



Department of Public Works and  
Highways

**Infrastructure Preparation and  
Innovation Facility – Output 1 –  
Roads and Bridges**

Laguna Lakeshore Road Network –  
Environmental and Social Impact  
Assessment Report

| 29 September 2020



ARUP

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## Executive Summary

### Project Fact Sheet

<b>Name of Project</b>	Laguna Lakeshore Road Network (LLRN) Project	
<b>Project Location</b>	National Capital Region: <ul style="list-style-type: none"> <li>- Taguig City; and</li> <li>- Muntinlupa City</li> </ul> Region IV-A / CALABARZON <ul style="list-style-type: none"> <li>- San Pedro City;</li> <li>- Biñan City;</li> <li>- Santa Rosa City;</li> <li>- Cabuyao City; and</li> <li>- Calamba</li> </ul>	
<b>Nature of the Project</b>	Road Network	
<b>Project Size</b>	Alignment Length: 37.6 km Width: Dual 2 / Dual 3 Carriageway (Varies)	
<b>Summary of Major Components</b>	Viaduct Embankment Interchanges Land Drainage	
<b>Project Cost</b>	Approximately Php. 117.168 Billion (Civil Works) Approximately Php. 166.268 Billion (Total Project Cost)	
<b>Project Duration</b>	2018-2026	
<b>Operation Date</b>	2026	
<b>Proponent Name</b>	Department of Public Works and Highways	
<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 EcosysCorp Inc.	
<b>Preparer Contact Person</b>	<b>David Rollinson</b> Ove Arup & Partners Hong Kong Ltd – Environmental and Social Team Leader	<b>Annabelle Herrera</b> EcosysCorp, Inc. – Project Director
<b>Preparer Address and Contact Details</b>	<b>Ove Arup &amp; Partners Hong Kong Ltd</b> 36F The Podium West Tower #12 ADB Avenue corner Julia Vargas Avenue Ortigas Center, Mandaluyong City 1550 Contact No.: +63 2 3485 8200  <b>EcosysCorp, Inc</b> Units 712, 716, & 710 JOCFER Bldg. 79 Commonwealth Ave., Q. C.	

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## Proponent's Profile

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 Environmental and Social Impact Assessment of Laguna Lakeshore Road Network (LLRN) Project. Arup is a multinational firm which provides engineering, design, planning, project management and consulting services for all aspects of the built environment.

EcosysCorp, Inc. was hired by Arup as its sub-consultant to carry out the Environmental Impact Assessment (EIA) including the social aspects such as conduct of public consultation, Information and Education Campaign (IEC), perception survey, among others for the Project.

<b>Proponent name</b>	Department of Public Works and Highways (DPWH)
<b>Address</b>	Bonifacio Drive Port Area, 652 Zone 068, Manila, 1018 Metro Manila, Philippines
<b>Authorized signatory/ representative to apply for ECC</b>	<b>Emil K. Sadain, CESO I</b> Undersecretary for UPMO Operations and Technical Services Department of Public Works and Highways Room 211, 2nd Floor, DPWH Main Office, Bonifacio Drive, Port Area, Manila, Philippines
<b>Recommending Approvals</b>	<b>Sharif Madsmo H. Hasim</b> Director Department of Public Works and Highways Roads Management Cluster II (Multilateral) Unified Project Management Office (UPMO)
<b>DPWH Contact Person</b>	<b>Soledad R. Florencio</b> Project Manager III Department of Public Works and Highways Roads Management Cluster II (Multilateral) Unified Project Management Office (UPMO) <b>Zenaida B. Mauhay</b> Project Manager II Roads Management Cluster II (Multilateral) Unified Project Management Office Department of Public Works and Highways 2nd Street, Port Area Manila, Philippines <a href="mailto:zenaida730@yahoo.com">zenaida730@yahoo.com</a> +63 2 5304 3727

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## Process Documentation

### Project Categorization

The Laguna Lakeshore Road Network Project (LLRN) – Phase I is an Environmentally Critical Project (ECP) which falls under Category A of the Revised Guidelines for Coverage Screening and Standardized Requirements under the Philippine EIS System as the project will traverse both land and water bodies, specifically the Laguna Lake.

