

## **EXECUTIVE SUMMARY FOR THE PUBLIC (ESP – English)**

### **Project Fact Sheet**

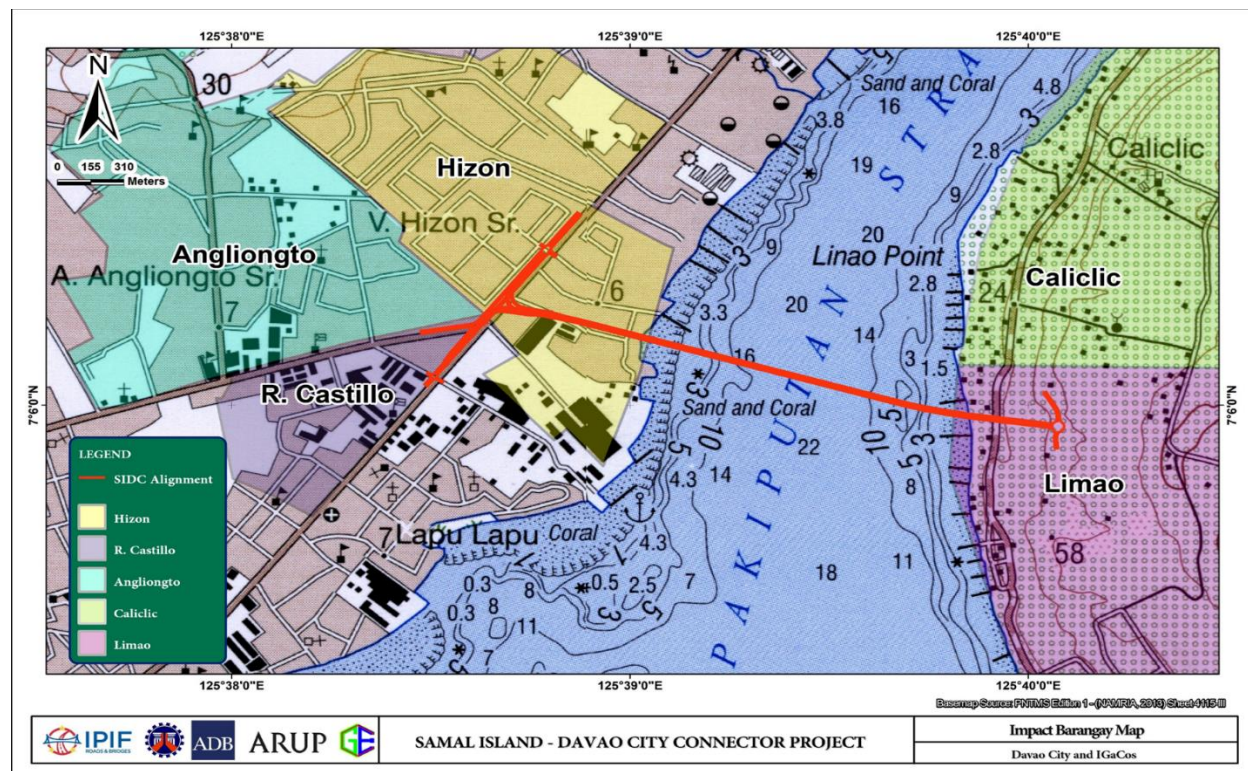
<b>Name of Project</b>	<b>Samal Island - Davao City Connector (SIDC) Project</b>	
<b>Project Location</b>	Davao City: Barangays Vicente Hizon Sr., Angliongto and R. Castillo Island Garden City of Samal (IGaCoS): Barangay Limao	
<b>Nature of the Project</b>	Bridge Construction	
<b>Project Size</b>	Length: 3.98km (total roadway, including 4 ramps); 2.85km (point to point length); Width: 24m (Dual 2 lane carriageway with hard shoulder and walkway)	
<b>Summary of Major Components</b>	<b>Project Component</b>	<b>Description / Specifications</b>
	Navigation bridge	Provide the necessary navigation clearance for ships
	Marine viaducts	Viaduct structures constructed above sea water
	Interchanges and viaducts on land	Viaduct structures constructed on land and provide connections to existing road networks
	Approach ramps	Parts of the road that go up from existing ground level towards the approach bridge
<b>Project Cost</b>	Php. 16.606 Billion (Civil Works) Php. 23.040 Billion (Total Project Cost)	
<b>Project Duration</b>	2019-2025	
<b>Operation Date</b>	2025	
<b>Proponent Name</b>	Department of Public Works and Highways (DPWH)	
<b>Proponent Authorized Representative</b>	<b>Emil K. Sadain, CESO I</b> Undersecretary for UPMO Operations and Technical Services Department of Public Works and Highways	
<b>Proponent Address and Contact Details</b>	Address: Bonifacio Drive Port Area, 652 Zone 068, Manila, 1018 Metro Manila, Philippines Contact Number: +63 2 5304 3805 / +63 2 5304 3681	
<b>EIA Preparer (Consultant)</b>	Ove Arup & Partners Hong Kong Ltd and Galerio Environmental Consultancy	
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<b>Preparer Address and Contact Details</b>	<b>Ove Arup &amp; Partners Hong Kong Ltd</b> 4F, Rockwell Business Center, Ortigas Ave., Pasig Metro Manila Tel. No.: +63 2 3485 8200  <b>Galerio Environmental Consultancy</b> Door No. 1, Ground Floor, Matina IT Park, Building 2, McArthur Highway, Matina, Davao City, Philippines, 8000 Tel No.: + 63 82 2243 197	

## Location

The proposed SIDC Project will be linking two cities, particularly the northeastern section of Davao City and the northwestern side of Samal Island, roughly located between geographic coordinates 7° 5' 52.896" and 7° 6' 12.777" North Latitude and 125° 38' 29.814" and 125° 40' 4.692" East Longitude.

