

PROJECT DESCRIPTION:

Project Name	SUMAGUI RIVER DREDGING PROJECT WITH RIVER DELTA CLEARING
Project Location	Sumagui River, Barangay Sumagui, Municipality of Bansud, Province of Oriental Mindoro
River Dredging Zone	Area – 21.73 hectares with length of 8,600 linear meters Volume – 510,382.50 cubic meters
Marine / Navigational Zone	Area – 50 Hectares Volume – (TBD) cubic meters
Estimated Operation Duration	1 year – River Dredging Zone (TBD) days – Navigational Zone (river delta clearing)
Extraction Rate	1,000 m ³ per hour capacity Cutter-Suction Dredger
Project Proponent	Ionic Cementworks Industries, Inc. (ICII) Mr. Ferdinand K. Constantino – Chairman & President Pasig River Expressway Corporation Mr. Raoul Eduardo C. Romulo – Chief Finance Officer
Proponent Address	No. 40 San Miguel Avenue, Mandaluyong City Telephone No. 02-87024833
EIA Preparer / Consultant	BLACKGEAR ENVIRONMENTAL & ENGINEERING SERVICES Engr. Julius Marino O. Cariño Mechanical Engineer / EIA Preparer – IPCO No. 089 2964-B Garong St., Brgy. 8, San Jose, Occidental Mindoro Mobile Number: +639277391727 Email Address: jmcarino77@gmail.com

The purpose of **SUMAGUI RIVER DREDGING PROJECT** is to increase the conveyance capacity of the Sumagui River Channel through deepening and widening of the river channel based on the approved dredging masterplan of the DPWH and restore the natural state and water flow of the heavily silted Sumagui River and to maintain the navigability of the channel. Dredging will mitigate the risk of flooding in the surrounding areas or communities and eventually focus on the restoration and rehabilitation of the said river. The aggregates / spoils of dredging will be temporary stockpiled / embanked on reclaimed area and riverbank to prevent future flooding. The dredging channel which requires slope protection shall be protected by sand bagging / geotextile retaining wall on both sides of the riverbanks in order to prevent erosion with the supervision and approval of DPWH.

The Sumagui River Basin is a 10,870-hectare watershed located in Oriental Mindoro covers six (6) barangays in Municipality of Bansud and five (5) barangays in Municipality of Bongabong. Specifically, it encompasses the barangays of Conrazon, Pag-asa, Poblacion, Alcadesma, Proper Bansud, Proper Tiguisan, Salcedo, Rosacara, Manihala, Malo, Bato and Sumagui in the municipality of Bansud; and Tawas, Sigange, Carmundo, Libertad, Labasan and Sta.Cruz in Bongabong. The DENR River Basin Control Office identified the basin to have a drainage area of approximately 97 square kilometers and an estimated 155 million cubic meter (MCM) annual run-off (DENR RBCO, 2015). The river basin is generally characterized by 8-50% slope and elevation of 0-250 meters above mean sea level. The soils in the river basin consist of Maranlig gravelly sandy clay loam, San Miguel loam, Quingua clay loam, and San Miguel sandy loam. This vicinity along Sumagui River reflects moderate to low susceptibility of flooding according to the Mines and Geosciences Bureau (MGB 2012) hazard maps.

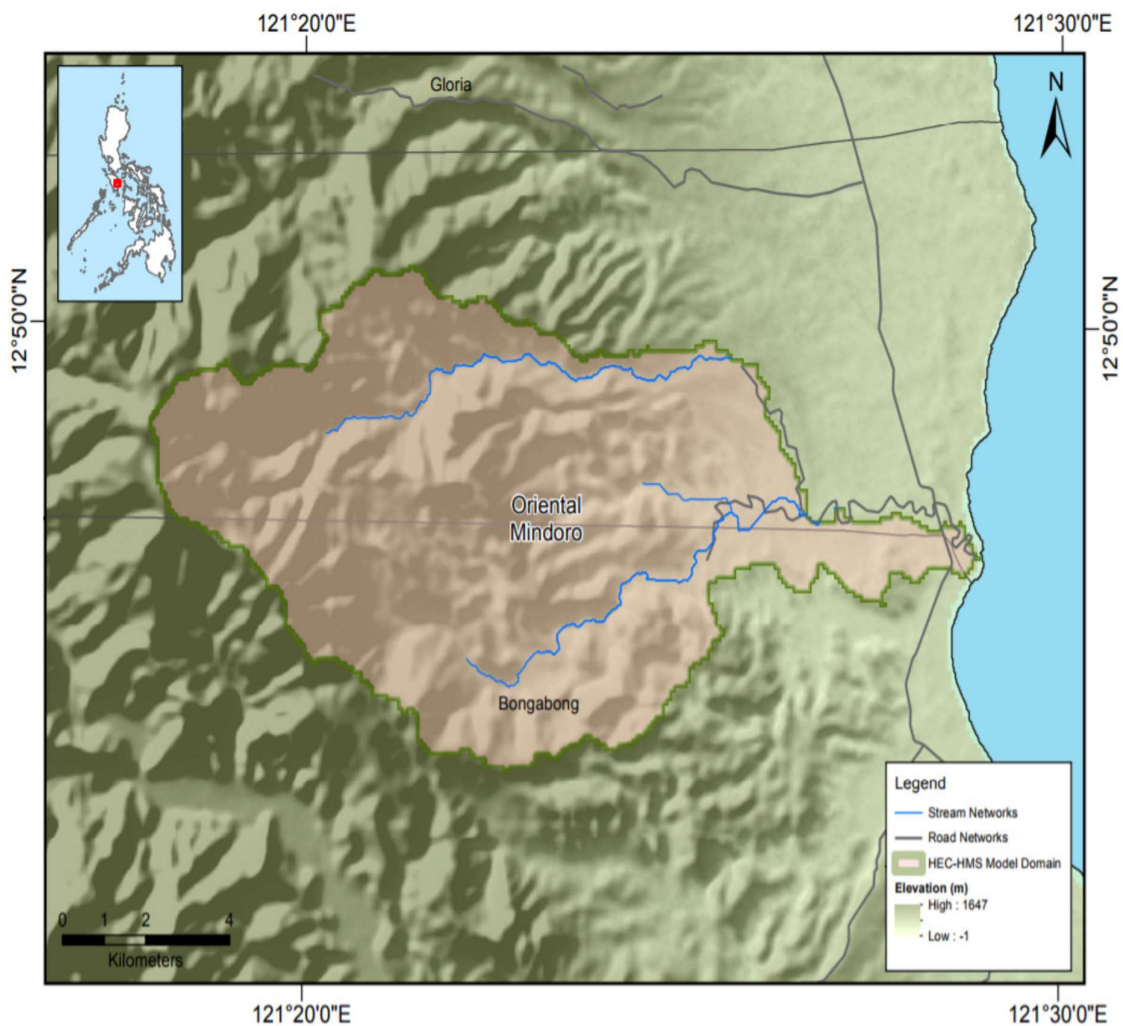


Figure 1_Map of Sumagui River Basin. **Source:** Hazard Mapping of the Philippines Using LIDAR (Phil-LIDAR 1)

