

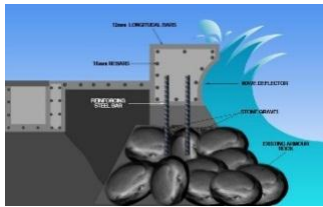

SECTION ES. EXECUTIVE SUMMARY

ES 1.0 Project Fact Sheet

Table ES-1. PROJECT FACT SHEET

Name of Project	PROPOSED BACOOR RECLAMATION AND DEVELOPMENT PROJECT (230-Hectare Outer Island and 90-Hectare Inner Island)	
Project Location	Along the Coast of Manila Bay in the Waters of the City of Bacoor	
Project Category per EMB Memorandum Circular 2014-005	"Category A-1 New": Environmentally Critical Project (ECP) / MC 2014-005 Major Reclamation Project ≥ 50 hectares	
Project Classification per EMB Memorandum Circular 2014-005	3.3 Reclamation and other land restoration project	
Scope of Project	Horizontal development only (Note: separate ECCs will be applied for the vertical development and source of reclamation materials)	
Authority over the project site	Memorandum of Understanding (MOU) between the Philippine Reclamation Authority (PRA) and City Government of Bacoor dated 07 December 2016	
Project Area	320 Hectares	
Project cost	Php 41.7 Billion	
Summary of Major Components	Major Components	
	<ul style="list-style-type: none"> Two (2) Islands 	
	Island	Area
	Outer Island	230 ha.
	Inner Island	90 ha.
Total Area	320 Hectares	
	<ul style="list-style-type: none"> Internal Road Network 	40 m wide (2 x 2 vehicle lanes 8 m, 2 x 8 m non-motorized vehicle lanes, 8 m refuges lanes)
	<ul style="list-style-type: none"> Drainage System 	A conceptual Drainage option for 230 ha.
	<ul style="list-style-type: none"> Containment Structures 	Options:

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	<ul style="list-style-type: none"> Storm Surge Protection 	Typical Wave Deflector 
	<ul style="list-style-type: none"> Access ways 	Integral to Master Plan as per Conceptual plan 
Project proponent	BACoor CITY GOVERNMENT The Honorable Mayor Lani Mercado Revilla Office of the Mayor Molino Boulevard, Bacoor, Cavite, Philippines Telephone No.: (046) 481 4100	
EIA Preparer / Consultant	TECHNOTRIX CONSULTANCY SERVICES, INC. Unit 305 FMSG Building, Balete Dr. QC 1101 Telephone No.: (632) 416.4625 (632) 745.5602 Cellular No.: 0917.8255203 E-mail address: technotrixinc@gmail.com Contact Person: Edgardo G. Alabastro, Ph.D.	

• **Notes:**

The City of Bacoor is proposing to undertake reclamation projects under two (2) different project names, i.e.:

- **The Proposed Bacoor Reclamation and Development Project (BRDP), and**
- **The Proposed Diamond Reclamation Development Project (DRDP)**

Shown in **Figure ES-1** are the configurations of the immediately adjacent reclamation landforms.

Inasmuch as the private-sector developers for the projects are different, two (2) separate EIS Reports and ECC applications will be submitted and applied for.

However, in reality the separate projects are treated as physically one for impacts assessment,

- ✓ **The channels separating the islands are small and intended only for better water circulation; Circulation, sedimentation modelling will take holistically both the BRDP and the DRDP**
- ✓ **The access ways are common and serve all of the islands.**

- ✓ The themes for the master plan are common. The master plan is developed on the basis of both the BRDP and the DRDP

