Ugasan-Juanico Small Reservoir Irrigation Project

Municipalities of Banate and Barotac Viejo, Iloilo

PROJECT DESCRIPTION for SCOPING

Lichel Technologies, Inc.
1403 Prestige Tower Condominium,
F. Ortigas Jr. Rd., Ortigas Center,Pasig City

National Irrigation Administration
NIA - Region 6
Brgy Tacas, Iloilo City

JUNE 2022

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LIST OF ACRONYMS

CIS	Communal Irrigation System
DAO	DENR Administrative Order
DENR	Department of Environment and Natural Resources
DIA	Direct Impact Area
ECC	Environmental Compliance Certificate
EIA	Environmental Impact Assessment
EMB	Environmental Management Bureau
ha	hectare
IA	Irrigator's Association
IIA	Indirect Impact Area
LGU	Local Government Unit
MCM	Million Cubic Meter
NIA	National Irrigation Administration
SRIP	Small Reservoir Irrigation Project
VE/VA	Value Engineering/Value Analysis

1 BASIC PROJECT INFORMATION

Project Name:	**Ugasan-Juanico Small Reservoir Irrigation Project (SRIP)**	
Proponent:	National Irrigation Administration Region 6	
Proponent Address:	Barangay Tacas, Iloilo City	
Proponent Contact Person/s and Contact Details:	**Engr. Rory F. Avance** Regional Manager National Irrigation Administration 6	(033) 320-9178 r6@nia.gov.ph
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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	Tel No : (02) 637-8209 Fax No: (02) 633-0094
Project Category	**Category A** 3.1.1 Dams with ≥25 ha Reservoir Area	

Project Components	**Project Component**	**Description**	
	Dam	Type	Central Core Earthfill Dam
		Elevation	86 m
		Height	38 m
		Crest Length	251m
		Crest Width	8 m
	Spillway	Type	Ungated
		Crest Length	20 m
		Crest Width	20 m
		Crest Elevation	81.65 m
	Reservoir	@Normal Water Level	
		Elevation	81.65 m
		Area	27.93 ha
		Capacity	3.2 MCM
	Access Road	Existing	1.08 km
		New	0.25 km
	Irrigation Canal	Existing	5.036 km
		New	3.447 km
Project Location	Municipalities of Banate and Barotac Viejo, Iloilo		
Project Cost	Php 513, 974,238.35		

2 PROJECT DESCRIPTION

2.1 Project Rationale

The objective of the project is to provide year-round water supply for irrigation to increase productivity and income of farmers in the project area through: the construction of dam and appurtenant structures; expansion of irrigation network facilities; strengthening of irrigators association; and allocation of part of the reservoir for fish production. More specifically, the project aims to

a) Raise average annual farm income per household in the Project area from Php 31,980 to Php 92,103 at 2018 prices by 2025.

b) Increase agricultural productivity by irrigating 273 ha during wet season and 227 ha during dry season by 2025

c) Raise the annual production of rice in the Project area from 1,092 tons without project to 2,668 tons with project by 2025.

2.2 Project Location and Accessibility

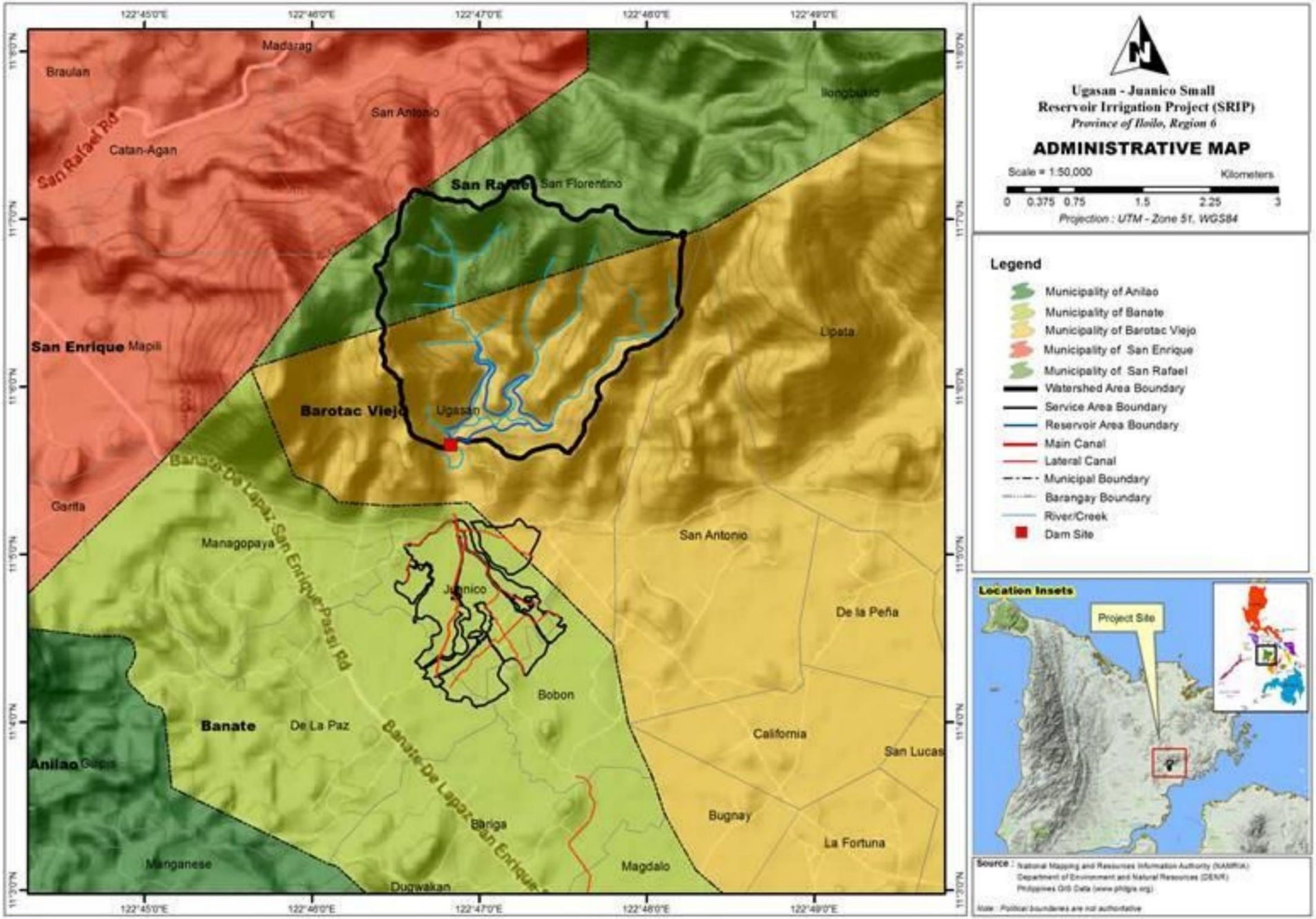
The Ugasan-Juanico SRIP is located in the province of Iloilo. The dam site and service area are situated within the Municipalities of Banate and Barotac Viejo, Iloilo. The project area is located about 73 kilometers away from Iloilo City. It can be reached through a well paved highway connecting Banate to Barangay Dela Paz via road linking Banate to Passi City (**Figure 2-1).**

Iloilo is in the central part of the Philippine archipelago and it stands as the gateway to Southern Philippines. Iloilo City, the capital of the province, is 450 kilometers south of Manila, one hour by plane and is within the route of major shipping lines

The proposed impounding dam is located at Barangay Ugasan, Barotac Viejo, Iloilo. Barotac Viejo is a third-class municipality situated in the northern part of the province of Iloilo facing the Strait of Guimaras and the Island of Negros. It is bounded on the north by the Municipalities of San Rafael and Lemery, on the east by the Municipality of Ajuy, on the south by Guimaras Strait, on the southwest by the Municipality of Banate and on the west by the municipality of San Enrique. The total land area of Barotac Viejo is about 185.78 km^2 composed of 26 barangays

Iloilo is one of the most accessible provinces in the Philippines. It can be reached by plane on regular commercial international flights from Hong Kong and Singapore to the Iloilo International Airport. Direct domestic flights connect Iloilo to major cities in the Philippines including Manila, Cebu, Davao, General Santos, Puerto Princesa, Zamboanga and Cagayan de Oro. Direct ferry routes and roll-on roll-off connections on the Philippines' nautical highway are also available between Iloilo and all major cities in the country.

By plane, travel time to the Iloilo takes around 1 hour from Manila, 30 minutes from Cebu, 2 hours and 30 minutes from Hong Kong, and 3 hours and 30 minutes from Singapore. By direct ferry, Iloilo is approximately 1.5 hours away from Bacolod, and 15 minutes away from Guimaras. By land, Iloilo is around 4–5 hours away from Boracay, 3 hours away from Kalibo, and 2 hours away from Roxas City.



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

FIGURE TITLE :

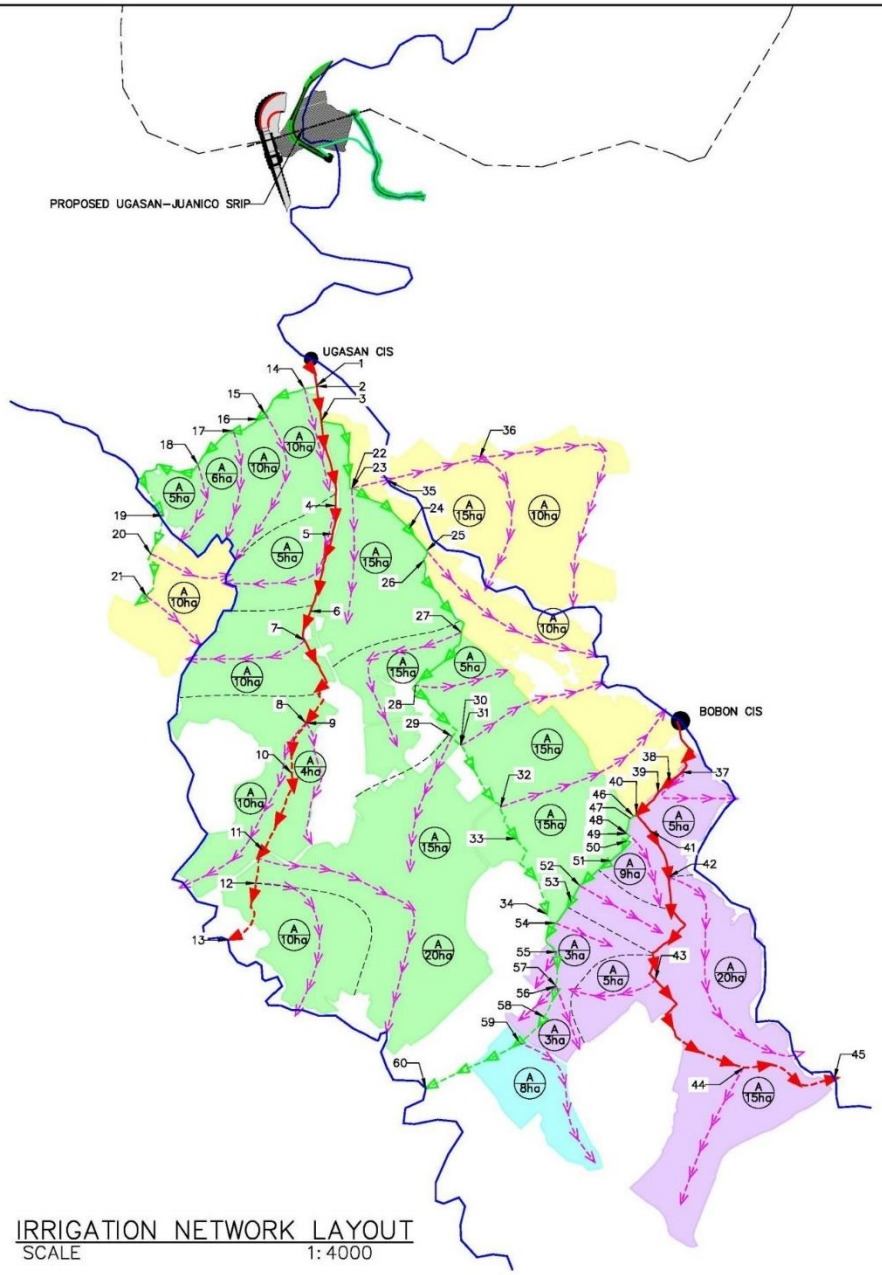
Location of the Project

FIGURE NO.:

2-1

LEGEND:

NO.	STRUCTURE	STATIONING FROM	STATIONING TO
	UGASAN–JUANICO CIS		
	MAIN CANAL	0+000	2+000
1	ROAD CROSSING	0+077	
2	HEADGATE LAT. A	0+080	
3	HEADGATE LAT. B	0+194	
4	MAIN TURNOUT 1	0+465	
5	THRESHER CROSSING	0+560	
6	THRESHER CROSSING	0+820	
7	MAIN TURNOUT 2	0+920	
8	MAIN TURNOUT 3	1+240	
9	MAIN TURNOUT 4	1+240	
10	DRAINAGE CROSSING	1+420	
11	COMB. ROAD CROSSING & MAIN TURNOUT 5	1+690	1+700
12	MAIN TURNOUT 5	1+800	
13	END CHECK	2+033	
	LATERAL A	0+000	1+032
14	TURNOUT 1	0+040	
15	TURNOUT 2	0+200	
16	THRESHER CROSSING	0+228	
17	TURNOUT 3	0+320	
18	TURNOUT 4	0+480	
19	SIPHON	0+840	0+900
20	TURNOUT 5	1+030	
21	TURNOUT 6 & END CHECK	1+132	
	LATERAL B	0+000	2+093
22	TURNOUT 1	0+280	
23	TURNOUT 2	0+280	
24	THRESHER CROSSING & DROP	0+510	
25	TURNOUT 3 & DROP	0+615	
26	THRESHER CROSSING	0+635	
27	TURNOUT 4 & DROP	0+916	
28	TURNOUT 5	1+200	
29	TURNOUT 6	1+400	
30	ROAD CROSSING	1+436	
31	TURNOUT 7	1+436	
32	TURNOUT 8	1+680	
33	DRAINAGE CROSSING	1+800	
34	END CHECK	2+093	
35	SIPHON	0+100	
36	TURNOUT 2–1	0+400	
	BOBON CIS		
	MAIN CANAL	0+000	1+700
37	MAIN TURNOUT 1	0+200	
38	THRESHER CROSSING	0+250	
39	DRAINAGE CROSSING	0+300	
40	HEADGATE LAT. A	0+400	
41	THRESHER CROSSING	0+466	
42	MAIN TURNOUT 2	0+630	
43	MAIN TURNOUT 3	1+040	
44	MAIN TURNOUT 4	1+500	
45	END CHECK	1+700	
	LATERAL A	0+000	1+249
46	THRESHER CROSSING	0+011	
47	THRESHER CROSSING	0+024	
48	TURNOUT 1	0+070	
49	THRESHER CROSSING	0+078	
50	THRESHER CROSSING	0+107	
51	DRAINAGE CROSSING	0+190	
52	TURNOUT 2	0+279	
53	THRESHER CROSSING	0+423	
54	TURNOUT 3	0+463	
55	TURNOUT 4	0+583	
56	TURNOUT 5	0+700	
57	TURNOUT 6	0+700	
58	DROP	0+800	
59	TURNOUT 7	0+900	
60	END CHECK	1+249	



IRRIGATION NETWORK LAYOUT
SCALE 1:4000

LEGEND:

- MAIN CANAL (EXISTING)
- MAIN CANAL (PROPOSED)
- EXISTING LATERAL CANAL
- PROPOSED LATERAL CANAL
- PROPOSED MAIN FARM DITCH
- EXISTING DAM
- LIMIT OF ROTATIONAL AREA
- RIVER

UGASAN CIS
- POTENTIAL IRRIGABLE AREA
- EXISTING IRRIGABLE AREA

BOBON CIS
- POTENTIAL IRRIGABLE AREA
- EXISTING IRRIGABLE AREA

A1 SCALE 1:4,000
A3 SCALE 1:8,000
0 100 200 300 400 500 (m)

REV. NO.	DATE	NATURE OF REVISION	CONSULTANT BY	CHECKED	RECOM.	APPROVED N.I.A.
1						
2						
3						
4						
5						

REPUBLIC OF THE PHILIPPINES
NATIONAL IRRIGATION ADMINISTRATION
EDSA, DILIMAN, QUEZON CITY

FEASIBILITY STUDY FOR UGASAN–JUANICO SMALL RESERVOIR IRRIGATION PROJECT
BAROTAC VIEJO,BANATE,ILOILO CITY

ENGINEERING AND DEVELOPMENT CORPORATION OF THE PHIL. (EDCOP)
10th Floor, JELP Building
409 Addition Hills, Shaw Boulevard, Mandaluyong City

THE CONSULTANT/EXPERT CLAIM SOLE RESPONSIBILITY AND FULL LIABILITY FOR THE VERACITY OF THE PREPARED DESIGN DATA, DESIGN CALCULATIONS, DRAWING DETAILS AND SPECIFICATIONS HEREIN CONTAINED AND INCORPORATED IN THE PLAN INCLUDING OUTPUT OF EACH JOINT VENTURE PARTNERS.

CONSULTANT/S SIGNATORIES:
DRAWN : A. DE VERA
DESIGNED/PREPARED: L.N. MARTIREZ (EXPERT)
CHECKED/REVIEWED: (TEAM LEADER)
AUTHORIZED MANAGING OFFICER OR PRESIDENT — DATE

NIA SIGNATORIES:
THE APPROVAL BY THE NIA OFFICIALS OF THE DETAILED ENGINEERING SURVEYS AND DESIGN DATA UNDERTAKEN BY CONSULTANTS NEITHER DIMINISHES THE RESPONSIBILITY OF THE LATTER FOR THE TECHNICAL INTEGRITY OF THE SURVEYS AND DESIGNS NOR TRANSFER ANY PART OF THAT RESPONSIBILITY TO THE APPROVING OFFICIALS.

RECOMMENDING APPROVAL:
REGIONAL MANAGER — DATE — MANAGER, ENGINEERING DEPT.

APPROVED:
DEPUTY ADMINISTRATOR FOR ENGINEERING & OPERATIONS — DATE

DWG. NO. — SHEET — OF —

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

FIGURE TITLE :

General Layout of the Project

FIGURE NO.:

2-2

Plate 1: Dam Site

The Iloilo International Airport is the primary gateway to Iloilo. It serves regularly scheduled direct domestic flights to Iloilo from major Philippine airlines including Manila, Cebu, Davao, General Santos, Puerto Princesa, and Cagayan de Oro. The airport also serves international flights from Iloilo to Hong Kong and Singapore. Flights to Iloilo are served by Cebu Pacific, Philippine Airlines, PAL Express, and Tiger Air. The Iloilo Airport is located approximately 19 kilometers or 20 minutes away by taxi from Iloilo City.

Ferries in Iloilo depart and arrive at various seaports in Iloilo City and Iloilo Province depending on the route and vessel type. (1) Ferry terminals along the Iloilo River in Lapuz district, Iloilo City serves fast craft ferries to and from Bacolod, RORO ferries to and from Guimaras, and ferries to and from Palawan. (2) The Iloilo Domestic Port in Fort San Pedro, Iloilo City Proper serves shipping companies with routes to and from Manila, Cebu, Cagayan de Oro, and Zamboanga.

The project site could be reached from the national highway by vehicle going to Barangay Ugasan, and about 1.40 km walk criss-crossing the Ugasan Creek.

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 (Ugasan Creek). 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 Alternatives

The major factors considered in the VE/VA of the Ugasan-Juanico SRIP are (i) dam location, (ii) height of dam, and (iii) types of structures. Each of the pre-selected dam sites was evaluated based on the volume of water that couldbe possibly stored for irrigation supply, accessibility, geological features, and the type and configurations of the structures.

2.4.1 Alternative 1

This alternative comprises of the provision of the impounding dam and minor improvement ofirrigation facilities in Ugasan, and Bobon CIS's. The proposed impounding dam is a zoned earth fill type. The proposed dam site is about 1.0 km upstream of the existing Ugasan CIS dam. It is situated in a narrow valley of the creek where its bed section ranges from 5.0 to 8.0 meter.

The spillway and the diversion outlet works are designed to be located at the left abutment. The design inflow flood discharge was based on 200-year return period with 253.0 m^3/sec was initially adopted in determining the corresponding outflow for designing the spillway. Thespillway crest width is 20 meters while its length is 160 meters. The dissipated flood water will be discharged back to the Ugasan creek.

The diversion conduit will consist of 2-unit concrete structure with sizes of 1.5 meters in diameter and a length of 570 meters. Other dimensions and combinations were tried to minimize or optimize the overall cost of diversion works considering the constraints on implementation methods and schedule. A five (5)-year design flood of 135 m^3/sec was used in the sizing of the diversion conduit and the corresponding height of the cofferdam. The typical section of the zoned earth fill dam and general arrangement of the structures are shown in **Figure 2-3** and **Figure 2-4.**

A zoned type earthfill dam was adopted in the design. The dam will consist of an impervious clay core, sand and gravel filters, random fill rock toe/dump boulders and riprap.

