CHAPTER 4 EVALUATION OF MASTER PLANS AND SELECTION OF AN AIRPORT FOR F/S

It was required to select one medium term development project for the feasibility study to be conducted in the Study. A project should be selected mainly from the viewpoints of national development strategy and foreign aid status once technical, environmental, economical and financial viability of the master plan (in long term) is confirmed.

The following were agreed, in principle, between DOTC and the JICA Study Team as the major determining factors of selecting a project for the feasibility study.

a) Optimal economic internal rate of returns in long term
b) Large number of beneficiaries (high traffic volume) in long term
c) Least problems in project implementation in medium term
d) Project cost

Evaluation results of the four airport development master plans are summarized in Table 4.1 and the following paragraphs.

Bacolod Airport : Anticipated traffic volume at Bacolod Airport is the second highest among the four airports and about 85% of Iloilo Airport, the highest. Total project cost is in the middle range and similar to but about 14% higher than Iloilo. Economic Internal Rate of Returns (EIRR) is in the similar range to Iloilo (over 20%). The EIRR is high enough to justify the development of Bacolod Airport. It is considered that the project will have the least technical and environmental problems. It should be noted that the development of the new airport will reduce aircraft noise problem of the province.

Iloilo Airport : Anticipated traffic volume at Iloilo Airport is the highest among the four airports. Total project cost is in the middle range and 14% lower than Bacolod. EIRR of the Iloilo Airport development is the highest among the four, and high enough to justify the project. There will be substantial impacts by resettlement and on aircraft noise pollution. It may be required from the environmental protection viewpoint to conduct a study on new airport development as an alternative.

Tacloban Airport : Anticipated traffic volume at Tacloban Airport is the second lowest; about 50% of Iloilo. Total project cost is the lowest and about 70% of Iloilo. As a result, EIRR is lower than Iloilo, but it is high enough to justify the development of Tacloban Airport. There will be some impact on aircraft noise pollution at Runway 36.

Legaspi Airport : Anticipated traffic volume at Legaspi Airport is the lowest; about 32% of Iloilo. Total project cost is the highest due to the hill obstacle removal. As a result, EIRR is the lowest. The EIRR suggest that the project is unfeasible from the economical viewpoint. There will be impacts by resettlement and on aircraft noise pollution. Furthermore, hill obstacle removal will have impacts on flora, fauna and landscape.

From the view point of EIRR and number of beneficiaries the developments of Bacolod and Iloilo Airports should have higher priority than the development of Tacloban and Legaspi Airports. Comparing the developments of Bacolod and Iloilo Airports, it is considered that the development of Bacolod Airport has less technical and environmental problems, which is one of the major concerns of the international lending agencies.

Developments of the trunkline airports are an urgent requirement of the development of civil aviation sector of the Philippines. Therefore, it is recommended to seek an international financial assistance for the development of Bacolod and Iloilo Airports first, then the others. Iloilo Airport, however, needs a study on new airport development as mentioned previously. Therefore, it was decided to conduct a feasibility study on Medium Term Development of Bacolod Airport in the Study.

Table 4.1 Comparison of Four Airport Developments

Item	Bacolod Airport	Iloilo Airport	Tacloban Airport	Legaspi Airport
1. Annual Passengers				
Year 2005	1,003,000	1,179,000	655,000	375,000
Year 2015	1,436,000	1,688,000	938,000	537,000
2. Project Costs (PHP million)				
Medium Term	2,144	1,770	1,377	3,049
Long Term	277	320	166	264
Total	2,421	2,090	1,543	3,313
3. Technical / Environmental Issues	– Minimal adverse impacts by resettlement of inhabitants. – Reduce aircraft noise problems of the province. – Little adverse impacts on flora and fauna.	– Considerable adverse impacts by resettlement of inhabitants. – Substantial increase of aircraft noise pollution. – Little impacts on flora and fauna.	– Some adverse impacts by resettlement of inhabitants. – Some increase of aircraft noise pollution on Runway 36 side. – Need special attentions to avoid adverse impacts on the mangrove area near the Runway 18 end.	– Some adverse impacts by resettlement of inhabitants. – Substantial increase of aircraft noise pollution. – Adverse impacts on flora and fauna by cutting the hill tops. – Impacts on landscape by removal of hill tops. – Potential environmental problems by transportation and dumping of the removed soils and rocks
4. EIRR	21.9%	21.8%	19.7%	6.1%

Note: Due to the environmental problems, it is recommended to conduct a study on new airport development for Iloilo and Legaspi Airports.

CHAPTER 5 FEASIBILITY STUDY ON THE MEDIUM TERM DEVELOPMENT OF NEW BACOLOD AIRPORT

5.1 PLANNING AND PRELIMINARY DESIGN

The airport layout plan in Chapter 3 was prepared on the basis of the minimum facility requirements anticipated in the year 2015 so that it could be compared with the development of the existing airport which has limited expandability in the future. The new airport should, however, be able to cope with the ever growing demand as long as possible after the year 2015. Therefore, overall airport layout was reviewed to make the following provisions for the future:

a) construction of parallel taxiway
b) accommodation of B747 class aircraft
c) extension of runway up to 3,200m
d) expansion of terminal area

Figure 5.1 shows the revised airport master plan for the New Bacolod Airport.

