Executive Summary - English

Project Fact Sheet

<table>
<tr><td>Name of Project</td><td colspan="2">Bataan – Cavite Interlink Bridge (BCIB) Project</td></tr>
<tr><td>Project Location</td><td colspan="2">Mariveles, Bataan: Barangays Mountain View and Alas-Asin
Cavite: Barangays Timalan-Concepcion and Timalan-Balsahan</td></tr>
<tr><td>Nature of the Project</td><td colspan="2">Bridge Construction</td></tr>
<tr><td>Project Size</td><td colspan="2">Length: 32.15km; Width: 20.92m (carriageway)</td></tr>
<tr><td>Summary of Major Components</td><td colspan="2"><table><tr><th>Project Component</th><th>Description / Specifications</th></tr><tr><td>Navigation bridge</td><td>Provide the necessary navigation clearance for ships</td></tr><tr><td>Marine viaducts</td><td>Viaduct structures constructed above sea water</td></tr><tr><td>Interchanges and viaducts on land</td><td>Viaduct structures constructed on land and provide connections to existing road networks</td></tr><tr><td>Approach ramps</td><td>Parts of the road that go up from existing ground level towards the approach bridge</td></tr></table></td></tr>
<tr><td>Project Cost</td><td colspan="2">Php. 120.79 Billion (Civil Works)
Php. 175.66 Billion (Total Project Cost)</td></tr>
<tr><td>Project Duration</td><td colspan="2">2018-2027</td></tr>
<tr><td>Operation Date</td><td colspan="2">2027</td></tr>
<tr><td>Proponent Name</td><td colspan="2">Department of Public Works and Highways (DPWH)</td></tr>
<tr><td>Proponent Authorized Representative</td><td colspan="2">Emil K. Sadain, CESO I
Undersecretary for UPMO Operations and Technical Services
Department of Public Works and Highways</td></tr>
<tr><td>Proponent Address and Contact Details</td><td colspan="2">Address: Bonifacio Drive Port Area, 652 Zone 068, Manila, 1018 Metro Manila, Philippines
Contact Number: +63 2 5304 3805 / +63 2 5304 3681</td></tr>
<tr><td>EIA Preparer (Consultant)</td><td colspan="2">Ove Arup & Partners Hong Kong Ltd and EcosysCorp Inc.</td></tr>
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Ove Arup & Partners Hong Kong Ltd – Environmental and Social Team Leader</td><td>Annabele Herrera
EcosysCorp, Inc. – Project Director</td></tr>
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</table>

Process Documentation

• Project Categorization

As per the Revised Procedural Manual of the Department of Environment and Natural Resources (DENR) Administrative Order No. 30 Series of 2003 (DAO 2003-30), major roads and bridges are categorized as Environmental Critical Project (ECP) under Category A and within the scope of the EIS System based on Proclamation No. 2146 (1981) and Proclamation No. 803 (1996). The proposed Bataan-Cavite Interlink Bridge (BCIB) is technically defined under an area which will traverse water bodies tapped for domestic purposes, within the controlled and/or protected areas declared by appropriate authorities and which support wildlife and fishery activities.

Based on the Environmental Management Bureau (EMB) Memorandum Circular 005 of 2014 (EMB MC 2014-005) or the Revised Guidelines for Coverage Screening and Standardized Requirements under the Philippine EIS System, the proposed project, which is 32.15km long falls under Category A. Thus, a full-blown EIS is needed to secure an Environmental Compliance Certificate (ECC). This EIS report will outline the current conditions of the project area and will demonstrate all potential impacts that may be found significant. Moreover, as this project falls under the President Rodrigo Duterte's Build, Build, Build Projects, streamlining this environmental impact assessment (EIA) is also considered in the process (DAO 2019-16).

- **Definition of EIA**

As defined under the DAO 2003-30, an EIA is a systematic process that involves the prediction and evaluation of significant impacts of a project, including cumulative impacts on the environment all throughout its life cycle (*construction, operation and abandonment phase*). In addition, it involves designing appropriate preventive, mitigating and enhancement measures addressing the consequences in attaining socio-economic and environmental balance.

- **Scope of the EIA Study**

The contents of this report are based on the scoping checklist of the Terms of Reference from Annex A of DAO 2019-16 (**Annex A**). Among the major and critical components of the EIS Report are the following:

1. Project Description
2. Environmental Impact Assessment (EIA) Summary
3. Assessment of Environmental Impacts
4. Environmental Management Plan (EMP)
5. Environmental Risk Assessment (ERA) and Emergency Response Policy and Guidelines
6. Social Development Plan (SDP) and Information and Education Campaign (IEC)
7. Self-Monitoring Plan, Multi-Sectoral Monitoring Framework and Environmental Guarantee and Monitoring Fund Commitments
8. Decommissioning/ Abandonment/ Rehabilitation Policy, and
9. Institutional Plan for Environmental Management Plan (EMP) Implementation

- **EIA Team**

The Department of Public Works and Highways (DPWH), the main proponent of the project, is the lead engineering and construction agency of the government, tasked in ensuring and designing infrastructure developments such as national highways, bridges, flood control and other related public works.

DPWH has appointed Ove Arup and Partners Hong Kong Ltd., "Arup", as the lead consultant for the Feasibility Study of this BCIB Project. Arup is a multi-national firm which provides engineering, design, planning, project management and consulting services for all aspects of the built environment (**Annex B**).

Ecosys Corporation was hired by Arup as its sub-consultant to collaborate in the preparation of the EIA for the project, including social aspects such as the conduct of public consultations, IECs, perception survey, among others. The EIA Team consists of the following members:

Table 1 EIA Team

Name	Role in the EIA Study	Qualification
David Rollinson	Environmental and Social Team Leader (Arup)	BSc (Hons) Environmental Biology MSc Environmental Management
Angel Salcedo	Environmental and Social Specialist (Arup)	EIA Registration No. IPCO 334 MSc Environmental Engineering B.S. Chemical Engineering
Maria Catherine Rontos	Environmental and Social Specialist (Arup)	EIA Registration No. IPCO 037 Diploma in Urban and Regional Planning B.S. Environmental Planning and Management
Frederick Esternon	Terrestrial Ecology Specialist Environmental and Social Specialist EIA Head (Ecosys Corp)	EIA Registration No. IPCO 311 Environmental Management Specialist B.S. Forestry and Natural Resources
Elenor De Leon	Environmental and Social Specialist EIA Deputy Lead (Ecosys Corp)	EIA Registration No. IPCO 425 Master in Development Management Master of Environment and Natural Resources Management (units earned)
Ruben Estudilo	Marine Ecology Specialist (Ecosys Corp)	PhD Marine Science (Units Earned) MSc Marine Science Ecology B.S. Marine Science
Armando Gillado Jr	Terrestrial Flora Specialist (Ecosys Corp Inc)	EIA Registration No. IPCO 312 B.S. Forestry and Natural Resouces
Russel Banigued	Terrestrial Fauna Specialist (Ecosys Corp Inc)	EIA Registration No. IPCO 157 Environmental Science Specialist

- **EIA Study Schedule**

Table 2 presents the timeframe of activities set by the EIA consultant for the EIA study of the BCIB project.

