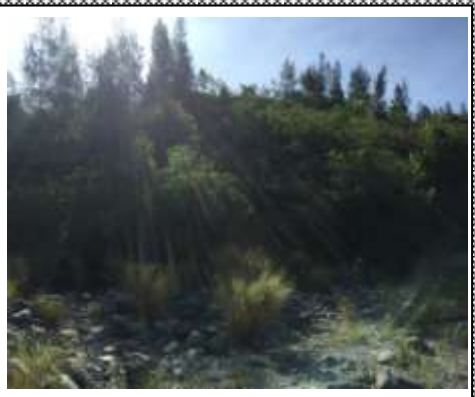

DUMOLOC SMALL RESERVOIR IRRIGATION PROJECT

Municipality of Bugallon, Pangasinan

PROJECT DESCRIPTION

Submitted by:

Lichel Technologies, Inc.

Unit 1403 Prestige Tower Condominium,
F. Ortigas Jr. Road, Ortigas Center,
Pasig City

Submitted to:

National Irrigation Administration- Region 1 ,
Barangay Bayaoas, Urdaneta City
Pangasinan

April 2019

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1 BASIC PROJECT INFORMATION

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	

2 PROJECT DESCRIPTION

2.1 Project Rationale

The Dumoloc Small Reservoir Irrigation Project is envisioned as a storage scheme to store excess water during the wet season for use during the dry season supply of the existing Dumoloc River Irrigation System (RIS). The Dumoloc RIS is composed of four (4) complementary diversion dams (DD). These are Dumoloc DD and Cayanga DD on Dumoloc River and Cabatuan DD and Laguit DD on Cabatuan River.

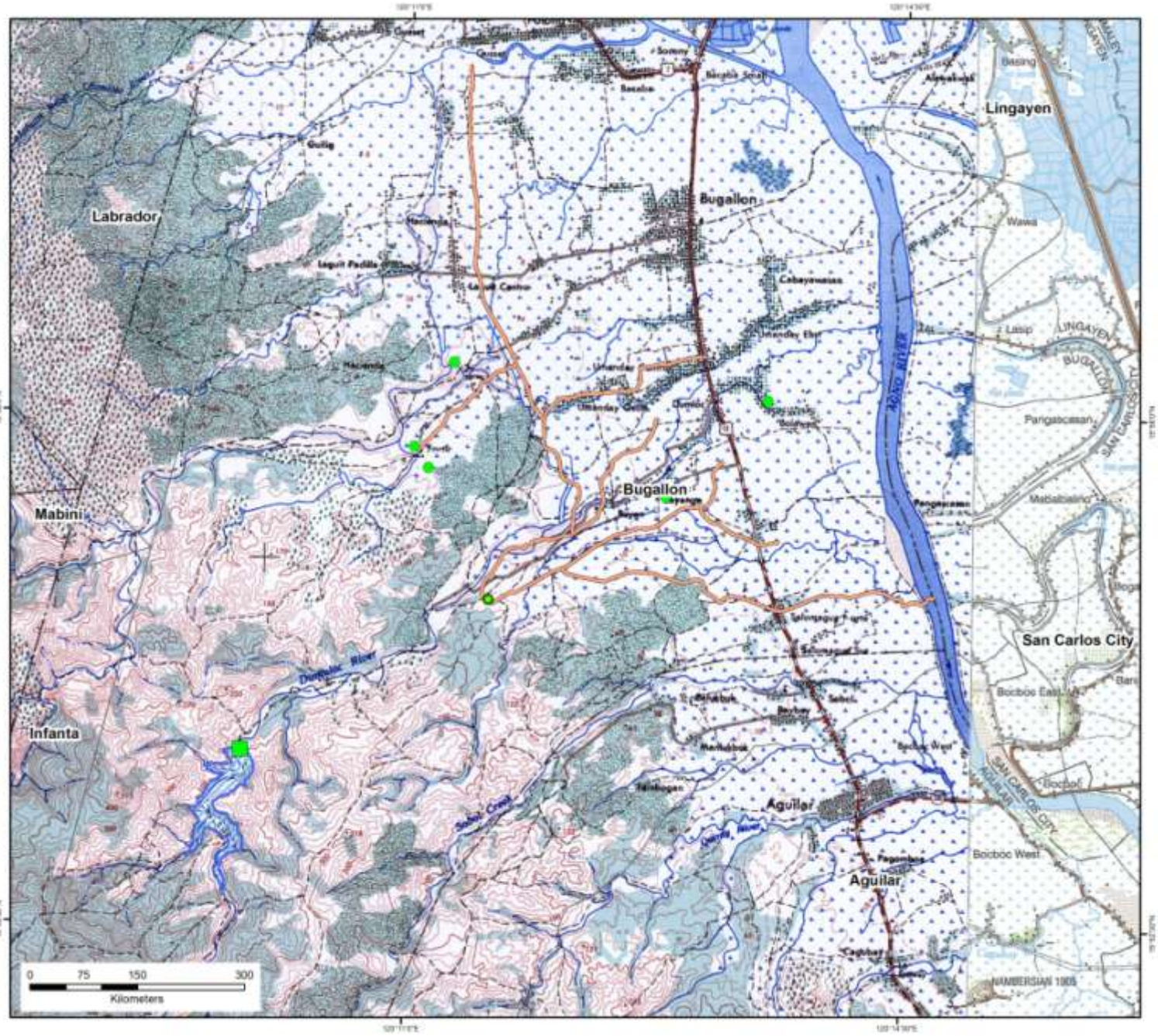
The Dumuloc Small Reservoir Irrigation Project entails the construction of a zoned type earth fill dam across Dumuloc River to provide additional water for irrigation and to improve the efficiency of water distribution in the existing Dumuloc Irrigation System. It will also supplement the water supply to other existing dams namely Cayanga, Cabatuan and Laguit dams; and the Drainage Reuse Points for Cabigaan area.