Facility planning and preliminary design for the Medium Term Development Project were conducted based on the Long Term Development Plan established in Chapter 3. Brief descriptions of the major components of the Project are as follows:

1) Land Acquisition and Compensation

Land acquisition of about 180ha and relocation of about 35 households.

2) Site Preparation

The site preparation shall include bulk earthworks and drainage works. Grading of the runway strip, taxiway strip and runway end safety areas shall comply with the standards and recommended practices for the precision approach category I of Annex 14, ICAO. Preliminary design indicated that the volume of earthworks would be about 84,000 cu.m cut and 1,478,000 cu.m fill.

The storm water drainage shall be constructed to discharge the design storm with a five-year return period. It will include various sizes of open channels and culverts. The open channels on the airside will mainly be trapezoidal channels with riprap slope protection. Trapezoidal channels and concrete U-shaped channels will be used in the terminal area.

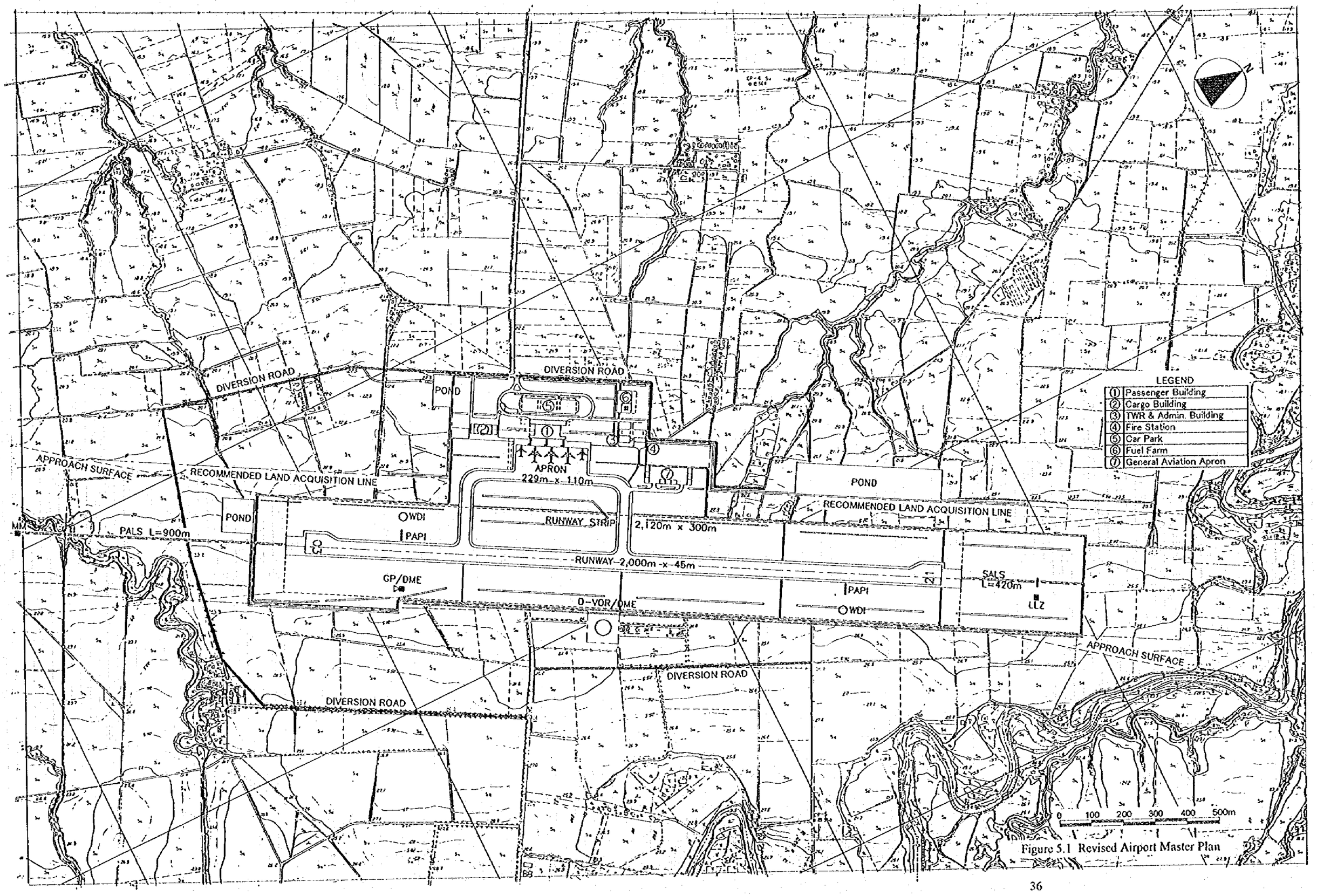


Figure 5.1 Revised Airport Master Plan

Pipe and box culverts will be used where the drainage runs under the pavement area. Three regulation ponds shall be constructed to control the volume of discharge during the peak period.

