EXECUTIVE SUMMARY

PROJECT FACT SHEET

Name of Project	:**Bayawan City River Flood Control Project Thru Dredging Method**
Locatio	:Bayawan River, Bayawan City, Negros Oriental
Nature of Project	:Dredging for Flood Mitigation and Disaster Risk Reduction
Proponent Name	: **Local Government Unit of Bayawan City**
Address	: Bayawan City, Negros Oriental
Authorized Signatory	: Hon. Pryde Henry A. Teves
Contact Details	: (035) 531-0020 to 21
Email Address	: mayorbayawan@gmail.com
Proponet Name	: **Marisand Resources Co., Ltd.**
Address	: Sitio Baas, Brgy. Pagsabungan, Mandaue City, Cebu
Authorized Signatory	: Mr. Philip Tan
Contact Details	: (032) 345-9525 / (032) 345-9526
Email Address	: marisandresources@gmail.com
EIS Consultant	: **POIEL Engineering and Management Services**
Address	: Unit 121, Urban Deca Homes, H. Cortes St., Kasambagan, Cebu City
Contact Details	: (0917) 7147727
Email Address	: dredging@poielcebu.com

BRIEF PROJECT DESCRIPTION

The project aims to **mitigate and reduce the risk** of flood occurrences along Bayawan River. This is done by reconfiguring the river channel to accommodate the volume of water estimated to occur during a 50-year return period. Precision dredging will be employed starting from the mouth of the river up to 6 km upstream and will be guided by Detailed Engineering Design as approved by DPWH.

The project, when implemented, is only a part of the overall strategic alternative for flood control and mitigation for Bayawan River. Marisand Resources Co., Ltd. will dredge the channel with no financial obligation on the part of the city government. Moreover, the company will provide Five Pesos (Php 5) per cubic meter of dredged materials to the city government that will be shipped out of Bayawan City. A Private-Public Partnership (PPP) Agreement has been entered into on this regard. Estimated volume of materials to be extracted under the PPP contract is about **10 million cubic meters**.

PROJECT LOCATION AND ACCESSIBILITY

Bayawan City ia a second-class component city of the 3rd Congressional District of the province of Negros Oriental. It is located southwest of Negros Island at coordinates 9°22”00.14” N and 122°47’59.01”. Based on the 2010 census, it has a population of 114,074. It has a land area of 699.08 sq. km., the largest in the province. Bayawan is bounded in the north by the municipality of Mabinay, in the east by the Cities of Tanjay and Bais, in the southeast by Sta Catalina, and Basay in the northwest. The city is politically subdivided into 28 barangays. It is linked by an all-weather asphalt-concrete 2-lane provincial road for about 102 kilometers from Dumaguete City, the provincial capital of Negros Oriental.

PROJECT AREA

The Project site starts at the estuary and mouth of the river and extends up to 6 kilometers upstream. Bayawan River Project site is situated at the Poblacion, extending up to Barangay Nangka. The river mouth can be easily accessed through the City's boulevard at Poblacion-Suba. Downstream and upstream sections of the river can also be seen from the main bridge at the national highway. Some riverbank sections can also be accessible in the upstream barangays and sitios of the City.

The project site is part of the Bayawan Floodplain. The Bayawan floodplain occupies a relatively flat land as a consequence of the meandering nature of Bayawan River when it enters Sulu Sea. The meander zone presently occupies the western portion of the floodplain, forming an elongated zone of active and abandoned riverine channel ways, 1 km across and stretching inland to about 6 km at barangay Nangka.

PROJECT RATIONALE

Flooding is a serious problem in Bayawan City. Sandwiched between the Bayawan and Sicopong Rivers, Bayawan City is highly susceptible to flooding during rainy days. In October 13, 2013, three days of successive torrential rains brought Bayawan City to its knees. P50.9M and P40M worth of agriculture and infrastructure, respectively, were destroyed by floods. Damage to business establishments was pegged at P8M and another P1.8M for textbooks for a total of P100.1M. Six persons, including a policeman rescuer, were killed by the rampaging floodwaters. Thirty-six families lost their homes and about 20,000 people were evacuated.

