CHAPTER 12 ENVIRONMENTAL IMPACT ASSESSMENT

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12.1 GENERAL

The main purposes of environmental impact assessment in a feasibility study are to evaluate the environmental viability of the project and to recommend appropriate environmental mitigation measures for the implementation of the project.

This chapter describes: the existing environmental conditions around the NBIA, forecasts and evaluations of the environmental impacts from the Medium Term Development Plan, and environmental conservation measures and monitoring.

The environmental issues to be assessed in detail have been selected in Section 9.5 "Initial Environmental Examination" and are as follows:

Social Environment

a) Resettlement

b) Cultural Property

c) Water Rights and Rights of Common

d) Waste

Natural Environment

e) Hydrological Situation

f) Fauna and Flora

Pollution

g) Air Pollution

h) Water Pollution

i) Noise

An environmental survey was conducted to obtain basic data to forecast and evaluate the environmental impacts. The terms of reference of the environmental survey are shown in Appendix 12.1.1, and survey items, areas, time, and methods are summarized in Appendix 12.1.2.

12.2 EXISTING ENVIRONMENTAL CONDITIONS

12.2.1 Resettlement

1) Outline of the Communities

The outlines of six communities around the Airport are shown in Table 12.2.1. The total area of the communities is about 4,300 ha with a population of 51,800. The average number of persons per household is 5.3.

Table 12.2.1 Outline of Communities

Community Name	Location	Population Distributed Area	Total area (ha)	Population (person)	households	Persons /Household
Mai Dinh	- East of the existing airport	- Thai Phu, Mai Noi, Noi Phat, Ap Cat, Dong Bai, Dai Tai, Huong Dinh, Dong, Doai	955.0	12,500	2,100	6.0
Quang Tien	- East of the existing airport	- Dong Mia, Bac Ha, Bac Thuong, Dien Xa, Xuan Bach, Dong Lai, Dong Quan, Mai Doai, Thai Phu	650.0	6,246	1,200	5.2
Phu Cuong	- South of the existing airport - Along NR No.2	- North of NR No.2: Tan Trai, Cao Phong, Duong - South of NR No.2: Cau Den, Thuy Huong, Huong Gia	900.0	8,500	1,800	4.7
Phu Minh	- South of the existing airport - Along NR No.2	- Thang Loi, Dong Phong, Xa Doai - Moi, Ma Co (New area at north of NR No.2) - Dong Chi (New area at south of NR No.2)	429.6	6,347	1,350	4.7
Hien Ninh	- North and Northwest of the existing airport	- Nam Cuong, Hien Luong, Yen Ninh, Tan An, Thai Duong	600.0	9,100	-	-
Thanh Xuan	- West of the existing airport	- Along NR No.2: Trung, Na, Thanh Nhan, Chi Nga, Bac Thuong, Kim Anh, Ben Coc, Thach Loi, Dong Gia, Cau Den	731.6	9,100	1,650	5.5
Total			4,266.2	51,793	8,100	5.3

2) Land Use

The existing land use in the survey area is summarized in Table 12.2.2. Around 60% of the land use of the 6 communities is agricultural land.

Table 12.2.2 Existing Condition of Land Use

Community Name	Landed property (%)	Office land (%)	Agricultural land (%)	Garden land, lane (%)	Special land (%)	Others (%)	Total (%)
Mai Dinh	12.4	0	69.9	0	15.7	2.0	100.0
Quang Tien	9.8	5.8	50.4	0	0	34.0	100.0
Phu Cuong	13.7	17.9	46.2	3.6	0	18.6	100.0
Phu Minh	13.4	17.4	68.2	0	0	10.0	100.0
Hien Ninh	-	-	-	-	-	-	-
Thanh Xuan	7.3	0	63.4	0	26.0	3.3	100.0
Av.	11.3	8.2	59.6	0.7	8.3	13.6	100.0

3) Distribution of Graves

There are 17 main cemeteries in the survey area as shown in Table 12.2.3. Three cemeteries, Tan Trai, Cao Phong in Phu Cuong Community and Dong Soc in Phu Minh Community, are located in the proposed development site (see Figure 12.2.1). The compensation per grave for transferring to a new location is estimated to be 150,000 VND for a ground grave, 200,000 VND for a constructed grave, and 2,000,000 VND for a grave containing cremated remains.