3) Pavements for Aircraft Movement Area

The pavements for aircraft movement area will be designed for the traffic equivalent to 6,000 departures of A320s per year. Preliminary design of a rigid (cement concrete) pavements indicated the typical pavement structure would be a 35cm slab on a 27.5cm aggregate base course. The PCN of this pavement will be 53R/C/W/T. The thickness of concrete slabs along the runway edge will be reduced to 26cm. The shoulder pavement will be a rigid pavement with a 17.5cm slab on 45cm subbase courses. The pavement for the general aviation apron will be a flexible pavement with a 4cm bituminous concrete on a 20cm base course.

4) Pavements for Roads and Car Parks

The pavement for the roads and car parks will be designed to accommodate the anticipated traffic of about 5,000 vehicles per day, of which about 75 are large vehicles. Preliminary design of a flexible pavement indicated the typical structure would be a 5cm bituminous concrete on 10cm base and 15cm subbase courses.

5) Passenger Terminal Building

The passenger terminal building will be a two-story reinforced concrete structure building. It will have a total floor area of about 7,000 sq.m. The first floor will be used for departure concourse, check-in area, baggage make-up and break-down areas, baggage claim area, concession area, arrival concourse and others. The second floor will be used for departure lounges, concession area, corridors, and others. The passenger terminal building will be equipped with two passenger loading bridges, departure and arrival baggage conveyors, two escalators, two elevators, a flight information display system, security equipment (two X-ray machines for check-in bags, two X-ray machines for cabin bags and two magnetometers), an air conditioning system and a building management system (including public address, fire detection and alarm, security, electricity monitoring and control, and air conditioning monitoring and control systems).

6) Cargo Terminal Building

The cargo terminal building will be a single-story building with mezzanine office area. It will have a total floor area of about 1,850 sq.m, and a steel frame structure with a corrugated fiber glass cement roof. The cargo handling area will be about 1,180 sq.m, and have the minimum ceiling height of 6.5m to allow operations of forklifts.

7) Control Tower and Administration Building

The administration building will be a two-story reinforced concrete structure building with a total floor area of about 1,910 sq.m. The control tower will be a six-stories, reinforced concrete structure building. The control tower will be equipped with an elevator.

8) Fire Station

The fire station will be a single-story, reinforced concrete structure building with a total floor area of about 560 sq.m. It will consist of a garage for three fire fighting vehicles and one command car, study room, bedroom, canteen with kitchen, locker room, storage and others.

9) Air Navigation Systems

Radio navigation aids including a Cat I ILS (LLZ/DME, GP, and MM) and a Doppler VOR/DME shall be installed. The performance and installation of the radio navigation aids shall conform to standards and recommendations of ICAO Annex 10.

Five ATC consoles (for APP,ADC, FD, AUX and supervisor) shall be installed in the ATC tower. Each console shall be equipped with circuits for ATS direct speech, intercom, telephone, VHF/HF radio. Flight strip boards, weather data indicator and navigation aids status indicator shall also be provided on the console as required.

The VHF transmitters and receivers, VHF multi-channel transceiver, HF transmitters and receivers, voice logging recorder and reproducer, and ATIS shall be installed. The PC/Fax machine and VSAT shall be relocated from the existing airport to the new airport. The performance and installation of the communication systems shall conform to standards and recommendations of ICAO Annex 10.

The aeronautical ground lights consisting of a PALS Cat I, a SALS, two PAPIs, Runway Edge Lights, Runway Threshold and End Lights, Taxiway Edge Lights, Apron Flood Lights, an Aerodrome Beacon, two Illuminated Wind Direction Indicators, Illuminated Instruction Signs, and an Aeronautical Ground Light Monitoring and Control System shall be installed for the new airport. The performance and installation of lighting fittings shall conform to standards and recommendations of ICAO Annex 14.

10) Power Supply System

The airport power supply system including the primary power supply system of 1,200kVA capacity, the secondary power supply system of 600kVA capacity, power distribution lines, and monitoring and control system shall be constructed to supply the electric power within the new airport.

11) Water Supply System

A water supply system including a 100 cu.m service reservoir, elevated tank, automatic delivery pump and water distribution pipes shall be constructed to supply the potable water within the new airport.

12) Sewerage System

A sewerage system with a capacity of 170 ton/day (20 ton/hour) shall be constructed to collect and treat the waste water at the new airport.

13) Incinerator

An incinerator with the incineration capability of 1 tons per 4 hours shall be installed to dispose the combustible waste collected at the airport.

14) Aviation Fuel Supply System

A fuel hydrant system including four 100 kl fuel storage tanks, hydrant pumps and pipes, five hydrant pits, etc. shall be installed to supply the aviation fuel at the new airport.

15) Rescue and Fire Fighting Equipment

Three fire fighting vehicles with the 6.1 kl water tank capacity each shall be procured to provide category 8 services for the new airport.