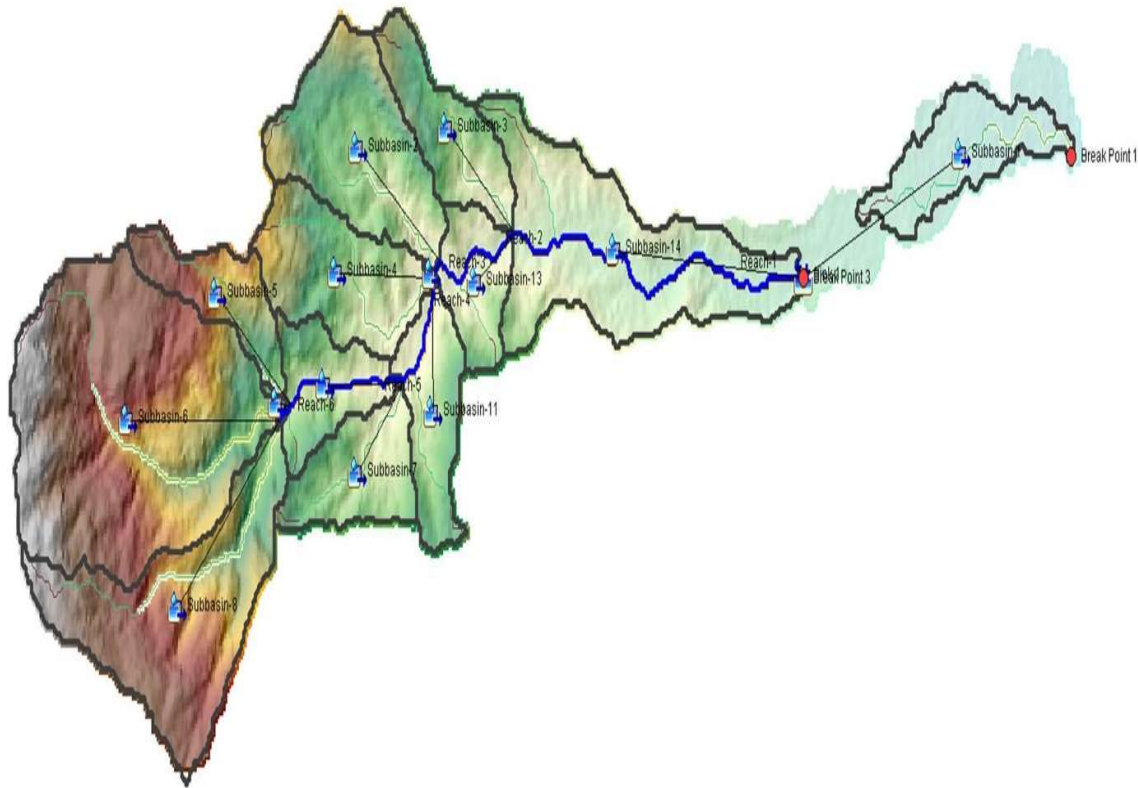


Figure 2_Delineated Watershed of Sumagui River showing elevation (meters). **Source:** Hydrologic Modelling and Technical Analysis for the Proposed Rehabilitation / Improvement of Riverbed at Sumagui River, Municipality of Bansud, Province of Oriental Mindoro

Thus, a 1,000 cubic meters per hour capacity Cutter-Suction Dredger (CSD) equipped with state-of-the-art technology shall be employed to dredge the river mouth and its attributes. On the portions and sections where the CSD cannot perform, Long Arm Excavator with bucket capacity of 1.5 cubic meter will be employed in removing river run materials of the subject river to increase the carrying capacity of the river, resurface the river water and restore aquatic habitat and vegetation as well as to ensure the safety of the nearby residential communities from flooding hazard.

*The Local Government Code empowers the province to do preventive actions or implement risk reduction by way of providing services to the people in the form of drainage, sewerage, flood control, reclamation projects, and other emergency measures, as may be necessary during and in the after-math of man-made and natural disasters. Thus, the Inter-Agency Committee (IAC) headed by Provincial Government of Oriental Mindoro together with DPWH-MIMAROPA, DENR-MIMAROPA, MGB-MIMAROPA and EMB-MIMAROPA concluded Resolution No. 04 series 2022 dated December 6, 2022 attached as **Annex A** that authorizes **Ionic Cementworks Industries, Inc. (IICI)** joint venture with **Pasig River Expressway Corporation (PAREX)** to dredge the mouth, lower reaches and the upstream of Sumagui River including the marine area (to open the river mouth).*



Photo No. 1_Panoramic view of the river delta or the mouth of SUMAGUI RIVER using DJI Mavic 2 Zoom Drone. Note that the mouth or the river delta was stalled by silt materials or sediments that prevents the flow of the water including the river run materials to the receiving Tablas Strait.



Photo No. 2_Panoramic view of the SUMAGUI RIVER using DJI Mavic 2 Zoom Drone showing the contoured stream where some portions of its bank are protected with gabion walls to prevent overflow or flooding.



Photo No. 3_Panoramic view showing that the banks and its vicinity is heavily vegetated.



Photo No. 4_Panoramic view taken at the Steel Hanging Bridge connecting the Sitio Villa Pagasa and Sitio Aplaya showing eastern section of SUMAGUI RIVER with chest deep water according to locals. Without this dike it could potentially brought flooding hazard to the main road – Western Nautical Highway during rainy season.



Photo No. 5_Panoramic view showing western section of SUMAGUI RIVER equipped with gabions for protection from flooding hazard and erosion.



Photo No. 6_This photo showing the Steel Hanging Bridge connecting the Sitio Villa Pagasa and Sitio Aplaya.

1.1 Project Location and Area:

Sumagui River to be dredge and restore is located at Barangay Sumagui within the Municipality of Bansud in the Province of Oriental Mindoro.

Bansud is a Philippine municipality located in the province Oriental Mindoro in Region IV-B MIMAROPA which is a part of the Luzon group of islands. The municipality of Bansud is seated about 91 kms from the capital City of Calapan and about 153 kms from the Philippine main capital, Manila. The geographic coordinates of Bansud are 12° 49' 59" N, 121° 22' 0" E. Bansud is bounded in the north by the municipality of Gloria, municipality of Bongabong in the south, Tablas Strait in the east and mountains of Occidental Mindoro in the west.

Administratively, the Municipality of Bansud is subdivided into 13 barangays. Three (3) barangays were classified as urban having a total land area of 2,025.96 hectares or 5.13 percent land share of the total land area of the municipality. The remaining ten (10) barangays were classified as rural having a total land area of 37,486.38 hectares which makes up the 94.87 percent of the total land area of the municipality.