Table 2 EIA Study Schedule

Year	2019												2020																													
Month	**Oct**				**Nov**				**Dec**				**Jan**				**Feb**				**Mar**				**Apr**				**May**				**June**				**July**							
Week	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Activities																																											
Reconnaissance Survey																																											
Coordination and Communication meeting																																											
Initial Perception Survey																																											
IEC and FGD																																											
Bataan																																											
Cavite																																											
Meeting with EMB																																											
Fauna Assessment																																											
Flora Assessment																																											
Corals Assessment																																											
Fish Assessment																																											
Air & Noise Sampling																																											
Water sampling and analysis																																											
Sediment sampling and analysis																																											
EIS report writing																																											
Awaiting new EMB DMO																																											
EMB Procedural Screening and EIS Draft Report Acceptance for substantive Review of REVCOM																																											
Public Hearing																																											

- **EIA Study Area**

The bridge will be constructed between the provinces of Bataan and Cavite. The alignment crosses over the Manila Bay – a natural harbour that is bounded by Cavite and Metro Manila on the east, Bulacan and Pampanga on the north and Bataan on the northwest. It has two navigation channels and the alignment will cross both the north and south channel on either side of Corregidor Island.

In Bataan, the alignment is situated between jurisdiction starting from the Roman Highway and then traversing the barren land area at Barangay Alas-Asin, and then skirts to the shoreline of Barangay Mountain View in Mariveles.

In Cavite, the alignment will start from the shoreline of Barangay Timalan Balsahan in Naic, then traversing through the agricultural and residential area and terminating at Antero Soriano Highway, which is in a relative flat terrain in Barangay Timalan Balsahan and Barangay Timalan Concepcion.

- **EIA Methodologies**

Table 3 Summary of EIA Methodologies

EIA Key Components	Methods
Land	
Land Use and Classification	• Review of secondary data from comprehensive land use plans and maps • Key informant interviews • Site visits
Geology/Geomorphology	• Review of secondary data • Simplified ground modelling
Geohazard Assessment	• Maps from Comprehensive Land Use Plans (CLUPs) and from the Mines and Geosciences Bureau (MGB) and the Philippines National Geophysical Data Center
Pedology	• Review of secondary data from comprehensive land use plans, and soil survey report of Bataan (2003) and Soil Survey Classification of Cavite (2002) from Bureau of Soils and Water Management (BSWM).
Terrestrial Ecology: Flora Assessment	• Transect survey • Use of quadrat sampling plots • Documentation of tracks and coordinates of sampling stations using a handheld GPS • Geo-tagging of photos
Terrestrial Ecology: Fauna Assessment	• Transect survey • Netting • Trapping • Night sampling
Water	
Hydrology/ Hydrogeology	• Review of secondary data
Oceanography	• Review of secondary data
Water Quality	• Surface and groundwater sampling • Marine water quality sampling
Freshwater Ecology	• Review of secondary data
Marine Ecology	• Inter-tidal, Exposed Coastal Beach and River Estuary - Collection of primary data from on-site observation, interview and coastal characterization. • Collection and Analysis of Phytoplankton and Zooplankton • Ichthyoplankton (Fish Eggs and Fish Larvae) - Secondary data review (baseline information from a published report) • Primary Productivity (Chlorophyll-a Concentration) - Surface water sampling • Harmful Algal Blooms - Review of secondary information • Soft Bottom Infaunal Benthos - River estuary and intertidal sediment sampling • Corals and Associated Fish Assemblages - Rapid reef survey - Review of secondary data

EIA Key Components	Methods
	- Fish survey • Macroinvertebrates - Visual observation • Macrophytes (Seagrasses and Macrobenthic Algae) - Review of secondary data - Interviews with local fisherfolks - Visual inspections along the exposed coastal beaches and intertidal and subtidal shallows of Alas-asin (Mariveles), Corregidor Island, and Timalan Concepcion (Naic) on the presence of seagrasses and macrobenthic algae (seaweeds). • Mangrove and Other Coastal Vegetation - Flora assessment using point sampling method - Use of the Shannon biodiversity index to measure species diversity • Fish Sanctuary and Artificial Hard Structures (Artificial Reef and Shipwreck) - Key informant interviews - Site visit to local marine resources - Review of map provided by CFI • Protected Marine Species (Threatened or Endangered Species) - Actual site visits and direct observations - Key informant interviews • Review of secondary data • Fisheries Resources - Site inspections and actual observations - Key informant interviews - Review of secondary data
Air	
Ambient Air sampling	• Ambient air sampling • Air dispersion modelling
Noise sampling	• Noise sampling • Noise modelling
People	
Scoping and Public Participation	• Preliminary desk research • Site visits • Initial consultations • Stakeholder mapping • Key informant interviews • Consultations • Household survey
Traffic Impact Assessment	• Secondary data review • Vehicle-classified count surveys • Traffic impact assessments • Travel time savings analysis
Environmental Risk Assessment	• Site assessment • Secondary data review • Key informant interviews • Consultations

Public Participation Activities

Consistent with the Guidelines on Public Participation under the Philippine Environmental Impact Statement System (PEISS) of DAO 2017-15, stakeholder's consultation has been continuously conducted for the BCIB Project. Information and Education Campaigns (IEC) were completed in Barangay Timalan Conception, Sabang and 53B in Naic and Cavite on 21 January 2020 and Barangay Mt. View and Alas-Asin in Mariveles on 22 January 2020. The complete Public Participation Reports are attached in **Annex C**.

Public scoping is not yet held due to the restrictions of the COVID-19 pandemic. DPWH sent a letter to EMB requesting for an advice for the conduct of Public Scoping and should EMB agree to waive this activity and resume the moment it is safe to conduct public gatherings (**Annex D**). EMB advised to temporary hold the activity due to the restrictions of the current health situation and proceed with the preparation of this EIS Report. Hence this report initially contains the IEC

and FGD issues and concerns conducted before the start of the Enhanced Community Quarantine (ECQ).

Table 4 Summary of Pre-Scoping IEC Activities and Issues

LGUs Covered by IEC	Actual IEC Schedule / Dates	Issues Raised / Suggestions Provided
Brgy. Timalan Concepcion, Naic, Cavite	21 January 2020	• Access for fishermen and boat operators. • Vehicular traffic near and along Timalan Concepcion Elementary School will increase. It will also be affected by the planned road widening in the area. • Once construction begins, roads will be busy. Who will ensure safety in the area/community? • Will tricycles be allowed to use the bridge?
Brgy. Sabang, Naic, Cavite	21 January 2020	• Consideration of community welfare by the project. • How about those who are within the project alignment? • Does the government pay those whose properties will be affected by the project? • How will Cavite benefit from the project in terms of employment?
Brgy. 53B, Cavite City, Cavite	29 January 2020	• Project alignment • Benefits to Cavite City and its residents
Brgy. Mt. View, Mariveles, Bataan	22 January 2020	• Specific areas and sitio to be traversed by the BCIB alignment. • Concern regarding the pollution that will be produced during construction of the BCIB alignment. • Responsible entity for cleaning the pollutants generated during and after the construction. • Construction of toll gates.
Brgy. Alas asin, Mariveles, Bataan	22 January 2020	• Inclusion of exit to Corregidor. • When to expect the development and traffic from the Cavite and Bataan entry points. • Concern regarding the pollution that the BCIB Project will produce. • Confirmation of rumors that fisherfolks would not be allowed to go near the bridge post. • Allowing fisherfolks to use the bridge in case their boats break down. • Participants added that fisherfolks frequently stay in Corregidor Island when their boats break down.