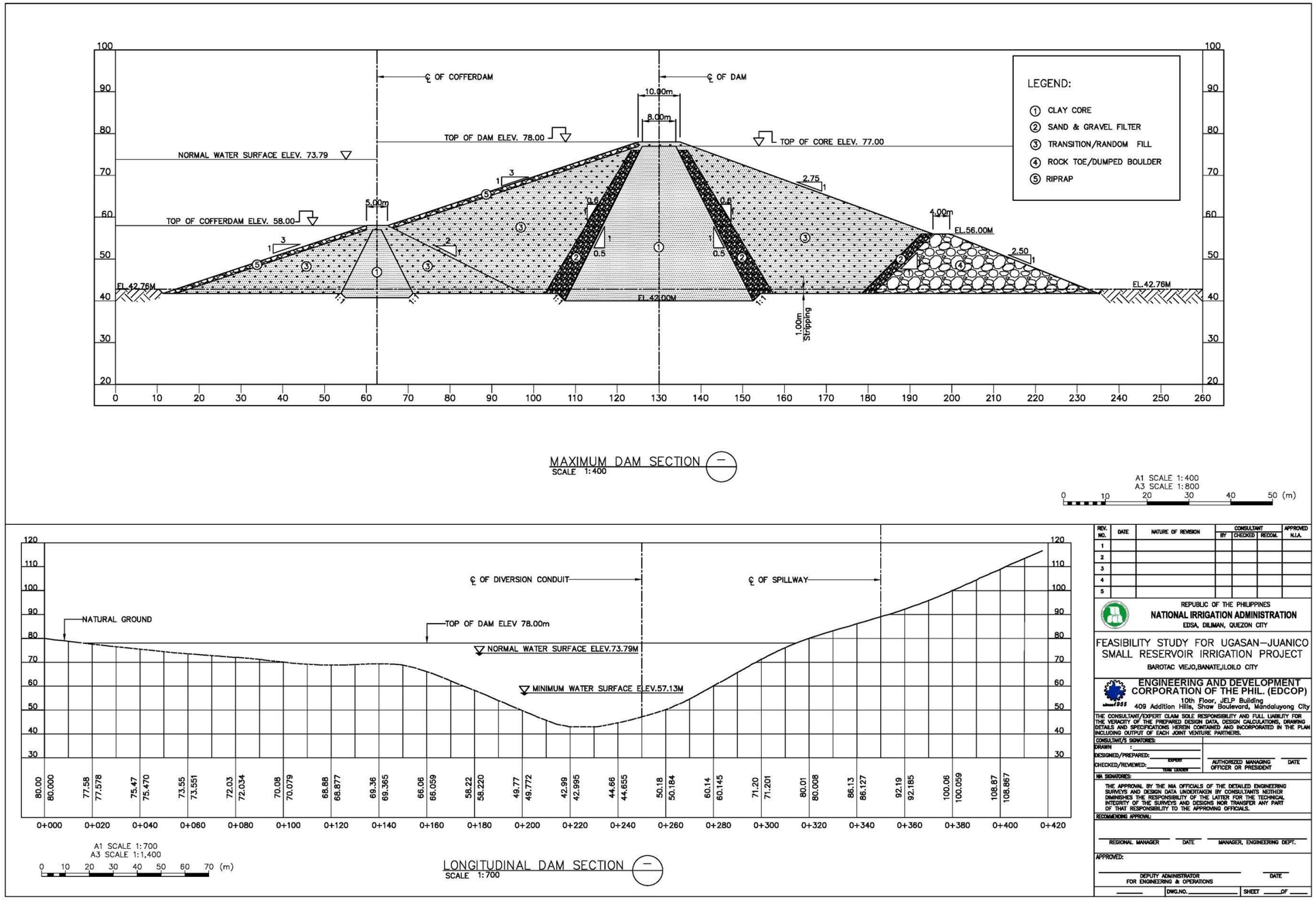


Figure 2-3: Typical Section of Zoned Earthfill- Dam (Alternative 1)

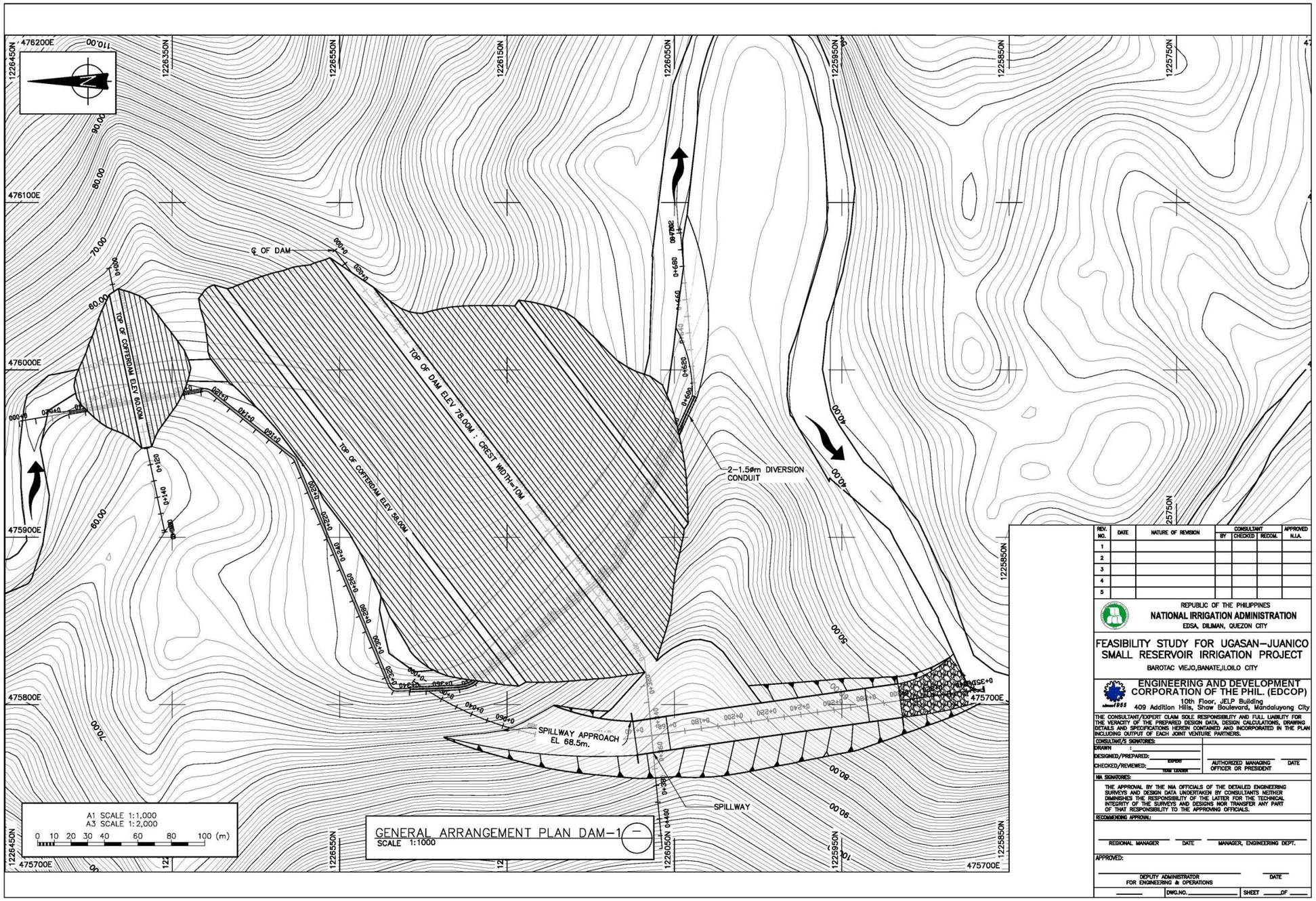


Figure 2-4: General Arrangement Plan of the Proposed (Alternative 1)

2.4.2 Alternative 2

This alternative comprises the construction of the impounding dam at a location 1.6 km upstream of the Ugasan CIS dam, or 600 meters upstream of the dam site of Alternative 1. Minor repair of existing irrigation facilities will also be covered. The dam is situated at coordinates $11^0$5'39.31" north latitude and $122^0$46'50.13" east longitude. This site has higher reservoir capacity-dam embankment volume ratio compared to other sites that were investigated. The catchment area at this dam site is 7.37 km^2. The length of the creek to centroid is 1.54 km with an average slope of 0.06.

The maximum section of the zoned earthfill dam and general arrangement of the structure with a dam height of 30.6 meter above creek bed is shown in **Figure 2-5 and**

Figure 2-6.

The spillway and diversion outlet works are situated on the right side of the abutment. The spillway is un-gated ogee type with a crest width of 20 m and length of 170 m. The spillway chute is a rectangular channel and stilling basin as energy dissipator. The diversion conduit will consist of 2 units concrete structure with sizes of 1.5 meter in diameter and a length of 240 meter. The selection of the size and number of diversion conduit is dependent on the height of the cofferdam. The design discharge capacity of the diversion conduit during construction is 150.60 m^3/sec by corresponding to 5-year return period.

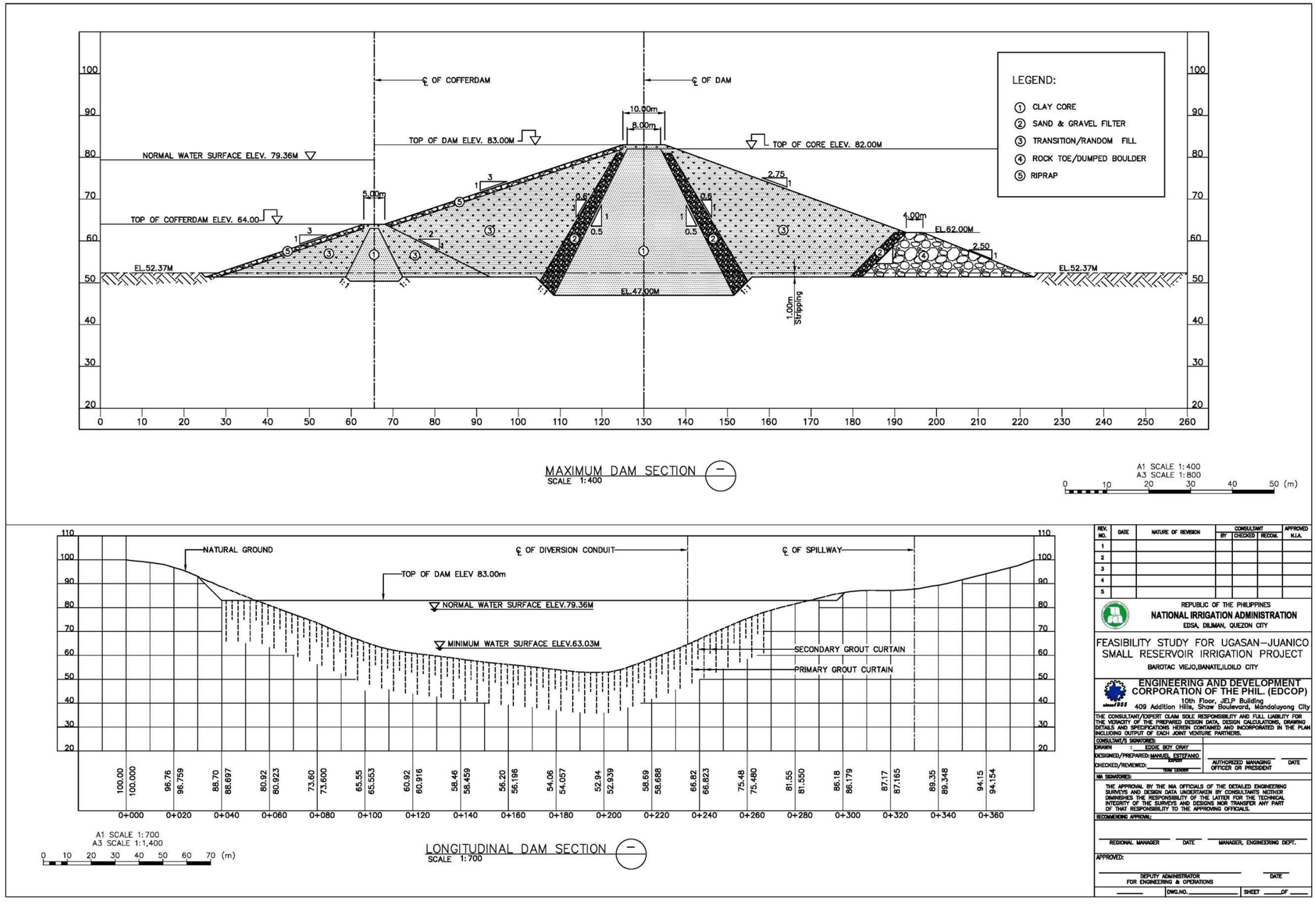


Figure 2-5: Typical Section of Zoned Earthfill Dam (Alternative 2)

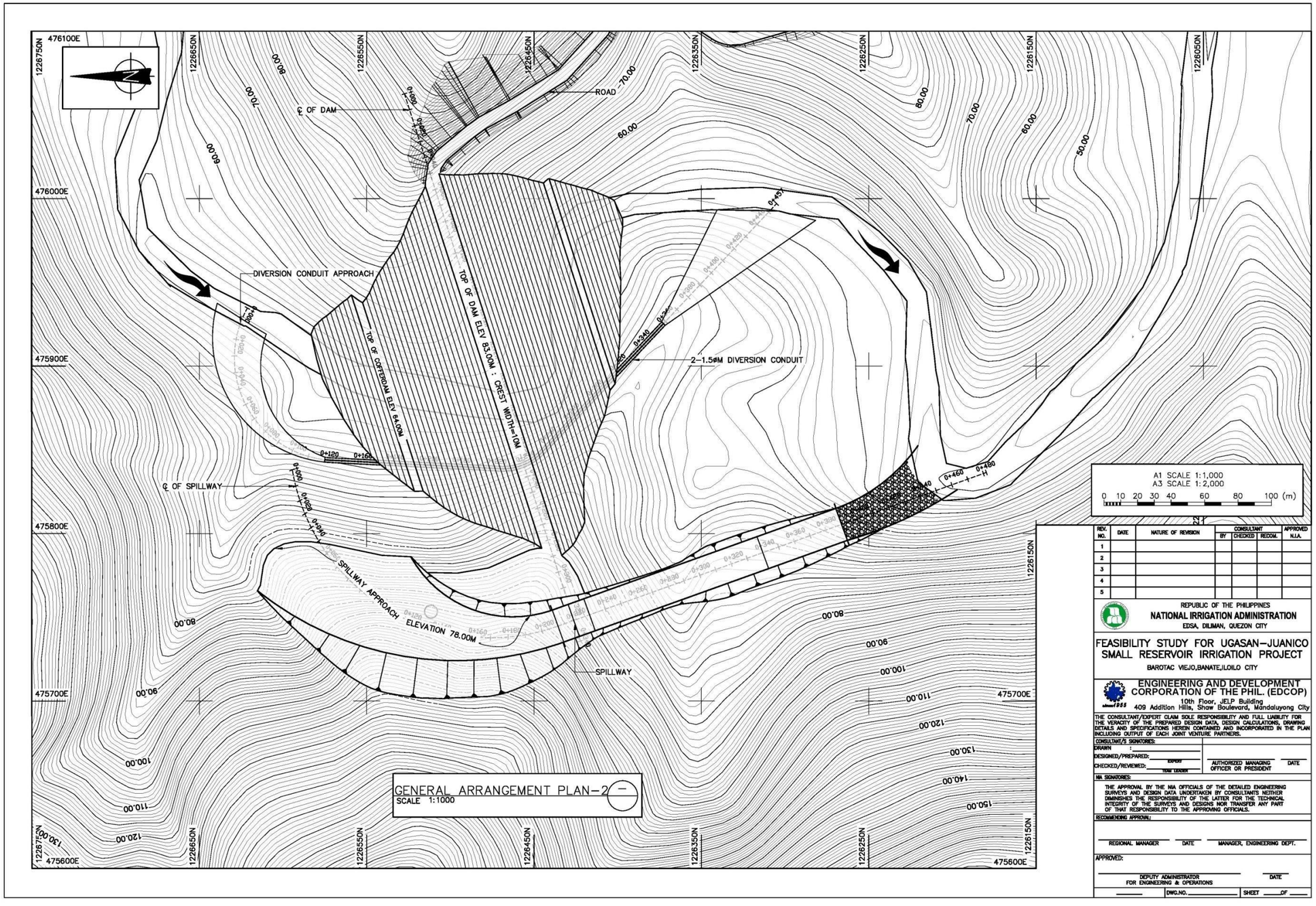


Figure 2-6: General Arrangement Plan of the Proposed (Alternative 2)

2.4.3 Evaluation of Alternatives

2.4.3.1 Reservoir Simulation

2.4.3.2 Operations Criteria

Reservoir operation simulation was performed using a decadal accounting of reservoir inflows and releases, including evaporation and other losses at the reservoir. Lake evaporation loss is assumed equal to pan evaporation. Other losses were assumed about 10% of losses due to evaporation. The change in storage content of a reservoir is calculated using the basic continuity or conservation of volume equation for a reservoir.

The simulation assumes that as soon as the water level reaches the maximum operating level, spillage occurs. The water could be drawn within the active reservoir storage, suchthat the water level may not be lower than the minimum water level. When the reservoir is below the minimum operating level: inflow is utilized to replenish the deficit first; secondly, excess inflow, if any, is used to satisfy irrigation demand; and, thirdly, storage to increase water level but not higher than the normal water surface.

The following operations criteria were also used:

(i) Maximum annual shortage should be less than 35% of average demand;
(ii) Maximum cumulative shortage for ten (10) consecutive years should be lessthan 55% of the average annual demand.
(iii) Reservoir reliability should not be less than 95%.
(iv) Shortage should not be exhibited in three (3) successive years.
(v) Allowable carryover period should not be higher than 24 months.

2.4.3.3 Area-Capacity Elevation

Meantime that actual land survey at the project site is not yet complete, the area-capacityelevation data for this preliminary reservoir simulation was based on digital terrain model (DTM) map generated from data files procured from NAMRIA. The elevation — area — capacity data for the two (2) alternatives are shown in **Table 2-1** and **Table 2-2.**

Table 2-1: Elevation-Area-Capacity Data for Alternative 1

Elevation (m,amsl)	Area (m^2)	Volume (m^3) Increment	Cumulative Volume (m^3)
42.76	al 0.00	0.00	0
43.00	117.27	14.07	14.07
44.00	1,013.48	565.37	579.45
45.00	2,439.81	1,726.65	2,306.09
46.00	4,113.12	3,276.47	5,582.56
47.00	6,056.91	5,085.02	10,667.58
48.00	9,160.31	7,608.61	18,276.19
49.00	13,747.52	11,453.92	29,730.10
50.00	19,728.57	16,738.05	46,468.15
51.00	25,130.62	22,429.59	68,897.74
52.00	29,749.11	27,439.86	96,337.61
53.00	34,352.34	32,050.72	128,388.33
54.00	42,450.64	38,401.49	166,789.82
55.00	50,315.91	46,383.27	213,173.09
56.00	57,856.84	54,086.37	267,259.46
57.00	67,759.87	62,808.35	330,067.82
58.00	81,007.26	74,383.56	404,451.38
59.00	95,608.14	88,307.70	492,759.08
60.00	109,425.65	102,516.89	595,275.97
61.00	122,868.07	116,146.86	711,422.83
62.00	136,366.47	129,617.27	841,040.10
63.00	147,864.31	142,115.39	983,155.49
64.00	161,548.91	154,706.61	1,137,862.09
65.00	174,385.87	167,967.39	1,305,829.48
66.00	188,428.83	181,407.35	1,487,236.84
67.00	202,171.20	195,300.01	1,682,536.85
68.00	216,215.16	209,193.18	1,891,730.03
69.00	229,852.75	223,033.95	2,114,763.98
70.00	245,424.59	237,638.67	2,352,402.65
71.00	262,383.72	253,904.16	2,606,306.81
72.00	278,475.52	270,429.62	2,876,736.43
73.00	293,425.24	285,950.38	3,162,686.81
74.00	308,409.40	300,917.32	3,463,604.13
75.00	324,382.87	316,396.14	3,780,000.27
76.00	342,376.19	333,379.53	4,113,379.80
77.00	358,891.91	350,634.05	4,464,013.85
78.00	376,035.00	367,463.45	4,831,477.30
79.00	393,301.36	384,668.18	5,216,145.48
80.00	409,871.88	401,586.62	5,617,732.10

Table 2-2: Elevation-Area-Capacity Data for Alternative 2

Elevation (M, amsl)	Area (m²)	Volume (m³)	Cumulative Volume (m³)
52.37	tal 0.00	Incremen 0.00	0
53.00	217.96	68.66	68.66
54.00	4,266.10	2,242.03	2,310.68
55.00	8,260.59	6,263.34	8,574.03
56.00	11,972.64	10,116.61	18,690.64
57.00	17,722.58	14,847.61	33,538.25
58.00	26,717.97	22,220.27	55,758.52
59.00	37,433.21	32,075.59	87,834.11
60.00	47,497.31	42,465.26	130,299.37
61.00	57,533.21	52,515.26	182,814.62
62.00	67,780.54	62,656.87	245,471.50
63.00	76,337.75	72,059.15	317,530.64
64.00	87,174.25	81,756.00	399,286.64
65.00	97,568.75	92,371.50	491,658.14
66.00	109,216.18	103,392.46	595,050.61
67.00	120,556.72	114,886.45	709,937.05
68.00	132,215.13	126,385.92	836,322.97
69.00	143,424.79	137,819.96	974,142.93
70.00	156,417.26	149,921.02	1,124,063.96
71.00	170,655.63	163,536.44	1,287,600.40
72.00	184,458.11	177,556.87	1,465,157.26
73.00	197,167.43	190,812.77	1,655,970.04
74.00	210,000.25	203,583.84	1,859,553.88
75.00	223,866.78	216,933.52	2,076,487.39
76.00	239,751.40	231,809.09	2,308,296.48
77.00	254,216.08	246,983.74	2,555,280.22
78.00	269,294.88	261,755.48	2,817,035.70
79.00	284,599.26	276,947.07	3,093,982.78
80.00	299,234.54	291,916.90	3,385,899.68
81.00	313,569.82	306,402.18	3,692,301.86
82.00	327,743.44	320,656.63	4,012,958.49
83.00	342,026.91	334,885.17	4,347,843.66
84.00	356,416.79	349,221.85	4,697,065.51
85.00	370,719.33	363,568.06	5,060,633.56
86.00	384,884.46	377,801.89	5,438,435.46
87.00	399,087.29	391,985.88	5,830,421.34
88.00	413,676.45	406,381.87	6,236,803.21
89.00	428,634.24	421,155.35	6,657,958.55
90.00	443,854.31	436,244.28	7,094,202.83

2.4.3.4 Minimum Storage

There is no sedimentation data for the Ugasan Creek watershed. The minimum storage was,therefore, set at 10% of the storage volume at normal water surface as usually recommended by NIA. The computed equivalent sedimentation rates at the minimum storage volumes are 876-868 m^3/km^2/year, which appear to be reasonable values.

2.4.3.5 Simulation Results

Simulation runs were made using various combinations of normal water surface and seasonal irrigable area for the two dam sites. The base forecast shows that around 250 and 220 hectares could be irrigated per year (wet and dry cropping season) under Alternative 1 with a dam height of around 35.24 meter above from creek bed. Under Alternative 2, the 265 and 220 hectares could be irrigated during the wet and dry season, respectively, with a dam height of around 30.63 meters. The summary results of the simulations for the two (2) dam sites are shown in Table 2-3.

