


DUMOLOC SMALL RESERVOIR IRRIGATION PROJECT

National Irrigation Administration 1-Pangasinan Irrigation Administration Office

EXECUTIVE SUMMARY

I. PROJECT FACT SHEET

Project Name: Dumoloc Small Reservoir Irrigation Project (SRIP)		
Proponent: National Irrigation Administration Region 1 Pangasinan Irrigation Management Office	Proponent Address: Barangay Bayaoas, Urdaneta City Pangasinan	
Proponent Contact Person: Gaudencio M. De Vera Division Manager	Proponent Means of Contact: (075) 632 2775	
Report Preparer: Lichel Technologies, Inc.	Preparer Address : Unit 1403 Prestige Tower Condominium, F. Ortigas Jr Road, Ortigas Center, Pasig City	
Preparer Contact Person: Rachel A. Vasquez Managing Director	Preparer Means of Contact : Tel No : (02) 637-8209 Fax No: (02) 633-0094	
Project Location : Municipality of Bugallon, Pangasinan		
<p>The proposed project includes the construction of a 40m earthfill, zoned type of Dam across Dumoloc River to irrigate around 1,825 ha of farmlands during the wet season and 990 ha during dry season. The reservoir will cover 45.3 hectares with a storage volume of 5.38 MCM. The project also includes the rehabilitation of existing irrigation facilities namely, Cayanga Dam, Laguit Dam, and Cabatuan Dam.</p>		

Component	Features
1. Dam	Earthfill, zoned type Height: 40 m. Crest Length: 246 m Crest width: 11 m
2. Reservoir	Area: 45.3 Hectares (ha) Storage Volume: 5.38 Million Cubic Meters (MCM) Location: Right abutment
3. Spillway	Length: 100 m Width: 38 m Capacity: 428.76 cubic meter per second (m ³ /s) (100 year flood)
4. Outlet works	Capacity : 10cms

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5. Main and Connecting Canal	Main Canals Dumuloc: 3.6 km. Salamague: 4.645 km. Cabatuan: 1.505 km. Connecting Canal Laguit: 0.925 km. Cayanga: 0.200 km. Balat: 0.150 km.
6. Laterals	Total :22.125 km.
7. Road	7.3 km