Based on 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).

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 states that infrastructure, more specifically roads and bridges, must secure an Environmental Compliance Certificate (ECC) through conduct of full-blown Environmental Impact Assessment (EIA) as the project poses significant environmental impacts.

With this, an Environmental Impact Statement (EIS) Report has been prepared for the ECC application of the project. This report will outline the current conditions of the project area and will present all potential impacts that may be found significant.

### Definition of EIA

Department Administrative Order (DAO) 2003-30 defines EIA as 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, operations, and abandonment phase*). It involves designing appropriate preventive, mitigating and enhancement measures addressing the consequences in attaining socio-economic and environmental balance.

## Scope of the EIA Study

This EIS Report covers the environmental and social impact assessment and activities associated with the feasibility studies of the project. The contents of this report include the following major and critical components based on the requirements stipulated in the **Technical Scoping Checklist which was agreed upon by DENR-EMB, the proponent, and the consultant (see Appendix XX):**

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

All regulations and cited information are aligned with the rules and regulations of the Philippines in relation to its compliance with the requirements of the Department of Environment and Natural Resources (DENR) and Asian Development Bank (ADB), primarily the Guidelines on Environmental Assessment and Safeguard Policy Statement (SPS) 2009.

As part of the ECC application process, a series of activities such as LGU consultations, socioeconomic and perception surveys, and public consultations were carried out for completion of the EIA. Information and Education Campaigns (IEC) and coordination meetings with LGUs and other stakeholder engagement activities were carried out in conformance with the revised LLRN scheme consistent with the guidelines prescribed by DENR-EMB and ADB Safeguards Policy.

Baseline environmental sampling for air, surface water, ground water, and sediment were conducted. Terrestrial and aquatic ecological surveys were accomplished by experts. The Right-of-Way Acquisition and Resettlement Action Plan (ROWWARAP) has been prepared for the project which includes surveys for land, utilities, and structures that may be affected by the proposed alignment.

## EIA Team

The EIA Team for the preparation of the environmental impact assessment of the LLRN Project consists of the following experts and members:

Name	Role in the EIA Study	Qualifications
<b>Ove Arup and Partners Hong Kong Ltd.</b>		
<b>David Rollinson</b>	Environmental and Social Team Leader	BSc (Hons) Environmental Biology MSc Environmental Management
<b>Angel Salcedo</b>	Environmental and Social Specialist	EIA Registration No. IPCO 334 MSc Environmental Engineering B.S. Chemical Engineering
<b>Maria Catherine Rontos</b>	Environmental and Social Specialist	EIA Registration No. IPCO 037 Diploma in Urban and Regional Planning B.S. Environmental Planning and Management
<b>Geanella Allyson Belino</b>	Environmental and Social Specialist	M.A. Urban and Regional Planning B.S. Environmental Planning and Management
<b>Gabriel Luis Mabanta</b>	Environmental and Social Specialist	B.S. Environmental Science
<b>EcosysCorp Inc.</b>		
<b>Frederick Esternon</b>	Terrestrial Ecology Specialist Environmental and Social Specialist EIA Head	EIA Registration No. IPCO 311 Environmental Management Specialist B.S. Forestry and Natural Resources
<b><i>Insert Experts</i></b>		
<b><i>Insert Experts</i></b>		

## EIA Study Schedule

EIA Activities	2019		2020												2021											
	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
DPWH Endorsement for IEC Coordination (27/11/19)																										
IEC Meeting with City/Municipal LGUs																										
Health & Safety Protocols Prep Activities																										
Barangay-level IEC																										
Conduct of SES and FGDs																										
Preparation for the public scoping																										
Public scoping proper																										
Technical Scoping with EMB																										
Field Surveys (freshwater and terrestrial ecology sampling including riparian)																										
Climate Risk and Vulnerability Analysis																										
Impact Assessment and Mitigation																										
Environmental Management Plan																										
Draft EIS Report preparation and submittal																										
Official acceptance of the EIS																										
1st EIA Review meeting																										
AI submission																										
Public Hearing																										
Site inspection																										
Revised EIS submitted																										
Public Hearing proceedings submitted																										
2nd EIA Review Meeting																										
Posting at EMB website																										