Based on the Cadastral Map issued by the Department of Environment and Natural Resources (DENR), the computed total land area of the municipality of Bansud was Thirty Nine Thousand Five Hundred Twelve and Thirty Four (39,512.34) hectares. This land area is the one being used for planning purposes. It accounts for the 9.05 percent of the total land area of the province or Oriental Mindoro which is Four Hundred Thirty Six Thousand Four Hundred Seventy Two (436,472) hectares as shown in Figure 1. It is one of the medium – sized municipalities in the province in terms of land area. On the other hand, the total land area of the municipality which was approved by the DENR – Land Management Bureau is Thirty Four Thousand Three Hundred Forty Seven (34,347) hectares.

Based on the "DPWH Hydrologic Modelling and Technical Analysis Report 2023 for the proposed SUMAGUI RIVER DREDGING PROJECT" conducted by DPWH MIMAROPA given to a dredging contractor – IONIC CEMENTWORKS INDUSTRIES, INC. (IICI) joint venture with PASIG RIVER EXPRESSWAY CORPORATION (PAREX) with the following coordinates on the table listed below with varying elevation starting from 0 meter at the mouth to 7-12 meters at the middle and 18 meters above mean sea level (amsl) at the upstream of Sumagui River.

Table No. 1_Geographic coordinates of the dredging area (using WGS 84 datum).

Corner	Latitude	Longitude
1	12°47'24.88"	121°28'59.14"
2	12°47'26.00"	121°28'57.39"

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3	12°47'23.85"	121°28'54.83"
4	12°47'24.50"	121°28'52.75"
5	12°47'30.16"	121°28'53.58"
6	12°47'32.11"	121°28'50.39"
7	12°47'32.57"	121°28'45.72"
8	12°47'35.54"	121°28'44.07"
9	12°47'39.49"	121°28'45.99"
10	12°47'43.38"	121°28'49.38"
11	12°47'43.52"	121°28'45.18"
12	12°47'39.56"	121°28'40.75"
13	12°47'36.30"	121°28'37.41"
14	12°47'41.18"	121°28'34.34"
15	12°47'44.51"	121°28'40.15"
16	12°47'49.97"	121°28'36.22"
17	12°48'3.82"	121°28'28.52"
18	12°48'4.79"	121°28'19.43"
19	12°47'56.19"	121°28'18.45"
20	12°47'57.94"	121°28'14.98"
21	12°48'2.60"	121°28'14.47"
22	12°47'59.32"	121°28'8.62"
23	12°48'1.98"	121°28'3.43"
24	12°48'5.85"	121°28'4.14"
25	12°48'2.12"	121°27'54.95"
26	12°48'9.41"	121°27'48.95"
27	12°47'59.81"	121°27'37.24"
28	12°48'5.08"	121°27'16.20"
29	12°47'52.32"	121°27'14.02"
30	12°47'54.04"	121°27'4.86"
31	12°48'6.89"	121°27'2.90"
32	12°48'0.43"	121°26'53.36"
33	12°47'49.94"	121°26'48.35"
34	12°47'58.78"	121°26'35.13"
35	12°47'59.53"	121°26'35.56"
36	12°47'51.23"	121°26'48.23"
37	12°47'59.88"	121°26'51.46"
38	12°48'8.54"	121°27'2.96"
39	12°47'53.04"	121°27'6.73"
40	12°48'6.79"	121°27'15.33"
41	12°48'2.12"	121°27'33.47"
42	12°48'10.11"	121°27'46.47"
43	12°48'3.37"	121°27'53.92"
44	12°48'7.33"	121°28'3.44"
45	12°48'0.12"	121°28'5.34"
46	12°48'4.01"	121°28'13.32"
47	12°47'56.65"	121°28'16.56"

48	12°48'6.05"	121°28'18.64"
49	12°48'3.90"	121°28'30.29"
50	12°47'51.53"	121°28'35.49"
51	12°47'43.23"	121°28'40.83"
52	12°47'38.88"	121°28'35.46"
53	12°47'40.80"	121°28'40.33"
54	12°47'45.49"	121°28'48.71"
55	12°47'37.29"	121°28'45.50"
56	12°47'33.01"	121°28'48.93"
57	12°47'31.22"	121°28'54.18"
58	12°47'24.90"	121°28'53.67"
59	12°47'26.71"	121°28'57.27"
60	12°47'25.40"	121°28'59.56"

Approximately 21.73 hectares with a length of 8,600 linear meter of RDZ

Table No. 2_Geographic coordinates of the marine area

Corner	Latitude	Longitude
1	12°47'35.46"	121°29'4.07"
2	12°47'23.45"	121°29'21.34"
3	12°46'59.65"	121°29'8.19"
4	12°47'10.30"	121°28'52.96"

Marine Area / Navigational Zone – 50 hectares (approximately)

1.1.1 Impact Areas

The area subject for Environmental Impact Assessment (EIA) Study was based on the perceived direct and indirect impact areas of the proposed dredging project is from the marine area (to open the river delta), mouth, lower reaches and portion of upstream of Sumagui River having a length of 8,600 linear meter situated at Barangay Sumagui, Bansud, Oriental Mindoro as identified by the consultants during the site inspection and verification.

As stipulated in DAO No. 2003-30, direct impact area for the dredging & desilting project is considered as the shoreline, navigational area, riverbank, bridges, freshwater ecosystem, estuarine area and the host barangay specifically all along the 100 meter radius bank to bank of Sumagui River and approximately 1.5 kilometer diameter of the navigational area due to the movement of dredgers, barges, sand carrier, tug boats and local fishing boats where it will be altered in terms of physical environment while the indirect impact area is identified as those or outside of the primary impact area, which is identified as the nearby barangay and farmlands including barangay access roads.