Table 12.2.3 Distribution of Main Grave Areas

Community Name	Number of Cemeteries	Content	Area of Cemetery (ha /Cemetery)	Number of Graves (per Cemetery)
Mai Dinh	1	Duong Giam (Mai Doai Village) (Under Construction)	-	-
Quang Tien	7	6 Cemeteries and 1 Monument for the War Dead	0.6	200
Phu Cuong	5	In Tan Trai, Cao Phong, Thuy Huong, Huong Gia Villages	0.4 ~ 0.6	400~500
Phu Minh	3	3 Monuments for the War Dead - Thang Loi - Doai - Dong Soc	 0.5 0.4 0.6	200~250
Hien Ninh	0	-	-	-
Thanh Xuan	1	-	1.5	200
Total	17	-	0.4 ~ 1.5	200~500

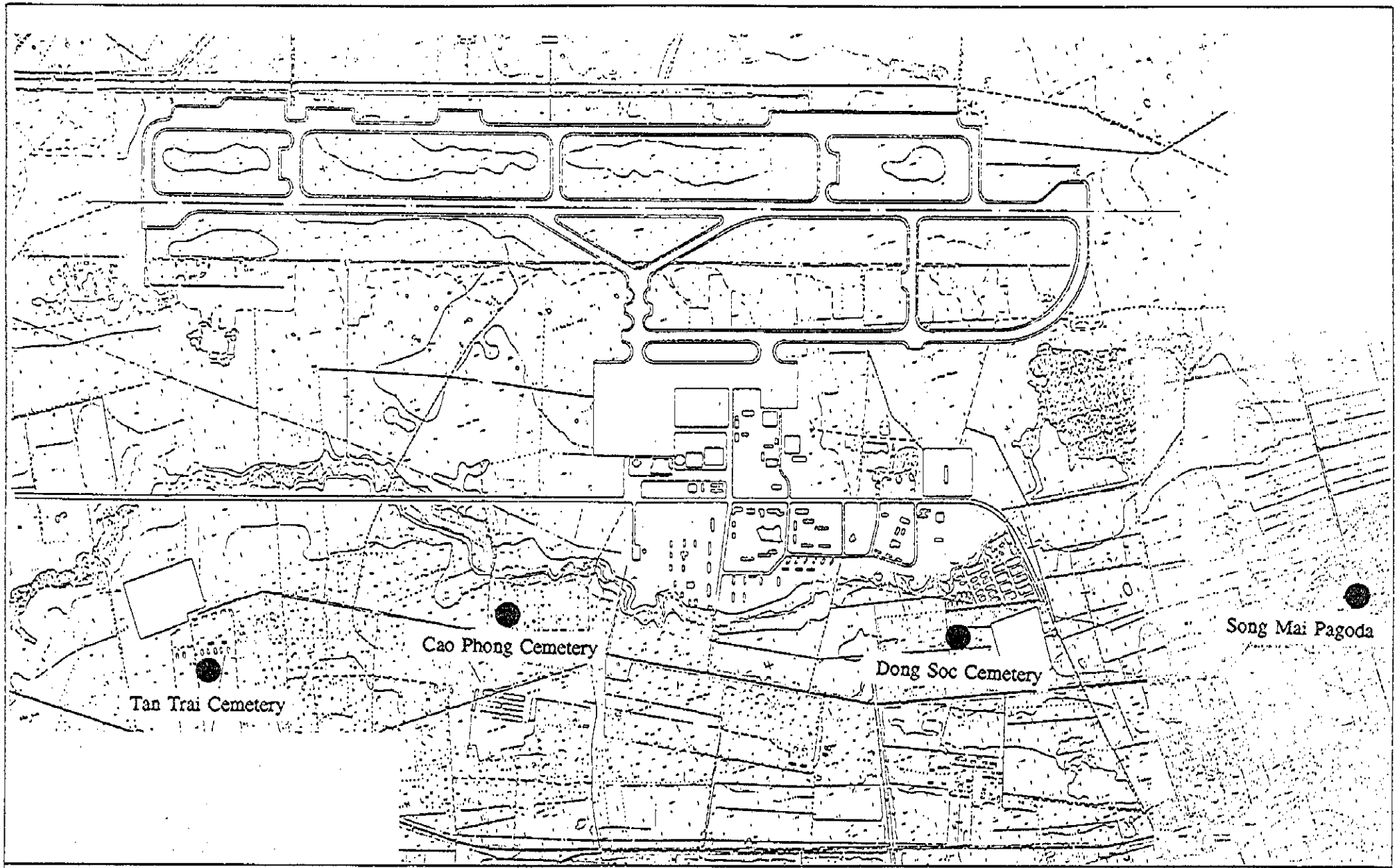

Figure 12.2.1 Location of Main Graves and Pagoda in the Development Site

4) **Interview Results**

Interviews with 221 families in the 6 communities around the Airport were conducted to obtain the data on the existing conditions of families, land ownership, income and the opinions on resettlement. The results are summarized in the following sections.

(1) Family Composition

The average number of persons per family is 5.0, consisting of 1.9 husband/wife, 2.7 children, 0.3 grandfather/grandmother, and 0.1 others.

(2) Ages in the Family Composition

Distribution of ages in the family composition are as follows:

Age	~ 10	10~20	20~30	30~40	40~50	50~60	60 ~	Total
Percentage	18.9%	25.0%	14.1%	18.3%	8.7%	11.8%	8.1%	100.0%

(3) Occupation

The major occupations are agriculture oriented (46.7%) student (31.1%), and pre-school child (10.0%). Other occupations are manufacturing (2.9%), services/sales (2.0%), housewife (0.9%) education oriented (0.5%), professional (0.5%), government (0.4%), retired (0.4%) and others (2.0%).

(4) Land Ownership

The average area of land ownership is around 3,500 sq. m. Agricultural land is 81.4% of the total land area. Land for gardens and houses account for 11.0% and 6.3% respectively. Land for manufacturing and offices/shops are less than 0.2% of the total, and other land accounts for 1.0%.