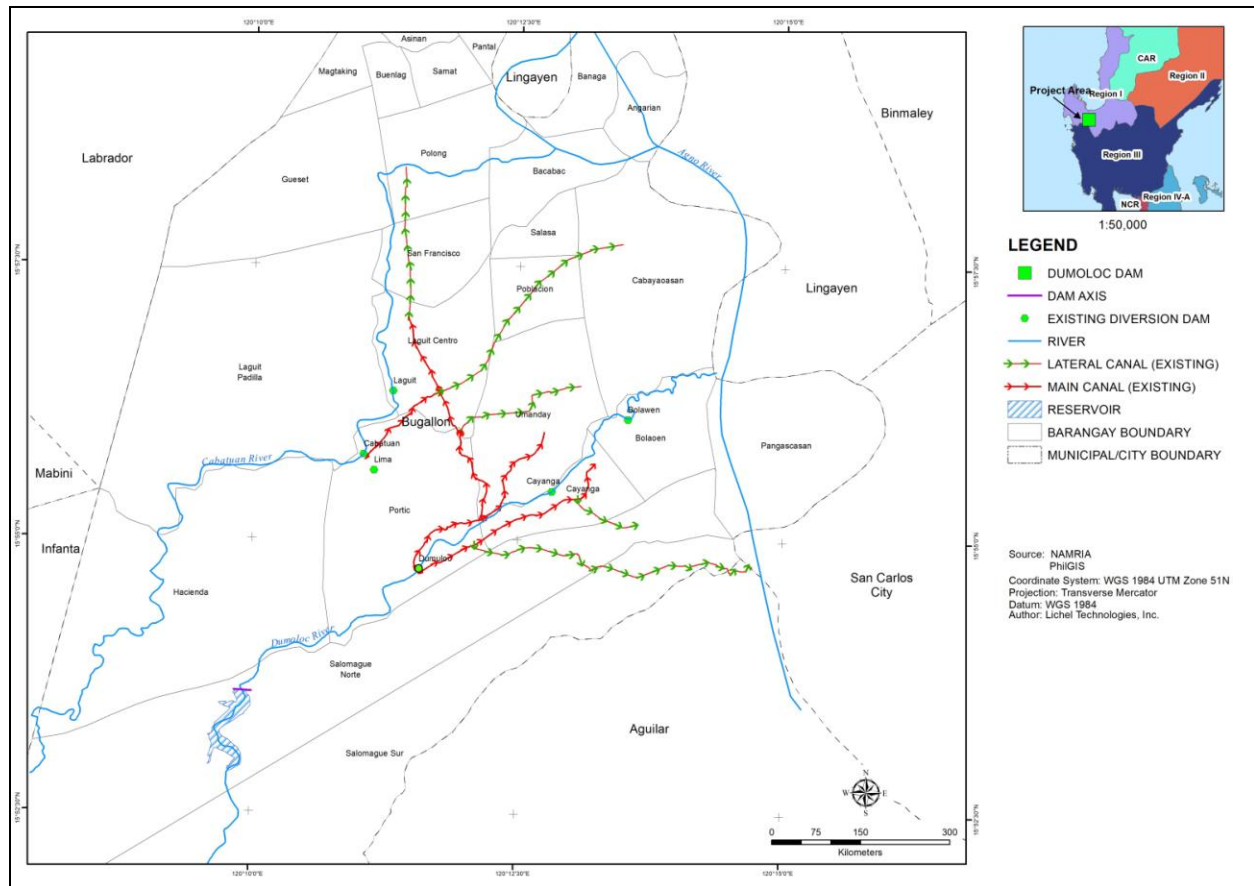


Figure ES-1: Project Location Map

II. PROCESS DOCUMENTATION

1. Brief Summary of the Project's EIA Process

The National Irrigation Administration 1-Pangasinan Irrigation Management Office commissioned Lichel Technologies Inc. (LTI) to conduct the Environmental Impact Assessment (EIA) for their proposed Dumuloc Small Reservoir Irrigation Project located in the Municipality of Bugallon, Pangasinan. The conduct of the EIA was guided by relevant issuances of the Department of Environment and Natural Resources (DENR) and the Environmental Management Bureau (EMB) including, but not limited to, DAO

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2003-30, MC 2010-14, EMB MC 2014-005 and DENR DAO 2017-15. In compliance with the requirements of the mentioned issuances, pre-Scoping IECs were conducted last February 12, 2019. From this, a request for scoping (with initial issues identified during the IEC) was submitted to EMB and the Public Scoping was conducted last May 23, 2019 and the Technical Scoping last June 20, 2019. Guided by the requirements of the Technical Scoping Checklist for Baseline Characterization and Impact Assessment, baseline characterization was conducted from July-September 2019 and February, March and September 2020 to account for the seasonal variation requirements for baseline characterization.

2. EIA Team

The key members of the multi-disciplinary team who conducted the EIA study and their fields of expertise are shown in **Table ES 1** below:

Table ES 1: EIA Team

NAME	SPECIALIZATION	REGISTRATION NO.
Rachel A. Vasquez	Project Director/Peer Reviewer/Air Quality/ Water Quality	IPCO-280
Emmanuel Cleofas	Socioeconomics/People	IPCO-277
For. Jan Paolo Pollisco	Terrestrial Flora and Fauna	IPCO 276
Dr. Roberto Pagulayan	Freshwater Ecology/Fisheries/Aquatic Resources	
Engr. Franklin D. Ramones	Hydrology/Hydrogeology/ Agriculture	
Mark Anthony Abrenica	Socioeconomics/People	IPCO 505
Elijah Dave Alderete	Water Quality	IPCO-506
Rainier D. Reyes	Peer Reviewer/Air Quality	IPCO-104
Allen B. Villanueva	Climate Change	IPCO-279
Lynnette Lyzelle Ferrer	Biology/ Aquatic Resources	IPCO-275

3. EIA Schedule

Table ES 2 below shows the study schedule. Initial IEC Activities were conducted last February 12, 2019. The Public Scoping was conducted last May 23, 2019. The Scoping meeting with the Environmental Management Bureau was conducted last June 20, 2019.

Table ES 2: EIA Study Schedule

Module	Activity	Date
Pre-Scoping/ Scoping Activities	Initial IEC	February 12 2019
	Public Scoping	May 23, 2019
	Technical Scoping with EMB	June 20, 2019
Land	Soil Sampling	July/August /
	Geological Survey	September 2019
	Terrestrial Ecology	February/March
Water	Water Quality	/September 2020

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Module	Activity	Date
	Hydrology	
	Water Ecology	
Air	Air Quality and Noise Sampling	
People	Household Surveys and Secondary data collection	

4. EIA Study Area

The study area covers the identified direct impact areas such as the location of the proposed dams, the 40-ha reservoir area in Barangays Portic, Hacienda and Somalague in the Municipality of Bugallon Pangasinan. The study also covers the 1,825 ha of service area within Municipality of Bugallon. Included in the study is the Dumuloc River which is the main source of water for the project.