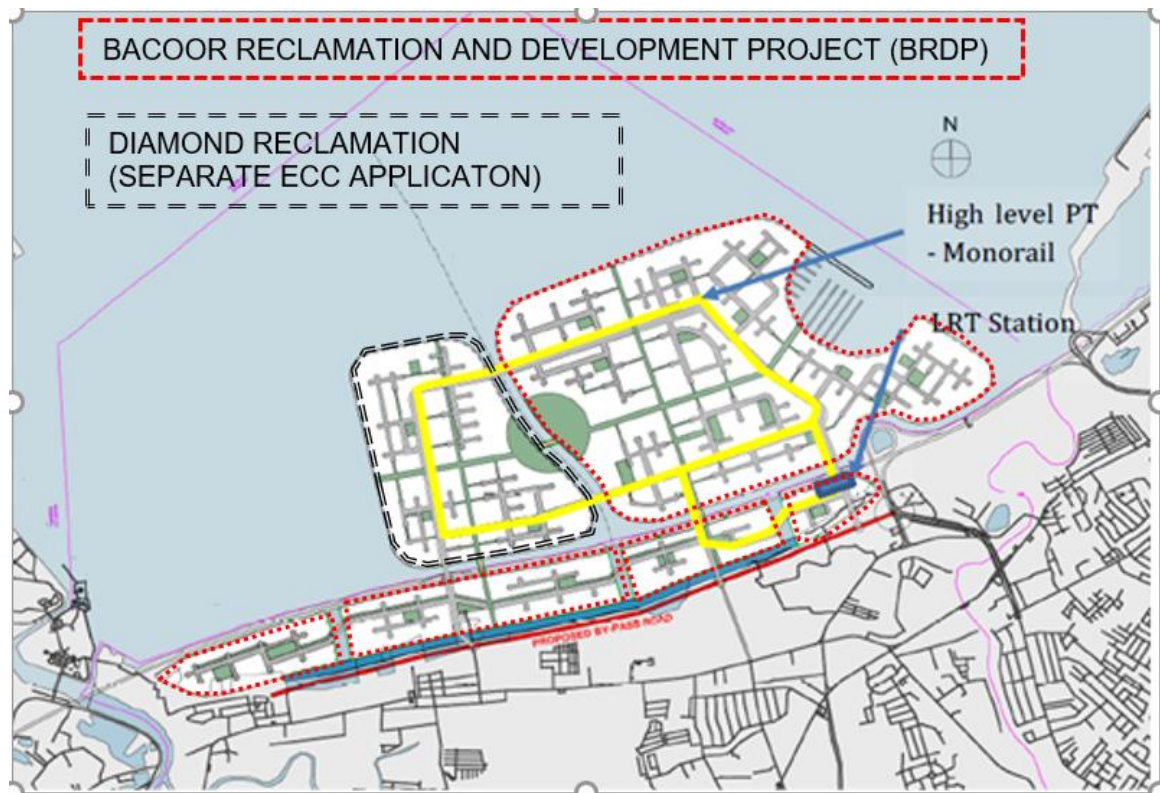


Figure ES-1. Configurations of the Bacoor and the Diamond Reclamation Project

ES 1.1 Project Description Summary

The Environmental Impact Statement (EIS) Report has been prepared to serve as an application for an Environmental Compliance Certificate (ECC) for the Proposed Bacoor Reclamation and Development Project (230-Hectare Outer Island 90-Hectare Inner Island). **The ECC application covers only the horizontal development or the reclamation of land, including the construction of accessway(s).** The vertical development which will be implemented after the full stabilization of the reclaimed land will basically cater to mixed use development. This development – referred to as the *Operations Phase* – is not included in this ECC application.

The project will be situated along the coast of Manila Bay encompassing the eleven (11) barangays namely Sinaguelasan, Alima, Campo Santo, Tabing Dagat, Digman, Kaingin, Maliksi III, Maliksi I, Talaba II, Talaba I and Zapote V within the territorial jurisdiction of Bacoor City.

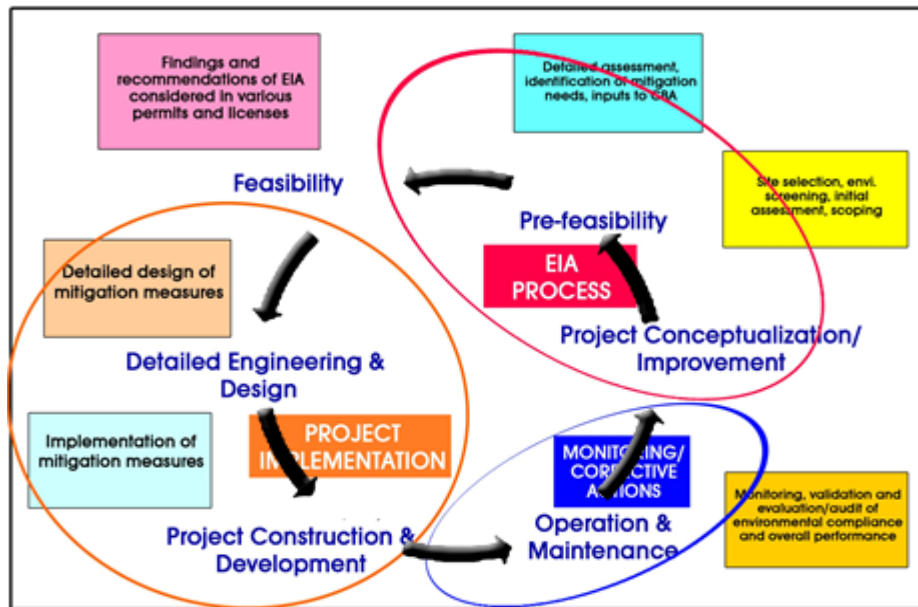
The reclamation is divided into two (2) which are classified as the (a) Bacoor Coastline Reclamation and (b) Bacoor Coastline Reclamation Inner Island. The former is approximately 230 hectares and 2.71 km away from Kawit, Cavite while the Bacoor Coastline Reclamation Inner Island is approximately 90 hectares. The Bacoor Coastline Reclamation Inner Island has a total length of 7.55 km at the coastline.