Table 2-3: Summary Results of Reservoir Simulations

Particulars	Alternative 1	Alternative 2
Irrigated Rice Area (ha)		
Wet season	250	265
Regular dry season	220	220
Ending storage		
Maximum (1000 m3)	3,400	3,200
Elevation (m)	73.79	79.36
Minimum (1000 m3)	340	320
Elevation (m)	57.13	63.03
Frequency of spills	630	658
	26%	27%
Frequency of deficits	29	27
Reliability	99%	99%
Maximum annual deficit		
1,000 m3	741.90	727.07
% of diversion requirement @ 0 rainfall	9%	8%
% of net irrigation demand	12%	11%
Maximum cumulative shortage: 10 successive years		
1,000 m3	1,014	1,000
% of diversion requirement @ 0 rainfall	12%	11%
% of net irrigation demand	16%	15%
Number of decades reservoir is full every year		
Maximum	15	15
Minimum	0	0
Maximum carryover period (months)	23	23
Number of 3 successive years with deficit	0	0
Number of times storage below minimum	0	0
Note: Simulation period (years)	68	68
River bed elevation (m)	42.76	52.37

Alternative 1: Based on the results of the reservoir simulation, the normal water surface elevation would be at elevation 73.79 meters or 31.03 meters above natural creek bed. Adding a freeboard of 4 meters, the maximum dam height would be at elevation 78 masl or 35.24 meters from the creek bed level. The total area that could be irrigated to rice duringthe 1st and 2nd cropping seasons are 250 and 220 hectares, respectively. The whole service area of Ugasan and Bobon CISs would be fully irrigated. The area that will be affected due to the construction of the dam and reservoir, and additional canals/laterals totalled to 38.8 hectares.

Alternative 2: Based on the results of the reservoir simulation, the normal water surface elevation would be at elevation 79.36 masl. Adding a freeboard of 4 meters, the maximum dam height would be at elevation 82 masl or 30.63 meters from the creek bed. The storage volume at normal water surface is 3.2 MCM. The dam is a zoned earth fill with crest width of 10 m and dam crest height of 82 masl. Increasing the water surface elevation will result to violation of reservoir operations criteria. The areas that could be irrigated with rice cropduring the wet and dry cropping seasons are 265 and 220 hectares, respectively. The height of the dam under Alternative 2 is around 4.61 meters lower than that of Alternative 1.

The features of the 2 alternatives are shown in **Table 2-4**.

Table 2-4: Features of Development Alternatives

Particulars	Alternative 1	Alternative 2
1. Land Use (Present Situation, ha)		
Irrigated rice (WS/DS)	138/100	138/100
Rainfed rice (WS/DS)		
Subtotal	138/100	138/100
2. Water Resources		
Drainage Area at proposed reservoir (km^2)	776	737
Average Annual Rainfall (mm)	2,031	2,031
Computed Irrigable Area (ha)	470	485
Wet Season	250	265
Dry Season	220	220
3. Flood Hydrology		
Construction Flood (5-Yr Return Period)		
Peak Inflow Discharge (m^3/sec)	135.2	150.6
Spillway Inflow Design Flood (200 Yr Return Period)		
Peak Discharge (m^3/sec)	253.0	282.1
Freeboard Design Flood (10,000 Yr Return Period)		
Peak Discharge (m^3/sec)	381.1	425.0
4. Geologic Features		
Dam Foundation	Underlain by Igneous Rocks (belonging to andesitic, basaltic and pyroclastic)	
Spillway Foundation		
5. Reservoir Dam		
Dam Crest Width (m)	10	10
Dam Crest Elevation (m)	78	82
Normal water surface elevation (m)	73.79	79.36

Creek bed height (m)	42.76	52.37
Dam volume (MCM)	3.40	3.20
6. Spillway		
Type	Ungated Ogee	Ungated Ogee
Width (m)	20	20
Length (m)	160	170
Spillway Chute	Rectangular channel	Rectangular channel
Energy Dissipator	Stilling basin	Stilling basin
Channel Discharge (m^3/sec)	163.8	165.0
7. Diversion Conduit		
Conduit diameter/length (m)	1.5/540	1.5/230
Number of Barrel	2	2

2.4.4 Estimated Cost

Preliminary designs were prepared to be able to estimate and compare the cost in each ofthe alternatives. The estimated costs are presented in Table 2-5. It could be seen that alternative 1 has higher cost (Php845.25) million compared with alternative 2 cost (Php558.03 million) of about Php287.22 million.

Table 2-5: Comparative Cost of Dam and Appurtenant Structures

Particulars	Estimated Cost (Php'000) Alternative 1	Alternative 2
I. Direct Cost		
1. High Dam, Reservoir and Appurtenant Structures		
1.1 Pre-Construction (General Requirements)	32,546.86	27,411.16
1.2 Dam	467,061.37	328,355.16
1.3 Spillway	154,478.36	58,992.71
1.4 Diversion Conduit/ Outlet Works	20,180.67	18,754.01
Subtotal	**674,267.26**	**433,513.04**
2. Irrigation and Drainage Facilities (Repair & Improvement)		
2.1 Canal/laterals	6,400.00	6,784.00
2.2 Canal Structures	10,600.00	11,236.00
2.3 Terminal Facilities	3,000.00	3,180.00
Subtotal	20,000.00	21,200.00
Total civil works	**694,267.26**	**454,713.04**
3. Other Aspects		
3.1 Environmental and Social Measures	15,549.50	13,926.00
3.2 Institutional Development	3,471.34	2,273.57
Subtotal	19,020.84	16,199.57
Total Direct Cost	**713,288.10**	**470,912.61**
II. Indirect Cost		
1. GESA (3.5 %)	24,965.08	16,481.94
2. Management Fee (5%)	35,664.40	23,545.63
3. Physical Contingency (10%)	71,328.81	47,091.26
Total Indirect Cost	**131,958.30**	**87,118.83**
Total (Direct and Indirect Cost)	**845,246.39**	**558,031.44**

2.4.5 Irrigation Benefit

The primary benefit that would be derived from the project is increase in crop production. The net annual incremental benefit at full development of the project was estimated by taking the difference between the net value of crop production under "with" and "without" project situation (**Table 2-6**).

The estimated annual benefit that would be derived under Alternative 1 is Php 24.89 million while that of Alternative 2 is Php 26.03 million. The fishery benefit would be obtained fromthe reservoir by growing tilapia and other inland species.

Table 2-6: Net Annual Project Benefit

Particulars	Annual Benefit (Php' Million)	
	Alternative 1	Alternative 2
1. Irrigation	24.89	26.03
2. Fishery	10.22	9.84
3. Service Roads	1.09	1.12
Total	**36.20**	**36.99**

2.4.6 Preliminary Economic Evaluation

The preliminary economic evaluation was performed using discounting rate of 10% and economic life of 50 years. Preliminary results show that Alternative 2 has higher economic internal rate of return (EIRR) compared to Alternative 1. The summary of the EIRR, NPV, and B/C ratio for the base forecast and or normal scenario is shown in Table 2-7 below.

Table 2-7: Summary of Preliminary Economic Evaluation

Scenario/Case	EIRR	ENPV (Php'M)	B/C Ratio
Alternative 1	3.04	-430.86	0.36
Alternative 2	5.98	-175.72	0.60

2.4.7 Environmental Impacts

Environmental and social assessment on the two alternatives was done by valuing the affected area and improvements considering the size of the reservoir and extent of the dam area. Alternative 1 will cause higher negative impact and disturbances in the community since: its dam height is higher by around 4 meters; and its reservoir area is bigger, 30.5 hectares compared to Alternative 2 reservoir area of 28.99 hectares. The huts/households that will be affected are 62 in alternative 1 while 56 households in alternative 2. The land classification and tenure of the project impact area is presented in Table 2-8. The dam and reservoir area are classified as forest/timber land. There was no area classified as ancestral domain within the coverage of the dam and reservoir area in both of the alternative. The geographic coordinates of the two alternative dam sites and coverage of the reservoir area that will be inundated so with the households that will be affected is presented in **Figure 2-7.**

Table 2-8: Summary of Environmental and Social Assessment per Alternative

Particular	Alternatives	
	# 1	# 2
1. Cost of Right-of-Way, Resettlement and Social Measures	15,549,500	13,926,000
1.1 Affected lands		
Reservoir area (ha)	30.5	29.0
Damsite/Access (ha)	4.8	2.9
Canals/laterals(ha)	3.5	4.6
1.2 House Structures	62	56
1.3 Improvements	38.8	36.5
1.3.1 Existing road (km)	0.4	0.2
1.3.2 Agricultural/field Crops, (ha)	13.6	12.8
1.3.3 Orchard, fruit and other trees (ha)	25.2	23.7
2. Assessment of Environmental and Social Impacts		
2.1 Reservoir Area	inundated (30.52 ha)	inundated (28.99 ha)
2.2 Dam area & Access	affected (4.8 ha)	affected (2.9 ha)
2.3 Access road, Canals	affected (3.5 ha)	affected (4.6 ha)
2.4 Service area (irrigated)	(ws-250 ha, ds-220 ha)	(ws-265 & ds-220 ha)
3.Land classification of Project Area		
3.1 Protected Area (ha)	none	none
3.2 Ancestral Domain	none	none
3.3 Alienable and Disposable		
3.2.1 Damsite/Access (ha)	4.8	2.9
3.2.2 Reservoir Area (ha)	30.5	29.0
3.2.3 Canal/Laterals (ha)	3.5	4.6
3.2.4 Service Area (ha)	250	265
3.3 Forest/agro-ecosytem (ha)	25.2	23.7
3.4 Agricultural land (ha)	263.6	277.8

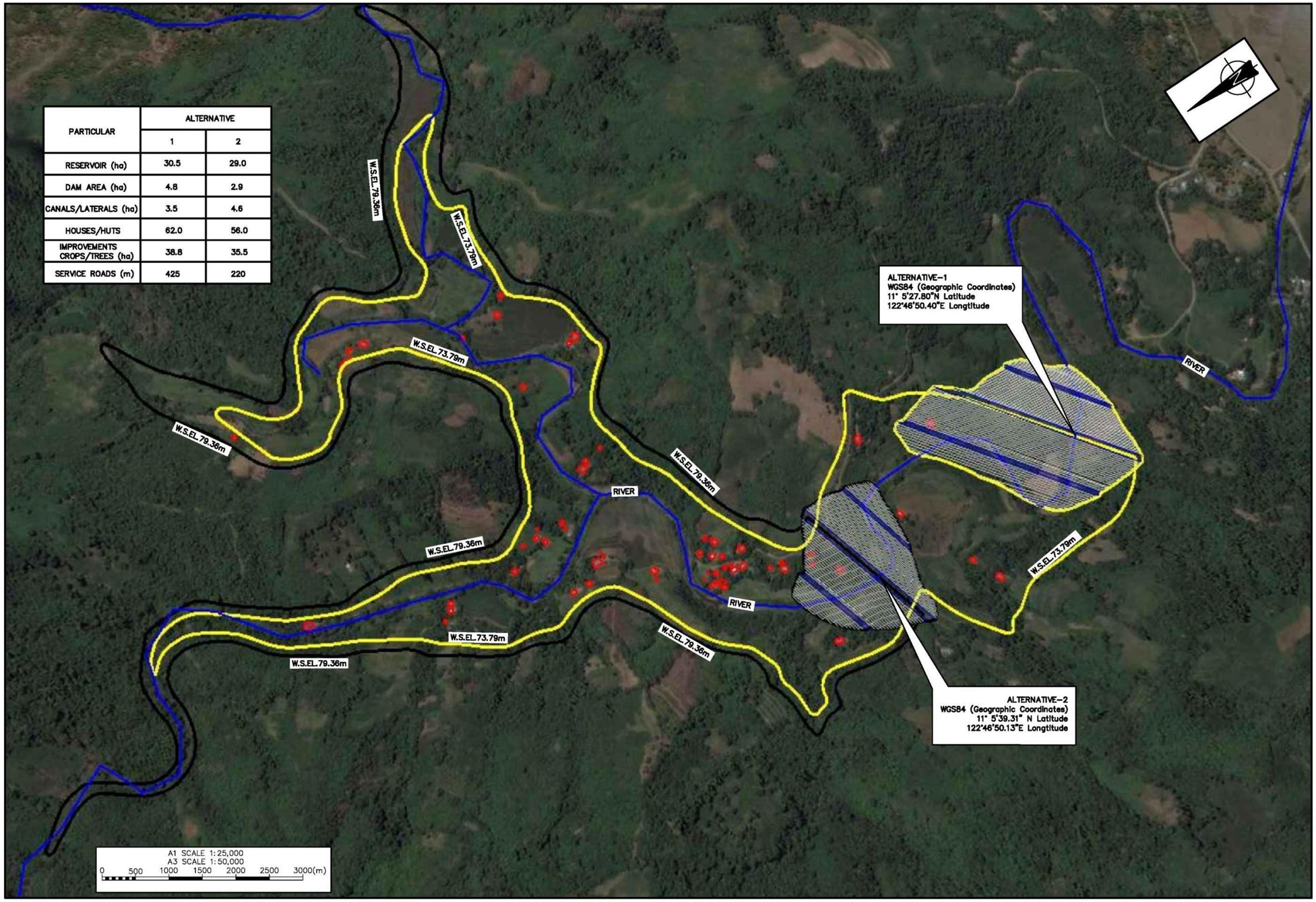


Figure 2-7: Location of the 2 Alternatives and Reservoir Area

2.4.8 Conclusion

The proposed impounding dams at either site would be able to deliver the function requiredto augment water supply to Ugasan-Juanico and Bobon CIS. However, Alternative 2 was found to have higher dam-storage ratio, more area to be irrigated and with lower cost. Likewise, Alternative 2 has higher EIRR compared to Alternative 1. At this point of the study, the EIRR is below the NEDA's threshold level but the project would be technically feasible and socially acceptable to the stakeholders. Therefore, Alternative 2 is recommended to be pursued for further study. The identified options or means that will be undertaken in pursuing the study to increase the EIRR are the following;

(i) The development cost for Alternative 2 will be further refined. The derivationof unit cost and quantities of various items of works will be reviewed and unnecessary items will be discounted.

(ii) The economic budget will be updated to consider improvement in yield from existing irrigated areas in existing CISs due to enhanced reliability of water supply.

(iii) The scope of works will comprise the construction of the impounding dam at Ugasan Creek and rehabilitation/modification of three (3) existing CIS. Source of irrigation water for Bobon/Bariga CIS will be analyzed and accounted to determine the extent of its irrigable area and this will be added as part of the project service area.

(iv) Accounting of possible savings on hauling/transportation cost by using service roads will also done to increase the benefits that will be derived from the project.

2.5 Project Component

The various components of the Projects are presented in **Table 2-9.**

Table 2-9: Project Components

Project Component	Description	
Dam	Type	Central Core Earthfill Dam
	Elevation	86 m
	Height	38 m
	Crest Length	251m
	Crest Width	8 m
Spillway	Type	Ungated
	Crest Length	20 m
	Crest Width	20 m
	Crest Elevation	81.65 m
Reservoir	@Normal Water Level	
	Elevation	81.65 m
	Area	27.93 ha
	Capacity	3.2 MCM
Access Road	Existing	1.08 km
	New	0.25 km
Irrigation Canal	Existing	5.036 km
	New	3.447 km

2.5.1 Dam and Appurtenant Structures

2.5.1.1 Dam Site Location and Dam Type

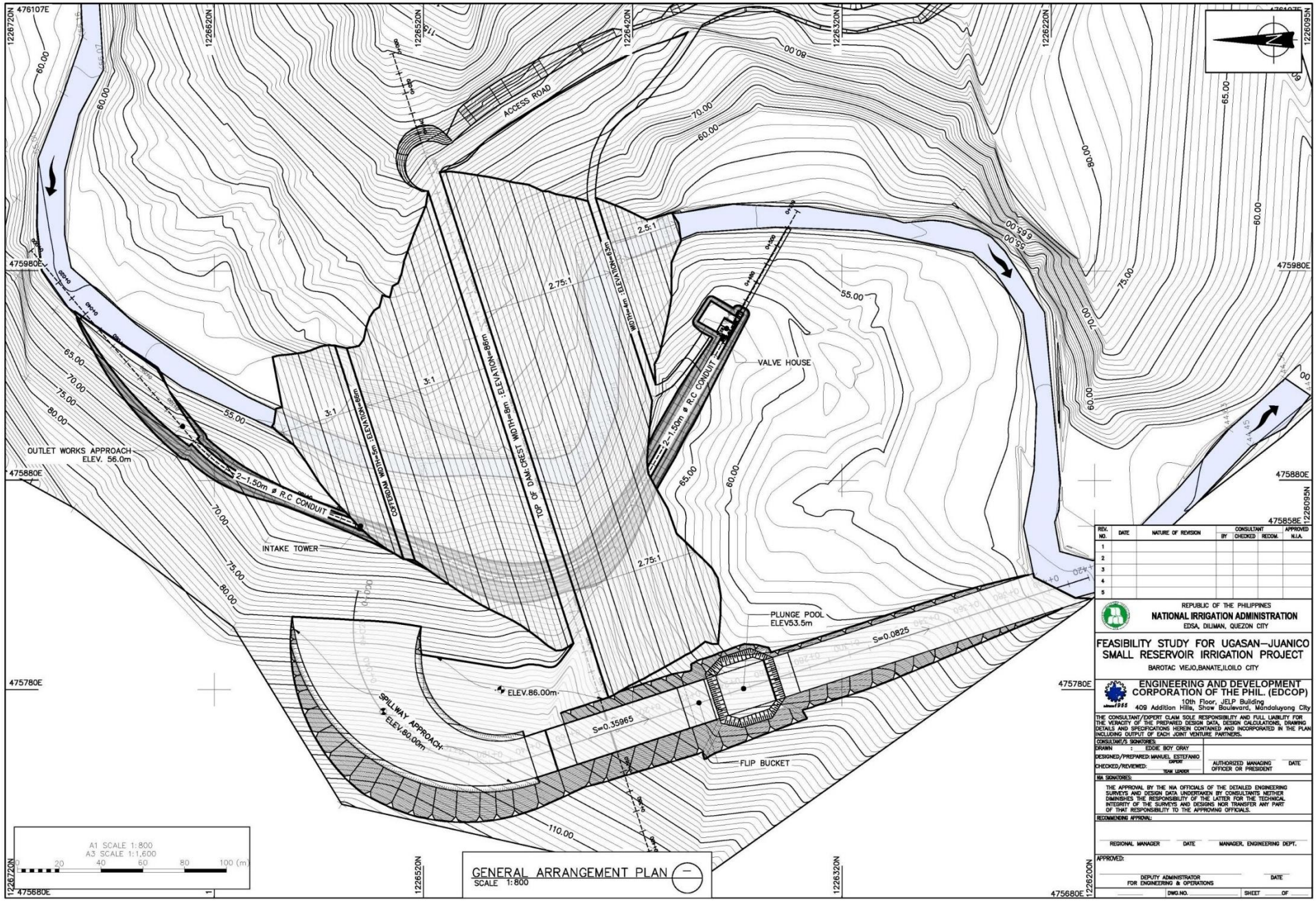
The dam site is located at approximately 122º 46' 50.13" East latitude and 11º 05' 39.31" North longitude. **Figure 2-8** shows the general arrangement plan while **Figure 2-9** shows the reservoir map.

The proposed dam site and its vicinity are comprised mainly of diorite and gabbro. Overburden at lower elevation (El.55 meters and below) of both abutments are observed to be thin, however on higher elevation (El. 55 meters and above) up to crest of the dam the overburden is about 10-20 meters thick. Massive rock outcrops are very visible at the river course and on both banks of the river. Large volume of high plasticity soils within the immediate vicinity of the dam site for clay core was noted. Moderate quantity of alluvial/river deposit for sand and gravel filters can be quarried along the stretches of the river.

The abutments have a slope of about 50-60 degrees rising to an elevation of 100 to 150 meters. Based on the value engineering and value analysis (VE/VA) undertaken where two alternatives dam site that was been studied, the upstream damsite (Alternative No.2) resulted to have higher irrigated area. This means that Alternative No 2 has a lower development cost per cubic meter of stored water compared to Alternative 1, hence selected as the proposed site.

The proposed dam is a central core zoned earthfill dam (**Figure 2-10**). The crest of the dam is at El. 86 meters. The impervious core of the dam shall be at El. 85 meters with width of about 6 meters. The impervious core will be composed of clay materials borrowed from the low-lying area at downstream of the dam. The face of the impervious core has a slope (horizontal: vertical) for both upstream and downstream face of 0.5:1 and shall be about 0.92 meter above the maximum water surface. The core will be cladded with filter of sand and gravel with a 0.60: 1 on both faces to prevent transport of materials into or out of this zone and safely facilitate seeping water. The top of the sand and gravel filter shall be at El. 84 meters, about 0.08 meter below the maximum water surface. Random/transition fill materials with surface gradient of 3:1 at the upstream side and 2.75 meters at the downstream side will interface with the filter. The outer most face of the dam upstream will be covered with a 1.0-meter-thick riprap on 0.30-meter sand and gravel beddings, on the other hand downstream face will have 50 centimeters thick of 2 inches diameter gravel ballast and will have a slope of 3.0 and 2.75 horizontal to 1 vertical, respectively. Significant volume of soils expected from the excavation of the spillway together with the large quantity of boulder litter in the creek channel and its banks will be used as rock toe (dumped boulders). The rockfill will offer a stronger resistance against sliding and protection against erosion. It also serves as an efficient energy dissipator for wave action and or water currents that may tend to scour portions of the embankment works.

Dam Height. The height of the dam above the river bed shall be 34.50 meters while the structural height from the deepest foundation would be about 38 meters. The total freeboard was computed at about 3.74 meters and was rounded to bring the crest exactly to El. 86.0 meters.



