

12.5 AIR NAVIGATION SYSTEMS

The Air Navigation Systems consist of;

- a) Radio Navigation Aids;
- b) ATC and Communication System;
- c) Airfield Lighting System; and
- d) Meteorological Observation System.

Figures 12.5.1 and 12.5.2 show conceptual diagram and layout plan of air navigation systems (except for aeronautical ground lighting system) respectively.

12.5.1 Radio Navigation Aids

A Category I Instrument Landing System (ILS) should be installed for Runway 03. The ILS will consist of Localizer (LLZ), Glide Path (GP), Middle Marker (MM) and Distance Measuring Equipment (DME). The DME will be collocated with the GP, and perform the function of the outer marker. A Doppler VOR/DME should also be installed at the new airport. The D-VOR/DME will be located in front of the terminal area opposite side of the runway so as to allow straight-in approach for both Runway 03 and 21. The performance and installation of the radio navigation aids should conform to standards and recommendations of ICAO Annex 10. Layout of the radio navigation aids is shown in Figure 12.5.2.

12.5.2 ATC and Communication Systems

Five ATC consoles should be installed in the ATC tower for the following functions:

- a) Approach Control (APP)
- b) Aerodrome Control (ADC)
- c) Flight Data (FD)
- d) Auxiliary (AUX)
- e) Supervisor (SPV)

Each console should be equipped with circuits for ATS direct speech, intercom, telephone, VHF/HF radio. Flight strip boards, weather data indicator and navigation aids status indicator should also be provided on the console as required.

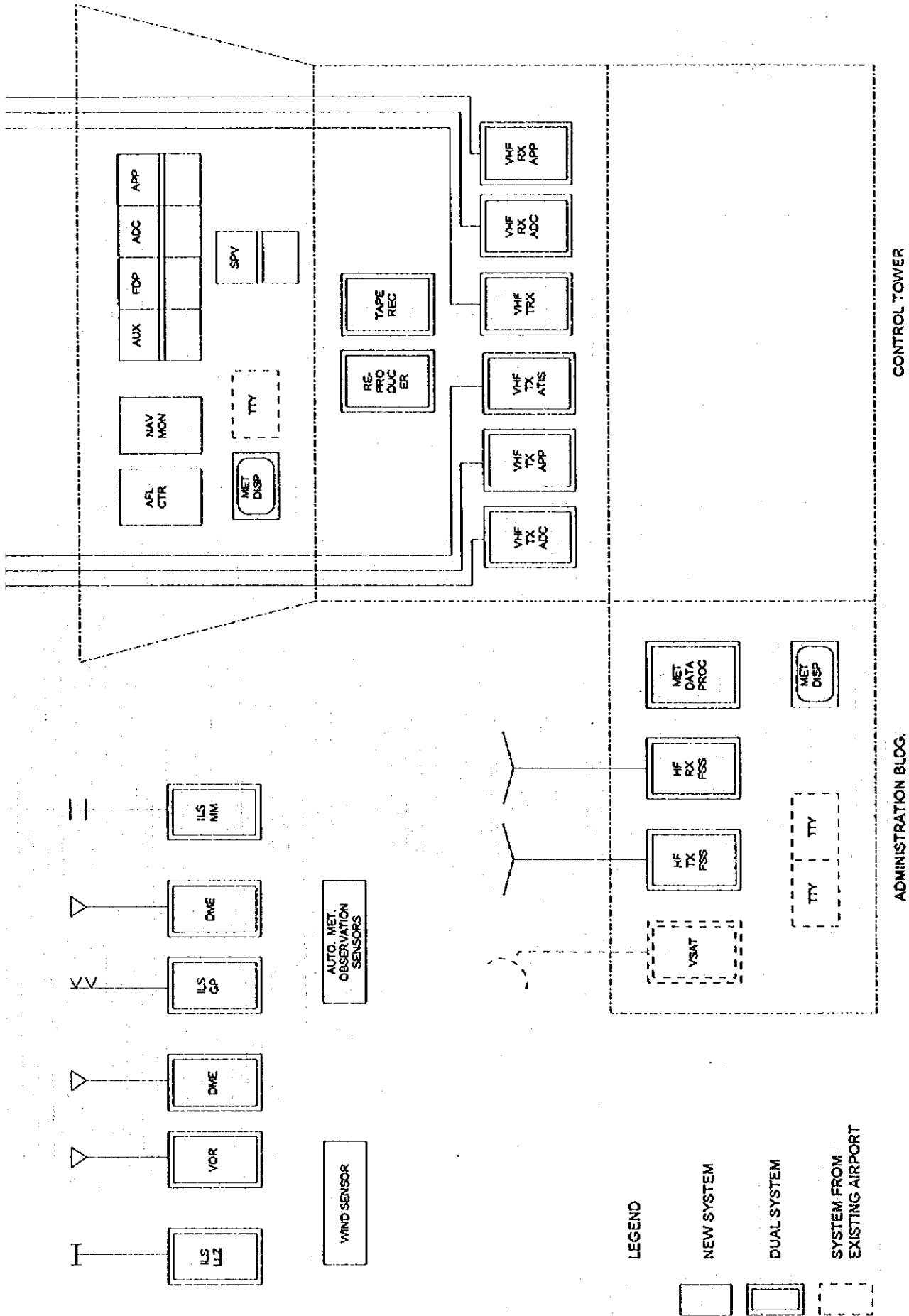


Figure 12.5.1 Conceptual Diagram of Air Navigation Systems

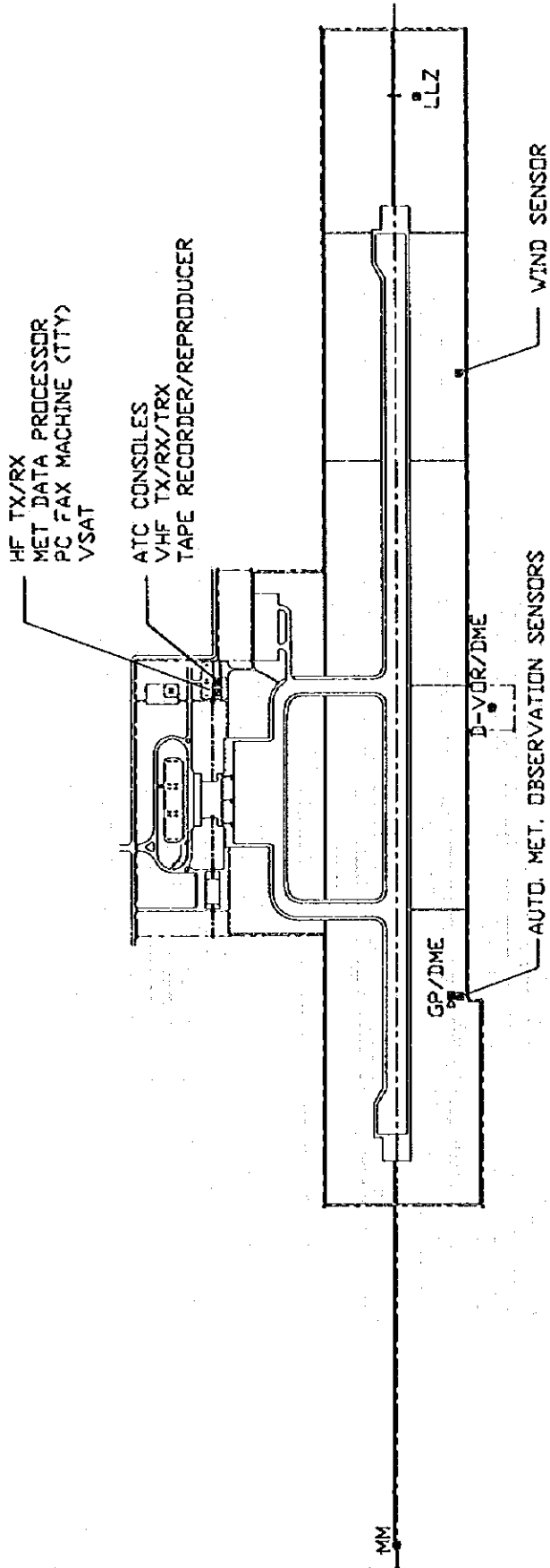
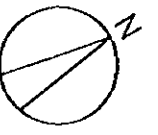


Figure 12.5.2 Layout Plan of Air Navigation Systems



- ABBREVIATIONS
- PALS Precision Approach Lighting System
 - SALS Simple Approach Lighting System
 - PAPI Precision Approach Path Indicators
 - REDL Runway Edge Lights
 - RTHL Runway Threshold Lights
 - RENL Runway End Lights
 - TWYL Taxiway Edge Lights
 - AFL Apron Flood Lights
 - ABN Aerodrome Beacon
 - IWDI Illuminated Wind Direction Indicators
 - TXGS Taxiway Guidance Signs

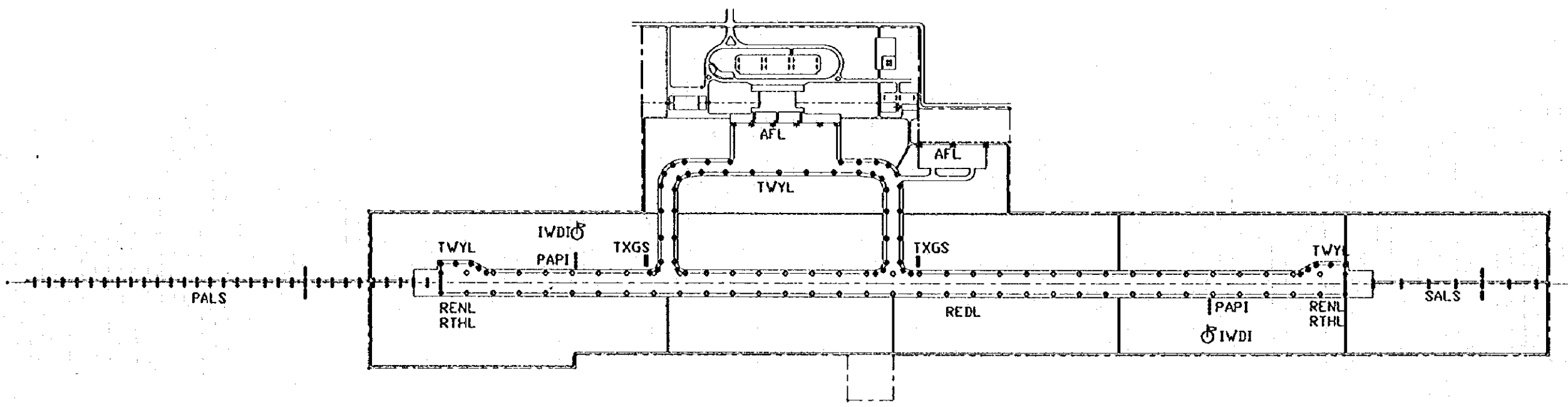


Figure 12.5.3 Layout of Aeronautical Ground Lighting Systems

The following aeronautical telecommunication equipment should be installed:

- a) VHF transmitters and receivers
- b) VHF multi-channel transceiver
- c) HF transmitters and receivers
- d) Voice logging recorder and reproducer
- e) Automatic Terminal Information System (ATIS)

The performance and installation of the communication systems should conform to standards and recommendations of ICAO Annex 10.

In addition to the above, PC/Fax machine (Teletypewriters) and Very Small Aperture Terminal (VSAT), which are planned to be installed at the existing airport under the Nationwide Air Navigation Modernization Project, should be relocated to the new airport.

12.5.3 Aeronautical Ground Lighting Systems

The following aeronautical ground lights should be installed for the new airport:

- a) Precision Approach Category I Lighting System (PALS Cat-I) for Runways 03
- b) Simple Approach Lighting System (SALS) for Runways 21
- c) Precision Approach Path Indicators (PAPI) for Runway 03 and 21
- d) Runway Edge Lights
- e) Runway Threshold and End Lights
- f) Taxiway Edge Lights
- g) Apron Flood Lights
- h) Aerodrome Beacon
- i) Illuminated Wind Direction Indicators
- j) Illuminated Instruction Signs
- k) Aeronautical Ground Light Monitoring and Control System

Figure 12.5.3 shows the layout of the aeronautical ground lighting systems.

The performance and installation of lighting fittings should conform to standards and recommendations of ICAO Annex 14. Lighting controls, such as switching and illuminance control, should be located in the ATC tower cab. The electric power supply should be controlled by Constant Current Regulators (CCR), and supported by a secondary power supply system to conform with Annex 14.

12.5.4 Meteorological Observation Systems

The automatic meteorological observation system consisting of observation sensors and data processor should be provided at the new airport. The following observation sensors and field data converter should be installed near the touchdown zone of Runway 03 so as to observe the weather conditions at the representative place of the main approach runway.

- a) Runway Visual Range (RVR) transmissometer / background illuminance meter with 75m base line length
- b) Cloud Ceilometer
- c) Wind Sensor
- d) Temperature / Humidity Probe
- e) Precipitation Gauge

A Wind Sensor should be installed also near the touchdown zone of Runway 21 to observe the wind direction and velocity at the representative place of the secondary approach runway.

Pressure transducer and mercury barometer which measure values of pressure QFE and QNH will be installed at the equipment room in the administration building.

Reporting data in cyclic routine from the sensors should be processed by the data processor and be indicated on the weather data display on real time. A main processor will be installed in the equipment room. Data display will be provided to the ATC tower, briefing room and equipment room.

The performance and installation of the equipment should conform to the standards and recommendations of ICAO Annex 3.

The layout of meteorological observation systems is shown in Figure 12.5.2.