The future area that would be irrigated is projected to increase to 1,825 ha during wet season and 990 ha during dry season with a cropping intensity of 180%.

2.2 Project Location and Area

The Project is located in the Municipality of Bugallon, Pangasinan **Figure 2-1**. The proposed storage dam for the project is situated across Dumoloc River in Bugallon, Pangasinan. It is located about four (4) kilometers upstream of the Dumoloc Diversion Dam, at geographic coordinates of 120° 09’ 55.7” East longitude and 15° 53’ 36.30” North latitude.

The total area to be served due to Project implementation is approximately one thousand eight hundred twenty five (1,825) hectares.



Lichel Technologies, Inc.
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FIGURE TITLE :

Location of the Project

FIGURE NO.:

2-1

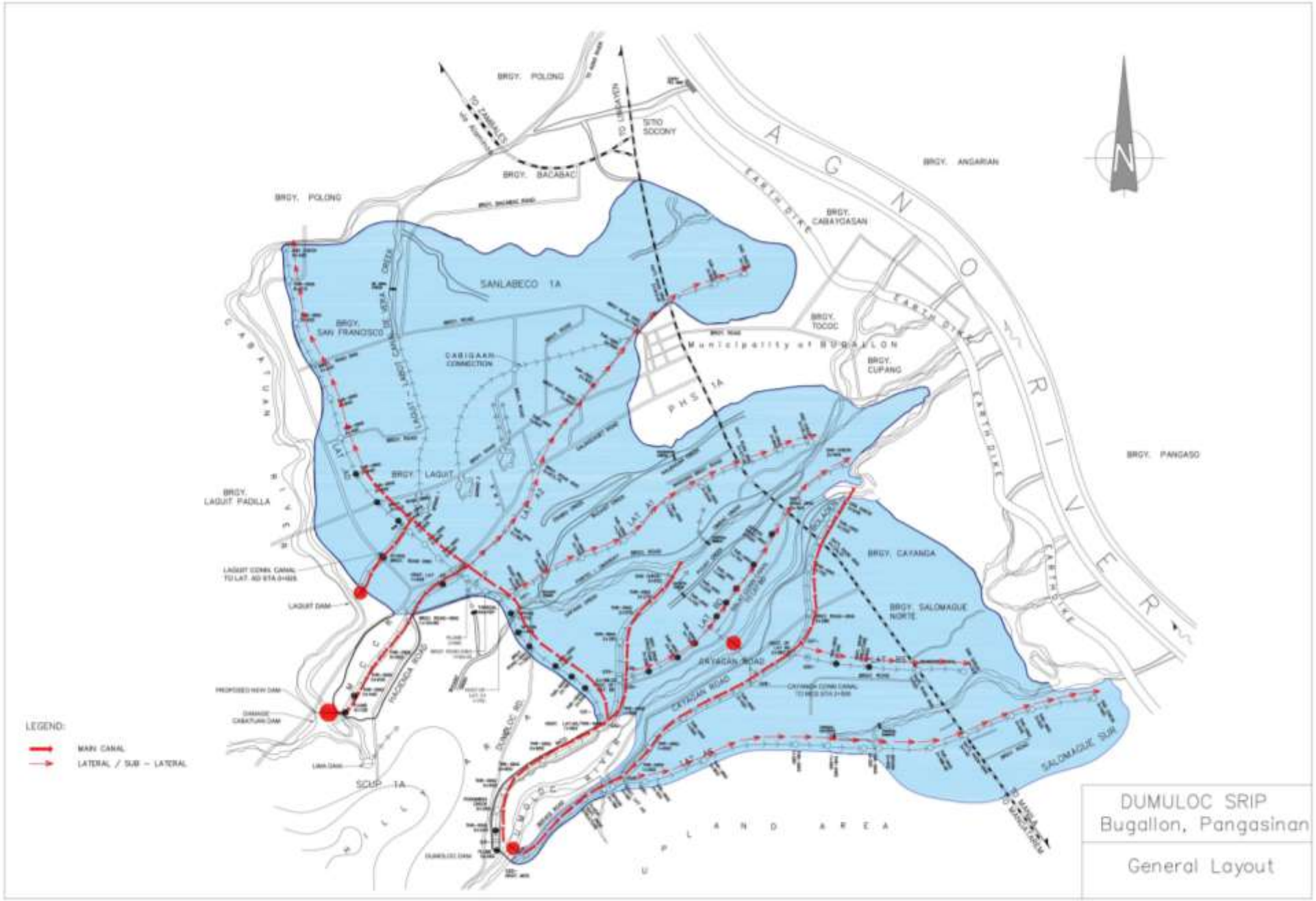

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FIGURE TITLE :

General Layout of the Project

FIGURE NO.:

2-2

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FIGURE TITLE :

Aerial View of the Project Site

FIGURE NO.:

2-3

Plate 1: Dam Site Looking East

Plate 2: Dam Site Looking North

2.3 Direct and Indirect Impact Areas

Annex 3 of DENR Memorandum Circular 2010-14 provided the guidelines in the identification of Direct and Indirect Impact Areas (DIA and IIA). The DIA include areas where all project facilities are proposed to be constructed /situated and where all operations are proposed to be undertaken. This may also include mixing or buffer zone areas delimited by the point or isopleths where ambient standards/guidelines are met. The IIA, on the other hand, may be the area from the outer boundary of the mixing or buffer zone to the point or area where the baseline environmental quality is calculated or monitored to be met. The socio-cultural IIA shall be based on the area of influence of the biophysical IIA. Further, DAO 2017-05 provided guidelines on defining DIA for the impact on land, water, air and people.