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REPUBLIC OF THE PHILIPPINES
NATIONAL IRRIGATION ADMINISTRATION
EDSA, DILIMAN, QUEZON CITY

FEASIBILITY STUDY FOR UGASAN–JUANICO SMALL RESERVOIR IRRIGATION PROJECT
BAROTAC VIEJO,BANATE,ILOILO CITY

ENGINEERING AND DEVELOPMENT CORPORATION OF THE PHIL. (EDCOP)
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THE CONSULTANT/EXPERT CLAIM SOLE RESPONSIBILITY AND FULL LIABILITY FOR THE VERACITY OF THE PREPARED DESIGN DATA, DESIGN CALCULATIONS, DRAWING DETAILS AND SPECIFICATIONS HEREIN CONTAINED AND INCORPORATED IN THE PLAN INCLUDING OUTPUT OF EACH JOINT VENTURE PARTNERS.

CONSULTANT/S SIGNATORIES:
DRAWN : EDDIE BOY GRAY
DESIGNED/PREPARED: MANUEL ESTEFANIO EXPERT
CHECKED/REVIEWED: TEAM LEADER
AUTHORIZED MANAGING OFFICER OR PRESIDENT DATE

NIA SIGNATORIES:
THE APPROVAL BY THE NIA OFFICIALS OF THE DETAILED ENGINEERING SURVEYS AND DESIGN DATA UNDERTAKEN BY CONSULTANTS NEITHER DIMINISHES THE RESPONSIBILITY OF THE LATTER FOR THE TECHNICAL INTEGRITY OF THE SURVEYS AND DESIGNS NOR TRANSFER ANY PART OF THAT RESPONSIBILITY TO THE APPROVING OFFICIALS.

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REGIONAL MANAGER DATE MANAGER, ENGINEERING DEPT.

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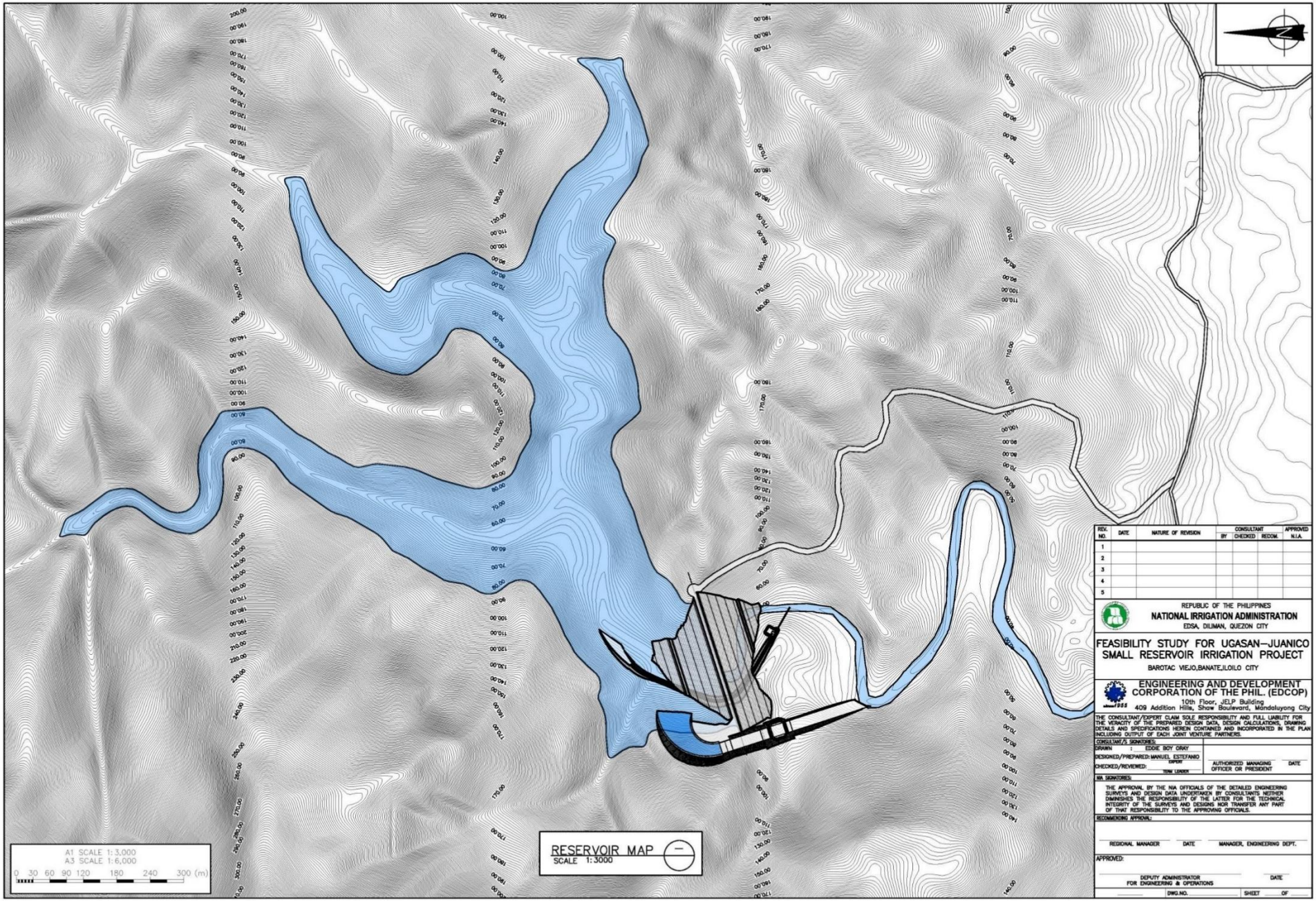
F. Ortigas, Jr. Road, Ortigas Center, Pasig City

FIGURE TITLE :

General Arrangement Plan

FIGURE NO.:

2-8



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Unit 1403 Prestige Tower Condominium
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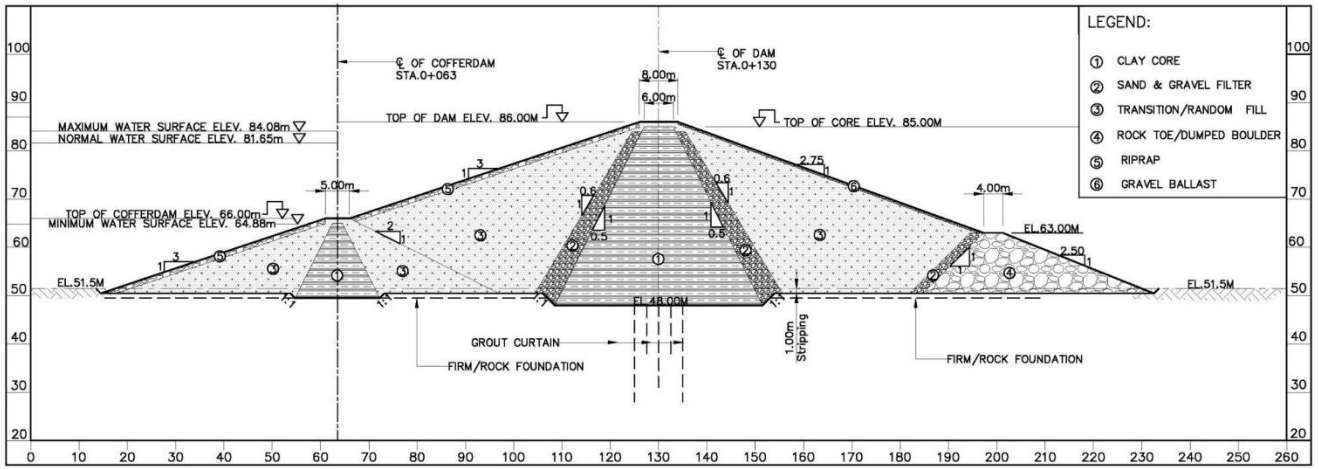
FIGURE TITLE :

Reservoir Map

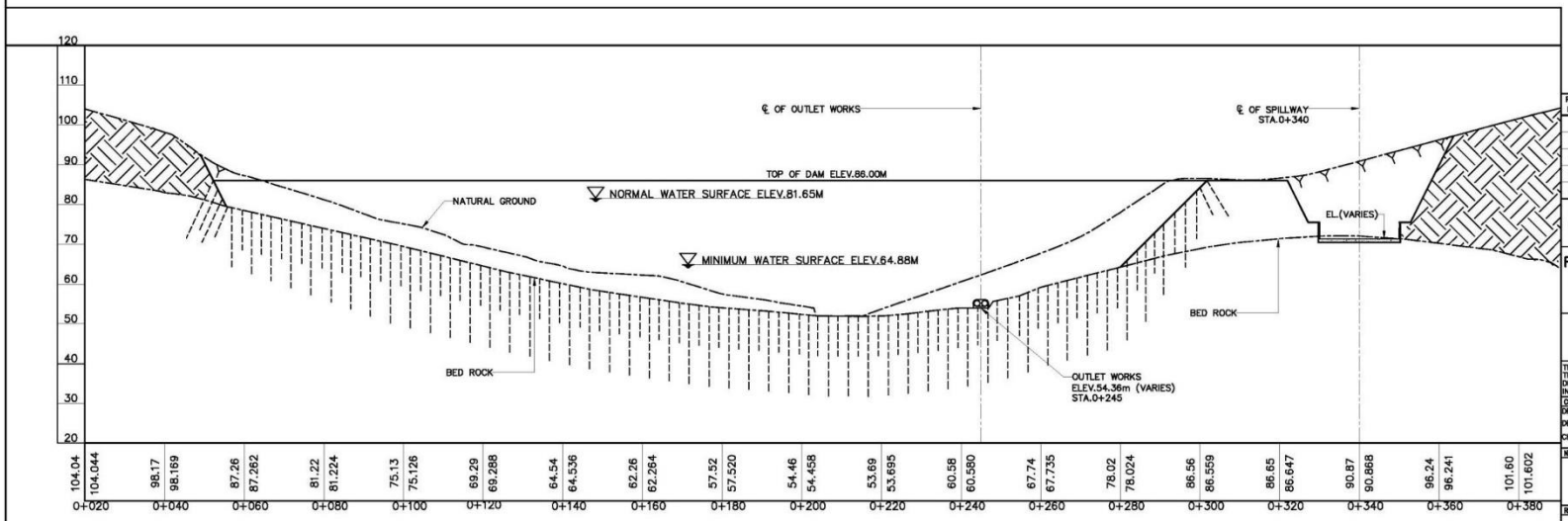
FIGURE NO.:

2-9



MAXIMUM DAM SECTION
SCALE 1:500

A1 SCALE 1:500
A3 SCALE 1:1,000
0 10 20 30 40 50 (m)



LONGITUDINAL DAM SECTION
SCALE 1:600

A1 SCALE 1:600
A3 SCALE 1:1,200
0 6 12 18 24 36 48 60 (m)

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FIGURE TITLE :

Maximum and Longitudinal Dam Section

FIGURE NO.:

2-10

The total freeboard was computed using the following formula. The higher result is adopted.

(a) FB = hs + hw + Sw
(b) FB = hs + hw + he/2

Where:

Surcharge height (hs) – 2.43 meters for 200-year flood with 20 % Climate change adaptation and 20 meters width of spillway;
Height of wave (hw) due to wind – 0.90 meter computed using the following formula:
hw = (0.032 (FV)1/2 + 0.763 – 0.271 (F)1/4)

hw = wave height measured between trough and crest, meters
V = wind velocity, 162 kilometer per hour
F = reservoir fetch, 1.03 kilometer

Additional height due to wind setup (Sw) - 0.01 meter, computed using the following formula:

$Sw = (V^2*F)/(63200*d)$
Where d = average depth of reservoir is about 31.37 meters.

Height of wave due to earthquake (he) – 0.82 meters, computed using the Seiichi Sato formula, shown below:

$he = ke*T*\sqrt{(g*h)} / 2*\pi$

where:
he = wave height due to seismic effect (m)
h = spillway crest elevation – river bed elevation (30.15 m)
ke = horizontal seismic acceleration (0.30)
T = 1.00 second
π = 3.1416
g = 9.81 m/sec2

During construction, a camber height of about 0.23 meter is to be added as a buffer due to consolidation/settlement of the embankment and is taken as 0.001 of $H^{3/2}$ (structural height, 38 meters). The total freeboard was checked against the flood surcharge of 10,000-year flood. The flood surcharge under this return period was computed at 3.06 meters plus the height of the wave due to wind of 0.90 meter will result to El. 85.61 meters which is less than the crest elevation (86.00 meters) of the dam.

Clay core base and trench width. The core trench bottom width is influenced by the depth of the alluvial deposit to be excavated and the needed space for excavation and grouting works. . It is expected that big volume of excavated alluvial deposit will be hauled outside the dam area. For medium to high dam classification, a minimum slope of 0.3 ~ 0.4:1 (H:V) for clay core is required. A slope of 0.35 was adopted for the project and the corresponding width at the bottom of the clay core i.e., cutoff trench is about 43 meters. With the clay core base extended down to the bedrock formation it serves as a positive cut-off.

Clay core top width. The top of the clay core shall be at El. 85 meters, one meter below the crest of the dam. It is about 6.0 meters in width. The top of the clay core would be about 0.29 meter above the 10,000-year flood. The maximum water surface (El. 84.08 meters) would be high enough for additional freeboard allowance for wave height due to wind and earthquake.

Embankment top width. Several formulae were used to determine the crest width (**Table 2-10**): The adopted crest width is 8.0 meters.

Table 2-10: Computed Crest Width

Formula		Crest Width (meters)
Trautwine	Wc = 0.6 + 1.1 H ½	7.38
ICOLD	Wc =3.6 H 1/3 – 3	9.10
USBR	Wc =3.6 H 1/3 – 1.5	10.60
G.T.C. instructions	Wc =5/3 H ½	10.27

2.5.1.2 Spillway Structure

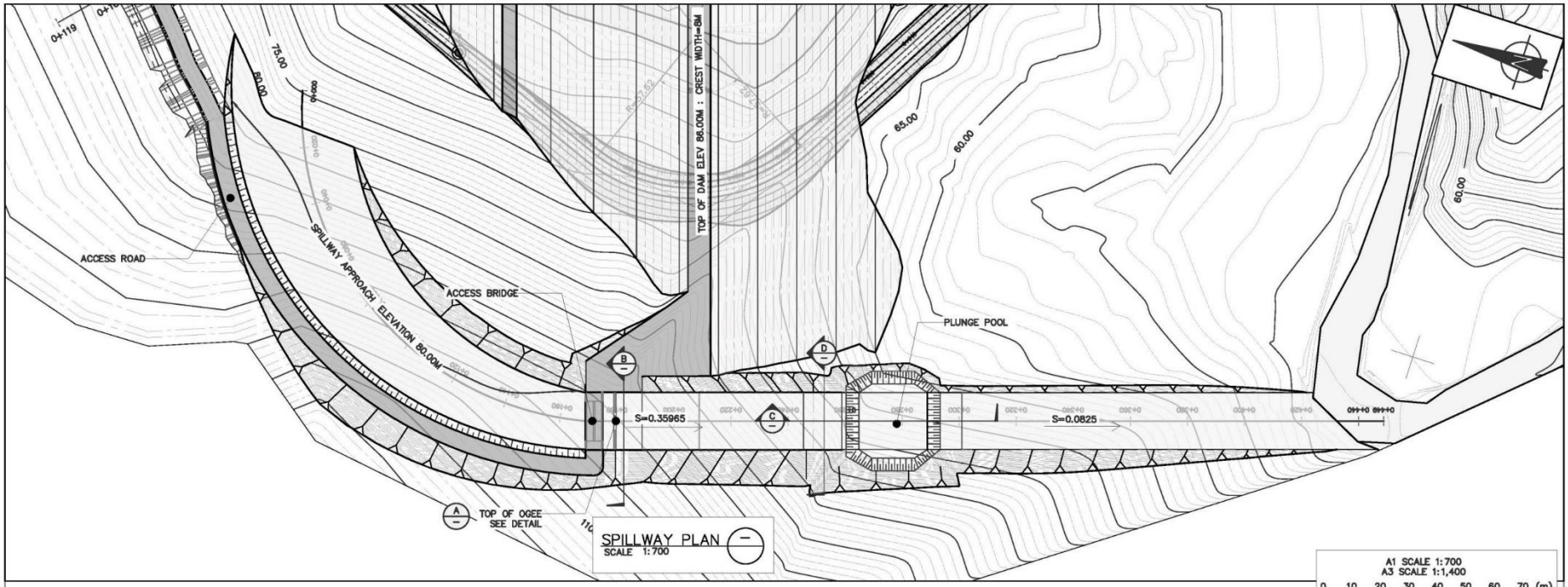
A reservoir must have a spillway designed such that the largest flood that is expected to occur can pass without overtopping the dam and endangering the structure with potential disastrous consequences downstream. A spillway is a structure constructed at or near the dam used to discharge surplus water that cannot be stored in the reservoir and function infrequently and only at times of flood. Spillway is provided as a safety measure against overtopping and the consequent damages and failure.

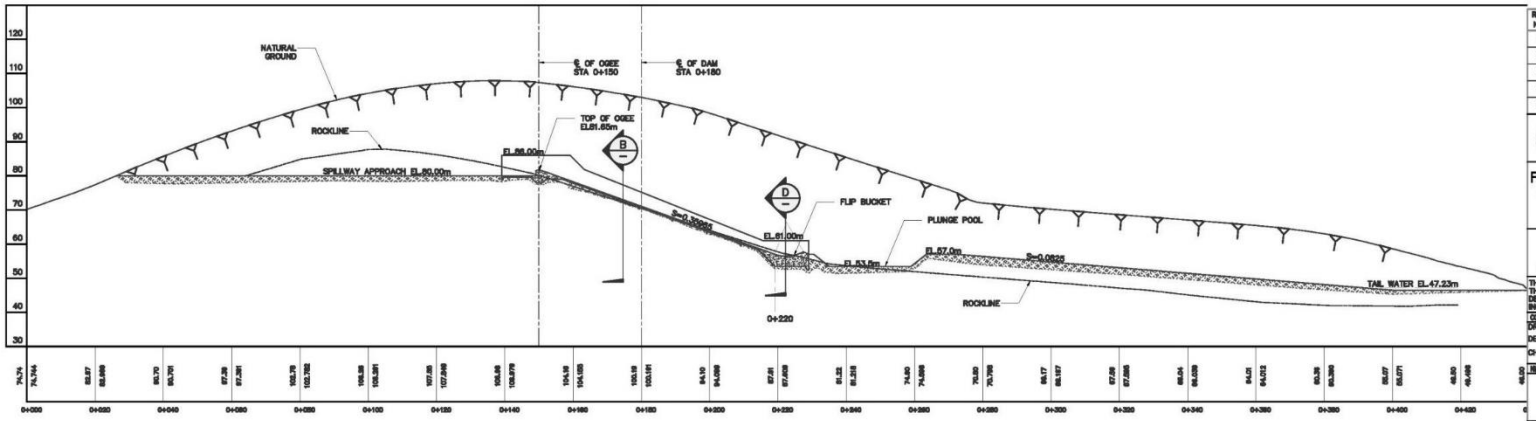
The spillway is configured as an ungated type (**Figure 2-11**) for ease of operation and maintenance and as usually adopted in SRIP's project. The proposed dam has a catchment area of 7.37 km^2 and when completed will have a reservoir area of 27.93 and 31.04 ha at normal and maximum water surface level respectively. Selection of a flood discharge for the design of spillway is based on the hazard potential for a given size of dam. The inflow discharge of 338.50 m^3/sec (200-year flood with climate change adaptation) selected in the design of spillway components. The structural integrity of the spillway structure is ensured as it is set and founded on a rock formation as shown in **Figure 2-12,** Geologic profile of spillway and Spillway plan and profile respectively.

2.5.1.3 Diversion and Outlet Works

Diversion conduit. Flood routing was conducted to determine the size of the diversion conduit in conjunction with the height of the cofferdam. A 5-year return flood of 150.60 m3/sec was used. Various sizes and combination of number of units were evaluated. Two units of 1.50 meters diameter is needed to divert said flood in combination with a 14.50-meter-high cofferdam **(Figure 2-13**). The conduit is about 330 meters long reinforced concrete circular conduit with a slope of 0.0121. Its inlet shall be at El. 56.00 meter while its outlet invert elevation shall be at El. 52 meter which is about 0.50 meters above the river bed. The conduit will be 20-cm thick cut and cover reinforced concrete pipe. After construction, the left side conduit will be permanently plugged while the other will be converted and used as irrigation outlet works conduit.

Cofferdam. A 14.50-meter-high cofferdam at the upstream of the dam axis will be constructed and will be integrated into the main dam body. It will have an upstream slope of 3:1 on and 2:1 on the downstream slope. The center line or axis of the cofferdam would be about 67 meters upstream from the axis of the main dam. The depth of the cut-off trench shall be about 1 meter. The crest of the cofferdam is at El 66 meters and is 5 meters wide.