The Davao landing point is located within Barangay Hizon and is approximately 8.2km (road distance) and 5km (aerial distance) northeast of the City Hall of Davao. The Samal landing point, on the other hand, is located within Barangay Limao and is approximately 10.2 km (road distance) and 5.5 km (aerial distance) from the IGaCoS City Hall.

**NAMRIA Map Showing Impact Barangays and Boundaries**



## Options Selection

Six (6) options for the road links structural form were initially proposed for the SIDC project. An options selection workshop was held on 19 February 2019 to compare advantages and disadvantages based on various criteria identified as key to the success of the project: (1) Technical, (2) Financial, (3) Economic, (4) Environmental, and (5) Social. Each category was divided into several definable criteria, which each alignment option can be scored against. A ranking and weighting system was determined upon establishment of the criteria. The weighting system for the criteria was agreed during the option selection workshop at ADB and confirmed by DPWH.

**Summary of Bridge Options**

Option	Structural Form
1d	Immersed Tube Tunnel
2b	Low Level Bridge
3	Bridge
4a-1	Box Girder Bridge
4a-2	Extradosed Bridge
4b	Immersed Tube Tunnel

### Illustration of SIDC Alignment Options



### Summary of Results of Options Selection Workshop

Structural Form	Option					
	Option 1: Northern Corridor	Option 2: North of Sasa Port	Option 3: Central Corridor	Option 4: Southern Corridor		
	1d	2b	3	4a-1	4a-2	4b
	Immersed Tube Tunnel	Low Level Bridge	Bridge	Box Girder Bridge	Extradosed Bridge	Immersed Tube Tunnel
Length	3845 m	245 m	2620 m	2830 m		
Construction Cost	PhP 62.4 B	18.8 B	15.6 B	25.2 B	22.4 B	54.4 B
Implementation Schedule	87 months	54-60 mos.	75 mos.	60 mos.	60 mos.	87 mos.
Technical	Good	Good	NCRG*	Good	Best	Good
Financial	Most Expensive	2nd cheapest	Cheapest	Moderate	Moderate	Expensive
Economics	Good	Good	Good	Good	Best	Good
Environmental and Social	Slightly Worse	Good	Ok	Good	Least Impact	Slightly Worse

\* non-compliant road geometry

The project options were carefully assessed based on a set of criteria both measurable (i.e. cost) and other more subjective non-quantifiable items such as some of the potential environmental impacts. The evaluation procedure involves the comparison of each option against baseline criteria. It was determined that an extradosed bridge along the Southern Corridor was the most feasible option for the SIDC – Option 4a-2.

An extradosed bridge is frequently adopted in situations where there are height restrictions. This type of bridge is considered as "in-between" girder bridges and cable-stayed bridges. An extradosed bridge is generally composed of pylon, girder and pier. For a seismic region like the Philippines, the longitudinal displacement of the deck is minimized



by using a rigid connection. Moreover, this connection does not require a temporary support or fixing during balanced cantilever erection, which is most commonly used for extradosed bridges.

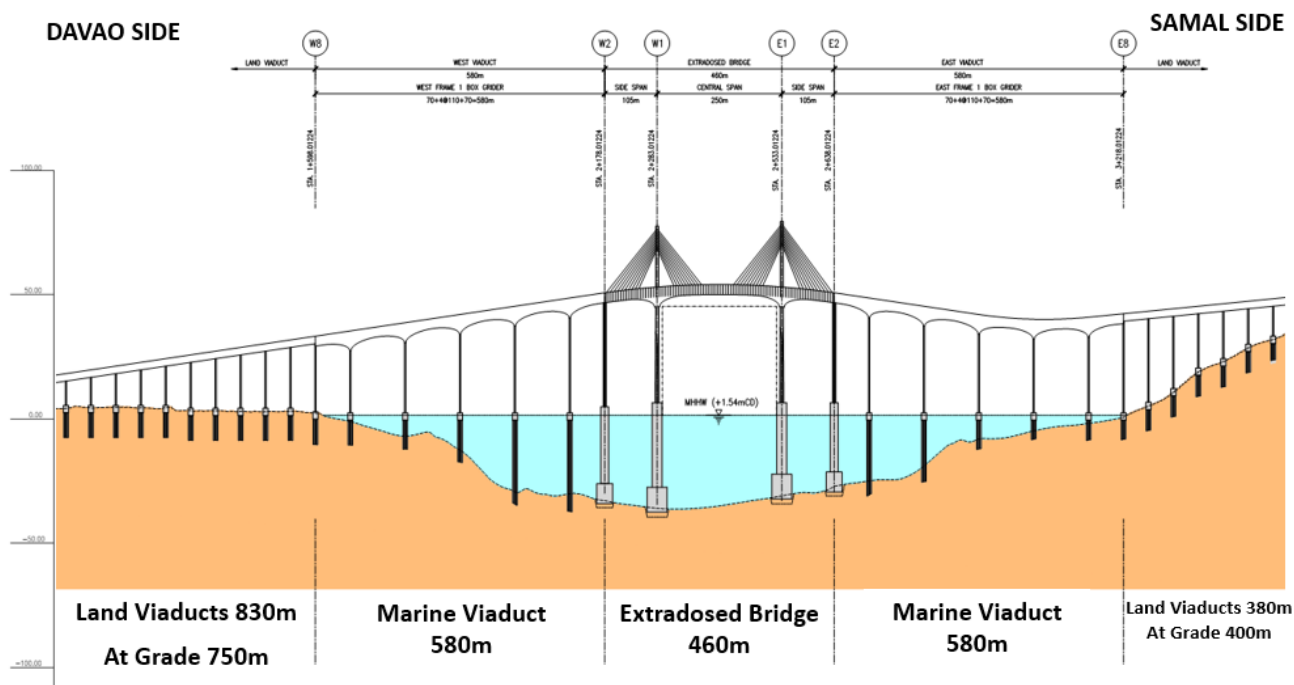
### Illustration of an Extradosed Bridge