Based on these guidelines, the direct and indirect impact areas were delineated. For impacts on land, this includes areas that may be inundated and may experience habitat disturbance (reservoir area). For water, this includes portions of water bodies that traverses the project (dam and canals) and may be affected during construction. This includes the reservoir area and rivers that the canals will traverse (Dumuloc River). For the people component, identified DIA are the barangays where the facilities are located and the settlements near/within the proposed facilities which may necessitate involuntary relocation and settlements that might experience competition in resource use with the project including the service areas. Considered as IIA in the assessment are the remainder of municipalities where the DIA barangays are located since the impacts (positive and negative) will have a corresponding effect on these municipalities.

2.4 Project Component

The various components of the Projects are presented in **Table 2-1.**

Table 2-1: Project Components

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
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: 0200 km. Balat: 0.150 km.
6. Laterals	Total :22.125 km.

Other components include:

- Rehabilitation of diversion dams (Dumuloc, Cayanga, Laguit and Cabatuan Dams)
- Rehabilitation of main canals
- Road networks plans
    - Construction of a permanent access road with length of 4 km linking the existing barangay road at the Dumuloc Diversion Dam in Barangay Portic to the crest of the high dam; and
    - Upgrading of the service road along the main right canal with a length of 3.20 km.

2.4.1 Dam and Reservoir

The proposed Dumuloc Reservoir would have a total storage capacity of 5.567 million cubic meters reckoned at the top of the active storage level at elevation 103.00 meters. At this level, the surface area is about 40.15 hectares. Reservoir capacity allocations and corresponding water surface elevation are as follows:

Allocation	Water Surface Elevation (m)	Capacity (million cubic meters)
Active Storage	103.00	4.815
Inactive Storage	84.47	0.752
Total Reservoir Capacity		5.567

In addition to the total storage capacity, the reservoir would have a surcharge capacity of 2.323 million cubic meters at maximum water surface elevation 107.59.
In an impounding project, the clearing of reservoir is essential to its operation. Prevailing winds and watershed flow conditions move trees, logs and other debris to the shoreline and outlets of the reservoir. Under extreme flood conditions with high flows passing through the spillway, large trees and other floating debris could plug the spillway to a certain degree, thereby reducing the spillway outflows to a point of endangering the safety of the dam. In this respect, the project plans anticipate the removal of all trees, brushes and other structures below the maximum water surface elevation.

2.4.2 Dam and Appurtenant Structures

The proposed zoned type earthfill dam will be constructed across the Dumoloc River, 4 kilometers upstream from the existing Dumoloc Diversion Dam. The salient and technical features (**Table 11-1**) of the dam and reservoir are the following:

Table 2-2: Salient Features of Dam and Reservoir

Watershed Area	sq. km	31.13
Reservoir Surface Area at Normal Level	ha	40.15
Total Storage at Reservoir Normal Level	mcm	5.567
Active Storage at Reservoir Normal Level	mcm	4.815
Dam Crest Elevation	m	110
Dam Crest Length	m	254.3
Dam Crest Width	m	11
Dam Height (Riverbed to Dam Crest Elev.)	m	40
Riverbed Elevation	m	70
Normal Water Surface Elev.	m	103

Maximum Water Surface Elev.	m	107.59
Minimum Water Surface Elev.	m	84.47

2.4.2.1 Layout Considerations

The alignment of the dam axis was based primarily on topographical considerations as well as abutment and foundation conditions at the damsite. The abutments along the selected axis and in the immediate riverbed vicinity have moderate slope banks. The ground contours are almost parallel to the river alignment without major morphological variations.

The selection of the dam axis was such that it would provide an ideal location for the spillway, diversion conduit and outlet works. The spillway would be located on the right abutment in a favorable position with respect to the dam. The diversion conduit and outlet works will be located on the left abutment and so aligned to entail minimum excavation.

2.4.2.2 Dam Design

The dam structure would be a zoned earth embankment utilizing available materials within the vicinity of the dam site. For the dam structure to attain the requisite degree of imperviousness, its mid-section or central core would be composed of clayey materials. A downstream sand and gravel filter drain would be placed directly adjacent to the clayey central core with its horizontal segment extending up to the boulder too drain.

To provide additional structural stability and more protection to the impervious zone, a random fill composed of inorganic materials with low to medium plasticity, preferably with preponderant gravel particles would blanket in enormous quantity the upstream side of the aforesaid zone. Similarly with the downstream side in such a manner that their respective slope requirements could be attained. In turn, the upstream random fill is kept firm and stable against erosion, especially due to run-off and the possible occurrence of wave action arising from high velocity winds, by the placement of a 1.00m boulder riprap mantling its inclined surface area. The upstream and downstream embankment slopes would be 3:1 and 2:75:1 respectively.