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FEASIBILITY STUDY FOR UGASAN–JUANICO SMALL RESERVOIR IRRIGATION PROJECT
BAROTAC VIEJO,BANATE,ILOILO CITY

ENGINEERING AND DEVELOPMENT CORPORATION OF THE PHIL. (EDCOP)
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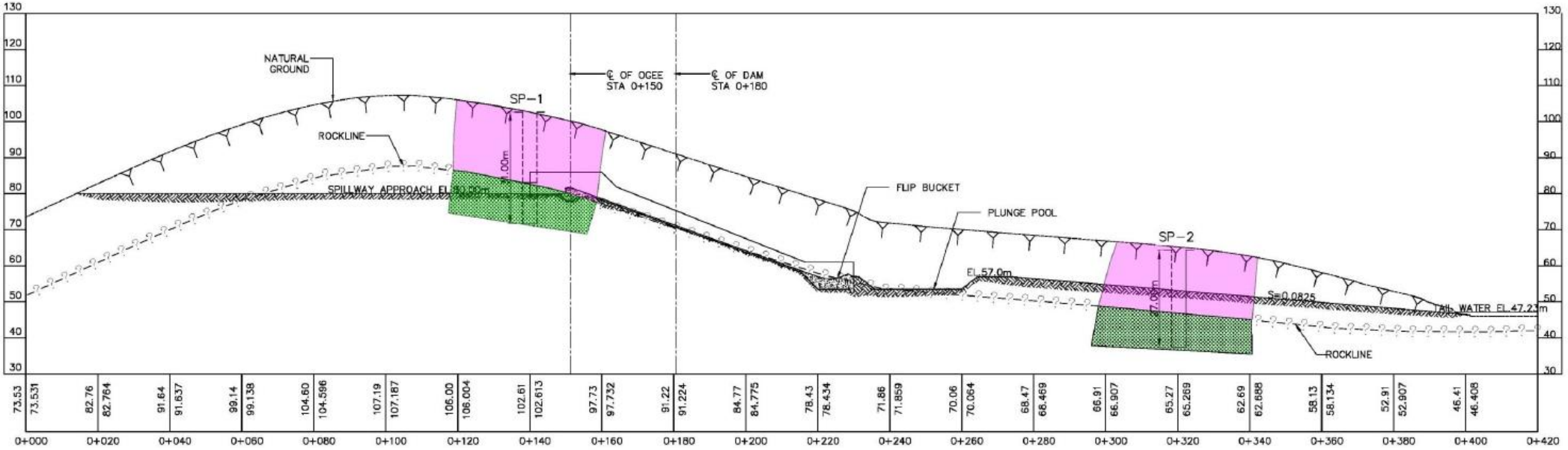
Lichel Technologies, Inc.
Unit 1403 Prestige Tower Condominium
F. Ortigas, Jr. Road, Ortigas Center, Pasig City

FIGURE TITLE :

Spillway Plan and Profile

FIGURE NO.:

2-11



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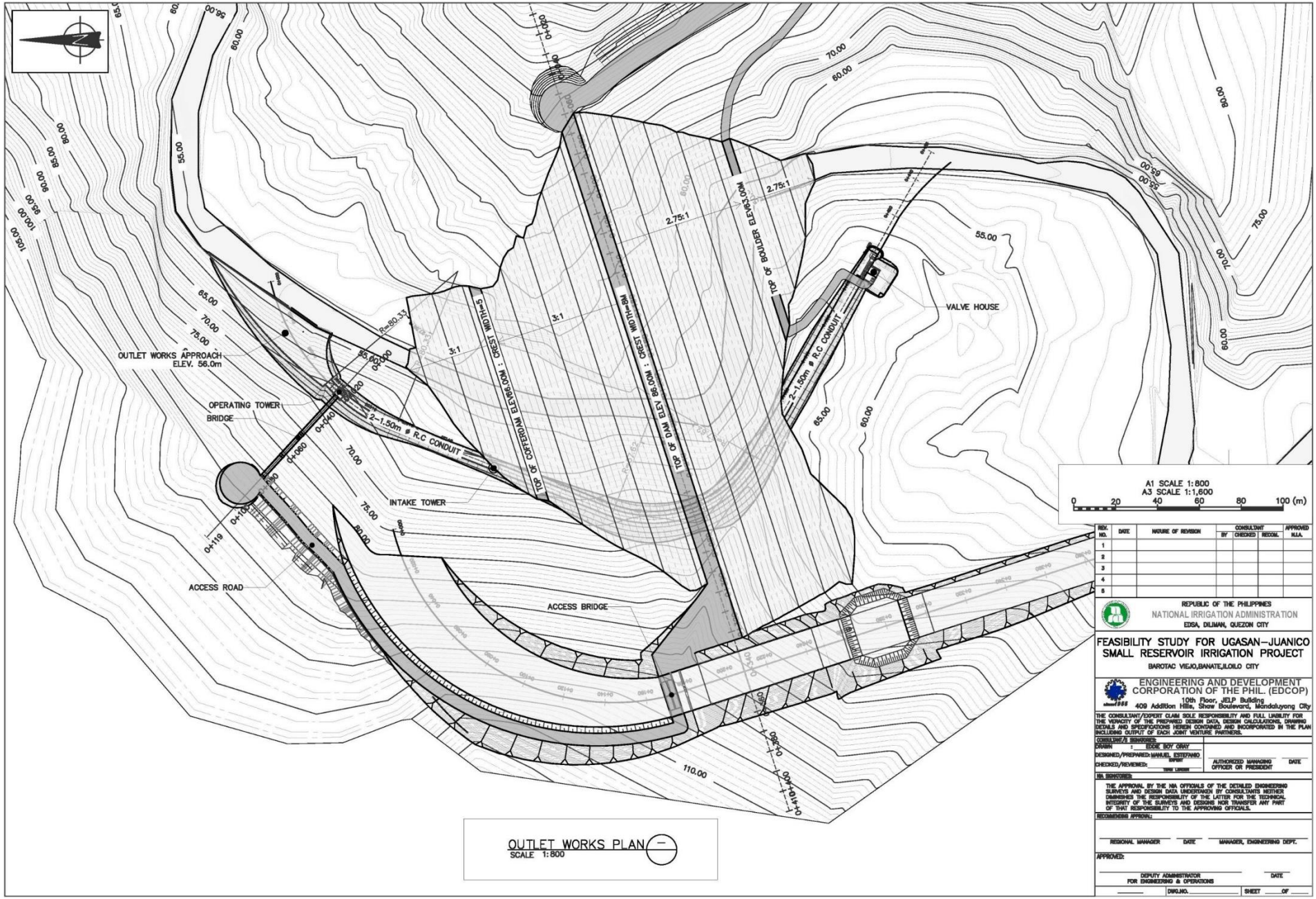
Unit 1403 Prestige Tower Condominium
F. Ortigas, Jr. Road, Ortigas Center, Pasig City

FIGURE TITLE :

Geologic Profile of Spillway

FIGURE NO.:

2-12



OUTLET WORKS PLAN
SCALE 1:800

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FIGURE TITLE :

Outlet Works Plan

FIGURE NO.:

2-13

2.5.1.4 Irrigation Outlet Works and Appurtenances

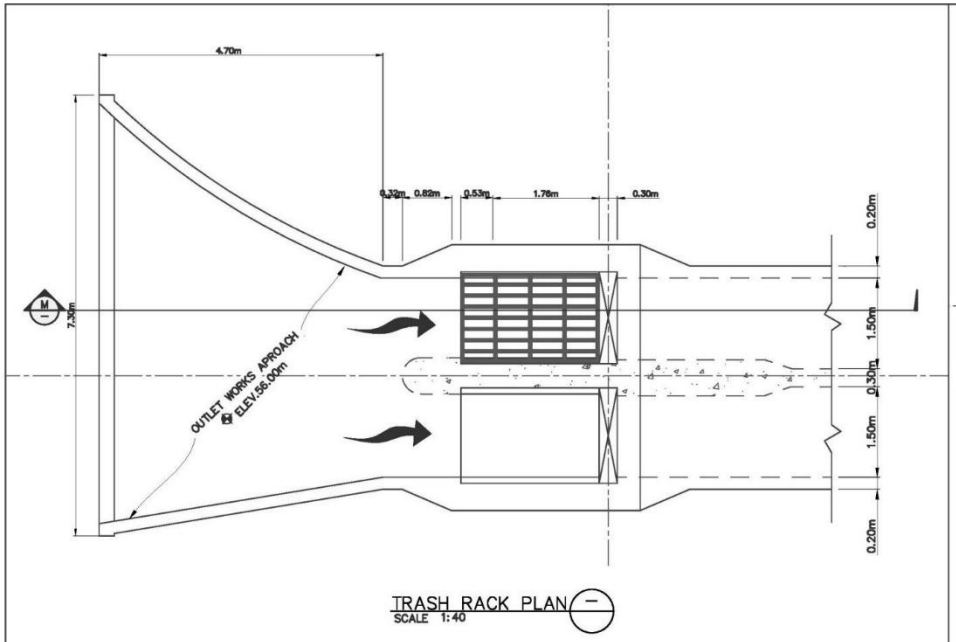
The first stage of river diversion during construction will be at the river course itself. As excavation progresses, foundation preparation and concreting works follow. This will be completed within the first year of construction. During concreting works, provision of second stage concrete for transition and concrete plugs would have to be in place along with the intake tower/shaft. The second stage of river diversion will take place at the competed diversion conduit while dam foundation (cut-off trench excavation) is undertaken. Construction/provision i.e., modification of the diversion conduit, of the remaining components of the irrigation outlet works would be done on the last dry season of the construction period and the spillway is set in place/completed. The left side of the conduit will be used as the next stage for river flow diversion. After completion of the irrigation outlet works component, the closure of the inlet portal of the 1.50 m diameter diversion conduit will be effected. This will pave the way for the plugging works of its inlet and at shaft portion. Construction and furnishing of the other components of the irrigation outlet works follows.

Vertical intake shaft. A 1.0-meter diameter concrete vertical shaft will be constructed and connected to one of the 1.5.0-meter diameter horizontal diversion conduit via a 90-degree transitional bend at Sta. 0+210. It will serve as the intake tower for the irrigation outlet works. The inlet structure of the intake tower has dimension of 2.0 by 2.0 meters. It is provided on its 4 sides entrance measuring 2.0-meter high by 1.0-meter-wide opening fitted with removable trash racks. The top of the inlet structure is provided with an opening with 1 by 1-meter fixed trash rack. At a minimum head of 1.0 meter from the inlet invert elevation, the inlet weir will be capable of discharging 0.62 m3/sec with gate fully open.

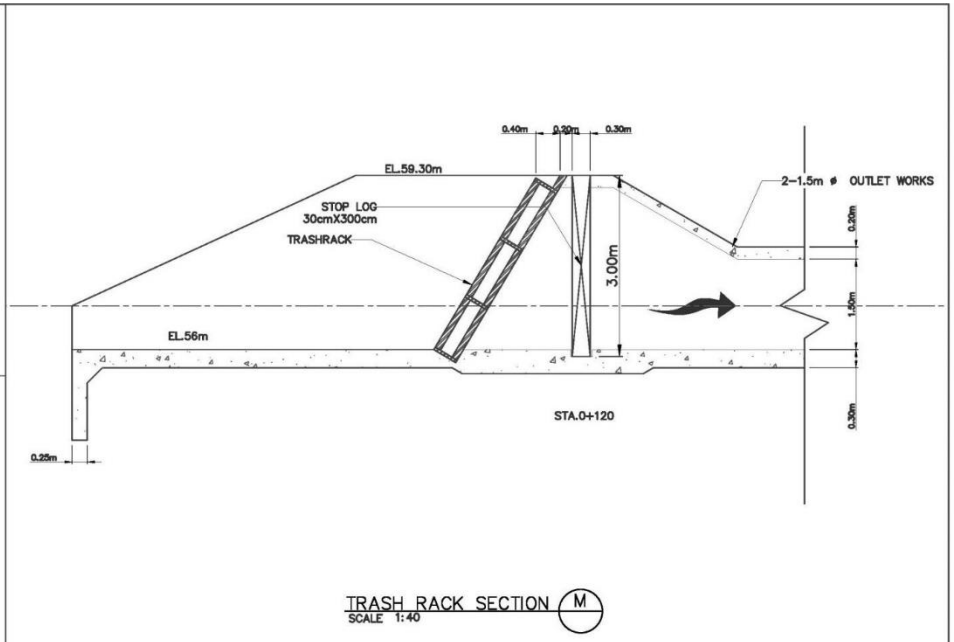
Penstock, Gates and Control House. At Sta. 0+447 near the end of the diversion conduit, the 1.50-meter diversion conduit will be fitted with a transition (reducer) steel penstock of 1.50 X 0.30 X 3.0 meters. The steel penstock shall have a total of 11 meters long, Sta. 0+447 to 0+458 and will be provided with 2 – 0.30-meter diameter gates installed in tandem. The gates shall be electrically-driven and could be provisionally manually operated. One of the gates will be a guard (Valve) gate positioned at the upstream part of the gate house and will be kept open. The other one is a butterfly valve installed next to the guard gate. This shall be used to control irrigation releases. Its main function is to regulate the distribution of irrigation water during operation. The upstream guard gate shall be closed only for the maintenance of the butterfly gate or for any situation where the downstream gate fails to be operated or at some emergency situation. An 8.0 X 7.0 meters control room will house the two gates and will be equipped an A-Frame crane. Adjacent to the gate house, an impact block dissipator will be provided **(Figure 2-14**). It has a dimension of 2.00 X 2.70 X 1.50 meters (W/L/H). The outlet of the impact block dissipator is directed towards the river where it flows further to the existing Ugasan-Juanico diversion dam.

2.5.2 Dam Instrumentation

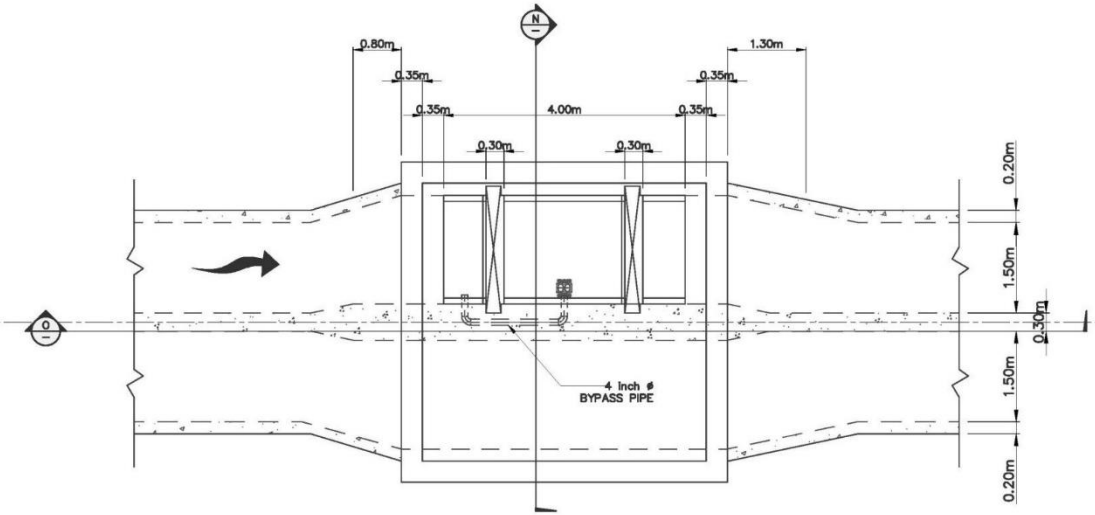
To monitor the condition of the dam, a package of dam instrumentation (**Figure 2-15**) will be installed in the dam body. The instrumentation would monitor settlement, and deformation within the various elements of the dam body. The instrumentations include stand pipe piezometer, surface monitoring points and surface bench monuments.



TRASH RACK PLAN (—)
SCALE 1:40



TRASH RACK SECTION (M)
SCALE 1:40



OPERATING TOWER PLAN (—)
SCALE 1:40

A1 SCALE 1:40
A3 SCALE 1:80
0 1.0 2.0 3.0 4.0 5.0 (m)

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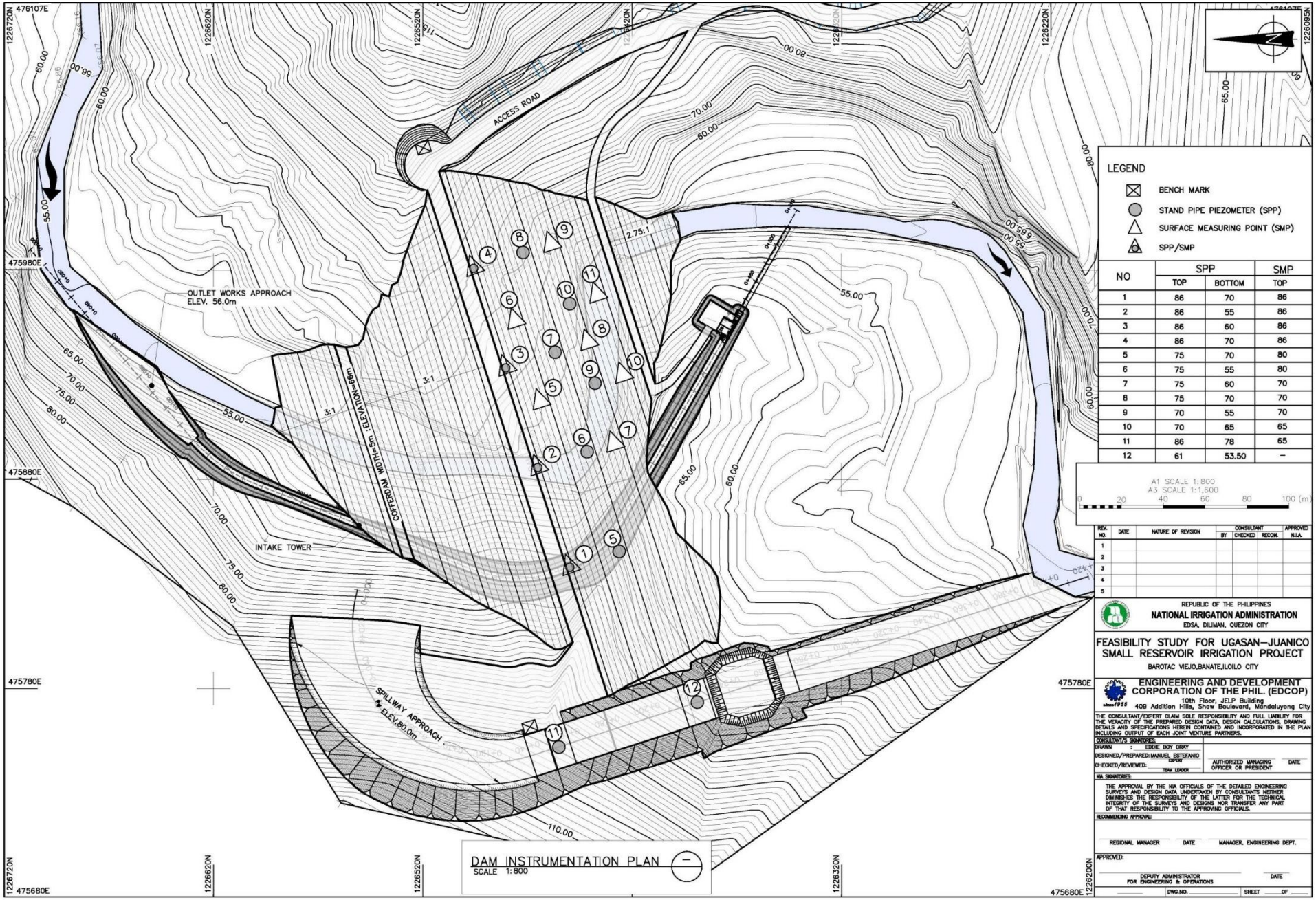
F. Ortigas, Jr. Road, Ortigas Center, Pasig City

FIGURE TITLE :

Operating Tower Plan, Trash Rack Plan and Section

FIGURE NO.:

2-14



NO	SPP		SMP
	TOP	BOTTOM	TOP
1	86	70	86
2	86	55	86
3	86	60	86
4	86	70	86
5	75	70	80
6	75	55	80
7	75	60	70
8	75	70	70
9	70	55	70
10	70	65	65
11	86	78	65
12	61	53.50	–

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DAM INSTRUMENTATION PLAN
SCALE 1:800

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F. Ortigas, Jr. Road, Ortigas Center, Pasig City

FIGURE TITLE :

Dam Instrumentation Plan

FIGURE NO.:

2-15

2.5.3 Road Network Plan

A 1.08-km existing road will be rehabilitated starting from the junction of Ugasan-Juanico barangay road leading to the left abutment of the crest of the dam. Service road shall be provided on one bank of the canal at the side where the service area is located to satisfy mobility within the area. Access road will also be constructed to link the existing road network within the area. At every 500 meters along the canal embankment with 5.00 m roadway, a gravel- surfaced "lay-bye" or temporary parking bay will be provided in order that there will be no vehicle jamming problem in case of two vehicles running in opposite direction. A total of 1.08 km of existing service roads will be improved and 0.25 km access road will be provided in the service area. Shown in **Figure 2-16** is the typical section of service road along main canals.

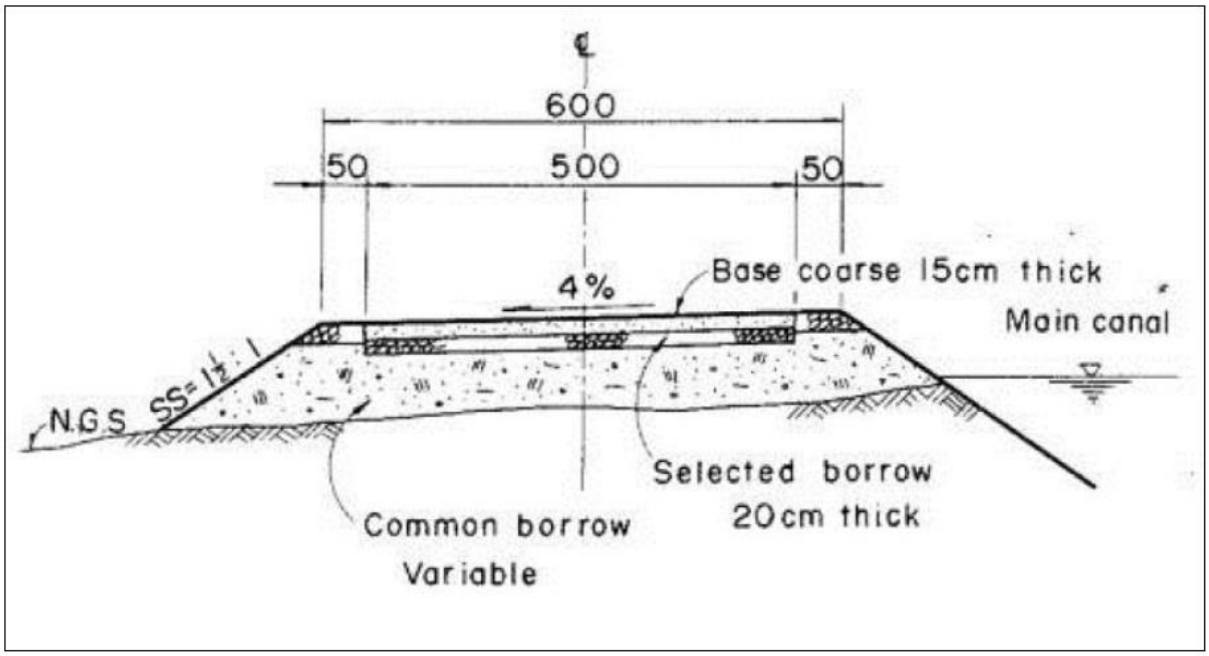


Figure 2-16: Typical Road Section

2.5.4 Scheme of Irrigation Development

The Ugasan-Juanico SRIP objective is to augment the water supply of existing CIS and irrigate additional service area. The project aims to construct a dam and reservoir to augment the water supply of the existing Ugasan-Juanico CIS and Bobon CIS.