EIA Summary

- **Siting**

The options for the road links structural form were narrowed down to six (6). Based on initial studies and a rigorous option selection process, it was recommended that a cable stayed bridge is taken forward for both North and South Channel Bridge using the most preferable option for the BCIB project (alignment option 2c).

Table 5 shows the various structural forms considered.

Table 5 Summary of Bridge Options

Option	Structural Form
Option 2a	Immersed Tube Tunnel
Option 2b	Navigation Bridge
Option 4a	Immersed Tube Tunnel
Option 4b	Navigation Bridge
Option 5	Navigation Bridge
Option 2c	Navigation Bridge

- **Technology Selection**

Given the nature of the project, which is a bridge, there will be no alternative / special technologies, operation processes and measures to minimize waste generation. The updated designs will be

determined as the study progresses whilst good site practices and standard waste collection process will be implemented in the construction and operational phase, respectively.

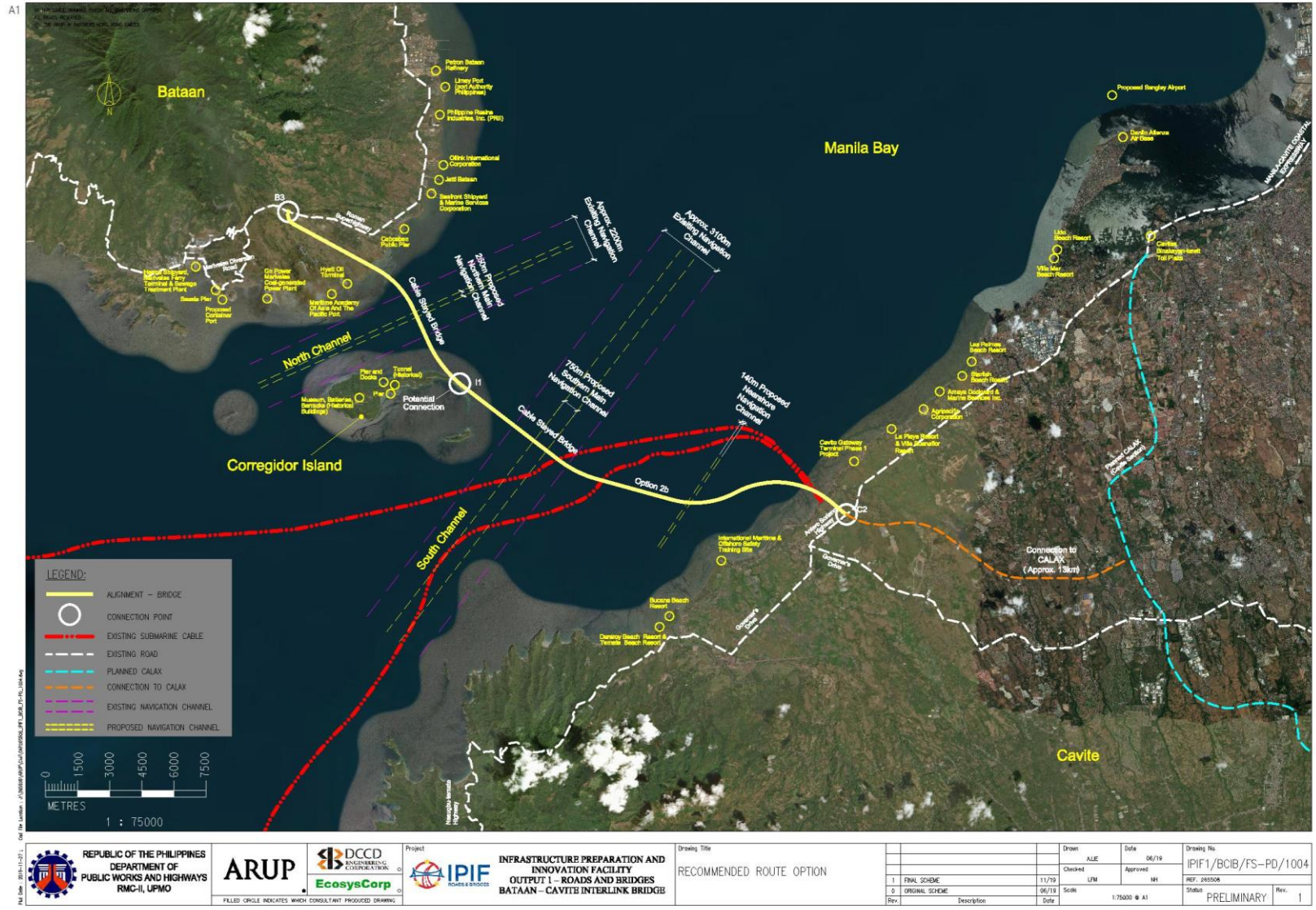

Figure Error! Use the Home tab to apply Report Level 1 to the text that you want to appear here..**1** Project Alignment

Integrated Summary of Impacts and Residual Effects after Mitigation

Table 6 Integrated Summary of Impacts and Residual Effects

Project Activity	Environmental Aspect	Potential Environmental Impacts	Proposed Mitigation Measures	Efficiency of Measures
Pre-Construction				
A1. Preparation of the project site for construction	Terrestrial Ecology	Cutting down of trees along the road right-of-way Displacement of animals, insects and avifauna	• Identification of tree replacement site • Compliance with conditions of DENR/LGU, Tree Cutting Permit, ROW • Temporary fencing to vegetation that will be retained • Delineation on the ground of the areas to be cleared.	DPWH will ensure 80-100% efficiency on areas for land clearing; DPWH will ensure to 100% compliance with the tree permitting mandate, and tree replacement, whenever necessary.
	Water Quality	Inconsistency on DENR and LGU's current mandate to rehabilitate and improve the water quality of Manila Bay	• Integrate the Manila Bay Rehabilitation plan in the project • Regular coordination with LGUs, DENR and Manila Bay Coordinating Office (MBCO) • Regular water quality monitoring	DPWH will ensure that the project will be integrated with DENR's Manila Bay Rehabilitation plan. Impacts on water contamination will be 80-100% mitigated.
A2. Procurement and planning	Economy	Increase business opportunities due to purchase of construction materials	• Purchase from local suppliers whenever possible • Secure services of residents whenever possible	DPWH will ensure 80-100% purchase of construction materials to local suppliers and services of the locals.
A3. Land acquisition and resettlement	People	• Loss of land; • Displacement of residents and structures	• Implementation of the approved Resettlement Action Plan (RAP) of the Project	Provide 100% implementation based on the final agreement between the proponent and the Project Affected Persons (PAPs).
Construction				
B1. Erection of temporary facilities for workers and field office, storage sheds, and workshops	Noise	Increased noise level due to use of heavy equipment and other vehicles	• Limit the use of noise-emitting machines and equipment to daytime only; • Provide noise barriers • Properly operate and maintain all noise sources	Impacts on noise disturbance will be 80-100% mitigated, but the proponent will ensure 100% compliant with standards.