16) Airport Maintenance Equipment

One pavement surface friction test device and one mechanical sweeper shall be provided to conduct periodical friction test of the runway and clean debris from the pavement surface. Four disc type mowers, four tractors, four hand mowers and one dump truck shall be procured so that grass cutting of the runway strip and other areas can be conducted about once per month.

5.2 ENVIRONMENTAL IMPACT ASSESSMENT

During the Master Planning of the new airport an Initial Environmental Evaluation was conducted and the following 13 items were selected for further study and assessment.

Social Environment

a) Resettlement
b) Economic Activities

c) Traffic and Public Facilities

d) Split of Communities

e) Cultural Property

f) Water Rights and Rights of Common

Natural Environment

a) Ground Water

b) Hydrological Situation

c) Flora and Fauna

Pollution

a) Air Pollution

b) Water Pollution

c) Noise and Vibration

d) Land Subsidence

An environmental survey, which covers the all baseline data required for preparing the Environmental Impact Statement in accordance with the DENR Administrative Order No.21, was conducted at the project site and its vicinity. Field investigations were supplemented by the various existing data collected in Negros Occidental and in Manila. Then, based on the existing environmental conditions, environmental impact of the Project was predicted. As a result of assessment, it was revealed that the Project would not have significant adverse effects on the environment. Table 5.1 summarizes the result of assessment.

Environmental Item	Prediction
Resettlement	Resettlement of around 175 people (35 houses) will be required. The perception survey indicates that the people living in the project site need to be provided the relocation site, financial assistance, house and lots, and source of livelihood income.
Economic Activities	The new airport will occupy some 180ha of sugarcane field (0.9% of the total agricultural land in Silay City). The magnitude of this impact is considered not so significant. The Project will require 4,000 man-months of workforce as the general labor during the construction stage, and create directly and indirectly additional job opportunities related to the operation of the new airport. These are considered as a positive impact of the Project.
Traffic & Public Facilities	There will be additional traffic of more than 400 dumptrucks per day per direction for transporting the borrowed soils during the construction stage. As there is very few traffic around the project site, this additional traffic will not cause sever traffic congestion. During the operation stage, there will be about 950 airport access vehicles per direction in 2005. This could create a congestion along the National Road

	No.1. Overall road network of the province should be reviewed to minimize the adverse effects on traffic. There is no public facility within the new airport site. Although there will be some chages in the access routes to the public facilities in the vicinity of the project site, the magnitude of impact is considered not so big.
Split of Communities	Although diversion roads will be constructed so as not to create isolated lands, additional travel of about 2km will be required for the communications within the barangays in the worst case. However, such impact is considered not so significant because there are very few inhabitants at present.
Cultural Property	There are no rich past heritage or cultural attraction within and in the vicinity of the project site. Therefore, no impact is foreseen.
Water Rights & Rights of Common	There are 13 water rights granted along the river and creek which runs near the project site. At present, there is no plan to use the river water by the Project, and surface water from the new airport will be discharged into the existing creeks through regulation ponds. Therefore, no impact on water use is expected.
Groundwter	As no use of ground water is planned both in the construction and operation stages, there will be no impact on the groundwater.
Hydrological Situation	Some changes in flow of surface water are expected. However, no adverse effect is expected as the peak flow will be regulated.
Flora & Fauna	The project site and its vicinity has already been developed for agricultural purposes and no endangered or rare species were found by the field survey. Therefore, impact on flora and fauna is considered minimal.
Air Pollution	There will be some changes in air quality due to the construction machines, construction-related transportation, and airport access vehicles. The impacts are, however, considered not significant based on the size of operations, volume of traffic and experiences elswhere.
Water Pollution	Muddy water and chemically contaminated water created at the construction site should be discharged through appropriate treatment facilities. Waste water from the airport operation will be discharged after treated to the allowable quality. Therefore, it is expected that there will be no water pollution problem.
Noise and Vibration	The noise and vibration generated by the construction works will not create a problem as there is no residential area in the immediate vicinity of the project site. Airport access vehicles will generate the noise. However, it is expected the noise pollution due to this level of traffic will not be significant. There are, at present, no houses within the WECPNL 75 contour line except those subjected for resettlement due to the possession of the project site. About 20 houses are distributed at the area between WECPNL 70 and 75 contour lines. If the land use in the vicinity of the new airport is controlled properly, the aircraft noise pollution will be insignificant.
Land Subsidence	No utilization of groundwater is planned in the Project, therefore no impact is expected.

It is considered that further study on environmental impact is required during the detailed design and construction supervision stages when more detailed construction plan are studied and details of methods of construction become available. Major items to be studied are;

a) traffic;
b) hydrological situation;
c) flora nad fauna;
d) air pollution;
e) water pollution; and
f) noise pollution.

Careful planning and implementation of resettlement program is required to minimize the adverse impact to the people suffered by the Project. Therefore, the following issues should be considered in addition to the monetary compensation during the planning and implementation of the program;

a) selection of a relocation land which have similar culture to the project site and less confrict with original residents;
b) Provision of reasonable infrastructures in and accessibility to the relocation land;
c) job opportunities and training; and
d) any other assistance which may be required, such as transportation of household effects.

