

ANNEX 10

FACILITY STATUS AND RECTIFICATION PLAN FOR PILOT NIS

**THE STUDY
ON
THE IRRIGATORS ASSOCIATION STRENGTHENING PROJECT
IN
NATIONAL IRRIGATION SYSTEMS**

ANNEX 10

**FACILITY STATUS AND RECTIFICATION PLAN
FOR PILOT NIS**

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ANNEX 10 FACILITY STATUS AND RECTIFICATION PLAN FOR PILOT NIS

1 Introduction

1.1 General

Annex 10 presents the general profile of the 6 pilot NISs, the results of the joint walk through inspection conducted during the PRA survey at the pilot IAs, rectification plans for the areas, and cost estimate of the rectification projects.

1.2 Joint Walk Through Inspection

Joint walk through inspection, walking along canal and inspecting facilities and canals status, was conducted with IA members and NIA staff in the pilot IA areas during the PRA survey. The results of previous walk through inspection conducted by NISO staff pursuant to M.C. 13 in 2001 were used as initial information and verified during the inspection. Parcellary maps with structure locations were also used in the inspection to confirm location of critical problems as reported by farmers and NISO staff. Before the inspection, IA members and NISO staff selected the critical areas on the parcellary map and decide a route of inspection. The status of structures was classified into 4 levels as presented below.

Classification of Structure Status

	Classification	Remarks
FF	Fully functioning	
PD	Partly deteriorated	Functioning in satisfactory range
SF	Slight functioning	Not functioning well and/or affecting the discharge
NF	Not functioning	Completely not functioning

Items of rectification works are identified based on request of farmers and NISO staff during the inspection, but limited to minimal works to restore original function of the system. Improvement works, such as lining of canal were limited to include the list of the rectification works.

Out put of the walk through inspection are followings,

- a map of the each pilot IA pointed at location of the identified problems,
- up-dated walk through result with classification of each structure status in revised M.C. 13 form
- and, analysis table consisting of particular problem, its causes, proposed countermeasures, and cost estimate.

These out put are compiled in Data Book II and described following paragraph of the each system.

2 San Fabian RIS

2.1 Project Area

2.1.1 System

San Fabian River Irrigation System is located in municipality of San Fabian, San Jacinto and Manaoag, in Pangasinan province. The system was constructed in 1967 to 1969 and starts to irrigate in 1970. The system diverts irrigation water from Bued River with 297 km² watershed area. The firm up service area of the system is 2,288 ha. The service area is extended both right and left bank areas of Bued River, called San Fabian area, and San Jacient area, respectively. The intake is located at only right side of the river and two main canal, Main Canal F and Main Canal J are extended to each side. The system profile is summarized in Table 2.1 and its general layout map is shown in Figure 2.1.

2.1.2 Present Condition of Pilot IA Area

The pilot IAs area is selected at San Jacient side, all left bank side service area, composed of Scientific Farming IA, San Juan Babasit IA, and BGM IA. Scientific Farming IA is upstream IA irrigated by Main Canal J and Lateral AJ and BGM IA is midstream IA irrigated by Lateral BJ which diverted from Main Canal J. While San Juan Babasit is downstream IA irrigated by Main Canal J.

The intake gate for San Jacient area is located at right side of Bued River in front of the intake gate for San Fabian. 2.0 m height by 1.2 m width and about 460m conduit was installed under the river from the intake gate to left bank. The conduit is almost full of sediment therefore it is difficult divert water to San Jacient area. At the end of the conduit, the only 0.3 m height of opening was observed. A manhole on the conduit was closed by concrete to avoid dumping of obstructions. Although flume type canal was constructed in 2,700 m in Main Canal J and 1,420 m in Laterals, damages on lining including illegal turnouts and overflow of irrigation water were observed during field inspection. The cause of the overflow is mainly heavy siltation in the canal. All turnouts have no gate and all headgates and checkgates are damaged. Farm ditches are seldom found after the turnouts. These above mentioned out of water control conditions in San Jacient area causes yearly water shortage at downstream, San Juan Babasit IA area, particularly during dry season. Furthermore the reducing discharge at the river due to adverse effect of earthquake in 1990, the denudation of watershed of the river and construction of Communal Irrigation System along the upper reach portion of the diversion dam worsen the shortage. To improve this water shortage status in San Juan Babasit IA, NISO will implement construction of deep wells for

supplemental water supply. The result of walk through inspection is indicated on the maps of each pilot IA shown in Figure 2.2 to 2.4 and the irrigation facility status in the area is summarized in Table 2.2.

2.2 Rectification Project

2.2.1 Rectification Project in Pilot IAs Area

The major rectification works in the pilot IAs area of San Fabian are desilting of canal, re-installation of gates, and repair of lining. Desilting work along the main canal is estimated about 1 to 2 m depth and mechanical desilting is necessary. The laterals also need to desilt and each IA may implement by manual. All turnouts including illegal turnouts are to be review and selected for authorized turnouts through re-activation of TSAG. All of the authorized turnouts will be construct with new gates. Other turnouts shall be closed. All headgates and checkgates are also repaired to be operational. Repair of the three existing check dams along the creek area also includes to improve water distribution in downstream of Scientific Farming IA area. Construction of farm ditches is not included in the rectification works because the re-construction works shall be implemented by farmers themselves through re-activation of TSAG.

All proposed rectification works are tabulated per the pilot IAs in Table 2.3 to 2.5.

2.2.2 Rectification Cost

The total rectification cost in each pilot IA is shown in Table 2.6 and summarized in below. Total cost of Php 11.1 million is only direct cost, not includes any indirect cost.

Rectification Cost in Selected IAs Area (San Fabian)		
Item of Works	Quantity	Cost
1.1 Headworks improvement		P406,000
2.1 Canal desilting	2,900 m ³	P252,000
2.2 Canal embankment	1,570 m ³	P251,000
2.3 Repair & heightening of canal lining	5,540 m ²	P2,365,000
2.4 Farm ditch		P32,000
3.1 Repair of irrigation structure	6 units	P370,000
3.2 Headgate / Checkgate	6 units	P320,000
3.3 Turn-out	86 units	P2,192,000
4.1 Service road rehabilitation	2 km	P210,000
5.1 Repair of check dam along Balanay Creek	3 dams	P4,728,000
Total of rehabilitation cost		P11,126,000

3 Angat RIS

3.1 Project Area

3.1.1 System

Angat RIS is located in municipality of San Rafael in Bulacan province. The system was completed in 1967. The system has the impounding dam at upstream and diverts by the diversion dam from Angat River with 613 km² watershed area. The service area is extended both side of Angat River, irrigated through north main canal and south main canal from the diversion dam. The system profile is summarized in Table 3.1 and its general layout map is shown in Figure 3.1.

3.1.2 Present Condition of Pilot IA Area

The pilot IAs are located along Sub-lateral D-1 diverge from Lateral D where NISO plan to implement irrigation management turnover to the IAs. Out of Lateral D area of 4,151 ha, the area of the pilot IAs is 1,393 ha. Picaba IA is located upstream IA irrigated by Lateral D, Lateral D-1 and Lateral D-1 Extra. Along Lateral D-1, Balucoc IA is located midstream IA and Josephian IA is downstream among of the pilot IAs..

The facilities of the system in the pilot area are relatively well maintained including gates. However, there are huge illegal turnouts observed during the inspection. (30 authorized turnouts and 145 illegal turnouts in 1,393 ha) Huge numbers of the illegal turnouts are caused by wide coverage of the original turnouts, weakened TSAG, and demolition of farm ditches causes. Urbanization in upstream of the pilot area along Lateral D is significant influence to the system. Connection of many drainpipes and sewer from houses and garbage dumping were observed. Not only water management but also contamination of water is concerned due to multi-utilization of irrigation water at downstream such as laundry, taking bath, and swimming.

The result of walk through inspection is indicated on the maps of each pilot IA shown in Figure 3.2 to 3.4 and the irrigation facility status in the area is summarized in Table 3.2.

3.2 Rectification Project

3.2.1 Rectification Project in Pilot IAs Area

The major rectification works in the pilot IAs area of Angat RIS are re-installation of turnout gates, desilting canals, and widen narrow dike of canals. Most of illegal turnouts have only a pipe installed in canal dike without gate. Water control of

these turnouts is done using mad or stone, but closing of the turnouts is termination period only before harvest. This is cause of waste of water. Narrow canal dike encroached by farmers is also one of the causes of illegal turnouts. Maintain certain width of service road is necessary to access to farms and convey farm products. Both side of canal dike will re-construct to original width of service road.

All proposed rectification works are tabulated per the pilot IAs in Table 3.3 to 3.5.

3.2.2 Rectification Cost

The total rectification cost in each pilot IA is shown in Table 3.6 and summarized in below. Total cost of Php 6.2 million is only direct cost, not includes any indirect cost.

Rectification Cost in Selected IAs Area

Item of Works	Quantity	Cost
2.1 Canal desilting	12,300 m ³	P1,184,000
2.2 Canal embankment	10,100 m ³	P1,616,000
3.1 Repair of irrigation structure	2 unit	P15,000
3.2 Headgate / Checkgate	7 units	P428,000
3.3 Turn-out	102 units	P2,040,000
4.1 Service Road Rehabilitation	6.9 km	P966,000
Total of rehabilitation cost		P6,249,000

4 Bago RIS

4.1 Project Area

4.1.1 System

Bago River Irrigation System is located mostly in Bago City, Negros Occidental province. The system was constructed in 1959 and completed 1969. The system was rehabilitated in 1983 and another rehabilitation project funded by JBIC will start in this year. The system diverted irrigation water from Bago River by the diversion weir with 616 km² watershed area. The firmed up service area is 12,700 ha. The system can divided two district, north and south. The north district is extended from the intake to north side of Bago River. The south district is extended south side of the river after crossing the river at middle of the main canal. The system profile is summarized in Table 4.1 and its general layout map is shown in Figure 4.1.

4.1.2 Present Condition of Pilot IAs Area

The pilot IAs area is selected all IAs along Lateral E in the north district. There

are 3 IAs from upstream Atidu IA, Amana IA and Bunasabala IA. Only Atidu IA has other source of irrigation besides Lateral E, i.e. Main Canal and Lateral D. The pilot area covers 2,234 ha.

Facility status in the area has been found to be moderate condition. The ration of unauthorized turnout (UTO), however, is relatively high. The UTOs were observed at the upstream and midstream IAs and more than 90% of UTOs did not have gates. Only one UTO was observed at the downstream. While most of the gates of the authorized turnouts are damaged or deteriorated and those are hardly to operate. Although some area at the upstream was enjoy third crop, but the downstream of Lateral D and E area could not irrigated even in wet season. Existing of the many UTOs are obviously causes of the shortage of water at the downstream.

Narrow canal dikes encroached by farmers, planting plants on the dikes and inside canals were also observed. Most area of the service road had many potholes and became difficult to pass during rain.

Although there was shortage of irrigation water at the downstream of Lateral D, overflow at upstream was reported. An unnecessary siphon for road crossing at Station 0+600, a small size of culvert at Station 0+112, and vegetated and silted canal cause of the overflow.

The result of walk through inspection is indicated on the maps of each pilot IA shown in Figure 4.2 to 4.4 and the irrigation facility status in the area is summarized in Table 4.2.

4.2 Rectification Project

4.2.1 Rectification Project in Pilot IAs Area

The major rectification works in BagoRIS are re-installation or repair of turnout gates, repair of headgates and checkgates, re-construction of canal dikes, and rehabilitation of service roads. All turnouts without gates and deteriorated gates will be replaced with new ones after re-organizing TSAG. The checkgates along the main canal for Lateral D and E and headgate of Lateral D will be replaced or repaired to be operational for proper water distribution. All obstructions on the dike and inside the canals will be removed by the IAs and the dike will be widened as the original design for recover the original function as service way. To revive function of service road, leveling and graveling will be implemented along Lateral D and Lateral E. To improved water flow along Lateral D, obstructed structures, such as the siphons and the culvert will be demolished.

All proposed rectification works are tabulated per the pilot IAs in Table 4.3 to 4.5.

4.2.2 Rectification Cost

The total rectification cost in each pilot IA is shown in Table 4.6 and summarized in below. Total cost of Php 8.6 million is only direct cost, not includes any indirect cost.

Rectification Cost in Selected IAs Area

Item of Works	Quantity	Cost
2.1 Canal desilting	6,600 m ³	P528,000
2.2 Canal embankment	9,255 m ³	P1,481,000
2.3 Repair & heightening of canal lining	2,593 m ²	P606,000
2.4 Farm ditch		P50,000
3.1 Repair of irrigation structure	27 units	P383,000
3.2 Headgate / Checkgate	16 units	P1,070,000
3.3 Turn-out	127 units	P2,555,000
4.1 Service Road Rehabilitation	11.4 km	P1,596,000
5.1 Repair of Water Master Technician Station	1.0 unit	P300,000
Total of rehabilitation cost		P8,569,000

5 Labangan RIS

5.1 Project Area

5.1.1 System

Labangan River Irrigation System is located in municipality of Labangan and a part of Pagadian City, in Zamboanga del Sur province. The system was constructed in 1955 and completed in 1959. The system diverted irrigation water from Labangan River by a free intake with 434 km² watershed area. The firm up service area is 3,195 ha extends at right and left bank of the river. Only two irrigators association existed and covers right and left bank side of the river respectively. The system profile is summarized in Table 5.1 and its general layout map is shown in Figure 5.1.

Christian society and Muslim society coexist in the system, but separately inhabit in the area. The Muslim society has sultans who have strong influence among of the society and mainly stayed southern part of the system between the national highway and seashore before. But after irrigation had been introduced in the area, the Muslim society expanded to northern part of the highway and encroaching the Christian society who had immigrated into the area.

5.1.2 Present Condition of Pilot IA Area

Only two IAs, Munchrist IA and Sandata IA cover all service area of the system. Therefore, the pilot area is equivalent the system area. Munchrist IA is irrigated by the main and laterals canals and extended at the left bank side. While Sandata IA is diverted water at main canal at Station 2+682 through Lateral A crossing the Labangan River by the siphon and extended at the right bank side. Both IA members are mixture of Christian and Muslim.

The irrigation water has been diverting from a new intake by free intake type. There is no diversion dam at the present intake. During dry season coffer dam is necessary to lead the flow to the intake. The old diversion dam had been constructed in 1959 and rehabilitated in 1986 including heightening of the fixed weir, but it has been abounded due to impassable water flow from the intake to the canal. The huge sedimentation in main canal inverted elevation at the intake to be lower. The causes of huge sedimentation in main canal are facing to river flow at the intake gate without trash rack and directly entering surface drainage water from hillside to the main canal from beginning point to headgate of Lateral A.

Conveyance structures, such as culvert, drop, siphon and flume were relatively good condition, but almost all gates and turnouts were not functional. There are 242 turnouts and only 5% of them have gates. Illegal turnouts are counted 92 and almost all of them do not have gates. Most of headgate and checkgate were deteriorated and not functional.

Siltation was observed all canals and caused overflow at inlet of some siphons and culverts. Narrow dikes that were encroached by farmers were observed at downstream of the canals.

The results of walk through inspection are indicated on the each pilot IA map shown in Figure 5.2 to 5.4 and the irrigation facility status in the area is summarized in Table 5.2.

5.2 Rectification Project

5.2.1 Rectification Project in Pilot IAs Area

Major rectification works in Labangan are headworks improvement, desilting canal, widening canal dike, installation of cross drains, excavation of drainages, re-installation of turnouts and gates, construction of flood protection dike to protect the canal, and construction of a spillway bridge at Labangan River.

As the rectification works to restore the function of the system, the only present

free intake will be enforced including repair of one malfunctioned intake gate. Rehabilitation of the existing old diversion dam will not include the rectification works. The reactivation of the existing dam consisting of desilting inside the conduit and replacement of a sluice gate will be implemented during main system rectification in the national replication project.

Besides of desilting works in the canals, to minimized siltation at upstream of the main canal, installation of 3 new cross drains, reviving of an existing silt excluder at the main canal Station 1+124, strengthening of the main canal slope at connection with drainage will be implemented.

All trees, plants and obstructions on the dikes and inside the canals will be removed by the IAs and the dikes will be widened as the original design for recover the original function as service way. To revive function of service road, leveling and graveling will be implemented along the main canal and the lateral canals, especially in downstream.

The several siphons along the main canal will be improved and reinforced to prevent overflow or possible damages. Declogging in the conduits, heighten wingwall, additional concrete protection on the conduit will be implemented.

Re-installation of gates for headgate, checkgate, and turnout, restoring of canal dike, and desilting canal will be executed for proper water delivery

All proposed rectification works are tabulated per the pilot IAs in Table 5.3 to 5.4.

5.2.2 Rectification Cost

The total rectification cost in each pilot IA is shown in Table 5.5 and summarized in below. Total cost of Php 35.5 million is only direct cost, not includes any indirect cost.

Rectification Cost in Selected IAs Area

Item of Works	Quantity	Cost
1.1 Headworks improvement		P1,500,000
1.2 Siphon under Labagan River		P700,000
2.1 Canal desilting	57,870 m ³	P4,647,000
2.2 Canal embankment	24,694 m ³	P3,541,000
2.3 Repair & heightening of canal lining	590 m ²	P136,000
2.4 Excavation along drainage canal	40,050 m ³	P3,204,000
3.1 Repair of irrigation structure	56 units	P7,510,000
3.2 Headgate / Checkgate / Floodgate	27 units	P1,620,000
3.3 Turn-out	295 units	P5,920,000
4.1 Service road rehabilitation	2.5 km	P350,000
4.2 New service road	0.32 km	P320,000
5.1 Flood protection dike along Pulacan Creek	425 m ³	P2,595,000
5.2 Spillway bridge at Labagan River	1 unit	P3,500,000
Total of rehabilitation cost		P35,543,000

6 Pulangui RIS

6.1 Project Area

6.1.1 System

Pulangui River Irrigation System is located in Valencia City, Malaybalay City and municipality of Quezon, in Bukidnon province. The system was constructed in 1975 and completed in 1983. The system diverted irrigation water from Pulangui River by the diversion weir with 1,394 km² watershed area. The firm up service area of the system is 11,415 ha. The service area extends mainly at left bank side of the river irrigated through Main Canal South. The right bank side about 2,096 ha is irrigated through Main Canal North. Tributaries of Pulangui River are also irrigated at southern part of the system, area about 1,897 ha. The system profile is summarized in Table 6.1 and its general layout map is shown in Figure 6.1.