The height of the dam would be 40 meters above the streambed and would have a crest length of 254.30 meters at elevation 110.00 meters. The base width at its maximum section would be 263.20 meters.

The design of the body of the dam satisfies the following items:

- The foundation of the dam will be able to resist the loads exerted by the dam body;
- The dam body is effectively cohesive to the foundation.

The section and configuration of the dam maintains safely against the combination of the anticipated loads.

The foundation excavation level shall ensure satisfactory stability against sliding and seepage control. These conditions would require excavation of earth materials up to the fresh rock foundation.

Foundation seepage shall be controlled by rock treatment. Deep single or multi-row grout curtain will be employed. The extent of grouting shall be determined based on the results of a systematic exploration and testing of the entire dam centerline carried out by test holes. The grout curtain depth shall be about two thirds of the relevant hydrostatic head.

No problem in rim stability or water holding capacity of the reservoir are expected since no disclosure of potential sliding areas have been observed during the field investigation.

2.4.2.3 Spillway Structure

The proposed spillway structure would be located at the right abutment of the dam with its centerline at 44.50 meters from the edge of the dam. The concrete spillway was designed with an inflow design flood of 619.06 m^3/s equivalent to 200-year return period. Through the reservoir routing using the approximate elevation-storage capacity relationship of the reservoir derived from the topographic map and the inflow flood hydrograph, an ogee crest length of 30 meters was adopted which will be able to pass an outflow discharge of 564.78 cms towards the Dumoloc River downstream. The chute shape is rectangular having a width of 30 meters. The Inflow-Outflow Hydrograph is presented in Figure 2-4.

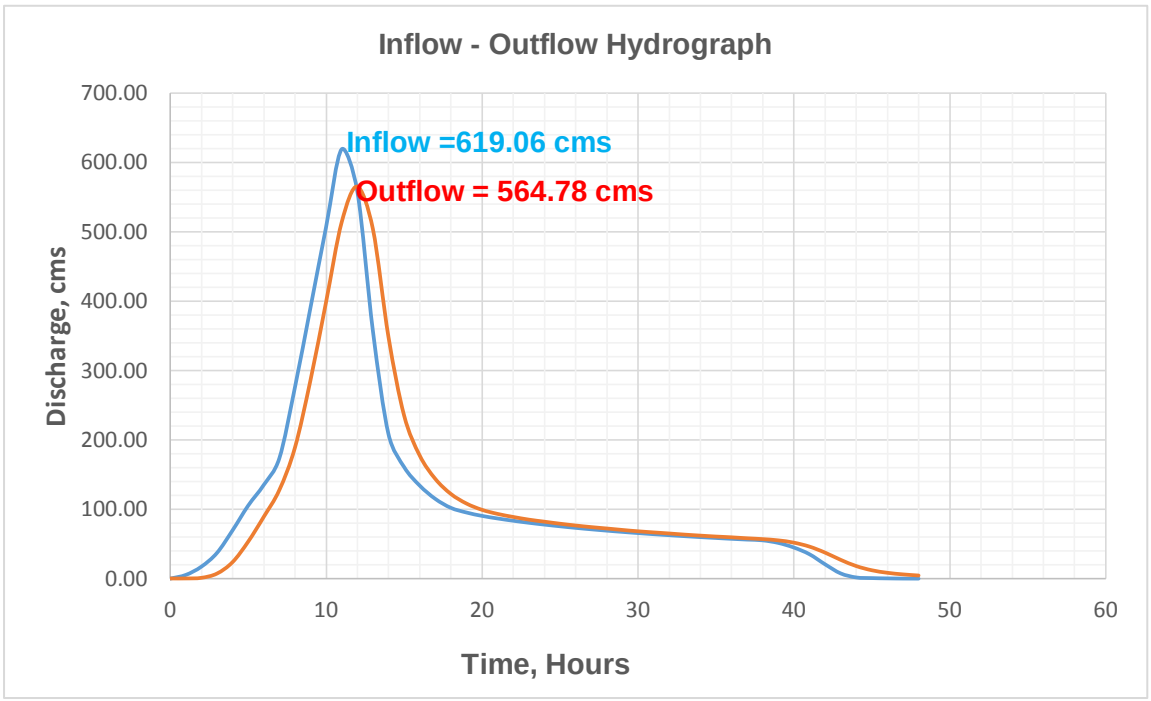

Figure 2-4: Inflow-Outflow Hydrograph

At the terminus of the spillway structure, a 42-meter long Type II USBR stilling basin with a width of 30 meters was provided to dissipate the energy of the water before it is channeled back into the downstream portion of the river**.**

2.4.2.4 Diversion and Outlet Works

Two concrete conduits in combination with a cofferdam would divert river flows during construction. The construction period of the dam is estimated within three years, the diversion conduit is designed with a flood discharge of 274.91 cubic meters per second equivalent to the 5-year return period. Two circular concrete conduits of 3.50 meters diameter designed as an open channel with its alignment along the river bank to minimize excessive excavation.

The river waters will be diverted into the diversion conduit by means of cofferdam. The cofferdam embankment will consist of a homogenous material with slope 3:1 on the upstream side and on the downstream side the slope is 2.75:1. The cofferdam crest would be 6.00-meter wide and having a length of 177.50 meters. The cofferdam crest elevation is set at 80.00 meters. The cofferdam will be incorporated into the main dam body.