It is recommended to monitor the water quality and construction noise during the construction stage.

5.3 PLANNING OF OPERATIONS MANAGEMENT AND TRAININGN

An appropriate organization, staffing and training are bases of the efficient operations and management of the airport. At an airport of the size of Bacolod with only domestic traffic, it is of great importance to create an integrated organization meaning that all the airport staff should be educated and trained to perform various functions required at the airport.

The present organizational structure at Bacolod Airport is generally well working. However, to underline the importance of an integrated organization, it is proposed to form only two units, i.e. airport maintenance and airport operations units, within the airport section.

It is recommended to adjust the present staffing level of 69 regular staff and 27 casual staff (total 96 staff) to 82 regular staff (or combination of regular and casual staff equivalent to this workforce) by the time of opening of the new airport. To adjust the present staff level to the indicative staff level of the new airport, it is suggested to take the following steps:

a) Obtain sufficient equipment, vehicles and computer capacity to ease the need of maintenance and administrative staff.
b) Introduce a training and education program so that the personnel of the airport section will be provided with at least two different competencies.
c) Adjust the staffing level by stopping the new employment.

An airport has to be a competitive part of the air transportation system with an efficient interaction with the other major components of the system. It is, therefore, an important obligation of the airport management to coordinate and control all the activities at the airport in order to provide the safe and sufficient air transportation services. The bases for coordination and control are relevant instructions and directives issued regarding all major operations procedures. In addition, the new airport will imply new conditions for the management to deal with. It is, therefore, necessary to prepare a new airport operating system from the very start of the operations of the new airport. It should consist of; (1) Airport Operations Manual; (2) Airport Security Plan; and (3) Airport facilitation Committee.

As an airport is a highly regulated and technologically sophisticated system, there is a need of various management systems to support management and control. The basis for the management are the goals for the business set up by the ATO headquarters and goals for the airport organization set up by the airport management. In order to measure to what degree the goals are reached and as a background and basis for the management's decision -making there is a need of a wide range of information. It is recommended to provide a computerized financial management system at the new airport. It is also recommended to establish procedures for issuing and publishing local regulations and instructions, and to have regular meetings with the management group, airport operators group.

Efficiency of operations can only be expected from facilities that are in good operational condition. The maintenance of facilities is the prerequisite to such a condition. Furthermore maintenance can control and extend considerably the life span of technical components. In this respect maintenance becomes an economic requirement to keep investment and capital costs for the facilities within acceptable limits. Since the major maintenance works are planned and executed by the ATO headquarters, it is suggested that a computerized system which facilitates budgeting, simplifies work planning and contracting out, and contributes to the limitation of the maintenance costs, be introduced at the ATO headquarters. The airport management should periodically report to the ATO headquarters the data required for the above system. It is recommended that contracting out be tested in cases of special and complex maintenance work, for example repair of vehicles, air-conditioning, elevators, passenger loading bridges, etc.

5.4 COST ESTIMATES

The project costs are estimated as shown in Table 5.1 based on the following assumptions:

a) Costs are based on the 1996 prices.

b) The costs are broken-down into the local and foreign portions. The local portion include (i) construction materials produced in the Philippines, (ii) wages of local workers, (iii) overhead and profit for the local contractors. The foreign portion include (i) imported construction materials, (ii) wages of foreign workers, (iii) operation costs of construction equipment and plant except wages of local operators, (iv) overhead and profit for the foreign contractors.

c) Costs are indicated in Philippine Pesos (PHP). Exchange rates are fixed at US$ 1.00 = PHP 26.00 = Yen 110.

d) Price escalation (inflation) is not included.

e) Cost for engineering services is estimated to be about 10% of the construction cost.

f) Contingencies are estimated to be about 10% of the total cost.