6.1.2 Present Condition of Pilot IAs Area

The pilot IAs area is located along Lateral G which is the longest lateral canal, irrigating about 3,600 ha, diverted from Main Canal South at Station 11+300. 5 IAs belong to Lateral G and the pilot IAs are located in middle of the 5 IAs, from upstream Paradise G5 & G6 IA, Kafugpungan IA, and MAD IA. Paradise G5 & G6 and Kafugpungan IAs were irrigated almost all area during wet and dry season except downstream of the sub-lateral canals. But MAD IA located downstream was irrigated about 70 to 90 % of the area. There was shortage of irrigation water in downstream of Lateral G and the sub-lateral canals, therefore, water re-use using check structures or direct drainage connections had been constructed to

utilize drain water from higher area of Lateral G irrigated by tributaries of Pulangui River.

Facility status in the area has been found to be moderate condition. The ration of unauthorized turnout (UTO), however, is relatively high. The UTOs were observed at the upstream and midstream IAs and more than 80% of UTOs did not have gates. While half of the gates of the authorized turnouts were damaged or no gate to be replaced. Although water control facilities were not function, there in no serious water shortage due to abundant water resources and plenty of water re-use systems.

All sub-lateral canals at near headgate have a parshall flume, but these are not utilized because of no measurement record system and uncontrolled headgate and/or checkgate. Some of parshall flume was affected by erosion at downstream.

Status of service roads was worse. Several part of service roads including along Lateral G were unpassable during the inspection. Potholes, eroded slope, and abandoned desilted material on the road were obstructed.

The result of walk through inspection is indicated on the maps of each pilot IA shown in Figure 6.2 to 6.4 and the irrigation facility status in the area is summarized in Table 6.2.

6.2 Rectification Project

6.2.1 Rectification Project in Pilot IAs Area

The major rectification works in Pulangui RIS are desilting of canal, repair of irrigation structure, relocation and re-installation of turnouts, rehabilitation of service road, and construction of check structures along drainages.

Lateral G and the all sub-laterals were necessary to desilt. The NISO conducted desilting works using backhoe yearly, but sedimentation in the canals was observed. Manual desilting works by IA members in the sub-laterals is necessary to maintain smooth water delivery.

8 headgates of the Sub-laterals G-8 to G-14 and Sub-lateral G-6A will be replaced by new gate for control of water during water termination period and water crisis. 80 turnouts that are selected through TSAG reactivation, also will be installed new gates.

Check structures at drainages for utilization of drainage water to irrigation will be constructed in each IA. Downstream of Sub-lateral G-6, G-7, and G-14 will be benefited.

Service road will be embanked, removed silted material, trees, and plants, leveled, and graveled to be passable. Unpassable service road along Lateral G in Kahugpungan and MAD IAs and Sub-lateral G-5, G-6A, G-7, G-8 are urge to rehabilitate.

All proposed rectification works are tabulated per the pilot IAs in Table 6.3 to 6.5.

6.2.2 Rectification Cost

The total rectification cost in each pilot IA is shown in Table 6.6 and summarized in below. Total cost of Php 10.9 million is only direct cost, not includes any indirect cost.

Rectification Cost in Selected IAs Area

	Item of Works	Quantity		Cost
2.1	Canal desilting	17,742	m ³	P1,422,000
2.2	Canal embankment	800	m ³	P128,000
2.3	Repair & heightening of canal lining	745	m	P221,000
2.4	Farm ditch			
3.1	Repair of irrigation structure	20	units	P1,128,000
3.2	Headgate / Checkgate	14	units	P620,000
3.3	Turn-out	80	units	P1,524,000
4.1	Service road rehabilitation	21.8	km	P4,049,000
4.2	New access road	0.24	km	P240,000
4.3	Repair of road structure	2		P78,000
5.1	New check structure along drainage	3	units	P1,533,000
Total of rehabilitation cost				P10,943,000

7 Mal RIS

7.1 Project Area

7.1.1 System

Mal River Irrigation System is located in municipality of Matanao in Davao del Sur province, approximately 65 km south of Davao City. The system was constructed in 1987 and completed in 1992. The system diverted irrigation water from Mal River by the diversion weir with 152 km² watershed area. The firm up service area is 2,613 ha, but the system has a potential area of 3,036 ha. The service area extended at right and left bank of the river and irrigated by Right Main Canal and Left Main Canal respectively. The system profile is summarized in Table 7.1 and its general layout map is shown in Figure 7.1.

7.1.2 Present Condition of Pilot IAs Area

The pilot IAs area, WESLASUFIA, LABAKAFIA, and MALKAIRA, is located

in middle of Right Main Canal. WESLASUFIA is irrigated through Lateral C, LABAKAFIA is Right Main Canal and Lateral E, and MALKAIRA is Lateral F. All of these canals are lined and maintained as a functional condition. Only one gate out of 5 headgate and checkgate, and 5 turnouts out of 15 needed to repair. There is only one illegal turnout out of 15 turnouts in the area. Overflows were observed at the laterals during the walk through inspection because the rotational water distribution applied to the continuous irrigation designed canals. The rotational water distribution method was yearly excised during shortage of water in dry season. Shortage of water in this dry season is very serious due to El Niño.

The result of walk through inspection is indicated on the maps of each pilot IA shown in Figure 7.2 to 7.4 and irrigation facility status is summarized in Table 7.2.

7.2 Rectification Project

7.2.1 Rectification Project in Pilot IAs Area

The major rectification works in Mal RIS are extension and heightening of lining canals and construction of new service road along the new lateral canals. Rectangular concrete hollow block lining will be heightened at part of Lateral C, Lateral E and Lateral F where overflow irrigation water due to insufficient discharge capacity for rotational water distribution. Culverts along the laterals are also replaced with larger size to accommodate rotational discharge. 4 culverts along Lateral E and 3 culverts along Lateral F will be improved. Extension of lining and service road along a main farm ditch after end of Lateral C will be constructed to improve shortage water distribution at downstream of WESLASUFIA. For improvement of accessibility of farm to market and facilitation of proper maintenance works, construction of new service road along Lateral E and Lateral F are also included in the project. Metal works are only one replacement of damaged checkgate for Lateral C at Right Main Canal and installation of 2 turnout gates. Besides of extending lining after Lateral C, construction of a check structure along the creek in WESLASUFIA for supplemental supply of water during dry season is proposed.

All proposed rectification works are tabulated per the pilot IAs in Table 7.3 to 7.5.

7.2.2 Rectification Cost

The total rectification cost in each pilot IA is shown in Table 7.6 and summarized in below. Total cost of Php 11.3 million is only direct cost, not includes any indirect cost.

Rectification Cost in Selected IAs Area

Item of Works	Quantity	Cost
2.2 Canal embankment	1,095 m ³	P176,000
2.3 Repair & heightening of canal lining	2,780 m	P2,873,000
3.1 Repair of irrigation structure	10	P406,000
3.2 Headgate / Checkgate	1 unit	P60,000
3.3 Turn-out	3	P41,000
4.1 Service road rehabilitation	1.3 km	P180,000
4.2 New service road	4.24 km	P4,240,000
5.1 New check structure along creek	2 units	P3,328,000
Total of rehabilitation cost		P11,304,000

Table 2.1 Major Feature of San Fabian RIS

Location:		
Region		I
Province		Pangasinan
Operation Started		1970
Annual Rainfall		2,804 mm
Main Source of River		Bued River
Watershed Area at Intake		297 km ²
Number of Farmers		3,005 nos
Number of IA members		1,833 nos
Number of IA		7 IAs
Service Area		2,288 ha
Irrigated Area (Cropping Intensity) in 2001		
Wet Season		1,475 ha (64%)
Dry Season		1,107 ha (48%)
Irrigation Service Fee Collection		
Wet Season		37%
Dry Season		77%
Headworks		Diversion Dam (Height 3.5m, Length 206 m)
Design Discharge at Intake		8.4 m ³ /sec
Length of Canal (km)		
Main Canal		MCJ = 9.5 km, MCF = 6.0 km
Lateral Canal		32.0 km km
Drainage Canal		7.6 km
Length of Service Road		54.7 km

Source: NIA Data Base & NISO

Table 2.2 Irrigation Facility Status in San Fabian RIS

CANAL	Canal (m)			Headgate				Checkgate				Turn-out				Unauthorized Turn-out				Conveyance Structures			
	Total	Good	Rehab	FF	PD	SF	NF	FF	PD	SF	NF	FF	PD	SF	NF	FF	PD	SF	NF	FF	PD	SF	NF
Scientific Farming IA																							
Main Canal J	4,300	1,760	2,540					1							1	2				2	6		
Lat. A-J	3,340	450	2,890			1										7					3		
Lat. AJ-1	2,400	0	2,400			1															1	1	
<i>Sub-total</i>	<i>10,040</i>	<i>2,210</i>	<i>7,830</i>	<i>0</i>	<i>0</i>	<i>2</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>1</i>	<i>0</i>	<i>0</i>	<i>42</i>	<i>0</i>	<i>0</i>	<i>1</i>	<i>9</i>	<i>0</i>	<i>0</i>	<i>2</i>	<i>10</i>	<i>1</i>
BGM IA																							
Lat. BJ	3,110	500	2,610			1								13			6				3	1	
<i>Sub-total</i>	<i>3,110</i>	<i>500</i>	<i>2,610</i>	<i>0</i>	<i>0</i>	<i>1</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>13</i>	<i>0</i>	<i>0</i>	<i>6</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>3</i>	<i>1</i>
San Juan Babasit IA																							
Main Canal J	5,200	0	5,200					1						23			14			1	7	9	
<i>Sub-total</i>	<i>5,200</i>	<i>0</i>	<i>5,200</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>1</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>23</i>	<i>0</i>	<i>0</i>	<i>14</i>	<i>0</i>	<i>0</i>	<i>1</i>	<i>7</i>	<i>9</i>	<i>0</i>
Total	18,350	2,710	15,640	0	0	3	0	0	0	1	1	0	0	78	0	0	1	29	0	1	9	22	2

FF : Fully functioning, PD : Partly deteriorated, but functioning in a satisfactory range,

SF : Slight functioning. Not functioning well and/or affecting the discharge, NF : Completely not functioning

Source: Result of walk through, MC13

Table 2.3 Rectification Plan - San Fabian RIS, Scientific Farming IA

Region : 1
 NIS : San Fabian River Irrigation System
 IA : Scientific Farming IA

Particular	Engineer's Views					
	Problems	Causes of problems	Proposed counter measures for problems	Estimated Volume of Works	Estimated Cost of Works (Peso)	Conditions to be considered for implementation
Headwork/Diversion Dam	Blocking of dam barrel by upstream farmers.	Siltation inside the barrel and reduced irrigation diversion requirement at downstream.	Fabrication and installation of permanent man hole cover	Class A concrete 1m3	6,000	
Headwork/Diversion Dam	Scoured bottom of weir at left side of diversion dam.	Damaged by flood during Feria typhoon	River channelization and back filling	Excavation 2,000m3 Embankment 1,500m3	400,000	During dry season
MCJ Sta. 0+000 to 0+540	Lined canal was partially damaged	Scoured canal embankment and overflowing of water	Repair of partial damaged lined canals	Lining Canal 1,600m2	368,000	During cut off
MCJ Sta. 0+000-1+080	Illegal pumping during dry crop season	Not including service area	Include in the final listing of the IA/be a member of the IA			
MCJ Sta.0+540 (siphonic type structure) & drainage crossing	Water overflow at inlet, back water to upstream	Right wing wall portion of the structure was damaged	Repair the damaged wingwall of the structure	CHB lining 27m3	136,000	
		Silted canal bed after the outlet of the siphon	Desilting of the outlet canal bed	Desilting 50m3	4,000	
MCJ Sta. 0+540 to 1+080	Over flowing of water	Silted canal bed	Desilting of canal bed	Desilting 900m3	72,000	
MCJ sta. 1+520 to 3+680 (Lined Canal)	Over tapping of irrigation water from rectangular canal	Scoured of canal embankment and service road, canal capacity is not enough	Increase canal wall height	CHB lining 350m3	1,768,000	
MCJ Sta. 1+800 Check gate	No steel gate	Broken by farmers	Installation of steel gate	Steel gate 1pc	60,000	
MCJ Sta. 2+188 Farm ditches	No farm ditches	Not provided during project	Construct farm ditches	Excavation 400m3	32,000	
MCJ Sta. 2+320 Culvert	Low embankment	Scoured of canal embankment	Repair of canal embankment	Embankment 200m3	32,000	
MCL sta. 3+532 Siphoned with Submerged bridge(Spillway type)	Damaged spillway structure for drainage. Road hole affects the accessibility for O&M and farmers works	Downstream of spillway was washed out	Repair the damaged spillway structure Provide gabion at downstream	Backfilling 10m3 Gabion 25m3 Concrete A 1.0m3	135,000	
MCJ sta. 3+680 Checkgate for Lateral A-J	No check gate at main canal to Lat. AJ	Broken by farmers	Fabrication of gate	Steel gate 1pc	60,000	
MCJ sta. 3+750 Cross drain	Submergence of paddy rice	Small size of drainage pipe	Improved drainage facilities	Excavation 40m3 RCP dia.30" 6pcs Concrete A 3.0m3 Backfilling 40m3	42,000	
MCJ sta. 0+000 to 4+300	Farmers installed 10 STW pump	Shortage of water supply during dry crop	Obligated the farmers to pay ISF			
Lat. AJ Sta.0+000 headgate	No steel gate	Removed by farmers	Fabrication of gate	Steel gate 1pc	60,000	
Lat AJ sta. 0+550	Collapsed canal lining, clogged check structure	Typhoon damage Presence of boulders inside structures	Repair the collapse lining, declogging of the structures	Concrete A 20m3	124,000	

Table 2.3 Rectification Plan - San Fabian RIS, Scientific Farming IA

Region : 1
 NIS : San Fabian River Irrigation System
 IA : Scientific Farming IA

Particular	Engineer's Views					
	Problems	Causes of problems	Proposed counter measures for problems	Estimated Volume of Works	Estimated Cost of Works (Peso)	Conditions to be considered for implementation
Lat. AJ Sta. 0+680 Siphone	Low embankment at outlet	Eroded by overflow water and typhoon	Repair embankment	Embankment 100m3	16,000	
Lat. AJ Sta. 1+980 Culvert with Check structure	Low embankment	Eroded by overflow water and typhoon	Repair embankment	Embankment 100m3	16,000	
Lat. AJ Sta. 3+100-3+340	Waste water flow into Lat. AJ from beverage factory	Drainage pipes from factory connect Lat. AJ.				
Lat. AJ-1 Sta.0+000 headgate	No steel gate	Removed by farmers	Fabrication of gate	Steel gate 1pc	60,000	
Lat. AJ-1 Sta.0+370 Check	No headwall & steel gate	Removed by farmers	Fabrication of gate	Steel gate 1pc	20,000	
Lat AJ-1 Sta.1+616 Culvert	Water ponding at inlet, No water go to downstream	Culvert pipe not provided properly	Replace culvert pipe	Excavation 40m3 RCP dia.30" 6pcs Concrete A 3.0m3 Backfilling 40m3	41,000	Temporary road for provincial road during construction
MCJ & Lat. AJ & AJ-1 turnout	Uncontrolled water delivery due to none gated turnout	MCJ: TO 12 nos. Lat AJ: TO 18 nos. Lat AJ-1: TO 13 nos.	Install gate to turnout : 43 nos. Repair turnout structure: 23 nos.	Steel gate 43pc Concrete 46 m3	1,136,000	
MCJ & Lat. AJ & AJ-1 Unauthorized turnout	Uncontrolled water delivery due to none gated unauthorized turnout	MCJ: UTO 3 nos. Lat AJ: TO 7 nos.	Install gate and turnout structure: 7 nos. To be condemned 4 nos.	Steel gate 7pc Concrete 14 m3	224,000	
Brush Dam#1 at Balanay Creek	Damaged apron	Typhoon Feria	Repair/Rehab	Backfilling 500m3 Gabion 200m3 ClassA concrete 50m3	1,406,000	No access road
Brush Dam#2 at Balanay Creek	Damaged wall wing	Typhoon Feria	Repair/Rehab	Backfilling 1000m3 Gabion 200m3 ClassA concrete 50m3	1,486,000	No access road
Brush Dam#3 at Balanay Creek	Wash-out	Typhoon Feria	Construct new check	Class A concrete 150m3 Borrowhaul 1000m3 Excavation 500m3 Gabion 200m3	1,836,000	No access road
Total Cost of Rehabilitation (including Rehabilitation of Water Re-use Check Dam)					4,812,000 9,540,000	

Table 2.4 Rectification Plan - San Fabian RIS, BGM IA

Region : 1
 NIS : San Fabian River Irrigation System
 IA : BGM IA

Particular	Engineer's Views					
	Problems	Causes of problems	Proposed counter measures for problems	Estimated Volume of Works	Estimated Cost of Works (Peso)	Conditions to be considered for implementation
Headgate of Lat. BJ (sta. 0+000)	Collapsed wingwall of lined canal	Flush flood caused by Feria typhoon	Restored/repared the collapse wingwall	Class A concrete 1.0m3	6,000	
Lat. BJ Sta.0+000-0+740	Lining was partially broken	Improper design and construction works	Repair and rehabilitation of lining	Excavation 80m3 CHB lining 15m3 Backfilling 80m3	95,000	
Lat BJ Sta. 0+143	6m of lining collapsed	Damaged by typhoon	Restored/repared the wall	CHB lining 2.0m3	10,000	
Lat. BJ Sta.0+740 Culvert	Embankment at outlet eroded	No protection	Backfilling and protection work	Gabion 2.0m3 Backfilling 2.0m3	10,000	
Lat. BJ Sta.0+740 to 1+200	Embankment is damaged	Damaged by Carabao	Backfilling	Backfilling 50m3	8,000	
Lat. BJ Sta.1+600 to 1+650	Water overflowing	Low embankment	Backfilling	Backfilling 20m3	3,000	
Lat BJ sta.0+740 to End of canal	Vegetation of grasses and weeds in the canal	Logging of water, delay water delivery & distribution	Religious implementing the IA contract (Type 1)			
Service road sta.0+740 to 2+241	Service road is damaged	Overflowing of water	Repairing of service road	Grade & gravelling 1.5km	210,000	
Lat. BJ Sta. 2+241	Siphone is clogged , inlet overflow	Squatter clogged siphone	Declogging of siphone	Desilting & Declogging 50m3	8,000	
Lat BJ sta.2+241 to 3+110	Abandoned, illegal squatting along the canal	Squatter ed by labor of ricemill	Relocate the farmers and dredging the clogged siphon	Excavation 1800m3	144,000	
Lat BJ Turnout	Uncontrolled water delivery due to none gated turnout	Lat.BJ Turnout : 13nos.	1. Provision of turnout structure and fabrication of steel gate 8nos. 2. Fabrication of steel gate 5nos.	Steel gate 13pc Excavation 40m3 Class concrete 16m3 Backfilling 40m3	372,000	
Lat BJ Unauthorized turnout	Water can not be controlled during operation	Presence of unauthorized turnout 6 nos.	To be condemned			
Operation	Shortage of Water during dry crop	Many farmers are not financially stable. 22 has. planted during dry crop	Provision of Govt. support, credit, market & technology			
Total Cost of Rehabilitation					866,000	