Project Activity	Environmental Aspect	Potential Environmental Impacts	Proposed Mitigation Measures	Efficiency of Measures
	Air quality	Dust re-suspension from earthworks and other construction activity	• Water spraying of the area during dry days; • Fencing the area • Cover vehicles that deliver materials • Regular monitoring of the concentrations of PM2.5, PM10, TSP, SO_2 and NO_2 • Provision of appropriate PPEs • Practice standard occupational health and safety pursuant to BWC-DOLE Occupational Safety and Health Standards	Impacts on dust re-suspension and increased vehicular emission will be 80-100% mitigated, but the proponent will ensure 100% compliant with standards.
		Increased vehicular emission	• Use of heavy equipment and other vehicles that passed emission testing and underwent preventive maintenance • Scheduling of vehicle and equipment movements	
	Water Quality	Degradation of water quality due to generation of domestic wastewater	• Soil debris and other excavated materials should be hauled out from the site; • Monthly water quality monitoring. • Locate motor-pool area at least 500 meters away from any body of water; • Compliance with the Civil Works Guidelines; • Implement an organized waste storage	Impacts on generation of domestic wastewater will be 80-100% mitigated, depending on DENR accredited hauler collection, but the proponent will ensure 100% compliance with RA 9275
	Community health and safety	Increased risks to community due to increase in vehicular movement	• Proper scheduling of construction activities to minimize impact • IEC with community and LGU • Posting of safety signage to warn motorists • Regular coordination with the LGUs and barangays. • Establishment of GRM	Impacts on community health and safety will be 80-100% mitigated, but the proponent will ensure 100% monitoring and coordination with the LGUs and barangays.
		Disturbance to nearby residents and resort operators		
		Possible spread of diseases due to workers' unsanitary practices	• Observe proper sanitation practices in the construction area and workers' barracks.	Impacts on health and safety will be 80-100% mitigated, considering proponent's proper

Project Activity	Environmental Aspect	Potential Environmental Impacts	Proposed Mitigation Measures	Efficiency of Measures
			• Regular conduct of health and safety awareness to all construction employees.	sanitation practices and health and safety awareness within the construction site.
	Solid waste	Generation of solid waste from construction activities	• Implement solid waste management plan • Proper waste management and housekeeping measure • Waste will be collected daily by a 3rd party contractor; and • Trainings for site workers on proper solid waste management practices.	Waste management will be 90-100% implemented, unless there will be incidents which are uncontrolled.
		Generation of hazardous materials in land (i.e., disposal of busted lamps, batteries, empty chemical containers, used oil etc. (from casting yard and storage areas); generated from the operation of construction machinery and office facility.	• Implement an organized waste storage, collection, and management system; • Proper waste management and housekeeping measures can also prevent possible contamination in soil and water in compliance with RA 6969; • Used oil, spillages and other hazardous waste should be collected, contained and disposed by a 3rd party accredited hauler and treater; • Maintenance and proper use of construction materials and heavy vehicles; • The contractor shall be provided with training and should ensure daily collection of hazardous waste.	Impacts on generation of hazardous materials will be 90-100% mitigated depending on DENR accredited hauler collection. Proper equipment maintenance, disposal of hazardous wastes and non-recyclable wastes, and expert handling of waste oil and oil spills will translate to 80% to 100% efficiency in pollution control. Compliance to RA 6969 will be ensured.
	Local economy	Temporary employment for the locals during the construction stage Increase in economic opportunities.	• Prioritize locals when hiring laborers, with equal opportunities for men and women, skilled and unskilled, and PWDs. • Enforcement of RA6685	Providence on equal employment for qualified workers and livelihood will 80-100% be ensured by the proponent.
B2. Mobilization of equipment and supplies to project site	Noise	Increased noise level due to use of heavy equipment and other vehicles	• Limit the use of noise-emitting machines and equipment to daytime only; • Provide noise barriers, such as site fencing, during the construction stage	Impacts on noise disturbance will be 80-100% mitigated, but the proponent will ensure 100% compliant with standards.

Project Activity	Environmental Aspect	Potential Environmental Impacts	Proposed Mitigation Measures	Efficiency of Measures
	Air quality	Increased vehicular emission	• Heavy equipment and other vehicles to be used on site should have passed the emission testing and underwent preventive maintenance • Scheduling of vehicle and equipment movements.	Impacts on increased vehicular emission will be 80-100% mitigated, but the proponent will ensure 100% compliant with standards.
	Traffic	Transport of construction materials from source to casting yard	• The project will not cause congestion, however, traffic management plan will be prepared and implemented. • Coordination with LGUs.	The project will ensure implementation of Traffic Management Plan, provision of traffic enforcers, and coordination with LGU's regarding traffic rerouting to provide 80% to 90% efficiency of smooth traffic flow.
	Community health and safety	Increased risks to community due to increase in vehicular movement Disturbance to nearby residents and resort operators	• Proper scheduling of construction activities to minimize impact • IEC with community and LGU • Posting of safety signage to warn motorists • Regular coordination with the LGUs and barangays with regards to project plans and concerns of the residents • Establishment of GRM.	Impacts on community health and safety will be 80-100% mitigated, but the proponent will ensure 100% monitoring and coordination with the LGUs and barangays.
B3. Setting up of casting yard	Terrestrial flora	Cutting down of trees within the proposed casting yard	• Identify and limit the area within the proposed alignment • Initiate the possible tree earth-balling option instead of tree cutting • Compliance with conditions of DENR/LGU, Tree Cutting Permit	DPWH will ensure 80-100% efficiency on areas for land clearing; DPWH will ensure to 100% compliance with the tree permitting mandate, and tree replacement, whenever necessary.
	Noise	Increased noise level due to use of heavy equipment and other vehicles	• Limit the use of noise-emitting machines and equipment to daytime only • Provide noise barriers	Impacts will be 80-100% mitigated, but the proponent will ensure 100% compliant with standards.
	Air quality	Dust re-suspension from earthworks and other construction activity	• Water spraying of the area during dry days; • Fencing the area to contain the dust within the project site	
		Increased vehicular emission	• Heavy equipment and other vehicles to be used on site should have passed the	