The selected option takes into consideration key site constraints, including the imposed Civil Aviation Authority of the Philippines (CAAP) maximum allowable height of 73 meters (owing to the proximity of the project to the Francisco Bangoy International Airport).

It also considers the vessel navigation clearance needed within the Pakiputan Strait to ensure continued access of vessels to the ports in Davao and Panabo Cities.

### SIDC Bridge Structures



<b>Navigation bridges (extradosed bridge)</b>	The main structure that provides the necessary navigation clearance for safe operation of shipping at the project site
<b>Marine viaducts</b>	The typical viaduct structures which will be constructed above sea water. To minimize the impact to the waterway and reduce costs, longer spans are provided in the marine section.
<b>Interchanges and viaducts on land</b>	These are the viaduct structures which can be constructed on land and provide the connection to the existing road network.
<b>Approach ramps</b>	The parts of the road that go up from existing ground level towards to approach bridge.

## Technology

The next table summarizes construction methods that the project may employ.

**Summary of Bridge Construction Methods**

Construction Method	Description
Navigation Span Bridge	Balanced cantilever for superstructure erection of box girder
Extradosed Bridge	Externally prestressed structure and cable-stayed structure (combination)
Balanced Cantilevers	Launching girders
Span-by-span Erection	Launching gantry

The next figure, on the other hand, shows the preliminary layout of various project components.

**Preliminary Project Components Layout**



**SIDC Project Schedule**

Milestones	2018	2019	2020	2021	2022	2023	2024
<b>Pre-Construction Stage</b>							
Project Preparation and Identification	2mos						
FS Stage 1 -- Option Selection		3mos					
FS Stage 2 -- Preliminary Engineering Design		9mos					
*delays due to COVID							
Detailed Engineering Design			10mos				
<b>Construction</b>							
Procurement of Civil Works				4mos			
Civil Works Construction					42mos		
Foundations							
Substructure							
Superstructure							
Finishes							
<b>Start of Operation</b>							

### Integrated Summary of the Project Environmental Management Plan (EMP)

Project Phase/ Environmental Aspect	Environmental Component Likely to be Affected	Potential Impact	Options for Prevention or Mitigation or Enhancement
<b>PRE-CONSTRUCTION</b>			
Employment – Hiring of local workers	The People	Opportunity for employment and livelihood; Competition with local and migrant workers; Reduction of poverty and food poverty	<ul style="list-style-type: none"> <li>Contractors to adopt strict policy requiring the contractor to source workforce from qualified locals;</li> <li>Contractors to develop scheme of prioritization in local hiring with equal opportunities for men and women, skilled and unskilled, and PWDs;</li> <li>Compliance with RA 6685; and</li> <li>Contractors to provide trainings for hired workers.</li> </ul>
Health and Safety – Hiring of local worker	The People	Health and Safety of construction workers.	<ul style="list-style-type: none"> <li>Use of Personal Protective Equipment to all construction workers;</li> <li>DPWH and Contractor to provide emergency and health and safety program for workers;</li> <li>Provide Medical Kit and first aid;</li> <li>Provide potable water and temporary sanitation facilities;</li> <li>Provide trash bins in strategic locations and coordinate with LGUs and host barangays for regular waste collection and disposal;</li> <li>Conduct frequent safety, hygiene, and construction sanitation training for workers; and</li> <li>Training of personnel and staff during emergencies.</li> </ul>
Loss of livelihood of residents and business owners	The People	Displacement and loss of livelihood of residents and business owners during ROW land acquisition.	<ul style="list-style-type: none"> <li>Preparation of Resettlement Action Plan, Utilities Relocation Plan, Securing ROW, Land Acquisition, Socio-Economic Profiling, and conduct consultations guided by processes and directives under the Philippine Government, DPWH, DOTr, and ADB (i.e. RA 10752 – ROW Act; DPWH ROW Acquisition Manual; or DOTR ROW Site Acquisition Manual; and resettlement policy); and</li> <li>Proper compensation and/or relocation of affected residents and landowners.</li> </ul>
<b>CONSTRUCTION PHASE</b>			
Land Use	The Land	Impact in terms of compatibility with existing land use due to site preparation, clearing, and/ or tree cutting activities	<ul style="list-style-type: none"> <li>Reclassification of direct impact areas for infrastructure use and integration of the project in LGU land use and development plans</li> <li>Reclassification of appropriate land use development and rezoning, particularly on Samal Island Master Plan</li> </ul>
Terrestrial Ecology and Geology and Geomorphology	The Land	Loss of topsoil due to vegetation clearing may trigger soil erosion and may induce landslides in some areas during clearing, and/ or tree cutting activities, excavation, use of heavy equipment, and installation of columns/	<ul style="list-style-type: none"> <li>Prepare and implement a materials handling program or a site protection and rehabilitation program;</li> <li>Immediate compaction of the all-weather road by means of a road roller to prevent any splash and soil erosion.</li> </ul>