Table 2.5 Rectification Plan - San Fabian RIS, San Juan Babasit IA

Region : 1
 NIS : San Fabian River Irrigation System
 IA : San Juan Babasit IA

Particular	Engineer's Views					
	Problems	Causes of problems	Proposed counter measures for problems	Estimated Volume of Works	Estimated Cost of Works (Peso)	Conditions to be considered for implementation
MCJ sta. 4+300 to Tail end Operation	No canal maintenance, farmers not following cropping calendar	Vegetation of grasses and dumping of garbage's. Farmers not financially stable	Payment of remuneration (Type 1 Contract) Adjust/Adopt workable cropping calendar schedule			
MCJ Sta. 4+400-4+820	Overflowing of water	Low canal embankment	Upgrade the canal embankment	Embankment 250m3	40,000	
MCJ Sta. 5+600-7+022	Overflowing of water	Low canal embankment at right side, damaged by farmers & carabao	Upgrade the canal embankment	Embankment 800m3	128,000	
MCJ sta. 6+292 to 7+022	Scouring of canal embankment	Carabao wallowing	Provision of policy & implement			
	Banana & vegetable plantation	Farmer planting	Provision of policy & implement			
MCJ sta.7+042 Check gate for Lat. BJ	Inappropriate steel gate	Removed by farmers	Repair of steel gate	Steel gate 1pc	60,000	
MCJ sta. 7+264	Dumping of palay straw	Logging of water in the canal	Strict compliance of NIA, IA. LGU policies			
MCJ Sta. 8+080	Irrigation water flow to drainage	Low embankment	Improved canal embankment	Embankment 50m3	8,000	
MCJ Turnout	Operation/ Distribution of water could not be control	Un-gated turnout 23nos.	Fabrication of steel gate	23 steel gate	460,000	
MCJ Unauthorized turnout	Shortage of water during dry crop season	Construction of 14 UTO	Unauthorized turnout to be condemned			
MCJ Cross Drain	Submerged paddy rice	Siltation of cross drainage 8nos.	Dredging cross drainage	Desiltation 200m3	16,000	
MCJ Siphoned	Clogged Siphon	Dumping of grasses/grasses inside the canal/siltation of siphone 2nos.	Dredging of siphon	Desiltation 50m3	4,000	
MCJ Culvert	Clogged culvert	Dumping of grasses/grasses inside the canal/siltation of siphone 2nos.	Dredging of culvert	Desiltation 50m3	4,000	
IA Issues	Construction of 13 UTO	Continuous diversion of water to the paddy field	Evaluate the Turn-Out, To be legalized			
Total Cost of Rehabilitation					720,000	

Table 2.6 Rectification Cost of Selected IAs Area in San Fabian RIS

Item of Works	Total 3 IAs Area		Scientific Farming IA Area		BGM IA Area		San Juan Babasit IA Area	
	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost
1.1 Headworks improvement		P406,000		P406,000				
2.1 Canal desilting	2,900 m ³	P252,000	950 m ³	P76,000	1,850 m ³	P152,000	100 m ³	P24,000
2.2 Canal embankment	1,570 m ³	P251,000	400 m ³	P64,000	70 m ³	P11,000	1,100 m ³	P176,000
2.3 Repair & heightening of canal lining	5,540 m ²	P2,365,000	5,370 m ²	P2,260,000	170 m ²	P105,000		
2.4 Farm ditch		P32,000		P32,000				
3.1 Repair of irrigation structure	6 units	P370,000	4 units	P354,000	2 units	P16,000		
3.2 Headgate / Checkgate	6 units	P320,000	5 units	P260,000			1 unit	P60,000
3.3 Turn-out	86 units	P2,192,000	50 units	P1,360,000	13 units	P372,000	23 units	P460,000
4.1 Service road rehabilitation	2 km	P210,000			1.5 km	P210,000		
5.1 Repair of check dam along Balanay Creek	3 dams	P4,728,000	3 dams	P4,728,000				
Total of rehabilitation cost		P11,126,000		P9,540,000		P866,000		P720,000

Table 3.1 Major Feature of Angat RIS

Location:		Region	III
		Province	Bulacan
Operation Started			1967
Annual Rainfall			2,271 mm
Main Source of River			Angat River
Watershed Area at Intake			613 km ²
Number of Farmers			18,647 nos
Number of IA members			16,871 nos
Number of IA			90 IAs
Service Area *			31,485 ha
Irrigated Area (Cropping Intensity) in 2001*			
		Wet Season	18,984 ha (60%)
		Dry Season	25,123 ha (80%)
Irrigation Service Fee Collection *			
		Wet Season	58%
		Dry Season	46%
Headworks		Type	Diversion Dam (Height 2.5 m, Length 500 m)
		Design Discharge at Intake	45.2 m ³ /sec
Length of Canal			
		Main Canal	56.5 km
		Lateral Canal	524.5 km
		Drainage Canal	331.0 km
Length of Service Road			254.5 km

* : Includes Maasim RIS

Source: NIA Data Base & NISO

Table 3.2 Irrigation Facility Status in Angat RIS

CANAL	Canal (m)			Headgate				Checkgate				Turn-out				Unauthorized Turn-out				Conveyance Structures			
	Total	Good	Rehab	FF	PD	SF	NF	FF	PD	SF	NF	FF	PD	SF	NF	FF	PD	SF	NF	FF	PD	SF	NF
Picaba IA																							
Lat. D	1,933	164	1,769		1	1	1	1				2	1		3	15	8		8				
Lat. D-1	6,702	602	6,100	5				7		1		9	2		8	26	9		9		1		
Lat. D-1-Extra	1,110	560	550	1												6	2		2				
<i>Sub-total</i>	<i>9,745</i>	<i>1,326</i>	<i>8,419</i>	<i>6</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>8</i>	<i>0</i>	<i>1</i>	<i>0</i>	<i>11</i>	<i>0</i>	<i>3</i>	<i>0</i>	<i>11</i>	<i>0</i>	<i>47</i>	<i>19</i>	<i>19</i>	<i>0</i>	<i>1</i>	<i>0</i>
Baluoc IA																							
Lat. D-1-D	4,900	3,825	576		1							5	1			20	12		12				
Lat. D-1-D-1	1,420	220	1,200			1									2	9	3		3		1		
Lat. D-1-A-Extn.	2,140	1,070	1,070									2				10	1		1				
<i>Sub-total</i>	<i>8,460</i>	<i>5,115</i>	<i>2,846</i>	<i>0</i>	<i>1</i>	<i>1</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>7</i>	<i>0</i>	<i>1</i>	<i>0</i>	<i>2</i>	<i>0</i>	<i>39</i>	<i>16</i>	<i>16</i>	<i>0</i>	<i>1</i>	<i>0</i>
Josephian IA																							
Lat. D-1-A	4,620	150	4,470	1		1		1				6	2			9			11				
Lat. D-1-A-1	1,200	600	600																				
Lat. D-1-A Extn.	1,734	884	850	1											2				1				
<i>Sub-total</i>	<i>7,554</i>	<i>1,634</i>	<i>5,920</i>	<i>1</i>	<i>0</i>	<i>1</i>	<i>0</i>	<i>1</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>6</i>	<i>0</i>	<i>2</i>	<i>0</i>	<i>2</i>	<i>0</i>	<i>9</i>	<i>0</i>	<i>12</i>	<i>0</i>	<i>0</i>	<i>0</i>
Total	25,759	8,075	17,185	7	2	3	1	9	0	1	0	24	0	6	0	15	0	95	35	47	0	2	0

FF : Fully functioning, PD : Partly deteriorated, but functioning in a satisfactory range,

SF : Slight functioning. Not functioning well and/or affecting the discharge, NF : Completely not functioning

Source: Result of walk through, MC13

Table 3.3 Rectification Plan - Angat RIS, Picaba IA

Region : 3
 NIS : Angat River Irrigation System
 IA : Picaba IA

Particular	Engineer's Views					
	Problems	Causes of problems	Proposed counter measures for problems	Estimated Volume of Works	Estimated Cost of Works (Peso)	Conditions to be considered for implementation
Lat.D Headgate	3 gates not functional	Worn-out	Replace with new headgate	5 headgates	300,000	
	Remaining 2 gates deteriorated					
	No railing / safety device	No design	Provide hand railing around operation deck of headgate	Hand rail	50,000	
Lat.D Canal	Sewerage discharge entering canal	Less drainage system				Assistance from LGU
Lat. D after Sta.1+164 Canal	Silted canal	Less maintenance	Desilting works	Desilting 1,900 m ³	152,000	
Lat. D-1 Sta.3+000 Checkgate	Far checkgate from Turn-out					
Lat. D-1 Sta.4+958 to Sta.6+000 Canal	Constricted canal section	Deteriorated canal				
Lat. D-1 Canal	Silted canal	Less maintenance	Desilting works	Desilting 6,700 m ³	536,000	
	Encroachment of canal		Reclaim canal ROW, Reconstruct canal embankment	Earth fill 6,700 m ³	1,072,000	No ROW problem
	Accumulation of garbage at the downstream	Dumping garbage from houses beside canal				
	Difficult maintenance due to trees within ROW of canal		Cut down trees within ROW of canal			Coordination with DENR for cutting trees
Lat. D-1 Turn-outs	Almost all steel gares and turn-out are deteriorated		Provide turn-out gate	3 turn-out gates	60,000	
	Possible waste water due to oversize turn-out pipes comparing with service area					
Lat. D & D-1 Unauthorized Turn-out	Uncontrolled water delivery due to none gated unauthorized turn-out		1. Re-design & re-organize Turn-out Service Area 2. Install gate to legalized turn-out	46 Turn-outs	920,000	
Lat. D-1 After Sta.3+300 Service road	Many patholes along service road	Less maintenance	Provide gravel metaling	3.4km gravel	476,000	
Total Cost of Rehabilitation					3,566,000	

Table 3.4 Rectification Plan - Angat, Balucoc IA

Region : 3
 NIS : Angat River Irrigation System
 IA : Balucoc IA

Particular	Engineer's Views					
	Problems	Causes of problems	Proposed counter measures for problems	Estimated Volume of Works	Estimated Cost of Works (Peso)	Conditions to be considered for implementation
Lat. D-1-D Headgate	Steel gate is not properly installed		Re-installation of headgate			
Lat. D-1-D Sta.0+420 Turn-out	Scoured inlet of turn-out		Provide protection	Lining 10m ²	3,000	
Lat. D-1-D Sta.2+688 to 3+750 Canal	Excavated material from on going road slope protection works is in canal		Monitor removal of excavated material from canal			
Lat. D-1-D Sta.3+788 Illegal checking	Illegal checking	No end check	Provide check structure			
Lat. D-1-D-1 Headgate	Damage headgate structure	Disturbed water flow by headgate due to small dimension of installed pipe	Replace pipe larger size	24"RCPx4	6,000	
Lat. D-1-D Canal	Scoured and silted canal (4.9km)	Turn-out Lat. D-1-D: 6nos, 1 not functional Lat. D-1-D-1: 3nos, 1 not functional Lat. D-1-A Ext1: 2 nos	Desilting works	Desilting 1,200 m ³	96,000	
	Encroachment of embankment		Reclaim canal ROW, Reconstruct canal embankment	Earth fill 3,400 m ³	544,000	
	Deteriorated steel gates		Replace	2 Turn-outs	40,000	
	Difficult maintenance due to trees within ROW of canal		Unauthorized Turn-out Lat. D-1-D: 20nos Lat. D-1-D-1: 8nos Lat. D-1-A Ext1: 10nos	Cut down trees within ROW of canal		
Lat. D-1-D & D-1-D-1 Unauthorized turn-out	Uncontrolled water delivery due to none gated unauthorized turn-out		1. Re-design & re-organize Turn-out Service Area 2. Install gate to legalized turn-out	38 Turn-outs	760,000	
Lat. D-1-D Service area	Flood from Calantipay creek	Back water from main river				
Lat. D-1-D-1 & Lat. D-1-A Exten.1 Service Road	Unpassable service road		Grading and graveling	3.5 km	490,000	
Total Cost of Rehabilitation					1,939,000	

Table 3.5 Rectification Plan - Angat RIS, Josephian IA

Region : 3
 NIS : Angat River Irrigation System
 IA : Josephian IA

Particular	Engineer's Views					
	Problems	Causes of problems	Proposed counter measures for problems	Estimated Volume of Works	Estimated Cost of Works (Peso)	Conditions to be considered for implementation
Lat. D-1-A Headgate	No gate	Worn-out	Provide one headgate with groove	1 headgate	60,000	
	No groove for flashboard			2m ³ concrete	12,000	
Lat. D-1-A Sta.0+150 to end	Eroded embankment	Deterioration, Insufficient maintenance	Reshape canal	Earth fill 2,500m ³	400,000	
Lat. D-1-A Sta.0+600	Houses within ROW of irrigation canal may disturbed maintenance of canal		Remove house			
Lat. D-1-A Sta.1+050 - 1+300	Scoured embankment of canal		Reshape canal	above		
Lat. D-1-A Sta.1+792	Accumulation of garbage at siphon		Remove garbage			
Lat. D-1-A Sta.2+294 to 2+330	Difficult maintenance due to mango trees within ROW of canal		Cut down trees within ROW of canal			
Lat. D-1-A Sta.2+294 Diversion to Lat.D-1-A-1	None control of water delivery due to no diversion structure		Provide one division box	2m ³ concrete	12,000	
Lat. D-1-A Extend. 2 Service area	During wet season, no planting due to flood	Back water from Apalit river				
Lat. D-1-A Turn-out	Nonfunctional turn-out at Sta.2+300 & 3+880	Unauthorized Turn-out all none gate Lat. D-1-A: 9nos Lat. D-1-A Extn2: 2nos	Replace	2 Turn-outs	40,000	
Lat. D-1-A & D-1-A Exten.2 Unauthorized Turn-out	Uncontrolled water delivery due to none gated unauthorized turn-out		1. Re-design & re-organize Turn-out Service Area 2. Install gate to legalized turn-out	11 Turn-outs	220,000	
Total Cost of Rehabilitation					744,000	

Table 3.6 Rectification Cost of Selected IAs Area in Angat RIS

Item of Works	Total 3 IAs Area		Picaba IA Area		Balucoc IA Area		Josephian IA Area	
	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost
2.1 Canal desilting	12,300 m ³	P1,184,000	8,600 m ³	P688,000	1,200 m ³	P96,000	2,500 m ³	P400,000
2.2 Canal embankment	10,100 m ³	P1,616,000	6,700 m ³	P1,072,000	3,400 m ³	P544,000		
3.1 Repair of irrigation structure	2 unit	P15,000			1 unit	P3,000	1 unit	P12,000
3.2 Headgate / Checkgate	7 units	P428,000	5 units	P350,000	1 unit	P6,000	1 unit	P72,000
3.3 Turn-out	102 units	P2,040,000	49 units	P980,000	40 units	P800,000	13 units	P260,000
4.1 Service Road Rehabilitation	6.9 km	P966,000	3.4 km	P476,000	3.5 km	P490,000		
Total of Rehabilitation Cost		P6,249,000		P3,566,000		P1,939,000		P744,000

Table 4.1 Major Feature of Bago RIS

Location:		Region	VI
		Province	Negros Occidental
Operation Started			1969
Annual Rainfall			2,305 mm
Main Source of River			Bago River
Watershed Area at Intake			625 km ²
Number of Farmers			6,949 nos
Number of IA members			4,130 nos
Number of IA			17 IAs
Service Area			12,700 ha
Irrigated Area (Cropping Intensity) in 2001			
		Wet Season	9,723 ha (76%)
		Dry Season	8,093 ha (64%)
Headworks		Type	Diversion Dam
			(Height 3.0 m, Length 66 m)
		Design Discharge at Intake	23.6 m ³ /sec
Length of Canal			
		Main Canal	29.7 km
		Lateral Canal	143.7 km
		Drainage Canal	58.0 km
Length of Service Road			171.0 km

Source: NIA Data Base & NISO

Table 4.2 Irrigation Facility Status in Bago RIS

CANAL	Canal (m)			Headgate				Checkgate				Turn-out				Unauthorized Turn-out				Conveyance Structures			
	Total	Good	Rehab	FF	PD	SF	NF	FF	PD	SF	NF	FF	PD	SF	NF	FF	PD	SF	NF	FF	PD	SF	NF
Atidu IA																							
Main Canal	3,630	3,630	0					1	1			12	2			5				5			
Lat. D	4,302	2,100	2,202			1						6	5			4	8			6	3	4	
Lat. E	693	613	80			1		1				3				2				1	1		
<i>Sub-Total</i>	<i>8,625</i>	<i>6,343</i>	<i>2,282</i>	<i>0</i>	<i>1</i>	<i>1</i>	<i>0</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>0</i>	<i>0</i>	<i>21</i>	<i>7</i>	<i>0</i>	<i>0</i>	<i>4</i>	<i>15</i>	<i>0</i>	<i>7</i>	<i>9</i>	<i>4</i>	<i>0</i>
Amana IA																							
Lat. E	6,767	2,777	3,990			1						14	13			2	23			6	3	1	
Lat. E-1	2,240	2,240	0	1		1						1	5			14				2	1		
Lat. E-1-A	1,379	1,379	0			1							4			12				2		1	
<i>Sub-Total</i>	<i>10,386</i>	<i>6,396</i>	<i>3,990</i>	<i>1</i>	<i>1</i>	<i>2</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>15</i>	<i>0</i>	<i>22</i>	<i>0</i>	<i>0</i>	<i>2</i>	<i>49</i>	<i>0</i>	<i>10</i>	<i>4</i>	<i>2</i>	<i>0</i>
Bunasabala IA																							
Lat. E	4,345	1,440	2,905								2	4	2	12						6		1	
Sub-Lat. E	10	10	0	1													1						
Lat. E-2	2,784	0	2,784			1				1		2	1	7						5		1	
Lat. E-2-A	1,688	0	1,688	1				1				1		11						2			
<i>Sub-Total</i>	<i>8,827</i>	<i>1,450</i>	<i>7,377</i>	<i>2</i>	<i>0</i>	<i>1</i>	<i>0</i>	<i>1</i>	<i>0</i>	<i>3</i>	<i>0</i>	<i>6</i>	<i>4</i>	<i>30</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>1</i>	<i>11</i>	<i>1</i>	<i>1</i>	<i>0</i>
Total	27,838	14,189	13,649	3	2	4	0	2	1	4	0	21	25	59	0	0	6	64	1	28	14	7	0

FF : Fully functioning, PD : Partly deteriorated, but functioning in a satisfactory range,

SF : Slight functioning. Not functioning well and/or affecting the discharge, NF : Completely not functioning