Table 5.2 Cost Estimates for Medium Term Development of New Bacolod Airport

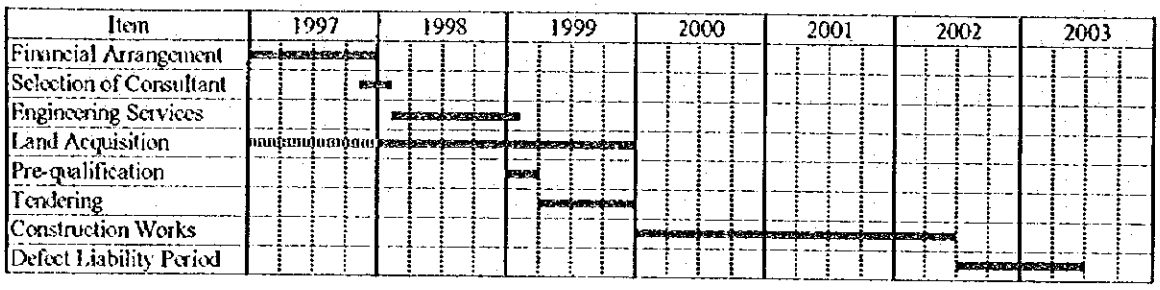
Item	Foreign Portion (Yen '000)	Local Portion (PHP '000)	Combined Total (PHP '000)
I. Land Acquisition and Compensation			
1. Land Acquisition	*0*	*18,261*	*18,261*
2. Compensation for Houses	*0*	*7,000*	*7,000*
Sub Total	0	25,261	25,261
Contingency (10%)	0	2,526	2,526
Total of I.	0	27,787	27,787
II. Construction Cost			
1. Preliminary and General	*251,153*	*67,373*	*126,736*
2. Civil Works			
Earthwork	0	401,103	401,103
Pavement Work	550,757	130,179	260,358
Drainage Work	24,916	54,761	60,650
Miscellaneous Works	37,485	22,840	31,700
Total of 2.	*613,158*	*608,883*	*753,811*
3. Building Works			
Passenger Building	385,000	136,500	227,500
Cargo Building	46,962	25,900	37,000
Administration Building	49,754	21,840	33,600
Control Tower	15,992	7,020	10,800
Fire Station	15,637	8,624	12,320
Other Buildings	8,462	8,000	10,000
Total of 3.	*521,806*	*207,884*	*331,220*
4. Special Equipment			
Rescue and Fire Fighting Vehicles	162,000	0	38,291
Other Special Equipment	108,000	0	25,527
Passenger Loading Bridges	114,231	3,000	30,000
Total of 4.	*384,231*	*3,000*	*93,818*
5. Utilities			
Power Supply System	394,212	62,118	155,296
Water Supply System	16,923	4,000	8,000
Telephone System	9,519	250	2,500
Sewerage System	30,462	16,800	24,000
Incinerator	31,500	2,482	9,927
Total of 5.	*482,616*	*85,650*	*199,723*
6. Fuel Supply System	*800,000*	*47,273*	*236,364*
7. Air Navigation Systems			
Aeronautical Ground Lights	515,850	6,417	128,345
ATC and Communications	31,654	394	7,876
Radio Navigation Aids	149,625	1,861	37,227
Weather Observation Equipment	88,957	1,107	22,133
Total of 7.	*786,086*	*9,779*	*195,581*
8. Miscellaneous	*179,395*	*48,123*	*90,526*
Subtotal	4,018,444	1,077,965	2,027,779
Contingency (10%)	401,844	107,796	202,778
Total of II.	4,420,289	1,185,761	2,230,557
III. Consultancy Services			
Consultancy Services	401,844	107,796	202,778
Contingency (10%)	40,184	10,780	20,278
Total of III.	442,029	118,576	223,056
Total Project Cost (I+II.+III.)	**4,862,318**	**1,332,125**	**2,481,400**

Note 1: Estimated based on 1996 prices. No price escalation is included.
Note 2: Exchange rates US$1.00=PHP26.00=Yen110

5.5 PROJECT IMPLEMENTATION PLAN

Table 5.1 shows a project implementation schedule, which would be applicable if the financial assistance from a foreign country is sought for both the design and construction of the Project at once.

Table 5.1 Project Implementation Schedule



The project executing agency will be the ATO. It is recommended to create a project team in the ATO and an interagency committee for monitoring and controlling of the Project.

5.6 ECONOMIC AND FINANCIAL ANALYSES

5.6.1 Economic Analysis

1) With Project Case and Without Project Case

The investments required to implement the Medium Term Development will be additional investments for the expansion of airport capacity; therefore, the returns of the Project should be evaluated as incremental benefits derived from the expansion of airport capacity. Benefits and costs should, therefore, be compared between the following two cases:

- With Project (WP) Case: The Medium Term Development will be implemented and airport capacity will be expanded to handle increases in air traffic up to the design capacity for the year 2005.
- Without Project (WOP) Case: No investments will be made on the existing airport facilities. Since many of the existing facilities lack in capacity, there will be no increase in air traffic volume after the year 1996.

2) Project Evaluation Period

The period from first year of investment (1998) up to the 25th year (2026) of the operation of the new facilities. The inauguration of the new airport is schedule to be in 2002.

3) Project Costs and Revenues

All costs and revenues are calculated in Philippine Peso at 1996 constant prices. Price escalation is not taken into consideration and it is assumed that thegeneral increase of price will equally affect costs and benefits.

4) Residual Value

The residual value is calculated with a 30 year depriciation period for civil works and buildings. The outstanding value for depreciation in the last year of the evaluation period is considered to be the residual value and is accounted for as a negative item on the costside of the cash flow.

5) Economic Costs of the Project

The costs of the project includes the following:

a) Construction Costs: The estimated costs in Section 5.4 excluding contingency are used with a standard conversion factor (SCF) of 0.84.

b) Maintenance Costs: These costs are estimated by multiplying the construction costs by percentage rate which differs between different groups of facilities. The SCF of 0.84 is applied.

c) Personnel, Overhead and Other Personnel Related Costs: These costs have been calculated for the number of incremental staff by the Project and annual cost per person. The SCF of 0.90 is applied.

d) Utilities Cost: The incremental utilities cost is accounted by applying an increasing rate on the present utilities cost. The economic prices for the utilities cost are assumed to be equal to the nominal prices.