Project Phase/ Environmental Aspect	Environmental Component Likely to be Affected	Potential Impact	Options for Prevention or Mitigation or Enhancement
		foundations and construction of interchanges and bridge structure.	
Terrestrial Ecology	The Land	Loss of vegetation during clearing operation (i.e. fruit bearing trees, and forest trees); Possible change in floral community structure	<ul style="list-style-type: none"> <li>• Clear areas that are only necessary for site preparation to prevent impact on terrestrial ecology;</li> <li>• Secure applicable and relevant permits, including tree cutting permit should be secured prior to tree cutting activity. Replacement of cut trees will be based to the DENR Memorandum Order (DMO) 2012-02. Earth balling of big trees native trees and vegetation will be planted to compensate for any loss or replacement seedlings will be provided by the proponent;</li> <li>• Compensation to owners of nontimber species that will be cut;</li> <li>• Native flora species shall be at least conserved in selected areas to serve as refuge and forage for wildlife species;</li> <li>• Creation of dedicated habitat areas to achieve no net loss habitat or rehabilitate native species in Samal and Davao;</li> <li>• A competent, experienced ecologist will oversee the clearance of native flora.</li> <li>• Coordination with LGUs.</li> </ul>
Terrestrial Ecology	The Land	Disturbance or loss of habitat and will affect existing wildlife during site preparation, clearing, and/ or tree cutting activities	<ul style="list-style-type: none"> <li>• Clear areas that are only necessary for site preparation to prevent impact on terrestrial ecology;</li> <li>• Secure applicable and relevant permits, including tree cutting permit should be secured prior to tree cutting activity. Replacement of cut trees will be based to the DENR Memorandum Order (DMO) 2012-02. Earth balling of big trees or replacement seedlings will be provided by the proponent;</li> <li>• Gradual conversion of the area to provide sufficient time for wildlife movement;</li> <li>• A biodiversity protection plan, restoration plans, and a stand-alone monitoring plan will be created to detail the restoration and habitat creation of native flora, as necessary;</li> <li>• Creation of dedicated habitat areas to achieve no net loss habitat or rehabilitate native species in Samal and Davao, as necessary; and</li> <li>• Coordination with LGUs</li> </ul>
Accumulation of solid wastes	The Land	Accumulation of solid wastes during site preparation, clearing, and/ or tree cutting activities, excavation and other construction and installation works; Devaluation of land value as a result of improper solid waste management	<ul style="list-style-type: none"> <li>• Implement an organized waste storage, collection, and proper waste management system;</li> <li>• Housekeeping measures can also prevent possible contamination in soil and water;</li> <li>• Non-recyclable waste will be collected daily by a licensed 3rd party contractor to ensure cleanliness in the workplace;</li> </ul>

Project Phase/ Environmental Aspect	Environmental Component Likely to be Affected	Potential Impact	Options for Prevention or Mitigation or Enhancement
			<ul style="list-style-type: none"> <li>• Trainings will be provided to site workers to improve the awareness on proper solid waste management practices;</li> <li>• Prepare Solid Waste Management Plan in accordance with RA 9003; and</li> <li>• Ensure compliance to national and local waste regulations</li> </ul>
Geology and geomorphology	The Land	May trigger siltation during site preparation, clearing, and/ or tree cutting activities, excavation, use of heavy equipment and installation of columns/ foundations and construction of interchanges and bridge structure.	<ul style="list-style-type: none"> <li>• Secure appropriate erosion control measures such as additional pavements, concrete sea walls, sediment traps and barriers during heavy rain periods;</li> <li>• Stockpiles will be placed away from the water courses and protected against natural elements to prevent the transport of soil and sediment;</li> <li>• Soil debris and other excavated materials should be hauled out from the site;</li> <li>• Regular monitoring to the adjacent water bodies to ensure the continuous conformance to their respective water quality criteria. Water quality monitoring will be conducted on a monthly basis during the construction phase;</li> <li>• Silt traps will be installed for all nearby water bodies; and</li> <li>• The waste soil and other debris will be properly handled and disposed on a regular basis.</li> </ul>
Geology and geomorphology	The Land	Change in subsurface geology and underground conditions due to project inducement of subsidence, karst subsidence, liquefaction, and mass movements during excavation, use of heavy equipment and installation of columns/ foundations and construction of interchanges and bridge structure.	<ul style="list-style-type: none"> <li>• Consider ground acceleration values in the final project design, particularly pile and pylon foundations;</li> <li>• Conduct detailed geotechnical and subsurface investigations during DED leading to the design of ground improvement activities to be implemented during construction;</li> <li>• Design structures and facilities to withstand ground subsidence where suspected to occur; and</li> <li>• Investigate underlying soils and rocks during DED.</li> </ul>
Visual aesthetics	The Land	Impairment of visual aesthetics during excavation and other construction works	<ul style="list-style-type: none"> <li>• Final project design to consider aesthetic impacts;</li> <li>• Harmonize with existing surroundings considering engineering, safety, environmental, and its aesthetic impacts; and</li> <li>• Ensure that iconic and elegant bridge be maintained and visually appealing during construction phase.</li> </ul>
Traffic	The Land	Traffic congestion during construction works	<ul style="list-style-type: none"> <li>• Follow the Traffic Management Plan to aid in avoiding traffic congestion;</li> <li>• Contractors to provide traffic enforcers in areas where construction is on-going; and</li> <li>• Coordinate with LGUs to provide alternative routes.</li> </ul>
Soil contamination; Hazardous materials	The Land	Soil contamination from leaks of lubricants agents and used oil due to excavation, and other construction works.	<ul style="list-style-type: none"> <li>• Implement an organized waste storage, where bulk waste oils and lubricants are placed in impermeable area with appropriate secondary containment;</li> <li>• Implement a proper waste management (handling, storage and disposal) and housekeeping measures to prevent possible contamination in soil;</li> </ul>