Source: Result of walk through, MC13

Table 4.3 Rectification Plan - Bago RIS, Atidu IA

Region : 6
 NIS : Bago River Irrigation System
 IA : Atidu IA

Particular	Engineer's Views					
	Problems	Causes of problems	Proposed counter measures for problems	Estimated Volume of Works	Estimated Cost of Works (Peso)	Conditions to be considered for implementation
Main Canal Sta. 9+273.45 Checkgates for Lat. D	Not operational 4 checkgates	Non-exersize of gates	Repair / rehabilitation	Checkgate 4 units	P 400,000	
Main Canal Sta.10+571 checkgate for Lat. E	Difficulty of managing the flow of water at headgate	One out of 3 checkgate was totally damaged (no lifting mechanism) and the other 2 is inclined due to deterioration and no measuring devices	1. Install new gates & repair/realign 2 gates	Checkgate 1 unit (new)	P 100,000	
			2. Install water measuring devices	Checkgate 2 units (repair)	P 20,000	
			3. Conduct calibration	1 unit	P 5,000	
Main Canal Sta. 11+761 Unauthorized Turn-out	Excessive flow of water for 4.85 ha irrigated area (no gate)	Neglected discharge calibration on control points	Recompute design discharge & adjust TO size proportional to discharge requirement	Turn-out 1 unit	P 20,000	Turn-out discharge must conform with design standards
Main Canal After Sta. 12+305 embankment	Scouring of Right embankment / no gate	Turbulent flow after check structure	Construct drop structure or chute	Drop structure 1 unit	P 25,000	
Lat. D Headgate	No flow control due to no gate		1. Installation of gate and staff gages	Headgate 1 unit	P 60,000	
	No measuring devices		2. Conduct calibration	1 unit	P 5,000	
Lat. D Sta.0+000-0+600 Embankment	Overflow of water left and right banks	Backflow of water from Siphon Sta.0+600 and Culvert Sta.0+112	1. Raising of embankment Sta 0+000 - 0+600 L&R	Embankment 1,800 m ³	P 288,000	No negative effect on farmers adjacent to siphon
			2. Lining of canal sta 0+000 - 0+600 L&R	Lining 2,520 m ²	P 580,000	
			3. Demolish siphon and connect/ construct canal	Embankment 200 m ³	P 32,000	
Lat. D Sta 0+112-0+600 Embankment	Encroachment on ROW (Right Bank)		Reclaim embankment ROW Rebuild embankment	Embankment	above	
Lat. D Sta. 0+700 Cross Drain	2-3 days submergence of areas affected by cross drain	Undersized Cross Drain pipe	Design and install crossdrain pipe based on the area affected by flooding	Cross drain 1 unit	P 25,000	No ROW problem in the construction of drainage canal to the creek
Lat. D Sta. 1+747 Abandoned Siphon	Obstructed water flow by abandoned inlet/outlet structure of siphon		Demolish inlet/outlet structure	Demolition 3 m ³	P 2,000	
Lat. D at Sta. 1 + 880 Canal	Water leaking to cross drain	Damaged canal lining	Repair damaged lining	Lining 3 m ²	P 10,000	
Lat. D Sta 2+650 Illegal Check for TOR	Affects the water distribution at downstream of illegal check	Elevation of existing Turn-out is too high to get water from canal	1. Construct check structure or 2. Proportional Divider	Check structure 1 unit	P 20,000	Backflow of water must be given special consideration when designing dividers.
Construction of Houses along ROW Lat. D-A Sta. 2+700-2+900	Difficulty of moving Equipment during repair	Construction of Houses on ROW	Demolish houses along canal ROW			

Table 4.3 Rectification Plan - Bago RIS, Atidu IA

Region : 6
 NIS : Bago River Irrigation System
 IA : Atidu IA

Particular	Engineer's Views					
	Problems	Causes of problems	Proposed counter measures for problems	Estimated Volume of Works	Estimated Cost of Works (Peso)	Conditions to be considered for implementation
Silted Canal /Vegetated Lat. D Sta. 2+700 to End check	Hampered flow of water along the canal	Non compliance of the IA on maintenance contract	Review/recommend for revision some contract provisions	Desilting 2,000m ³ (1.6km)	P 160,000	No obstruction along ROW during desilting activities
Insufficient water delivery at the end part of Lat. D	Water shortage. However in 1976 Sugar Cane was riceland and fully fully irrigated.	Backflow of water from Siphon Sta.0+600 and Culvert Sta.0+112	1. Raising of embankment Sta 0+000-0+600 L&R 2. Lining of canal sta 0+000 - 0+600 L&R	1. Embankment 1,800 m ³ 2. Lining 613 m ³	Above above	
Lat. E Sta. 0+600 to Sta. 0+680 Lined Canal	Water losses increased due to leakage		Repair damaged lined canal	Lining 70 m ²	P 16,000	
Lat. E 1+140 Water Master Technician Station Div C	Dilapidated office		Construct new WMT station	Office 1 unit	P 300,000	
Lat. D & E Service Road	Service roads have lots of pot-holes	Poorly mentained service road	Gravelling recommended	Leveling & graveling 6.4kms.	P 896,000	
Lat. D & E Canal embankment	Vulnerable to illegal T.O. & overflow	Encroachment by farmers	Construct embankment as per the design	Embankment 2,500 m ³	P 400,000	No ROW by affected farmers
Main Farm Ditch & Supplemental Farm Ditch	Less MFD & SFD Not properly located	Demolished by farmers Farmers individually constructed	1. Re-design & re-organize TSA			
			2. Construct necessary TOs			
Turn-outs	None or deteriorate gate	Demolished or destroyed by farmers	3. Construct MFD & SFD			No ROW on MFD & SFD
			Provide turn-out gates	Turn-out 8 units	P 160,000	
Illegal Turnouts / Open gaps	Size not designed proportional to area	Old design standard				
	Unauthorized Turn-out M.C. 5 Lat.D 12 Lat.E 2	Uncontrolled water distribution due to unauthorized turn-out	Re-design and re-organized TSA	Turn-out 19 units	P 380,000	
Illegal checks	Hampered the smooth flow of water by illegal checking		Construction of proportional dividers along main tributary in combination with weir or reduced pipe on TOs	Turn-out 15 unit	P 150,000	Consider backflow during design
Trees & Vegetables within ROW of Canal	Difficulty of moving heavy equipment during desilting and repairs	Planting of trees and vegetables along canal ROW	Cut down trees and prohibit planting of vegetables along canal ROW			Coordinate with DENR before cutting trees.
Total Cost of Rehabilitation					P 3,474,000	
(including Lining at Lat. D Sta.0+000 to 0+600)					P 4,054,000	

Table 4.4 Rectification Plan - Bago RIS, Amana IA

Region : 6
 NIS : Bago River Irrigation System
 IA : Amana IA

Particular	Engineer's Views					
	Problems	Causes of problems	Proposed counter measures for problems	Estimated Volume of Works	Estimated Cost of Works (Peso)	Conditions to be considered for implementation
Lat. E Sta. 1+985 Right side Embankment	Narrowing of embankment	Encroachment of adjacent farm on the embankment	Reclaim / rebuild embankment 50 m	Embankment 150 m ³	P 24,000	No conflict with farmer
Lat E Sta. 2+076 Culvert	Constricted of water flow passing through the Culvert	Possible undersized Culvert	Re-investigate design discharge of Culvert / redesign Culvert			
Lat. E Sta.2+076 Checkgate	Difficulty in water delivery specially during dry season where there is a need to close checkgate due to damage checkgate	Worn out checkgate	Provide/ install new gate	Checkgate 1 unit		
Lat. E Sta. 2+000 - Sta. 3+000 canal	Hampered the flow of water due to "Gabi" Plant planted at the foot of embankment		Removal of "Gabi" plant inside the canal			No resistance among farmers / with assistance from IA
Lat. E Sta. 4+ 243 Check, Culvert & Drop	Scouring at bottom of outlet		Provide protection	Lining 20 m ²	P 5,000	
Lat. E Sta.4+692 After turn-out	Water distribution problem due to totally damaged Division Box		Construct new Division Box	Division box 1 unit	P 15,000	
Lat. E Sta. 4+695 Culvert & Drop	Water leakage from hole at outlet right side wingwall	Hole used as draining outlet of adjacent farm	Repair Wing wall / investigate possible location for drainage	Concrete 2 m ³	P 13,000	
Lat. E Sta. 3+470-7+460	Reduced Flow of water to downstream of Lat. E due to heavily silted canal		Desilting	Desilting 4,000 m ³	P 320,000	No abstraction on ROW for movement of Equipment during repair
Lat E Sta. 5+669 Culvert & Drop	Damaged checkgate		Provide new checkgate	1 unit	P 60,000	
Lat. E canal	Difficulty of movement of heavy equipment during repairs/rehabilitation.	Due to planting of trees along canal ROW	Cut down trees and plant vetiber grasses for erosion control.			Coordinate with DENR before cutting trees
Lat. E Sta. 2+500-sta. 3+500 Service road	Hard to travel service road	Existence of many potholes on the road	Road patching gravelling	Leveling & gravelling 1 km.	P 140,000	No obstruction along ROW
Lat. E Sta. 5+560 to 7+460 Service Road	Unpassable	Patholes, eroded narrow	Road patching gravelling	Leveling & gravelling 2 km.	P 280,000	No ROW
Foot Bridge along Lat. E	Reduced discharge caused by debris collected at the foot of the footbridges		Identify necessary foot bridge and provide bridge. Remove unnecessary bridge			

Table 4.4 Rectification Plan - Bago RIS, Amana IA

Region : 6
 NIS : Bago River Irrigation System
 IA : Amana IA

Particular	Engineer's Views					
	Problems	Causes of problems	Proposed counter measures for problems	Estimated Volume of Works	Estimated Cost of Works (Peso)	Conditions to be considered for implementation
Lat. E-1 Sta. 0+689 Checkgate & culvert	Difficulty in water delivery specially during dry season due to none functional gate	Worn out checkgate	Provide/ install new gate	Checkgate 1 unit	P 60,000	
	Leakage from culvert		Repair hole at culvert	Concrete 1 m ³	P 6,000	
Lat. E-1 Sta. 0+689 Main farm ditch along service road	Demolished by farmer		Consult with Turn-out Service Area members			Acceptance from affected farmers
Lat. E-1-A Headgate 0+689	Water delivery problem due to damaged gates		Provide/install new gate	Headgate 1 unit	P 60,000	
Lat. E-1-A Sta. 0+413 Siphon	Reduced flow of water due to clogged and Silted Siphon		Demolish siphon and construct elevated flume	Concrete L = 40 meters, 17 m ³	P 106,000	Inform IA on the demolition of Siphon and construction of Elevated flume
Lat. E-1 & E-1-A Tailend area	Insufficient water supply at downstream of lat E-1 & E-1a	1. Illegal Turn-outs	1. Close or legalize illegal Turn-outs			Agree on location of Turn-outs with farmers
		2. All TO's no gates	2. Install/provide steel gate			
		3. Clogged siphon at Sta. 0+453 Lat E-1a	3. Demolish siphon at sta. 0 + 453 Lat E - 1 and construct elevated flume	3. Above mentioned		
Lined Canal Lat. E-1 sta. 0+000 to 2+000 Lat. E-1-A Sta. 0+000-1+200	Even canals are lined Still can not irrigate the whole area served by E-1 & E-1a	Unlimited drawing of water from canal of turn-outs serving upstream farmers of the Lat. E-1 & E-1a	reduce pipe size proportional to area served.			Must conformed to design standard
Lat. E Sta. 4+360 & Sta. 3+753	Obstruction during rehabilitation.	3 houses along canal ROW	Remove /relocate houses			Coordinate with Barangay officials on removal / relocation of houses along ROW
Turn-out	Damaged or no gate turn-out Lat.E 10nos, Lat.E-1 3nos, Lat.E-1-A 1no		Provide Turn-out	Turn-out 14nos	P 280,000	
Unauthorized Turn-out	No gate Lat.E 25nos, Lat.E-1 14nos, Lat.E-1-A 12nos		Provide Turn-out	Turn-out 51nos	P 1,020,000	
Flooding of Lot 774-A, 810,811 near Anagas Creek	Flooding at lot 774-A, 810, 811 and other adjacent lots	Insufficient capacity of drainage but not caused by checking at Anagas Creek	Further study for possible construction of drainage facilities that will drain flood water from Anagas Creek to Bago River.			Source fund, arrange ROW Determine responsible agency to undertake the activity
Total Cost of Rehabilitation					P 2,389,000	

Table 4.5 Rectification Plan - Bago RIS, Bunasabala IA

Region : 6
 NIS : Bago River Irrigation System
 IA : Bunasabala IA

Particular	Engineer's Views					
	Problems	Causes of problems	Proposed counter measures for problems	Estimated Volume of Works	Estimated Cost of Works (Peso)	Conditions to be considered for implementation
Lat. E Sta. 8+064 to Sta. 8+364 Canal	Retards the flow of water due to Siltation depth (1) one meter deep.		Desilting	Desilting 600 m ³	P 48,000	
Lat. E Sta. 8+567 Supplemental farm ditch	50m of Supplemental farm ditch converted to ricefield	Farmers attitude	Implement stricter policy stipulated in the NIA-IA Contract			
Lat. E Sta. 9+095 Checkgate for Sub. Lat. E	Water delivery problem due to none operational checkgate		Install new checkgate	Checkgate unit 1	P 60,000	
Lat. E Sta.10+315 Main farm ditch	Many water losses at MFD	Poorly constructed MFD	Construct New MFD	MFD 100 meters	P 50,000	
	MFD lining sidewall destroyed about 1.5m		Provide cross drain under MFD	RCP 2m pipes	P 3,000	
Lat. E Sta. 10+000 and Sta. 11+016 Main Farm Ditches		Periodic repair not implemented	Implement stricter policy stipulated in the NIA-IA Contract			
Lat. E Sta.10+318 Road crossing with drop	Damaged outlet wing wall and connected to farm drain	Destroyed by farmers	Provide drainage along service road	Excavation 100 m ³	P 7,000	
				Concrete 1 m3	P 6,000	
Lat. E Sta. 10+700 Turn-out Left	High checking at Thresher Crossing if TOL Sta. 10+700 is being used.	Elevated TO pipe	Relocate TOL pipe and compute required pipe size and elevation		P 20,000	
Lat. E Sta. 11+016 Checkgate for Lat. E-2	Water delivery problem due to no gate		Install new gate	Checkgate 1 unit	P 60,000	
Lat. E Sta. 11+300 - Sta. 11+600 Canal	Retards the flow of water due to "Gabi" plant "		Remove "Gabi" plant			
Sub-Lat. E Sta.0+010 Turn-out	Water distribution problem due to no structure		Construct structure	Concrete 2 m ³	P 15,000	
			Install gates	Turn-out 1 unit	P 20,000	
Tail-end of Lat. E		Inadequate water supply coming from Lat. E	Minimize losses upstream of Lateral E			
Lat. E-2 Headgate	No gate		Install new gate	Headgate 1unit	P 60,000	
Lat. E-2 Sta. 1+070 to Sta. 1+200 Canal	Obstruction when using equipment during repair and maintenance due to houses within ROW of canal	Squatting within ROW	Demolish/relocate houses			
Lat. E-2 Sta. 1+073 Checkgate for Lat. E-2-A	Water delivery problem due to non functional checkgate		Replace worn-out steelgate parts	Checkgate 1 unit	P 60,000	
Lat. E-2 at Sta. 0+000-End Water delivery		Inadequate water supply coming from Lat. E	Minimize losses upstream of Lat. E-2			
Lat. E-2-A 3 Illegal turn-outs			Close open gaps	Embankment 5 meters 5 m ³	P 1,000	

Table 4.5 Rectification Plan - Bago RIS, Bunasabala IA

Region : 6
 NIS : Bago River Irrigation System
 IA : Bunasabala IA

Particular	Engineer's Views					
	Problems	Causes of problems	Proposed counter measures for problems	Estimated Volume of Works	Estimated Cost of Works (Peso)	Conditions to be considered for implementation
Lat. E, E-2, E-2-A Turn-out	No / non operational gate of Turn-out: Lat.E; 13 out of 18, Lat.E-2; 7 out of 10 , Lat.E-2-A; 12 out 12 (80% destroyed)	Destroyed by farmers	Install new steelgates	Turn-out 32 units	P 640,000	
Lat. E Sta. 9+000 to end Lat. E-2 All canal Lat. E- 2-A All canal	Canal embankment was reduced to size of paddy dike.	Farmers fields adjacent to canal embankment convert portion of embankment to paddy field and leave only a paddy dike.	Rebuild canal embankment 6.3 km	Embankment 4.600 m ³	P 736,000	
Pump Irrigation at 2 Hilly area during Dry Season at the Southern part of Bunasabala and Pump Irrigation also at the tail end of Sub-Lat E-2.	Insufficient water supply	MFD supplying the hilly area have many leaks, While at the tail end of Sub-Lat E have not been reach by water during dry season because water from canal insufficient.	Repair MFDs and Increase volume of water coming from Sub-Lat. E during dry season.			
Service/Access road	Seriously damaged at Sta. 11+016-11+800(Lat. E) Sta. 8+064- 8+120(Lat. E) Sta. 1+280-2+130(Lat. E-2)	Poor soil type for service/Access road.	Road surfacing and gravelling	Leveling & gravelling 2 kms.	P 280,000	
Total Cost of Rehabilitation					P 2,066,000	

Table 4.6 Rectification Cost of Selected IAs Area in Bago RIS

Item of Works	Total 3 IAs Area		Atidu IA Area		Amana IA Area		Bunasabala IA Area	
	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost
2.1 Canal desilting	6,600 m ³	P528,000	2,000 m ³	P160,000	4,000 m ³	P320,000	600 m ³	P48,000
2.2 Canal embankment	9,255 m ³	P1,481,000	4,500 m ³	P720,000	150 m ³	P24,000	4,605 m ³	P737,000
2.3 Repair & heightening of canal lining	2,593 m ²	P606,000	2,593 m ²	P606,000				
2.4 Farm ditch		P50,000						P50,000
3.1 Repair of irrigation structure	27 units	P383,000	19 units	P222,000	6 units	P145,000	2 unit	P16,000
3.2 Headgate / Checkgate	16 units	P1,070,000	8 units	P590,000	4 units	P240,000	4 unit	P240,000
3.3 Turn-out	127 units	P2,555,000	28 units	P560,000	65 units	P1,300,000	34 units	P695,000
4.1 Service Road Rehabilitation	11.4 km	P1,596,000	6.4 km	P896,000	3.0 km	P420,000	2 km	P280,000
5.1 Repair of Water Master Technician Station	1.0 unit	P300,000	1 unit	P300,000				
Total of Rehabilitation Cost		P8,569,000		P4,054,000		P2,449,000		P2,066,000