The basic rationale for the proposed reclamation project is to provide developable land to meet the robust urban population growth over a long-term planning horizon of at least twenty five (25) years. The proposed Bacoor Reclamation and Development Project (230-Hectare Outer Island and 90-Hectare Inner Island) to be located within the city waters of Bacoor will create land areas for planned expansion of the city.

ES 2.0 Process Documentation of the Conduct of EIA

The EIA Report for this Proposed Reclamation Project has been prepared in compliance with the basic principle of the Philippine EIS System (PEISS), i.e. that an **EIA/ECC is a planning tool and not a permit**, substantiated hereunder.

- a. The Revised Procedural Manual (DAO 03-30) stipulates this basic paradigm (of a planning tool), shown in **Figure ES-2**.



(Reference: Revised Procedural Manual for DENR Administrative Order No. 30 Series of 2003 (DAO 03-30))

Figure ES-2 Chart Showing the Planning Tool Concept Based on DAO 03 30

- b. The Public Announcement in a major daily newspaper of Former DENR Secretary J.L. Atienza asserting the Planning Tool concept of an ECC, shown in **Figure ES-3**. (Reference is also made to <https://litoatienza.wordpress.com/2009/11/26/due-process-is-a-requirement-of-good-governance-secretary-lito-atienza/>)

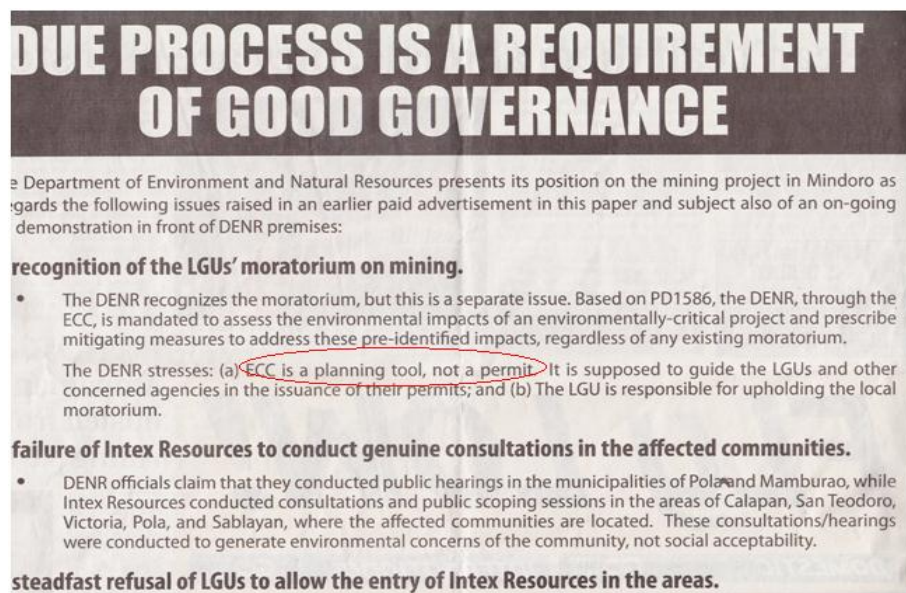


Figure ES-3 Verbatim excerpts from an ECC granted by EMB Region IV-A.

c. Moreover, the details of a project are established post-ECC, as stipulated in **page 10 of the Revised Procedural Manual**, quoted verbatim below:

iii) *During the project's **Detailed Engineering Design (DED)** stage, which is post-ECC, the generic measures identified during the EIA study at the FS stage will now be detailed based on the project facility design and operational specifications. Additional baseline monitoring may also be required prior to construction or implementation of the project to provide a more substantive basis for defining the environmental management and monitoring plans.*

The paradigm that an ECC is a planning tool is invoked. Under this prior to project implementation - which can only commence upon securing of a Notice to Proceed from the Philippine Reclamation Authority - several clearances have to be secured which require an ECC as input for decision making by various agencies in granting these clearances.

The Public Scoping Process as stipulated in **DAO 2017-15**. This DAO on Public Participation is faithfully complied with.

The Technical Screening Guidelines (Annex 1) are complied with.

ES 2.1 Document Types for ECC Application and Generic Contents

Following are the current types of documentation prescribed by the EMB/DENR under the Revised Procedural Manual (RPM)