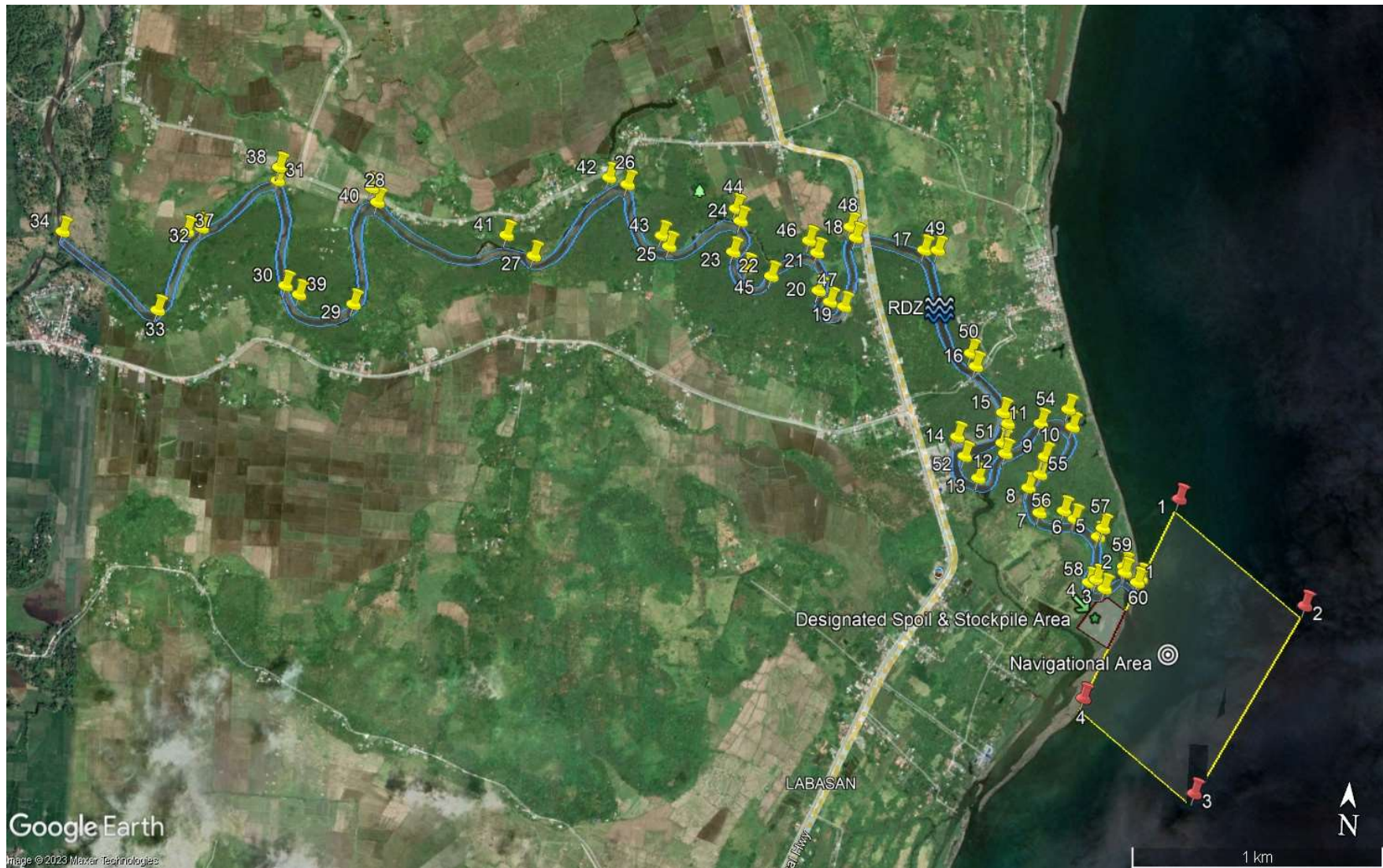


Figure 3_ Satellite Image showing the geographical coordinates of the project area (RDZ – blue and Navigational – yellow polygon, respectively).

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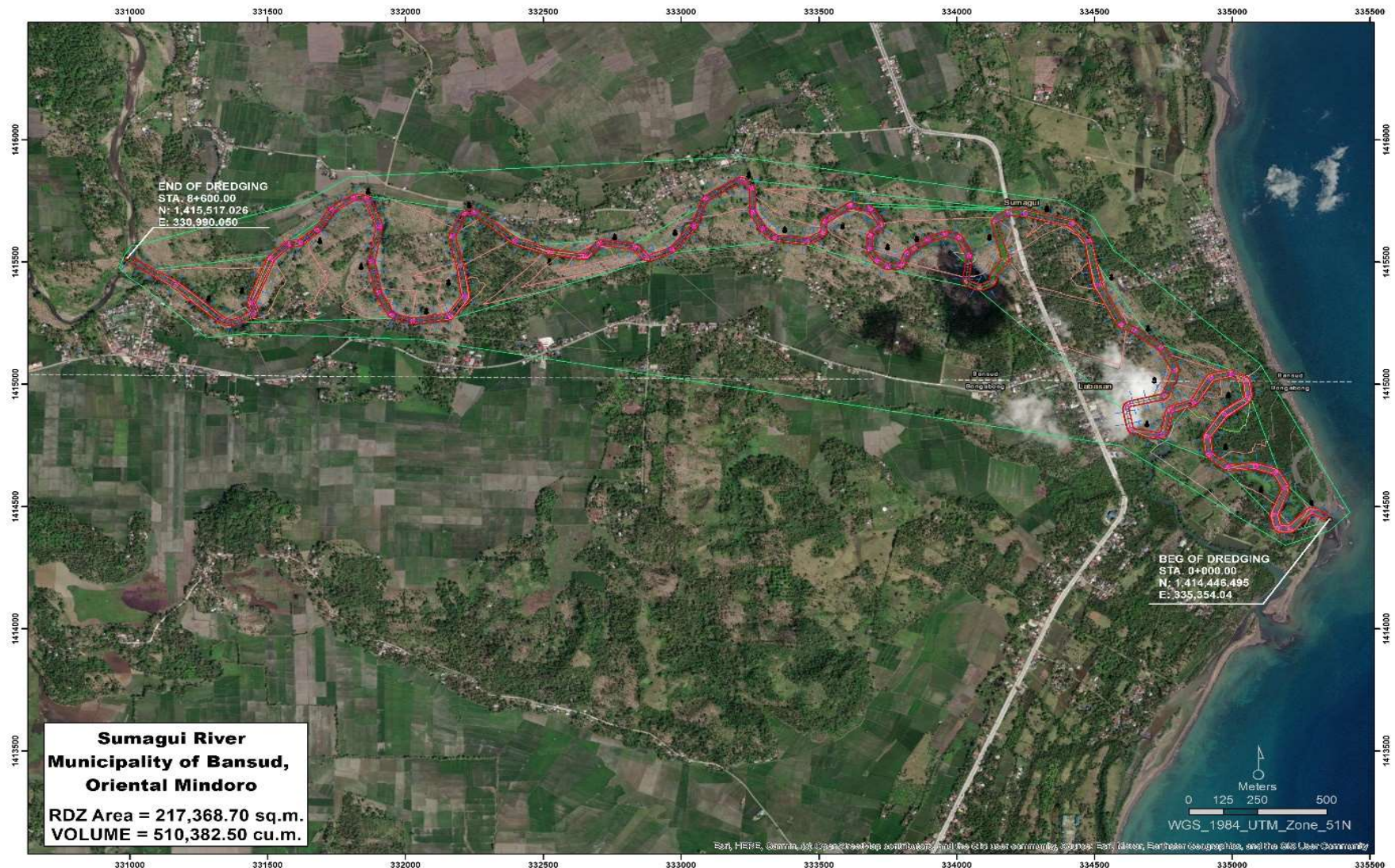


Figure 4_ Satellite Image showing the **River Dredging Zone** of Sumagui River based on the DPWH Dredging Master Plan.



Figure 5_The Primary and Indirect Impact Area is the 100 meters represented by the **red polygon** on both side of the dredging area.



Figure 6_The Primary Impact Area within the 1.2-kilometer diameter of the dredging area's navigational zone.