Table 5.1 Major Feature of LabanganRIS

Location:		Region	IX
		Province	Zamboanga del Sur
Operation Started			1960
Annual Rainfall			3,659 mm
Main Source of River			Labangan River
Watershed Area at Intake			434 km ²
Number of Farmers			1,608 nos
Number of IA members			250 nos
Number of IA			2 IAs
Service Area			3,195 ha
Irrigated Area (Cropping Intensity) in 2001			
		Wet Season	1,535 ha (48 %)
		Dry Season	1,550 ha (49 %)
Irrigation Service Fee Collection			
		Wet Season	13%
		Dry Season	25%
Headworks		Type	Free Intake
		Intake Gate	6 nos
		Design Discharge at Intake	7.0 m ³ /sec
Length of Canal			
		Main Canal	14.6 km
		Lateral Canal	57.0 km
		Drainage Canal	54.7 km
Length of Service Road			52.3 km

Source: NIA Data Base & NISO

Table 5.2 Irrigation Facility Status in Labangan RIS

CANAL	Canal (m)			Headgate				Checkgate				Turn-out				Unauthorized				Conveyance				
	Total	Good	Rehab	FF	PD	SF	NF	FF	PD	SF	NF	FF	PD	SF	NF	FF	PD	SF	NF	FF	PD	SF	NF	
Muchrist IA																								
Main Canal	14,510	2,515	11,995						7			3	52	4		20				19	6	4		
Lat. B	760	760	0			1							4			1				3				
Lat. C	1,890	1,890	0			1							1			1				3	1			
Lat. D	6,980	0	6,980			1		1					22	3		1	5			7	3		1	
Lat. D-1	4,634	0	4,634	1				1					26	1		12				11	2			
Lat. D-1A	2,887	2,143	744			1							4			10				6	1			
Lat. E	1,160	1,160	0			1							4			2				2				
Lat. F	1,950	1,830	120			1							4			9				3	2	1		
Lat.G	2,440	0	2,440	1									6			2				5				
Lantian Supply	1,094	1,094	0									1	4			3				3				
Pulacan Supply	880	880	0										3			3				3				
<i>Sub-Total</i>	<i>39,185</i>	<i>12,272</i>	<i>26,913</i>	<i>2</i>	<i>0</i>	<i>6</i>	<i>0</i>	<i>1</i>	<i>0</i>	<i>8</i>	<i>0</i>	<i>1</i>	<i>3</i>	<i>130</i>	<i>8</i>	<i>0</i>	<i>1</i>	<i>68</i>	<i>0</i>	<i>65</i>	<i>15</i>	<i>5</i>	<i>1</i>	
Sandata IA																								
Lat. A	10,240	8,097	2,143			1		1	3					31	2		8			11	4			
Lat. A-1E	2,300	300	2,000			1						1	5	1		8				7				
Lat. A-2	5,694	0	5,694			1			2			2	21			5				11		2		
Lat. A-2A	3,934	0	3,934			1								12	2		2			8			1	
Lat. A-2B	1,966	0	1,966			1							4							3				
Lat. A-3	4,616	0	4,616			1						5	13	1						8	1		1	
<i>Sub-Total</i>	<i>28,750</i>	<i>8,397</i>	<i>20,353</i>	<i>0</i>	<i>0</i>	<i>6</i>	<i>0</i>	<i>1</i>	<i>0</i>	<i>5</i>	<i>0</i>	<i>8</i>	<i>0</i>	<i>86</i>	<i>6</i>	<i>0</i>	<i>0</i>	<i>23</i>	<i>0</i>	<i>48</i>	<i>5</i>	<i>2</i>	<i>2</i>	
Total	67,935	20,669	47,266	2	0	12	0	2	0	13	0	9	3	216	14	0	1	91	0	113	20	7	3	

FF : Fully functioning, PD : Partly deteriorated, but functioning in a satisfactory range,

SF : Slight functioning. Not functioning well and/or affecting the discharge, NF : Completely not functioning

Source: Result of walk through, MC13

Table 5.3 Rectification Plan - Labangan RIS, Muchrist IA

Region : 9
 NIS : Labangan River Irrigation System
 IA : Muchrist IA

Particular	Engineer's Views					
	Problems	Causes of problems	Proposed counter measures for problems	Estimated Volume of Works	Estimated Cost of Works (Peso)	Conditions to be considered for implementation
New free intake M.C. Sta. 0+000	Deep scouring (left bank of river).	Turbulent flow of H2O from Labangan river during heavy rainfall.	Provide river protection at up/down stream of intake	Concrete 200 m ³	1,240,000	
	Unsafe house during typhoon	Temporary gatekeepers house.	Construct permanent gatekeepers house	Gatekeeper House 1 unit	200,000	
	Limited flow of water at intake in dry season	Out of 6 gates 1 not functional, No diversion dam (Brush Dam Only)	Replace gate.	Intake Gate 1 unit	60,000	
Existing diversion dam (old intake site)	Abandoned Dam.	Heavy siltation & rock deposit inside the intake barrels.	None (Abandoned)			
	Intake water could not reach canal	Low water head at intake due to siltation in canal. Top of reconstructed ogee of dam is about 2 m lower than canal				
M.C. Sta. 0+000 - Existing diversion dam	Row of existing M.C.	New free intake and M.C. were temporary structure at construction time				
M.C. Sta.0+030 Canal	Deep scouring after intake tunnel	Turbulent flow	Reshape canal Provide slope protection	Backfilling Lining	130,000	
M.C. Sta. 0+353, 0+524 Water re-use	Scouring main canal	No protection	Provide concrete protection	2 units	74,000	
M.C. Sta. 0+371 Parshall Flume	Damaged structure		Repair		40,000	
M.C. Sta.0+679 Road Crossing	Obstructed flow of H2O.	Disaligned one barrel.	Aligned Barrel.		60,000	
M.C. Sta. 0+856 Cross Drain	Clogged drain culvert	Less maintenance	Declogging		25,000	
M.C. Sta. 0+890	Damage flume.	Foundation damage.	Construct Flume	Flume 1 unit	45,000	
M.C. Sta.1+124 Silt excluder	Not functioning silt excluder	Clogged Barrel.	Desilt barrel.	Desilting	120,000	No ROW on drainage canal
		Complain on flood at drainage canal	Enlarge drainage canal	Excavation		
	Scoured outlet embankment					
M.C. Sta 1+260, 1+414, 1+485, 2+100 Creek in	Scouring main canal	No protection	Provide concrete protection	4 units	160,000	
M.C. Sta 1+645	Back flow with silts.	Silted.	Desilting.			
M.C. Sta. 0+000 - 6+093	Siltation problem.	Direct inflow of surface flow/drainage from mountain to canal	Construct Drainage Canal	Excavation 9,000 m ³	720,000	
			Construct Drainage Crossing.	Cross drain 3 units	2,600,000	
			Desilt Canal.		below	
M.C. Sta. 0+000 to H.G. of Lat. A	Unregulated flow of water.	Desilting of MC	Desilts Main Canal	Desilting 39,000 m ³	3,120,000	
M.C. Sta.2+055 Road crossing & Check structure	Water overflow.	Silted canal.	Desilting of Canal.	-	above	

Table 5.3 Rectification Plan - Labangan RIS, Muchrist IA

Region : 9
 NIS : Labangan River Irrigation System
 IA : Muchrist IA

Particular	Engineer's Views					
	Problems	Causes of problems	Proposed counter measures for problems	Estimated Volume of Works	Estimated Cost of Works (Peso)	Conditions to be considered for implementation
M.C. Sta. 2+682 Road crossing & Checkgate for Lat. A	Obstructed flow of water.	Outlet heavily silted.	Desilting of outlet.		above	
	Unregulated flow of water due to none functional 2 gates for Lat. A		Repair gate.	Checkgates 2 units	120,000	
Siphon M.C. Sta. 2+685	Breaching left dike	Low embankment	Hightening of dike	Embankment 300 m ³	48,000	
		Unauthorized Turn-out	Provide Turn-out	Turn-out 1 unit	20,000	
M.C. Sta. 2+701 Drainage crossing	Flooded at inlet side of cross drain	Size of cross drain 18" Ø . too small	Replace culvert to 24" Ø	RPC Ø 24" 30 L,M	60,000	
M.C. Sta. 3+392 Siphon	Overflow at inlet/outlet	Low embankment	Rise up inlet/outlet wingwall	Concrete 20 m ³	124,000	
Checkgate for Lat. B sta. 4+127	Unregulated flow of water due to check structure 2 gates damaged		Replace 2 gates	Checkgates 2 units	120,000	
M.C. Sta. 4+706 Siphon	Waste of water due to overflow wingwall at inlet of structure		Repair wingwall inlet.	Concrete 25 m ³	155,000	
M.C. Sta 5+733 Waste way	Waste water due to no steel gate for wast way		Replace gate	Waste way gate 1 unit	20,000	
M.C. Sta. 5+749 Siphon	Might affect the normal operation of siphon.	Eroded river embankment at outlet of the structure.	Repair river embankment.	Embankment 40 m ³	7,000	
				Protection 20 m ³	124,000	
MC Sta 6+093 Road crossing and check structure	Outlet of Rd. Cr. & Check Scoured		Repair scoured outlet embankment.	Embankment 15 m ³	3,000	
			Provide protection	Concrete 7.5 m ³	47,000	
M.C. Sta. 6+474 Culvert + Check structure + drop	Scouring at outlet	No protection	Provide protection		120,000	
M.C. Sta 7+000 - 7+877	Overflow of water & difficulty of moving equipment during repair.	Canal encroachment /low embankment	Raised/restore canal embankment	Embankment 644 m ³	103,000	
M.C. Sta 8+538 Siphon	Prone to damage siphon due to exposed conduit		Provide protection cover.	Concrete 300 m ³	1,100,000	
M.C. Sta. 8+538	Difficulty of moving farm equipments during repair.	Trees on embankment after MC siphon.	Remove trees			
M.C. Sta 8+595 - 9+110	Flooded at downstream	Direct connection of creek/drainage & others.	Construct Dr. Crossing	Cross drain 1 unit	900,000	
			Drainage Canal.	Excavation 3,000 m ³	240,000	

Table 5.3 Rectification Plan - Labangan RIS, Muchrist IA

Region : 9
 NIS : Labangan River Irrigation System
 IA : Muchrist IA

Particular	Engineer's Views					
	Problems	Causes of problems	Proposed counter measures for problems	Estimated Volume of Works	Estimated Cost of Works (Peso)	Conditions to be considered for implementation
M.C. Sta 8+595 - 9+110	Difficulty of movement of equipment during repair due to encroached embankment with trees on narrow dike		Restore canal embankment.	Embankment 400 m ³	64,000	
M.C. Sta 10+000 to end	Difficulty of movement of equipment during repair due to encroached embankment with trees on narrow dike		Restore canal embankment.	Embankment 6,000 m ³	550,000	
M.C. Sta 10+187 - 10+698	Difficulty of movement of equipment during repair due to trees along right side embankment		Remove trees along embankment.			
M.C. Sta 10+187 Checkgate for Lat.E	Unregulated flow of water due to no checkgate		Install gate	Checkgate unit 1	60,000	
M.C. Sta 10+698 Siphon with spillway	Excess water go to creek through spillway	Under sized siphon silted siphon and canal at downstream	Change pipe to bigger size.		300,000	
M.C. Sta 11+250 Siphon	Controlled flow of water.	Under size siphon.	Change size of siphon.		300,000	
M.C. Sta 11+708	Damaged canal.	No Road Crossing.	Proposed road crossing.	1	80,000	
M.C. Sta 12+600-end check	Overflow of water at canal embankment.	Encroachment and low embankment.	Raising and restoration canal embankment.	Embankment 2,404 m ³	above	
M.C. (End of Structure)	Drainage problem .	No drainage canal; damage canal.	Construct drainage canal	Excavation 800 m ³	100,000	No ROW for new drainage
			Construct floodgate.	1 flood gate	100,000	
M.C. Sta 12+028 - end	Limited movement of farmers to transport their produce.	Damaged service road after Main Canal.	Repair damaged road.	2.5 km	350,000	
M.C. Sta 12+028	Damaged canal embankment	Absence of road/ thersher crossing	Consult farmers on location of thresher crossing.	Thresher crossing 5 units	100,000	
M.C. Sta.12+028 Checkgate	Unregulated flow of water due to no checkgate	No Checkgate for Lat F.	Install gate.	Checkgate 1 unit	60,000	
Lat. A Sta. 0+000 Headgate	Overflow of water (waste of water)	Low embankment & damaged wingwall of head gate.	Raise embankment & repair wingwall.	Embankment 50 m ³	8,000	
				Concrete 15 m ³	91,000	
	Unregulated flow of water due to none functional headgate		Replace headgate	1 unit	60,000	
Lat. B Sta. 0+000 Headgate	Unregulated flow of water due to outlet scoured		Provide protection	Concrete 20 m ³	124,000	

Table 5.3 Rectification Plan - Labangan RIS, Muchrist IA

Region : 9
 NIS : Labangan River Irrigation System
 IA : Muchrist IA

Particular	Engineer's Views					
	Problems	Causes of problems	Proposed counter measures for problems	Estimated Volume of Works	Estimated Cost of Works (Peso)	Conditions to be considered for implementation
	Unregulated flow of water due to none functional headgate		Install gate	Headgate 1 unit	60,000	
Lat. B Sta 0+500 - 0+820	Farmers difficulty of transporting produce.	No service road	Construct service road.	New road 320 m	320,000	
Lat. C Sta. 0+000 Headgate	Unregulated flow of water due to no steelgate		Install gate	Headgate unit 1	60,000	
Lat. D canal	Difficulty of moving farm implements & difficulty of movement of equipment during repair due to encroached embankment		Restore canal embankment.	Embankment 5,000 m ³	800,000	
Lat. D-1	Over flow of water/eroded embankment.	Encroachment/ low embankment.	Restore/raise dike	Embankment 3,300 m ³	528,000	
Lat. D-1 Sta 0+821-Sta. 1+750	Overflow of water at right bank	Low embankment	Restore canal dike		Above	
La. D-1-A Sta. 0+356 to 1+100	Overflow of water.	Low embankment & canal encroachment.	Raise/restore dike	1,200 m ³	192,000	
between M.C & Lat. D-1-A	Flooded (submerged area) below National H-way (about 300 ha)	No drainage canal.	Provide drainage canal.	2 km	2,000,000	
Lat. D-1-A Sta 2+317 Road crossing	Scoured outlet.	Wallowing place of carabao.	Provide lining	Lining 25 m ²	6,000	
Lat. E Sta 0+000	Scouring after wingwall of H.G. of Lat E L/R embankment.		Provide protection	Concrete 3 m ³	18,000	
Lat. E Headgate	Unregulated flow of water due to No gate for Headgate.		Install gate.	Headgate 1 gate	60,000	
Lat. F Headgate	Unregulated flow of water due to no headgate		Install gate.	Headgate 1 unit	60,000	
Lat. F Sta 0+000 - 0+020	Controlled flow of water to silted headgate		Desilt headgate	desilting 30 m ³	3,000	
Lat. F Sta 0+700 Road crossing	Overflow	Undersized culvert.	Change to bigger size culvert.	2 pieces - 30" Ø RCP	6,000	No ROW on drainage alignment
Lat. F Sta 1+850 - end struc.	Flooding.	No drainage canal at downstream of lateral.	Construct drainage canal & floodgate.	1 floodgate Excavation 300 m ³	60,000 24,000	
Lat. G Headgate	Unregulated flow of water due to no headgate	No gate.	Install gate.	Headgate 1 unit	60,000	
Lat. G Sta 0+000 - end check	Surface flow from mountain entering canal.	Insufficient Cross Drain.	Install larger cross drain.		75,000	
	Silted canal		Desilting.	1,100 m ³	88,000	
Pulacan Supptl'. canal. Intake	Unregulated flow of water due to no gate.	Needs checkgate	Provide checkgate	Checkgate 1 unit	60,000	

Table 5.3 Rectification Plan - Labangan RIS, Muchrist IA

Region : 9
 NIS : Labangan River Irrigation System
 IA : Muchrist IA

Particular	Engineer's Views					Conditions to be considered for implementation
	Problems	Causes of problems	Proposed counter measures for problems	Estimated Volume of Works	Estimated Cost of Works (Peso)	
Along Access Rd. Dike Pulacan supply canal Sta 0+100	Eroded access road dike.	Eroded access road dike by polacan creek may affect supply canal.	Repair access road/Flood protection	Concrete 225 m ³	1,395,000	
Lantian supply Sta. 0+000 intake	Obstructed flow of water.	Silted intake barrel.	Desilting of intake barrel.	Desilting 40 m ³	20,000	
Turn-out	Many no gate turn-outs		Provide Turn-out	Turn-out 121 units	2,420,000	
Unauthorized Turn-out	No gate		Provide Turn-out	Turn-out 66 units	1,320,000	
Polacan Supplementary canal.	Flooding Problem.	No river protection dike.	Construct protection dike.	200 m ³	1,200,000	
Total Cost of Rehabilitation					20,408,000	
(including Drainage Improvement and River protection at Lantian and Polacan)					25,087,000	

Table 5.4 Rectification Plan - Labangan RIS, Sandata IA

Region : 9
 NIS : Labangan River Irrigation System
 IA : SANDATA IA

Particular	Engineer's Views					
	Problems	Causes of problems	Proposed counter measures for problems	Estimated Volume of Works	Estimated Cost of Works (Peso)	Conditions to be considered for implementation
Lat. A Headgate	Unregulated flow of water due to none gate		Install gates	Headgates 2 units	120,000	
Lat. A Sta. 0+750 Siphon	Water waste/looses.	Exposed barrel/Leaking Barrel.	Repair leaks & provide protective cover for barrel.	Concreting 120 m ³	700,000	
	Difficult to monitor upstream of Lat. A sta. 0+750	No bridge crossing Labangan River.	Construct spill-over Bridge (2 lane)	Spillover Bridge 1 unit	3,500,000	
Lat. A Sta. 0+750 Outlet of siphon	Outlet of siphon right side is scoured.	Unlined rightside outlet of siphon.	Lined rightside outlet of siphon	Concreting 20 m ³	120,000	
Lat. A Sta. 0+750-0+950 Canal	Limited access of equipment during repairs.	Banana trees along canal ROW.	Remove banana trees.			
Lat. A Sta. 1+524 Drainage crossing	Flooding problem due to Silted Drainage canal (500m) below sta. 1+500		Desilting of drainage canal.	Desilting 2,500 m ³	200,000	
Lat. A Sta. 0+940 1+238, 2+040	Flooding problem & overflow of water on canal embankment.	Inflow of water from the mountain to Lat. A	Construct catch drain.	3 units	100,000	Consent on construction from downstream farmers.
Lat. A Sta. 1+917-2+124	Over flow of water on canal embankment.	Low canal embankment left side.	Raise/restore canal embankment.	Embankment 400 m ³	64,000	
Lat. A Sta. 1+917 Road Crossing & Check	No checkgate, Scouring at outlet of culvert	Comb. Rd. Cr & check has no checkgate	Provide checkgate Provide protection	Checkgate 1 unit	60,000	
Lat. A Sta. 2+124	Damaged canal.	No. Thr. Cr. & Turn-out structure.	Construct thresher crossing & turnout structure.	Thresher Crossing 1 unit Turn-out	40,000	
Lat. A Sta. 2+684-4+220	Difficulty in moving farm equipments during repair.	Narrow Embankment.	Restore canal embankment.	Embankment 3,000 m ³	480,000	
Lat. A Sta. 2+384-2+390 Service Road	Damaged service road.	Inflow at adjacent hill.	Construct cross drain.	Cross drain 1 unit	75,000	
Lat. A Sta. 3+316 Culvert & check structure, drop	Outlet of canal structure scoured.		Line the outlet of the structure.	Lining 20 m ²	5,000	
Lat. A Sta. 4+220 Checkgate for Lat. A-2	Unregulated flow of water sometimes.	Scoured outlet.	Line the outlet of structure.	Lining 20 m ²	5,000	
		No checkgate on check for Lat A2.	Install new gate.	Checkgate 1 unit	60,000	
Lat. A Sta. 5+690	Overflow of water on the canal embankment.	Low Embankment.	Raise the embankment.	Embankment 400 m ³	64,000	
Lat. A-1 Headgate	Unregulated flow of water due to no gate		Provide headgate	Headgate 1 unit	60,000	
Lat. A-1 Sta. 0+000-end Canal	Overflow of water on the canal embankment.	Irregular shaped canal.	Reshaping of canal.	Excavation 100 m ³	8,000	
		Low embankment.	Low embankment.	Embankment 1000 m ³	160,000	
	Difficult to move equipments during repair.	Coconut trees along LS of embankment.	Coconut trees along LS of embankment.			