Table ES-2. Document Types for ECC Application and Generic Contents

Type of Document	Generic Contents
1. Environmental Impact Statement (EIS)	EIS is applied to Single New Projects covered by <ul style="list-style-type: none"> • Group I- Environmental Critical Project (ECP) in Environmental Critical Area (ECA) or Non-Environmentally Critical Areas (NECA) • Group II- Non-Environmentally Critical Projects in Environmentally Critical Areas, • Group IV- A co-located project is a group of single projects, under one or more proponents/locators, which are located in a contiguous area and managed by one administrator, who is also the ECC applicant. (EMB. 2007. page 7)
2. Environmental Performance Report and Management Plan (EPRMP)	For operating projects with previous ECCs but planning or applying for clearance to modify / expand or re-start operations, or for projects operating without and ECC but applying to secure one to comply with PD 1586 regulations. For single project applications EPRMP is the document to be submitted. For co-located project applications PEPRMP is to be submitted. (EMB. 2007. page 7 to 8)
3. Programmatic EPRMP	
4. Initial Environmental Examination Checklist (IEEC)	Groups I, II and IV depending on project type, location, magnitude of potential impacts and project threshold. (EMB. 2007. page 7)
5. Project Description Report (PDR)	The appropriate document to secure a decision from DENR/EMB. The PDR is a must requirement for environmental enhancement and mitigation projects in both ECAs and NECAs to allow EMB to confirm the benign nature of proposed operations for eventual issuance of a Certificate of Non-Coverage (CNC). (EMB. 2007. page 7)
Programmatic EIS (PEISS)	EIS is applied to Co-located Projects covered by <ul style="list-style-type: none"> • Group I- ECP in ECA or NECA • Group II- Non-Environmentally Critical Projects in ECAs, • Group IV- A co-located project is a group of single projects, under one or more proponents/locators, which are located in a contiguous area and managed by one administrator, who is also the ECC applicant. (EMB. 2007. page 7) • PEISS more applicable for the Operations Phase

Based on **Table ES.2**, an Environmental Impact Statement (EIS) Report is the appropriate document. A Programmatic EIS type of report is not appropriate because the activities involved are only dredging, reclamation and horizontal works which are short term in duration and the

responsibility for these rests on one entity only, i.e. the Project Proponent and its private sector partner/project developer. During the operations phase a Programmatic EIS may be applicable because of several types of activities involved and of the participation of various locators.

ES 2.2 EIA Team

The composition of the EIA Team with compliance with EMB MC 2011-005 is shown in **Table ES-3**. Resource Persons/Expert Companies were also engaged and are also listed hereunder.

Table ES-3. The EIA Preparer Team

Team Member	Field of Expertise	EMB Registry No.	Company
Edgardo G. Alabastro, Ph.D.	Team Leader	IPCO-257	Technotrix Consultancy Services, Inc.
Nadia P. Conde	Project Coordinator	IPCO-102	Technotrix Consultancy Services, Inc.
Dr. Felixberto Roquia	Sociology Module	IPCO-028	
Hazel Victoriano	Socio Assistant	-	Technotrix Consultancy Services, Inc.
Benjamin Francisco	Marine and Fresh Water Ecology (Team Leader)	IPCO-038	Technotrix Consultancy Services, Inc.
Virgilio Pantaleon	Coral Reef, Seagrass	-	Technotrix Consultancy Services, Inc.
Engr. Emerson Darroles	Oceanography	-	Technotrix Consultancy Services, Inc.
Jose Rene Villegas	Marine Team	-	Technotrix Consultancy Services, Inc.
Ernie Fontamillas	Marine Team	-	Technotrix Consultancy Services, Inc.
Michael Francisco	Fisheries	IPCO-040	Technotrix Consultancy Services, Inc.
Nazario Sabello	Air Quality	-	Technotrix Consultancy Services, Inc.
Jean Ravelo	Geology	-	Technotrix Consultancy Services, Inc.
Lawrence S Mojica	Technical Assistant	-	Technotrix Consultancy Services, Inc.
Angelie Faye Nicolas	Technical/Research	IPCO-259	Technotrix Consultancy Services, Inc.
Warren Conde	Field Survey	-	Technotrix Consultancy Services, Inc.
Proponent's External Expertise			
<ul style="list-style-type: none"> • Eng'r Manuel R. Berenia = Reclamation Technology • Ms. Sujata Govada UDP International (H.K.) – Master Plan • Ramboll Group, Copenhagen. – Engineering • AMH Philippines, Inc. – Engineering • EGS (Asia) Inc. – Topographic and Bathymetric Survey • WSP Philippines, Inc. – Traffic Survey • Kwan Sing Construction Corp. – Geotechnical Survey/Borehole tests • Royal Van Oord - Reclamation & Dredging 			

ES 2.3 EIA Study Schedule

The following are the activities that were conducted for this study:

Table ES-4. EIA Study Schedule

ACTIVITY	DATE
▪ Secondary Data Researches	August 2018
▪ Marine Study	02 to 04 August 2017
▪ Bathymetric Survey	
▪ Geotechnical Survey	January to March of 2018. By A.M. Geoconsult
▪ Engineering Geological and Geohazard Assessment Report (EGGAR)	August 2018
▪ Geotechnical Survey (Drilling)	March 2018
▪ Preliminary Concept Masterplan and Engineering Design	03 August 2018
SOCIAL PREPARATION UNDERTAKEN	
ACTIVITY	DATE
IEC and Perception Survey (Public participation Documentation provided in Annex 3)	
▪ Initial Perception Survey	15-20 February 2018
▪ Information, Education and Communication (IEC)	26 January 2018
▪ Focus Group Discussion	27 June 2018
▪ Focus Group Discussion	17 July 2018
▪ Focus Group Discussion	26 July 2018
▪ Focus Group Discussion	27 July 2018
▪ Public Scoping	24 January 2019
▪ Technical Scoping	08 February 2019 (Technical Scoping Checklist provided in Annex 2)
▪ Perception Survey <ul style="list-style-type: none"> ✓ Barangay Banalo ✓ Barangay Maliksi I ✓ Barangay Maliksi III ✓ Barangay Sinaguelasan ✓ Barangay Talaba ✓ Barangay Zapote ✓ Barangay Kaingen ✓ Barangay Tabing Dagat ✓ Barangay Digman ✓ Barangay Alima 	January to March 2019

ES 2.4 EIA Methodologies

Table ES-5. EIA Methodology

Module / Section	Baseline	Methodology
LAND		
Land Use Classification	Secondary data: Bacoor City Comprehensive Land Use Plan (CLUP). Bacoor City Zoning Ordinance	Assessment of compatibility of the proposed project in the land use classification, Manila Bay Coastal Strategy, Consistency with the PRA Implementing Rules and Regulations, Relation to the PRA Master Plan for Manila Bay
Geology	Secondary data: Geologic, seismic, liquefaction, slope hazard maps and evaluation based on government data and maps. Primary data: Borehole drilling by 3 rd party A.M. Geoconsult & Associates	Identify and assess project impact in terms of the changed in topography including existing hazard as maybe aggravated Conduct of EGGA. MGB Methodology

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Module / Section	Baseline	Methodology
Pedology	Primary data: Geotechnical Investigation by A.M. Geoconsult & Associates	Describe the physical properties and erodibility potential of the soil, ongoing erosion processes and assess the erosional impacts of the project.
WATER		
Hydrology / Hydrogeology	Secondary data: Existing drainage system. Historical flooding occurrences	Identify and assess project impact on the change in drainage morphology, local drainage and resulting effects of flooding
Marine Water Quality	<p>Primary data: Standard Methods for Water Quality Sampling and Monitoring.</p> <p>Water Body Classification: DENR Class SB</p> <p>Parameters Considered</p> <ul style="list-style-type: none"> • BOD • Fecal Coliforms • COD • Lead • Total Coliforms • Hexavalent Chromium • Total Suspended Solids • pH • Oil and Grease • DO • Fecal Coliforms • Nitrate • Phosphate • Arsenic • Mercury • Cadmium • Color • Chromium <p>Secondary data: BFAR Report on Manila Bay</p>	<p>Assess impacts on siltation of surface and coastal marine waters</p> <p>DAO 2016-08</p> <p>Analytical Methods: by CRL Laboratory, recognized by DENR</p> <p>Metals : Spectrophometry AAS Cold Vapour AAS for Hg Coliform : Multiple Tube Fermentation BOD : Azide Modification Winkler O & G: Gravimetry (n-Hexane extraction) DO : Winkler/Titrametric pH : Electrometry TSS : Gravimetry</p>
Oceanography	<p>Primary data: Tide Measurements 2/6/2018 – 19/6/2018. Bathymetric data</p>	<p>Tidal Stations</p> <p>Echo sounder or equivalent</p>
Marine	<p>Primary data: Abundance / density / distribution of ecologically and economically important species, mangroves, benthism plantons, coral rees, algae, seaweeds, sea grasses</p> <p>Presence of pollution indicators</p>	<p>Transect, manta tow and spot dives surveys, marine resource characterization (e.g. city/municipal and commercial fisheries data), Key informant interview.</p> <p>Mircoscopic Examination</p>
AIR		
Ambient Air Quality	<p>Primary data: Ambient air quality sampling and testing.</p> <p>DENR Classification Ambient Air and Noise Classification: Class B – Commercial Area</p> <p>Parameters Considered: TSP, PM10, SO², NO²</p>	<p>Methodology: Standard Methods for Ambient Air Quality Sampling by Volume Sampler</p> <p>TSP: Gravimetric PM10: Gravimetric PM2.5: Gravimetric SO₂: Pararosaniline NO₂: Griess Saltzman Noise: Instantaneous reading</p>

Module / Section	Baseline	Methodology
Ambient Noise Quality	Primary data: Noise Meter	
Contribution in terms of GHG	Data on Greenhouse Gases	Estimation of projected greenhouse gasses (GHG)
PEOPLE		
<ul style="list-style-type: none"> Demographic Profile / Baseline 	Primary data: Conduct of Public Perception Survey, Public Scoping Secondary data: Comprehensive Land Use Plan and Socio Demographic Profile of Bacoor City	