(5) Income

The average income of a family is VND 11,222,000 per year. About 94% of the income is from agriculture. Incomes from offices/shops and manufacturing account for 4.4% and 0.6%

respectively. Other income accounts for 0.8%. The average income per person is VND 2,244,400 per year. This level is very low in Vietnam.

(6) Compensation

The choice of compensation is shown in Table 12.2.4. Land and houses were selected by the majority of the families. Financial compensation and training were also selected by more than 40% of families. Land for agriculture was selected by around 60%, although around 95% of the current income is from agriculture. It seems that a considerable number of agricultural families wish to change their job and choose training and land for either manufacturing or a shop.

Table 12.2.4 Preferable Compensation

Compensation	%
Financial Compensation	44.9
Land	82.1
for agriculture	(59.9)
for manufacturing	(9.5)
for a shop	(12.7)
for a office	(0.0)
for others	(0.0)
House	62.1
Building	12.6
Building for manufacturing	(6.4)
Building for a shop	(5.7)
Building for a office	(0.5)
Building for others	(0.0)
Training	46.2

(7) Place of Resettlement

The preferable place of resettlement, if it is required, is within the Soc Son District (chosen by 90.4% of families). The second preference is near the Soc Son District (19.4%). Outside of the Soc Son District was selected by only 1.1% of families, and 1.1% of the families answered "anywhere".

12.2.2 Cultural Property

The cultural and historical places certified by the State in the survey area are shown in Table 12.2.5. There are no cultural and historical places certified by the State in the proposed development site. The

nearest cultural and historical place, which is not certified by the State, is Song Mai Pagoda about 1.5 km southeast of the eastern end of the runway (see Figure 12.2.1).