It is anticipated that part of the embankment materials would come from the dam and spillway excavations. The cofferdam will divert river's low water flow into the diversion conduit.

The diversion conduit would become the waterway for the outlet works for irrigation after satisfying the diversion requirements during the construction of the dam embankment. The irrigation outlet works would consist of a 2.6m diameter, intake trashrack structure and a vertical intake shaft connected to one of the two diversion conduits.

After the dam construction, a portion of the downstream end of the diversion conduit would be reconfigured. A steel reducer (3.500x1000mm) would be connected to a 1.00 meter diameter steel pipe. At the end of the steel pipe, a 0.70 meter diameter high pressure gate valve would be provided to control the release for irrigation. A stilling basin would be constructed to reduce the exit velocity of the water before it is discharged to the river channel.

2.4.3 Dam Instrumentation

To monitor the condition of the dam, an extensive package of instruments will be installed in the dam body during construction. These would monitor settlements, deformation, pore pressures and total loads or pressure within the various elements of the structures. The instrumentation package would include piezometers, inclinometers, internal movement and strain gauges, total pressure cells, settlement gauges and surface monuments.

2.4.4 Irrigation Rehabilitation Plan and Proposed Facilities

The irrigation scheme of the proposed Dumoloc SRIP is to undertake improvements deemed necessary to improve the efficiency of water distribution in the existing Dumoloc Irrigation System. A link canal (Lat. AD) has been original constructed to supply water from Dumoloc diversion dam to Cabatuan-Laguit service areas. Thus, water from the reservoir which would be released and diverted from the Dumoloc diversion dam would supplement the water supply in the other dams – Cayanga, Cabatuan, and Laguit; and the Drainage Reuse Points for the Cabigaan area. The total area to be served is 1,232 hectares. Initially, it was observed and confirmed by the NIA regional Office that the items enumerated below are the required improvements on the diversion dams, gates and control mechanisms. It is, however, noted that some of these works are already programmed and funded under the annual repair and rehabilitation program of NIA. It was assumed that even without the Dumoloc SRIP, these improvement works would be undertaken by the RIO. If it would be decided to include these works under Dumoloc SRIP, these shall be confirmed and finalized to include other items during the detailed engineering phase.

Dumoloc Dam: Modification of diversion works – Sluice gates and control mechanisms; Protection of left and right embankments, (upstream and downstream);

Cayanga Dam: Modification of diversion works – Sluice gates and control mechanisms; Protection of left and right embankments, (upstream and downstream); Rechanneling of River

Laguit Dam: Modification of diversion works – Sluice gates and control mechanisms; Protection of left and right embankments, (upstream and downstream); Rechanneling of River

Cabatuan Dam: Protection of left and right embankments, (upstream and downstream)

Caoet/Kawit Dam: Modification of diversion works – Sluice gates and control mechanisms; Protection of left and right embankments, (upstream and downstream); Rechanneling of River.

The Dumoloc Diversion Dam left main canal has a length of 3.630 km and right main canal of 4.645 km; Cabatuan main canal is 1.505 km Laguit connecting of 0.925 km; Cayanga connecting canal of 0.200 km and Balat connecting canal of 0.150 km. The lateral canals total about 21.985 km with rectangular lined canal of 240 meters and a number of canal related structures. It was reported that 12 headgates of lateral and connecting canals and eight (8) check structures need repair or modification. The RIO/PIMO have initial plans to extend the main canal at Salomague and six (6) other laterals, as well as construction of connecting canals at Cabigaan, Laguit Labot, and Caoet.

The improvement works and necessary modifications on the diversion works, embankment protection, rechanneling of the river and canal extension shall be confirmed during the Detailed Engineering Phase of the Study.

a) Construction of cut and cover structures along the left main canal from Sta. 0+240 to Sta. 0+800 and right main canal from Sta. 0+000 to Sta. 0+700.
b) Upgrading of a sub-lateral with a length of 480 meters.
c) Construction of canal-related structures such as one (1) road crossing, one (1) thresher crossing and one (1) elevated flume with length of 12 meters.
d) Construction of on-farm facilities and improvement of drainage facilities.

2.4.5 Road Network Plan

The proposed roads to be undertaken shall involve the following:

a) Construction of a permanent access road with a length of 4 kilometers linking the existing barangay road at the Dumoloc diversion dam in Barangay Portic to the crest of the high dam. This shall also include drainage structures along the stretch.

b) Upgrading of the service road along the main right canal with a length of 3.20 kilometers.

All roads shall have a width of 5 meters and shall be provided with road surfacing of 20 centimeters thick. Sections on cut shall be provided with drainage interceptors for easy access and maintenance.

2.4.6 Alternatives Considered

There is no other alternative. The benefits of the Project were based on the cost and return analysis for rice crop production per hectare was done to determine the financial and economic net value of production after cost of labor and other farm expenses under the “present/future without-project” and “future with project” conditions. The economic net return in rice crop production per hectare in the “present/future without project” condition during the wet cropping season in rainfed areas is Php 20,487, while in irrigated areas during “future with-project” the net income of the farmers is estimated to reach Php 50,163 in the wet cropping season and Php 51,350 in the dry cropping season.

With the completion of the project and provision of year-round irrigation in the service area, benefits will be realized as a result of increases in cropped area and yield of paddy. The irrigation benefits that would accrue annually to the project are estimated as the difference of the net value of production between “with” and “without” project situations.