Project Activity	Environmental Aspect	Potential Environmental Impacts	Proposed Mitigation Measures	Efficiency of Measures
			emission testing and underwent preventive maintenance • Scheduling of vehicle and equipment movement.	
	Traffic	Transport of construction materials from source to casting yard	• The project will not cause congestion, however, should be necessary, traffic management plan will be prepared and implemented. • Coordination with LGUs is proposed to provide traffic enforcers for safe and organized traffic flow.	The project will ensure implementation of Traffic Management Plan, provision of traffic enforcers, and coordination with LGU's regarding traffic rerouting to provide 80% to 90% efficiency of smooth traffic flow.
	Water Quality	Degradation of water quality due to oil, fuel or other lubricant agents leaks	• Locate motor-pool area at least 500 meters away from any body of water; • Soil debris and other excavated materials should be hauled out from the site; • Monthly water quality monitoring. • Compliance with the Civil Works Guidelines; • Implement an organized waste storage • Emergency and contingency plan in case of spills; • Daily collection of solid and hazardous waste.	Siting motor pool away from water bodies, adhering to Civil Works Guidelines, and installing oil-water separators will result in 80% to 100% efficiency in pollution control The proponent will ensure 100% compliance with emergency plans and standards and RA 6969
B4. Establishment of dry dock and works area for navigation bridge	Terrestrial flora	Cutting down of trees within the proposed dry dock and works area	• Identify and limit the area within the proposed alignment • Initiate the possible tree earth-balling option instead of tree cutting • Compliance with conditions of DENR/LGU, Tree Cutting Permit	DPWH will ensure 80-100% efficiency on areas for land clearing; DPWH will ensure to 100% compliance with the tree permitting mandate, and tree replacement, whenever necessary.
	Noise	Increased noise level due to use of heavy equipment and other vehicles	• Limit the use of noise-emitting machines and equipment to daytime only; • Provide noise barriers, such as site fencing, during the construction stage	Impacts will be 80-100% mitigated, but the proponent will ensure 100% compliant with standards.

Project Activity	Environmental Aspect	Potential Environmental Impacts	Proposed Mitigation Measures	Efficiency of Measures
	Air quality	Dust re-suspension from earthworks and other construction activity	• Water spraying of the area during dry days; • Fencing the area to contain the dust within the project site	
		Increased vehicular emission	• Heavy equipment and other vehicles to be used on site should have passed the emission testing; • All vehicles and heavy equipment should have undergone preventive maintenance to reduce emission • Scheduling of vehicle and equipment movement	
	Transportation/ Occupational Health and Safety	Sea Traffic	• Proper coordination with the Maritime, PPA, Coast Guard, LGUs and other related government offices regarding the following: -Schedule of shipping -Coordinates of alternative route of ships passing through North and south Passage • Ships/barges will be fitted with proper lighting during nighttime • Continuous coordination with the LGUs and affected barangays, PPA and other related government-offices • Assign a ship crew to assist the helmsman during nighttime steering • Designated exclusion zones should be defined and vessels not related to the construction works shall be prohibited from entering these areas in order to minimize impacts from marine traffic. • Flexible rules and mitigation measures should be developed by the contractor. • Establishment of a Marine Liaison Group prior to construction.	Risks of accidents among small fishing boats and ships/ barges will be 80-100% mitigated, by ensuring that the project coordinated the construction activities to affected fishers and vessel operators.

Project Activity	Environmental Aspect	Potential Environmental Impacts	Proposed Mitigation Measures	Efficiency of Measures
	Water Quality	Degradation of water quality due to construction, and water contamination due to fuel, oil and other hazardous materials leakages	• Apply appropriate siltation control measures; • Soil debris and other excavated materials should be hauled out from the site; • Regular monitoring of the affected and adjacent water bodies prior, during and even after the construction phase; • Compliance with the Civil Works Guidelines; • Daily collection of solid and hazardous waste; • Compliance in of MARPOL 73/78 - Prevention of Pollution by Sewage from Ships and PCG Memorandum # 10-14; • Ensure compliance to PCG Memorandum # 07-14; • Implement an organized waste storage; and • Emergency and contingency plan in case of spills.	Impacts on generation of hazardous materials will be 90-100% mitigated and 100% compliance with emergency plans and standards and RA6969 is ensured, unless there will be incidents which are uncontrolled. This will also depend on DENR accredited hauler collection.
	Marine ecology	• Increased turbidity • Ballast water discharges of construction/cargo/delivery vessels may introduce some phytoplankton species known to trigger harmful algal blooms or HABS/toxic red tides that can alter the structure and function of aquatic ecosystems • Bilge water discharges of construction/cargo/del	• Use of geotextile silt curtains • Prohibit marine vessels from discharging ballast water in the sea; quarantine protocols through a Ballast Water Management Plan could be adopted • Prohibit marine vessels from discharging bilge water, or possibly by establishing treatment for bilge water; • Impact on shallow water/intertidal or sublittoral areas might be reduced by controlling movement of oil spill and/or dispersion at sea. Oil Spill Contingency Plans should be prepared and made readily available	Due to the permanent construction effect, the proponent will ensure to limit use on areas that are only necessary during construction. This will be well coordinated with LGUs/ barangays affected, Philippine Coast Guard (PCG) and other related government agencies. Use of silt curtains will be 40% efficient.

Project Activity	Environmental Aspect	Potential Environmental Impacts	Proposed Mitigation Measures	Efficiency of Measures
		ivery vessels may depress photosynthesis and growth of phytoplankton • Pile driving will crush or destroy benthic infaunal organisms and some epibenthic macroinvertebrates in small area and cannot be mitigated; • Anchoring will crush or loose epifauna in small area • Turbidity plumes (pile driving) will disturb feeding activities and respiration of benthos • Accidental oil spills- significant impact on benthos in shallow water or intertidal/ sublittoral areas; less threatening in offshore areas	• Compliance to marine protocols by PPA and PCG requirements • Avoid or reduce the potential for the introduction of HABs/ toxic phytoplankton species • Avoid or reduce the potential to cause damage to phytoplankton communities • Lessen or avoid complaints received on oil spills of nearshore/coastal waters from residents, fisherfolks, and resort owners/operators	
	Marine ecology (Coral Reefs)	• Turbidity (sediment resuspension), pile driving -resuspended fine sediments could travel to a neighboring coral reef in Corregidor Island; • Accidental bumping of construction vessels and localized disturbance from dropping and dragging anchors and chains	• Use of geotextile silt curtains is recommended • To prevent physical damage to adjacent patch reef during construction from dropping and dragging anchors and chains on the reef surface as well as accidental bumping by construction vessels, a marker buoy will be placed to indicate location of the adjacent reef formation. This will forewarn ship operators and aid them where they can only operate and anchor.	Due to the permanent construction effect, the proponent will ensure to limit use on areas that are only necessary during construction. This will be well coordinated with LGUs/ barangays affected. Use of silt curtains will be 40% efficient.