12.6 AIRPORT UTILITIES

12.6.1 Power Supply System

The primary source of electric power will be Central Negross Electric Cooperative. Receiving voltage will be 13.2kV.

The maximum load of the new airport in the Medium Term is estimated as follows:

a) Passenger Terminal Building :	650 kVA
b) Cargo Terminal Building :	100 kVA
c) Control Tower and Administration Building :	150 kVA
d) Air Navigation Systems :	200 kVA
e) Others :	100 kVA
f) Total :	1,200 kVA

The secondary power supply system of a 600 kVA capacity should be provided at the airport in order to maintain the operations of essential facilities during commercial power failures.

The airport power supply system is planned as shown in Figures 12.6.1 and 12.6.2. The system is based on a concept of central monitoring and control at the main power house adjacent to the Control Tower and Administration Building. Two engine generators including one set of spare, having a 600 kVA capacity each, will be installed at the main power house. There will be seven substations, one each at the Passenger Terminal Building, Cargo Terminal Building, Fuel Farm, LLZ, GP, MM, and D-VOR/DME. Electric power will be distributed from the main power house to the substations through 6.6 kV lines, and stepped down to 3 phase 4 wire 380/220 V at the substations.

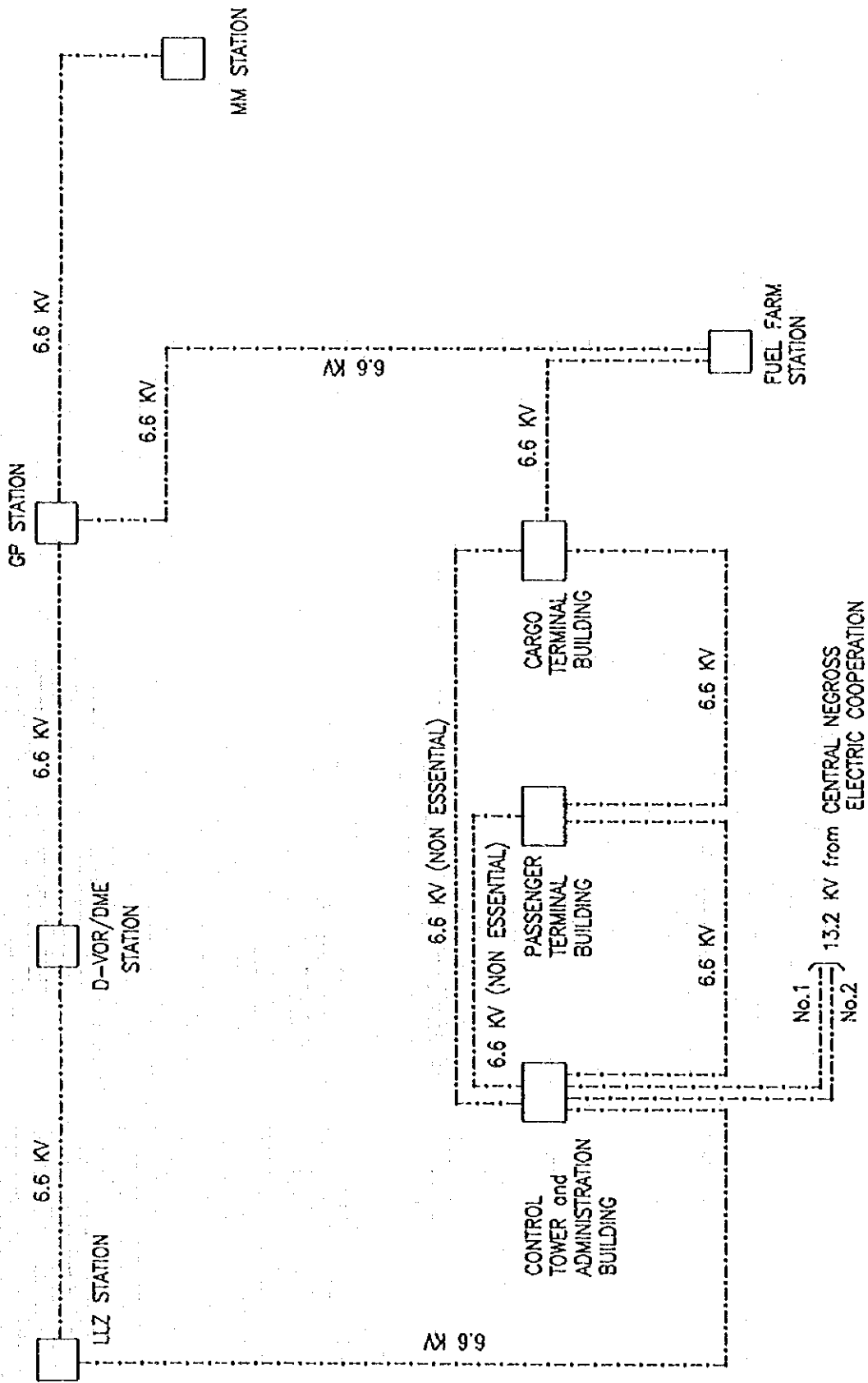


Figure 12.6.1 High Voltage Power Supply Cable Diagram

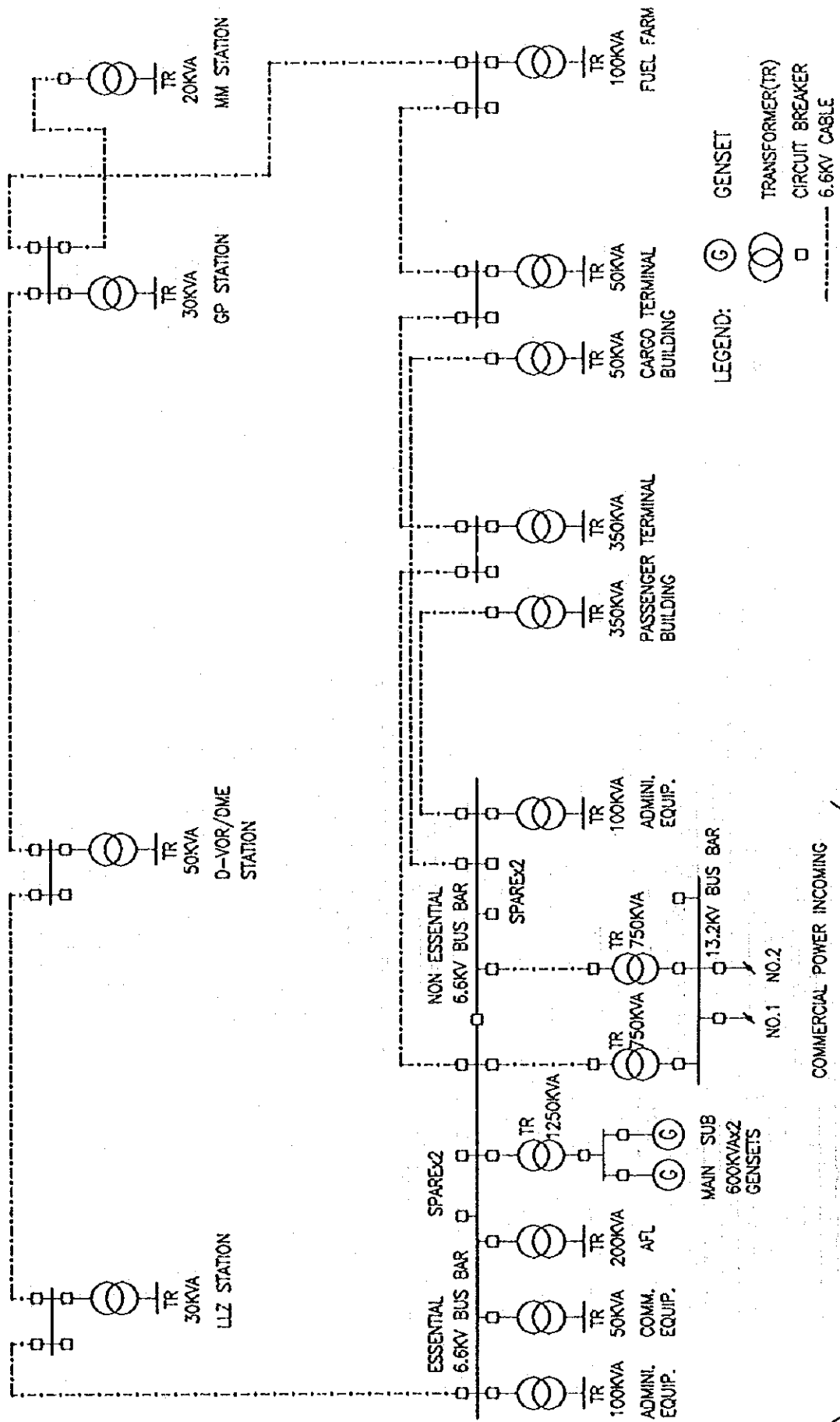


Figure 12.6.2 High Voltage Single Line Block Diagram

12.6.2 Telephone System

A trunk line of the telephone system from the telephone service company will be connected to an exchanger through the Main Distribution Frame (MDF). The exchanger will be an electronics private automatic branch exchanger (EPABX), with a capacity of about 120 extension lines and 20 external lines. MDF and PABX will be installed in the administration building.

12.6.3 Water Supply System

According to the Silay City Water District, a new water treatment plant will be constructed before the new airport is constructed and potable water can be supplied from the city main. Maximum water supply volume will be about 200 cu. m per day and 60 cu. m per hour. A 150 mm diameter water pipe will, therefore, be extended to the new airport by the city water district. A service reservoir of a 100 cu. m capacity, elevated tank and automatic delivery pump will be provided at the airport to prepare for the emergencies.

12.6.4 Sewerage System

A sewerage system, with a capacity of 170 t/day (20 t/hr), should be constructed to collect and treat the waste water at the new airport. For the purposes of the preliminary design, the condition of the influent and effluent has been assumed as follows:

- a) Influent : BOD₅ - 250 mg/l and SS - 250 mg/l
- b) Effluent : BOD₅ - 50 mg/l and SS - 70 mg/l

There are various types of sewerage treatment systems such as conventional activated sludge process, extended aeration process, oxygen aeration sludge process, oxidation ditch process, etc. A comparative evaluation of various systems are shown in Table 12.6.1. From this comparison the oxidation ditch process is selected for the new airport. The concept of the process is shown in Figure 12.6.3.

Table 12.6.1 Comparison of Sewerage Treatment System

Method	Effluent Quality	Stability against Load Change	Sludge Generation	Required Area	Maintenance	Construction Cost	Operation Cost
Conventional Activated Sludge Process	A	D	D	A	D	D	D
Extended Aeration Process	A	A	A	A	A	D	D
Oxygen Aeration Activated Sludge Process	A	A	D	A	D	D	D
Oxidation Ditch Process	A	A	A	A	A	A	D
Sequencing Batch Reactor Process	A	A	D	A	D	D	A
Rotating Biological Contactor Process	A	D	A	A	A	D	A
Oxidation Pond Process	D	A	A	D	A	A	A

Note: "A" Advantageous; "D" Disadvantageous

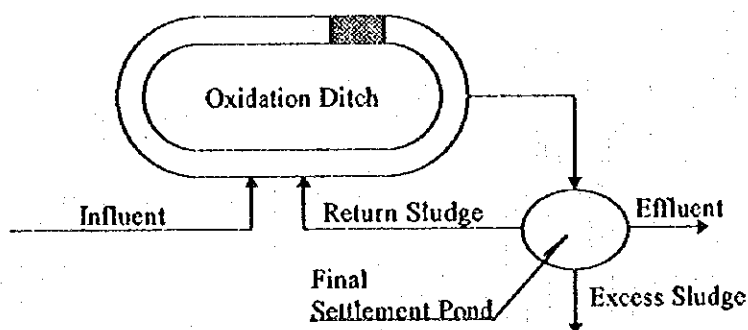


Figure 12.6.3 Concept of Sewerage Treatment System

12.6.5 Solid Waste Disposal System

An incinerator should be provided at the airport so as to dispose of combustible solid waste collected from the airport. The incinerator should be able to incinerate 1 tons of waste from the airport within about 4 hours. An area of about 50 sq.m for the incinerator will be reserved near the northeastern boundary of the terminal area considering the prevailing wind direction.

12.7 OTHER FACILITIES

12.7.1 Aviation Fuel Supply System

A fuel hydrant system will be provided at the new airport so as to reduce the traffic on the apron and to maintain fuel quality. In order to store the Jet-A1 fuel for 7 days, four 100 kl fuel storage tanks will be installed at the airport. Based on the peak hour aircraft movements, it is assumed that two A300's will simultaneously need to be refueled about 10 kl each within 10 to 20 minutes. To meet this requirement, three 60 kl/hr hydrant pumps (including one spare pump) and 8" fuel hydrant pipe will be installed. Five hydrant spots, one spot per aircraft stand, will be provided. Figure 12.7.1 shows layout of the fuel supply system.