EIA Activities	2019		2020												2021											
	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
EIARC report submission by EIARC Chair																										
EIARC recommendations decision by EMB Director / Endorsement from OD to the Office of the Secretary for clearance																										
ECC Approval/Disapproval by EMB Director																										

EIA Study Area

The road network caters the area in the vicinity of Laguna de Bay. Phase I runs along the western coastline of the Lake while Phase II stretches in the Northern to Southern coastline via an eastern route.

The proposed alignment is a combination of viaduct and embankment. The alignment will start in Brgy. Lower Bicutan in Taguig City and end in Brgy. Bucal in Calamba. It has eight (8) interchanges distributed along the course of the alignment and will provide access to seven (7) cities/ municipalities in the western side of the lake.

The table below summarizes the coverage of the EIA study in Metro Manila and the province of Laguna:

Table 1 EIA Study Coverage

		City/Municipality	Number of Barangays Covered
Metro Manila	1	Taguig	3
	2	Muntinlupa	8
Laguna	3	San Pedro	3
	4	Biñan	4
	5	Sta. Rosa	3
	6	Cabuyao	5
	7	Calamba	8
Total		7 Cities/Municipalities	34 Barangays

EIA Methodologies

The methods of the EIA include collection of primary and secondary data, the alignment option selection, the ADB Categorization, and the assessment of potential environmental and social impacts and the proposed mitigation measures. These are described in detail as follows:

**Compliance:** This report has been prepared in accordance with ADB SPS (2009), ADB’s Environmental Assessment Guidelines (2003), and the guidelines and requirements of the Philippine’s DENR Administrative Order 2003-30 (DAO 2003-30) – Implementing Rules and Regulations of Presidential Decree 1586 (Establishing Environmental Impact Statement System, including Environmental Management Bureau Memorandum Circular 2014-005 (EMB-MC 2014-005) – Revised Guidelines for Coverage Screening and Standardised Requirements under the Philippines EIS System (PEISS).

**Categorization:** EMB-MC 2014-005 states that infrastructure, more specifically roads and bridges, must secure an Environmental Compliance Certificate (ECC), through conduct of full-blown Environmental Impact Assessment (EIA) as the project poses significant environmental impacts. The project falls under Catgory A of the ADB SPS guidelines (2009) as the project is perceived to have adverse environmental and social impacts. For Projects under Category A, an EIA Report shall be submitted and be approved by ADB’s Chief Compliance Officer (CCO). Other existing regulatory and institutional framework required for the Project from pre-construction, construction, and operation phases are presented in this report.

**Review of Secondary Data:** Readily available secondary data regarding the Project are used as baseline information. These are published materials made available by the local government and non-government bodies and were reviewed to verify usefulness before adopting to be used in the report.

**Site Reconnaissance and Investigation:** During the EIA study after project categorization, site visits and investigation would be required through the study that will form part of the preparation of public consultation and feed into the overall assessment.

**Alignment Option:** The team continuously studied the optimum alignment option for the Project. The studies conducted consist of options selection workshop, initial site visits as well as investigations and desktop reviews to help the team in the selection process. This report will give a brief background on the scoring procedures and lists the criteria used to come up with preferred alignment.

**Preliminary Identification of Impacts:** Identification of impacts was done for each option through desktop review, after which, the findings were then verified by site investigations. Constraints were further identified and discussed. A study for mitigation measures will then be considered in relation to the laws and regulations for each respective module ranging from the use of machineries, proper use and storage of materials, trainings of personnel, safety rules of contractors, staff and employees, and traffic management.