Table 5.4 Rectification Plan - Labangan RIS, Sandata IA

Region : 9
 NIS : Labangan River Irrigation System
 IA : SANDATA IA

Particular	Engineer's Views					
	Problems	Causes of problems	Proposed counter measures for problems	Estimated Volume of Works	Estimated Cost of Works (Peso)	Conditions to be considered for implementation
Lat. A-1 Canal	Reduce flow of water due to heavy siltation full stretch of canal.		Desilting.	Desilting 1,000 m ³	80,000	
Tawagan Creek (Supply pipe)	Temporary laying bamboo pipe over Tawagan Creek for irrigating 10 has.	Easily to damage by flood.	Provide elevated flume	1 unit	100,000	
Tawagan Creek along Banay area	Flooded/Submerged along Banay area.	Flood Control Dike Damaged.	Rehabilitation of Dike.	Embankment 1,000 m ³	160,000	
Lat. A1 Extn. Headgate	Unregulated flow of water due to no headgate		Install new headgate.	Headgate 1 unit	60,000	
Lat. A1 Extn. Sta. 0+000-2+000	Reduced flow of water due to siltation.		Desilting	Desilting 1,000 m ³	80,000	
Lat. A-2 Headgate	Unregulated flow of water due to non operational headgate		Install new headgate.	Headgate 1 unit	60,000	
Lat. A-2 Sta. 0+000-0+694	Reduced flow of water due to silted		Desilting.	500 m ³	40,000	
Lat. A-2 Sta. 0+328 Illegal check	Illegal check	Non irrigated area	Proposed check structure (Left & Right Turn-out).	Check structure 1 unit Turn-out 2 units	50,000	
Lat. A-2 Sta. 0+298 to End.	Narrow canal embankment does not allow movement of farm implement & maintenance of equipment.	Encroachment of canal embankment.	Restore canal embankment.	Embankment 1,050 m ³	168,000	
Lat. A-2 Sta. 0+984	Damaged canal.	No Check & Carabao Crossing.	Construct Comb. check & Carabao Crossing	Crossing and check 1 unit	50,000	
Lat. A-2 Sta. 1+059	Unregulated flow of water due to illegal turnout Left & Right & no check structure.		Construct check structure w/ TOLL & TOR.	Check structure 1 unit Turn-outs 2 units	50,000	
Lat. A-2 Sta. 1+949 Checkgate for Lat. A-2-A	Unregulated flow of water due ton checkgate structure.		Construct checkgate.	Checkgate 1 unit	60,000	
Lat. A-2 Sta. 1+949 Road Crossing and drop	Damaged left side wingwall of comb. Rd. Cr. & Drop (inlet)	Eroded embankment.	Repair wingwall.	Concrete 12 m ³	75,000	
Lat. A-2 Sta. 2+508-2+758	Movement of farm implements & maintenance equipment is not easy.	Trees along embankment(Left side). Irregular shape of canal.	Cut down trees. Restore canal prism.			DENR Permission
Lat. A-2 Sta. 2+758 Checkgate for Lat.A-2-B	Unregulated flow of water due to no checkgate structure.		Provide checkgate.	Checkgate 1 unit	60,000	
Lat. A-2 Sta. 1+487 Check structure	Outlet of check structure scoured.	Eroded embankment.	Line the outlet of the check structure.	Lining 110 m ²	30,000	

Table 5.4 Rectification Plan - Labangan RIS, Sandata IA

Region : 9
 NIS : Labangan River Irrigation System
 IA : SANDATA IA

Particular	Engineer's Views					
	Problems	Causes of problems	Proposed counter measures for problems	Estimated Volume of Works	Estimated Cost of Works (Peso)	Conditions to be considered for implementation
Lat. A-2-A 0+000	Outlet (Left & right side) of headgate scoured.	Eroded embankment.	Line the outlet of headgate.	Lining 33 m ²	8,000	
Lat. A-2-A Sta. 0+000-3+934	Reduce flow of water due to siltation		Desilting.	Desilting 4000 m ³	320,000	
Lat. A-2-A Sta. 2+558 Road crossing	Obstruction of water flow due to damaged Road Crossing.		Repair damaged road crossing.	1	20,000	
Lat. A-2-A Headgate	No headgate		Provide headgate	Headgate 1 unit	60,000	
Lat. A-2-A Sta. 2+050	Obstruction flow of water.	Damaged culverts.	Needs to construct Cr. drain (4 pcs pipe 12" Ø) 350 m away from turnout gate	4 LM 12" Ø	6,000	
Lat. A-2-A Sta. 2+230	Unregulated flow of water.	Damaged culvert, turnout left side no gate.	Replace culvert.	1 unit	10,000	
Lat. A-2-A Supplemental	Reduce flow of water due to narrow canal		Enlarge canal to design capacity,	Excavation 3,000 m ³	240,000	No ROW problem on construction of canal dike
			Construct road crossing	5 Rd. Cr.	100,000	
Lat. A-2-B Sta. 0+000-1+966	Silted canal		Desilting	1,000 m ³	80,000	
Lat. A-3 Headgate	Unregulated flow of water due to no gate		Install new gate & desilt culverts.	1 unit	60,000	
Lat. A-3 Sta. 0+000-4+616	Silted		Desilting	2,500 m ³	200,000	
Lat. A-3 Sta. 0+210 & 0+220	During heavy rainfall & can cause flooding in some areas.	Bamboo trees along embankment of creek.	Cut down/clear bamboo trees along embankment.			
Lat. A-3 Sta. 0+220 Siphon	Limited flow of water in the siphon. Scoured barrel.	Two (2) barrel siphon has 1 barrel silted w/c limits flow of water. Exposed barrel.	Desilt canal. Provide protection cover		20,000	
Lat. A3 Sta. 0+648	Inflow of water	Low embankment.	Raise embankment.	Embankment 1,000 m ³	160,000	
Turn-out	Many no gate turn-outs		Provide Turn-out	Turn-out 88 units	1,760,000	
Unauthorized Turn-out	No gate		Provide Turn-out	Turn-out 15 units	300,000	
Lat. A3 Sta. 4+200	Limited drainage capacity	Silted drainage canal.	Desilting.	Desilting 2,100 m ³	168,000	
Total Cost of Rehabilitation (including Spillway Bridge)					6,956,000	10,456,000

Table 5.5 Rectification Cost of Selected IAs Area in Labangan RIS

Item of Works	Total 2 IAs Area		Munchrist IA Area		Sandata IA Area	
	Quantity	Cost	Quantity	Cost	Quantity	Cost
1.1 Headworks improvement		P1,500,000		P1,500,000		
1.2 Siphon under Labangan River		P700,000				P700,000
2.1 Canal desilting	57,870 m ³	P4,647,000	40,170 m ³	P3,231,000	17,700 m ³	P1,416,000
2.2 Canal embankment	24,694 m ³	P3,541,000	16,844 m ³	P2,285,000	7,850 m ³	P1,256,000
2.3 Repair & heightening of canal lining	590 m ²	P136,000	590 m ²	P136,000		
2.4 Excavation along drainage canal	40,050 m ³	P3,204,000	40,050 m ³	P3,204,000		
3.1 Repair of irrigation structure	56 units	P7,510,000	34 units	P6,746,000	22 unit	P764,000
3.2 Headgate / Checkgate / Floodgate	27 units	P1,620,000	16 units	P960,000	11 units	P660,000
3.3 Turn-out	295 units	P5,920,000	188 units	P3,760,000	107 units	P2,160,000
4.1 Service road rehabilitation	2.5 km	P350,000	2.5 km	P350,000		
4.2 New service road	0.32 km	P320,000	0.32 km	P320,000		
5.1 Flood protection dike along Pulacan Creek	425 m ³	P2,595,000	425 m ³	P2,595,000		
5.2 Spillway bridge at Labagan River	1 unit	P3,500,000			1 unit	P3,500,000
Total of Rehabilitation Cost		P35,543,000		P25,087,000		P10,456,000

Table 6.1 Major Feature of Pulangui RIS

Location:		
Region		X
Province		Bukidnon
Operation Started		1984
Annual Rainfall		3,160 mm
Main Source of River		Pulangui River
Watershed Area at Intake		1,394 km ²
Number of Farmers		6,712 nos
Number of IA members		6,696 nos
Number of IA		17 IAs
Service Area		11,415 ha
Irrigated Area (Cropping Intensity) in 2001		
Wet Season		9,209 ha (81%)
Dry Season		9,741 ha (85%)
Irrigation Service Fee Collection		
Wet Season		74%
Dry Season		42%
Headworks	Type	Diversion Dam
		(Height 2.8 m, Length 120.8 m)
	Design Discharge at Intake	19.8 m ³ /sec
Length of Canal		
	Main Canal	105.1 km
	Lateral Canal	195.2 km
	Drainage Canal	266.0 km
Length of Service Road		226.0 km

Source: NIA Data Base & NISO

Table 6.2 Irrigation Facility Status in Pulangui RIS

CANAL	Canal (m)			Headgate				Checkgate				Turn-out				Unauthorized Turn-out				Conveyance Structures			
	Total	Good	Rehab	FF	PD	SF	NF	FF	PD	SF	NF	FF	PD	SF	NF	FF	PD	SF	NF	FF	PD	SF	NF
Paradise G5&G6 IA																							
Lat. G	1,596	1,596	0					2				5	1							1	1		
Lat. G-5	4,925	4,735	190	1								4	1	5	1	4	16			2	8		
Lat. G-6	2,820	2,080	740	1				1	1			2	1	5		1	6			1	4	2	
Lat. G-6A	1,240	1,240	0			1						1											
<i>Sub-total</i>	<i>10,581</i>	<i>9,651</i>	<i>930</i>	<i>2</i>	<i>0</i>	<i>1</i>	<i>0</i>	<i>0</i>	<i>3</i>	<i>1</i>	<i>0</i>	<i>12</i>	<i>2</i>	<i>11</i>	<i>0</i>	<i>1</i>	<i>5</i>	<i>22</i>	<i>0</i>	<i>4</i>	<i>13</i>	<i>2</i>	<i>0</i>
Kahugpungan IA																							
Lat. G	5,788	884	4,904					1	1	1		8	2	8			3			3	3	3	
Lat. G-7	4,460	400	4,060	1								3		12	4	3	14	6		7	2	1	
Lat. G-8	3,105	1,785	1,320			1						9	1	2	1	2	2	6	9	2	6		
Lat. G-9	2,141	1,141	1,000		1													3			1	2	
<i>Sub-total</i>	<i>15,494</i>	<i>4,210</i>	<i>11,284</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>0</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>0</i>	<i>20</i>	<i>3</i>	<i>10</i>	<i>13</i>	<i>6</i>	<i>5</i>	<i>23</i>	<i>18</i>	<i>12</i>	<i>12</i>	<i>6</i>	<i>0</i>
MAD IA																							
Lat. G	4,810	4,810	0	1				1	2			9	3				1			5		1	
Lat. G-10	2,800	250	2,550			1						6		1			1			6		1	
Lat. G-11	3,830	2,110	1,720			1						8	2	2			8			6	2	2	
Lat. G-12	2,710	2,710	0			1						3	3							6	2		
Lat. G-13	3,036	3,036	0			1								6						4		4	1
Lat. G-14	1,140	1,140	0			1						2					2			3		1	
<i>Sub-total</i>	<i>18,326</i>	<i>14,056</i>	<i>4,270</i>	<i>1</i>	<i>0</i>	<i>5</i>	<i>0</i>	<i>1</i>	<i>0</i>	<i>2</i>	<i>0</i>	<i>28</i>	<i>5</i>	<i>9</i>	<i>3</i>	<i>0</i>	<i>0</i>	<i>11</i>	<i>1</i>	<i>30</i>	<i>4</i>	<i>5</i>	<i>5</i>
Total	44,401	27,917	16,484	4	1	7	0	2	4	4	0	60	10	30	16	7	10	56	19	46	29	13	5

FF : Fully functioning, PD : Partly deteriorated, but functioning in a satisfactory range,

SF : Slight functioning. Not functioning well and/or affecting the discharge, NF : Completely not functioning

Source: Result of walk through, MC13

Table 6.3 Rectification Plan - Pulangui RIS, Paradise G5 & G6 IA

Region : 10
 NIS : Pulangui River Irrigation System
 IA : Paradise G5 & G6 IA

Particular	Engineer's Views					
	Problems	Causes of problems	Proposed counter measures for problems	Estimated Volume of Works	Estimated Cost of Works (Peso)	Conditions to be considered for implementation
Lat. G Sta. 6+520 Turn-out # 27	Gate not functional	Loss of lifting nut and stem	Provide new assembly of gate	1 (one) T.O. gate	20,000	
Lat G Sta. 7+370 checkgate for Lat G-6	Checkgate for lateral G6 one gate not functioning out of the Three (3) gate	Loss of lifting nut and rotten frame	Provide new assembly of gate	1 checkgate	60,000	
Lat. G Left side embankment	Embankment planted with banana and trees		Cut the trees and warn the farmer not to plant in the canal embankment	Banana 30 group Gemolina 20 pc		Land title of canal area under NIA
Lat. G-5 Sta. 0+010 to 0+200 Canal embankment	Mango trees are planted along canal embankment		Cut the trees and warn the farmer not to plant in the canal embankment	Mango trees 25 pc		Land title of canal area under NIA
Lat. G-5 Sta. 0+000-2+900 service road	Road is not passable needs repair	Lack of fund	Needs road surfacing	Leveling & gravel surfacing 2.9 km	406,000	
Lat. G-5 Sta. 2+400	Drainage water was top to irrigation	Flooding in the farm area	Improve the existing drainage canal	Desilting 1,500 cu.m.	120,000	
Lat. G-5 Sta. 3+560 Road crossing	Flooding occur cause by silted road crossing	Lack of maintenance	Need maintenance	Manual desilting 5 cu.m.	1,000	
Lat. G-6 Sta. 0+015 Parshall flume	No measuring device at the parshall flume		Provide staff gauge	One (1) unit concrete staff gauge	1,000	
Lat. G-6 Sta. 0+000-0+700 & 1+620-1+650 canal embankment	Narrow embankment at right side of canal F/DS	Encroachment of canal by farmers	Improve/rehab the canal section	CHB bench flume lining L=730 m V=1,250m ³	200,000	Farmers agree on the design of canal
Lat. G-6 Sta. 1+645 - 1+660	Wider canal width	Scouring canal embankment by water-flow	Improve/rehab the canal section with lining	CHB bench flume lining L=15 m	21,000	
Lat. G-6 near Sta. 1+600 part of Service area			Improved drainage canal	Manual desilting V=960 m ³	77,000	
			Construct check structure	Check structure	500,000	
Lat G-6 Sta 2+820 road crossing	Flooding at upstream of road crossing	Small size of conduit	Replace conduit with larger size	30" dia pipes 20 m	42,000	
	Shortage of irrigation at downstream	Siltation in conduit				
Lat. G-5 & G-6	Plenty of illegal checking	Lack of check structure in Turn-out	Provide check structure	Class "A" V=15 m ³	93,000	
Lat. G-5 & G-6 Turn-out	Many Turn-outs has no gate G-5 6 nos G-6 7 nos	Lack of fund, deteriorated	Provide and install new gate	Turn-out 13 units	260,000	
	Some Unauthorized Turn-outs (which will be legalized) has no gate G-5 14 nos, G-6 4 nos		Provide and install new gate	Turn-out 18 units	360,000	
Lat. G-6-A Sta. 0+000 headgate	Headgate not functioning		Provide new headgate	Headgate	30,000	

Table 6.3 Rectification Plan - Pulangui RIS, Paradise G5 & G6 IA

Region : 10
 NIS : Pulangui River Irrigation System
 IA : Paradise G5 & G6 IA

Particular	Engineer's Views					
	Problems	Causes of problems	Proposed counter measures for problems	Estimated Volume of Works	Estimated Cost of Works (Peso)	Conditions to be considered for implementation
Lat. G-6-A service road	Service road is not passable		Repair/rehab of service road	Embankment & gravel surfacing 1km	500,000	No ROW for new access road
				New Road 240m	240,000	
Total Cost of Rehabilitation (including Water Re-use Structure and New Access Road)					2,114,000	2,931,000