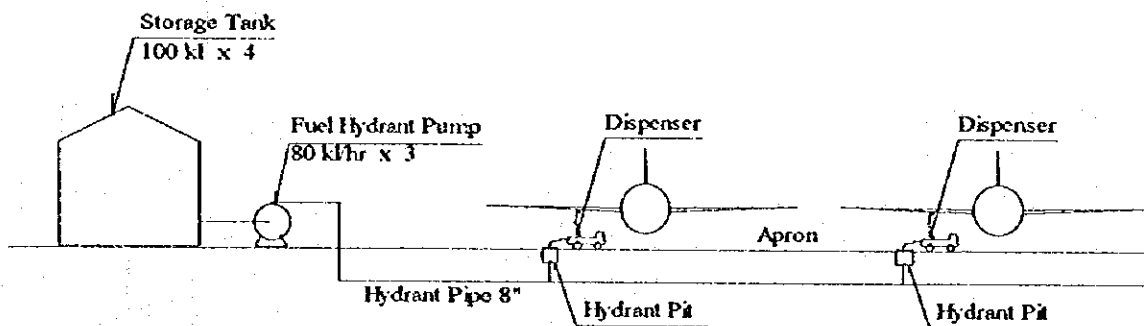


Figure 12.7.1 Conceptual Diagram of the Fuel Supply System

Fuel for the general aviation aircraft will be stored in separate small tank or drum and supplied to the aircraft by a small lorry.

Fuel storage tanks, various pumps, office and substation building, and other ancillary facilities will be laid out in a land area of 70m x 45m. An area of 70m x 10m will be reserved for the expansion in the Long Term Development.

12.7.2 Rescue and Fire Fighting System

Three fire fighting vehicles should be provided at the fire station so as to provide category 8 services for the new airport. The performance of the vehicle should conform to the following requirements and the recommendations of ICAO's Annex 14 and Airport Service Manual, Part 1.

- a) Water Tank Capacity: 6,100 liter
- b) Discharge Rate of Foam Solution: 2,400 liter/min
- c) Complementary Agent: 150 kg of dry chemical powder

In addition, one command car should be provided for the effective rescue and fire fighting operations.

12.7.3 Airport Maintenance Equipment

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

12.8 CONSTRUCTION PLAN

12.8.1 Site Condition

Sugarcane plantation is spread through the project site and the terrain is relatively flat. The earthworks to be carried out for the project, contains a lot of embankment and according to the soil investigation results, soil layers which underlie just the ground surface, generally consist of Silty Clay or Fine Sand. N - Values of which range between 3 and 30 and the workability for the earthwork seems not to be bad, in building embankment on these soil layers.

In addition, judging from the soil boring logs, it is considered that a total settlement of the ground due to the surcharge of the embankment and the loads of buildings to be newly constructed, is small.

In order to preserve the surrounding site environment, the following measures should be taken during the construction period.

- a) Contaminated water, especially from a concrete batching plant, an asphalt mixing plant, and a workshop should be discharged into nearby drainage / channels through treatment facilities and water quality must be controlled within the allowable standard.
- b) In the course of the execution of a sizable amount of the earthwork, temporary drainage should be installed on or around embankment yards so that mud and/or muddy water may not be washed away by the rain.
- c) During the excavation period at a borrowed pit, the washing away of mud and muddy water into the surrounding sugarcane fields or existing channels, should also be prevented by installing suitable drain. Upon completion of borrowed soil excavation, excavated slope surfaces should be sodded or appropriately landscaped.

12.8.2 Major Temporary Works

For the construction of the new airport, a considerable amount of cement concrete and asphalt concrete are required to build mainly various buildings and pavements. Therefore, a concrete batching plant, an asphalt mixing plant and a second aggregate crushing plant will be temporarily erected within or around the area of the project site.

The construction of sizable length of temporary roads are necessary within the project site, in order to haul construction materials including soils used for embankment to carry out the construction operations effectively and safely.

12.8.3 Manpower Requirement

The construction for the new airport consists of mainly four works, i.e. Civil Works, Building Works, Air Navigational Works and Fuel Supply Works, and requires an occupational category by each engineering work.

It is considered that common labors will be available in the region . On the other hand , skilled labors who are specialized in paving work, electrical and mechanical work, installation work for air navigation equipment / fuel supply equipment, special equipment such as baggage conveyers, boarding bridges, will have to be supplied from other regions.

It is expected that about 500 - 700 workers, perhaps more, will work on the site at the heyday of the construction works.

12.8.4 Hauling of Materials

Around 1.5 million cubic meters of borrowed soils are needed for the embankment. About 3,000 cu.m of the borrowed soils per day will be brought into the project site from a borrow pit through the existing 2 - lane roads.

This means that supposing 8-hour working time and 10 ton load trucks are used, one dump truck loading 7 cu.m soil is to discharge in every 53 seconds. If the borrow pits are located about 5 km away from the project site, 30 dump trucks will be required to transport 3,000 cu.m of the soils per day. A large scale formation of earthwork equipment will be required in order to spread and compact soils which are dumped down.

12.8.5 Construction Schedule

The Construction Schedule is shown in Table 12.8.1.

As shown in Table 12.8.1, the Critical Path of the construction work for the Project is on the embankment operations, which is built with borrowed soils. The construction period for carrying out the embankment operations is expected 26 months and total construction period is estimated to be 30 months.

Chapter 13 Environmental Impact Assessment

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CHAPTER 13 ENVIRONMENTAL IMPACT ASSESSMENT

13.1 GENERAL

In this chapter, the existing environmental conditions of the project site, assessment of the environmental impact of the project, and the environmental conservation measures are discussed.

The existing environmental conditions are described in accordance with the standard contents of the Philippine's Environmental Impact Statement, while the assessment are made on the following environmental factors identified by the Initial Environmental Evaluation in Section 5.5.5.

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) Groundwater
- b) Hydrological Situation
- c) Flora and Fauna

Pollution

- a) Air Pollution
- b) Water Pollution
- c) Noise and Vibration
- d) Land Subsidence

13.2 EXISTING ENVIRONMENTAL CONDITIONS

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 from August to September 1996. Field investigations were supplemented by the various existing data collected in Negros Occidental and in Manila. The Terms of Reference for the

environmental survey is attached as Appendix 13.2.1. The results of the survey are summarized in the following sections.

13.2.1 Atmosphere

1) Meteorological Characteristics

The project area belongs to Type III under the Coronas classification of the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA). Type III is characterized with no pronounced maximum rain period and short dry season lasting from one to three months. This is an intermediate between types I and II although it resembles the first type more closely because it has short dry season.

The principal air streams which significantly affect the Negros Island are the southwest monsoon, northeast monsoon and the Pacific trade winds. The southwest affects the area during the months of May to October, the northeast monsoon during the months of October to March, and the North Pacific trade winds during the months of April and May. The northwest monsoon is associated with the dry season and the southwest monsoon with the wet season.

Tropical cyclones are the most influential factors that bring considerable rainfall in the Philippines. Typhoons usually occur from June to December with highest frequencies in July and August. For the Visayan area where the project area is located, the probability of at least one typhoon crossing the region in one year is 87%. The most frequent disastrous typhoons generally occur during the months of October and November. During the 47-year period from 1948-1994 tropical cyclones have crossed Negros Occidental province which consisted of 4 tropical depressions, 11 tropical storms and 21 typhoons.

The project area receives an annual average rainfall of 2,368.9 mm. There is relatively dry period from January to May with average rainfall of 65.7 mm of rains in March and April. The rainy months are usually from June to December. Generally the total rainfall are declining beginning December and increase beginning in May with peak usually in November, the wettest month.

The mean annual temperature is about 27.6 °C. January is the coldest month with an average temperature of 26.2 °C while May is the warmest at 29.1 °C. The lowest recorded temperature is 16.5 °C which was recorded in January 1990 while the highest recorded temperature is 39.0 °C which was registered in March 1973.

2) Air Quality Survey

Air quality survey was conducted at the project area. The location of sampling stations are:

- a) Station No. 1 : Barangay Panaogao (Water District Pump Station)
- b) Station No. 2 : Barangay Purisima Concepcion (Elementary School)
- c) Station No. 3 : Barangay Bagtic (75 meter from elementary school)
- d) Station No. 4 : Barangay Bagacay (Hacienda Bagacay)

The schedule of sampling for Sulfur Dioxide (SO₂), Nitrogen Dioxide (NO₂) and Total Suspended Particulates (TSP) are 7:00 AM to 9:00 AM, 11:00 AM to 1:00 PM, 4:00 PM to 6:00 PM and 9:00 PM to 11:00 PM. The summary result of observations and location map of the survey points are shown in Appendix 13.2.2. The observed SO₂ and NO₂ concentrations fall within the range expected values for rural areas although the variance of the values are quite high. This may be due to changing weather conditions during the survey. The TSP concentrations are quite high compared to what may be expected for the area. This could be attributed to unpaved roads, pollen grains from vegetation and the factory (sugar central) nearby.

3) Noise Survey

Noise levels were measured at the following sampling stations:

- a) Noise in Silay
 - Station No. 1 : Barangay Panaogao (Residential Area)
 - Station No. 2 : Barangay Bagacay (Near Edge of Proposed Runway)
- b) Noise in the vicinity of Bacolod Airport
 - Station No. 3 : Asia Brewery, Magsaysay St., Bacolod City
 - Station No. 4 : Saint Vincent Village, Barangay Tangub

The summary result of the noise survey and location map of the survey points are shown in Appendix 13.2.3.

The noise sources in Silay are vehicular noise emissions, domestic noise and insects (during nighttime). These contributed to the observed noise levels of below 40 to about 60 dB(A) which is typical for a rural area. The maximum noise levels during takeoff and landing range from about 80 to 100 dB(A) as observed from the two noise stations. These can be considered as typical levels for domestic airplanes. Smaller planes have maximum noise levels ranging from over 70 to over 80 dB(A).

13.2.2 Terrain

1) Topography and Geology

The topography of the area is relatively flat with a surface slope of less than one percent. According to the slope classification for the province, this area is classified as level to very gently sloping (0-3% slope class). Only 23 percent of the total land area of the province belongs to this category.

Based on historical record, the stratigraphy of the area shows that the most recent sedimentary layer is alluvium. These are sedimentary accumulations deposited by comparatively recent action of rivers. Soils in Silay City are classified as Isabela Clay, Silay Loam, Guimbala-on Clay, and Silay Fine Sandy Loam. From a textural viewpoint, classified clay soil must have 40 percent clay and may have as much as 40 percent silt or 45 percent sand. The Isabela Clay belongs to a soil series that is fairly productive. Its boundary with the subsoil is wavy and diffuse. The layer has an average depth of about 30 centimeters. Isabela Clay is fairly rich in organic matter and is suited to lowland rice culture, but could be devoted to corn or sugar cane. The upper subsoil is also clay but lighter in color than the overlying layer. The soil structure is granular; is sticky and plastic when wet, but becomes hard upon drying. This layer is compact and is very slowly permeable. The lower subsoil is likewise clay; yellowish-brown; coarse granular; sticky when wet, friable when moist. This layer is also very slowly permeable.

The Philippine Archipelago belongs to an active trench complex wherein numerous seismic events coupled with volcanic activity often occur. However, Silay City has a lower seismicity compared to most parts of the country.

The project site and its immediate vicinity areas are not flood-prone areas. There are no landslide-prone areas in or near Silay City.

2) Groundwater

Silay City and nearby areas are within the designated difficult areas. These are areas, defined by the National Water Resources Board (NWRB), where groundwater supply is minimal and the probability of encountering non-productive boreholes is very high. Water supply sources of these areas are replenished mainly by way of sheared rocks such as fissures, cracks, and crevices.

Except for one deep well of the Silay City Water District (SCWD), there are no deep wells in the vicinity of the project site. All other wells in the area are shallow wells. These are wells with

depths of not more than 20m and are equipped with a hand-pump. Static water level in these areas are generally within 6m below ground surface. Most of the communities within and near the project site have shallow wells equipped with hand-pumps.

Deep well water quality assessment are regularly monitored by the SCWD. The data indicate that the water quality of the deep well has a high iron content that resulted to concentrations exceeding the Philippine Drinking Water Standards. Nevertheless, the general water quality is considered by SCWD to be acceptable for drinking purposes.

Two shallow wells were also tested by the Study Team for water quality assessment of the aquifer near the ground surface. The results of the water quality tests indicate that the groundwater of the project site is already contaminated with phosphorus with concentration levels way above the normal maximum value of 0.1 mg/l for groundwater. Phosphorus in the groundwater could possibly come from the application of fertilizers in the sugar cane fields. Inorganic fertilizers could leach into the underlying groundwater and may accumulate over a long period of use. In addition, the groundwater of the deep and shallow aquifers have pH values slightly lower than 7. This could possibly be due to the acidic conditions of the underlying soil. Most sugar cane plantations in the area are using lime to control the acidity of the top soil.

3) Landscape From the Main View-Point

Presently, the landscape of the project site is relatively flat. The surface of the land slopes gently towards the sea. Visually, one could see a vast flat land planted with sugar canes against the backdrop of a mountain range.

13.2.3 Hydrology

1) Flood Control

There are four streams within the proposed project site and its nearby areas, namely: (1) Imbang River, (2) Bagacay Creek, (3) Binonga Creek, and (4) Matagoy Creek. Imbang River is the largest stream, while Matagoy Creek is the smallest. Estimates on flow velocities on Imbang River, Bagacay Creek, and Binonga Creek were conducted using the float method to obtain an order of magnitude of their flows. No flow measurements were made on Matagoy Creek since this is almost stagnant. Flow volumes of Imbang River, Bagacay Creek and Binonga Creek at the time of survey were estimated to be about 8.5, 3.8 and 0.04 cu. m/sec respectively.

There were no flood-related disasters in the area. Interviews with the people living near the river

banks revealed that river water only rises up to the banks during heavy rains. Flooding of lands did not occur.

2) Water Use

Imbang River and Bagacay Creek are not only used for surface water abstraction but as sources also of sand and gravel for construction. During the field investigations, the team observed some people removing sand from Bagacay Creek. There are no evidences that the other two streams, Binonga and Matagoy Creeks are used for water abstraction or as sources for construction aggregates.