6) Economic Benefits of the Project

The following economic benefits are considered in the analysis.

a) Time Saving Benefit for Business Passengers

b) Benefit from Increased Number of Tourist Passengers

c) Benefit from Increased Volume of Air Cargo

d) Economic Value of Existing Airport Assets

7) Economic Internal Rate of Returns and Net Present Value

The economic internal rate of returns (EIRR) and net present value (NPV) of the Project are

estimated as follows:

EIRR	NPV at 15% discount rate (PHP million)
18.8%	271

The Project's EIRR of 18.8% is higher than the opportunity cost of capital of 15% which is suggested from NEDA. The project is, therefore, expected to produce economic returns to the national economy great enough to justify its implementation.

8) Sensitivity Tests

The sensitivity test of the economic analysis is undertaken to evaluate how the EIRR varies against the rise in construction cost and the slower growth of air traffic. The following two cases related to the base case have been studied:

a) Increase of the construction costs by 20%

b) Low forecast of air traffic volumes (equivalent to a decrease of incremental revenues by 20%)

The EIRR of the respective cases are estimated as follows:

Case	EIRR
Base Case	18.8%
Construction Cost up by 20%	15.9%
Low Forecast of Air Traffic Volumes	15.7%

These results indicate that the feasibility of the Project is sound even when the construction cost is 20% higher than estimated or air traffic volumes grow in line with the low forecast, meaning that the Project will be of clear benefits for the Philippine economy.

5.6.2 Financial Analysis

1) Project Evaluation Period

The period from first year of investment (1998) up to the 25th year (2026) of the operation of the new facilities. The inauguration of the new airport is schedule to be in 2002.

2) **Project Costs and Revenues**

All costs and revenues are calculated in Philippine Peso at 1996 constant prices. General increases in price are assumed to be met by timely increases in airport charges and improvement in productivity.

3) **Financing Conditions**

The following financing conditions are assumed in the financial analysis. The composition of foreign/local fund and lending conditions of the assumed loan is those of the OECF loans to the Philippines.

a) 25 % of the total construction costs are financed by the government's general account.

b) 75 % of the total construction costs are financed by a soft loan with an interest rate of 2.7 % per annum and a repayment period of 20 years after a grace period of 10 years.

c) Temporary cash deficit will be financed from the accumulated cash in hand. In the case where accumulated cash in hand is not sufficient to cover the current deficit, the difference will be borrowed from the government's general account with no interest.

d) No interest is accounted on the accumulated cash in hand.

4) **Depreciation Costs**

The construction costs are allocated in the income statement over the following time periods:

a) Civil and building works: 30 years

b) Other facilities: 15 years

The residual value of the investments is accounted in the last year of the cash flow table for IRR and NPV calculations.

5) **Costs of the Project**

The costs of the project includes the following:

a) Construction Costs: The estimated costs in Section 5.4 excluding contingency are used.

b) Maintenance Costs: These costs are estimated by multiplying the construction costs by percentage rate which differs between different groups of facilities.

c) Personnel, Overhead and Other Personnel Related Costs: These costs have been calculated for the number of incremental staff by the Project and annual cost per person.

d) Utilities Cost: The incremental utilities cost is accounted by applying an increasing rate on

the present utilities cost.

6) **Revenues of the Project**

The following operating revenues are considered in the analysis.

a) Landing fee
b) Operational charge
c) Aircraft parking charge
d) Passenger service charge
e) Passenger terminal space rental
f) Cargo terminal space rental
g) Concession privilege fee
h) Aviation fuel surcharge
i) Utilities services

When calculating the revenue of the Project in this analysis, several price levels of airport charges are considered.

In addition to the above, sale value of the existing airport property area is included in the revenue of the Project.

7) **Financial Internal Rate of Returns and Net Present Value**

The financial internal rate of returns (FIRR) and net present value (NPV) are calculated based on the cost and revenues which will be incrementally incurred by implementing the Project. A discount rate of 1.8% (= 25% x 0% + 75% x 2.7%) is used in consideration of the assumed financing condition of 25% from the government's general account and 75% from a loan with an interest rate of 2.7% per annum.

The financial analysis based on the current airport charges was initially conducted, and it was found that the FIRR and NPV were negative. Since the same airport charges are used at all the airports under the DOTC, it is inappropriate to discuss the level of airport charges based on the financial analysis of this project only. It should also be considered that the local airports play a role in the public services. Nevertheless, the present level of airport charges are quite low, and it is considered necessary to increase the level of charges.

As the next step, the 700% increase of charges, by which the charges become similar level to those for domestic operations at Manila and Cebu International Airports, were considered. The

result of analysis indicates the FIRR and NPV are 3.9% and PHP 541 million respectively. If the GOP adopts a cost recovery principle at the new airport (recover not only the operation and maintenance costs but also investment cost), the following increase of charges will be required.

a) 550% increase of prices by the inauguration of the new airport, or

b) 10% annual increase of prices from the year 1997.

In case that the GOP's policy is to cover only the operation and maintenance costs of the new airport, at least 90% increase of all charges will be required.