ES 2.5 Public Participation Activities

1. Information Education Communication (IEC) Activities

▪ IEC AND FGD WITH THE CONCERNED STAKEHOLDERS

IEC activities were conducted with the concerned stakeholders on 26 January 2018, 27 June 2018, 17 July 2018 and 26 July 2016. Among these invited were LGU Officials, Government Offices, Non-Government Organizations (NGO) / People's Organization (PO), Private Offices and Impact Barangays. Barangay Officials perceived that their barangays will be benefited by the livelihood and employment opportunities that will be generated by the proposed project. Moreover, the other participants appreciated the IEC as the chance to raise issues and feedback. The presentation gave background and understanding on the proposed project as well as the potential impacts that could arise. Provided below are the top key issues raised during the IEC and FGD conducted.

Key Issues and Concerns raised during IEC and FGD conducted:

- Identification of the developer or partner of the City of Bacoor
- Traffic Problem
- Source of Filling Materials
- When to conduct Public Scoping

▪ INITIAL SURVEY WITH THE COMMUNITIES NEAR THE PROJECT SITE

The results of the initial surveys covering the communities near the project site are presented in **Annex 3**. The said surveys were conducted as part of the Information, Education and Communication (IEC).

2. Public Scoping

The Public Scoping conducted on 24 January 2019 at the Bacoor City Hall Gymnasium was attended by participants from different sectors. The concerned stakeholders, especially those known to have opposing on reclamation projects, as well as those located in the Impact Areas were invited to participate. Among those invited were LGU Officials, Government Offices, Non-Government Organizations (NGO) / People's Organization (PO), and others. On the other hand, there were also participants that are not included in the official list of invitees but attended the said scoping. The Summary of Participants during the Public Scoping is provided in **Annex 3**.

It is noted that sufficient lead time was provided the invitees. For whatever the individual reasons maybe for their inability to attend, the stakeholders continued to be consulted to date for their concerns, if any. Letters of No Objection (LONO) have in fact been secured from certain agencies as shown below and provided in **Annex 1.7**.

- Department of Tourism (DOT) dated 19 November 2019
- Bureau of Fisheries and Aquatic Resources (BFAR) dated 20 November 2018
- Philippine Navy dated 27 November 2018
- Department of Energy (DOE) dated 29 November 2018

- e. Regional Development Council (RDC) dated 05 December 2018
- f. Philippine Reclamation Authority (PRA) dated 18 December 2018
- g. Department of Public Works and Highways (DPWH) dated 07 January 2019
- h. Department of Information and Communications Technology (DICT) dated 15 January 2019
- i. National Headquarters Philippine Coast Guard (PCG) dated 17 January 2019
- j. Philippine Ports Authority (PPA) dated 20 February 2019
- k. National Commission for Culture and the Arts dated 03 July 2019

Summary of Issues and Concerns Raised during Public Scoping Activity

The objective of the conducted Public Scoping Activity and other continuing IEC to be conducted is to ensure that the Environmental Impact Assessment (EIA) will address the relevant issues and concerns of the stakeholders and that it will be consistent with the Philippine Environmental Impact Statement System (PEISS).

Among the major issues are: (a) beneficiaries of housing programme; (b) source of the sands/filling materials; and (c) impacts on fisherfolks. A bullet list of the top Issues and Concerns raised during the Public Scoping Activity is provided below.

Major Issues and Concerns during Public Scoping Activity

- **Issues Not Directly related to Environmental Concerns of the Reclamation Project**
 - Source of Filling Materials and Impacts on San Nicholas Shoal
- **Issues Directly Related to Environmental Concerns of the Reclamation Project**

--During the Construction/Reclamation Phase

- Impacts on Water Circulation
- Impacts on Fisherfolks
- Displacement of settlers
- Miscellaneous Concerns:
 - ✓ Solid Waste
 - ✓ Erosion
 - ✓ Subsidence
 - ✓ Storm Surge
 - ✓ Sea Level Rise
 - ✓ Climate Change

--During the Operations Phase

- Traffic Problem

--Others

- Impacts on 844 Hectare Cavite Reclamation Project
- Impacts on LPPCHEA
- Impacts policy on clean up and rehabilitation of Manila Bay

The complete Public Scoping Report is provided in **Annex 3**. It is noted that details on the project were preliminary and not yet firm during the conduct of Public Scoping Activity.

The Table of List of Issues and Concerns, Propents's Response and page discussed in the EIS is provided in **Section 2.4, Table 2.4-72**.

ES 3.0 EIA Summary

ES 3.1 Summary of Alternatives

This is discussed in **Section 1.3** from which the key parameters are as follows:

Territorial Jurisdiction

- Must not be in or conflict with ECAs or Protected Areas as declared in the NIPAS, principally the LPP Wetland Park and mangrove communities
- Must not be in or cause irreversible disturbance of significant marine resources
- Must not conflict with existing settlers, or for which resolutions can be developed
- With respect to the other possible reclamation projects in the future

There should be sufficient buffer zone between the site and these other projects.