Records of the NWRB revealed that water permits issued in the vicinity of the project area are only for surface waters. Only the Imbang River and Bagacay Creek have water rights grantees. Most of these permits were issued for the use of water in irrigations. Permits issued on the downstream section of Imbang River at the coastal area are mostly for fisheries. The largest approved water abstraction (1,000 l/sec) is for an industrial purpose granted to the First Farmer sugar processing facility located at the upstream section of Imbang River.

3) Water Quality

The streams within the project site and its immediate environs were examined for its water quality. Water samples were collected from 10 points. Three sampling points each were selected for Imbang River and Bagacay Creek, while Matagoy and Binonga Creeks have two each.

Result of the water quality tests and location map of the survey points are shown in Appendix 13.2.4. It showed the influence of agrichemical use. All streams showed high concentrations of phosphorus. Bagacay and Binonga Creeks have consistent high concentrations. These phosphorus in the waters could possibly come from the runoffs of the sugar cane fields which are using inorganic fertilizers.

Total nitrogen concentrations are consistently high in Binonga Creek and Sampling Point No.2 of Matagoy Creek. These could possibly be due to the low flushing ability of these creeks since they have very small flows. Runoffs from the sugar cane fields could have high residence time in these creeks. Where water flows are large, such as the Imbang and Bagacay Creek, total nitrogen concentrations are beyond the detection limit of 0.4 mg/l. The very low concentrations could be due to the high dilution factor of the large flows. Total nitrogen concentrations in surface waters are typically less than 0.2 mg/l N. Higher concentrations could be an indication of pollution such as from fertilizer runoffs.

Values for the Biochemical Oxygen Demand (BOD) of the four streams are within the normal range for surface waters. Except for Matagoy Creek, the lower stretches of all streams have slightly higher BOD values than the upstream sections. This could possibly be due to the increase presence of communities in the lower stretches. The headwater of Matagoy Creek has a very small flow and is very near to a group of houses. Hence, its BOD value is relatively higher than those of other streams.

In addition to the aforementioned water analysis, an interview with the local farmers were conducted to know if pesticides are being used in the proposed project area. The results of the interview revealed that herbicides have been used extensively for the sugar cane fields.

13.2.4 Vegetation

Ocular inspection within 10 km radius of the project site indicated that the floral composition of the area is mostly of secondary growth vegetation due to the nature of land use in the region. Thirty-nine (39) species of plants were identified within and around the vicinity of the project area (refer to Appendix 13.2.5 for more details). As the proposed project site is mostly made of sugarcane plantation, the identified plant species were mostly those of domesticated species of non-dipterocarps, shrubs, vegetables and fruit-bearing trees.

The most dominant species of plant in the project site are *Saccharum officinarum* or sugarcane. Because of this, the standing crop biomass in the area is very high due to the cultivation of sugarcane as the primary crop on the area. This larger biomass is attributed to cultivation, favorable environment and longer growing season of these crops. As these plantation are cultivated, no disturbance in the life cycle of the crops occur.

Due to the dominance of sugarcane plants in the area, biodiversity is relatively low as there are only few species of plants which are often of domesticated nature and also cultivated by the farmers themselves.

The haciendas were often separated from each other by feeder roads leading to the City of Silay. These roads are often lined with coconut, ipil-ipil, kamachile, and eucalyptus trees cultivated by tenants in the sugarcane plantations. In some areas, plantation are lined with kogan grasses.

The IUCN Red Data book was used to identify possible endangered/threatened or rare species of plants in the proposed project site. From this book, none of the plants collected and identified were included in the listing. This could be attributed to the fact that the area has been developed as sugarcane plantation for quite long time now.

13.2.5 Fish and Wildlife

It was revealed that fishes thriving in Imbang River and Bagacay Creek are small and very limited in number. A normal catch for children spending about 4 - 5 hours is about 5 - 7 pieces of fish approximately 4 - 5 inches in length. The fish species they caught were mostly Gourami (*Trichogaster trichopterus*) and Carps (*Hypophthalmichthys molitrix*). Inland fishing in these areas is not viable as the site is rather close to the sea and fish is readily available in the market.

Bird calls were not observed during the site inspection. However, interview with local people indicated the presence of bird species such as quail (pugo) and maya. Animal species observed in the proposed project site include domesticated species such as dogs, carabaos, and chicken.

No wildlife species of animals were observed and reported by the local people in the project site. Due to this, no further identification/confirmation of species were required.

From the IUCN Red Data Book, no species of fish or wildlife have been identified as endangered/threatened or rare species. The area has long been developed as sugarcane plantation and therefore does not warrant the possible survival of wildlife species of animals.

13.2.6 Land and Resource Use

1) Silay City General Land Use

The City has a total land area of 21,486 hectares, 96.40% of which on 20,704 is classified as Agricultural as to land use. The remaining areas are used for Residential (624.50 hectares on 2.90%), Commercial (59.80 hectares on 0.30%); and industrial (91.70 hectares on 0.40%).

The City's economic base is in the agricultural sector, the area that is devoted being 96.40% of the City's total. The dominant agricultural crop is sugar cane.

2) Proposed General and Urban Land Use

The increasing business and agro-industrial activities of the city due to the number of service and infrastructure utilities and facilities have signified the gradual shift from agricultural to agro-industrial base economic states. This development has pointed to the need for allocating a larger income for the purpose of the proposed land use plan. Among the major seasons that have influenced the development planning involving the conversion were areas for the City's agro-industrial growth needs include the proposed seaport and airport infrastructure.

13.2.7 Demography

1) Population Size and Distribution

The 1995 reported population of Silay is 109,529, reflecting on annual growth rate of 1.58 percent. From the historical growth of Silay population, the City has a negative growth pattern between 1980 and 1990. Distributing the 1995 population according to the City's 3 major population center, Coastal Barangays have an aggregate figure of 36,167; Urban Barangays (Poblacion), 24,819 and the Rural Barangays with 48,543.

The total land area of each of these population centers are: Coastal Barangays, 2,157.0 hectares; Urban Barangays (Poblacion), 1,820.0 hectares; and Rural Barangays, 17,502.2 hectares. All together, the 21,480.0 hectares represent the City's total land area coverage. Population density of the Coastal Barangays is about 17 persons per hectare compared to the Urban Barangays which is 14 persons per hectare and Rural Barangays is 3 person per hectare.

2) Population Composition

Total population count by barangay for male is 54,995 (50.2%) and 54,534 (49.8%) for female or a ratio of almost 1:1. Of the total population of Silay, 36.9% are under fifteen years of age, 59.4% belong to the productive age group (15-64 years old) and 3.7% are at least 65 years old. In general, the bigger proportion of the population are of ages 1-24 years old. The mean age of the population in Silay is 20 years old.

3) Fertility / Morbidity / Mortality (City Health Profile)

Record of the City Health Office on the vital health statistics for 1995 indicates that there were 3,528 births or 32.21% per 1000 population and 533 deaths or 4.86% per 1000 population. Infant deaths (17) were 4.81% per 1000 population of live birth while the 20 incidents of fetal deaths represent 5.66 per 1000 live birth. Under the same period, there were 16,409 Married Couple of Reproductive Age (MCRA).

Of the prevalent diseases afflicting the people, bronchitis leads all others with 2,007 cases reported or 18.32% per 1000 population. Influenza was the next common illness with 1,063 cases or 9.7% per 1000 population. Other cases showing relatively significant number were diarrhea (823), 7.53% per 1000 population; TB pulmonary, 565 or 5.15% and Pneumonia 360 or 3.28%. Malnutrition is ranked 8 out of 10 of the leading causes of Morbidity (0.51%).

Reported as the first 3 leading causes of mortality were disease of the heart, 120 cases, TB pulmonary, 100 cases, and Pneumonia with 84 cases. Malnutrition ranked 6 (10 cases) or 0.09% per 1000 population. The Key City Health personnel complements include 7 Physicians, 4 of which are on contractual status; 12 Nurses with 5 as contractual; 2 Dentists; 21 Midwives with 6 as contractual; 4 Sanitary Inspectors and 1 Pharmacist. Health facilities include 1 government hospital and private infirmary of the Sugar Central operating in the place. In addition, there are 20 family planning clinics; 1 rural health unit and 19 Barangay Health Stations and their Reporting Unit networks. There is 1 nutrition and rehabilitation center with 2 nutritionists.

4) Residential Area Distribution

Silay City has a total of 18,144 households for its 16 barangays. In terms of household number, Barangay E. Lopez is the biggest with 2,145. Next is Barangay Mambulac with 2,129. Barangay Guinhalaran comes third with 1,589 followed by Guimbala-on with 1,417. Fifth is Barangay Lantad with 1,417 and sixth is Barangay Bagtic with 1,345. Another barangay with over one thousand households is Barangay Hawaiian with 1,242. Those remaining have below one thousand households. In this group, Barangay I has the lowest with 354 and Balaring, the highest with 955.

5) Major Dialects

The report on population by Mother Tongue points to Hiligaynon as the major dialect among the fourteen dialects spoken by Silaynons. The others are Cebuano, Tagalog, Inibaloi, Kiniray-a and Waray.

6) Religious Affiliation

Silaynons are predominantly Roman Catholic (95.25%); Iglesia ni Kristo has 1.51% out of 109,529 population of Silay (1995). The two other religion reported in the "*Silay City Profile 1995*" with relatively significant number of follower as compared to all other religious groups are Baptists (0.86%) and Protestants (0.84%).

7) Literacy Rate

The City Planning and Development Office document (*Silay City Profile 1995*) reports that the literacy rate for the population 10 years old and over is 83.16% in 1980 and 94.76% for 1990 or an increase of 11.6%. Consequently, the number of illiterate also decreased from 12,824 in 1980 to 3,950 in 1990 or by almost 31 %.

8) Educational Attainment

Of the reported total 90,410 for the 1995 population belonging to seven years and over who have attended schooling, 53.46% are in the elementary level; 26.55% in high school; 2.86% post-secondary and 5.43% for those who have completed college and acquired academic degree. The relatively high percentage of school attendance at the elementary level was attributed to the accessibility of public schools in the urban area as well as the accelerated construction of public school buildings in the rural areas. It was further observed that entrance to the secondary level by those coming from the elementary level decreased by almost 50% and decreased further in the post-secondary level. The high cost of education (relative to family income capacity) was given as reason for these downward trend.

There are private school institutions in Silay offering both elementary and high school level education. One (Silay Institute) has both high school and college levels.

13.2.8 Manpower Profile

1) Occupation / Structure

According to the nature or type of occupation the people of Silay are engaged in, Farmers/Forestry workers/Fishermen number 6,799; Service/Shop market sales workers number 1,537; Craft and related workers number 2,283; Professionals number 1,516; and Plant/Machine Operators/Assembles group number 1,657. Government officials and others whose jobs are managers and supervisors total 1,404. Those with occupations as clerks total 1,051. Those whose activities are classified as "*Elementary Occupations*" all together, totals 11,750. The total for non-gainful occupations is 28,370. For "*others*", the total is 1,394. Occupation "not stated" have a total of 1,404.

2) Employment Situation

Report on the assessment of the employment/unemployment situation during the period 1995 (CPDO: *Silay City Profile 1995*) indicated that a total of 70,298 persons or 63.1% of the total population belong to the productive age 15 years and over. In this age bracket, 35,297 are males and 35,001 are females. Under this population of 15 years and over, 49.9% were in the labor force while 50.09% were not employed. With those employed, 31.6% are males and 12.9% females. On the otherhand, of those who are not economically active, 34.9% are females and 15.2% are males.

3) Key Industries Type

Silay City was identified in 1991 as one of Region VI "DAICs" (District Agro-Industrial Center). There are two sugar central; namely Caneland Sugar Corporation and hawaiian Philippine Company.

Inventory of the commercial, industrial/manufacturing, service and agricultural establishments operating in the City prepared in 1993, showed that there were 947 commercial establishments a great number of which belong to the Sari-Sari stores (6.29). Other commercial activities listed are those involved in the marketing or selling of various goods/merchandise items for such basic necessities as clothing, food, fuel, construction supplies, agricultural supplies and other household items. There were 18 establishments listed under drugstore/Pharmacy. Type of business group under manufacturing totals 143. Those engage in the providing of various kind of services total of 155.

13.2.9 Transportation

The Silay City has adequate transportation facilities. The total road network is 107.54 kms. which were clasified as :

- a) National primary road : 7.50 km
- b) City streets : 24.18 km
- c) Barangay roads : 75.86 km

Based on this survey, Silay city has the following road system :

- a) concrete pavement : 43.08 kms (40.06%)
- b) asphalted : 21.18 kms (19.70%)
- c) gravel base : 43.28 kms (40.24%)

There are also existing hacienda roads serving various agricultural settlements which usually link to the main barangay roads.

To determine the actual traffic flow in the area, traffic volume counting was conducted at two (2) counting stations situated along the National Road and Barangay Road. These roads are expected to be influenced by the new airport project. The summary result of the vehicle counts and location map of the survey points are shown in Appendix 13.2.6.

For the National Road, the results of the survey show that the peak hours in the morning is at about 7:00 to 10:00 and 5:00 to 6:00 in the afternoon. During the entire period of traffic counting,

the observed traffic situation was very light. There was no occurrence of heavy traffic congestion in the national road. It is noted that in both direction of the traffic count station, cars, taxi, vans and pick-up account for the most number of vehicles. The second are motorcycles, tricycles, etc., and the third most in number are the jeepneys.