5. EIA Methodology

Environmental studies focused on the identified location of each component as the direct impact area. All information and data gathered were compiled and analyzed based on the Guidelines of DAO 03-30. Field investigations and sampling were conducted, together with the secondary data gathered, and the critical parameters for the environmental conditions were established.

The EIA methodology for each study modules are provided in Section 2 and are summarized in **Table ES 3** below.

Table ES 3: Methodology Used for each Module

Modules	Methodologies Used for Assessment																								
Geology	<ul style="list-style-type: none"> Secondary data gathering from different offices and institutions (e.g., Mines and Geosciences Bureau) Site visit; 																								
Soils	<ul style="list-style-type: none"> Secondary data gathering from different offices and institutions Sampling conducted by sub-stratum Parameters analyzed include pH, OM, K, P, N, Cd, Pb, Hg, As, CR⁶⁺ <table border="1" data-bbox="698 1354 1161 1764"> <thead> <tr> <th>Parameter</th> <th>Method</th> </tr> </thead> <tbody> <tr> <td>pH</td> <td>Electrometric</td> </tr> <tr> <td>Potassium</td> <td>Flame AAS</td> </tr> <tr> <td>Phosphorus</td> <td>Colorimetric</td> </tr> <tr> <td>Organic Matter</td> <td>Walkley-Black</td> </tr> <tr> <td>Nitrogen</td> <td>kjeldahl</td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td>Cadmium</td> <td>Flame AAS</td> </tr> <tr> <td>Lead</td> <td>Flame AAS</td> </tr> <tr> <td>Mercury</td> <td>Cold Vapor AAS</td> </tr> <tr> <td>Arsenic</td> <td>GF/AAS</td> </tr> <tr> <td>Chromium (Cr⁶⁺)</td> <td>Diphenylcarbazide</td> </tr> </tbody> </table>	Parameter	Method	pH	Electrometric	Potassium	Flame AAS	Phosphorus	Colorimetric	Organic Matter	Walkley-Black	Nitrogen	kjeldahl			Cadmium	Flame AAS	Lead	Flame AAS	Mercury	Cold Vapor AAS	Arsenic	GF/AAS	Chromium (Cr ⁶⁺)	Diphenylcarbazide
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Land Use	<ul style="list-style-type: none"> Secondary data gathering from Comprehensive Land Use Plan, National Commission on Indigenous People and Proponent Site visit 																								

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Modules	Methodologies Used for Assessment																				
Terrestrial Flora	<ul style="list-style-type: none"> Transect survey Secondary data from relevant sources 																				
Terrestrial Fauna	<ul style="list-style-type: none"> Transect line survey Interviews Secondary data from the relevant sources s 																				
Hydrology	<ul style="list-style-type: none"> Stream flow measurement Secondary data gathering from different offices and institutions Secondary data used for flood peak prediction 																				
Water Quality	<ul style="list-style-type: none"> <i>In situ</i> measurement of water temperature and DO parameters Orion Oxygen Meter (Model 840) <table border="1"> <thead> <tr> <th>Parameter</th> <th>Methodology</th> </tr> </thead> <tbody> <tr> <td>Total Suspended Solids (TSS)</td> <td>Grab sampling</td> </tr> <tr> <td>Oil and Grease</td> <td>Grab sampling</td> </tr> <tr> <td>Biochemical Oxygen Demand (BOD)</td> <td>Grab sampling</td> </tr> <tr> <td>Dissolved Oxygen (DO)</td> <td>Multi-parameter meter</td> </tr> <tr> <td>Temperature</td> <td>Multi-parameter meter</td> </tr> <tr> <td>pH</td> <td>Multi-parameter meter</td> </tr> <tr> <td>Total Dissolved Solids (TDS)</td> <td>Multi-parameter meter</td> </tr> <tr> <td>Salinity</td> <td>Multi-parameter meter</td> </tr> <tr> <td>Conductivity</td> <td>Multi-parameter meter</td> </tr> </tbody> </table>	Parameter	Methodology	Total Suspended Solids (TSS)	Grab sampling	Oil and Grease	Grab sampling	Biochemical Oxygen Demand (BOD)	Grab sampling	Dissolved Oxygen (DO)	Multi-parameter meter	Temperature	Multi-parameter meter	pH	Multi-parameter meter	Total Dissolved Solids (TDS)	Multi-parameter meter	Salinity	Multi-parameter meter	Conductivity	Multi-parameter meter
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Freshwater Ecology	<ul style="list-style-type: none"> Riparian, Channel, and Environmental Inventory done using the metrics of Petersen Plankton sample collection was done using a plankton net of 80 µm mesh size. Riverside macroinvertebrate sampling was done using an improvised 1 mm mesh sieve Fish and macro-biota were done on wadable areas with the help of local fisherfolk using cast nets, e. line, or hand sieves, where applicable. Interview with local fisherfolk Secondary literature search 																				
Air Quality	<ul style="list-style-type: none"> High Volume Sampler for TSP sampling, Gas Bubble Sampler. Sound level meter for noise/sound level determination Secondary data from PAGASA for climatic condition 																				
People	<ul style="list-style-type: none"> Secondary data gathering for demographic analysis Key Informant Interview Household and Perception Interview Land Acquisition and Resettlement Plan-FGDs, Inventory of Assets; FGDs, Interviews, site visits at sacred sites. 																				