There are (two) 2 primary objectives for undertaking this dredging operation:

a. To increase the river channel capacity and its ability to convey runoff water during heavy rains along the meandering channel towards its outlet at the river's mouth;
b. Deepen the river's mouth for easy access of fishing boats to the Bayawan fishport.

PROCESS DOCUMENTATION

EIA TEAM:

Marisand Resources Co. Ltd.

Engr. Rogelio Vergara	- Consultant, POIEL Engineering and Management Services
Prof. Atanacio Almocera Jr.	- Lead EIS Preparer, Environmental Management Specialist
Dr. Danilo Dy	- Consultant, University of San Carlos
Dr. Roland Otadoy	- Consultant, Unviersity of San Carlos
Dr. Julie Otadoy	- Consultant, University of San Carlos
Engr. Hernulfo B. Ruelo	- Geologist

Bayawan City LGU

Engr. Edward Ryan Torreda	- Disaster and Risk Reduction Management Office
Engr. Eric O. Torres	- City Engineer
Engr. Kenneth Arte	- City Planning and Development Coordinator
Erjien R. Tenefrancia	- City Agriculture Office
Engr. Ion Bollos	- City ENRO

MODULE	PREPARERS
EXECUTIVE SUMMARY	Engr. Vergara
PROJECT DESCRIPTION	Engr. Vergara
LAND	
1. Land Use and Classification	Engr. Arte / Engr. Torres
2. Geology/Geomorphology	Engr. Ruelo
3. Pedology	Engr. Ruelo
4. Terrestrial Ecology	Dr. Julie Otadoy
WATER	
Hydrology/Hydrogeology	Dr. Roland Otadoy / Engr. Ruelo
Oceanography	Dr. Dy / Engr. Ruelo
Water Quality	Dr. Dy / Dr. Roland Otadoy
Freshwater Ecology	Dr. Julie Otadoy
Marine Ecology	Dr. Julie Otadoy / Ms. Tenefrancia
AIR	
Meteorology/Climatology	Engr. Ruelo / Ms. Tenefrancia
Air Quality (& Noise)	Dr. Julie Otadoy
PEOPLE	
Displacement of Settlers	Engr. Torreda / Engr. Arte
In-migration	Engr. Torreda / Engr. Arte
Cultural / Lifestyle Change	Engr. Torreda / Engr. Arte
Impacts on Physical Cultural Resources	Engr. Torreda / Engr. Arte
Threat to Delivery of Basic Services	Engr. Torreda / Engr. Arte / Engr. Torres
Threat to Public Health and Safety	Engr. Torreda / Engr. Arte
Generation of Local Benefits from the Project	Engr. Torreda / Engr. Arte
Traffic Congestion	Engr. Torreda / Engr. Arte
ENVIRONMENTAL MANAGEMENT PLAN	Prof. Almocera
ENVIRONMENTAL RISK ASSESSMENT & EMERGENCY RESPONSE POLICY	Prof. Almocera
SOCIAL DEVELOPMENT PLAN AND IEC FRAMEWORK	Prof. Almocera
ENVIRONMENTAL COMPLIANCE MONITORING	Prof. Almocera
DECOMMISSIONING / ABANDONMENT / REHABILITATION POLICY	Prof. Almocera
INSTITUTIONAL PLAN FOR EMP IMPLEMENTATION	Prof. Almocera

EIA SCHEDULE OF ACTIVITIES:

ACTIVITY	2016	2017				2018
		Q1	Q2	Q3	Q4	Q1
Field Reconnaisance						
Initial Scoping						
Organization of EIA Team						
Baseline Characterization						
Public Scoping						
Technical Scoping						
Site Visit by EMB						
EIS Draft Report Prep						

This project requires an EIS and the ECC as the decision document. The EIA was initiated and driven by the conduct of three level scoping activities as stipulated by Revised Procedural Manual of DAO 2003-30 and DAO 2017-15.