For Barangay Guimbala-on Road, the results show that traffic situation in this area is very light wherein tricycles, motorcycles and the like account for the most number of vehicle observed in the area, followed by a combination of car, taxi, vans and pick-up and then rigid bus. The peak hour in the morning was observed at around 7:00 to 8:00 while in the afternoon is at around 4:00 to 5:00. There was no incidence of heavy traffic in the area.

13.2.10 Housing and Community Infrastructure

1) Housing

The recent increase in number of housing subdivision in Silay City is attributed to the influence of the expansion direction of the growth development of Bacolod City which is toward the north. These residential subdivisions are located in the City different Barangays.

2) Community Infrastructure

The following are the major community infrastructures located in the City of Silay.

- a) A number of school institutions, which offer pre-school education, elementary, high school and college levels.
- b) A number of various health service/facilities including one provincial hospital, barangay health centers, private medical clinic, and others.
- c) Three public markets, namely the Silay City Public Market, the Central Hawaiian Public Market and the Guimhalaran Public Market.
- d) Six banks.

However, there are none in the project site.

13.2.11 Rich Past Heritage / Cultural Attractions

Silay City has earned the title of Museum City of the province. The presence of many historical-cultural landmarks and other tourism attraction sites make the City a primary tourist destinations in Negros Occidental. It is reported that for a number of years, Silay has been adjudged as the cleanest and greenest city in the region (Western Visayas) and has won numerous

awards in many cultural activities in the province.

13.2.12 Perception Survey

1) Overview

A perception survey was conducted to collect data or information on the people's perception that reflects their attitudes either way towards the project. The area covered by the perception survey is comprised of residential communities or seven haciendas situated within or lie inside the perimeter boundary of the proposed airport project. These hacienda communities has a reported total of 728 households. Some 30% or 216 of the total reported households for each of the seven (7) haciendas communities involved was determined for the random selection in the interview coverage. Actual survey returns reached 31.13% or 227 respondents.

2) Characteristics of Respondents

Those interviewed were predominantly males, married, in their late thirty's (ages 30 to 40) and early forty's to late fifty's (ages 40 to 60); have attended elementary school level and a significant number reaching high school. Almost all belong to the Catholic religion.

Majority of the respondents belong to the family whose size has up to 5 members. This is closely followed by those belonging to family with size up to 10 members. Among rural households, this size as well as above this number could represent the extended family situation. By age group, the predominant number covers the family members with ages belonging from 15 - 60 age bracket.

3) Migration / Settlement History

All together, majority of the respondents have reported that they have lived in the place more than eleven (11) years. Of this group, almost one half have stayed in the place "since birth". Some have been there more than five (5) years. Those who lived somewhere else before settling down to their present place are a little less than one third of those who consider themselves "native" or "original" to the place.

The predominant reason given for transferring to their present place from where they came from was occupation or employment. To join family or relatives and marriage (to someone from the place) were the two other reasons given for relocating to the place. Almost all (87.23%) of the respondents had no plan of transferring to another place.

Those who welcome the idea of transferring represent 11.45% of the total 227 respondents. Quite

a number of respondents (1.32%) who are undecided for the moment but appears to be inclined to the idea (of transferring) gave the answer - "*it depends*". Nearby hacienda or subdivisions is the preferred place to transfer to.

4) Perception

(1) Awareness of the Project

Almost all of the respondents are aware of the proposed airport project. Radio is reported as the main source of information of having learned about the project. Those with electricity included TV as their source of information. (The relatively high score reported for this answer could be due to full coverage by media particularly radio/TV of the deliberation of the project by the Provincial Development Council.) Almost one half of this group of respondents learned of the project through their neighbors and "*reliable persons*" which could refer to the engineers or field surveyors who earlier visited the place to do survey work.

(2) In Favor of the Plan

The predominant respondents (84.5% out of the total) were in favor of the plan, and those who not in favor were 14.08%. Many of them who supplied reasons for favoring the project consider the project as one that will contribute progress and development of the City. The second important reason is their possible employment or job opportunities the project can bring. Those who did not answer or provide any comment represent a significant number compared to the report for the other reasons given for favoring the project. The perceived negative consequence of the project mentions possible loss of job or displacement as number one reason. This can relate to the next reason which is the reduction of sugar cane field areas. With this reason, equal concern is given to the perceived difficulties involving relocations.

(3) Things to be Done before Finalizing the Plan

The predominant respondents have no idea on "things to be done before plan is finalized". Those with ideas suggested the consideration of relocation site as one of the things that have to be done first before plan (airport construction) is finalized. With this answer, next is "*consultation with people*". Third is the advice (those concerned) to "*plan well*" the project. Importance is given to the need to inform the residents/community first.

(4) Possible Effects on the Natural Environment

Majority of the respondents have no idea as to the possible effects of the project on plants and animals. A little less in number than this group are those who believe in the project as having harmful effects like death and destruction of plants and animals. Those who believe that the project will have no effects registered third in number.

With regard to the quality of air, that the project will cause air pollution is the predominant perception of the respondents. "No idea" comes second in terms of responses. The third group considers "No effect" on the quality of air.

With regard to the quality of water, "No idea" appears to be the predominant answer. Probably like the possible effect on air quality, the project's effect on water is too technical a subject for the respondents to appreciate. About half of the number with no idea belong to the group who sees the project as having no effect on the water quality.

With regard to the quality of soil, the predominant answer indicates "No idea". Again, just like the possible effects on air and water, the subject is probably too technical for those respondents concerned to relate with. There are those who believe, nonetheless that the proposed project will have no effect on soil (quality). Those who have relatively concrete ideas indicated that the project could make the soil less productive and lessen productive area for farming.

(5) Benefits of the Project

Employment is seen as the first among the possible benefits of the project for the people in the City / Province. Second is progress of the city due to increase in (business) tax source. This relates with "more business" reason. Employment is, also, considered as first among the possible project benefits to the respondents and their family. This represents 63% of the total number of respondents.

(6) Negative Effects of the Project

Reinforcing the earlier observations that the coming in to their place of the airport project is considered by the people as a welcome development because of the expected benefits, they see no negative effects of the project to them. Those who expressed apprehensions cited loss of job/ displacement as possible negative effect to the people in the City / Province. Noise (jet engines), confusion (community becoming over-crowded) and pollution are the other possible negative

effects that the project could bring to the City. Other have no idea.

Majority of the respondents appeared at a loss in thinking of the negative effects the project will have on them and their family. Those think of the negative effects of the project on them/family expressed worries on the following reasons like dislocation/displacement (being transferred to another place) and the accompanying inconvenience; noise (from jet engines) and possible loss of job (as a consequence of being dislocated/displacement from their place/present place of work).

(7) Assistance Needed in the Event of Relocation

The providing of preparation of the relocation site appear to be the topmost concern of the people to be affected by relocation. The next concern cited financial assistance. With the relocation site, they expect the provision of house and lot for them to move in. With the expected government assistance, these should include the providing of or creation of source of livelihood income; job placement. Some have no idea and would just leave the problem to the landowner (hacienda owner) to consider.

(8) Preferred Place to be Relocated

The predominant choice for the place to transfer to give preference to nearby Haciendas and within the City, and the new place should be peaceful and accessible. Many did not indicate any preference and would consider any place chosen by the government. In like manner, some would consider the choice of their land-owner (Haciendero) they presently serve. Others still prefer near the airport (probably in consideration of the economic benefits like job or income opportunities).

Accessibility of the place and familiarity are the two topmost reason for choosing the particular place for relocation. That they see the place as peaceful and "*more productive*" are also among their priority considerations.

(9) Estimate of Just/Fair Amount of Expected Financial Assistance

Many answered to have a fair and just estimate for the needed financial assistance. And that such financial assistance would be for the compensation of the demolition of their present houses and which should be their equivalent value. Majority still do not know or have idea for the estimates. "*No estimate/sufficiently enough*" and "*depends on agency concerned*" complement this group. Those who cited figures have PHP 50,000.00 to 100,000.00; PHP 100,000.00 above and below PHP 50,000.00 in the order according their numbers.

13.2.13 Housing / Utilities

Majority of the number of houses were constructed more than 10 years ago. These were made of light-mixed materials like bamboo and wood. These houses are owned by them and a little less than this group do not and just like the lots. These houses are built-on, are owned by the Haciendas. The houses are mostly of the two-bedrooms type and with a floor area of 8 x 8 to 12 x 20 square meter.

Many of the respondents did not provide an estimate of the house floor area and instead cited the lot size which range from 80 square meters to 200 square meters.

With regard to amenities or facilities, most of the houses have toilets ("*buhos*" type inodoro). Other types used include "*Inodoro*" with flush; "*antipolo*" (close pit). The use of "*open pit*" type is adopted by many. Houses with no toilet are a little more than those who use the "*open pit*" type. As to lighting facility, most of the houses use kerosene lamp. Less than one third of this number enjoy electricity. Firewood is the common material used for cooking.

Houses with electricity, the monthly average for electric bill is less than PHP 100.00. Following this group are those with monthly average of PHP 100.00 to 200.00. There are those with PHP 300.00 and above monthly average for electric consumption

13.2.14 Household, Income and Employment

The household's monthly income estimate is from PHP 2,000.00 to 3,999.00. Second to this group are those with monthly income from PHP 4,000.00 to 6,999.00. About half of this number have PHP 500.00 to 999.00. Most of the households have only one (1) member as income earner followed by those with 2 members of the household contributing to the family income. The third group have more than 3 members as income earners.

Farming activities and as Hacienda laborer provide the main source of family income. Earnings by working either as a carpenter or as a driver provide the main source of income for others. Managing a sari-sari store business and livestock raising are two other sources of income of the family. Pensions received monthly augments family income. Jobs engaged in by others to augment family income include such activities as vegetable raising, selling ready-to-wear clothes, tricycle/"*trisikad*" driver, job-moonlighting (as carpenter, maid).

13.2.15 Community Situation

1) Perceived Main Community Problem

There were a number of problems and situations mentioned as problems besetting the community. On top of the list is unemployment or limited job opportunities. Lack of electricity is given as the second top concern. Other problems given notice include air pollution from other barangay as source; public disorder (incidence of drunkenness), lack of water facilities; lack of toilet (sanitation); high incidence of out-of-school youth; and lack of income source.

2) Solution of the Problem

Of the perceived problems of the community, it appears that they see the providing of solutions as simply beyond them thus the answer "none or no idea" or simply just did not make any attempt to provide any answer. Instead, they looked up to the concerned person and/or office (government) for the providing of needed solutions like support or assistance. Specific solutions mentioned include the providing of income-generating projects, supply of rice to laborers (farm) during off-season (sugarcane); provide job opportunities or business opportunities.

3) Recommendations to the Solution of the Problem

Some recommendations to the solution of the problem are given by the respondents. Problem-specifics, for lack of employment opportunities, the recommendation is to create or provide more job opportunities; income-generating projects. For the out-of-school youth, education/scholarship or employment opportunities must be provided. With the peace and order problem resulting from public disorders caused by high incidence of drunkenness, calling the attention of government agency concerned (police) to provide disciplinary action is suggested. While they took up to the government for solutions to the others identified, they also recognize the need to cooperate in problem-solving through dialogue/communications.

13.3 PREDICTION AND ASSESSMENT OF ENVIRONMENTAL IMPACTS

13.3.1 Resettlement

Resettlement will be required due to the occupation of land by the new airport. Magnitude of impact may be measured by the number of people to be resettled. Based on airport layout plan drawn on the topographic map of the scale 1:5,000, 35 houses are located within the new airport site. It is estimated

that the total number of people to be resettled will be around 175 people based on the average number of family members per household in the barangays.

Most of the households subjected for resettlement are the workers of the sugarcane plantation and therefore, such household will lose both their house and job due to the Project. According to the perception survey results, about 15% of respondents considered the relocation will be the negative effect of the Project to them and less than 3% of respondents concerned about the job opportunities.

The perception survey indicates that the people living in the project site need to be provided the relocation site, financial assistance, house and lot and source of livelihood income. Thoughtful planning and implementation of resettlement program will be required to minimize adverse effects to the resettlers such as loss of their living foundation like their living place and employment, friction between locals and resettled residents due to the social and cultural unrest of the latter towards the former, etc.

13.3.2 Economic Activities

The project will give some impacts to the economy of the area due to the following:

- a) Loss of agriculture land;
- b) Change of traffic system, commodity distribution routes and its volume; and
- c) Change in employment due to construction and management of the airport.

1) Loss of Agricultural Land

The new airport will require some 180ha of land to be converted from sugar cane field to the airport property. This is 0.9% of the total area of land classified as agricultural in Silay City. The magnitude of this impact is considered not so significant, if further improvements of the productivity in the agricultural sector is expected.

2) Change of Traffic System, Commodity Distribution Routes and Its Volume

There may be no serious impact to the traffic system since re-routing or new construction of the road are included in the Project to mitigate the impact to the traffic system within the vicinity. Commodity distribution routes and its volume will be changed slightly due to the Project in both construction and operation stages. However, no adverse effect due to these changes is foreseen.

2) Change in Employment

(1) Construction Stage

The construction works associated with the Project may need to acquire a service of the local constructors. It is expected that more than 4,000 man-months of workforce will be hired locally as the general labors. This is considered as an positive impact of the Project.

(2) Operation Stage

Although most of the airport employees will be transferred from the existing Bacolod Airport, increased facilities and services at the airport will create, directly and indirectly, additional job opportunities. This is considered as an positive impact of the Project. It should be studied during the course of implementation of the Project to provide these job opportunities to the people affected by the Project as much as possible.

13.3.3 Traffic and Public Facilities

1) Traffic

(1) Construction Stage

Construction of the new airport will include transportation of approximately 1,600,000 cu.m of soils from borrow pits to the project site. Traffic of more than 400 dumptrucks per day per direction is expected to complete the Project in 29 months.