The main source of water for the proposed Ugasan-Juanico impounding dam is Ugasan Creek, one of the major tributaries of Alacaygan River which discharges to Barotac Bay together with the Barotac Viejo River.

The primary function of the project is to impound water for irrigation purposes. The works will consist of storage dam construction and rehabilitation/ improvement of the CIS existing facilities. The identified location where the impounding dam will be established is at the Ugasan Creek, one of the tributaries to Alacaygan River.

In consideration of the factors for an efficient and effective irrigation system in the project area, the development scheme will comprise of: (a) construction of a dam & reservoir at the Ugasan Creek to

augment water supply to the existing diversion dams located at (i) Ugasan and (ii) Bobon cascading along Ugasan Creek; and (b) rehabilitation and improvement of Ugasan-Juanico CIS and Bobon CIS. These two (2) CIS check dams along the same creek irrigating about 138 hectares during wet season and 100 hectares during dry season are located on the midstream section of the creek. Despite the two check dams, the whole service area is not irrigated specially during dry season primarily due to lack of water. The local flows through the run-of-the-river diversion weirs are not sufficient to meet irrigation demand.

Based on the results of the reservoir simulation, the whole service area of Ugasan and Bobon CISs would be fully irrigated.

The proposed SRIP will impound water during rainy months for release to augment water supply in the existing systems during the dry months. The volume of water that will be diverted from the reservoir will be conveyed to the service area via Ugasan Creek to the existing/improved irrigation facilities of the Ugasan-Juanico CIS and Bobon CIS. The dam will be designed to proportionately augment water supply to the service areas of the dams according to demand or irrigable area.

The Ugasan – Juanico IA reported an existing service area of 150 hectares while Bobon CIS service area is 60 hectares. The existing Lateral A and Lateral B of Ugasan-Juanico CIS will be extended to serve an additional area of 55 has totaling the service area to 205 has. In Bobon CIS, the existing Lateral A will be extended to serve an additional area of 8 hectares totaling the service area to 68 hectares

The impounding dam would provide reliable irrigation supply to about 273 hectares of agricultural land at the municipalities of Barotac Viejo and Banate in the province of Iloilo. The schematic water flow of the Ugasan-Juanico SRIP is shown in **Figure 2-17.**

Ugasan-Juanico SRIP	Potential Service Area (hectares)		
	Existing	Expansion	Total
Ugasan-Juanico CIS			
Main Canal	59		59
Lateral A	31	10	41
Lateral B	60	45	105
Total	**150**	**55**	**205**
Bobon CIS			
Main Canal	45		45
Lateral A	15	8	23
Total	**60**	**8**	**68**
Grand Total	**210**	**63**	**273**

Table 2-11: Summary of Service Area

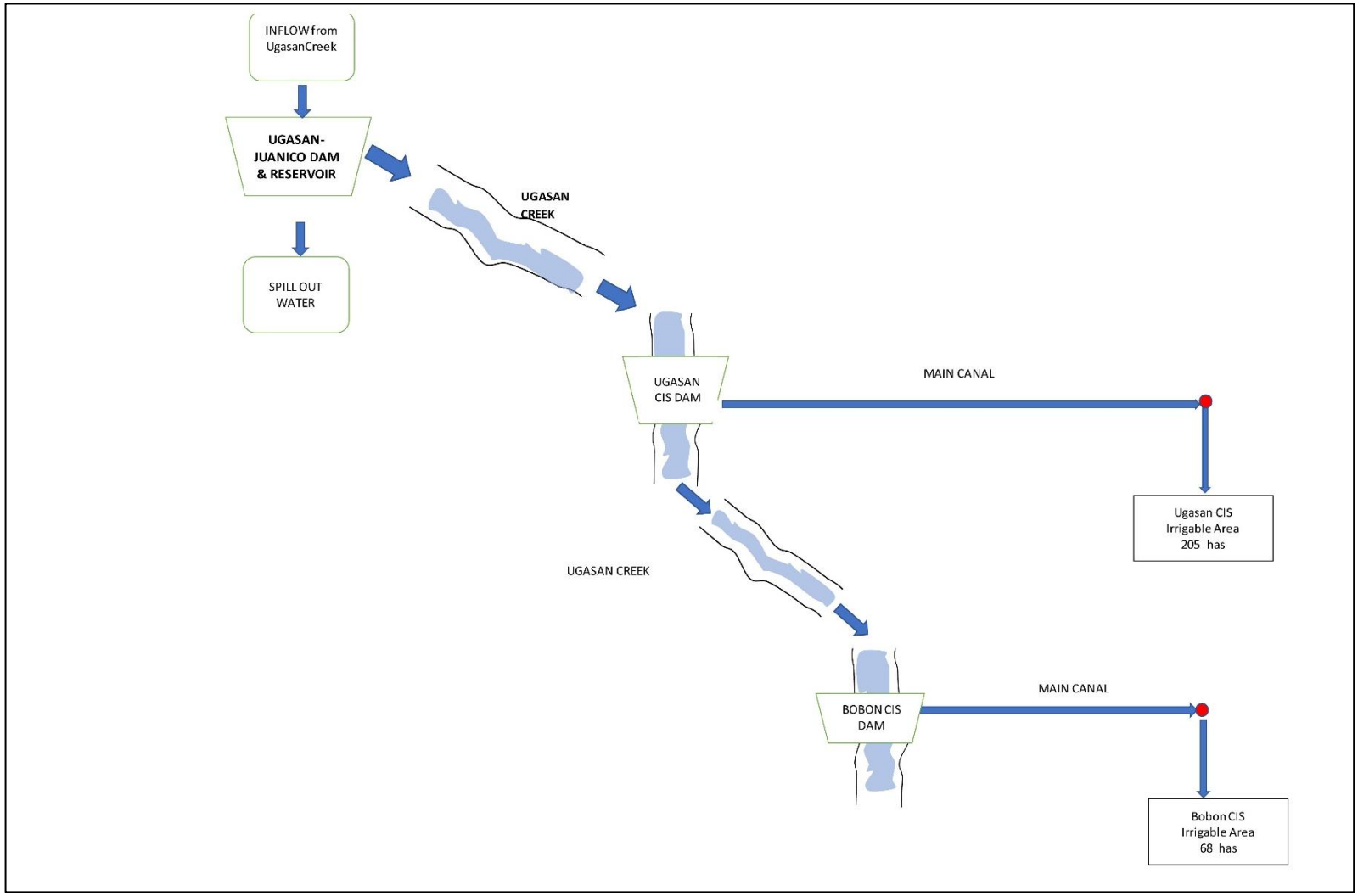


Figure 2-17: Schematic Water Flow of the Propose Ugasan-Juanico SRIP

2.5.5 Irrigation Canal Layout

In the design layout for irrigation canal network, irrigation water originates from the dam. The irrigation water would then be conveyed into the service area through the main canal and lateral canals. The canal network considers the optimum area to be irrigated based on design standard. The main canal is laid to maximize the service area to be provided with irrigation water and to minimize the cost of construction. The main canal will traverse minimum number of depressions to balance the volume of cut & fill minimizing construction cost. **Figure 2-18** presents the general layout of the project showing the proposed service area irrigation network.

The irrigation network diagram or schematic diagram is prepared based on water duty (in liters/sec/ha) and corresponding diversion requirement or design discharge (in m^3/sec) for the total service area of the irrigation system.

The resulting total design discharge is then distributed to the canal system beginning from the intake works down to the farthest turnout structure of the main canal, lateral canals, and sub-lateral canals. The net discharge (water duty x turnout service area) for the different stretches of the canals in between head gates and turnouts becomes the basis of design for the canal section and appurtenant canal structures.

The schematic diagram of the irrigation and drainage network for Ugasan-Juanico CIS and Bobon CIS is shown in **Figure 2-19** and **Figure 2-20,** respectively**.**

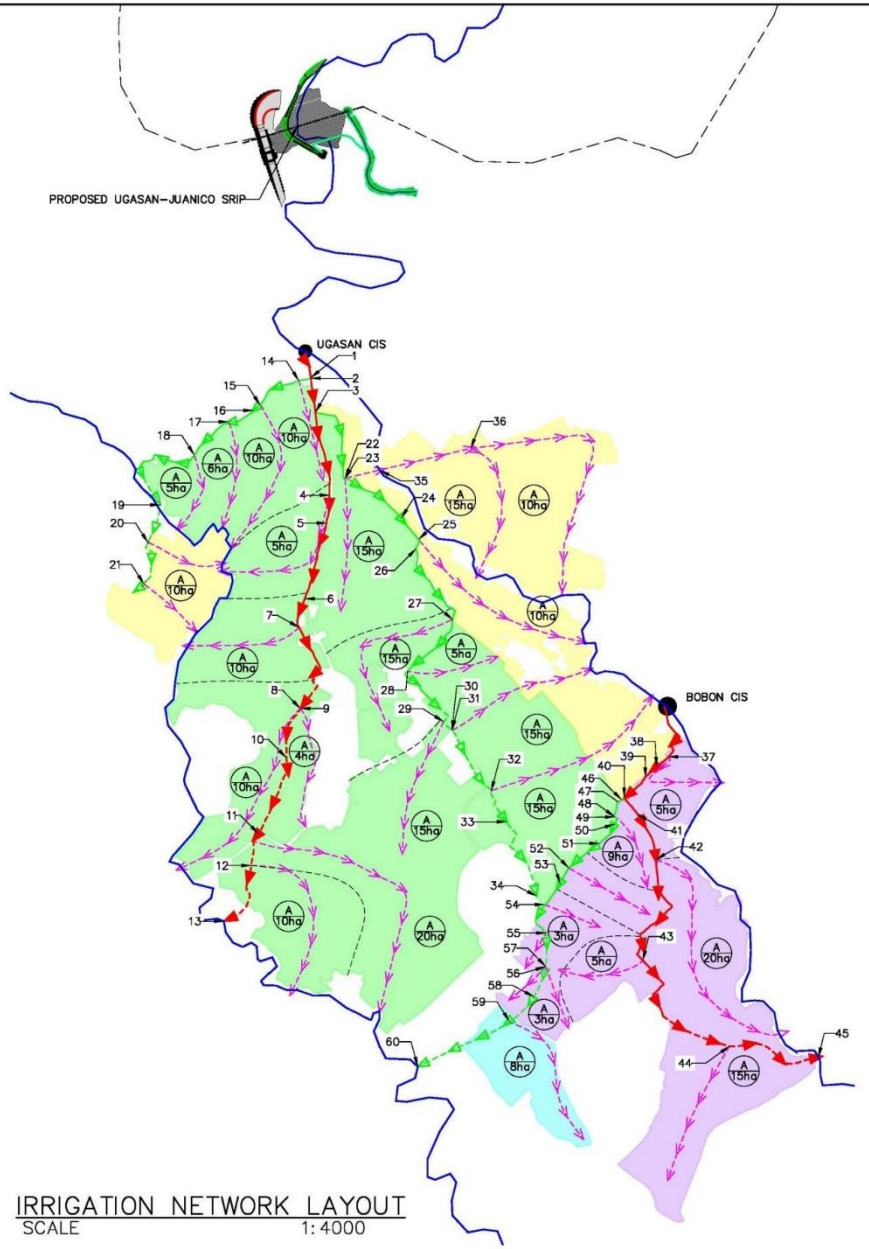
Canal is a series of structures (including facilities for water distribution, water measurement, confluence, etc.) to convey a required amount of water from one place to another with a certain purpose, and canals are broadly divided into canals for conveying water (such as main canals and lateral canals) and canals for distributing or collecting water (such as farm ditches and farm drains), according to their functions and hydraulic characteristics.

The canal system is designed to divert from a supply source at sufficient elevation to reach the land to be irrigated with proper gradients and by the most economical route. The section may, at various points in the channel, be partially or entirely in either cut or fill, depending on the location selected to satisfy the requirements of safety, structural design, distribution, and least annual cost including maintenance. Main canals are specifically designed to deliver irrigation to the nearest and highest service area (command area). The canal route was selected based on the design discharge and designed level by considering the entire canal alignment, the purpose of canal, safety and economy of the structures in addition to the natural and social conditions existing along the route.

The canal type was determined on the basis of the designed discharge and designed level in consideration of the natural and social environments of the route, economy, water use, water requirement, operation and maintenance and other conditions, so that the purpose and the function of the entire canal system shall be fully achieved. Knowing these factors, the theoretical design capacity of the system is determined. In actual practice, field conditions do not remain the same in the future as envisage during planning stage. To take care of such contingencies, design capacity is increased by some ad hoc percentage for channels of all sizes.

LEGEND:

NO.	STRUCTURE	STATIONING FROM	STATIONING TO
	UGASAN–JUANICO CIS		
	MAIN CANAL	0+000	2+000
1	ROAD CROSSING	0+077	
2	HEADGATE LAT. A	0+080	
3	HEADGATE LAT. B	0+194	
4	MAIN TURNOUT 1	0+465	
5	THRESHER CROSSING	0+560	
6	THRESHER CROSSING	0+820	
7	MAIN TURNOUT 2	0+920	
8	MAIN TURNOUT 3	1+240	
9	MAIN TURNOUT 4	1+240	
10	DRAINAGE CROSSING	1+420	
11	COMB. ROAD CROSSING & MAIN TURNOUT 5	1+690	1+700
12	MAIN TURNOUT 5	1+800	
13	END CHECK	2+033	
	LATERAL A	0+000	1+032
14	TURNOUT 1	0+040	
15	TURNOUT 2	0+200	
16	THRESHER CROSSING	0+228	
17	TURNOUT 3	0+320	
18	TURNOUT 4	0+480	
19	SIPHON	0+840	0+900
20	TURNOUT 5	1+030	
21	TURNOUT 6 & END CHECK	1+132	
	LATERAL B	0+000	2+093
22	TURNOUT 1	0+280	
23	TURNOUT 2	0+280	
24	THRESHER CROSSING & DROP	0+510	
25	TURNOUT 3 & DROP	0+615	
26	THRESHER CROSSING	0+635	
27	TURNOUT 4 & DROP	0+916	
28	TURNOUT 5	1+200	
29	TURNOUT 6	1+400	
30	ROAD CROSSING	1+436	
31	TURNOUT 7	1+436	
32	TURNOUT 8	1+680	
33	DRAINAGE CROSSING	1+800	
34	END CHECK	2+093	
35	SIPHON	0+100	
36	TURNOUT 2–1	0+400	
	BOBON CIS		
	MAIN CANAL	0+000	1+700
37	MAIN TURNOUT 1	0+200	
38	THRESHER CROSSING	0+250	
39	DRAINAGE CROSSING	0+300	
40	HEADGATE LAT. A	0+400	
41	THRESHER CROSSING	0+466	
42	MAIN TURNOUT 2	0+630	
43	MAIN TURNOUT 3	1+040	
44	MAIN TURNOUT 4	1+500	
45	END CHECK	1+700	
	LATERAL A	0+000	1+249
46	THRESHER CROSSING	0+011	
47	THRESHER CROSSING	0+024	
48	TURNOUT 1	0+070	
49	THRESHER CROSSING	0+078	
50	THRESHER CROSSING	0+107	
51	DRAINAGE CROSSING	0+190	
52	TURNOUT 2	0+279	
53	THRESHER CROSSING	0+423	
54	TURNOUT 3	0+463	
55	TURNOUT 4	0+583	
56	TURNOUT 5	0+700	
57	TURNOUT 6	0+700	
58	DROP	0+800	
59	TURNOUT 7	0+900	
60	END CHECK	1+249	



IRRIGATION NETWORK LAYOUT
SCALE 1:4000

LEGEND:

- MAIN CANAL (EXISTING)
- MAIN CANAL (PROPOSED)
- EXISTING LATERAL CANAL
- PROPOSED LATERAL CANAL
- PROPOSED MAIN FARM DITCH
- EXISTING DAM
- LIMIT OF ROTATIONAL AREA
- RIVER

UGASAN CIS
- POTENTIAL IRRIGABLE AREA
- EXISTING IRRIGABLE AREA

BOBON CIS
- POTENTIAL IRRIGABLE AREA
- EXISTING IRRIGABLE AREA

A1 SCALE 1:4,000
A3 SCALE 1:8,000
0 100 200 300 400 500 (m)

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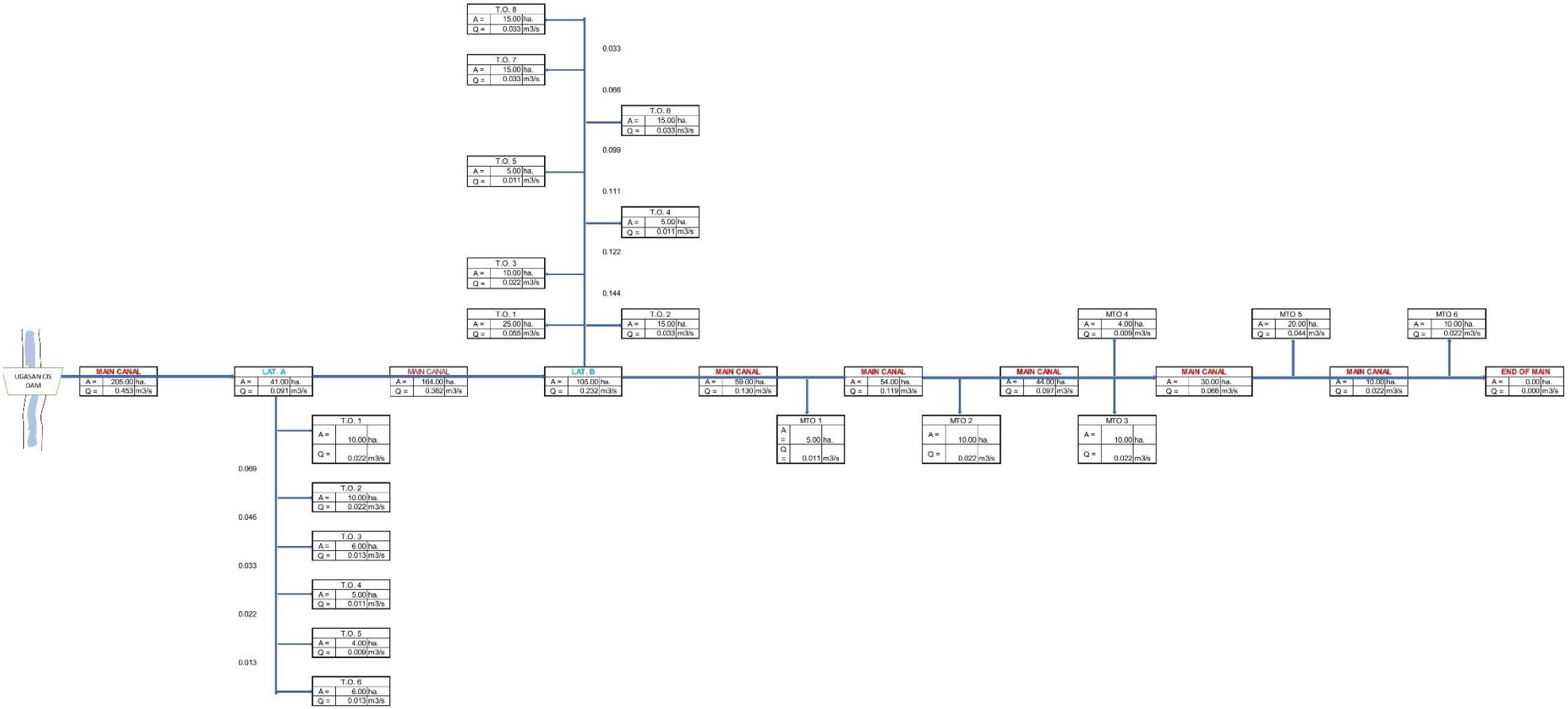
Lichel Technologies, Inc.
Unit 1403 Prestige Tower Condominium
F. Ortigas, Jr. Road, Ortigas Center, Pasig City

FIGURE TITLE :

Irrigation Network Layout

FIGURE NO.:

2-18



Lichel Technologies, Inc.
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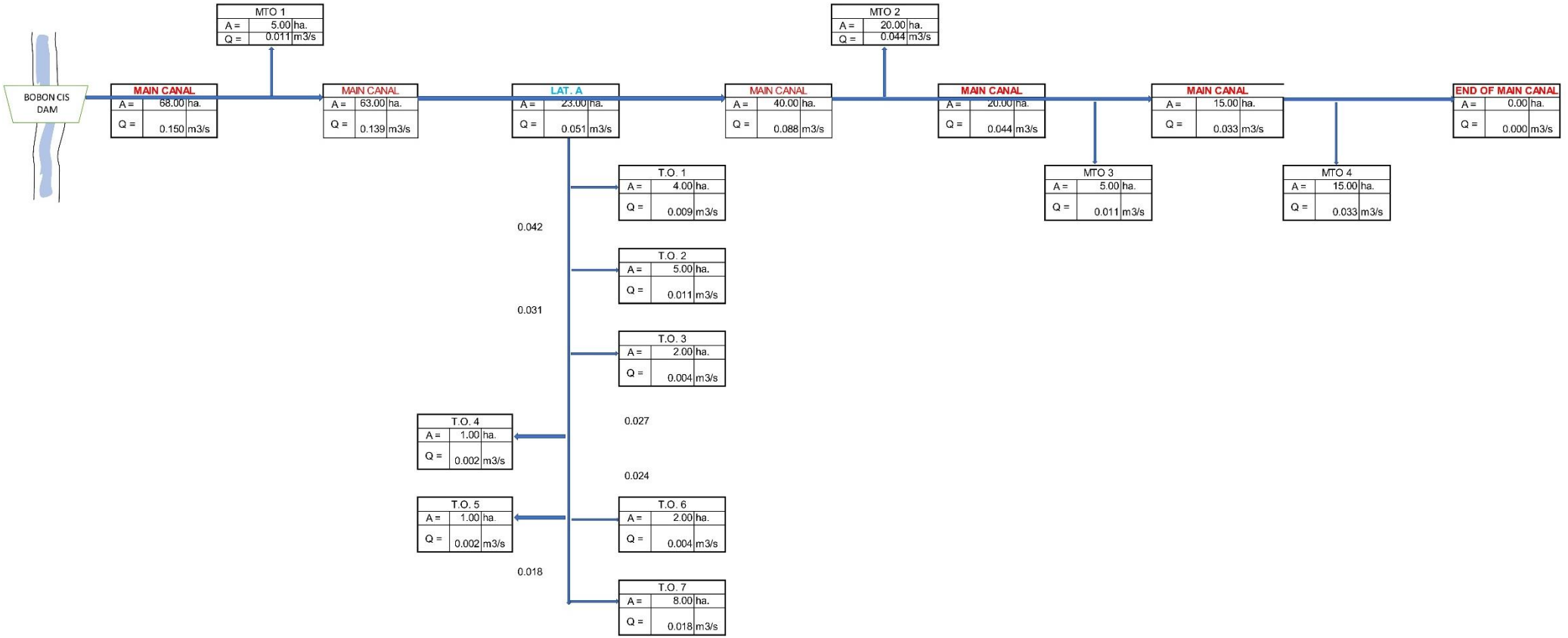
F. Ortigas, Jr. Road, Ortigas Center, Pasig City

FIGURE TITLE :

Schematic Diagram for Ugasan-Juanico CIS

FIGURE NO.:

2-19



Lichel Technologies, Inc.
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FIGURE TITLE :

Schematic Diagram for Bobon CIS

FIGURE NO.:

2-20

The hydraulic design of canals is made following NIA guidelines and criteria. For hydraulic canal elements, Manning's Formula for open channel flow was considered as stated below:

$$V = \frac{1}{n} R^{2/3} S^{1/2} \text{ and } Q = AV$$

Where:

Q = Discharge in cu.m/sec.
A = Wetted area in sq. meter
R = Hydraulic radius in meters
S = Slope of canal
V = Velocity in meters per second
n = Coefficient of roughness,
with n=0.015 - 0.018 for concrete canal

Irrigation and drainage canals must be separate from each other, in principle. However, in paddy fields on sloping land, canals are used as dual-purpose: a) canal for irrigation during the irrigation season and for drainage during the flood season and b) canals which used as drainage canals for paddy fields in higher area and as irrigation canals for those in lower area.