With assured water supply and provision of trainings on latest technologies for irrigated rice crop production, timely releases of high yielding and resistant varieties from pest and diseases, the farmers would be motivated to apply the required farm inputs and adopt proper crop cultural management. The estimated yields if the recommended fertilizer inputs are applied are 6.0 tons per hectare during wet season and 7.0 tons per hectare during the dry season.

Furthermore, establishment and operation of fish cages in Dumoloc reservoir would provide income to the populace in the community. Following the recommended practices in putting-up fish cages and technologies in feeding the tilapia stocks, the total annual income that could be realized from fish production in about 10 % of the reservoir area for two cropping/growing period is Php 40.20 million.

2.5 Project Phases, Key Environmental Aspects, Waste Issues, Built in Measures

2.5.1 Description of Project Phases & Activities

2.5.1.1 Pre-construction/ Pre-operational phase

The proposed pre-construction activities include: tendering and awarding of construction contract; securing of the necessary permits, construction of all-weather roads, detailed engineering activities and arrangement for relocation of affected communities.

2.5.1.2 Construction/ Development Phase

The start of project implementation is the mobilization of the staff and heavy equipment. Preparatory activities such as survey, construction of camp facilities, construction of permanent and temporary access roads, and utilities shall immediately follow. Upon completion of the preparatory works' especially in survey and ROW negotiations, the construction of the civil works shall then proceed. Each major component shall have separate construction crew and heavy equipment.

2.5.1.3 Operational phase

The works that shall be done before and during the operation and maintenance of the dam and the irrigation facilities include the following:

- Dam and Appurtenant Structures Operation

The operation of the dam and its appurtenant structures includes a series of works prior to normal use. These preparatory works or inspection works must confirm that the dam, diversion canals and laterals are completed and/or sufficiently functioned.

- Dam and Appurtenant Structures Maintenance

The dam and its appurtenant structures have to be well maintained so as to keep the facilities, as long as possible. The maintenance works of the dam are divided into three (3) categories, which are as follows:

- ✓ Routine Works - these include the routine inspection of the dam, its appurtenant structures and vicinities;

- ✓ Periodic Works - these include the removal of floating obstacles around the inlet diversion dam;

- ✓ Emergency Repairs - these are the repairs needed to the damaged facilities and structures caused by unusual weather or geological disturbances like very strong rain, big flood or devastating earthquake.

2.5.2 Key Environmental Impacts

From previous experiences in the preparation of EIS and ECC acquisition for irrigation Project, common key environmental impacts and proposed mitigating measures were already identified. Other impacts during field survey and site inspection shall be included in the impact assessment and improvement/modification of the mitigating measures. Table 2-3 show the summary of predicted impacts and mitigating measures for the proposed Project:

Table 2-3: Key Impact and Proposed Mitigating Measures

Project Phase / Environmental Aspect	Environmental Component Likely to be Affected	Potential Impact	Options for Prevention for Mitigation or Enhancement
I. PRE-CONSTRUCTION PHASE			
None			
II. CONSTRUCTION PHASE			
A. The Land			
Excavation	Geology	• large excavation depths & volumes translating into large earthmoving costs	• geotechnical drilling w/ or w/o seismic refraction during site investigation; drilling, trenching, test pitting during construction
		• potential seepages leading to water loss, uplift pressure on dam or subsurface erosion / piping; resulting in higher construction costs for mitigating measures (e.g. excavation & engineered backfilling, grouting)	• pumping test during geotechnical drilling; excavation & backfilling; grouting
		• dam design depends on availability of construction material	• test pitting, soil sampling & testing; dam design
		• differential settlement (from seismic risk assessment; impact of environment on project)	• geotechnical investigation & settlement analysis; dam be founded on bedrock after excavation
		• liquefaction	• geotechnical investigation & liquefaction potential analysis; dam be founded on bedrock after excavation
	Terrestrial Flora	• Permanent removal of vegetation on the Project site due to noisy activities	• Develop new areas to re-establish vegetation • Implementation of Reforestation and Landscaping Program
	Terrestrial Fauna	• Temporary disturbance of terrestrial fauna	• Avoid cutting of trees as much as possible
	Aquatic Flora and Fauna	• Temporary disturbance due to increase in sediment load and reduction in productivity	• Implementation of soil erosion control and proper disposal of spoils
B. The Water			

Project Phase / Environmental Aspect	Environmental Component Likely to be Affected	Potential Impact	Options for Prevention for Mitigation or Enhancement
• Excavation for foundation of the dam, main canals and laterals • Pouring/concreting, transport/hauling/reloading of construction materials • Washing/maintenance of equipment • Construction of access roads • Construction of temporary diversion for river flow	Hydrology	• increase sedimentation and turbidity • formation of rivulets and gullies • domestic waste from construction workers • -loss of vegetative cover and tree species	• designation/construction of stockpile near the working area/excavated spoil materials • installation of adequate and efficient drainage facilities • careful planning of removal of vegetative cover • -provision of site toilet ad inspection of good housekeeping on working areas • designation of motor pool with complete facilities • provision of site toilet and inspection of good housekeeping on working area • well-planned access road network • -access roads should be well-maintained and should be part or integrate on the existing road network • careful planning of or minimize removal of vegetative cover • -locate the temporary diversion where alteration of landscape is at the minimum
C. Air			
Excavation	Air	• 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	• Increase in noise levels	• Use of mufflers and exhaust silencers • Proper maintenance of equipment
D. People			
Labor	People	• Employment Opportunities	• Priority of hiring of qualified laborer are given to the residents in the area
Households/ Properties		• Permanent and temporary dislocation of households and loss/destruction of properties	• Implementation of mutually acceptable compensation scheme • Implementation of an IEC program
River usage		• Disruption of river usage • Temporary effect on fish population and fishing activities	• Alternative livelihood • Implementation of control measure to minimize pollution
Health, Sanitation and Safety		• Temporary increase of illness to workers due to increase of TSP. Recovery is expected after construction activities is completed	• Provision of temporary housing and sanitary facilities. • Proper orientation of workers on waste management and disposal
Occupational Risks		• Undesirable accidents to workers and exposure to occupational hazards	• Hiring of physically fit workers • Provisions of protective and safety gears to workers