Table 12.2.5 Cultural and Historical Places Certified by the State

Community Name	Description
Mai Dinh	- Mai Noi Pagoda - Hoang Phuong Pagoda
Quang Tien	- Family Worship Places for Local Customs
Phu Cuong	- Huong Gia Temple - Thuy Huong Pagoda
Phu Minh	- Doai Temple - Dong Phong Pagoda
Hien Ninh	- Proposed Cultural and Historical Places in Hien Luong and Thai Duong Villages
Thanh Xuan	- Thanh Nhan Temple located 3 km west of the existing airport - Temple for Emperor Worship at Thach Coc (0.15 ha) reconstructed by 1.5 Billion VND - Many Ancestral Worship Places for Local Customs

12.2.3 Water Rights and Rights of Common

1) Existing Conditions of Water Use

(1) Water Use for Daily Life

Water for bathing, washing, and drinking is mainly taken from shallow wells. There are 7,800 wells in the area (0.97 wells per household) as shown in Table 12.2.6. Water demand for one person is 0.05 cu. m per day, and for the whole population 750,000 cu. m per year. Water of about 50,000 cu. m per year for daily life uses is taken from ponds, lakes, and the Ca Lo River.

Table 12.2.6 The Existing Conditions of Water Use

Village Name	wells	population	persons per well	households	wells per household
Mai Dinh	2,000	12,500	6.3	2,100	0.95
Quang Tien	1,200	6,246	5.2	1,200	1.00
Phu Cuong	1,700	8,500	5.0	1,800	0.94
Phu Minh	1,400	6,347	4.5	1,350	1.04
Phu Lo	1,500	10,000	6.7	1,600	0.94
Total	7,800	43,593	5.6	8,050	0.97

(2) Water Use for Agriculture and Fisheries

About 50% of the survey area is for the cultivation of food and industrial plants. There are two main crops; the winter rice from January to May and the summer rice from June to December. Water demand for these rice crops is;

- Winter rice 3,500 cu. m per ha
- Summer rice 4,000 cu. m per ha

The total quantity of water necessary for the main two crops is 15,000,000 cu. m per year.

Vegetables, beans, peas, peanuts, corn, tobacco, etc. are grown between two rice crops. The area for these crops is 1,200 ha, and about 600,000 cu. m per year of water is required.

Water for fisheries is from swamps, lakes, ponds and rivers in the area;

- Maximum water surface250 ha (in rainy season)
- Minimum water surface 120 ha (in dry season)

(3) Water Use for Industry

There are two industrial enterprises in the Phu Minh Community as follows;

- Kim Anh Processing Tea Enterprise
- Z 175-Mechanical Enterprise

Water for these factories is 50 cu. m per day (20,000 cu. m per year).

(4) Regulation of Water Rights and Rights of Common

There are no local regulations for water resources at present, and all matters related to water resources are under State regulations. The Ministry of Water Resources has been preparing "A Draft Water Law" to submit to Parliament in the near future. This draft law consists of: rules on water management, exploitation, use, conservation and investment for water resources; responsibilities of offices, organizations, and individuals to prevent water caused damage and water pollution; protection of water resources projects; and giving and withdrawing licenses for water use, exploitation and waste water.

2) Existing Conditions of the Fisheries

(1) Existing Conditions of Fishermen

Fishing is not so active in the survey area. There are about 2,000 people (500 households) breeding fish, mainly in Noi Bai and Noi Phat Lakes and some swamps along the Noi Bai Canal. However fishing is not a major source of income, and catching or breeding fish is not their main profession.