Project Phase/ Environmental Aspect	Environmental Component Likely to be Affected	Potential Impact	Options for Prevention or Mitigation or Enhancement
		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.	<ul style="list-style-type: none"> <li>Waste oils, oily water and other hazardous wastes will be collected and disposed offsite by an accredited third-party waste hauler and treater;</li> <li>Emergency and contingency plan in case of spills (health and safety management plan must be in place).</li> <li>Maintenance and proper use of construction materials and heavy vehicles;</li> <li>Disposal of non-recyclable wastes by a licensed contractor;</li> <li>Trainings will be provided to site workers to improve the awareness on proper solid waste management practices.</li> </ul>
Water Quality	The Water	Degradation of water quality due to generation of domestic wastewater during installation of site facilities – Temporary Facilities (field offices and barracks) and columns and other construction works on land	<ul style="list-style-type: none"> <li>Secure appropriate erosion control measures such as additional pavements, concrete sea walls, sediment traps and barriers during heavy rain periods;</li> <li>Stockpiles will be placed away from the water courses and protected against natural elements to prevent the transport of soil and sediment</li> <li>Soil debris and other excavated materials should be hauled out from the site</li> <li>Regular monitoring of the affected and adjacent water bodies prior, during and even after the construction phase to monitor the water quality and ensure the continuous conformance of the water bodies to their respective water quality criteria. Water quality monitoring will be conducted on a monthly basis during the construction phase.</li> <li>Locate motor-pool area at least 500 meters away from any body of water;</li> <li>Set up of portable sanitary facilities and collect wastewater to be disposed accordingly;</li> <li>The contractor will be required to comply with the Civil Works Guidelines;</li> <li>Project shall be equipped with an oilwater separator to remove oil from effluents prior to discharge to water bodies;</li> <li>Implement an organized waste storage, where bulk waste oils and lubricants are placed in impermeable area with appropriate secondary containment;</li> <li>Implement a proper waste management (handling, storage and disposal) and housekeeping measures to prevent possible contamination in soil;</li> <li>Waste oils, oily water and other hazardous wastes will be collected and disposed offsite by an accredited third-party waste hauler and treater;</li> <li>Emergency and contingency plan in case of spills (health and safety management plan must be in place).</li> </ul>
Water Quality	The Water	Degradation of water quality due to dredging, operation of vessels and installation of columns/ foundations and construction of bridge structure	<ul style="list-style-type: none"> <li>Apply appropriate siltation control measures such as well-designed marine silt curtain scheme installed within the buffer of construction areas to prevent any pollution and silt disturbance due to construction activities at sea;</li> <li>Soil debris and other excavated materials should be hauled out from the site;</li> </ul>

Project Phase/ Environmental Aspect	Environmental Component Likely to be Affected	Potential Impact	Options for Prevention or Mitigation or Enhancement
			<ul style="list-style-type: none"> <li>Regular monitoring of the affected and adjacent water bodies prior, during and even after the construction phase to monitor the water quality and ensure the continuous conformance to their respective water quality criteria. Water quality monitoring will be conducted on a monthly basis during the construction phase;</li> <li>The contractor will be required to comply with the Civil Works Guidelines; and</li> <li>Compliance to MARPOL 73/78 - Prevention of Pollution by Sewage from Ships and PCG Memorandum # 10-14.</li> </ul>
Water Quality	The Water	Degradation of water quality due to oil, fuel or other lubricant agents leaks due to works, installation and other construction works on land	<ul style="list-style-type: none"> <li>Project shall be equipped with oilwater separator to remove oil from effluents prior to discharge to the water bodies;</li> <li>Locate motor-pool area at least 500 meters away from any body of water;</li> <li>Set-up portable sanitary facilities and collect wastewater to be disposed of accordingly;</li> <li>Implement an organized waste storage, where bulk waste oils and lubricants are placed in impermeable area with appropriate secondary containment; Implement a proper waste management (handling, storage and disposal) and housekeeping measures to prevent possible contamination in soil;</li> <li>Waste oils, oily water and other hazardous wastes will be collected and disposed offsite by an accredited third-party waste hauler and treater; and</li> <li>Emergency and contingency plan in case of spills (health and safety management plan must be in place).</li> </ul>
Solid Wastes	The Water	Accumulation of solid wastes and impact on sediments during dredging, operation of vessels and installation of columns/ foundations and construction of bridge structure	<ul style="list-style-type: none"> <li>Implement an organized waste storage, collection, and management system;</li> <li>Proper waste management and housekeeping measures can also prevent possible contamination in soil and water;</li> <li>Storage or disposal sites of the excavated or dredged sediments should be properly secured to prevent leakage of sediments, contaminants or pollutants through surface runoff;</li> <li>Slope protection on the bridge landing site, particularly on IGaCoS side, to minimize surface runoff and sedimentation;</li> <li>Employ well-designed marine silt curtain scheme installed within the buffer of construction areas to prevent any pollution and silt disturbance due to construction activities at sea;</li> <li>Waste will be collected daily by a 3rd party contractor to ensure cleanliness in the workplace;</li> <li>Trainings will be provided to site workers to improve the awareness on proper solid waste management practices;</li> </ul>

