capacity about 2000 cu.m.
Stockpile Area	1	3.77 million m <sup>3</sup> , equipped with conveyor belts
Floating dock	1	Old barge to be tied to shore, to be used as jetty for shuttle barge
Trommel screen	4	Capacity 600 MT/hr each
Sand Washer	12	Capacity 200 MT/hr each
Dump Trucks	2	20-30 MT each
Frontloader	4	CAT970 & Bobcat
Generator Set	3 sets	Sand processing (1800KW), stockpile (800KW), office & other facilities (300KW)
Magnetic Separators	Optional: 6	This only applies to river sand dredged from inside the Abulug River. If customers of the river sand require to lower the iron contents of the sand, then the river sand dredged would undergo the magnetic separators. The amount of black sand extracted is expected to be very small. It would be stored in the spoil area.

## 1.7. PROCESS / TECHNOLOGY

### 1.7.1. Extraction Method

The project involves two (2) phases:

a) Off-shore desilting of 2.0 kilometers reckoned from the river mouth. (Monthly projected desilted volume: 370,000 – 500,000 cu.m.)

The sea sand desilted will be discharged directly without processing into a conveyor trans-shipment barge, where the sea sand will be uploaded by high-speed conveyor belt into an ocean vessel. The anchorage is about 2 kilometers from the river mouth where the sea depth is 13-14 meters, enough draft for a 50,000 MT vessel. **Figure 12** shows the photo of desilting sea vessel for desilting sea sand.



**Figure 12: Desilting Sea Vessel**

b) River desilting covering 3.5 kilometers reckoned from the river mouth. (Monthly projected desilted volume: 250,000 – 370,000 cu.m.)

The excavation and removal of sediments in the bottom of the river will be undertaken using a desilting vessel fitted with a water jet mechanism or cutter heads for loosening the sediments. These equipment and appurtenances are mounted on a nearly flat-bottom mobile platform. Technically the set-up would be similar to a desilting vessel used in navigational river desilting, except that the mobile platform is to be fitted with a water jet mechanism or cutter heads as shown in **Figure 13**.

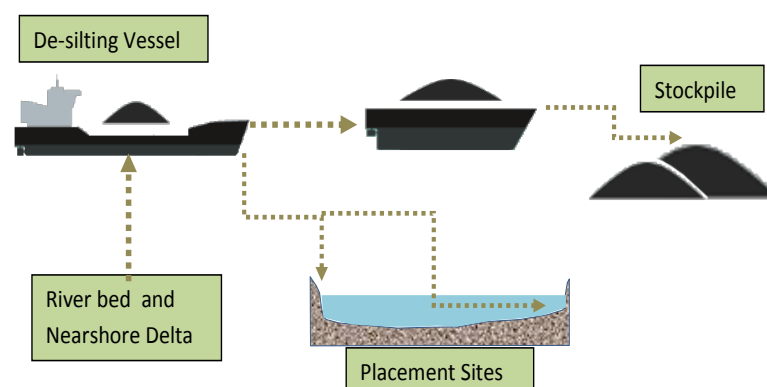




**Figure 13: Photos of desilting vessel to be used in the extraction of riverbed materials (left photo) and sand slurry being pumped to the stockpile/processing site on the beach using HDPE pipe (right photo)**

The cutter-head desilter uses a rotating cutter-head, which loosens the riverbed materials. Once loosened, a hydraulic pump transports the materials to a designated disposal site for stockpiling (spoil sites) thru HDPE pipes that can be used for long distances. In compliance to DPWH and DENR requirements, mitigation measures shall be strictly employed by the Proponent to ensure that turbidity, spillage and other possible adverse environmental impacts are prevented during the course of desilting activities.

The materials gathered will also be hydraulically transported by extended pipelines to the desired areas that need backfilling or reclamation, and/or along riverbanks as protection from erosion. In order to prevent the riverbed materials from being transported/washed away by flood flows, coconet slope protection works in selected locations shall be provided by the Proponent. See **Figure 14** for the process flow of desilting.



**Figure 14: Schematic diagram of desilting process flow**

Incidental to the declogging and desiltation project geared toward increasing the discharge capacity of Abulug River, extraction of useful minerals shall be carried out to recover the cost of operation. Processing of stockpiled materials will involve the screening out of the gravels by trommel screen. The residual sand will be washed and stockpiled. The gravels and the residual sand will be disposed to recover the cost of equipment and the operation. **Figure 15** shows the trans-shipment conveyor barge and the shuttle conveyor barge in action for outbound shipments by ocean vessels.