8) Sensitivity Tests

In the sensitivity tests, the case with assumed increase of prices by 700 %, by which the charges become similar level to those for domestic operations at Manila Airport, has been considered as the base case, and the following two cases are studied in relation to the base case:

a) Increase of the construction costs by 20%

b) Low forecast of air traffic volumes (equivalent to a decrease of incremental revenues by 20%)

The IRR approach analyzes the financial returns of the Project assuming a rise of construction costs and a slower growth of the revenues as follows:

Case	FIRR
Base Case	3.9%
Construction Cost up by 20%	2.7%
Low Forecast of Air Traffic Volumes	2.3%

The FIRR will, as anticipated, fall to a lower level in the test cases than in the base case. However, the FIRR is still greater than the assumed financing condition of 1.8% per annum, thus the Project will be financially feasible against assumed adverse conditions.

CHAPTER 6 CONCLUSION AND RECOMMENDATIONS

6.1 CONCLUSION

As a result of comprehensive study of the development of Bacolod Airport, including alternative airport site selection, long term master development planning and a feasibility study on the medium term development plan, it can be concluded that the new airport development at approximately 5km east of Silay City is the most effective, efficient and sustainable airport development scheme of Negros Occidental. The existing Bacolod Airport has various safety problems, limited opportunities of operations for the airlines other than PAL, and constraints for further developments. Therefore, the development of the new airport is one of the most urgent requirements for the civil aviation of the Philippines, especially for ensuring safe and reliable air transportation to/from Negros Occidental.

The existing airport area should be redeveloped for non-aviation purposes. A part of the benefits from the redevelopment (approximately equal to the land price of the existing airport area) should be regarded, in the GOP's financial accounting, as a benefit of the new airport development.

The Study also includes master development planning for Iloilo, Tacloban and Legaspi Airports. It can be concluded that the development of these three airports are also important and urgent requirements for the balanced development of the civil aviation of the Philippines.

6.2 RECOMMENDATIONS FOR DEVELOPMENT OF BACOLOD AIRPORT

a) Approve the medium term development plan of the new airport at about 5km east of Silay City by the Government of the Philippines.
b) Initiate financial arrangement at the earliest possible time including both the low interest rate soft loan from the foreign country and the local counterpart finance.
c) Create, as soon as possible, a project team in the ATO and an interagency committee for the implementation of the Project.
d) Employ as soon as possible a consultant for the basic and detailed designs of the airport facilities and environmental mitigation measures, and preparation of tender documents.
e) Coordinate with all national and local government units related to the Project so that all government's activities are harmonized with the Project. Special attentions should be given to the road network, city water supply system, and land use zoning around the new airport and in the region.

f) Initiate, as soon as possible, monitoring and controlling the migration of people and transaction of land ownership at and around the new airport site so as to avoid unnecessary increase of costs for land acquisition and compensation.

g) Review the levels of airport charges so as to improve the financial status of the airport.

6.3 RECOMMENDATIONS FOR OTHER AIRPORTS

6.3.1 ILOILO AIRPORT

As a result of the master planning study of the existing Iloilo Airport development, it can be concluded that the development of the existing airport is economically feasible, but have some problems in environmental protection. It is, therefore, recommended to take the following actions as soon as possible.

a) Review the ongoing and planned projects and suspend (or decrease the scale of) the major projects which aim to increase the airport capacity.

b) Conduct a site selection study for a new airport and decide the optimum airport site (including the existing site).

c) Prepare and authorize a long term master development plan of Iloilo Airport at the selected site.

d) Conduct a detailed feasibility study on the Medium Term Development of the airport including environmental impact assessment.

e) Approve the Medium Term Development, and initiate financial arrangements.

f) Implement the Medium Term Development.

6.3.2 TACLOBAN AIRPORT

As a result of the master planning study of Tacloban Airport development, it can be concluded that the development of the existing airport is economically feasible in long term. Development of the airport facilities is an urgent requirement to cope with the increasing demand. It is, therefore, recommended to take the following actions as soon as possible.

a) Authorize the proposed master development plan.

b) Review the ongoing and planned projects and adjust them (if necessary) to suit to the master plan.

c) Conduct a detailed feasibility study on the Medium Term Development including environmental impact assessment.

d) Approve the Medium Term Development, and initiate financial arrangements.

e) Implement the Medium Term Development.

6.3.3 LEGASPI AIRPORT

As a result of the master planning study of the existing Legaspi Airport development, it can be concluded that the development of the existing airport is economically and environmentally infeasible due to the hill obstacle removal required for the operational safety. It is, therefore, recommended to take the following actions as soon as possible.

a) Review the ongoing and planned projects and suspend the major projects which aim to increase the airport capacity such as runway extension to 2,400m.

b) Establish Standard Instrument Approach procedures using the existing air navigation facilities so as to improve usability of the airport.

c) Conduct a site selection study for a new airport.

d) Prepare and authorize a long term master development plan of the new airport.

e) Conduct a detailed feasibility study on the Medium Term Development of the new airport including environmental impact assessment.

f) Approve the Medium Term Development, and initiate financial arrangements.

g) Implement the Medium Term Development.

JICA