Project Phase/ Environmental Aspect	Environmental Component Likely to be Affected	Potential Impact	Options for Prevention or Mitigation or Enhancement
			<ul style="list-style-type: none"> <li>• Compliance to MARPOL 73/78 - Prevention of Pollution by Sewage from Ships and PCG Memorandum # 10-14; and</li> <li>• Prepare Solid Waste Management Plan in accordance with RA 9003.</li> </ul>
Water contamination	The Water	Water contamination due to fuel, oil and other hazardous materials leakages during dredging, operation of vessels and installation of columns/ foundations and construction of bridge structure	<ul style="list-style-type: none"> <li>• Implement an organized waste collection and storage, where bulk waste oils and lubricants are placed in impermeable area with appropriate secondary containment;</li> <li>• Implement a proper waste management (handling, storage and disposal) and housekeeping measures to prevent possible contamination in water;</li> <li>• Waste oils, oily water and other hazardous wastes will be collected and disposed offsite by an accredited third-party waste hauler and treater;</li> <li>• Emergency and contingency plan in case of spills (health and safety management plan must be in place);</li> <li>• Maintenance and proper use of construction materials and heavy vehicles; and</li> <li>• Ensure compliance to PCG Memorandum # 07-14.</li> </ul>
Flooding	The Water	Increase in flooding susceptibility due to excavation, use of heavy equipment and installation of columns/ foundations and construction of interchanges and bridge structure.	<ul style="list-style-type: none"> <li>• Provide proper drainage canals that consider surface water flows and existing structures in the area;</li> <li>• Control water inflow by placing water-shut panels, intercept drainages and pump stations in strategically selected areas; and</li> <li>• Provide overflows to avoid water build-up on bridges when drainage infrastructure is blocked.</li> </ul>
Marine Ecology	The Water	Seagrass in IGaCoS side are still abundant and thriving and may decline when buried by sediment during dredging, operation of vessels and installation of columns/ foundations and construction of bridge structure.	<ul style="list-style-type: none"> <li>• Employ well-designed marine silt curtain scheme installed within the buffer of construction areas to prevent any pollution and silt disturbance due to construction activities at sea;</li> <li>• Biodiversity protection plan to be drawn up to detail methods to minimize impacts on seagrass beds and detail seagrass habitat creation and subsequent monitoring.</li> <li>• Surveys to be undertaken to explore opportunities for suitable translocation and habitat creation sites for seagrass beds, should be necessary.</li> <li>• Dredging must be confined at the immediate area so that only a small part of the meadow will be affected.</li> </ul>
Marine Ecology	The Water	Local loss and disturbance of natural sedimentary habitats due to introduction of hard substrates and increase in sediment loads	<ul style="list-style-type: none"> <li>• Engineering modifications to provide greater surface complexity and encourage marine growth;</li> <li>• Engineering design does not hinder longshore currents and ensures free circulation of water;</li> <li>• Well-designed silt control scheme;</li> <li>• Proper disposal of debris;</li> </ul>

Project Phase/ Environmental Aspect	Environmental Component Likely to be Affected	Potential Impact	Options for Prevention or Mitigation or Enhancement
		Deterioration, destruction and disruption of fish habitats in IGaCoS side during dredging, operation of vessels and installation of columns/ foundations and construction of bridge structure	<ul style="list-style-type: none"> <li>Any debris or concrete waste must be removed as quickly as possible;</li> <li>Monitoring and evaluation of benthic habitats to be conducted quarterly or bi-annually to capture changes;</li> <li>Secure storage or disposal sites of excavated or dredged sediments to prevent leakage of sediments, contaminants or pollutants through surface run-off; and</li> <li>Provide slope protection on bridge landing site, particularly on the IGaCoS side, to minimize surface runoff and sedimentation.</li> </ul>
Marine Ecology	The Water	Changes in channel beds and impacts on fish and aquatic life during dredging, operation of vessels and installation of columns/ foundations and construction of bridge structure	<ul style="list-style-type: none"> <li>Strict observance and implementation of Site Protection and Rehabilitation Program and materials handling which provide for soil erosion control measures;</li> <li>Observe best practices in proper construction procedures that promote care and minimal disturbance to the existing environment;</li> <li>Monitoring and evaluation of benthic habitats, including habitat created/ translocated and remedial actions taken, if required;</li> <li>Should there be any affected corals and seagrasses, coral translocations/ seagrass mitigation / translocation of any benthic species should be undertaken by a suitably qualified marine ecologist.</li> <li>Biodiversity protection plan to be drawn up to detail methods to minimize impacts.</li> </ul>
Visual Aesthetics	The Water	Impairment of visual aesthetics during dredging, operation of vessels and installation of columns/ foundations and construction of bridge structure	<ul style="list-style-type: none"> <li>Final project design to consider aesthetic impacts</li> <li>Harmonize with existing surroundings considering engineering, safety, environmental, and its aesthetic impacts; and</li> <li>Ensure that iconic and elegant bridge be maintained and visually appealing during construction phase.</li> </ul>
Marine Navigation	The Water	Disruption of marine navigation route along Pakiputan Strait during dredging, operation of vessels and installation of columns/ foundations and construction of bridge structure	<ul style="list-style-type: none"> <li>Coordinate with Marina, PPA and Coastguard for the rerouting of sea vessels; and</li> <li>Vessels will observe speed restriction and follow routing clearance to avoid sensitive marine areas.</li> </ul>
Air Quality	The Air	Alteration of air quality from fugitive dust and equipment use, during site preparation, clearing, and/ or tree cutting activities, construction and installation of site facilities – Temporary Facilities (field offices and barracks), excavation, installation and	<ul style="list-style-type: none"> <li>Regular and adequate sprinkling of water should be done in the premises to minimize the dust particles generated;</li> <li>Preventive maintenance of heavy equipment and vehicle;</li> <li>Regular monitoring of the concentrations of PM2.5, PM10, TSP, SO2 and NO2 shall be done to ensure that the levels of these pollutants will still be within the NAAQGV.</li> </ul>