- Must be able to address the City Resolution CR 2014-38 on the designation of Aquaculture zone, fishing grounds and mangrove areas

The options for the appropriate landforms are also discussed in **Section 1.3**.

The landforms must address environmental issues e.g. circulation and sediment transport.

ES 3.2 Summary of Main Impacts and Residual Effects after Applying Mitigation

See table below.

Table ES-6. Summary of Main Impacts, Mitigation and Residual Effects after Applying Mitigation

Activity / Resources Likely	Potential Impact	Options for Prevention or Mitigation* or Enhancement	Residual Effects
I. PRE-CONSTRUCTION PHASE			
Site Clearing	Displacement of lift nets and mussel farms	<ul style="list-style-type: none"> • Avoidance or • Thru agreements with fisherfolks 	Nil. Affected fisherfolks are provided with fair and agreed compensation.
	Displacement of Existing Properties		
	Displacement of established fishing areas within the proposed site		
II. CONSTRUCTION PHASE			
Dredging and Reclamation Phase	Impacts on ECA	Not Relevant ECA distant from site	Nil
	Solid Waste Generation	<ul style="list-style-type: none"> • Domestic garbage from construction crews segregated and collected onboard ship and disposed onshore per RA 9003. No garbage disposal to Manila Bay. • Inventory of solid wastes, principally garbage through records of amount of garbage 	Nil
	Disturbance of Marine Species	<ul style="list-style-type: none"> • Provision of silt curtains where sediment streams are likely to occur and escape. 	Nil after a[[;ocatopm pf mitigating measures

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Activity / Resources Likely	Potential Impact	Options for Prevention or Mitigation* or Enhancement	Residual Effects
	Silt Dispersal	<ul style="list-style-type: none"> • Installation of silt and sediment weirs around reclamation equipment and barges; • Monitoring of sediment fluxes and application of more stringent control measures when necessary; or temporary cessation of activities. • Sediment canals in reclaimed areas will be installed to divert sludge into filters and weirs that capture sediments and fugitive reclamation filling materials at source. 	
Land Stabilization	Inducement of natural hazards such as floods, subsidence, liquefaction, tsunami, storm surge, land subsidence	<ul style="list-style-type: none"> • Reclamation Platform itself with wave deflector gives sheltering effect. • Appropriate structure to be selected in DED stage. Current best option is the use of wave deflector for tsunamis/storm waves; soil compaction/stabilization for liquefaction & subsidence; sufficient drainage system & retention/storage areas for floodwaters, among others. • Structural defense options are: seawalls at breakwaters wave deflectors, other similar defenses such as revetment; angled bypass walls. • Monitoring of ground level will be done during the period of soil stabilization (before vertical development) to determine quantitative surface movements with respect to both spatial and temporal rates. • Design of evacuation routes • Public education, awareness and preparedness campaign to include each of the known hazards. This will include evacuation drills, placing of signage, and establishing alert systems. This will be done in coordination with agencies like NDRRMC, PHIVOLCS, PAGASA, Project NOAH, etc. vis-a-vis the Disaster/Risk Reduction and Management Plan of the government. 	Nil Reclamation will not cause floods, subsidence, and other natural hazards
	Soil Erosion	<ul style="list-style-type: none"> • To prevent erosion on the seaward portion of the project, the construction of the seawalls shall be implemented in the initial phase of the reclamation. Consideration shall be given to forming a bund after the construction of the sea wall and placement of filter material, using selected granular material where possible, along the line of and immediately behind the sea wall. Such a bund assists in stabilizing the sea wall and its foundation if mud waves occur during filling. 	Nil
Dredging and Reclamation Phase	Changes in Seabed properties	<ul style="list-style-type: none"> • Reclamation technology to minimize seabed soil removal e.g. by maximum reuse of existing through surcharges derived from SNS; possible use of sand bag technology, etc. 	Nil
	Perceived Permanent loss of 320 Hectare Manila Bay Waters of the City of Bacoor, Change in Bathymetry		Permanent residual effect