2.5.6 Rehabilitation and Improvement Works

Rehabilitation and improvement work of the existing facilities not only aim to improve and upgrade the existing facilities, but also to extend the area where water for irrigation is not sufficiently supplied due to existing facility and water management problems. The objective of the rehabilitation and improvement plan was set through the assessment of the existing irrigation and drainage facilities. The design for full rehabilitation and improvement for irrigation canals and structures is based on the results of inventory survey and NIA design standards.

Thus, minimum requirements of functional and structural components of canals and related structures were reviewed on the basis of present degree of structural and functional deterioration and main cause of structural deformity. Improvement of canals and structures includes not only rehabilitation works but also improvement works of the existing system for ultimate goal of 100% system efficiency. The minimum requirements of structural components for the canals are as follows: (1) sufficient canal capacity including freeboard, (2) allowable velocity corresponding to the material of canal lining and (3) appropriate curve radius at bend portion.

Based on the findings and observations during fieldworks of the present condition of irrigation canal and related structures, the existing system layout will be maintained and does not necessitate abandoning or relocating permanent structures thus the canal configuration will be maintained as per NIA criteria for rehabilitation works. The capacity of the existing canal and structures is sufficient to the design requirement i.e., design for the existing and the additional areas and a 30% increase in design Q to account for runoff into the canal.

The existing Lateral A and Lateral B of Ugasan-Juanico CIS will be extended to serve an additional area of 55 has totaling the service area to 205 has. In Bobon CIS, the existing Lateral A will be extended to serve an additional area of 8 ha totaling the service area to 68 ha. The design for the new canals is proposed to be a rectangular shaped type (or bench flume), Class B reinforced concrete (fc'= 170 kg/cm2) having a maximum height of 1 m with stiffeners provided every 5m interval. Foot planks or stiffeners are provided in order to provide access during maintenance and access to farmers residing near the canal. Based on the present canal sections and scale of canal dimensions, wherein the existing canal is already a rectangular canal. Comparing with the commonly used CHB wall type, this type is

more economical, easier to construct, less time consuming, and better in quality which is now being used in most NIA projects.

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

2.6.1 Description of Project Phases and Activities

2.6.1.1 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.

2.6.1.2 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.

2.6.1.3 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.

The existing operational strategy of CIS is basically either On or Off. The maximum flows that can be diverted from the river diversion are taken into the main canals and then this flow is roughly divided among different lateral canals according to a pre-determined schedule. There is no effective flow measurement in the system. The CIS was designed for manual upstream water level control using vertical gate cross regulators situated at each lateral headgate. Due to poor maintenance - several structures have been abandoned all together.

The CIS follows an irrigation water distribution schedule among the various lateral canals. The headgates of the lateral canals are operated wide open (maximum flow) for a period based on the area served. The irrigation water delivery schedule of the service area turnouts from the lateral canals is determined by the IA's water tenders. The CIS water tenders attempt to match the available flow with demands at service area turnouts, however there are major tail ender inequity problems.

There is a major lack of preventative maintenance and de-silting of canals, especially at the tail-end of laterals. Unlined main canal, laterals (secondary canals) and farm ditches (tertiary canals) have major difficulties in delivering water to outlying paddy fields, which is exacerbated by the poor drainage.

To ensure the design flow capacity of the canals and maintain an efficient system operation, strengthening the periodic maintenance works (i.e., desilting, grass cutting, by IA are strongly recommended.

The new turnouts and farm ditches will ensure equitable water distribution.

2.6.2 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 2-12** show the summary of predicted impacts and mitigating measures for the proposed Project:

Table 2-12: 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			
• Excavation for foundation of the dam, main canals and laterals • Pouring/concreting, transport/hauling/reloading of construction materials	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

Project Phase / Environmental Aspect	Environmental Component Likely to be Affected	Potential Impact	Options for Prevention for Mitigation or Enhancement
• Washing/maintenance of equipment • Construction of access roads • Construction of temporary diversion for river flow			• 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 NO2 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 NO2 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 • Provisions of emergency medical facilities
Tax Revenues		• Employment generation and increase income and business opportunities	• Priority in hiring qualified local residents
III. OPERATION PHASE			

Project Phase / Environmental Aspect	Environmental Component Likely to be Affected	Potential Impact	Options for Prevention for Mitigation or Enhancement
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 dam

Project Phase / Environmental Aspect	Environmental Component Likely to be Affected	Potential Impact	Options for Prevention for Mitigation or Enhancement
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.			

2.6.3 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.

2.7 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 study is assumed to be 50 years upon completion of construction activities (**Table 2-13**).

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 are 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 513,974,238.35.

Table 2-13: 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. Agricultural and Institutional Development					
7. Test Run for Constructed Facilities					
8. Rectification of Project Works					
9. Project Commissioning and Completion					

3 Public Scoping Materials

3.1 List of Invitees for Public Scoping

HON. NIELO C. TUPAS, Mayor, Municipality of Barotac Viejo
Municipal Engineer
Municipal Planning and Development Coordinator
Municipal Environment and Natural Resources Officer
Municipal Social Welfare and Development Officer
Municipal Agriculturist
Punong Barangay, Brgy Ugasan, Barotac Viejo
President, Irrigator's Association
President, Women's Association
President, Senior Citizen's Organization
Chairperson, Sangguniang Kabataan
Academe Representative
Religious Sector Representative

HON. CARLOS O. CABANGAL, JR, Mayor, Municipality of Banate
Municipal Engineer
Municipal Planning and Development Coordinator
Municipal Environment and Natural Resources Officer
Municipal Social Welfare and Development Officer
Municipal Agriculturist
Punong Barangay, Brgy Juanico, Banate
Punong Barangay, Brgy Bobon, Banate
President, Irrigator's Association
President, Women's Association
President, Senior Citizen's Organization
Chairperson, Sangguniang Kabataan
Academe Representative
Religious Sector Representative

3.2 Draft Invitation Letter

(date)

HON. NIELO C. TUPAS
Mayor
Municipality of Barotac Viejo
Province of Iloilo

Dear Hon. Tupas

RE: Invitation to attend the Public Scoping for the proposed Ugasan-Juanico Small Reservoir Project of the National Irrigation Administration Region 6

The National Irrigation Administration Regional Office Region 6 intends to develop the **Ugasan-Juanico Small Reservoir Irrigation Project** ("Project") to be located in the Municipalities of Banate and Barotac Viejo, Iloilo. The Project will involve the construction of a 38-m central core earth fill dam, development of spillways, canals and access roads. The project aims to increase agricultural productivity in the project area and to increase the coverage of irrigation service from 210 ha to 273 ha.

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: **Ugasan-Juanico Small Reservoir Irrigation Project**
Project Location: **Municipalities of Banate and Barotac Viejo, Iloilo**
Project Proponent: **National Irrigation Administration Regional Office 6**
Date and Time of Scoping: _____
Scoping Venue/Address: _____

Time Allotted	Program of Activities	Person Responsible
7:30-9:00 am	Registration	LTI NIA
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 NIA
9:30 – 9:40 am	Overview of the Scoping Guidelines; Mechanics of the Scoping for the project,	DENR-EMB EIAMD Personnel/EMB Case handler
9:40 – 10:00 am	Brief Presentation of Proposed Project, and EIA Process	LTI NIA
10:00-11:00 am	Open Forum and Raising of Issues to be addressed by the EIA Study	LTI NIA
11:15-11:30 am	Synthesis and Integration/ Summary of Issues and Agreements on Scoping	LTI NIA 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.**

4 PROOF OF CONDUCT OF IEC AND PERCEPTION SURVEY

4.1 Information and Education Campaign Activity

4.1.1 Stakeholder Attendance

The Information and Education Campaign in the Environmental Impact Assessment (EIA) process in the Philippines adheres to the strengthened Guidelines on Public Participation under the Philippine Environmental Impact Statement (EIS) System (Department of Environment and Natural Resources (DENR) Administrative Order No. 2017-15) and DAO 2020-30. The IEC is conducted in preparation for the public scoping by providing the stakeholders with basic project information and implementation guide for the EIA process. According to the Section 6 of the said DAO, IEC could be performed in various form including Focused Group Discussions (FGD), Key Informant Interviews (KII), and/ or Informal Meetings.

For the proposed project, IEC was conducted through informal community meetings with sectoral representatives from host communities, Barangay Ugasan in the Municipality of Barotac Viejo and Barangays Juanico and Bobon in the Municipality of Banate, Province of Iloilo. A total of 32 participants were involved in the activity which came from the following sectors:

- Barangay Officials
- Barangay Tanods
- Barangay Health Workers
- Irrigator's Association
- Youth Representative
- Women Representative
- Academe Representative
- National Irrigation Administration Region 6
- Lichel Technologies Inc.

The IEC activity on the project area was conducted last February 24, 22 after the courtesy call with the Local Chief of Executives of the Municipalities of Banate and Barotac Viejo.

Figure 4-1: IEC Material

Figure 4-2: Photo documentation of IEC Activities

4.1.2 Issues and Concerns Raised

Issues and concerns raised during the IEC activities is summarized below:

Table 4-1: Issues and Concerns Raised During the IEC

Issues and Concerns Raised	Response
What will happen to the 80 households that will be affected once the project is approved? ? In that area they have their livelihood that they are depending since then until now, so that is my question of what we are going to do?	A Resettlement Action Plan will be prepared for the project. The RAP is specific to those who will be affected in terms of their houses and livelihood. So, in this RAP we will see if how many will lose their houses and how many will lose their livelihood and land because of the project. We will identify the benefits, compensation, that we can give to them. We will check what their houses are made of and we will plan if they want to relocate within the barangay, or maybe relocation outside the barangay those are the details that we will check, because in our experience there are some that have relatives in other barangays, so they get paid for houses and transfer to their relatives. But there is also a relocation site prepared for those who are affected. We need to coordinate with the National Housing Authority and the LGU since they are the mandated agency when it comes to housing. The different impact of the project will be identified, there are some that they will only lose their land, there are also that accepts payment for their land, we will see what are the demands of the affected. In our Social Development Plan (SDP) as mentioned earlier, we have our livelihood and training and usually our priority is those affected by the project. Also, we will have consultation with the LGUs, barangays and affected households. In our entitlement and benefits, we will not just pay the house, they will be given disturbance allowance, transportation allowance we are considering those benefits aside from their loss of house. In crops, we are considering a benefit to replace the crops that they lose.
Will Barangay Ugasan benefit from the water supply of the project? The dam site is in Barangay Ugasan the barangay would appreciate if we could also benefit from the water supply of this project.	Currently the NIA is finalizing the Detailed Engineer Design for the project. We are seeing also the additional possible service area in our dam that will benefit from the project since it is near the reservoir. After our Detailed Engineering is approved, we come back here again and present to you our final output and details. So, right now Cap we are considering add-up in our irrigated area.

Issues and Concerns Raised	Response
Is the canal included in Barotac at the back of Biyak?	In our survey, the Biyak area is included and we are seeing that you will also have irrigation. What you are asking if it will be included in the canal of Barotac, it is separate. Biyak, is in the canal of Ugasan CIS. That is why they had a survey last time and asked question about your land so they will compute and will include in the irrigation system. We cannot finalize yet how many hectares will be included in your barangay because our detailed design is still on-going. We can finalize that if once our design is finished
In the Detailed design, if it is finished, for example in Barotac Viejo if 27% will benefit and in Banate is 78% farmers will benefit, if possible, can it be 50% in Barotac Viejo and 50% in Banate if possible.	As of the present design of the dam and the structure , we will elevate your suggestion to the management. As per design, we cannot force a land if the water is not possible. But we are considering to expand our area so we will bring this up to our designer in Ugasan SRIP, if it is possible to do a 50/50. We cannot assure you with this but we will try to bring this matter to the management.

4.2 Initial Perception Survey

In addition to the IEC activity, an initial perception survey was undertaken to gather preliminary issues and concerns of the stakeholders in the project area. The perception survey was undertaken in the three impact barangays. A total of 266 respondents were interviewed distributed as shown in Table 4-2.

Table 4-2: Distribution of Respondents by Barangay

Barangay	Freq	%
Ugasan, Barotac Viejo	104	39.10%
Juanico, Banate	87	32.71%
Bobon, Banate	75	28.20%
Total	266	100.00%

4.2.1 Respondent's Profile

Majority of the respondents are male (56.39%) (Table 4-3). Age of the respondents ranged from 22-79 years old with a median age of 50 years old (Table 4-4). Majority of the respondents (93%) identify as Ilonggo/Hiligaynon (Table 4-5). Majority of the respondents are married (Table 4-6) .

Table 4-3: Sex of Respondents

Sex	Freq	%
Male	150	56.39%
Female	116	43.61%
Total	266	100.00%

Table 4-4: Age of Respondents

Age	Male	%	Female	%	Total	%
21-25	3	2.00%	1	0.86%	4	1.50%
26-30	7	4.67%	5	4.31%	12	4.51%
31-35	11	7.33%	9	7.76%	20	7.52%
36-40	19	12.67%	17	14.66%	36	13.53%
41-45	20	13.33%	9	7.76%	29	10.90%
46-50	19	12.67%	6	5.17%	25	9.40%
51-55	19	12.67%	14	12.07%	33	12.41%
56-60	7	4.67%	15	12.93%	22	8.27%
61-65	18	12.00%	14	12.07%	32	12.03%
>65	19	12.67%	17	14.66%	36	13.53%
No response	8	5.33%	9	7.76%	17	6.39%
Total	**150**	**100.00%**	**116**	**100.00%**	**266**	**100.00%**

Table 4-5: Ethnicity of Respondents

Ethnicity	Freq	%
Cebuano	2	0.75%
Tagalog	4	1.50%
Ilonggo	248	93.23%

No Response	12	4.51%
Total	266	100.00%

Table 4-6: Civil Status of Respondents

Civil Status	Freq	%
Single	12	4.51%
Married	199	74.81%
Widow	26	9.77%
Separated	2	0.75%
Others	2	0.75%
Live-in	9	3.38%
No response	16	6.02%
Total	266	100.00%

Household size of the respondents ranges from 1 to 12 members per household. The average household size among the respondents is at 5 members per household. Total household population is at 1,080 with a dependency ratio of 56.07. (Table 4-7))

Table 4-7: Household Size

Household Size	Freq	%
1 Member	8	3.01%
2 Members	33	12.41%
3 Members	57	21.43%
4 Members	60	22.56%
5 Members	44	16.54%
6 Members	22	8.27%
7 Members	16	6.02%
8 Members	11	4.14%
9 Members	2	0.75%
11 Members	2	0.75%
12 Members	1	0.38%
No Response	10	3.76%
Total	266	100.00%
Household Age Range	**Freq**	**%**
0-14 Population	318	29.44%
15-64 Population	692	64.07%
>65 Population	70	6.48%
Household Population	1080	100.00%
Average Household Size	5.10	
Dependency Ratio	56.07	

In terms of religious affiliation, majority of the respondents are Roman Catholics (80.45%). Other religions present among the respondents are Protestant, Baptist, INC, Aglipayan and Islam). (Table 4-8)

Table 4-8: Religion of Respondents

Religion of Respondents

Religion	Freq	%
Roman Catholic	214	80.45%
Protestant	1	0.38%
Baptist	29	10.90%
Iglesia Ni Cristo	2	0.75%
Islam	1	0.38%
Aglipayan	5	1.88%
No Response	14	5.26%
Total	266	100.00%

In terms of highest educational attainment, around 24% were able to finish high school; 20% were able to reach elementary level, 17% finished elementary, 8 % reached college level while 11% finished college. Another 6.39% finished vocational education. (Table 4-9).

Table 4-9: Educational Attainment of the Respondents

Education	Freq	%
Elementary	44	16.54%
Elementary Undergraduate	54	20.30%
High School	64	24.06%
High School Undergraduate	24	9.02%
Vocational	17	6.39%
College	28	10.53%
College Undergraduate	21	7.89%
Post-Graduate	2	0.75%
No Response	12	4.51%
Total	266	100.00%

In terms in employment, majority of the respondents are farmers (60.53%). Contractual work, selling, family business, remittances and regular employment in private/government entity are the other forms of employment/source of income among the respondents. Of the 266 respondents, 26 mentioned that they have currently no work. (Table 4-10)

Table 4-10: Employment Status of the Respondents

Employment	Freq	%
None	26	9.77%
Regular Private/ Government Employee	5	1.88%
Contractual	29	10.90%
Selling	22	8.27%
Farming	161	60.53%
Family Business	11	4.14%
OFW Remittance	4	1.50%
No response	8	3.01%
Total	266	100.00%

4.2.2 Awareness of the Project

When asked of their awareness of the project, 207 out of the 266 respondents (77.82%) mentioned that they are aware of the project (Table 4-11). Of those aware of the project, the barangay officials are the most common source of information followed by NIA 6 and the Irrigator's Association (Table 4-12).

Table 4-11: Awareness of the Project

Awareness	Freq	%
Aware	207	77.82%
Not Aware	36	13.53%
No response	23	8.65%
Total	266	100.00%

Table 4-12: Source of Information

Source of Information	Freq	%
Neighbours	19	9.18%
Barangay Officials	134	64.73%
Local Government Unit	2	0.97%
IEC of NIA 6/IAs	43	20.77%
Media	1	0.48%
No response	8	3.86%
Total	207	100.00%

When asked of the perceived benefits of the project, employment opportunities, improvement of livelihood/farming activities are the most common perceived benefits of the project (Figure 4-3). On the other hand, health and safety concerns, loss of livelihood (dam area) and impacts on air, water and lands were among the perceived negative impacts of the project (Figure 4-4). When asked of their overall opinion of the project, around 47% of the respondents expressed some form of agreement over the project citing the increase in available water for irrigation as the main reason. On the other hand, around 35.5% of the respondents expressed some form of disagreement about the project citing safety reasons and that the project will not benefit their barangay (Ugasan) directly. Around 45 or 17.6% of the respondents mentioned that they are neutral about the project and would need more information (Table 4-13).