Project Phase/ Environmental Aspect	Environmental Component Likely to be Affected	Potential Impact	Options for Prevention or Mitigation or Enhancement
		transport of materials, and during dredging, operation of vessels and installation of columns/ foundations and construction of bridge structure	<ul style="list-style-type: none"> <li>Workers will be provided with the appropriate personal protective equipment (PPE) and will practice standard occupational health and safety pursuant to BWC-DOLE Occupational Safety and Health Standards; and</li> <li>Fuel efficiency will be maximized through scheduling of vehicle, and equipment movements in order to minimize both idle time and distances travelled and use of low sulfur fuel, where possible.</li> </ul>
Noise Level	The Air	Disturbance in nearby communities due to generation of noise during site preparation, clearing, and/ or tree cutting activities, construction and installation of site facilities – Temporary Facilities (field offices and barracks), excavation, installation and transport of materials	<ul style="list-style-type: none"> <li>Use equipment which generates less noise, and/or will be fitted with muffler or silencers;</li> <li>The host communities will be kept informed of the duration and timing of any noisy construction;</li> <li>Limit the construction time to a given standard hours or limit night work to avoid distraction of nearby establishments like residential areas;</li> <li>Periodic monitoring and evaluation of noise levels;</li> <li>Work involving handling of noisy and/or vibrating power tools/ equipment shall be with maximum of 2 hours per day (for 8-hour work, duty cycle should be 1:4) in conformity to the requirements of BWC DOLE DO 1998-13 and the Occupational Safety and Health Standards (As Amended, 1989);</li> <li>Regular maintenance of all vehicles, machinery, and heavy equipment; and The project can use hydraulic oscillator to reduce noise and vibration. Pilling rig with acoustic mat will also be used to control noise impacts.</li> <li>The project can use hydraulic oscillator to reduce noise and vibration. Pilling rig with acoustic mat will also be used to control noise impacts.</li> </ul>
		Disturbance due to during dredging, operation of vessels and installation of columns/ foundations and construction of bridge structure	<ul style="list-style-type: none"> <li>Construction vessels that will be used will have on-board noise reduction to protect construction workers from excessive noise exposure, in accordance with the International Convention for the Safety of Life at Seas (SOLAS).</li> </ul>
Health and Safety	The People	Potential threat to health and safety of people / communities during Construction works	<ul style="list-style-type: none"> <li>Ensure site is well-lit, secured and guarded;</li> <li>Formulate security procedures with local police and LGUs for provision of needed facilities, guard posts.</li> <li>Provision of Grievance Redress Mechanism for any issues and complaints</li> <li>Coordinate with concerned agencies to ensure safety and reduced negative impacts to the community and environment.</li> </ul>
	The People	Temporary disruption of public services, such as water and electric supply during Site preparation, clearing, and/ or tree cutting activities	<ul style="list-style-type: none"> <li>Relocation and replacement of affected utilities will be paid by the proponent and will be carried out by the relevant utility companies;</li> <li>Inform affected stakeholders ahead of any temporary disruption during utility relocation; and</li> </ul>