**Table 2** Summary of EIA Methodologies

EIA Key Components	Methods
Land	
Land Use and Classification	
Geology/Geomorphology	<ul style="list-style-type: none"><li>Review of secondary data</li><li>Simplified ground modelling</li></ul>
Geohazard Assessment	<ul style="list-style-type: none"><li>Maps from Comprehensive Land Use Plans (CLUPs) and from the Mines and Geosciences Bureau (MGB) and the Philippines National Geophysical Data Center</li></ul>
Pedology	
Terrestrial Ecology: Flora Assessment	
Terrestrial Ecology: Fauna Assessment	
Water	
Hydrology/ Hydrogeology	<ul style="list-style-type: none"><li>Review of secondary data from comprehensive land use plans, Integrated Water Resource Management Master Plan by the Provincial Government of Laguna, related hydrologic studies, and historic flood levels</li></ul>
Water Quality	<ul style="list-style-type: none"><li>Sediments, and surface and groundwater sampling</li></ul>
Freshwater Ecology	
Air	
Ambient Air sampling	<ul style="list-style-type: none"><li>Ambient air sampling</li><li>Air dispersion modelling</li></ul>
Noise sampling	<ul style="list-style-type: none"><li>Noise sampling</li><li>Noise modelling</li></ul>
People	

Public Participation Activities

**Table 3** Summary of Pre-Scoping IEC Activities and Issues

LGUs Covered by IEC	Actual IEC Schedule / Dates	Issues Raised / Suggestions Provided
		<ul style="list-style-type: none"><li></li></ul>

EIA Summary

Integrated Summary of Impacts and Residual Effects after Mitigation

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		•	
	Water Quality		•	
A2. Procurement and planning	Economy		•	
A3. Land acquisition and resettlement	People		•	
Construction				
B1. Erection of temporary facilities for workers and field office, storage sheds, and workshops	Noise		•	
	Air quality		•	
			•	
	Community health and safety		•	
			•	
	Solid waste		•	
	Local economy		•	
B2. Mobilization of equipment and supplies to project site	Noise		•	
	Air quality		•	
	Community health and safety		•	
B3. Setting up of casting yard	Terrestrial flora		•	
	Noise		•	
	Air quality		•	
			•	
B4. Establishment of dry dock and works area for navigation bridge	Terrestrial flora		•	
	Noise		•	
	Air quality		•	
			•	
	Marine ecology			

Project Activity	Environmental Aspect	Potential Environmental Impacts	Proposed Mitigation Measures	Efficiency of Measures
	Marine ecology (Coral Reefs)		•	
	Protected Marine Species i.e. Marine turtles			
	Fish and Fishery resources			
B5. Setting up of dumping/storage areas	Terrestrial flora		•	
	Noise		•	
	Air quality		•	
			•	
	Solid waste		•	
B6. Setting up of haul roads	Terrestrial flora		•	
	Noise		•	
	Air quality		•	
			•	
B7. Development of landing site	Terrestrial flora		•	
	Noise		•	
	Livelihood			
	Occupational health and safety		•	
B8. Placement of precast segments	Coastal water		•	
	Water quality		•	
	Marine Ecology			
	Coral Reef		•	
	Protected Marine Species i.e. marine turtles			

Project Activity	Environmental Aspect	Potential Environmental Impacts	Proposed Mitigation Measures	Efficiency of Measures		
	Fish and Fisheries resources					
	Air quality		•			
	Noise		•			
	Employment		•			
	Economic Development		•			
	Transportation		•			
	Religious practices		•			
	Occupational Health and Safety		•			
	Community Health and Safety		•			
	Fisheries		•			
	Livelihood		•			
	Maritime safety		•			
Operation / Maintenance						
Operation of the LLRN	Community Health and Safety					
Operation of the LLRN	Occupational Health and Safety		•			
	Local economy		•			
			•			
Decommissioning/Abandonment					Water Quality/ Contamination	
Disintegration of the demobilized structure			•			

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 4** below.

**Table 4     Risk and uncertainties of the project**

EIA Module	Risks and Uncertainties	Control Measures
Project Design	Structural failure due to possible earthquake and other unexpected calamities (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
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.

EIA Module	Risks and Uncertainties	Control Measures
	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