The 1st level involves project briefing with various regulatory agencies from the provincial and city level then to the regional level and finally the central office of EMB. During this stage, several meetings and discussions were conducted and participated by the city engineer, city planning officer, the local disaster and risk reduction team, the local chief executive, and other stakeholders to conceptualize, present, refine, and establish institutional arrangements related to the project. This include the conduct of a Public-Private Partnership (PPP) procurement process that was won by Marisand Resources Co. Ltd. and endorsements from other line agencies.

The 2nd level involves public scoping as endorsed by the central office of EMB. The Project was then presented to various respective stakeholders representing the general community. At this point in time, various stakeholders were given opportunities to air their views and concerns regarding the project. These issues and concern will be incorporated in the conduct of the study. The result of the public scoping provides insights on the project, specifically public perception and becomes part of the consideration during technical review for the 3rd level of scoping.

The 3rd level involves discussion and defining critical issues and concern with the technical review team of EMB regarding the implementation of the project. The result of the activity provides guidelines on the focus of the environmental study and assessment in the course of project implementation.

PROCESS DOCUMENTATION

KEY IMPACTS	ASSESSMENT/METHODOLOGY
PROJECT DESCRIPTION	• Consultation with Project Proponents and Regulatory Agencies. • Literature research and document review (MOA, Feasibility Studies, endorsements) • Ocular Field Reconnaissance
LAND	• Secondary data Review on: - Land use • Geology/geomorphology • Pedology • Transect walk for terrestrial ecology
THE WATER	• Secondary data review on: - Hydrology/hydrogeology - Oceanography - Water Quality - Fresh Water Ecology - Marine Ecology • Flood simulation modeling-HEC RAS • DENR Standard Sampling for water quality • Field Survey, Impact Analysis to fresh water ecology • Field survey, Impact Analysis to marine ecology

THE AIR	• Secondary data review on: - Climate Change - Climatological Norms • Ambient air characterization
THE PEOPLE	• Secondary data review on: - Demographic data • Public Scoping

EIA SUMMARY

SUMMARY OF ALTERNATIVES

Generally, there are two alternatives:

1. Leave the river as it is and allow it to find its new dynamic equilibrium or;
2. Dredge the river to a desirable cross section to maintain its stream path and dynamic equilibrium that lessen extent of flooding in the area.

The first alternative is a far outcry from reality. Economic opportunities provided by these floodplains have always outweighed the risk brought about by natural flooding in the area. This is one reality that may not change over a significant period of time. Furthermore, it is near impossible for the government to remove people in the area to minimize loss of lives and properties as a consequence of the natural flooding incidence.

It is therefore imperative to deepen the current river channel to be able to accommodate more volume of floodwater, thereby minimizing overflowing of the river that caused flooding and destruction in the main urban center of the City, including other low-lying areas.

Goal

The main goal of the project is to mitigate flooding extent in the area by increasing the capacity of the river to carry more volume of water by changing its configuration through precision dredging. Invariably, the result will be a new equilibrium condition of the river to accommodate this extra volume of water.

To achieve this new dynamic equilibrium, the entire river system has to be investigated in a holistic approach.

Siting

The project site is part of the Bayawan Floodplain. The Bayawan floodplain occupies a relatively flat land as a consequence of the meandering nature of Bayawan River when it enters Sulu Sea. The meander zone presently occupies the western portion of the floodplain, forming an elongated zone of active and abandoned riverine channel ways, 1 km across and stretching inland to about 6 km at barangay Nangka. Swamps surround the active river channel at its deltaic mouth and extends 3 km inland (3 meters asl elevation) at barangays Banga and Ubos, and fringes the coastal areas at barangay Villareal. The Bayawan floodplain is an aggrading (mainly depositional) floodplain. The Bayawan River which cuts it has reached beyond its natural base level of degradation, and therefore it is subject to repeated floods, rapid sedimentation, and river avulsion during extreme flood events.

Technology Selection/Operation Processes

There are two major impacts that may result from dredging river systems. The generation of excessive silt and river bank erosion.