Table 6.4 Rectification Plan - Pulangui RIS, Kahugpungan IA

Region : 10
 NIS : Pulangui River Irrigation System
 IA : Kahugpungan IA

Particular	Engineer's Views					
	Problems	Causes of problems	Proposed counter measures for problems	Estimated Volume of Works	Estimated Cost of Works (Peso)	Conditions to be considered for implementation
Lat. G service road	Difficult/unpassable	Pothole & Slippery	Need rehab. Need surfacing materials Need drainage ditch	5.6 km Resurfacing V 4,500 m ³	1,056,000	
	Silt removed from Lat G was just place on the side & service road	No place for disposal	To widen the service road	V 10,200 m ³	365,000	
Lat. G Sta. 8+198 Checkgate for Lat. G-7	Non operational one checkgate	Always open	Replace checkgate	checkgate 1 unit	60,000	
Sta. 8+470 to 13+374	Canal is silted		Desilting of canal	Desilting 9.800 m ³	784,000	
Lat. G Sta. 8+600-9+700	Lateral G embankment is being cultivated & planted with corn, etc...	Policies not disseminated	Remove plant			
Lat G Sta 9+796 checkgate for Lat G-8	Gates were fixed to open	Always open		Checkgate 1 unit	60,000	
	Platform was damaged			Class "A" V 30 m ³	2,000	
Lat. G Sta. 9+980 cross drain	Breaching of canal left side embankment and drain into Lat G	Insufficient capacity of cross drain	Provide drainage inlet structure	Class "A" 5.60 m ³	35,000	
				Excavation 20 m ³	2,000	
				Backfill 15 m ³	3,000	
Lat. G Sta. 9+370, 10+610 cross drain	Silted canal due to drain water entering	Clogged cross drain	Desilt cross drain	Desilting 20 m ³ x 2 site	4,000	
Lat. G Sta. 8+740, 8+961, 9+470 10+790, 11+170 Turnouts	No division box		Provide division box	Division box 5 units	35,000	
Lat. G Sta. 11+410 Culvert	Flooded at upstream side	Existing cross drain is too small	Additional Barrel	Class "A" 20 m ³	124,000	
				Excavation 180 m ³	15,000	
				Backfill 150 m ³	24,000	
Lat. G Sta. 12+460 cross drain (siphonic structure)	Cross drain was damaged Canal embankment was breached Drain water directly enter Lat G	Damaged by flash flood	Change structure to bench flume	Class "A" 35 m ³	217,000	
				Excavation 210 m ³	17,000	
				Embankment 1000 m ³	160,000	
Lat. G Sta. 13+754 Silt ejector	Scoured at spillway outlet		Repair spillway chute	Class "A" 6.5 m ³	40,000	
				Backfill 60 m ³	10,000	
Lat. G Turn-out	Need repair 6 units None gate 2 units		Provide new Turn-out	Turn-out 8 units	160,000	
Lat. G-7 canal embankment	Narrow right side embankment	Soil erosion, grabbed by farmers lack of dissemination	Restore the canal embankment	Embankment 500 m ³	80,000	
Lat. G-7 Drainage way	Water shortage		Provide check structure to support water supply of G7 downstream	Check structure	800,000	

Table 6.4 Rectification Plan - Pulangui RIS, Kahugpungan IA

Region : 10
 NIS : Pulangui River Irrigation System
 IA : Kahugpungan IA

Particular	Engineer's Views					
	Problems	Causes of problems	Proposed counter measures for problems	Estimated Volume of Works	Estimated Cost of Works (Peso)	Conditions to be considered for implementation
Lat. G-7 Sta. 0+400 to end	Silted	Deteriorate the water capacity Overlapping the canal embankment	Need desilting	Desilting 2,300 m ³	184,000	
Lat. G-7 Sta. 1+600, 2+039+2+179, 2+182, 3+684 Turnouts	Not in proper location		To be relocate and transfer 5 units	Class "A" 0.50 cu.m. x 5	15,000	
				Excavation 20 cu.m. x 5	7,500	
				Backfill 15 cu.m. x 5	12,500	
Lat. G-7 Sta. 2+720 cross drain	Flooded inlet side	Small size of barrel & siltation	Desilting of drainage structure	Manual desilting 20 cu.m.	2,000	
Lat. G-7 Sta. 2+740 Culvert	Overflow	Small size of pipes replace	RC Pipe	24" dia - 5 pcs	10,000	
Lat. G-8 Headgate	No functional gate		Provide Headgate	Headgate 1 unit	60,000	
Lat. G-8 Sta. 0+020 parshall flume	Scoured outlet	No protection	Restore the canal section	Backfill 20 cu.m.	3,000	
			Provide protection boulder - riprap 10 m ³	Boulder riprap 10 m ³	23,000	
Lat. G-8 Sta. 1+785 turnout	Not functioning	Damaged of steel gate	Provide new gate	Turn-out 2 units	40,000	
Lat. G-8 Sta. 1+785 Service area	Farmers don't pay ISF due to water shortage	Silted farm ditch	Desilting of canal	Manual excavation 600 cu.m.	48,000	
After Lat. G-8 Sta. 1+785	Heavily silted canal	No catch drain along service road	Provide & improve side drain	Manual desilting 1,200 cu.m.	96,000	
Lat. G-7, G-8 service road	Difficult to pass due to many pothole	Service road are being utilized by big trucks	Need repair of service road, Get assistance to LGU, Get assist truck owner for maintenance	Leveling and graveling 7.6 km	1,064,000	
Access road between Lat. G-7 & G-8		Damaged by flood	Repair of structure	Class "A" 12.50 m ³	78,000	
Lat. G-9 Sta. 0+000 headgate	No gate		Provide headgate	Headgate 1 unit	60,000	
Lat. G-9 Sta. 0+020 parshall flume	Deep scoured at outlet	No protection	Repair & provide protection	Back filling 40 m ³	7,000	
				Boulder riprap 10 cu.m.	23,000	
Lat. G-9 Sta. 1+141	No structure at end check	Water goes else where	Provide structure	Class "A" 3.20 cu.m.	20,000	
				Excavation 8 cu.m.	1,000	
				Backfill 6 cu.m.	1,000	
Unauthorized Turn-out	None gate Lat. G 1 unit Lat. G-7 15 units Lat. G-9 6 units		Provide Turn-out	Turn-out 22 units	440,000	
Total Cost of Rehabilitation (including Water Re-use Structure)					5,448,000	
					6,248,000	

Table 6.5 Rectification Plan - Pulangui RIS, MAD IA

Region : 10
 NIS : Pulangui River Irrigation System
 IA : MAD IA

Particular	Engineer's Views					
	Problems	Causes of problems	Proposed counter measures for problems	Estimated Volume of Works	Estimated Cost of Works (Peso)	Conditions to be considered for implementation
Lat. G Sta. 13+890 Checkgate for Lat. G-10	Cannot control the volume of water allocation due to no steel gate		Provide new steel gate	2 units Headgates	120,000	
Lat. G Sta.14+960 TO # 19	Needs to have a full check at the check structures	Not on proper location	To be relocated	Class "A" 2.80 cu.m. Demolition 2.80 cu.m.	18,000	
Lat. G Sta.16+330 Unauthorized Turn-out Right	Needs full checking of Lat. G	TOR located in high elevation	Need to improve the location or to be condemned	Class "A" 1.70 m ³	11,000	
Lat. G Service Road	Many potholes	Less maintenance due to lack of fund	Repair of service road	Surfacing 4.7 km	658,000	
Lat. G-10 Sta.0+250	Damaged the canal embankment	Farm ditch joint to Lat. G-10	Relocate the farm ditch Restore canal dike	Embankment 20 m ³	3,000	
Lat. G-10 Sta.1+084 Drainage Crossing	Silted drainage Crossing	No maintenance Lack of fund	Improved the structure or desilt regularly	Excavation 20 m ³	2,000	
Lat. G-11 Headgate	No steel gate	Destroyed by farmers	Provide steel gate	Headgates 1 unit	30,000	
Lat. G-11 Sta.0+020 Parshall flume	Scouring canal at outlet of parshall flume	Strong current during high rainfall	Rehab outlet of parshall flume sidewall	Class "A" 2.65 m ³ Back Fill V 9.50 m ³	17,000 2,000	
Beside of Lat.G-11 Sta.2+110 drainage crossing under provincial road	Flooding	Siltation inside drainage crossing Insufficient size of pipes	Rehab the whole structure	Class "A" 4.50 cu.m. Excavation 25cu.m. 36" dia RCP 14 pcs	28,000 2,000 40,000	
Lat G-11 from Sta.2+110 to end	Silted canal	Insufficient maintenance	Desilt regularly	Excavation 540 m ³	43,000	
Lat G-11	No exact farm ditches	Condemned by farmer	Reroute the canal	Embankment (manual) 280 m ³	45,000	Agree among Turn-out Service Area members on alignment of farm ditches
Lat. G-12 Headgate	No steel gate	Lost of steel plate and stem Water level cannot control	Install new steel gate	Headgate 1 unit	30,000	
Lat. G-12 Sta.1+010 Culvert	Overflowing at the inlet that causes flooding	Culvert too small pipe	Needs improvement	Excavation 40 cu.m. (manual) Backfill 35 cu.m. (manual) Class "A" 2.5 cu.m. 24" dia RCP 13 pcs.	3,000 6,000 16,000 23,000	
Lat. G-12 Sta.2+320 Culvert	Silted		Desilting of structure	Desilting V 6.90 cu.m.	1,000	
Lat. G-13 Headgate	Not to control the water allocation delivery due to steel gate		Provide the new steel gate	Headgate 1 unit	30,000	

Table 6.5 Rectification Plan - Pulangui RIS, MAD IA

Region : 10
 NIS : Pulangui River Irrigation System
 IA : MAD IA

Particular	Engineer's Views					
	Problems	Causes of problems	Proposed counter measures for problems	Estimated Volume of Works	Estimated Cost of Works (Peso)	Conditions to be considered for implementation
Lat. G-13 Sta.0+760, 2+060 Turn-out	Small amount of water enter to the paddies	Low irrigation water level comparing with paddy	Provide check structure	Check structure 2 unit	48,000	No water head problems along upstream after installation of check structure
Lat. G-13 All Turn-outs	No steel gates	Deterioration	Install new steel gate	6 units steel turn-out gates	120,000	
Lat. G-13 at tail-end area	Flooding of area	Lack of drainage canal	Construction of drainage canal	Excavation 400 cu.m. (mech.)	32,000	No ROW along new drainage canal
Lat. G-14 Headgate	No gate		Provide headgate	Headgate 1 unit	30,000	
Lat. G-14 Unauthorized turn-out	UTOs	No exact water allocation delivery; Lack of TO	Provide new TO	Turn-out 3 units	60,000	Agree among Turn-out Service Area Group along Lat. G-14 on location of turn-outs
Lat. G-14	Canal capacity reduces	Lack of maintenance work	Need desilting	Desilting 350 cu.m.	28,000	
	No exact irrigation water delivery	Shortage of water	Construction of check structure	Class "A" concrete 35 m ³ Excavation 200 m ³	217,000 16,000	
Lat. G14 Sta. 0+310	No drainage crossing	Flooding	Provide drainage crossing	Class "A" 8.50 cu.m.	53,000	
				Excavation 29.00 cu.m	2,000	
				Backfill 22.00 cu.m	4,000	
				30" dia RCP 12 pcs	26,000	
Total Cost of Rehabilitation (including Water Re-use Structure)					1,531,000	1,764,000

Table 6.6 Rectification Cost of Selected IAs Area in Pulangui RIS

Item of Works	Total 3 IAs Area		Paradise G5 & G6 IA Area		Kahugpangan IA Area		MAD IA Area	
	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost
2.1 Canal desilting	17,742 m ³	P1,422,000	2,465 m ³	P198,000	13,960 m ³	P1,118,000	1,317 m ³	P106,000
2.2 Canal embankment	800 m ³	P128,000	m ³		500 m ³	P80,000	300 m ³	P48,000
2.3 Repair & heightening of canal lining	745 m	P221,000	745 m	P221,000				
2.4 Farm ditch								
3.1 Repair of irrigation structure	20 units	P1,128,000	3 units	P136,000	13 units	P770,000	4 units	P222,000
3.2 Headgate / Checkgate	14 units	P620,000	2 units	P90,000	4 units	P242,000	8 units	P288,000
3.3 Turn-out	80 units	P1,524,000	32 units	P640,000	37 units	P675,000	11 units	P209,000
4.1 Service road rehabilitation	21.8 km	P4,049,000	3.9 km	P906,000	13.2 km	P2,485,000	4.7 km	P658,000
4.2 New access road	0.24 km	P240,000	0.24 km	P240,000				
4.3 Repair of road structure	2	P78,000			2 units	P78,000		
5.1 New check structure along drainage	3 units	P1,533,000	1 unit	P500,000	1 unit	P800,000	1 unit	P233,000
Total of rehabilitation cost		P10,943,000		P2,931,000		P6,248,000		P1,764,000

Table 7.1 Major Feature of Mal RIS

Location:		Region Province	XI Davao del Sur
Operation Started			1992
Annual Rainfall			2,017 mm
Main Source of River			Mal River
Watershed Area at Intake			354 km ²
Number of Farmers			2,779 nos
Number of IA members			1,605 nos
Number of IA			15 IAs
Service Area			2,613 ha
Irrigated Area (Cropping Intensity) in 2001			
Wet Season			2,150 ha (82%)
Dry Season			2,339 ha (90%)
Irrigation Service Fee Collection			
Wet Season			90%
Dry Season			77%
Headworks			Diversion Dam (Height 2m, Length 43 m)
Sluice Gate			2 nos of 2.85 m x 2.88 m
Intake Gate			3 nos of 1.2 m x 1.2 m
Design Discharge at Intake			5.3 m ³ /sec
Length of Canal			
Main Canal			LMC = 8.77 km, RMC = 9.56 km
Lateral Canal			25.5 km
Drainage Canal			23.0 km
Length of Service Road			49.4 km

Source: NIA Data Base & NISO

Table 7.2 Irrigation Facility Status in Mal RIS

CANAL	Canal (m)			Headgate				Checkgate				Turn-out				Unauthorized Turn-out				Conveyance Structures				
	Total	Good	Rehab	FF	PD	SF	NF	FF	PD	SF	NF	FF	PD	SF	NF	FF	PD	SF	NF	FF	PD	SF	NF	
MAL RIS																								
Weslasufia IA																								
Right MC	1,977	1,977	0					1				1										1		
Lat. C	3,000	1,220	1,780	1								1	1	1								1		
<i>Sub-Total</i>	<i>4,977</i>	<i>3,197</i>	<i>1,780</i>	<i>1</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>1</i>	<i>0</i>	<i>1</i>	<i>1</i>	<i>2</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>2</i>	<i>0</i>	<i>0</i>	
Labakafia IA																								
Right MC	2,426	2,426	0					1				3	1								7	3		
Lat. E	2,017	1,337	680	1								1	3			1					1	4		
<i>Sub-Total</i>	<i>4,443</i>	<i>3,763</i>	<i>680</i>	<i>1</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>1</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>4</i>	<i>1</i>	<i>3</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>1</i>	<i>0</i>	<i>7</i>	<i>4</i>	<i>4</i>	<i>0</i>	
Malkaira IA																								
Lat. F	1,529	1,209	320	1								2	1									3		
<i>Sub-Total</i>	<i>1,529</i>	<i>1,209</i>	<i>320</i>	<i>1</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>2</i>	<i>1</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>3</i>	<i>0</i>	
Total	10,949	8,169	2,780	3	0	0	0	1	0	1	0	5	4	6	0	0	0	1	0	7	6	7	0	

FF : Fully functioning, PD : Partly deteriorated, but functioning in a satisfactory range,

SF : Slight functioning. Not functioning well and/or affecting the discharge, NF : Completely not functioning

Source: Result of walk through, MC13

Table 7.3 Rectification Plan - Mal RIS, WESLASUFIA

Region : 11
 NIS : Mal River Irrigation System
 IA : WESLASUFIA IA

Particular	Engineer's Views					
	Problems	Causes of problems	Proposed counter measures for problems	Estimated Volume of Works	Estimated Cost of Works (Peso)	Conditions to be considered for implementation
Right Main Canal Sta. 2+720 Headgate	Steel gate at headgate was damaged	Damaged by private truck	Repair of steel gate	1 steel gate	60,000	Repairing work shall be done during cut off
Lat. C Sta. 0+500 - 0+540	Water overflow from canal during rotation schedule	Capacity of lined canal is too small for rotation schedule	Raise the side wall of lined canal	40 m, class A concrete 2.40m3	15,000	
Main farm ditch after end check of Lat. C Sta. 1+260-3+000	Shortage of water during dry season	Seepage & percolation is high and there is high conveyance losses	Extension of canal lining	1,740 m, class A concrete 400m3	2,480,000	No access road
Lat. C service road	Many pot holes	Utilized by heavy equipment and truck / less maintenance	Rehabilitation of service road	Surfacing 1,240 m3	180,000	
Extension of Lat. C service road Sta. 1+260-3+000	No service roads	Not including design	Extension of service road	1.740 km	1,740,000	Land acquisition shall be clear
Check structure at La Suerte Creek for water re-use	Shortage of water during dry season	Water discharge from dam is not enough during dry season	Construct check structure at La Suerte Creek for water re-use	Class A concrete 15m3	93,000	
Total Cost of Rehabilitation (including New Service Road and Water Re-use Structure)					2,735,000	
					4,568,000	

Table 7.4 Rectification Plan - Mal RIS, LABAKAFIA

Region : 11
 NIS : Mal River Irrigation System
 IA : LABAKAFIA IA

Particular	Engineer's Views					
	Problems	Causes of problems	Proposed counter measures for problems	Estimated Volume of Works	Estimated Cost of Works (Peso)	Conditions to be considered for implementation
Lat. E Sta. 0+620-0+760, 1+100-1+260, 1+700-2+080 Canal lining	Water overflow from canal during rotation schedule	Capacity of lined canal is too small for rotation schedule. It was designed for continuous irrigation	Raise the side wall of lined canal	680 m Class A concrete 41m ³	254,000	
Lat. E Sta. 0+300-1+100	No canal berm	Canal berm is utilized by farmers	Rehabilitation of canal berm	Embankment 900m ³	144,000	Confirmation of boundary between field and canal
Lat. E Sta. 0+564,1+277,1+567,1+761 Culvert 4 places	Water overflow at pipe inlet during rotational water delivery	Pipe diameter is small for rotation schedule. It was designed for continuous irrigation	Replace existing pipe with bigger one	RCP 24" dia. 6pcs Class A concrete 5m ³ Excavation 10m ³ Back filling 20m ³ x4 places	200,000	
Lat. E Sta. 0+760 Turnout #93	Steelgate has no bolt & nut	Removed by farmers	Fix bolt & nut	Bolt & nut 2sets	1,000	
Lat. E Sta. 0+875 UTO	No steel gate	Not including design	Install steel gate	Turn-out 1 unit	20,000	
Lat. E Sta. 0+980 Aqueduct	Leakage of water from canal	Flume wall was broken by farmers	Repairing wall	Class A concrete 0.1m ³	1,000	
Lat. E Sta. 1+277 Turnout #95	No steel gate	Broken by farmers	Install steel gate	Turn-out 1 unit	20,000	
No service road along Lat. E Sta.0+000-1+200	No service road	Not provided during project	Provide service road	Length 1.2km Width 4.0m	1,200,000	Land acquisition shall be clear
Water re-use along La Suerte Creek	Shortage of water at downstream IA during dry season	Water resource is not enough	Provide check or small dam	Class A concrete 480m ³ Borrowhaul 1,300m ³ Excavation 640m ³	3,235,000	
Total Cost of Rehabilitation (including Extension of New Service Road and Water Re-use Structure)					640,000	5,075,000