Project Activity	Environmental Aspect	Potential Environmental Impacts	Proposed Mitigation Measures	Efficiency of Measures
	Protected Marine Species i.e. Marine turtles	Artificial light- reproductive success of marine turtles may potentially be reduced because matured females could be deterred from nesting on sandy beaches; hatchlings may also be disoriented/ misoriented and displaced on the beach Accidental collisions/ boat strikes and propeller hits from construction vessels due to higher vessel traffic- severe injury and/or mortality from accidents is greater (marine turtles have poor hearing and vision, and often times will not notice an approaching boat in time to move to safet Accident (oil spills) - disorientation, alter behavior, ingestion, disrupt breeding, egg/juvenile/adult mortality; if there is an oil spill, these impacts will be significant and not mitigatable but might be reduced. In general, impacts are considered insignificant short duration and site specific	• Use of geotextile silt curtains. • Minimize light intensity to as low as reasonably particularly in nearshore areas. • Avoid use of white lights. • Reduce lighting spill • Reduce horizon glow • Lighting on moored vessels at night will be kept to a minimum. • Periodic monitoring of the waters • Trained personnel will be responsible for observing marine turtles during active piling at piling sites. • Vessel crew will undergo site inductions and clear briefings covering procedures to be undertaken. • Existing acoustic control on noise-generating equipment (including vessel engines, drill and piling equipment) will be implemented. • Noise-generating equipment will be routinely maintained and inspected. • Where practical, the practice of leaving engines, thrusters and auxiliary plant on standby or running mode will be avoided. • If marine turtles are sighted in the monitoring area, project vessels operating in the area will be notified. • Trained vessel crew will monitor and report observations of marine turtles within a designated monitoring zone (250m radius of piling barge) around the pile driving operations. • Carry out a “soft start” for piling. • Any injuries or mortalities will be documented and reported.	Due to the permanent construction effect, the proponent will ensure to limit use on areas that are only necessary during construction. This will be well coordinated with LGUs/ barangays affected. Use of silt curtains will be 40% efficient.

Project Activity	Environmental Aspect	Potential Environmental Impacts	Proposed Mitigation Measures	Efficiency of Measures
			• Vessel crew will undertake site induction by appropriately trained project personnel. • Vessel speeds will be under the control of the Vessel Master • Trained vessel crew will monitor and report turtle sightings from project vessels during daylight hours during the construction phase. • Oil spill contingency plans should be prepared and made readily available.	
	Fish and Fishery resources	• Disruption/ disturbance of fishing activities. • Accidental oil spills	• A required safety exclusion zone along construction site is recommended (i.e., 0.2 km) • Oil spill impact might be reduced by controlling movement of any spill; therefore, Oil Spill Contingency Plans should be prepared and made readily available • Regular coordination with the LGU and affected fisherfolks	Due to the permanent construction effect, the proponent will ensure to limit use on areas that are only necessary during construction. This will be well coordinated with LGUs/ barangays affected.
B5. Setting up of dumping/storage areas	Terrestrial flora	Cutting down of trees within the proposed dumping/storage area	• Identify and limit the area within the proposed alignment • Initiate the possible tree earth-balling option instead of tree cutting • Compliance with conditions of DENR/LGU, Tree Cutting Permit	DPWH will ensure 80-100% efficiency on areas for land clearing; DPWH will ensure to 100% compliance with the tree permitting mandate, and tree replacement, whenever necessary.
	Noise	Increased noise level due to use of heavy equipment and other vehicles	• Limit the use of noise-emitting machines and equipment to daytime only; • Provide noise barriers, such as site fencing, during the construction stage	Impacts on noise disturbance will be 80-100% mitigated, but the proponent will ensure 100% compliant with standards.
	Air quality	Dust re-suspension from earthworks and other construction activity	• Water spraying of the area during dry days; • Fencing the area to contain the dust within the project site	

Project Activity	Environmental Aspect	Potential Environmental Impacts	Proposed Mitigation Measures	Efficiency of Measures
		Increased vehicular emission	• Heavy equipment and other vehicles to be used on site should have passed the emission testing; • All vehicles and heavy equipment should have undergone preventive maintenance to reduce emission • Scheduling of vehicle and equipment movements.	
	Solid waste	Generation / Increased in solid waste from the activity	• Implement solid waste management plan • Proper waste management and housekeeping measure • Waste will be collected daily by a 3rd party contractor to ensure cleanliness in the workplace; and • Promote proper solid waste management practices among site workers.	Waste management will be 90-100% implemented, unless there will be incidents which are uncontrolled.
B6. Setting up of haul roads	Terrestrial flora	Cutting down of trees within the proposed haul roads	• Identify and limit the area within the proposed alignment • Initiate the possible tree earth-balling option instead of tree cutting • Compliance with conditions of DENR/LGU, Tree Cutting Permit	DPWH will ensure 80-100% efficiency on areas for land clearing; DPWH will ensure to 100% compliance with the tree permitting mandate, and tree replacement, whenever necessary.
	Noise	Increased noise level due to use of heavy equipment and other vehicles	• Limit the use of noise-emitting machines and equipment to daytime only; • Provide noise barriers, such as site fencing, during the construction stage	Impacts on noise disturbance will be 80-100% mitigated, but the proponent will ensure 100% compliant with standards.
	Air quality	Dust re-suspension from earthworks and other construction activity	• Water spraying of the area during dry days; • Fencing the area to contain the dust within the project site	
		Increased vehicular emission	• Heavy equipment and other vehicles to be used on site should have passed the emission testing and have undergone preventive maintenance.	

Project Activity	Environmental Aspect	Potential Environmental Impacts	Proposed Mitigation Measures	Efficiency of Measures
			• Scheduling of vehicle and equipment movements.	
B7. Development of landing site	Terrestrial flora	Removal of vegetation on the proposed landing site and along the proposed alignment leading up to the existing highway	• Compensatory planting will be done as per requirements of PD 705 • Identify and limit the area within the proposed alignment • Initiate the possible tree earth-balling option instead of tree cutting • Compliance with conditions of DENR/LGU, Tree Cutting Permit	DPWH will ensure 80-100% efficiency on areas for land clearing; DPWH will ensure to 100% compliance with the tree permitting mandate, and tree replacement, whenever necessary.
	Noise	Increased noise level due to use of heavy equipment	• Limit the use of noise-emitting machines and equipment to daytime only; • Provide noise barriers such as site fencing, during the construction stage	Impacts on noise disturbance will be 80-100% mitigated, but the proponent will ensure 100% compliant with standards.
	Livelihood	Removal of structures, including neighborhood sundry stores, backyard piggeries, and tricycle terminals, will lead to reduced income or income loss to affected residents/business owners	• Conduct of IEC with displaced individuals • Provide compensation options, including alternative livelihood options to project affected micro, and small entrepreneurs • Implementation of the approved Resettlement Action Plan of the Project	Provide 100% compensation based on the agreement between the proponent and the Project Affected Persons (PAPs).
	Occupational health and safety	Increased accident risks to workers due to the construction works Potential risks from natural hazards	• Provision for PPE to all workers • Training and safety drill to be given to workers • Conduct regular toolbox meeting • Record health and safety incidents on site	Impacts on health and safety will be 80-100% mitigated, considering proponent's proper sanitation practices and health and safety awareness within the construction site.
B8. Placement of precast segments	Coastal water	Siltation of coastal water may affect growth of coral reefs	• Installation of silt and sediment traps to localize the movement of silt and sediments to within the cable laying route	Due to the permanent construction effect, the proponent will ensure to limit use on areas that are only necessary during construction. This will be well coordinated with LGUs/ barangays affected. Use of silt curtains will be 40% efficient.