Potential borrow pits are located to the east of the project site along the Silay - Bagatic Road. The current traffic volume of Silay - Bagatic Road is very few (about 300 - 600 vehicles per two direction during 07:00 - 18:00). Therefore, it is considered that the traffic of the construction vehicles will not create sever traffic congestions. However, some preventative measures would be required to minimize the traffic accident, because the traffic volume will increase significantly during the construction.

Upon designation of the borrow pits, it is necessary to thoroughly study and investigate first on the possible impact to traffic condition along the transportation route and its vicinity. In case any adverse impacts are foreseen, proper mitigation measures must be taken.

(2) Operation Stage

Forecast peak hour traffic volumes of the airport access vehicles are 950 and 1,250 per direction in the year 2005 and 2015 respectively. It would create a congestion of traffic along the National Road No. 1 between Bacolod and Silay. Special attention should be given to the sections within the city and municipality proper. Therefore, overall road network of the province should be reviewed so as to minimize the adverse effects on the traffic.

On the other hand, the new airport will provide effective air transportation mainly to/from Manila and Cebu. This is the biggest benefit of the Project. This benefit is evaluated in detail in Section 17.1 Economic Analysis and Evaluation.

2) Public Facilities

No public facility is located within the new airport site. Due to the construction of the new airport, the access route to the public facilities in the vicinity of the project site may change. The magnitude of impact is, however, considered not so big because appropriate diversion roads will be constructed as a part of the project.

13.3.4 Split of Communities

The major part of the new airport will be located in Barangay 004. It will also occupy some part of Barangay 005, Guinhalaran, Bagtic, E. Lizarez, Rizal, and E. Lopez. The communications within these barangays will become less convenient due to the occupation of an area by the new airport. Although diversion roads will be constructed so as not to create isolated lands, additional travel of about 2km will be required in the worst case. However, such impact is considered not so significant because there are very few inhabitants at present.

13.3.5 Cultural Property

Based on the field survey, there are no rich past heritage or cultural attraction within and in the vicinity of the project site. Therefore, no impact on the cultural property is foreseen. If any buried cultural properties are found during construction, it is necessary to implement proper steps of its preservation and maintenance in accordance with the relevant law.

13.3.6 Water Rights and Rights of Common

According to the record of NWRB there are 11 and 2 water rights granted along Imbang River and Bagacay Creek respectively. Eleven water rights are for irrigation purpose. Remaining rights are for industrial (sugar processing facility at about 6km upstream of the project site) and fishery (fish ponds at the mouth of Imbang River). Five water rights are located downstream of the project site.

At present, there is no plan to use the river water by the project. The surface water from the airport is planned to be discharged through regulation ponds so as to cut off the high peak of runoff to the current level. Therefore, no impact on the water use is expected. However, some water may be taken temporarily from Imbang River for construction work of the new airport. In such a case impacts on the water use by others should carefully be studied, and appropriate measures must be taken to minimize the adverse effects.

13.3.7 Groundwater

No use of groundwater is planned both in the construction and operation stages, there will, therefore, be no impact to the ground water.

13.3.8 Hydrological Situation

1) Construction Stage

Change in the flow of surface water is expected due to land reform, such as cutting piling of soil, accompanied by the construction works. Magnitude of impacts will vary depending on the methods of construction which will normally be proposed by the contractor. Therefore, further study should be conducted during the detailed design and construction supervision stages to ensure that the contractor take appropriate measures to minimize the adverse effects of changing the flow

2) Operation Stage

Due to the vast paved area, such as the runway, taxiway and apron, the total volume of runoff will increase. Moreover, the peak of the water flow will become higher because the airport drainage system will discharge the surface water within shorter time as compared to the existing conditions. However, the regulation ponds will be constructed near the airport boundary so as to control the peak flow before discharging the water to the existing creeks. Therefore, no adverse effects of the increased water flow is expected.

13.3.9 Flora and Fauna

The project site and its vicinity has already been developed for agricultural purposes and no endangered/ threatened or rare species were found by the field survey. Therefore, the impact on flora and fauna at the new airport site is considered minimal. Study on flora and fauna will be required when the borrow pits and transportation routes of the borrowed soils are chosen.

13.3.10 Air Pollution

1) Construction Stage

There will be a change in air quality due to the exhaust gas emitted from both the construction machines and construction-related transportation and dusts created by the earthworks and vehicle traffic during the construction. However, it is expected from the existing air quality and expected size of construction works that the air quality will be still within the acceptable level, if the contractor takes appropriate methods of construction.

2) Operation Stage

The impact of the exhaust gas emitted from both the airport access vehicles will have some impacts on the air quality. If all of the airport access traffic is added to the traffic on the National Road No.1 near the center of Silay City observed by the environmental survey, the peak hour traffic (both directions) may increase from about 1,200 to 2,100 and 2,400 in the year 2005 and 2015 respectively. It is expected from the experience from other cases that the air pollution due to this level of traffic will not be significant.

The exhaust gas from the aircraft is considered not a problem from the experiences of the other airports.

13.3.11 Water Pollution

1) Construction Stage

During the construction work, the muddy water and chemically contaminated water will runoff from the project site during rain. However, it will not become a problem, if the contractor provide appropriate treatment facilities and measures as proposed in Section 12.8.

2) **Operation Stage**

Waste water from the airport will be discharged to the existing creek after treated to the allowable quality of effluent by the environmental standards. Therefore, it is expected that there will be no water pollution problem. It should be noted that the quality of water of the creeks is already influenced by agricultural use, and consists high concentrations of phosphorus.

13.3.12 Noise and Vibration

1) **Construction Stage**

The noise generated by the use of construction machinery and passage of construction-related transportation vehicles is expected. Since there is no residential area in the immediate vicinity of the project site, the noise of the construction machinery will not create a noise problem. Further study on noise along the access roads to the project site should be conducted during the detailed design and construction supervision stages when the location of borrow pits and transportation routes are planned. It should also be included in the technical specifications of the Project to comply with the environmental standards for noise such as not to proceed with the construction work during night time.

2) **Operation Stage**

1) Aircraft Noise

Noise from the aircraft in the years 2010 and 2015 was predicted by the Weighted Equivalent Continuous Perceived Noise Level (WECPNL). The WECPNL can be computed as follows :

$$\text{WECPNL} = \text{dB(A)} + 10 \log N - 27$$

where, dB(A) : Average power of noise level of all aircraft

N : Weighted numbers of daily flights

$$N = N_2 + 3N_3 + 10(N_1 + N_4)$$

where, N_1 : Number of aircraft at 00:00~ 07:00

N_2 : Number of aircraft at 07:00~ 19:00

N_3 : Number of aircraft at 19:00~ 22:00

N_4 : Number of aircraft at 22:00~ 24:00

The basis of the simulation of aircraft noise is as follows ;

Table 13.3.1 Assumptions for Calculation of Aircraft Noise Contours

Item	Assumption	
	2005 (Medium term)	2015 (Long term)
Forecast Year	2005 (Medium term)	2015 (Long term)
Ratio of Runway Use	Landing : Runway 03 : 21 = 80% : 20% Takeoff : Runway 03 : 21 = 80% : 20%	
Runway Length	2,000 m	2,000 m
Aircraft Type and Number of Daily Flights	MJ (A300 class) : 11 SJ (B737 class) : 10 Total : 21	MJ (A300 class) : 19 SJ (B737 class) : 7 Total : 26

Figures 13.3.1 and 13.2.2 indicate the aircraft noise contours in the vicinity of the new airport in the years 2005 and 2015. The total area within the WECPNL 70 contour line will be around 197ha in the year 2005, and will increase to 217ha in 2015. The area within the WECPNL 75 contour line will be around 103ha in 2005, and will increase to 111 ha in 2015.

There are, at present, no houses within the WECPNL 75 contour line except for those subjected for resettlement due to the possession of project site. About 20 houses are distributed at the area between the WECPNL 70 and 75 contour lines. Therefore, the aircraft noise pollution is considered insignificant if the land use in the vicinity of the airport is control as recommended in Section 12.2.3.

(2) Vehicle Noise

The airport access vehicles will generate the noise and it could cause noise problems along the airport access roads. As mentioned in Section 13.3.10 the traffic volume of National Road No. 1 will be doubled. However, it is expected from the experience from other cases that the noise pollution due to this level of traffic will not be significant.

13.3.13 Land Subsidence

No utilization of ground water is planned in the project, therefore no impact on land subsidence is expected.

Noise Model (Year 2005)

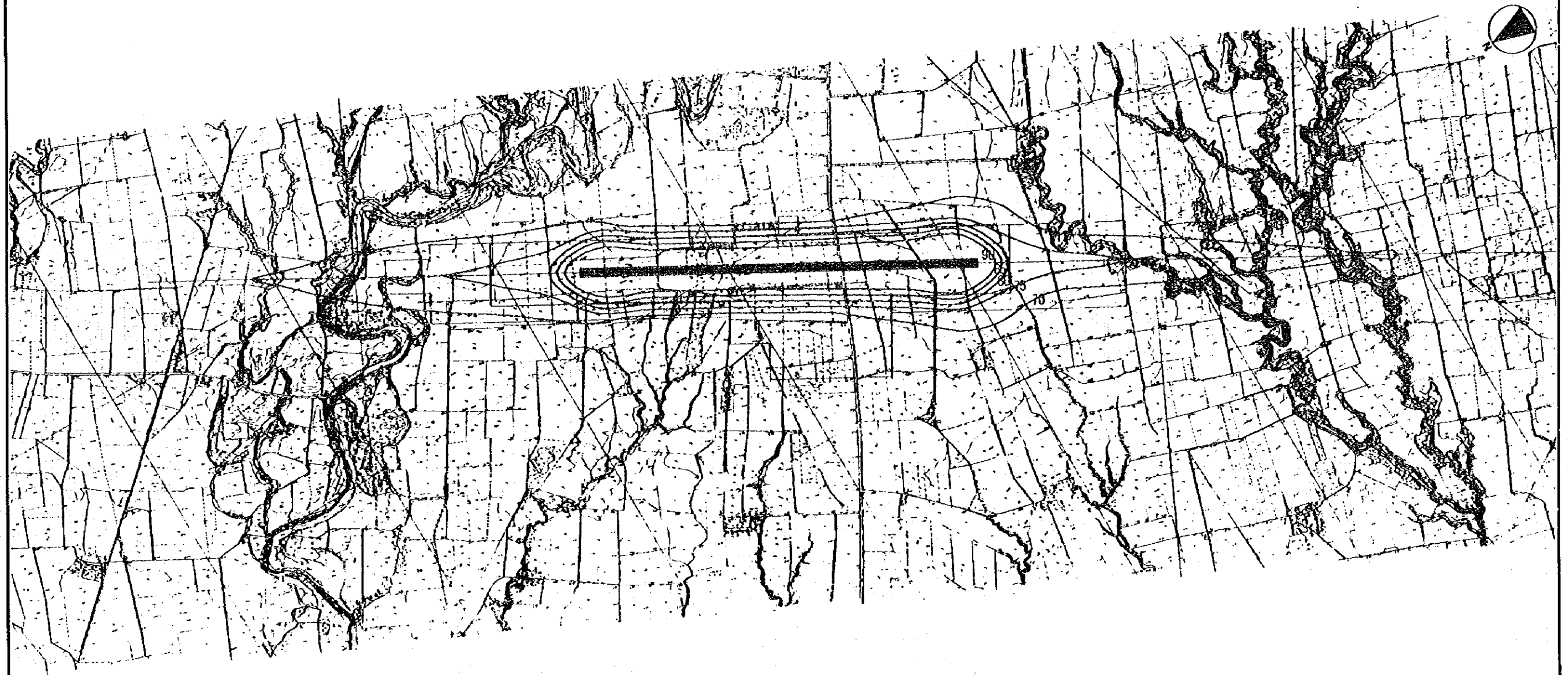


Figure 13.3.1 Aircraft Noise Contours in WPCNL Case 1 (Year 2005)



Noise Model (Year 2015)

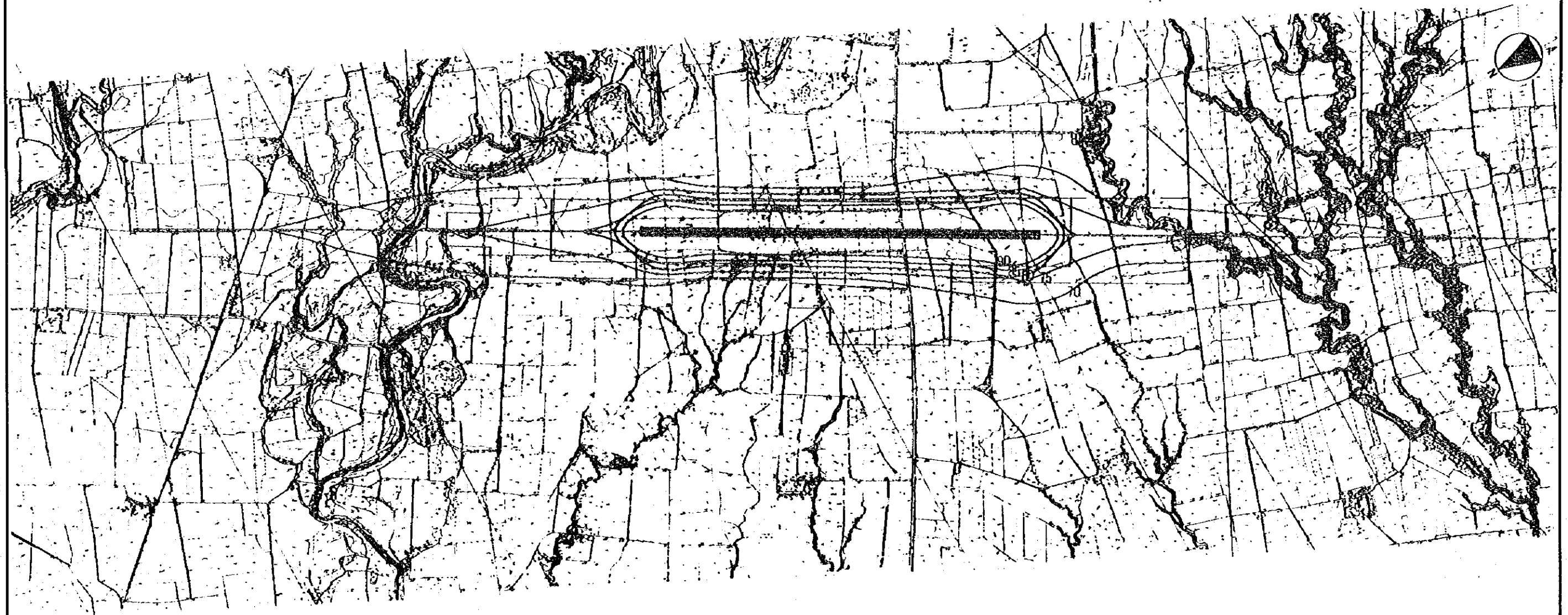


Figure 13.3.2 Aircraft Noise Contours in WECPNL Case 2 (Year 2015)



13.4 ENVIRONMENTAL CONSERVATION MEASURES AND MONITORING

13.4.1 Environmental Conservation Measures

It is recommended to take the following measures in order to minimise the adverse environment impacts of the project.