If customers of the river sand require to lower the iron contents of the sand, the residual river sand after the trommel screen would undergo magnetic separators, and then be washed and stockpiled as mentioned in the above. The amount of black sand extracted is expected to be very small. It would be stored in the spoil area.



**Figure 15: Photo of shuttle conveyor barge discharging the sea sand/processed river sand into the conveyor trans-shipment barge which then uploads the sand onto the ocean vessel**

### 1.7.2. Disposal of Spoil Materials

The Project is expected to generate a large volume of riverbed materials that need to be disposed or reused. Most of the materials will consist of sand and fine gravel materials.

The spoil materials will be properly disposed in areas that need backfilling or reclamation, along river banks as protection from erosion and for stockpile. The backfilled materials will be secured by gabion gravity walls to prevent it from being washed-away by river flood flows. Natural growth of vegetation is expected with the fertile characteristics of the riverbed materials. For the coastal area, the placement of desilted materials will serve as “beach nourishment.”

In addition, portion of the spoil materials (stockpile) could provide reclamation materials needed for the construction of the proposed fishport that may later be upgraded to serve as general purpose port servicing not only the Municipality of Abulug but also the neighboring towns of Pamplona and Ballesteros. The provision of stockpile will also support local public work projects. The desilted materials will also be used to elevate low-lying areas and return the areas to productive valuable land, above flood levels. **(Table 3)** gives the capacity of the tentative locations of the spoil sites and **(Figure 16)** their respective locations.

**Table 3: Spoil Site Details**

Spoil Site Location	Capacity (cu. m.)
A (red)	3.06 mil.
B (blue)	0.71 mil.
Total	3.77 mil.

Based on the available cross-section plans, the total capacity of the spoil sites is estimated to be 3.77 million cu.m.



**Figure 16: Spoil Sites (tentative locations shaded in red & blue)**

The required environmental clearances/permits from the DENR-Environmental Management Bureau shall be secured prior to the desilting activities.

## **1.8. PROJECT PHASES**

### **1.8.1. Desilting Offshore**

#### *Initial Phase*

This phase of the project will not require development work and construction of any facilities. It will only require documentation for importation of the subcontractor's desilting fleet.

#### *Operation Phase*

The extraction methodology, as previously discussed, shall be utilized. Environmental management and monitoring activities shall be regularly implemented during this phase.

#### *Abandonment Phase*

Upon completion of this project phase, all parties concerned, such as the Department of Public Works and Highways (DPWH), Department of Environment and Natural Resources (DENR), and the Local Government Units (LGUs) must jointly inspect the area to check if:

- Desilting equipment and unused materials are transported back to the contractors;
- Subject to the request of the Proponent, temporary structures, if any, are dismantled and stockpiled materials are properly disposed;
- Temporary camp of workers and facilities can be left to the Proponent for use in the phase of Desilting inside the river;

### **1.8.2. Desilting Inside the River**

#### *Initial Phase*

This phase of the project will require preparing the site for processing and stockpiling. This involves levelling, compacting, and paving the site with gravels and with concrete at selected locations. Since water is the medium for processing, a good drainage system using HDPE pipes shall be constructed. The water after the processing shall flow through a number of sediment ponds/tanks before it is

recycled. Concrete foundations shall be built for processing equipment or conveyor belt system of the stockpile. An old barge, to be used as floating dock for the berthing and loading of the shuttle barges, shall be tied to the shore by capstans which are firmly implanted to the ground by concrete foundations.

#### *Operation Phase*

The extraction methodology, as previously discussed, shall be utilized. Environmental management and monitoring activities shall be regularly implemented during this phase.

#### *Abandonment Phase*

Provided ensuing phases for desilting the upstream of the Abulug River are approved, upon completion of this project phase, all parties concerned, such as the Department of Public Works and Highways (DPWH), Department of Environment and Natural Resources (DENR), and the Local Government Units (LGUs) must jointly inspect the area to check if:

- Temporary structures, if any, are dismantled and stockpiled materials are properly disposed;
- Desilting equipment and unused materials are transported back;
- Temporary camp of workers and facilities, if any, are dismantled and cleared of debris;

### **1.9. MANPOWER REQUIREMENTS**

#### **1.9.1. Desilting Offshore**

All the manpower will be supplied and managed by the sub-contractor. The Proponent only has to assist the sub-contractor in the provision of living quarters, food, water, medical care, fuel supplies and employment of local workers.