Project Activity	Environmental Aspect	Potential Environmental Impacts	Proposed Mitigation Measures	Efficiency of Measures
	Water quality	Ships/barges may discharge sewage to the sea Ships/barges may discharge its ballast water which may contain oil and contaminate marine waters Placement of precast segments may disturb seabed sediments which may have accumulated heavy metal content	• Ships/barges will be required to have its own treatment facility • Ships/barges will not be allowed to discharge its sewage or ballast water to the sea. • Regular water quality monitoring • Installation of silt and sediment traps to localize the movement of silt and sediments to within the cable laying route • Regular water quality monitoring • Compliance with the Civil Works Guidelines; and • Compliance in of MARPOL 73/78 and PCG Memorandum # 10-14.	Although use of silt curtains will be 40% efficient, impacts on water quality will be 80-100% mitigated, hence the proponent will ensure compliant with standards.
	Marine Ecology	• Increased turbidity • Anchoring will crush or loose infauna and epifauna in small area • Accidental oil spills-significant impact (direct smothering) on benthos in shallow water or intertidal/sublittoral areas; while in offshore areas less threatening (insignificant impact)	• Use of geotextile silt curtains • Prohibit marine vessels from discharging ballast water in the sea; quarantine protocols through a Ballast Water Management Plan could be adopted • Prohibit marine vessels from discharging bilge water, or possibly by establishing treatment for bilge water. • Impact on shallow water/intertidal or sublittoral areas might be reduced by controlling movement of oil spill and/or dispersion at sea. Oil Spill Contingency Plans should be prepared and made readily available	Due to the permanent construction effect, the proponent will ensure to limit use on areas that are only necessary during construction. This will be well coordinated with LGUs/ barangays affected. Use of silt curtains will be 40% efficient.
	Coral Reef	Accidental bumping of construction vessels and localized disturbance from dropping and dragging anchors and chains	• Use of geotextile silt curtains is recommended • A marker buoy should be placed to indicate location of the adjacent reef formation.	Due to the permanent construction effect, the proponent will ensure to limit use on areas that are only necessary during construction. This will be well coordinated with LGUs/ barangays affected. Use of silt curtains will be 40% efficient.

Project Activity	Environmental Aspect	Potential Environmental Impacts	Proposed Mitigation Measures	Efficiency of Measures
	Protected Marine Species i.e., marine turtles	• Artificial light- reproductive success of marine turtles may potentially be reduced because matured females could be deterred from nesting on sandy beaches; hatchlings may also be disoriented/ misoriented and displaced on the beach • Accidental collisions/ boat strikes and propeller hits from construction vessels • Accident (oil spills) - disorientation, alter behavior, ingestion, disrupt breeding, egg/juvenile/adult mortality; if there is an oil spill, these impacts will be significant and not mitigatable but might be reduced. In general, impacts are considered insignificant short duration and site specific	• Use of geotextile silt curtains • Minimize light intensity to as low as reasonably particularly in nearshore areas. • Avoid use of white lights. • Reduce lighting spill • Reduce horizon glow • Lighting on moored vessels at night will be kept to a minimum. • Periodic monitoring of the waters by trained vessel crew around construction vessels and around the construction site. • Trained personnel will be responsible for observing marine turtles during active piling at piling sites (e.g., on a jackup barge or adjacent support vessel). • Vessel crew will undergo site inductions and clear briefings covering procedures. • Existing acoustic control on noise-generating equipment (including vessel engines, drill and piling equipment). • Noise-generating equipment will be routinely maintained and inspected. • Avoid leaving engines, thrusters and auxiliary plant on standby or running mode. • Trained vessel crew will monitor and report observations of marine turtles within a designated monitoring zone (250m radius of piling barge) around the pile driving operations. • Carry out a “soft start” for piling • Any injuries or mortalities will be documented and reported. • Site induction for vessel crew.	Due to the permanent construction effect, the proponent will ensure to limit use on areas that are only necessary during construction. This will be well coordinated with LGUs/ barangays affected. Use of silt curtains will be 40% efficient.

Project Activity	Environmental Aspect	Potential Environmental Impacts	Proposed Mitigation Measures	Efficiency of Measures
			• Vessel speeds will be under the control of the Vessel Master • Trained vessel crew will monitor and report turtle sightings from project vessels during daylight hours during the construction phase. • Oil spill contingency plans should be prepared and made readily available.	
	Fish and Fisheries resources	• Disruption/ disturbance of fishing activities - temporary impact and short duration will occur but minimal or insignificant • Accidental oil spills - generally, minimal or insignificant impacts on fish populations are expected	• A required safety exclusion zone along construction site is recommended (i.e., 0.2 km) • Oil spill impact might be reduced by controlling movement of any spill; therefore, Oil Spill Contingency Plans should be prepared and made readily available • Geotextile silt curtains should be used to reduce turbidity • Regular coordination with the LGU and affected fisherfolks • Establishment of Grievance Redress Mechanism	Due to the permanent construction effect, the proponent will ensure to limit use on areas that are only necessary during construction. This will be well coordinated with LGUs/ barangays affected.
	Air quality	Increased vehicular emission from use of heavy equipment	• Heavy equipment and other vehicles to be used on site should have passed the emission testing and should have undergone preventive maintenance. • Scheduling of vehicle and equipment movement.	Impacts on increased vehicular emission will be 80-100% mitigated, but the proponent will ensure 100% compliant with standards.
	Noise	Increased noise level due to use of heavy equipment	• Limit the use of noise-emitting machines and equipment to daytime only. • Provide noise barriers	Impacts on noise disturbance will be 80-100% mitigated, but the proponent will ensure 100% compliant with standards.
	Employment	Temporary employment for the locals during the construction stage	• Positive impact and does not require mitigation; • Prioritize locals when hiring laborers, with equal opportunities for men and	Providence on equal employment for qualified workers and livelihood will 80-100% be ensured by the proponent.

Project Activity	Environmental Aspect	Potential Environmental Impacts	Proposed Mitigation Measures	Efficiency of Measures
			women, skilled and unskilled, and PWDs. • Enforcement of RA6685	
	Economic Development	Additional income taxes for the LGU	• Positive impact and does not require mitigation • Continuous coordination with the LGUs and affected barangays	Permanent impact due to the project.
	Transportation	Traffic congestion due to trucks delivering supplies to site and movement of staff vehicles to and from the site	• Provide traffic aides • Request assistance from LGUs to minimize delays in vehicular traffic; • Install signage in the entrance to the project site and around 100 meters on both sides of the road. • Continuous coordination with the LGUs and affected barangays • Implementation of traffic management plan	Impacts on traffic congestion will be 60-80% mitigated, but the proponent will ensure that traffic management plan will be implemented and coordination with the LGUs and affected barangays will be done
	Religious practices	Disturbance to church activities in the nearby chapel	• Proper scheduling of construction activities to minimize impact • IEC with church, community and LGU • Posting of notices on church bulletin board to inform the community	Disturbance to church activities will be 60-80% mitigated, but the proponent will ensure the construction activities will be well-coordinated with the affected parish administrator
	Occupational Health and Safety	Increased accident risks to workers due to the construction works Potential risks caused by natural hazards	• Provision of PPE to all workers • Training and safety drill • Conduct regular toolbox meeting • Record health and safety incidents on site	Impacts on health and safety will be 80-100% mitigated, considering proponent's health and safety awareness practices within the construction site.
	Community Health and Safety	Increased risks to community due to increase in vehicular movement Disturbance to nearby residents and business owners	• Proper scheduling of construction activities to minimize impact • IEC with community and LGU • Posting of safety signage to warn motorists • Continuous coordination with the LGUs and affected barangays	
	Fisheries	Docking areas within the alignment may no longer	• Conduct IEC and FGD with affected boat owners/fisherfolks	