Project Phase/ Environmental Aspect	Environmental Component Likely to be Affected	Potential Impact	Options for Prevention or Mitigation or Enhancement
			<ul style="list-style-type: none"> <li>Attention will be made on utilities that will be relocated and will be closely monitored during implementation of utility relocation.</li> </ul>
<b>OPERATION PHASE</b>			
Accumulation of Solid Waste due to movement of passengers	The Land	Increase in solid waste generation from passengers and operational works	<ul style="list-style-type: none"> <li>Provision of waste bins that will allow proper waste segregation at both ends of the bridge;</li> <li>Regular waste audits and collection of wastes for recycling or disposal;</li> <li>Samal LGU to highly consider Solid Waste Management for the likely huge increase in development; and</li> <li>Local authorities to control littering and entry to the island</li> </ul>
Water Flow and Currents	The Water	Disruption of natural water flows and currents	<ul style="list-style-type: none"> <li>Monitor sediment transport loads;</li> <li>Samal landfall pier positioning to avoid ephemeral stream locations;</li> <li>Provide silt removal facilities; and</li> <li>Site formation design to re-direct surface runoff to appropriate discharge points at each landfall location.</li> </ul>
Marine Navigation	The Water	Disruption of marine navigation route along Pakiputan Strait	<ul style="list-style-type: none"> <li>Coordinate with Marina, Philippine Ports Authority (PPA) and Philippine Coast Guard for the rerouting of sea vessels.</li> </ul>
Noise Level	The Air	Noise from vehicles may exceed national standards for noise in general areas	<ul style="list-style-type: none"> <li>Portions of existing viaduct deck high above the sensitive receivers;</li> <li>Alert signage to reduce noise placed on the bridge; and</li> <li>Install noise barriers such as insulating walls</li> </ul>
Employment – Hiring of local workers	The People	Increase in employment opportunities and livelihood	<ul style="list-style-type: none"> <li>Contractors to adopt strict policy requiring the contractor to source workforce from qualified locals;</li> <li>Contractors to develop scheme of prioritization in local hiring with equal opportunities for men and women, skilled and unskilled, and PWDs;</li> <li>Compliance to RA 6685; and</li> <li>Contractors to provide trainings for hired workers.</li> </ul>
Health and Safety of workers	The People	Health and Safety of personnel	<ul style="list-style-type: none"> <li>Use of Personal Protective Equipment to all site workers;</li> <li>DPWH and Contractor to provide emergency and health and safety program for workers;</li> <li>Provide Medical Kit and first aid;</li> <li>Provide trash bins in strategic locations and coordinate with LGUs and host barangays for regular waste collection and disposal;</li> <li>Conduct frequent safety, hygiene, and sanitation training for staff; and</li> <li>Training of personnel and staff during emergencies</li> </ul>

<b>Project Phase/ Environmental Aspect</b>	<b>Environmental Component Likely to be Affected</b>	<b>Potential Impact</b>	<b>Options for Prevention or Mitigation or Enhancement</b>
Health and Safety to nearby communities	The People	Potential threat to health and safety of people / communities	<ul style="list-style-type: none"> <li>• Deploy security personnel and incorporate a control center with CCTV and other monitoring systems;</li> <li>• Ensure site is well-lit, secured and guarded;</li> <li>• Formulate security procedures with local police and LGUs for provision of needed facilities, guard posts; and</li> <li>• Implementation of Emergency Response Team for accidents and other emergency cases.</li> </ul>
Health and Safety to users	The People	Health and Safety of drivers bridge end-users (e.g. drivers and passengers)	<ul style="list-style-type: none"> <li>• Regular inspection of bridge;</li> <li>• Good signage and clear direction of traffic and bridge users; and</li> <li>• Training of personnel and staff during emergencies</li> </ul>
Economic Development	The People	Boost economic development of Samal Island by improving tourism competitiveness	
Mobility and linkages	The People	Accelerate infrastructure development that would enhance internal circulation, mobility and external linkages to support the growth potential of Davao Region	
<b>ABANDONMENT PHASE</b>			
Soil and Land Value	Land	Land	<ul style="list-style-type: none"> <li>• Complete soil/land evaluation to determine residual impacts and appropriate corrective actions, if applicable</li> </ul>
Water Quality	Water	Water	<ul style="list-style-type: none"> <li>• Assess groundwater capacity and monitoring of surface water quality to evaluate impacts during operation of project and provide possible mitigation measures.</li> </ul>
Air Quality	Air	Unlikely air impacts due to dispersion of mobile source emissions to the atmosphere and dilution of pollutants released when bridge was in operation	<ul style="list-style-type: none"> <li>• Assess temporary impacts during demolition; and</li> <li>• Assess unlikely impacts due to dispersion to the atmosphere and dilution of pollutants released when railway was in operation</li> </ul>
Economy and Livelihood	People	Loss of economic benefits and livelihood and employment	<ul style="list-style-type: none"> <li>• Assess loss of economic benefits;</li> <li>• Assess Loss of livelihood and employment;</li> <li>• Implement a Labor Retrenchment and support package and labor support programs</li> </ul>

### **Commitments/ Guarantees**

The guarantees of the Proponent DPWH through its Contractors which is under its responsibility are spelled-out in the EIS document are made or executed in order to ensure proper monitoring of the proposed project and to see to it that the environment is well protected, to wit:

1. Formation of a Multi-Partite Monitoring Team (MMT) which shall be composed by members coming from different sectors with the purpose of monitoring the project and its ECC conditionalities
2. Provision of support to the MMT by way of providing an Environmental Monitoring Fund to be used by the MMT in its monitoring activities
3. Provision of an Environmental Guarantee Fund (EGF) to cover damages that may be caused by the project
4. Proper utilization of the EGF by the MMT in accordance with the guidelines set in DAO 03-30
5. Implementation of the Environmental Monitoring Plan (EMoP)
6. Implementation of the Social Development Plan
7. Others guarantees, as the need arises

Copies of the full Environmental Impact Statement (EIS) for this project may be downloaded at the EMB website: <https://emb.gov.ph/environmental-impact-assessment/> . Copies are also available at the following:

1. Environmental Management Bureau Region XI
2. Provincial Planning and Development Office, Davao del Sur
3. City Planning and Development Office, Davao City
4. City Planning and Development Office, Island Garden City of Samal