Figure 7_Location of Protected Areas and Ramsar Sites in the Province of Mindoro

1.1.2 Protected Areas and RAMSAR Sites

Table No. 3 List of Protected Areas and RAMSAR Sites in the Province of Mindoro:

Name	Legal Basis	Legal Status	Proximate Distance from the Project Area
Naujan Lake National Park	Proclamation No. 335, s. 1968	Initial Component	39.8 aerial kilometers northwest of the project area
Mangrove areas of Mamburao River	Proclamation No. 2152, s. 1981	Initial Component	103.88 aerial kilometers northwest of the project area
Mangrove areas of Buluangan River to Lagarum River, Naujan			63.66 aerial kilometers northwest of the project area
Mangrove areas of Bank of Betel Creek, Sablayan Pt. to Bagong Sabang River			72.7 aerial kilometers west of the project area
Mangrove areas of Labangan to Calalayuan Pt.			71.49 aerial kilometers southwest of the project area
Mangrove areas of Sukol River			2.74 nautical miles southeast of the project area
Mangrove areas of Casiliga River, Island of Soguicay			50.27 aerial kilometers southwest of the project area
Mts. Iglit-Baco National Park	Proclamation No. 557, s. 1969	Legislated	18.22 aerial kilometers west of the project area
Apo Reef Natural Park	Proclamation No. 868, s. 1996	Legislated	106.22 aerial kilometers west of the project area
Mt. Calavite Wildlife Sanctuary	Proclamation No. 292, s. 2000	Legislated	137 aerial kilometers northwest of the project area
Calavite & F.B. Harrison Game Refuge and Bird Sanctuary	E.O. 9, s. 1920	Initial Component	137 aerial kilometers northwest of the project area

1.2 Project Rationale

The Local Government Code empowers the province *"to do preventive actions or implement risk reduction by way of providing services to the people in the form of drainage, sewerage, flood control, reclamation projects, and other emergency measures as may be necessary during and in the after-math of man-made and natural disasters."*

Based on the DENR Administrative Order No. 2019-14 "Rationalizing Dredging Activities in heavily-silted river channels within the Province of Oriental Mindoro pursuant to the DENR-DPWH-DILG-DOTC Joint Memorandum Circular No. 01 series of 2019" under Section 3. Rationale and Objectives states that *"In order to restore the natural state and water flow of the heavily-silted river systems and improve its hydraulic capacity thereby eliminate flooding, large-scale dredging and desilting operations, based on a comprehensive dredging plan, must be implemented."* DAO 2019-14 & JMC No. 2019-10 attached as **Annex B**.

The Inter-Agency Committee (IAC) headed by Provincial Government of Oriental Mindoro together with DPWH-MIMAROPA, DENR-MIMAROPA, MGB-MIMAROPA and EMB-MIMAROPA requested for the participation of the private entities to dredge the river systems affecting the concerned communities of the entire province Oriental Mindoro at *"no cost to the government of the Republic of the Philippines"* and conducted a thorough and meticulous process of selecting private companies with qualifications and capabilities to dredge or desilt the Sumagui River.

The IAC through a selection process awards Sumagui River to Ionic Cementworks Industries, Inc. (IICI) joint venture with Pasig River Expressway Corporation (PAREX) as the Dredging Contractor to dredge / de-clog / desilt the river channel from the river delta all the way to the upstream including the marine area as navigational zone to open the river mouth. The dredging operation will be supervised by the DPWH District Engineer's Office to conform with the approved dredging plans.

1.3 Project Alternatives

The Inter-Agency Committee (IAC) granted the proposed dredging area to Ionic Cementworks Industries, Inc. (IICI) joint venture with Pasig River Expressway Corporation (PAREX) based on the DPWH Dredging Master Plan attached as **Annex C** after complying all the necessary requirements of all the government agencies concerned.

The result of the exploration activity and other secondary information gathered at various government agencies guided the proponent to pursue the dredging and desilting project. Location was considered as

the most economical sources considering vessel will navigate roughly around 178 nautical miles from prospective government infrastructure projects and reclamation sites within METRO MANILA, CALABARZON and MIMAROPA.

Discussion of the consequences of not proceeding with the project on a “No Project Option”

Under this scenario:

- The purpose of dredging is preventing flooding hazard that could damage the farms, properties, infrastructures and more important is the threat to the lives of residents living near the river during rainy season;
- Dredging may restore the original water depths of the subject river, where decades of siltation have significantly reduced its depth;
- It aims to carry out dredging activities to create or improve waterways and to recover silt materials or sediments for beneficial use;
- The opportunity for social development of the community of the host barangay through additional employment of qualified residents as well as livelihood projects, skills training, scholarship programs and medical assistance will be lost;
- In addition, the substantial increase in local taxes and revenues, multiplier effect of the project such as business opportunities, support to social services and other opportunities for the community and the Local Government Unit (LGU) will also be foregone.

The possibility of expanding and upgrading LGU's basic infrastructure services and facilities and strengthening of LGU's capacity in local governance, investment planning, revenue generation and project development and implementation will not also be realized. This may also include possibility of enhancing the capabilities for local leadership because the project can provide technical support and assistance to local leaders such as training, seminars and workshops. All of these may be provided by the project thru its tax payments, permits, clearances and Social Development Plan.

However, No Project Option would mean no additional environmental impact such as siltation, disturbance of marine environment and potential oil spill from dredging vessel and other equipment.

1.4 Project Components

The dredging operation of Sumagui River will start to deepened the marine area or navigational zone covering an area of approximately **50 hectares** for validation through Seismic Data and Bathymetric

Measurement before opening the mouth of the river (delta) following the original contour or pattern of the river.

A pre-construction survey shall be jointly conducted by DPWH Technical Staff, Provincial Engineers Office representative and Dredging Contractor including their Dredging Experts to determine the actual situation of the river and the distance of riverbanks, dikes, bridges, irrigation canals as well as other infrastructures within the project area.

IICI and PAREX will construct temporary dikes or gabion as retaining walls to guarantee that it will not cause damage to any infrastructure based on the approved DPWH Dredging Master Plan. During construction of the retaining walls, sand materials shall be excavated with a depth that varies from 2 meters up to 5 meters (maximum depth) on the line of dredging area. The dredging channel shall be protected by sand bagging both sides in order to prevent erosion. Sounding shall be conducted every 100 meters of the dredge channel for the calculation of volume or by drop survey of vessel. For safety of all workers and crew during typhoon season or if there are announcement of tropical depression or huge swelling to arrive at Tablas Strait, the Engineers shall suspend the dredging activities and vessel shall automatically hide their barges, vessel and suction dredger to a safer place at Roxas Port. The DPWH Technical Staff as well as the Provincial Engineers Office representative shall monitor the conventional method and dredging operation up to 24 hours per day for 8 up to 10 months or as long as the weather permits.

The operation involves the eventual dredging of about **500,000 cubic meters of dredged materials** (sand and/or river-run / dredged materials) **per year** for the combined production during the maximum operation. The Cutter-Suction Dredger has a capacity of 1,000 cubic meters per hour to deal with the time and amount of river materials to be dredge / de-silt from the above-mentioned rivers due to the unpredicted weather condition nowadays. The materials dredged from the river delta and upstream shall be discharged aboard a floating or split hopper barge through a specialized floating discharge hose or via conventional loading through long-arm excavator or clamshell-type crane.