1) Further Study

As mentioned in several times in this chapter, further study on environmental impact is required during the detailed design and construction supervision stages when locations of borrow pits, transportation routes of the borrowed soils, and 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.

2) Resettlement

Careful planning and implementation of resettlement program is required to minimize the adverse impact to the people suffered by the Project. Major potential problems of the resettlement are;

- a) Social and cultural inadaptability to the new settlement site.
- b) Conflict between the original residents and those resettled.
- c) Deterioration of living standards after resettlement due to inadequate compensation.

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 conflict 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.

13.4.2 Monitoring System

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

Upon implementation of monitoring system, establish a monitoring activity planning organization composed of related agencies, scholars and men of experience. This organization provides the monitoring plan in connection with the monitoring item, the frequency of monitoring activity and the arrangement of the result of said activity. Also, the organization will create a written manual which establishes the details of implementation in accordance with the aforementioned monitoring plan. Furthermore, the organization will likewise study on necessary measures to be taken in case of emergency and create a written manual for it.

The result of monitoring and investigation activity should be reported to the related agencies and residents in a regular basis. If any adverse effects are detected, appropriate measures should be taken. The monitoring plan should be review whenever deemed necessary.

Chapter 14 Planning of Operations Management and Training

CHAPTER 14 PLANNING OF OPERATIONS MANAGEMENT AND TRAINING

14.1 GENERAL

An airport is a highly regulated and technologically sophisticated system which operates within an extensive political framework. It can also be regarded as a part of a larger system, namely the air transportation system. The air transportation system is operated very much according to the national regulations, which in many cases are derived from the ICAO standards and recommendations. As the air transportation system competes with other modes of transportation, each part of it must be constructed and operated in a competitive and cost effective way.

Therefore, the following aspects have to be observed when planning the airport operations and training:

- a) Air safety must always be the first priority.
- b) An airport comprises various expensive establishments and technical systems. The functions of many of these systems are vital for air safety and for an efficient operational performance not only of the airport but also of the whole air transportation system.
- c) The interaction with the other major components of the air transportation system is essential to create a complete and competitive travel for the passenger.
- d) The large fixed costs of an airport urges for the highest possible use of the capacity.
- e) Airport operation costs are not so related to the number of passengers and/or aircraft movements. They are more relative to the sizes of facilities, opening hours and traffic distribution during the opening hours.
- f) As commercial services at the airport are important sources of revenues, development of the commercial services is an important task for the airport management.

This chapter addresses some of the special conditions in airport operations focusing on airport organization, staffing and training, airport operation systems, airport management systems, and airport maintenance systems for the new Bacolod Airport. As described in Chapter 5, the existing Bacolod Airport is operated by ATO, but the existing passenger terminal building is owned, maintained and operated by PAL unlike other national airports. It is a primary assumption for the study on operations management and training that the new airport including the passenger terminal building will be owned, maintained and operated by ATO.

14.2 AIRPORT ORGANIZATION, STAFFING AND TRAINING

14.2.1 GENERAL

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 for the following reasons:

- a) It creates a possibility to keep the total number of staff at the lowest possible level.
- b) It creates an organizational flexibility to meet the demands at peak hours.
- c) It is a means for human resource development.

The study on airport organization, staffing and training is conducted based on the existing organizational framework of ATO.

14.2.2 ORGANIZATION

The organization is a means to make the most efficient and effective use of all available personnel resources to achieve the desired output for the airport. An organization is also a means to desegregate responsibility for achieving goals and matching authority to managers of selected responsibility centers. A rational distribution of responsibility and authority normally increases the efficiency in the whole organization. The delegating of authority to senior subordinate managers must be derived from the authority delegated to the airport manager by the ATO headquarters.

The present organizational structure at Bacolod Airport (refer to Section 10.2.2) is generally well working. However, to underline the importance of an integrated organization, some changes are recommended for the new Bacolod Airport. The changes consist of forming only two units, i.e. airport maintenance and airport operations units, within the airport section. Figure 14.2.1 indicates the proposed organization structure of the new airport.

The Air Traffic Section and the Airways Navigation Section staff are employed by the ATO headquarters and only administratively connected to airport management. However, it is worthwhile to study the possibility of combining some functions of the Airways Navigation Services and the Airport Maintenance.

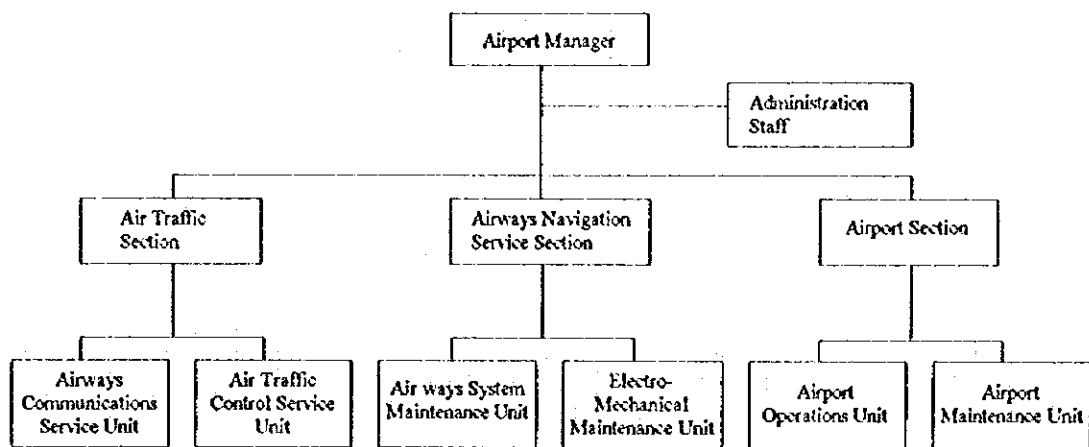


Figure 14.2.1 Suggested Airport Organizational Structure

14.2.3 STAFFING

As described in Section 10.2.2, the present number of staff at the Bacolod Airport is considered rather large compared with the size of facilities, frequency and distribution of aircraft movements and the present demand of opening hours. (The opening hours at present at the Bacolod airport is 24hrs due to its role as an alternative airport. As the own traffic is between 0400 and 2130, it is recommended to review the needs of 24hrs operation.) The estimated over staffing at present depends very much on lack of maintenance equipment and vehicles and computer capacity for administrative purpose.

The number of airport staff depends, as mentioned above, not only on the traffic distribution and opening hours but also on the sizes and complexity of the facilities. The new airport will have larger and more complex facilities and more frequent aircraft movements. It is recommended to adjust the present staffing level to the staffing level of the new airport indicated in Table 14.2.1 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 as described in Section 14.2.4
- c) Adjust the staffing level by stopping the new employment.

Table 14.2.1 Present and Target Level of Staffing for Bacolod Airport

	Present Level		Target Staffing Level in 1996		Target Staffing Level in 2005	
	372,000pax/year		372,000pax/year		1,003,000pax/year	
	Regular	Casual	Regular	Casual	Regular	Casual
Airport Manager	1	-	1	-	1	-
Administration Staff	6	-	3	-	4	-
Air Traffic Section						
Manager	1	-	1	-	1	-
Airways Comm. Service	5	-	5	-	5	-
Air Traffic Control Service	11	-	11	-	11	-
Airways Navigation Service Section						
Manager	1	-	1	-	1	-
Airways System Maintenance	7	-	7	-	7	-
Electro-Mechanical	6	-	6	-	6	-
Airport Section						
Manager	1	-	1	-	1	-
Airport Operations	27	22	24	-	35	-
Airport Maintenance	3	5	8	-	10	-
Total	69	27	68	-	82	-

- Note 1. Airport Operations staff are subdivided into Terminal Operations, Crash Fire & Rescue, and Airport Security at present. Airport Security does not include AVSECOM staff.
2. The causal employees are employed for a six month period and it may be extended depending on need and budget availability. The estimated working time for the causal employees is between 50 and 100 % of the working time for a regular employee.
3. Target Staffing Level in 1996 is an estimate of the required number of staff if the airport is reasonably equipped with the maintenance equipment, vehicles and computers and the staff are trained to perform various functions.

14.2.4 TRAINING

As mentioned in Section 10.5, there are training programs for the airport staff performed by the ATO headquarters. There is, however, a need of developing a local training program for the staff of the airport section in order to adjust the training closely to the local conditions. There are two main objectives to be achieved by this local training program:

- a) prepare the staff for the new conditions, facilities and equipment they will meet at the airport; and
- b) give the staff of each class sufficient training and education in various functions at the airport.

There is also a need of a training program for management staff.

An integrated organization needs staff with integrated competencies. The main competencies needed at an airport of the size of Bacolod are airport maintenance, crash fire and rescue, and airport security.

It is very evident that the staff have to be familiar with the new establishment, facilities and equipment and well trained to handle them. Sufficient time to perform such training has to be planned normally within a few months before the opening of the new airport when the construction works are almost completed. The duties of the regular staff at the existing airport have, in the meantime, to be performed by casual staff.

1) Training for Management Staff

For management staff, including the airport manager and the section managers, the following competencies are vital.

- a) knowledge of the factors that are important for safety and security at an airport
- b) sufficient knowledge to act in the management of an airport

To achieve and maintain these competencies a training program comprising the following items should be performed periodically (probably two to four years intervals).

- a) responsibilities for the management of an airport
- b) applicable rules and regulations
- c) application of relevant rules and regulations at a strategic level
- d) prediction of the risks and possibilities of planning and ordering various tasks
- e) human resource management

Since management training and education mainly are corporate concerns, it is suggested this training program will be conducted by the ATO headquarters.

2) Training for Airport Section Personnel

This group of personnel comprises maintenance, rescue and fire fighting, and security personnel. For this group a program of integrated training is suggested. The program starts with a basic (level 1) training. Only after the basic training the personnel can work at the airport as an assistant staff. After about one year experience as an assistant staff, the training of level 2 which focusing on a specific field of work will be conducted. Then, the personnel can work more

independently as an airport staff of the specific field. After several years of experiences as an airport staff of the specific field, the personnel may take the level 3 training so that they can perform multiple duties depending on the needs of the airport. The concept of the training program is illustrated in Figure 14.2.2.

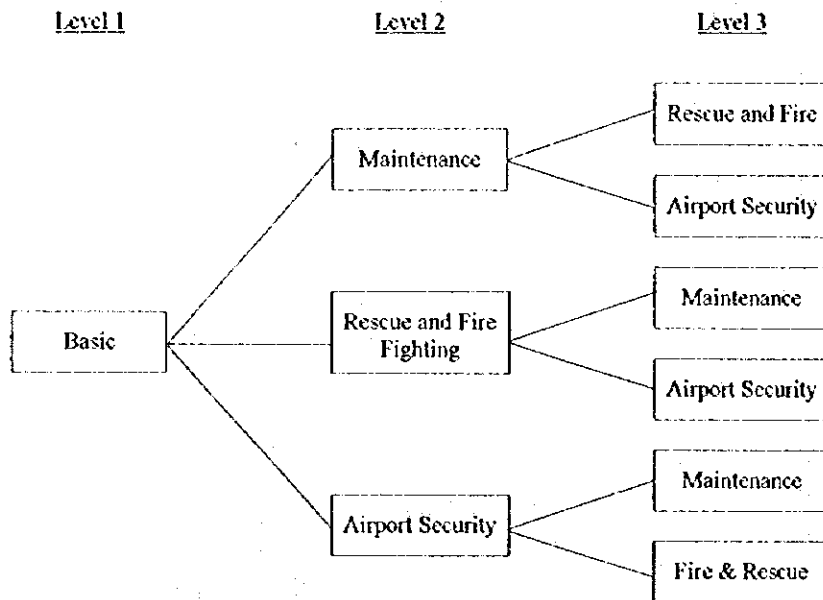


Figure 14.2.2 Concept of Training Program for Airport Section Personnel

It is suggested that the personnel of the Airport Section will be provided with at least two different competencies from two different categories at the new airport. Most desirable combination is the maintenance and one of the airport security and rescue & fire fighting, because the idle times of the latter are normally the working time the former and vice versa. When these integrated competencies are created they will enable the management to form a more flexible organization. This can, of course, be further expanded in harmony with the needs of the organization.