III. EIA SUMMARY

1. Summary of Alternatives

- **Siting**-no other sites were considered for the location of the dam site in consideration of topographic and geologic conditions of the project site.
- **Dam Type**-options for the dam type included rock fill dm and earth fill dam. Based on the stability analysis and economic analysis, the earth fill type of dam was selected for the project.

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- **Resources-** Construction materials are available along the floodplain and on the riverbed but impervious materials are scarce at the dam site. Impervious materials must be obtained from terraces and flat areas near the downstream of the existing diversion dam.

2. Summary of Issues and Concerns (Public Scoping)

The list of major issues and concerns gathered during the public scoping activity is summarized below.

Table ES 4: Summary of Issues and Concerns during Public Scoping

Module	Issues and Concerns	Response
Project Description	Exact location of dam and other facilities.	Dam location is discussed during the presentation.
	Rehabilitation of existing dams and canals	Priority of the project is the Dumoloc Dam and the upper areas.
	Lack of outlet for water system in some areas, including Barangay Hacienda	Feasibility Study and Technical Assessments should be done first because the concerned areas are in high elevation and not part of the project.
	Prospect time for project implementation	The project will start as soon as all permits and other documentary requirements from different agencies are completed.
	Concerned agencies should fast track the requirements needed by the proponent (NIA)	The project is considered, "big project" and must undergo required process as set by different policy bases.
	Actual location sketches of dam and other facilities should have been presented to the public for easy understanding and visualization.	There will be a pre-construction conference for the public to showcase the actual location of each project components, which could be easily realized by the stakeholders.
	Selected contractor for the works (Filipino or Foreign)	The contract for works will be given to a particular company who will mostly comply with technical and financial capabilities under the standardized bidding system in the Philippines.
	Barangay-level consultation should be done to strengthen the information dissemination activities for the project.	A public hearing will be held for the stakeholders and IEC activities for the project will be continuous in the whole process.
Land	Flooding risks of direct impact areas in terms of flooding	Risks and mitigating measures will be part of the Environmental Impact Assessment (EIA).

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3. Summary of Main Impacts

Summary of main impact, mitigation and residual impacts after mitigation is shown below.