Project Phase / Environmental Aspect	Environmental Component Likely to be Affected	Potential Impact	Options for Prevention for Mitigation or Enhancement
			• Provisions of emergency medical facilities
Tax Revenues		• Employment generation and increase income and business opportunities	• Priority in hiring qualified local residents
III. OPERATION PHASE			
A. The Land			
	Geology	• rise in groundwater levels w/in the reservoir resulting in reduced effective stress & increased potential for slope failure • possible scouring of toe of dam & spillway • differential settlement (from seismic risk assessment; impact of environment on project) • liquefaction (from seismic risk assessment; impact of environment on project) • flooding (downstream) (from risk assessment; impact of environment on project) • siltation of reservoir resulting in reduced project life span (from geohazard risk assessment; impact of environment on project)	• watershed management plan • proper design of hydraulic structures • geotechnical investigation & settlement analysis; dam be founded on bedrock after excavation • conduct of siltation study; watershed management plan; sediment discharge through low level outlet
Inundation of reservoir		• Increase of aquatic fish in the reservoir • Potential habitat for insect vectors	• Seed reservoir with endemic fish species that prey on vector larvae such as tilapia and carp • Put up appropriate health care facilities
Effects on livelihood		• Employment opportunities	• Priority hiring of qualified local residents
Watershed Rehabilitation and Management Program		• Improvement of the sub-catchment of River	• Implementation of Watershed Management Program through community based approaches under multiple-use concept. Local institutions to be given a role in program implementation
B. The Water			
Water	Hydrology	• inundation of upland farms, tree species, houses and other structures made of light materials • -displacement of farmers tiling the land and loss of livelihood • -reduction of stream flushing flow	• relocation of the affected local residence • -compensation of inundated properties based 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

Project Phase / Environmental Aspect	Environmental Component Likely to be Affected	Potential Impact	Options for Prevention for Mitigation or Enhancement
			dam
C. Air			
The Noise and TSP levels will be minimal after the completion of construction works.			
D. People			
Host communities	Tax Revenue and increase farm production	• Monetary and non-monetary benefits to host communities • Conflict in the distribution of benefits • Increased in access/mobility of goods and services	• Proper utilization of resources. • Conduct IEC Program • Proponent to allow residents to use access roads
Project Abandonment			
Should the Project be abandoned or decommissioned after its economic life, the proponent will provide DENR with the abandonment/decommissioning plan, two (2) years before its actual date of abandonment/decommissioning.			

2.5.3 Waste Generation and Built-in Management Measures

The Project will generate waste especially during the construction activities specially construction spoils. With the proper designation/construction of stockpile site near the working area and excavated spoil material and installation of adequate and efficient drainage facilities coupled with careful planning of removal of vegetative cover, the impacts brought about by the construction activities will be minimal.

Furthermore, provision of site toilet and inspection of good housekeeping on working areas will minimize domestic waste can be properly addressed by the Proponent.

2.6 Project Cost and Duration

The Project is scheduled to be completed in three years and the full agricultural development is expected to be attained after the dam construction and other appurtenant facilities. The economic life of the Project based on the feasibility studies is assumed to be 50 years upon completion of construction activities (**Table 2-4**).

The construction of the irrigation and drainage works shall start immediately after having cleared the ROW problems and also after having completed the construction drawings. The irrigation and drainage component is expected to be finished in October of the 3rd year in time for the test run and completion of the project within the prescribed duration of 3 years

The total project cost is Php 849.99 million.

Table 2-4: Project Schedule

Work Items	Preparatory Works		Construction		
	Year 1	Year 2	Year 3	Year 4	Year 5
1. Pre-construction					
Right-of-way and Damages					
Access Roads					
Civil Work Packaging					
Detailed Engineering Designs/					
Project Facilities					
Resettlement Implementation					
2. Tendering Contracts					
3. Dam Construction					
4. Main Canal Construction					
5. Laterals and On-Farm Construction					
6. Fishery Component					
7. Agricultural and Institutional Development					
8. Test Run for Constructed Facilities					
9. Rectification of Project Works					
10. Project Commissioning and Completion					

3 Public Scoping Materials

3.1 List of Invitees for Public Scoping

Proposed invitees for the Public Scoping:

Local Government Units:

HON. JUMEL ANTHONY ESPINO, Mayor, Municipality of Bugallon, Pangasinan
The Municipal Planning and Development Coordinator
The Municipal Agriculturist
The Municipal Environment and Natural Resources Officer

Irrigator's Association:

Barangays:

Punong Barangay, Barangay Hacienda, Bugallon, Pangasinan
Punong Barangay, Barangay Portic, Bugallon, Pangasinan
Punong Barangay, Barangay Cayanga, Bugallon, Pangasinan
Punong Barangay, Barangay San Francisco, Bugallon, Pangasinan
Punong Barangay, Barangay Salomague Sur, Bugallon, Pangasinan
Punong Barangay, Barangay Salomague Norte, Bugallon, Pangasinan
Punong Barangay, Barangay Laguit, Bugallon, Pangasinan

Irrigator's Association

The President, PORTIC-UMANDAY-BALAT IRRIGATOR'S ASSOCIATION INC.
The President, CAYANGA-BSB IRRIGATORS ASSOCIATION, INC.
The President, HACIENDA-POBLACION-SALINGCAOET IRRIGATORS ASSOCIATION, INC.