1.5 Process / Technology Options

The dredging operation will involve simple, straightforward dredging and haul out of dredged materials. This process will be repetitive until the desired river bed elevation based on the approved DPWH Dredging Master Plan is attained. It is important to mention that dredging in itself is a mitigating process to address the perennial and increasing flooding problem in Sumagui River.

The dredging process will be implemented using heavy equipment such as a cutter suction dredger to initially break up a small channel at the river mouth to the silting / catchment basin and to remove the deposits at the dredging channel in and the river mouth.

Going upstream to non-navigable portions, the long-arm excavator with 1.5 m³ capacity bucket and dump truck tandem shall be used in dredging. The cargo barge hauls the dredged material to the designated and permitted disposal site/s.

According to Damen, the dredger has the capacity to extract and pump some 1,000m³ of sand and/or river-run / dredged materials per hour. The floating pipeline, with an internal diameter of 250 mm, will start at just 100 meters in length. It connects to a 50m land line which is directly connected to the sand classification plant. The plant can process 150 tons per hour; the excess material is dumped on a designated spoils and stockpile area.



Figure 8_Side View of the Damen CSD 250, showing 2 spuds to position the dredger steadily.



Figure 9_This Cutter-Suction Dredger with ID "Damen CSD 250" will be employed initially in the project.

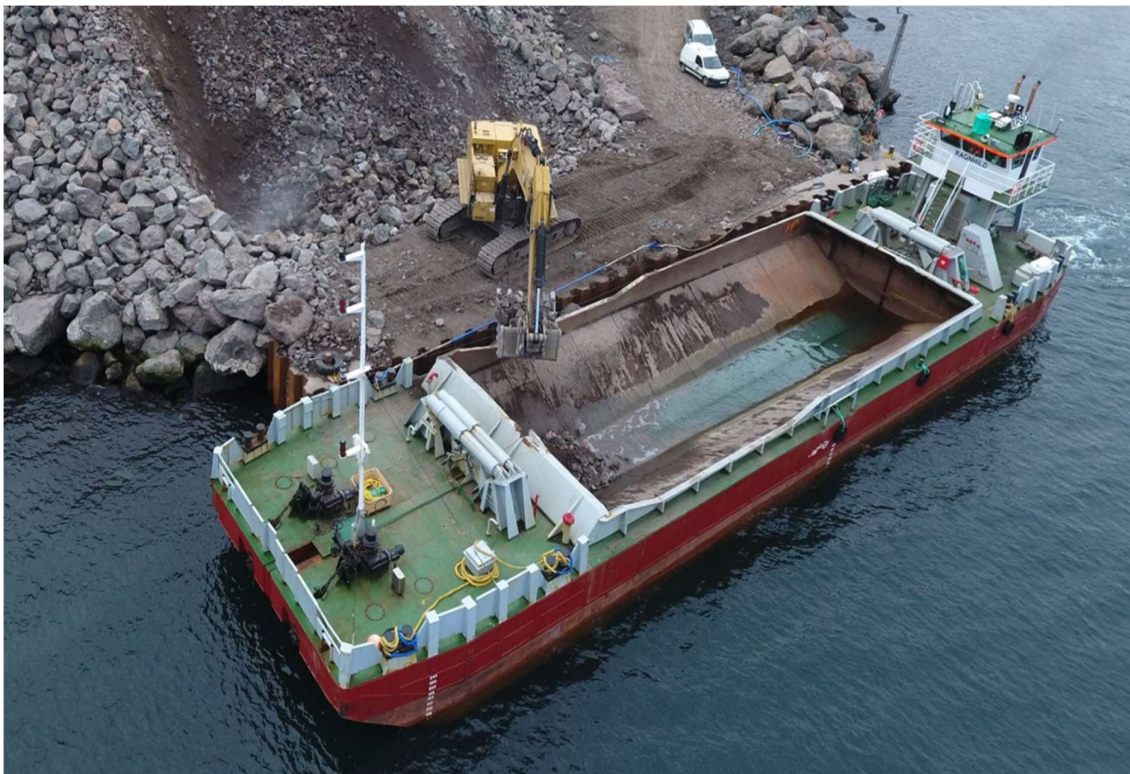


Figure 10_Typical Split Hopper Barge for reclamation projects.

From the dredging lakes, the excavator shall extract water-laden sand and immediately stockpiled the sand near the reach of the bucket. The development of the said lakes shall be in accordance with the direction of the dredging plan. The dozer-loader shoves the sand and load it to the hauling trucks. The loaded trucks are then unloaded the sand to the floating hopper barge steadily anchored in the causeway/port until fully loaded. The barges sail towards the mother vessel to unload the sand using the long-arm excavator.

SANY SY545C-10LR is advanced 10-Series long reach excavator designed with more power & higher working ranges to fulfill the segment Customer need. SANY 55T long reach excavator provides a massive dig envelope, a stable working platform and low ground pressure. The SY545C-9 long reach excavator designed to dig deeper, with a reach of over 22m & digging depth over 16m. The powerful & fuel efficient 403hp ISUZU engine with optimized positive flow hydraulic system delivers class leading performance. Reliable & Durable major aggregates with robust structures are adopted for trouble-free longer period operation with minimum operating cost.



Figure 11_Using Long-arm Excavator with 1.5m³ capacity bucket for extraction of sand.



Figure 12_Using Dozer-Loader to shove sand for stockpile.



Figure 13_Dump truck for loading using the port to the barges.

Navigational Traffic Scheme

The herein proponent shall follow the Rule 10 of the Convention on the International Regulations for Preventing Collisions at Sea (COLREGS). The COLREGS are the rules of the road that vessels must obey at sea to avoid collisions. The proponent shall strictly follow the international navigational traffic rules, as follows:

1. A vessel using a traffic separation scheme shall: **a.)** proceed in the appropriate traffic lane in the general direction of traffic flow for that lane; **b.)** so far as practicable keep clear of a traffic separation line or separation zone; **c.)** normally join or leave a traffic lane at the termination of the lane, but when joining or leaving from either side shall do so at as small an angle to the general direction of traffic flow as practicable;