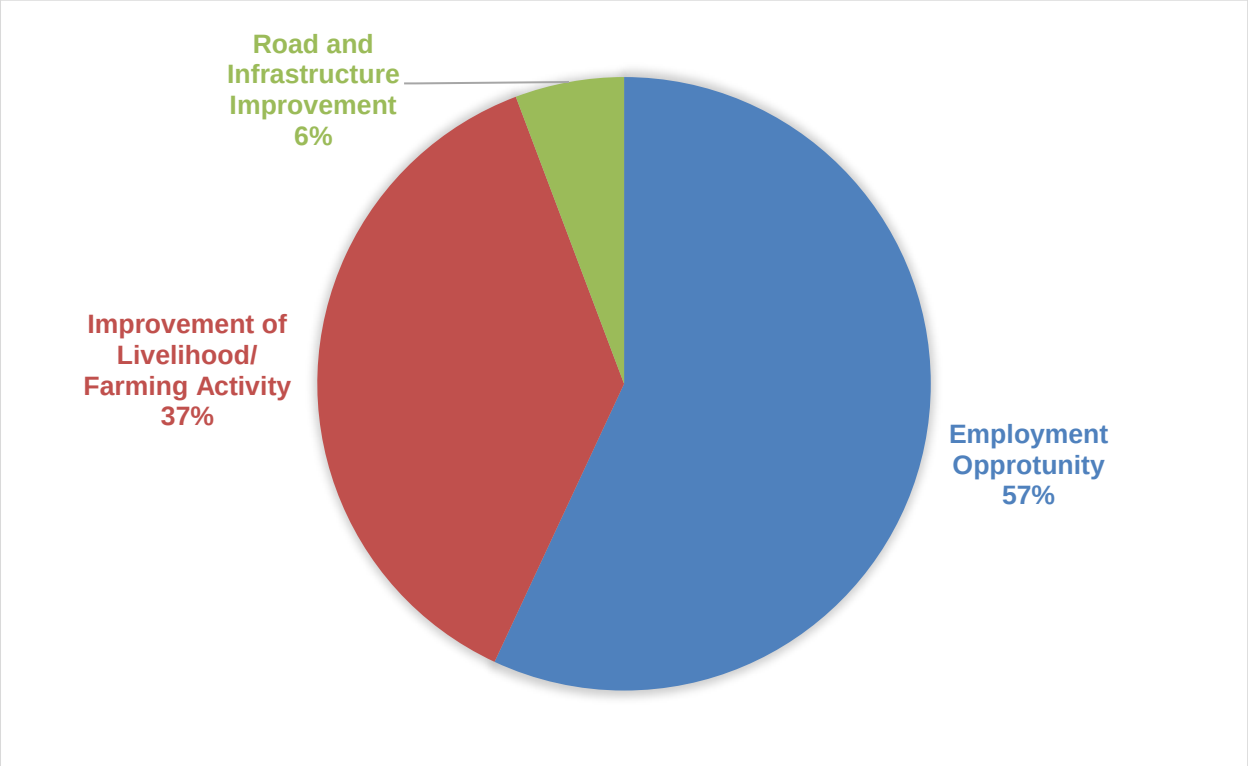


Figure 4-3: Perceived Project Benefits

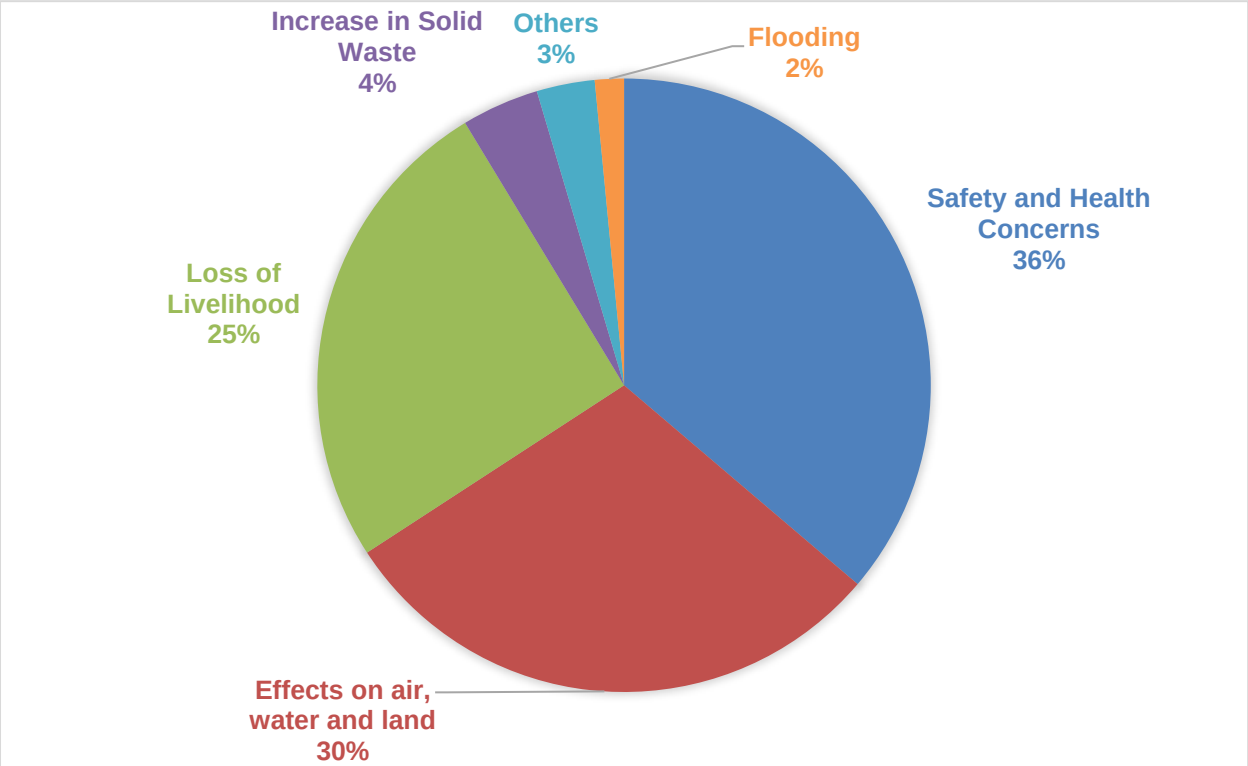


Figure 4-4: Perceived Negative Impacts

Table 4-13: Perception of the Project

Ranking	Freq	%
Strongly Agree	51	19.9%
Agree	69	27.0%
Neutral	45	17.6%
Disagree	14	5.5%
Strongly Disagree	77	30.1%
Average	3.43	

Annex 1: Presentation for Public Scoping

Ugasan-Juanico Small Reservoir Irrigation Project

Public Scoping

Lichel Technologies, Inc.

Outline

- Project Description
- Philippine EIS System
- Question and Answer

Lichel Technologies, Inc.

Project Description

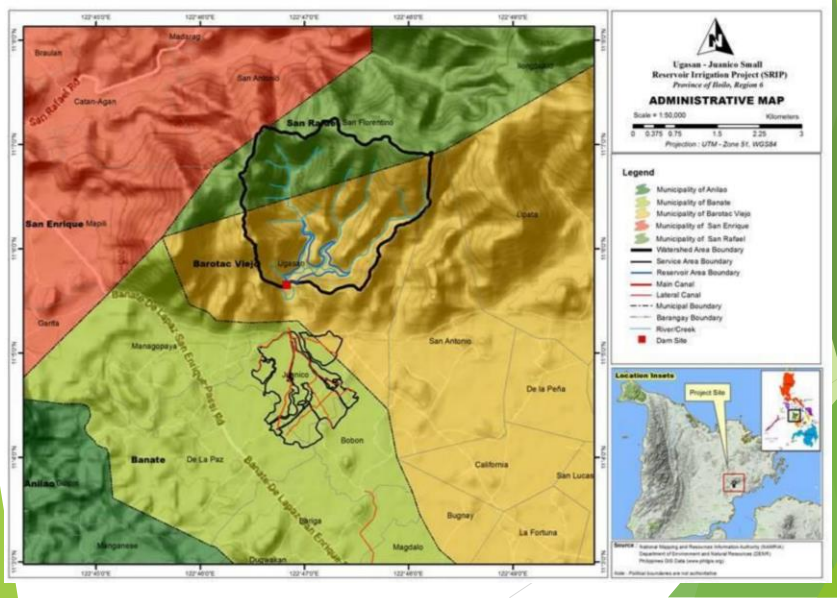
Project Name:	**Ugasan-Juanico Small Reservoir Irrigation Project (SRIP)**
Proponent:	National Irrigation Administration Region 6
Project Category	**Category A** 3.1.1 Dams with ≥25 ha Reservoir Area
Project Location	Municipalities of Banate and Barotac Viejo, Iloilo
Project Cost	Php 513, 974,238.35

Lichel Technologies, Inc.

Project Components

Project Component	Description	
Dam	Type	Central Core Earthfill Dam
	Elevation	86 m
	Height	38 m
	Crest Length	251m
	Crest Width	8 m
Spillway	Type	Ungated
	Crest Length	20 m
	Crest Width	20 m
	Crest Elevation	81.65 m
Reservoir	@Normal Water Level	
	Elevation	81.65 m
	Area	27.93 ha
	Capacity	3.2 MCM
Access Road	Existing	1.08 km
	New	0.25 km
Irrigation Canal	Existing	5.036 km
	New	3.447 km

Project Location



Project Benefits

- Benefits from Irrigation (increase in service area, increase in production)
- Benefit from Embankment and Access Roads
- Benefit from Fishery
- Employment Opportunities
- Tourism
- Recreational Activities
- Flood Control

Lichel Technologies, Inc.

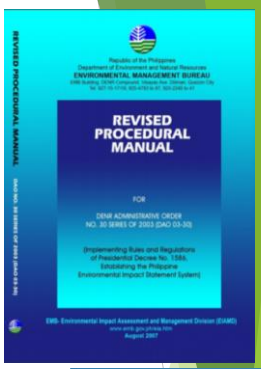
PHILIPPINE EIS SYSTEM

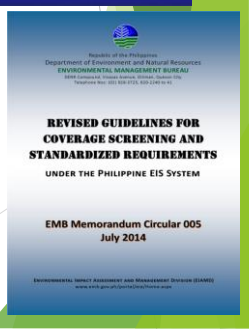
DENR ADMINISTRATIVE ORDER NO. 30 SERIES OF 2003 (DAO 2003-30)

Lichel Technologies, Inc.

Ang Philippine EIS System ay ipinagtibay ng PD 1586 (1978)

Nasasaad sa Seksyon 4 na "walang sinumang tao o korporasyon ang maaaring magsagawa o magpatakbo ng anumang proyektong deklaradong ECP o proyekto sa deklaradong ECA nang hindi kumukuha ng Environmental Compliance Certificate (ECC)."





NASASAKUPANG PROYEKTO AYON SA PP NO. 2146 (1981)

- Environmentally Critical Projects (ECPs)
- Projects located in Environmentally Critical Areas (ECAs)

Ang ECC ay hindi permit, kundi isang patunay na ang isang proyekto ay nagdaan sa masusing pagsusuri at ang mga nasasaad na “mitigating measures” sa dokumento ay magiging epektibo kung ipatutupad ang mga ito nang maayos at naaayon sa “Environmental Management Plan” o EMP.

Republic of the Philippines
Department of Environment and Natural Resources
ENVIRONMENTAL MANAGEMENT BUREAU
National Capital Region
National Kidney Unit Compound, East Avenue, Diliman, Quezon City

ENVIRONMENTAL COMPLIANCE CERTIFICATE
(Issued under Presidential Decree 1586)
ECC-NCR-1705-0030

THIS IS TO CERTIFY THAT THE PROPONENT, **SAN MIGUEL BREWERY, INC.**, represented by its AVP-Plant Manager, Roberto D. De Leon, is granted this ECC for the **Polo Brewery Greater Manila Supply Center**, located in a 100,820 square meter parcel of land along McArthur Highway, Barangay Marulas, Valenzuela City, by the Department of Environment and Natural Resources (DENR), through the Environmental Management Bureau-National Capital Region.

SUBJECT ONLY to the conditions and restrictions set in this ECC and in the attached document labeled as Annexes A & B.

This Certificate is issued with the following details:

PROJECT DESCRIPTION

The ECC amends the coverage of ECC no.96-NCR-VE-239/9602-028-107 issued on 13 December 2007 for the Polo Brewery Greater Manila Supply Center which consists of the following:

Particulars	From:	To:
Project	Alcoholic and Non-Alcoholic Beverage Manufacturing Plant	Alcoholic and Non-Alcoholic Beverage Manufacturing Plant and Concentrate Blending Facility
Production Capacity	72 Million Cases (852 Million MT/year of Alcoholic & Non-Alcoholic Beverage	72 Million Cases (852 Million MT/year of Alcoholic & Non-Alcoholic Beverage 600 MT/year of Ironized Beverage Bases

As per Annex "A" of EMB Memorandum Circular 05 Series of 2014, the project falls under item 1.6.8 and considered as Category B (Non-ECP) EIA.

This Certificate is issued in compliance with the requirements of Presidential Decree No. 1586 in accordance to DENR Administrative Order (DAO) No. 2003-30 and EMB Memorandum Circular 2014-005. Violation of any condition stated herein shall constitute sufficient cause for the cancellation of this Certificate and/or imposition of a fine in an amount not to exceed Fifty Thousand Pesos (P50,000.00) for every violation thereof without prejudice to imposition of fines and penalties under other environmental laws. The EMB, however, is not precluded from reevaluating and correcting any deficiencies or errors that may be found after issuance of this Certificate.

ANO ANG ENVIRONMENTAL IMPACT ASSESSMENT O EIA?

Ang EIA ay isang proseso ng pagsusuri sa mga epekto na maaaring idulot ng isang proyekto sa kapaligiran, mula sa pagtatayo (*construction*) hanggang sa pamamalakad (*operation*), at pag-abanduna (*abandonment*).

Kasama sa proseso ng EIA ay ang pagtukoy ng mga alternatibo at pamamaraan upang maiwasan o mabawasan ang maaaring masasamang epekto ng proyekto.

SINO ANG DAPAT MAGSAGAWA NG EIA?

- Tagapagtayugod ng proyekto (*Proponent*) at kasangguni nito sa EIA (*Consultant*)
- DENR Environmental Management Bureau
- DENR Review Committee
- Komunidad na apektado
- At iba pang mga maytaya (stakeholders) sa proyekto

Mahalaga ang pakikilahok ng mga taong maapektuhan ng proyekto mula sa simula ng pag-aaral, pag-paplano at pagsasagawa ng proyekto.

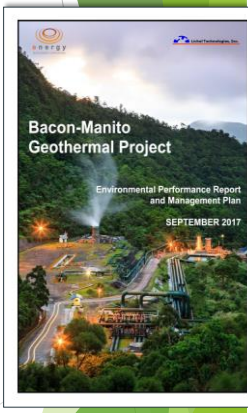
ANO ANG MGA NILALAMAN NG ISANG EIA STUDY?

Ang dokumento o report na resulta ng EIA na tinatawag na ENVIRONMENTAL IMPACT STATEMENT O EIS…

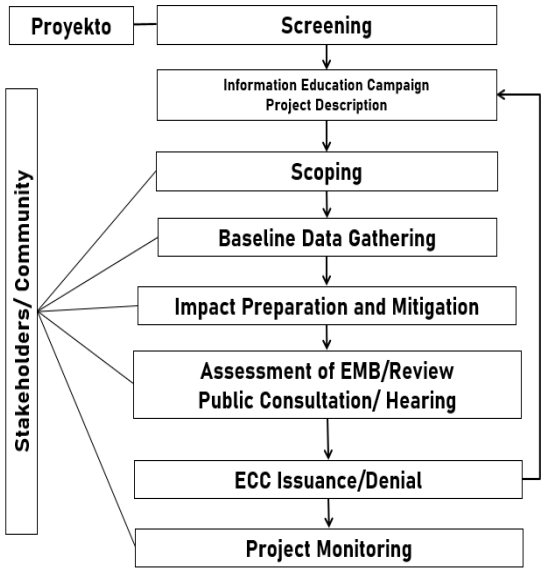
ENVIRONMENTAL IMPACT STATEMENT

Ang EIS ay naglalaman nga mga mahahalagang impormasyon tungkol sa:

- Binabalak na proyekto
- Kasalukuyang kalagayan ng kapaligiran
- Mga maaaring epekto ng proyekto sa kapaligiran
- Mga gawaing maaaring makababawas sa mga masasamang epekto o magpapalawig ng mga makabubuting epekto ng proyekto (mitigating and enhancement measures).



ANU-ANO ANG BAHAGI NG PROSESO NG EIA?



chnologies, Inc.

INFORMATION EDUCATION CAMPAIGN

Ang bahagi ng proseso ng EIA kung saan ang impormasyon ukol sa proyekto ay ipinakakalat sa iba't ibang sektor at kinakalap ang iba't ibang isyu at inaalam ang mga kinakailangang pag-aaral o pagsisiyasat na dapat isama sa pagsasagawa ng EIA.

SCOPING (PUBLIC AT TECHNICAL)

- Mapag-ugnay ang DENR at ang Proponent
- Pakinggan ang mga isyu at agam-agam ng mga taong maaapektuhan ng proyekto
- Matukoy ang mga isyu at alternatibong dapat suriin
- Matukoy ang mga batas na dapat sunurin at bigyan pansin

BASELINE CHARACTERIZATION

Ang bahagi ng EIA kung saan susuriin o pag-aaralan ang kasalukuyang kondisyon o antas ng iba't ibang aspeto ng kapaligiran (lupa, halaman, hayop, tubig, hangin at tao) bago isagawa ang proyekto.

Ito ay magsisilbing gabay upang matukoy ang anumang pagbabago sa kapaligiran na maaaring maganap bunga ng pagsasagawa ng isang proyekto

BASELINE CHARACTERIZATION

MODULES	KEY ENVIRONMENTAL ISSUES
Land	• Land Use and Classification • Geology/Geomorphology • Pedology • Terrestrial Ecology
Water	• Hydrology/Hydrogeology • Oceanography • Water Quality • Freshwater Ecology • Marine Ecology
Air	• Meteorology/Climatology • Air Quality (& Noise)
People	• Demographics • Access to Basic Social Services • Health and Safety • Culture

IMPACT PREDICTION, ASSESSMENT AND ENVIRONMENTAL MANAGEMENT PLAN

- Pagtaya ng maaaring maging epekto ng proyekto sa kapaligiran
- Pagmungkahi ng mga alternatibo at pamamaraan upang maiwasan o mabawasan ang maaaring masasamang epekto ng proyekto
- Paghain ng mga alternatibong susuriin upang mapanatili ang antas ng kapaligiran at masiguro ang maayos na kabuhayan ng mga mamamayang maaapektuhan

MGA PLANO AT PROGRAMA UPANG MASIGURO ANG PAG-ALAGA SA KAPALIGIRAN

- Environmental Management Plan (EMP)
  - Mga aspeto ng kapaligiran na dapat bantayan (lupa, tubig, hangin)
  - Nagsasaad kung gaano kadalas at kung saan dapat magmonitor
  - Naglalaman ng mga pamantayan o "standards" na dapat sundin
- Social Development Plan (SDP)
- Environmental Monitoring Plan
- Self-Monitoring Report (SMR)

EIA REVIEW

Procedural Review

-Pagusuri kung ang nilalaman ng naisumiteng EIS ay kumpleto.

Substantive Review

-Pagsusuri ng EIARC sa aktwal na nilalaman ng EIS para ito ay mabigyang komento at rekomendasyon

DECISION ON ISSUANCE OF ECC

Matapos ang lahat ng pagsusuri at rekomendasyon ng EIARC, ang desisyon sa pagbibigay ng ECC sa isang proponent ay isasawaga ng Environmental Management Bureau.

MONITORING

Hindi natatapos sa pagkuha ng ECC ang responsibilidad ng isang proponent. Ang mga monitoring plan na nakasaad sa EMoP ng EIS, maging ang mga kundisyon na kaakibat ng ECC ay dapat sundin at gawin ng proponent.

KAHALAGAHAN AT BENEPISYO NG PUBLIC PARTICIPATION

Ang "public participation" ang pinaka-epektibong proseso sa pagtugon sa mga isyu at agam-agam ng maaapektuhang sector at pagtukoy sa mga alternatibong maaring isaalang-alang sa proyekto.

Dito rin napapalawig ang tiwala ng mga stakeholders patungkol sa mga layunin proyekto at naisusulong ang responsibilidad ng lipunan sa pangangalaga ng kapaligiran

EXISTING ENVIRONMENTAL LAWS AND REGULATION

- Philippine Clean Water Act of 2004 (RA 9275) and its implementing rules (DAO 2016-08)
- Philippine Clean Air Act of 1999 (RA 8749)
- Ecological Solid Waste Management Act (RA 9003)
- Toxic Substances and Hazardous and Nuclear Wastes Control Act of 1990 – RA (6969)
- PD 1586 Philippine Environmental Impact Statement System
- And other environmental laws and regulations

END OF PRESENTATION
THANK YOU!

Any questions?

Annex 2: Attendance Sheets during the IEC

Lichel Technologies, Inc.

INFORMATION, EDUCATION AND COMMUNICATION ACTIVITY

ATTENDANCE

Project Title: **Ugasan-Juanico Small Reservoir Irrigation Project**
Project Location: **Municipalities of Banate and Barotac Viejo, Iloilo**
Project Proponent: **National Irrigation Administration Region 6**
Date and Time: **February 24 2022/9:00am**
Venue:

	Complete Name	Barangay/Office/Org	Contact No.	Signature
1	MARY ANN B. BASINANG	Dpted / Ugasan ES	09099250169	
2	JOEY B. PLANTIG	KAGAWAD	09202824400	
3	EDGEN P. Basinang	KAGAWAD		
4	Palmares, Eden Ann	SK CHAIRMAN	09802956992	
5	Elna P. Pomada	Brgy. Treas.	09176640211	
6	Senita E. Palabrica	Brgy Kagawad	09072347729	
7	TEDDY MANDOLOSACA	BRGY. KAGAWAD	09289353889	
8	MONA LIZA S. CAUSING	BRGY ADMIN. STAFF	09469571005	
9	REY B. PAMARICA	TEACHER - DEPED	09309849994	
10	Melonia S. Deasis	Brgy. Kagawad	09463420688	
11		Brgy		
12	Sowelyn Causing	Brgy. Ugasas		

Lichel Technologies, Inc.

INFORMATION, EDUCATION AND COMMUNICATION ACTIVITY

ATTENDANCE

Project Title: **Ugasan-Juanico Small Reservoir Irrigation Project**
Project Location: **Municipalities of Banate and Barotac Viejo, Iloilo**
Project Proponent: **National Irrigation Administration Region 6**
Date and Time: **February 24 2022/9:00am**
Venue:

	Complete Name	Barangay/Office/Org	Contact No.	Signature
1	Zenaida Palabrica	Brgy. Ugasan		Z Palabrica
2	Imayan Bacay	"		
3	Nito Palmares			
4	Malapa Eddie	IA President		
5	NICA T. AMAGAN	Women's Pres.	09163683713	
6	JEFFRY P. TENIS	PURONG POPOY	09505832276	
7	MARLON BADOYA	BRGY KAGAWAD	09107269987	
8	Ariel Abogada	Ugasan	09466183516	
9	Jojit Juanico	Ugasan	09302716681	
10	Robert Arcenal	Jesusco	09508687488	
11	TEDDY MANDOZA	MGA SAN	09253538859	
12	LEMUEL D. JORDAN	POBOB	09704801673	

Lichel Technologies, Inc.

INFORMATION, EDUCATION AND COMMUNICATION ACTIVITY

ATTENDANCE

Project Title: **Ugasan-Juanico Small Reservoir Irrigation Project**
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Project Proponent: **National Irrigation Administration Region 6**
Date and Time: **February 24 2022/9:00am**
Venue:

	Complete Name	Barangay/Office/Org	Contact No.	Signature
1	JUNNEL NAPORA	NIA -REGION 6		
2	MARY GRACE CAUSING	NIA - IGIMO		
3	SUZETTE T. SUMAGAYSAY	PROPER II BHW		
4	KELVIN G. TACDA	NIA RO		
5	Karren Grace A. Babica	NIA RO		
6	KENNETH JAMILLO	NIA RO		
7	[illegible]	LTI		
8	Emmanuel Cortes	LTI	09669300044	
9				
10				
11				
12				