Table 7.5 Rectification Plan - Mal RIS, MALKAIRA

Region : 11
 NIS : Mal River Irrigation System
 IA : MALKAIRA IA

Particular	Engineer's Views					
	Problems	Causes of problems	Proposed counter measures for problems	Estimated Volume of Works	Estimated Cost of Works (Peso)	Conditions to be considered for implementation
Headgate to Lat. F	No staff gauge	Not provided during project	Install staff gauge or other measuring devices	Staff gauge 1pc	5,000	
Lat. F Sta. 0+550-0+680, 0+920-1+110	Water overflow during rotational water delivery	Canal capacity is too small during project time	Increase side wall of canal	320 m Class A concrete 20m3	124,000	
Lat. F Sta. 0+075-0+125, 0+480-0+530, 0+920-1+000	Canal berm is damaged	Canal berm is utilized by farmers for planting rice or other crops	Rehabilitate canal berm	Embankment 195m3	32,000	Confirmation of boundary between field and canal
Lat. F Sta. 0+575, 1+022, 1+466 Culvert	Water overflow at pipe inlet during rotational water delivery	Pipe diameter is small for rotation schedule. It was designed for continuous irrigation	Replace existing pipe with bigger one	RCP 24" dia. 6pcs Class A concrete 5m3 Excavation 10m3 Back filling 20m3 x 3 places	150,000	
Lat. F Sta. 0+920, 1+120	Illegal checking	Provided by farmers because of shortage of water	Enforce penalty to farmers by IA			
Lat. F Sta. 1+529	No road crossing structure	Not including design	Provide culvert	RCP 24" dia. 6pcs Class A concrete 5m3 Excavation 10m3 Back filling 20m3	50,000	
No service road along Lat. F Sta. 0+150-1+529	No service road	Not provided during project	Provide service road	Length 1.3km Width 4.0m	1,300,000	Land acquisition shall be clear
Total Cost of Rehabilitation (including New Service Road)					361,000	1,661,000

Table 7.6 Rectification Cost of Selected IAs Area in Mal RIS

Item of Works	Total 3 IAs Area		WESLASUFIA Area		LABAKAFIA Area		MALKAIRA Area	
	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost
2.2 Canal embankment	1,095 m ³	P176,000	m ³		900 m ³	P144,000	195 m ³	P32,000
2.3 Repair & heightening of canal lining	2,780 m	P2,873,000	1,780 m	P2,495,000	680 m	P254,000	320 m	P124,000
3.1 Repair of irrigation structure	10	P406,000			5 units	P201,000	5 units	P205,000
3.2 Headgate / Checkgate	1 unit	P60,000	1 unit	P60,000				
3.3 Turn-out	3	P41,000			3 units	P41,000		
4.1 Service road rehabilitation	1.3 km	P180,000	1.3 km	P180,000				
4.2 New service road	4.24 km	P4,240,000	1.74 km	P1,740,000	1.2 km	P1,200,000	1.3 km	P1,300,000
5.1 New check structure along creek	2 units	P3,328,000	1 unit	P93,000	1 unit	P3,235,000		
Total of rehabilitation cost		P11,304,000		P4,568,000		P5,075,000		P1,661,000

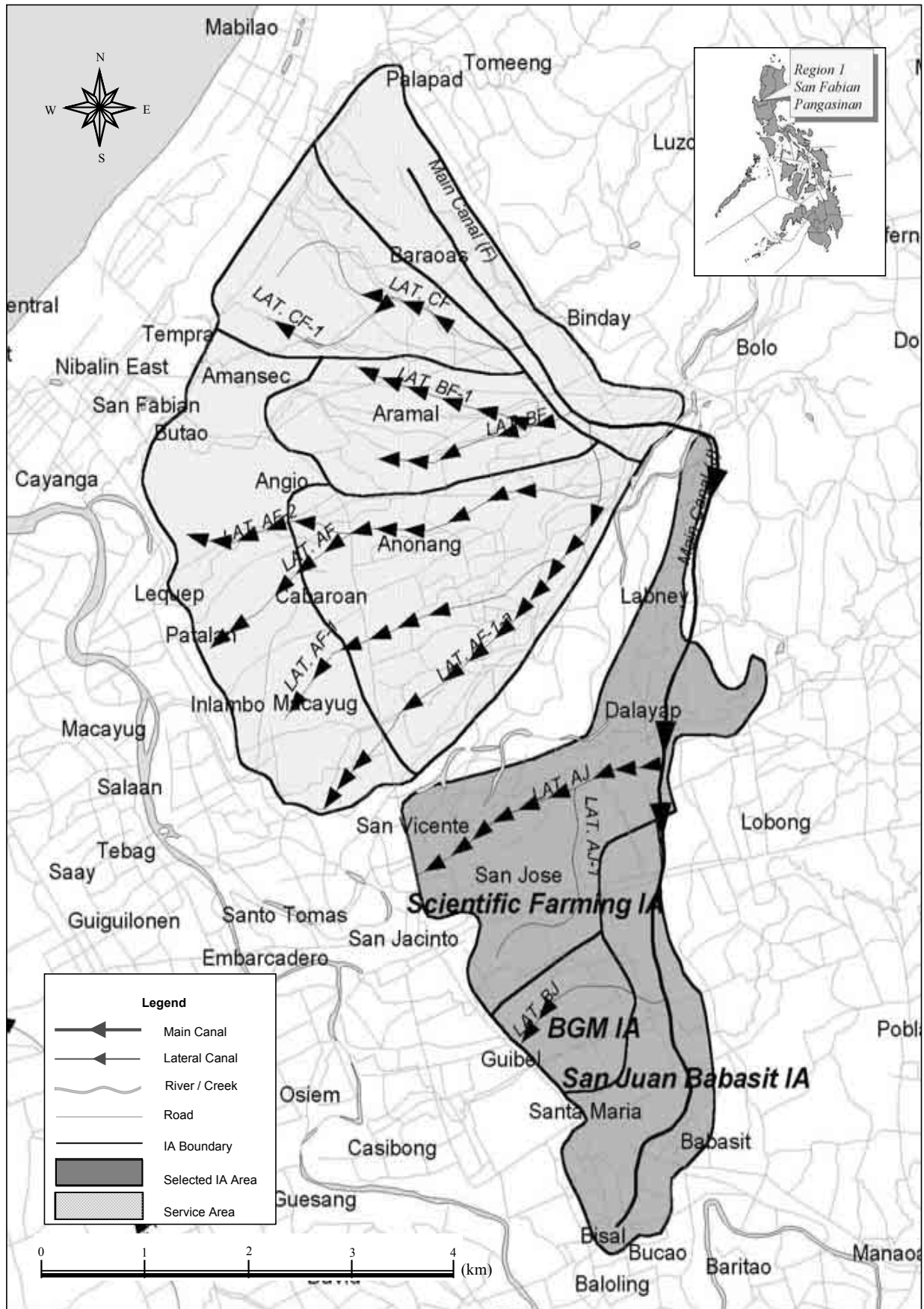


Figure 2.1 General Layout and Location of the Pilot IAs in San Fabian RIS

Figure 2.2 Findings on Walk Through San Fabian RIS - Scientific Farming IA

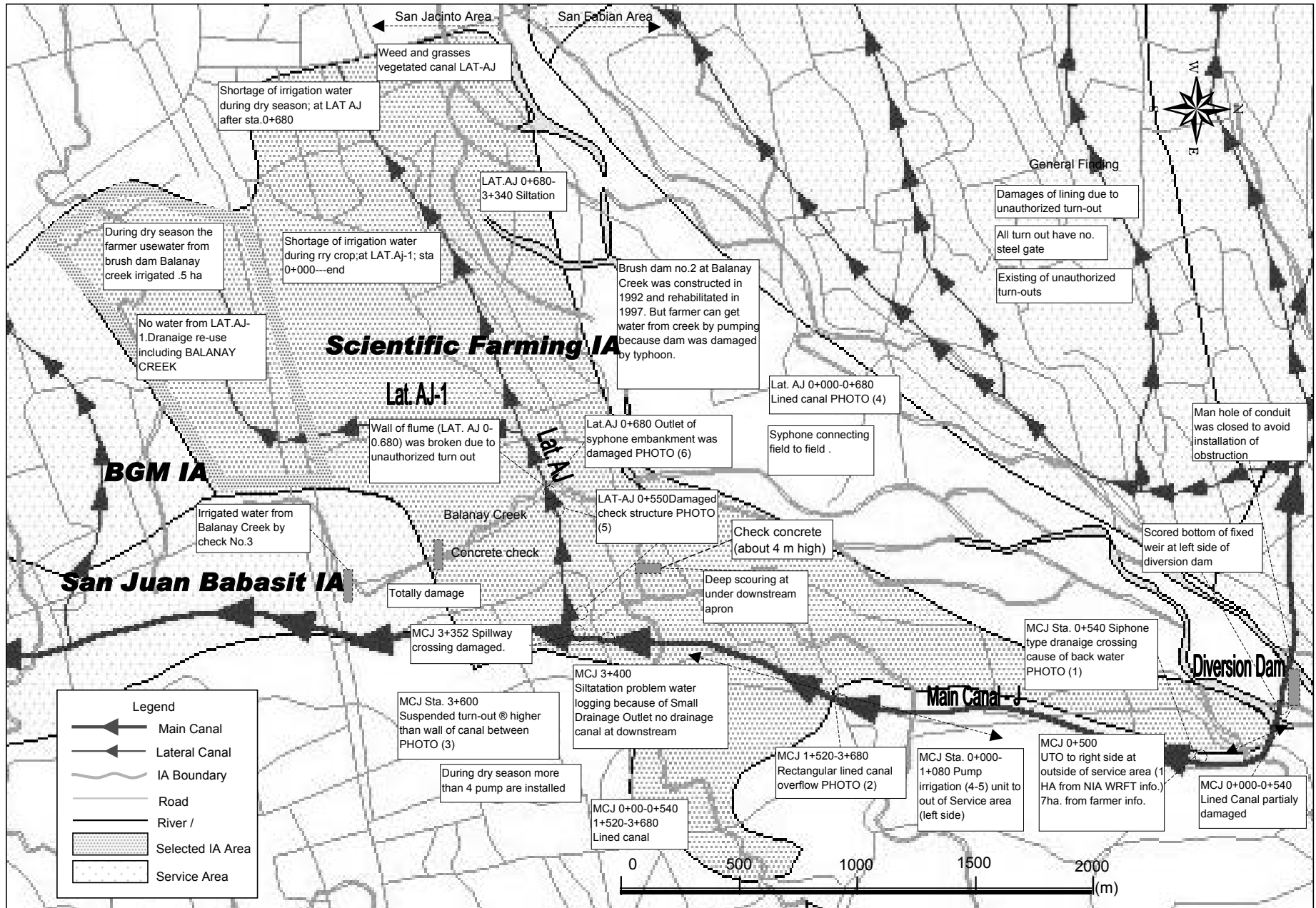


Figure 2.3 Findings on Walk Through San Fabian RIS - BGM IA

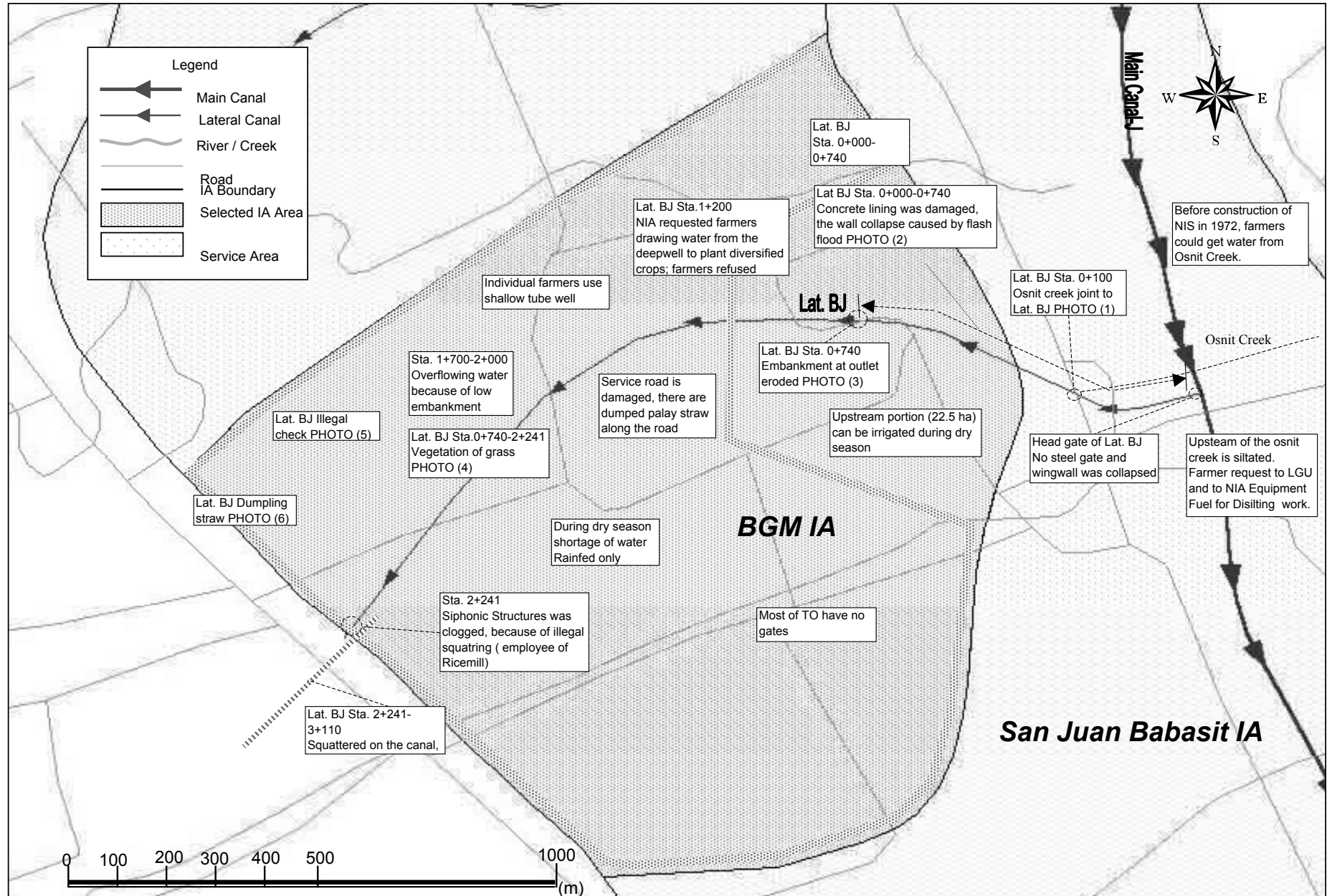


Figure 2.4 Findings on Walk Through San Fabian RIS - San Juan Babasit IA

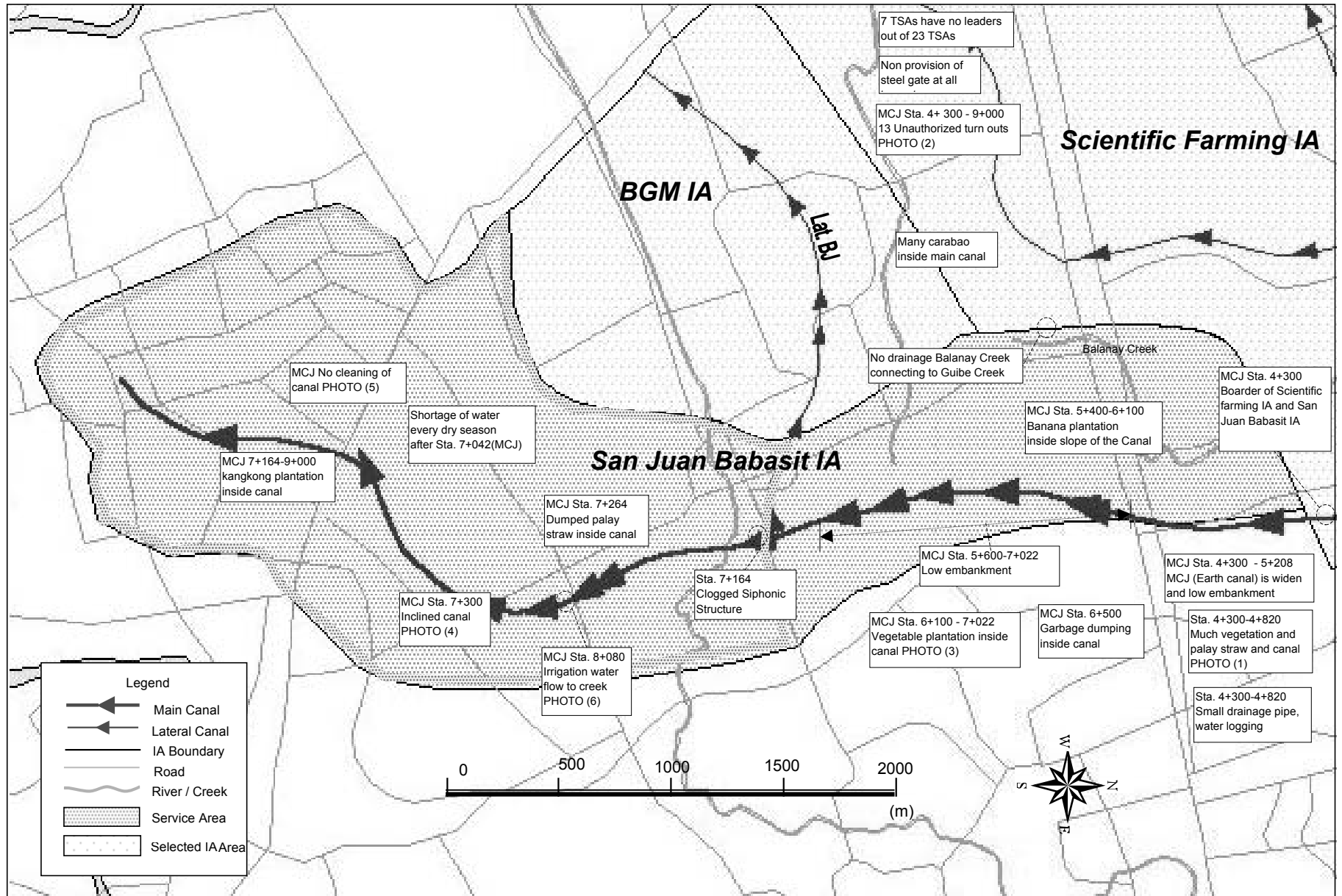


Figure 3.1 General Layout and Location of the Pilot IAs in Angat RIS