Project Activity	Environmental Aspect	Potential Environmental Impacts	Proposed Mitigation Measures	Efficiency of Measures
		be available for boat owners. Docking and fishing areas near the alignment will be temporarily unavailable due to construction activities	• Provide alternative docking areas for permanently occupied docking areas as well as temporary ones. • Maintain a navigable channel, as required. • Continuous coordination with the LGUs and affected barangays • Establishment of Grievance Redress Mechanism	Provide 100% compensation based on the agreement between the proponent and the Project Affected Persons (PAPs).
	Livelihood	Fisherfolks from the area will temporarily be prohibited from fishing within the area of the submarine cable route	• Alternative livelihood program for affected fisherfolks • Continuous coordination with the LGUs and affected barangays • Implementation of the approved RAP of the Project	
	Maritime safety	Small fishing boats may accidentally collide with the ships/barges, especially during nighttime	• Ships/barges will be fitted with proper lighting during nighttime • Continuous coordination with the LGUs and affected barangays, PPA and other related government-offices • Assign a ship crew to assist the helmsman during nighttime steering	Risks of accidents among small fishing boats and ships/barges will be 80-100% mitigated, by ensuring that the project coordinated the construction activities to affected fishers and vessel operators.
Operation / Maintenance				
Operation of the BCIB bridge	Marine Ecology	Creation of artificial hard substrate on the seafloor	• A positive impact; therefore, no mitigation required	Permanent impact due to the project.
Operation of the BCIB bridge	Community Health and Safety	Increased probability of road accidents due to increased traffic and higher speed limit on the bridge	• Post appropriate signage along the alignment • Widely disseminate information on allowed vehicles on the bridge and speed limit • Provide a crew to monitor traffic on the bridge • Continuous coordination with the LGUs and affected barangays	The proponent will ensure 100% safe use of the bridge and efficiency of Emergency Response Team.
	Occupational Health and Safety	Accidents may befall workers as they maintain the bridge	• Regularly site safety drills • Use of prescribed PPEs	

Project Activity	Environmental Aspect	Potential Environmental Impacts	Proposed Mitigation Measures	Efficiency of Measures
Operation of the BCIB bridge	Local economy	Accessibility as well as traffic will be increased, increasing opportunities as well for businesses.	• Positive impact.	Permanent impact due to the project.
Decommissioning/Abandonment				
Disintegration of the demobilized structure	Water Quality/ Contamination	Impacts on existing water quality of Manila Bay	• Implementation of approved decommissioning plan by the EMB	Impacts will be 80-100% mitigated, but the proponent will ensure 100% compliant with standards.

Risks and Uncertainties relating to the findings and implications for decision making

Risks and uncertainties anticipated regarding the construction and operation of the bridge are shown in the **Table 7** below.

Table 7 Risk and uncertainties of the project

EIA Module	Risks and Uncertainties	Control Measures
Project Design	Structural failure due to possible earthquake and other unexpected calamites (i.e., volcanic eruption, typhoon)	Use of high-quality materials and scaffoldings during construction Regular maintenance and monitoring
	As the project plans and alignment may still change due to the result of detailed engineering, this may impact the timeline of the implementation and regulatory permit acquisition.	Wait for the detailed engineering survey and secure design confirmation regarding the minor adjustment to the alignment prior to the acquisition of right of way (ROW) and necessary permits
Marine	Extreme wind force and waves including swell during typhoon passage, sustained southwest monsoon winds, and storms surges	Consider forecasting of bad weather and extreme storm surges
	Strong tidal current velocities at the North Channel and South Channel of Manila Bay, as both channels are deep	To be considered in the detailed engineering design
	Threats to biodiversity: • Introduction of invasive alien species and/ or toxic dinoflagellates via ships' ballast water discharge • Possible future loss of endangered species (marine turtles) due to increased potential for accidental oil spills, and chances of	By not allowing marine vessels from discharging ballast water in the area By controlling oil spills at sea; and minimizing vessel traffic/speed by incorporating routine visual reconnaissance efforts during the turtle nesting season

EIA Module	Risks and Uncertainties	Control Measures
	collision with marine vessels during construction	
	None	The Marine Ecology Study and Impact Assessment covers the primary impact area (the main alignment) and the secondary impact area (adjacent areas). The possible changes for some portions of the project design during the detailed engineering design (DED) will not affect the established Marine Ecology Sampling and Impact Assessment.
Surface Water	Degradation of water quality due to accidental contamination to nearby water body, improper effluent handling/ management/ disposal, and natural disaster (i.e heavy rains/ typhoons, earthquakes and storm surges), which may lead to deterioration, destruction and disruption of fish habitats	Application of appropriate erosion control measures such as addition of pavements, concrete sea walls, sediment traps and barriers during heavy rain periods Set up of portable sanitary facilities and collect wastewater to be disposed accordingly The contractor will be required to comply with the Civil Works Guidelines Monitoring and evaluation of benthic habitats to be conducted quarterly or bi-annually to capture changes
Ambient Air and Noise	Alteration to air quality during heavy rains, typhoons and other natural disaster.	Application of appropriate disaster risk measures and protocols Periodic monitoring to capture changes
	Excessive noise and vibration from construction equipment and vehicles may exceed national standards for noise in general areas	Periodic monitoring and evaluation of noise levels, among other parameters included in the ECC for future references Installation of noise barricade may be considered
Terrestrial Flora	None	The study area taken for the terrestrial flora study and impact assessment covers the primary impact area (the main alignment) and the secondary impact area (adjacent areas). The possible changes for some portions of the project design during the DED will not affect the established sampling points, impact management plan, and Environmental Monitoring Plan (EMoP) formulated for the proposed project. The results still cater such anticipated changes.
	Unanticipated additional cutting of trees during DED stage that may cause delays on the tree inventory and application of tree cutting permit	The project has to wait for the detailed engineering survey and secure design confirmation regarding the minor adjustment to the alignment prior to the acquisition of ROW and necessary permits
Terrestrial Fauna	None	The study area taken for the terrestrial fauna study and impact assessment covers the primary impact area (the main alignment) and the secondary impact area (adjacent areas). The possible changes for some portions of the project design during the DED will not affect the established sampling points, impact management plan, and EMoP formulated for the proposed project. The results still cater such anticipated changes.
People	As the project plans and alignment may still change due to the result of detailed engineering, this may impact the plans for ROW acquisition and that number of structures, PAPs may still change.	Wait for the detailed engineering survey and secure design confirmation regarding the minor adjustment to the alignment prior to the acquisition of ROW