(2) Existing Conditions of the Fishery Zone

The main fishery zones around the existing airport are Noi Bai Lake (10 ha), Noi Phat Lake (10 ha), Noi Bai Canal (20 ha) and other ponds (13 ha). Two years ago, the raising of fish in cages started in the river, and now there are about 150 cages (180 households). There are few kinds of fish, and yield is low (total 20 ~ 25 ton/year and 0.4 ~ 0.5 ton/year/ha). The fish are normal types such as *Cyprinus carpio, Cirrhina molitorella, Spinibarbichthys denticulatus, Milopharyrgodon piceus, Ctesopharyrgodon idellus, Hypophthalmichthys molitrix, Megalobrama termiralis,* and *Clarias macrocephalus.*

(3) Regulations of Fisheries

The "Regulations of Protection and Development of Aquatic Products Resource" law was approved on 25 April 1989 by the State. The law consists of rules on: state management of this resource; responsibilities and benefits of offices, organizations and individuals for exploitation; and protection and development of this resource. It is forbidden to damage aquatic products or cause pollution to the living environment.

12.2.4 Waste

1) Waste Water from the Airport

The waste water from the airport activities is collected together with storm water and run through a sewer line, diameter of which is up to 1,000 mm, and then discharged into Noi Bai Lake. Waste water from lavatories is decomposed in septic tanks. The total generated waste

water of the existing airport is estimated as 1,600 cu. m per day.

2) Solid Waste Generation and Collection Methods

Table 12.2.7 summarizes the current solid waste generation and the methods of collection at the Airport. The waste is collected and stored in small vehicles with a capacity of 0.3 cu. m, with no covering.

Table 12.2.7 Waste Generation and Collection Methods at the Existing Airport

Area	Collection Method	Collected Waste	
		m3/day	ton/day
Office buildings, Service areas, Restaurants, Airport Hotel	- 8 vehicles (0.3 m^3 each) - Vehicles are located at various points - Twice per day to final disposal area by truck (10 m^3)	2.1	0.95
Catering Area	- 3 vehicles (0.3 m^3 each) - Vehicles are located at various points - Twice per day to final disposal area by truck (10 m^3)	1.2	0.54
Cargo Buildings	- 1 vehicles (0.3 m^3 each) - Twice per day to final disposal area by truck (10 m^3)	0.2	0.09
Airplane Maintenance Area	- 1 vehicles (0.3 m^3 each) - Twice per day to final disposal area by truck (10 m^3)	0.1	0.45
Airside Complex	- Unloaded from aircraft after taxing then transferred to off-site disposal	2.4	1.08
Other Areas	- Several vehicles (0.3 m^3 each) - Vehicles are located at various points - Twice per day to final disposal area by truck (10 m^3)	1.6~2.0	0.72~0.90
Total		7.6~8.0	3.42~3.60

Note: Specific Gravity of Waste is estimated as 0.45 ton/m^3
Average moisture content of solid waste: 53%
Average ash content: 9.4%

3) Location, Scale and Capacity of Final Disposal Site

There is no solid waste treatment system at the existing airport. Most of the existing airport waste is discharged to the landfill, 2 km south east of the airport terminal area. During transportation of the waste from the airport to the point of disposal, excess water may spill from the garbage collection vehicles on to the road and verges and so contamination may occur. There are several small ponds in the disposal site. There is no proper control or management for solid waste disposal in this field and pollution of streams through leakage from the rubbish tip occurs in this area. Seepage through the soil may contaminate underground water.

4) Habitation and Propagation of Small Mammals and Insects

The vehicles at the airport transport waste without any covers. Storage is uncontrolled at the landfill site which causes vermin and birds to accumulate. These places also attract flies which results in a health and safety risk.

5) Regulation and Legislation Frame Work on Solid Waste Management

The "Law on Environmental Protection" stipulates "The choice of sites for collecting, dumping and treating refuse or pollutants and their transportation must comply with regulations by the State Management Agency for environmental protection and by the local authorities concerned. Waste water, refuse containing toxic substances, non-degradable wastes, must be properly treated before discharge. The State Management Agency for environmental protection shall stipulate a schedule of waste water and refuse mentioned in this article and supervise their treatment process before discharge" (Article 26).