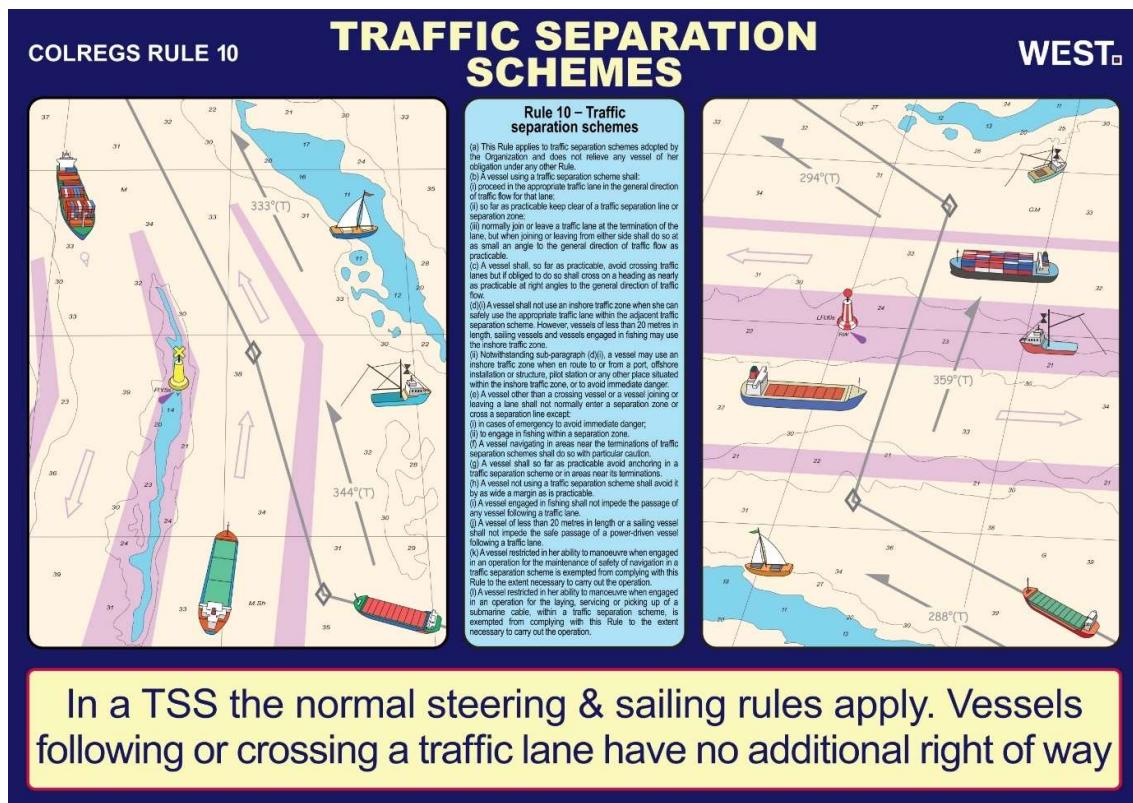


Figure 14_Schematic Form of Navigational Traffic Scheme using Rule 10.

2. A vessel shall, so far as practicable, avoid crossing traffic lanes but if obliged to do so shall cross on a heading as nearly as practicable at right angles to the general direction of traffic flow;
3. A vessel other than a crossing vessel or a vessel joining or leaving a lane shall not normally enter a separation zone or cross a separation line except: in cases of emergency to avoid immediate danger and to engage in fishing within a separation zone;

4. A vessel navigating in areas near the terminations of traffic separation schemes shall do so with particular caution;
5. A vessel shall so far as practicable avoid anchoring in a traffic separation scheme or in areas near its terminations; and
6. A vessel not using a traffic separation scheme shall avoid it by as wide a margin as is practicable.

The Philippine Coast Guard (PCG), Philippine Port Authority (PPA) and Maritime Industry Authority (MARINA) will issue an approved Navigational Traffic Scheme for the project before its operation.

1.6 Project Size

Sumagui River Dredging Project will cover a total area of **21.73 hectares with a length of 8600 linear meters of RDZ based on the DPWH Dredging Master Plan** that will start from the mouth of the river (delta), lower reaches up to upstream having a bottom width **20 meters Slope 1V:1H** with average depth of **2 – 3 meters (Design Depth is 4 meters)** situated at Barangay Sumagui within the Municipality of Bansud in the Province of Oriental Mindoro.

The data generated during the course of the various stages of the exploration, specifically the high-resolution seismic reflection profiling, bathymetric measurements, subsurface geotechnical investigation and geological sampling through drilling were all considered in the estimation of the resource.

Based on the **Final Geotechnical Final Geotechnical Evaluation Report** attached as **Annex D** conducted by Terms Concrete Testing for DPWH MIMAROPA and **DPWH Hydrologic Modeling & Technical Analysis Report** attached as **Annex E** for Sumagui River last March 2023 and June 2023, respectively suggests that the subject river is continuing in the deposition of sediments from its mountain sources, subbasin and watershed having a **total volume estimate of 510,382.50 cubic meters** of combined sand, gravel, pebble and other sediments as reflected on the DPWH Dredging Masterplan.

Based on the studies / report stated above it was concluded that:

1. The peak discharges of 636.40 m³/s and 709.80 m³/s corresponding to the 50-yr and 100-yr floods were simulated using the steady state one-dimensional flow of the HEC-RAS program;
2. Based on the results of the hydraulic analysis, the proposed dredging project reduces the simulated flood water levels up to about 2 meters along the 500-m length of the proposed dredged river for the 50-yr and 100-yr floods. The impact of the flood water level reduction is apparent up to Sta 1+500.

3. Sediment transport analysis shows that at design flood scenarios, scouring will occur at the immediate upstream of the dredged river and the scoured sediments will migrate and be deposited downstream. Estimated depth of maximum scouring for the scenario "with" dredging project is 2.01 m at the Sta 1+100 for the 100-yr flood.
4. The proposed dredging project will not have direct effect on the water level and scouring at the Sumagui bridge located at Sta 3+000.
5. Slope stability analysis shows that the existing and the dredged geometries of the river sections pass the criteria set for all load conditions and suggest that the river sections will be stable under any of these conditions. Additionally, the critical load condition is observed for load condition 4: ordinary water level with a strong earthquake as resulting factors of safety greater but close to 1.00.
6. Settlement analysis shows that approximately 24 mm of immediate settlement can be observed during the training works in site assuming the load conditions cited in this study.

The volume to be excavated in the navigational zone to be able penetrate the river mouth of Sumagui River will be determined based on the Report on the Seismic Reflection Profiling and Bathymetric Measurements will be added to the total estimated volume of the proposed Sumagui River Dredging Project to be conducted later on by a third-party Consultants and/or Experts.

1.7 Development Plan, Description of Project Phases and Corresponding Timeframes

Phases to be described by identifying main activities with special attention to those with significant environmental impacts and corresponding projected implementation timeframes (i.e. pre-construction, construction, operation, abandonment).

1.6.1 DESCRIPTION OF PROJECT PHASES

1.6.1.1 Pre – Development & Construction Phase

Prior to the implementation of the project, conduct of significant studies are being done. These include preliminary design, detailed engineering study, impact study to include geohazard identification and environmental impacts assessments. All the necessary information, plans, and designs will be gathered and prepared relative to the requirements and in compliance with the existing laws and regulations applicable to the project. Jurisdiction over the project site, clearances, permits and all other administrative requirements of concerned agencies will also be completed.

The proponent is in the process of securing the necessary permits, certifications and licenses from the government agencies concerned such as the DPWH, PPA-Marina, PCG, BFAR / MAO, MGB, LGU, PGOM, among others. The herein proponent is requesting the EMB MIMAROPA for the Environmental Compliance Certificate (ECC).

An option to have a Field Office and other support facilities like stockpile area, waste dumps area, staff house, motor pool and nursery will be constructed on a lease or acquired lot near the bank of Sumagui River (on-shore / land).