Table ES 5: Summary of Impact and Residual Impacts

Project Activity	Impacts	Mitigating Measures
Construction Phase		
Blasting for the removal of obstruction in the project site	Increase in noise levels	<p>Implement good blasting program and schedule, preferably done from 9:00 AM to 5:00 pm.</p> <p>Notify nearby communities of blasting activities and schedule.</p> <p>Establishment of dense vegetative buffer zone using Molave (<i>Vitex parviflora</i>), Duhat (<i>Syzygium cumini</i>) and Bangkal (<i>Neonauclea reticulata</i>).</p>
	Generation of fly rocks which may cause accidents, injuries and/or damage to properties	<p>Implement proper safety protocols such as proper blasting notifications to LGUs and nearby communities, use of PPEs for blasting personnel, and/or proper handling of explosives.</p> <p>Provision of buffer zones along the periphery of the project site with appropriate species/dense vegetation cover such as Molave (<i>Vitex parviflora</i>), Duhat (<i>Syzygium cumini</i>) and Bangkal (<i>Neonauclea reticulata</i>)</p> <p>Households will be temporarily evacuated until the blasting activity is finished</p>
Construction of the Dumoloc Dam, Spillway and Outlet Works	Soil erosion	Engineering measures will be used to control erosion such as contour- trenching, furrowing, terracing and ripraps.
Upgrading of the Main Canals and Laterals	Permanent removal of vegetation on the dam site and canal areas	<p>Selection of suitable species to be planted on-site for slope stabilization such as Molave (<i>Vitex parviflora</i>), Duhat (<i>Syzygium cumini</i>) and Bangkal (<i>Neonauclea reticulata</i>)</p> <p>Replacement of trees to be removed following the 1 tree to be removed : 100 seedling to be planted policy.</p>
Rehabilitation and Modification of diversion works	Temporary disturbance of terrestrial fauna	Noise from vehicles, heavy machinery, and construction works may temporarily disturb terrestrial fauna in the vicinities. Noise may be mitigated by using mufflers on equipment and/or proper scheduling of construction activities among others.
Construction of a permanent access road	Generation of spoils	Reforestation or re-vegetation of stripped areas especially at the dam site using indigenous tree species such as Molave (<i>Vitex parviflora</i>), Duhat (<i>Syzygium cumini</i>) and Bangkal (<i>Neonauclea reticulata</i>)

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Project Activity	Impacts	Mitigating Measures
Upgrading of the service road along the main right canal	Shortage of suitable construction material	Conduct of test pitting, soil sampling & testing; dam design to arrive at a conservative estimate of the needed materials to be used and determine the availability in the area Stockpiled materials from excavation may be used for construction.
	Oil and Grease Contamination of Soils	Proper and periodic maintenance of equipment
	Temporary disturbance of river system due to increase in sediment load and reduction in productivity	Implementation of soil erosion control and proper disposal of spoils
	Temporary inaccessibility of rivers for aquatic flora and fauna	Establishment of fish ladders
	Waste generation (solid waste and domestic wastewater from construction workers)	Provision of waste bins and proper implementation of solid waste segregation ·Provision of portalets for construction workers ·Regular hauling and disposal by a 3rd party DENR accredited haulers and treaters · Install Material Recovery Facility (MRF), septic tanks or portable toilets for contractors
	Dust emission from site preparation	Sprinkling of water at least thrice (3) a day along the access road especially during dry season · Impose speed limits in the construction area
	Potential increase in Total Suspended Particulate (TSP) within and around the Project site Increase in NO ₂ from vehicle emission	Regular sprinkling of water along the access road during dry season, speed limits should be imposed. Proper maintenance of construction equipment and good quality of fuel should be used to reduce NO ₂ emissions
	Noise pollution	Use of mufflers and exhaust silencers Construction works to be done during daytime only
Operation Phase		
Inundation of existing settlements	Flooding	On the prevailing market price of the locality Provision of alternative employment at the relocation site Harvesting of tree species of high commercial values and utilized it beneficial to the local residence Occasional release of large volume of water as "flushing flows" to remove sediment accumulated downstream of the dam

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Project Activity	Impacts	Mitigating Measures
		Provision of toilet and regular inspection and maintenance of working areas
Release of water from reservoir during heavy rainfall	Flooding of lowland areas	Proper control of dam gates

4. Risk and Uncertainties

The Environmental Impact Statement was prepared based on the latest available information and as a result of the different scenario analysis, modeling and comparison with standards. This should serve as a guide to local, regional and national decision makers in decisions concerning project-related activities. However, this should not be the sole basis of decision making since it is possible that there are project-related risks that is not within the scope of this assessment and may not have been considered in the related management plans. Hence, this assessment will only help as a guide and as supplement to the wide array of information available to decision makers.

In the determination of risks and uncertainties, natural and man-made hazards were assessed to aid decision makers in reducing risks for the multipurpose project. Natural hazards with high susceptibility include ground motion; Earthquake induced landslides, seiche, mass wasting and fluvial hazards.

In the conduct of study, limitations on the gathering of the environmental baseline information were encountered. Hence, in order to further enhance the gathered environmental baseline description, further baseline characterization will be conducted once access to previously inaccessible areas is granted and security in the area has improved. This should be done before the start of construction activities. The data collected will be used in assessing the actual impacts of the project implementation