The generation of excessive silt can be mitigated by providing silt curtains in the dredging area and in ecologically sensitive areas. These strategies will minimize impact to water quality in general and ecologically important niche in particular that may be found in the river stretch.

River bank erosion is an indication of instability of river systems. This is likely to occur if there is disturbance in the dynamic equilibrium of the river flow or its channel. To achieve a new desirable equilibrium, careful consideration must be taken in the reconfiguration of river channel corresponding to its new equilibrium condition. To do this, we employ the best practicable science of modeling. HEC-RAS software package will be employed to identify the limits of dredging. The modeling results as design criteria will be approved by DPWH.

Resources

Marisand, through its construction partner and "mother" company, will deploy and provide all dredging vessels and equipment needed for the Project. Financial requirements will also be provided by Marisand.

The fuel and oil used to run the dredging equipment will be sourced locally. Supply arrangements will be made to ensure sustainable and continuous operations.
Supervision of dredging operations, including engineering and environmental monitoring will be handled by another of Marisand's consortium partners, POIEL Engineering and Management Services.

PROJECT DESIGN AND IMPLEMENTATION PLAN

Pre-operational phase
The proponent organizes itself to expedite the resolution of institutional, environmental and regulatory considerations in relation to the project undertaking. During the implementation stage, an office based in Bayawan will be set up for administrative operations and to address local issues associated with project.

Operational phase
The Detailed Engineering Design will be the guiding protocol for attaining the desired channel configuration. The dredger itself will house the operating personnel and necessary implements for the effective and efficient maintenance and operations. The design limits are critical to minimize the phenomenon of hungry water that may erode river banks downstream. Since dredging involves the precision cutting of river channel, various sizes and capacity dredgers will be used.

Abandonment phase
This will include the removal of all equipment and machineries used in the operations and take these out of the Project site. The Project will also mitigate all negative environmental footprints that may have been caused by the project or stipulated in the monitoring plan.

All records will be submitted to Bayawan City LGU for future reference and integration into the river management plan.

Project Timeframe

The implementation of the Project is limited to what has been stipulated in the MOA between Bayawan City LGU and Marisand Resources Co Ltd.

The dredging activity is dependent on two limitations:

- Duration of Three (3) years as stipulated by MOA
- The river reach of six (6) km

The estimated volume of dredge materials as provided for in the MOA for the first 6 km of the river is about 10,000,000 cu m. If dredging of the first 6 km is done in less than 3 years, then the proponent can apply for another ECC for the subsequent river reach.

SUMMARY OF BASELINE CHARACTERIZATION

MODULE	BASELINE CHARACTERIZATION
LAND	• Project site is within the City's urban area
	• The Project included riparian zones which extends 300 meters inwards and are all within Bayawan City
	• All areas in the vicinity of the Project site are Alienable and Disposable, composed of urban settlements at downstream section and agricultural land in the upstream section
	• Minimal encroachment at the riverbanks
	• The Project site is alluvial and flood prone areas
	• Moderate to severe flooding is observed in areas surrounding the Project site
	• The river also serves as fishport of the City
	• No environmentally critical areas surrounding the Project site
	• Bayawan River floodplain is relatively large with an area of roughly 25 sq. km.
	• Floodplain is relatively flat
	• Swamps surround the river channel extending 3 kms inland
	• Floodplain comprises of thick layered sequences of unconsolidated sand, silt, mud and gravel materials
	• The floodplain is aggrading where sediment run-off is relatively high
	• The floodplain is not prone to landslides and has no history of debris flow and subsidence
	• There were river avulsions in Sitio Ondol, Brgy. Nangka and Sitio San Ramon, Brgy. Poblacion during the 1990 Typhoon Ruping
	• No known fault lines in the vicinity of the Project site
	• The City's topographic relief is generally moderate with rolling hills in plateaus and steeper deeply eroded hill slopes and streams-dissected valleys
	• No inland water body (lake) within the City
	• The City coastal plains, being historically swamplands, are most prone to liquefaction
	• The City's 5 km coastline is a tsunami hazard
	• Hinterland barangays have low to moderate hazard risks, while all urban and coastal barangays have moderate to high hazard risks
WATER	• The Project site is Bayawan River, starting from its mouth estuary and extending 6 kms upstream