#### **1.9.2. Desilting Inside the River**

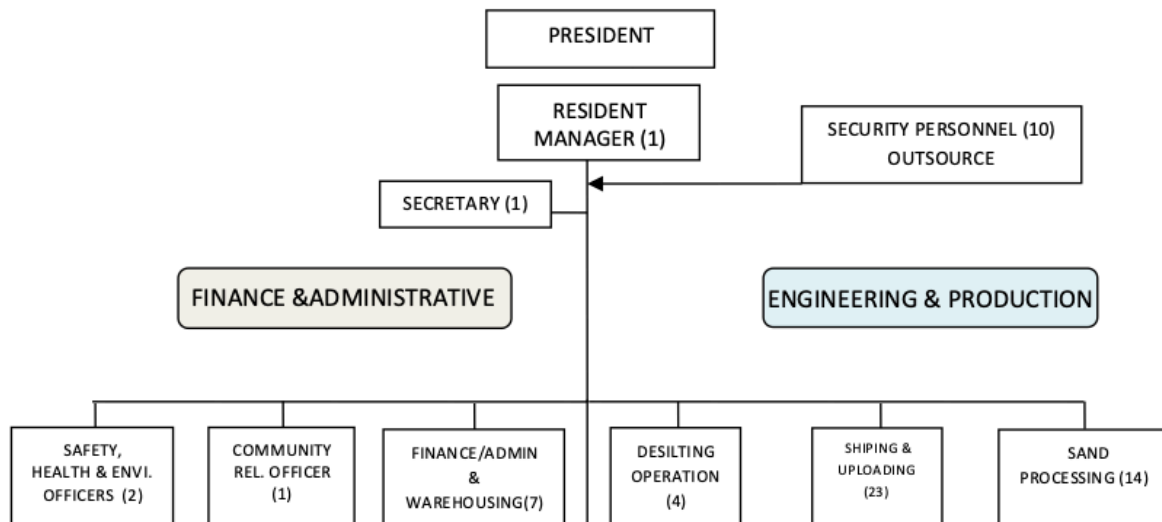
The Proponent has to employ and develop its project operation team. In addition to the senior management staff, there will be a total of 63 on-site staff, per 8-hr shift basis, with the following breakdown. When desilting and sand processing are operated on 2 shifts daily, and shipping on round-the-clock during loading to ocean vessels per day, the total no. of staff is expected to increase to 147.

**Table 4: Manpower Requirement of the Project**

<b>Position</b>	<b>No. of Personnel</b>
Resident Manager	1
Company Secretary	1
Community Relations and Safety/Health Officers	3
Finance/Admin & Warehousing	7
Desilting Operation	4
Sand Processing	14
Shipping & Uploading (Loading from stockpile incl Operators of Loaders & Dump Trucks, Shuttle Barges & Trans-shipment Barges)	23
Security Guards (to be outsourced)	10
<b>Total</b>	<b>63</b>

Consistent with the "Locals first policy", the company shall give preference to qualified Filipino and local residents in hiring its technical officers and rank-and-file employees. The security personnel shall be outsourced to local service providers following the prescribed rate of Philippine Association of Detective and Protective Agency Operators, Inc. (PADPAO). The organizational chart is presented below.





**Figure 17: Staffing pattern for the desilting project in Abulug**

## 1.10. PROJECT COST

### 1.10.1. Desilting Offshore

Since this part is undertaken by subcontractor, the initial investment cost would be the mobilization of the fleet and the importing charges for the fleet. This is estimated to be Php 93 million.

The annual operating cost based on monthly shipment of 435,000 cu.m. and working on 10.5 months per year is estimated to be Php 950 million.

### 1.10.2. Desilting Inside the River

Project Investment Cost for Purchase of Desilting Vessels, Barges and Processing Equipment as well as Working Capital is estimated to be Php 1040 million

The annual operating cost based on monthly shipment of 310,000 cu.m. and working on 10.5 months is estimated to be Php 540 million.