During the pre-construction phase the following activities are to be undertaken:

- Conducted a high-resolution seismic reflection profiling, bathymetric measurements, marine assessment and geological sampling, geotechnical study through drilling was all considered in the estimation of the resource;
- Topographic and Boundary Survey based on the area designated by the DPWH;
- Site Investigation for the causeway or port construction;
- Gathering of pertinent data from LGU;
- Procurement of vehicles and equipment;
- Call for tender of bids for the purpose of selecting qualified bidders as service providers for the dredging project;

A quality assurance / quality control program during construction and commissioning ensures that equipment is purchased and built according to the design requirements, while meeting all applicable legal and technical standards and codes. The dredging project is recommended to have a quality assurance/quality control program in place to prevent equipment failures that could result from:

- Use of faulty parts / materials due to improper delivery controls;
- Improper fabrication, installation, or repair methods.

The operator's manual should provide guidance and mechanisms to assure that appropriately qualified and trained personnel are used for specified vessel and piping fabrication and for installing safety critical equipment and instrumentation.

Hazard management during construction and commissioning of dredging project should have a procedure in place during the construction and the commissioning of the seabed quarry. Typically, risk assessments as described in the above section on

Safety Report / Declaration also apply during the Operations Phase. Pre-Start-up Safety Reviews are often being used during commissioning.

1.6.1.2 Dredging Operation

The dredging methods to be employed are the Cutter-Suction Dredgers from the navigational zone, river mouth and lower reaches while the Long Arm Excavator-Dozer-Dump Truck Tandem at some portion of the lower reaches until the upstream of Sumagui River to be filled or loaded to barges and/or sand carrier vessel that are on standby that take turns to be filled with the dredged materials for disposition to prospective clients in different locations.

The dredging operation is intended to remove substantial volume of river materials to ease and reduce the swelling of the river that threatens or could again damage the properties and farms within the vicinity. IICI and PAREX will initially dredge and remove the silt at the navigational zone to open up the river mouth and to be increased gradually upon full understanding of the dynamics of the river run materials. The activity will be properly coordinated with the concerned government agencies to ensure that the objective of solving the drainage and flooding problems in the municipality will be attained.

The dredging operation shall be undertaken using:

- Cutter-Suction Dredger (CSD) having a capacity of 1,000 cubic meters per hour
- Split and/or Floating Hopper Barges
- Sand Carrier Vessel
- Long Arm Excavator with 1.5m³ bucket capacity
- Tug Boat
- 10kVA Generator Set

Upon issuance of the ECC and other permits and clearances, the dredging site shall now be developed based on the dredging plan approved by the DPWH, as follows:

1. Construction of Site Office on a container van;
2. Perimeter boundary survey covering the 21-hectare with length of 8,600 linear meter river dredging zone;
3. Development of "dredging lakes" as source of sand to be extracted using backhoe. The said lake measures around 30-45 meters in diameter. Additional dredging lakes shall be added progressively.
4. Development of the stockpile area;

5. Installation of safety signs and lighting fixtures;
6. Installation of buoys and lighted markers on the 50-hectare navigational zone;
7. Development of temporary earthen ramp to cross the nearby riverbanks;
8. An option to construct causeway or port to load the sand materials;
9. An option to install a 1000-ton per hour trestle conveyor loading facility designed to allow sand material-shipment in most weather conditions; and
10. To mobilize the required equipment together with the necessary personnel and materials to jumpstart the project.

The herein proponent shall require all personnel involved in the development and operation to implement and install safety measures such as radio communication equipment, visible safety signs, well-lighted working areas, emergency clinic and the wearing of Personal Protective Equipment (PPE's) among others.

1.6.1.3 Abandonment

The decommissioning and abandonment plan has its focus on protecting public health and safety, improving or eliminating environmental damage and liabilities, and allowing the land use to be similar to its original use or an acceptable alternative.

The decommissioning plan shall be executable at any time throughout the lifetime of the dredging activity. This plan shall also take into account environmental rehabilitation. Environmental rehabilitation shall include the removal of all surface facilities and dredging equipment at Baclaran River and Mindoro Strait.

The formulation of the detailed decommissioning plan will be done by the proponent within the specified timeframe as part of the post-ECC requirement. It will be submitted for approval to the EMB MIMAROPA, IAC and all other concerned government agencies on the activities such as Environmental Site Assessment to determine contaminants left by the operation, method and equipment to be used for dismantling of structures, clean-up or remediation plan and demobilization scheme before proceeding.

The proponent shall conduct sub-bottom profiling and bathymetry, post coastal marine assessment, freshwater sampling and marine sampling prior to permanent cessation of the dredging area. Equipment, structures and other facilities will be assessed regularly for the project to continue its operation beyond its lifespan.

For purposes of compliance to ECC conditions, a detailed Abandonment Plan shall also be undertaken by the herein proponent for submission and approval of EMB at least six (6) months before the scheduled abandonment.

1.8 Manpower Requirements

It shall be a policy of the proponent to hire qualified local applicants based on the following order of priority.

Table No. 4_Manpower Requirement

POSITION / PERSONNEL	REQUIREMENT PER SKILL
Operation / Resident Manager	1
Captain / Dredger Operator	2
Dredging Ship Crew	10
Shift Foreman	2
Community Relations Officer	1
Safety & Pollution Control Officer	1
Quality Control Engineer	1
Mechanic & Welder	2
Accountant	1
Samplers	6
Nurse	2
Logistics	1
Clerk / Checker	2
Driver Liaison	2
Backhoe Operator	4
Bulldozer / loader Operator	2
Crew for land-based operation	10
Security Guards (on Contract)	10
Total	60

1.9 Indicative Project Investment Cost

The indicative project cost for the SUMAGUI RIVER DREDGING PROJECT is estimated at **ONE HUNDRED NINETY-TWO MILLION TWO HUNDRED EIGHTY TWO THOUSAND (PhP192,282,000) PESOS**. A summary of the capital cost is shown on the table below.

Table No. 5_Breakdown of initial expenditures / capital cost

DESCRIPTION	ESTIMATED COST (PHP)
Permitting	5,000,000.00
Cutter-Suction Dredger (CSD)	40,000,000.00
Long Arm excavator	8,000,000.00
Barge	10,000,000.00
Tug boat	15,000,000.00

Land-based (backhoe, dozer-loader, dump trucks and other support equipment) Heavy Equipment	12,000,000.00
Land Acquisition – On-site Office and Stockpile Area	3,500,000.00
Service vehicles and facilities	4,000,000.00
Silt Curtain	1,500,000.00
Loading line (pipes)	2,000,000.00
Screen and conveyor plant	3,000,000.00
Loading conveyor	2,500,000.00
Tower Light	120,000.00
Contingency allowance (10% of equipment and facilities)	10,662,000.00
Operating Cost	30,000,000.00
Total	147,282,000.00
Social Development Plan	TBD
Safety and Health Program	TBD
Local Taxes (OTP, Quarry Tax, Excise Tax Business Permit, etc.)	45,000,000.00