	• Average discharge is 3,466 cubic meters/second
	• Design velocity is 3.94 meters/second
	• Bayawan River catchment area is 4.5 sq kms
	• The river is heavily silted with accretion visible in both banks at the mouth of the river
	• Concentration of surfacants, arsenic, TDS and dissolved oxygen are either below detection limits, below normal or considered satisfactory
	• BOD is considered high compared to standards (DENR DAO 199034)
	• The macro-invertebrates and fish species in the riverine and riparian area are mostly considered of least concern or not threatened
	• The estuary, around 1 km radius from the river mouth, is in very poor condition to allow coral formations
	• No seagrass found in the Project site.
AIR AND NOISE	• Climate belongs to Type III based on modified Coronas classification
	• Dry months are January to May and wet months are June to December
	• Typhoons usually occur between May and November
	• Average annual rainfall 1,212.40 mm
	• Strong winds and heavy rains during southwest monsoon which comes from its coast and the Sulu Sea
	• Bayawan has a small urban area, air quality is within ambient standards
	• Noise level is also within ambient standards
PEOPLE	• City population is 114,070 (Census 2010) with 75.6% living in rural areas and 24.4% in urban areas
	• Literacy rate is 24.4% in urban areas
	• General population is highly favorable of the Project
	• Very minimal illegal settlers along the river
	• There are about 8,966 indigenous people called “Bukidnon” whose communities are living in 6 upland barangays, with CADC of about 350 hectares
	• No identified physical cultural resources near project site
	• City has complete telecommunications facilities
	• Water district is available, serving 80% of urban area
	• The city has a model SWM program with frequently visited sanitary landfill facility
	• Power is available in all barangays
	• The city has 3 hospitals and 2 main rural health units
	• City economy is predominantly based on agriculture with sugar, rice, corn, copra and marine products
	• City has 363 registered fishing motor boats, with fishing mostly done outside municipal waters

SUMMARY OF MAIN IMPACTS

Project phase/ Environmental Aspect	Environmental Component likely affected	Potential Impact	Option for mitigation, prevention and enhancement	Responsible Entity
Pre-Operations				
Mobilization of Dredging Equipment	The People	Navigational Traffic	Acquisition of permits	Marisand Resources
			Conduct Social preparations	Marisand Resources /LGU Bayawan
			Post Notices	Marisand Resources
Operations				
Dredging	The Water	Increase in turbidity	Install Silt Curtain	Marisand Resources
		Saline intrusion	Maintain slope as per design limits	Marisand Resources
		Change in Flow Regime of channel	Sounding before and after channel cutting	Marisand Resources
		Presence of Oil and Grease from machineries	Quarterly monitoring for water quality	Marisand Resources
	The People	Noise	Install Mufflers	Marisand Resources
			Scheduled Operations	Marisand Resources
		Navigational Traffic	Acquisition of Permits	Marisand Resources
			Conduct social preparations	Marisand Resources / LGU Bayawan
			Post Notices	Marisand Resources
	Resource Use	Use Disturbance	Avoidance or compensation package	Marisand Resources
Abandonment	Land and Water	Water quality and negative environmental footprints	Follow closure and abandonment policy and procedure	Marisand Resources

ENVIRONMENTAL MANAGEMENT PLAN (EMP)