3.2 Draft Invitation Letter

15 February 2019

Hon._____
Mayor
Bugallon, Pangasinan

Dear Hon. _____,

RE: Invitation to attend the Public Scoping for the proposed Dumuloc Small Reservoir Project of the National Irrigation Administration 1-Pangasinan Irrigation Management Office

The National Irrigation Administration Regional Office 1-Pangasinan Irrigation Management Office intends to develop the **Dumoloc Small Reservoir Project** ("Project") to be located in the Municipality of Bugallon, Pangasinan. The Project will involve the construction of a 40-m high zoned type earth fill dam, development of spillways, and canals. The project also involves the development of fisheries for livelihood, water supply for domestic consumption, service and access roads, quarry for the dam construction and flood control.

In line with the proposed Project, we would like to invite you to attend the Public Scoping scheduled on:

DATE : _____

TIME : _____

VENUE : _____

The Public Scoping will be a venue for the proponent to provide an overview of the proposed project, and for the stakeholders to raise their issues, questions and concerns regarding the proposed project. The concerns that will be gathered will be considered in the Environmental Impact Assessment that will be conducted, the objective of which is to identify the possible environmental impacts of the proposed projects and to formulate appropriate and effective mitigating measures for the perceived negative impacts and enhancement measures for the perceived benefits of the Project.

For more details, you may contact the EMB Regional Office at telephone number _____.
Thank you and we look forward to your participation.

Sincerely yours,

ENGR. ESPERANZA A. SAJUL
Chief
Environmental Impact Assessment and Management Division (EIAMD)

3.3 Draft Program for Public Scoping

Project Title: **Dumoloc Small Reservoir Irrigation Project**
Project Location: **Municipality of Bugallon, Pangasinan**
Project Proponent: **National Irrigation Administration Regional Office 1-Pangasinan Irrigation Management Office**
Date and Time of Scoping: _____
Scoping Venue/Address: _____

Time Allotted	Program of Activities	Person Responsible
7:30-9:00 am	Registration	LTI NIA1
9:00 – 9:15 am	Opening Prayer	LGU
	National Anthem	LGU
	Welcome Remarks	LGU Mayor
9:15-9:30 am	Introduction of Participants, Overview, Objectives and Expectation Setting of the Scoping	LTI NIA1
9:30 – 9:40 am	Overview of the Scoping Guidelines; Mechanics of the Scoping for the project,	DENR-EMB EIAMD Personnel/EMB Casehandler
9:40 – 10:00 am	Brief Presentation of Proposed Project, and EIA Process	LTI NIA1
10:00-11:00 am	Open Forum and Raising of Issues to be addressed by the EIA Study	LTI NIA1
11:15-11:30 am	Synthesis and Integration/ Summary of Issues and Agreements on Scoping	LTI NIA1 EIA Division Representative
11:30-12:00 nn	Closing Remarks, and Next Steps in the EIA Process	EMB RO EIAMD or representative

3.4 Presentation Materials for Scoping

Proposed presentation material for the Public Scoping is attached as **Annex 1.**

3.5 Proof of Conduct of IEC

The initial IEC for the Project was conducted last February 12, 2019 in Barangay Hacienda, Bugallon. A total of 47 participants from the Local Government Units, Irrigator's Association and two barangays attended the IEC activity. The attendance for the said activity is attached as **Annex 2**. Letters to Local Government Units is attached as **Annex 3**. The IEC focused on the proposed project and the EIA process that will be undertaken. An open forum followed where the participants were able to raise their concerns about the project. Issues and concerns raised during the IEC activity is shown in **Table 3-1** below while the photo documentation of the said activity is shown in **Figure 3-1.**

Table 3-1: Issues and Concerns during the IEC Activity

Stakeholder	Issues/Concerns Raised
Barangay Resident – what the people here are worried about is flooding.	The project has been studied since 2000. During these 19 years, the materials to be used, the type of dam to be constructed and the associated risk has been studied and considered. There is a degree of assurance that the project will not aggravate the flooding situation. In fact, the project may serve as a means to control flooding since it prevents water from directly going downstream uncontrolled.
Barangay Captain Malorie Tejada- our concern is that our area might lose our supply of water once this project pushes through.	This has been considered. The elevation of the dam is much higher than the barangay. Hence, it is possible to bring or provide water to this area though this has to be considered and decided by the higher ups.

Figure 3-1: Photo documentation of IEC Activities


ARANGAY HACIENDA
MISSION
VISION


MISSION
VISION


BARANGAY HACIENDA
MISSION

Annex 1: Presentation for Public Scoping

Annex 2: Attendance Sheets

Annex 3: Invitation Letters