The training programs for airport section personnel (except for those for chiefs) are suggested to be performed on the airport for practicable reasons and for the reason of focusing on local needs and conditions. It is, however, recommended that a standard training program be developed by the ATO headquarters for the use at all ATO airports. The local training may be performed by trainers from the headquarters and/or the chiefs at the airport who is qualified as a trainer by the headquarters.

The contents of the training program for the different categories of airport section personnel should comprise at least the items listed below:

Basic

- a) Orientation of national rules and regulations concerning civil aviation
- b) Orientation of international rules and regulations concerning civil aviation. ICAO Annex 14 and 17.
- c) Handling of radio equipment
- d) Knowledge and skill of driving vehicles on the airside area.
- e) Knowledge of safety and security rules on the airport
- f) Knowledge of the special conditions at the airport
- g) Orientation of the routines and procedures at a "turn around" of a passenger aircraft
- h) Orientation of the most common types of aircraft using the airport
- i) Knowledge of quality systems and how to follow up the operations

Maintenance

- a) Control of obstacles
- b) Airport electricity and lighting
- c) Airport plumbing
- d) Surface repairing of runway system
- e) Clearing of runway systems
- f) How to measure friction coefficients of pavements
- g) Runway sweeping courses
- h) Instruction courses for all types of vehicles used in the maintenance service, for instance sweepers, mowers, trucks, friction testers etc.
- i) Airport buildings
- j) Airport signing

Rescue and Fire Fighting

- a) Airport firemen
- b) Supervisor of airport firemen
- c) Head of airport fire brigade

Airport Security

- a) Security officers
- b) Security screeners
- c) Patrolling and guarding
- d) Head of airport security

In addition to the training programs described above it is also suggested to introduce a certification system for staff working at airside or handling complex, equipment and vehicles comprising the following steps:

- a) Basic training
- b) Specific training
- c) Examination
- d) Achieving certificate
- e) Periodical training at least once a year
- f) Renewal of certificate

3) Administrative Staff

The administrative staff seem to have sufficient and relevant training / education for their duties. No further training is, therefore, suggested for this group.

14.3 AIRPORT OPERATING SYSTEM

14.3.1 GENERAL

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.

14.3.2 AIRPORT OPERATIONS MANUAL

An airport operations manual is an important mean by which the airport staff are fully informed of;

- a) their duties and responsibilities;
- b) the airport services and facilities;
- c) all operations procedures; and
- d) any restrictions on airport availability.

It is recommended that the ATO headquarters provides a standard (or typical) airport operations manual which covers the items shown in Table 14.3.1.

Table 14.3.1 Suggested Contents of Airport Operations Manual

- | |
|--|
| <ul style="list-style-type: none">a) Introduction: purpose and distribution of the manual, etc.b) Technical Administrations: identifications, opening hours, runway length, etc.c) Aerodrome Characteristics: airport layout, lighting, etc.d) Ground procedurese) Rescue and fire fighting planf) Meteorological servicesg) Communications and Nav aidsh) Signal and markingsi) Passenger terminalj) Cargo handling terminalk) General aviationl) Aerodrome emergency plan including crisis controlm) Facility/equipment operation/maintenance procedures |
|--|

The airport management should have the responsibility to form (finalize) and issue an airport operations manual relevant to the needs and conditions at its airport. It is, therefore, important to add the items needed and underline the parts of most relevance to the particular airport and to collect all valid and relevant information, instructions and directives at the airport.

It is to be noted that it is of great importance that complete instructions and directives are issued for all major operations procedures at the airport such as:

- a) crash fire and rescue procedure
- b) security procedure
- c) inspections and maintenance procedures to ensure safe availability to the runway- and taxiway systems
- d) procedures to ensure order and safety at airside
- e) procedures to ensure secure and convenient availability to the air terminal
- f) other relevant maintenance procedures

Since air safety is the first priority for the airport management and for the airport operations, special attention should be paid to the item "rescue and fire fighting" in the airport operations manual. Suggested contents of this plan are shown in Table 14.3.2.

Table 14.3.2 Suggested Contents of Rescue and Fire Fighting Plan

1. Introduction: including foreword, content, distribution of the plan, amendments and amendment procedure, and alarm principles.
2. Instructions: including airport owner, airlines, air traffic control, crash fire and rescue unit, hospital in the airport vicinity, local police authority, other relevant local authorities, and post emergency procedures.
3. Alert Levels: including crash at known site, potential crash, probable crash at unknown site, procedures for identifying the crash site, and list of aircraft and helicopters
4. Alarming Lists: including telephone and address lists, and list of frequencies used in radio communications.
5. Maps: including regional maps, airport maps, and airport layout charts.

14.3.3 AIRPORT SECURITY PLAN

At the new airport, as is the case at all other national government airports, AVSECOM will have the responsibility of passenger/baggage screening. However there is still a need of a comprehensive airport security plan. It is recommended that the ATO headquarters provide a standard form of security plan and the airport manager has the responsibility to form (finalize) and maintain such a plan. Suggested content of an airport security plan is shown in Table 14.3.3.

Table 14.3.3 Suggested Content of Airport Security Plan

1. Introduction: including foreword, content, checklist, amendments, qualification to receive the security plan, and amendment procedure.
2. Basis for Forming the Security Plan: including legal basis, responsibility for relevant authorities on national level, and airport orientation.
3. Organization and Responsibilities Regarding Order and Security at the Airport: including airport owner, airlines, local police, other local authorities, and other relevant enterprises at the airport
4. Preventive Security Measurements: including physical design of the airport, alert - levels, guarding, surveillance and admission control, and security control
5. Measures to Be Taken in Specific Situations: including hijacking, bomb threat, suspicious dangerous items found, negotiation in a dangerous situation, evacuation
6. Public Relations: including press, radio and TV, and the public
7. Training and Education: including training organization, training plans and programs, examination and evaluation plan, and procedures for documentation and surveillance
8. Reporting

An admission control system is also of great importance for the total security standard at an airport. An admission control system should at least consist of the following items :

- a) procedure for perimeter surveillance
- b) admission control at entrances
- c) badge - system identifying qualified visitors and employees at air side
- d) training program

14.3.4 FACILITATIONS

As mentioned in Section 10.7, no special measures have been taken as of facilitation matters at the existing Bacolod Airport. However, a coordination between various bodies at the airport is of great importance for the effective utilization and convenient availability of the airport terminal. This is specially the case regarding signing system, traffic information system, car parking and ground transportation and caring systems for special categories of passenger (elderly, disabled, infants).

It is recommended to establish an airport facilitation committee consisting of, at least, the members from the ATO (airport), the airlines, AVSECOM, and other relevant bodies at the airport. The committee is suggested to perform at least two meetings a year focusing on matters concerning access to the airport, signing and other information systems outside or within the airport terminal building and for procedures to handle special categories of passengers.

14.4 AIRPORT MANAGEMENT SYSTEM

14.4.1 GENERAL

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.

The management will need a financial management system consisting of two components, i.e. financial accounting and managerial accounting. The management also need a system for issuing and publishing local regulations and instructions for various procedures and ensuring compliance. Another important means of management is meetings with the management group, airport operators group and other for the management relevant groups.

14.4.2 FINANCIAL MANAGEMENT SYSTEM

The financial management system must be able to provide the measurements and key ratios necessary for assessing to what degree the goals have been achieved during a selected period of time. It is recommended that the ATO headquarters and the airport management establish every year the goals for the airport. Indicative types of goals normally set up by the management include:

Financial Goals

- a) profit/selected time period
- b) return on assets/employee
- c) debt/equity ratio

Air Safety Goals

- a) max. minor failures/ selected time period

Quality Goals

- a) max. failures/selected time period
- b) punctuality rate (rate of aircraft arrival/departures at scheduled arrival/departure time)

Performance Goals

- a) revenue/employee
- b) cost/employee
- c) aircraft movement/employee
- d) number of passengers/employee
- e) total cost/aircraft movement
- f) total revenue/aircraft movement

The financial management system should consist of;

- a) financial accounting system; and
- b) management accounting system.

Financial accounting is traditional accounting. It provides information of all revenues and expenditures. It can also provide consolidated profiles of the total financial status of the business in the form of statements which detail assets, liabilities, equity, profit and loss. Important indicators for the management can be derived from these statements.

Management accounting is accounting for decision-making. It comprises planning, programming and budgeting of both expenditures and revenues. It can also calculate, by using statistical information together with financial information, various types of key ratios indicating the performance efficiency and degree of achievement of the goals. This is an important part of the financial management system.

Various computerized financial management systems are available on the market. It is recommended that the new airport be equipped with a computerized financial management system adjusted to the needs of the management of the new airport. The system normally consists of various kinds of software, a PC server, a number of PC placed at strategic offices (offices of the airport manager, administration, airport section, and control tower) and a local network. It is desirable that the financial management systems at the national airports will eventually be connected to a system at the ATO headquarters or information will periodically be sent by diskettes for reporting.

14.4.3 REGULATIONS AND INSTRUCTIONS

The legal basis for airport operations can be found in national regulations and instructions normally derived from the ICAO standards, recommendations and manuals. These basic instructions have, however, to be completed and amended with local instructions, for example instructions for rescue and fire fighting procedures, inspection routines etc. adjusted to the specific situation at the new airport. It is the management's obligation to issue and publish sufficient local regulations and instructions. In this respect there is a need of a procedure supporting the management in:

- a) finding the relevant issues to be regulated
- b) finding a correct time schedule and a form to publish the instructions
- c) amendment procedures
- d) distribution procedures
- e) checking and follow up procedures

The scope and level of a procedure can vary from airport to airport depending on size, number of employees, number of airlines, type of traffic and other factors. However, procedures including at least the functions mentioned above is recommended to be introduced at the new airport.

14.4.4 MEETINGS

The management responsibility and authority are normally desegregated to a hierarchy of responsibility-center managers. It is, therefore, important to perform regularly management group meetings focusing on air safety standard, quality standards, performance measures and financial issues. The airport manager and all section managers are suggested to participate in the management group meetings.

In order to keep up with the development in and demands from the other parts of the air transportation system it is important to hold meetings periodically with airport operators and other relevant parties at the airport and in the surrounding community.

For the new airport it is recommended to perform:

- a) a management meeting once a week
- b) an operators meeting at least 4 to 5 times a year

14.5 AIRPORT MAINTENANCE SYSTEM

14.5.1 GENERAL

An airport, being an important part of the air transportation system and the aeronautical infrastructure, has to meet high quality and safety standards. It can only be achieved by proper maintenance of all the elements composing the airport. 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

Maintenance includes measures to keep or restore the operational function as well as measures to check and to evaluate the present function of an element. The basic components of maintenance are :

- a) inspections according to checklists
- b) periodical servicing and overhaul
- c) repair

Inspections comprise all measures to check and evaluate the operating conditions including spontaneous and scheduled checks according to checklists. Servicing and overhaul comprise all measures to maintain or return a facility or device to its required operating condition. The measures should be carried out according to a plan specifying the time for the service, the nature of the service and the report of compliance. Whenever inspections or servicing discover deficiencies repair measures have to be planned and carried out as soon as practicable.

The maintenance described above has to be carried out for the following groups of airport facilities:

- a) buildings
- b) pavements sections and unpaved areas
- c) nav aids

- d) equipment
- e) vehicles

14.5.2 MAINTENANCE SYSTEM

All airports need a comprehensive and systematic maintenance system or procedures. It is necessary to establish the maintenance system or procedures consisting of the following components at the new airport:

- a) lists of items to be checked per maintenance group
- b) a time schedule for inspections per item or group of items (daily, weekly, monthly, annually)
- c) checklist per item with columns to note the time for inspection, the condition of the item, the nature of remarks and to report acknowledgment.
- d) unit measure (when applicable)
- e) unit price (when available)

A preventive maintenance work can be planned based on the information collected in the checklists, processed with unit measures and unit price. Such a comprehensive plan should be made once a year - and up-dated when necessary - for the purposes of budgeting and planning the preventive maintenance program.

Complexity of the maintenance system may vary from airport to airport depending on size, number of objects to be maintained and on the complexity of the equipment. For different administrators the requirements will vary but generally there is a need of a system providing survey, facilitating budgeting on short and long terms, simplifying work planning and contracting out and to contribution to the limitation of the maintenance costs. Although such work can be done manually, it is preferable to introduce a computerized system for the purpose of simulating budgets, making alternative plans and adopting the level of ambitions to the budget. The system should also allow comparison between the costs for further maintenance and the costs of reinvestment per object. Since the major maintenance works are planned and executed by the ATO headquarters, it is suggested that such a systems be introduced at the ATO headquarters. The airport management should periodically report to the ATO headquarters the data required for the above system.

14.5.3 CONTRACTING OUT

Contracting out is always an alternative for some maintenance work. The benefit of contracting out depends very much on the number of staff available for maintenance work, the education of the staff and availability of the services outside of the airport. However, contracting out can be a means to reduce the

workload peaks and to handle complex maintenance work. It should also be verified for the purpose of reducing maintenance costs.

Some maintenance work, such as major repair of pavements, is normally contracted out even at present. However, the new airport will have a largely increased number of equipment and facilities with a higher degree of complexity. It is, therefore, 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.