Project phase/ Environmental Aspect	Environmental Component likely affected	Potential Impact	Option for mitigation, prevention and enhancement	Responsible Entity	Cost (Php)	Guarantee/ Financial Arrangements
Pre-Operations						
Mobilization of Dredging Equipment	The People	Navigational Traffic	Acquisition of permits	Marisand Resources	200,000	part of development
			Conduct Social preparations	Marisand Resources/ LGU Bayawan	300,000	part of operation
			Post Notices	Marisand Resources	50,000	part of operation
Operations						
Dredging	The Water	Increase in turbidity	Install Silt Curtain	Marisand Resources	300,000	part of operation
		Saline intrusion	Maintain slope as per design limits	Marisand Resources	part of operation	part of operation
		Change in Flow Regime of channel	Sounding before and after channel cutting	Marisand Resources	part of operation	part of operation
		Presence of Oil and Grease from machineries	Quarterly monitoring for water quality	Marisand Resources	100,000	MMT Arrangements
	The People	Noise	Install Mufflers	Marisand Resources	200,000	part of operation
			Scheduled Operations	Marisand Resources	option to operations	part of operation
		Navigational Traffic	Acquisition of permits	Marisand Resources	part of mobilization	part of mobilization
			Conduct Social preparations	Marisand Resources/ LGU Bayawan	part of mobilization	part of mobilization
			Post Notices	Marisand Resources	part of mobilization	part of mobilization
	Resource use	Use disturbance	Compensation	Marisand Resources	part of mobilization	part of mobilization
Abandonment	Land and water	Possible negative environmental footprints	Follow closure and abandonment procedures/policy	Marisand Resources	part of mobilization	part of mobilization

ENVIROMENTAL MANAGEMENT AND MONITORING PLAN (EMMoP)

Key Environmental Aspect	Potential Impact	Parameter to be Monitored	Sampling and Measurement Plan			Lead Person	Annual Estimated Cost	EQPL MANAGEMENT SCHEME					
								EQPL RANGE			MANAGEMENT MEASURE		
			Method	Frequency	Location			ALERT	ACTION	LIMIT	ALERT	ACTION	LIMIT
The Land	Coastal erosion/ deposition	Change in Coastline configuration	Ocular spotting	Semi-annual	River mouth	Proponent	Php20,000.00						
The People	noise	dB(A)	Sound Meter	Monthly	River banks	Proponent	Php80,000.00						
	Navigational Traffic	No. of fishers affected	Log Book	Monthly	Municipal waters	Proponent	Php20,000.00						
	resource use	Use disturbance	compensation	Marisand Resources Co.Inc	part of operation	part of operation	to be established with MMT						
Impact on Water	Increase in turbiditv	TSS	Secchi disk	Monthly	River Channel	Proponent	Php20,000.00						
	Saline intrusion	salinity	refractometer	Monthly	River Channel	Proponent	Php20,000.00						
	Change in Flow Regime of channel	Channel depth	Sounding Survey	After every cut	River Channel	Proponent	Part of Operation						
	Presence of Oil and Grease from machineries	Oil and grease, DO	Water Quality Test	Quarterly	River Channel	Proponent	Php36,000.00						

ESTABLISHMENT OF ENVIRONMENTAL MANAGEMENT FUND (EMF)

Marisand Resources Co. Ltd. shall arrange the opening of an account in a reputable bank in the country for the EMF the amount of ***TWO HUNDRED SIXTY THOUSAND PESOS (Php260,000.00)*** to finance the initial organizational activities of the MMT for the project based on an agreed and approved Work and Financial Plan.

The Interest shall accrue to the same fund. Replenishment of this amount shall be done by the proponent regularly to correspond to the EMB-approved annual work and financial plan.

ESTABLISHMENT OF ENVIRONMENTAL GUARANTEE FUND (EGF)

Marisand Resources Co. Ltd. shall open an account for the Trust Fund in the amount of ***TWO MILLION PESOS (Php2,000,000.00)***. The earnings/interests of which shall accrue to the same Fund. The Trust Fund will be used to compensate aggrieved parties for any damages to life or property, undertake community-based environmental programs, conduct environmental research aimed at strengthening measures to prevent environmental damage and to finance restoration and rehabilitation of environmental quality of the project-affected area.

The Trust Fund shall be replenished to its original amount annually or whenever the amount goes below Php 1,000,000.00. The Trust Fund shall also be renewed upon every expiration. The proponent shall immediately inform EMB Central and RO should it fail to renew the Trust Fund (e.g. insurance policy) on its stated expiration date or should the Trust Fund be cancelled or voided by the Insurer because of non- payment of the required premiums or any other cause allowed by the Insurance Code or pertinent issuances of the Insurance Commission.