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Activity / Resources Likely	Potential Impact	Options for Prevention or Mitigation* or Enhancement	Residual Effects
	Change in water circulation	<ul style="list-style-type: none"> Final design and alignment of landform to be based on the mathematical modeling for the landform layout. Will include in modeling other approved projects. 	Minimal
	Disruption in water circulation pattern and coastal erosion and deposition		Minimal
	Overall impact on whole Manila Bay circulation pattern and dispersion behaviours of existing outfalls and discharges		Nil
	Inducement of Flooding	<ul style="list-style-type: none"> Project will not block or disturb existing drainage system 	Nil
	Degradation of marine water quality	<ul style="list-style-type: none"> Silt curtains and containment structures Pre-screening of filling materials; most possible source is from Manila Bay (San Nicolas Shoal) itself Install liquid waste management system ensuring modern waste retrieval and treatment system. Treatment and disposal of liquid waste at point source will involve collecting liquids of point source origin; directing waste into integrated multiple waste streams facilities or collecting vessels, and application of treatments. Any fluid effluent to be discharged at sea will be monitored and tested before discharging. Installation of latrines and waste receptacles; collection facilities; Collection of shipboard wastes. Adoption of clean practices by all project operating units and personnel; Implementation of an efficient waste retrieval system; Greening of reclamation area. Adoption of an oil and grease recovery and treatment system; Implementation of rigid policies against indiscriminate disposal of oily waste and marine vessel bilge water. 	Nil
	Threat to existence and/or loss of important local species and habitat	<ul style="list-style-type: none"> Support appropriate stock enhancement measures e.g., re-seeding of appropriate species; Support closed seasons to enhance reproduction capacity of sardines and recruitment of stocks. Provision of alternative livelihoods to affected fishers 	Nil after applying mitigating measures
	Sea Level Rise	<ul style="list-style-type: none"> Elevated platform is a mitigating measure 	Nil
Horizontal	Potential accidents and damages to marine ecosystems during transport of dredging vessel	<ul style="list-style-type: none"> Sea worthy vessels Navigational Devices Proper training Avoid transport during inclement weather Compliance with PCG and International regulations 	Nil
	Fugitive Dust Generation	<ul style="list-style-type: none"> Construction Methodology 	Nil

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Activity / Resources Likely	Potential Impact	Options for Prevention or Mitigation* or Enhancement	Residual Effects
Development	from construction equipment and vehicles		
	Increase of Ambient Air and Noise Quality	<ul style="list-style-type: none"> • Construction works distant from ESRs • Short term only • Sea is buffer zone itself to population onshore 	Nil
	Emissions if power generating sets used and fossil fuel using equipment	<ul style="list-style-type: none"> • Proper preventive maintenance of gensets; replace leaking valves, fittings, etc. 	Nil
Land Stabilization	Livelihood and employment opportunity	<ul style="list-style-type: none"> • Positive effects of the proposed project 	Long term positive impacts/enhancement

In summary, the major impacts on the land environment would be the perception of inducement of natural hazards. Reclaimed lands in general, are considered **prone to liquefaction** unless engineering and reclamation interventions are applied. In addition, the project site, being located along the coast of Bacoor Bay, is **susceptible to tsunami hazard** due to the presence of an active subduction zone – Manila Trench located 190km west of the area and other active faults and or earthquake generators. Furthermore, the reclamation project site would be underlain by fill materials that are highly compressible which makes it prone to **subsidence hazard**. Likewise, the project area falls within the delineated flood prone areas by MGB indicating that the project could experience flooding if sea level rises by <5 meters. Considering the flat terrain and average elevation of the coastal areas of about two (2) masl, the project site could **experience localized flooding** especially if the drainage systems are inadequate. **Lastly**, the location of the reclaimed land will be such that it will be the nearest to the waterfront relative to pre-existing sites. This makes it **most vulnerable to storm surge and flooding**.

For the water module, the main impact would be effects on fisherfolks. In consultation with the Bureau of Fisheries and Aquatic Resources (BFAR) and the local municipal agriculture office, the transfer of all mussel farms displaced by the proposed project to a more suitable site will be implemented. All foregone incomes, cost of relocation will be shouldered by the project proponent/project developer(s). The most probable site should be the LGU-designated mussel culture zone west of the proposed reclamation project. Mussel farms can also be relocated past the northwestern boundary of the proposed reclamation project but since seawater will be deeper, efforts shall be made to shift farming system from the current stake method to the more modern hanging raft method. The raft method will dispense with the use of bamboo stakes driven in the seabed which has become a serious navigational hazard and impediment to coastal water mixing in the shallower portions of the bay. Farming mussels using floating bamboo rafts, plastic drum buoys or fish cage-grade styropore floats and polypropylene rope is more economical, environmentally responsive and efficient in the long run. More importantly, it has greater spat settlement capacity and which result to better yields. The raft method, however, requires a higher initial investment. In cooperation with research institutions, the project will also provide technical assistance on upgrading.

For the air module, the main impact on the Environmental Sensitive Receptors (ESRs) would be essentially nil inasmuch as activities will be confined at sea

For the people module, the main impact would be the displacement of liftnets and mussel farms, displacement of existing properties and displacement of established fishing areas within the proposed site during the pre-construction phase. The presence of informal settlers is recognized as a major issue. Nevertheless, the City Government has already recognized in its latest CLUP that the informal settlers will have to be relocated “in-city” to manage this sector in preparation for envisioned developments in the City. This will undergo to thorough communications with the affected residents to ensure that the LGU will provide necessary assistance, compensation and livelihood.

Thus, no major risks and uncertainties arising from the project are identified.