12.2.5 Hydrological Situation

The survey area is located in the middle part of the Ca Lo River, which has a catchment area of 15 sq. km. The area is a low-hilly plain with a density of streams of 0.7 km per sq. km. The annual current module is about 23.8 liter/sec km^2. In this area, there is the Noi Bai Canal to the southeast and south of the Airport and the Dong Muc Canal to the north and northwest of the Airport. Both canals flow into the Ca Lo River. The volume of water flow in the rivers and streams varies by season; about 70% of the total water flows during the rainy season (four months from June to September), and 30% in the dry season (eight months from October to May). The total flow volume of the Ca Lo River is 0.66 cu. km per year, and the annual average flow volume is 21 cu. m per sec.

There are many lakes, swamps, and ponds in the area. About 5% of the airport's surrounding area, which is mainly distributed along rivers and streams, is always flooded. These flood areas increase to about 10% of the total area in the rainy season. The biggest ones are Noi Bai Lake, Ngoi Bac Lake, and Noi Phat Lake. The volume of water stored in the ponds, lakes, and swamps is about 50,000 cu. m.

12.2.6 Fauna and Flora

1) Flora

In the survey area, 145 species of flora, as shown in Table 12.2.8, exist at present.

Table 12.2.8 Counted Species of Flora

Order	Families	Genera	Species
Dicotyledoneae	45	95	118
Monocotyledoneae	8	19	22
Pteridophyta	3	3	3
Gymnospermae	2	2	2
Total	58	119	145

Major Families are:

Dicotyledoneae: Apiaceae, Asteraceae, Brassicaceae, Cucurbitaceae, Rutaceae, Myrtaceae, Moraceae, Euphorbiaceae, Solanaceae, Papilionioideae, Lamiaceae,

Monocotyledoneae: Poaceae

Most of 145 the species are useful for medicine and food for people and animals as given in the book "1900 used plant species in Vietnam". Among them there are longan, litchi, squanosa, and zapota with a high economic value (1).

There are no primary forests in the survey area. The main type is vegetation of the agricultural ecosystem. These are secondary vegetation types growing naturally or forestations grown by people: in the farming area; in the northern hills of the existing airport; around the Dong Quan, Noi Bai, Noi Phat Lakes; along irrigation canals such as the Noi Bai Canal; and on the banks of Ca Lo River.

As the land is mainly used for agriculture, the existing condition of flora is not good.

2) Fauna

(1) Location of Fauna and the Ecological Condition of Animals

According to the studies of Prof. Dang Van Huynh and Cao Van Sung for the whole of the Soc Son District, there were 18 species of wild animals, 60 species of Aves, and 20 species of Reptilias in the past, but only 45 species of non-aquatic animals, as shown in Table 12.2.9,

exist at present. This is because of the development of the agricultural ecosystem, industries, roads, the airport, and others.

Table 12.2.9 Counted Species of Fauna

Item	Order	Family	Species
Mammalia	2	3	7
Aves	7	14	22
Repitilia	1	5	11
Amphibia	1	3	5
Total	11	25	45

Note: 11 kinds of fishes and some kinds of benthos.

Except for wild animals, there are some species of domestic animals which are mainly kept in the villages to the south of the airport. Their composition and numbers in the whole survey area are shown in Table 12.2.10.

Table 12.2.10 Composition and Number of Domestic Animals

Item	Number
Buffalo and Oxen	6,000
Pig	11,100
Chicken	12,000
Duck	4,000

(2) Endangered and Rare Species as Listed in the Vietnamese Red Data Book

In the survey area, there are seven threatened or endangered species of animal as listed in the Vietnamese Red Data Book.

Table 12.2.11 Endangered and Rare Species

Species	Criteria
Viverra zibetha	Threatened species
Vivericuba indica	Threatened species
Lutra lutra	Endangered species
Ptyas korros	Endangered species
Ptyas mucosus	Threatened species
Naja naja	Endangered species
Zamenis mucosus	Endangered species

12.2.7 Air Quality

The air quality was measured at eight locations for one week (24 hrs per day). The survey points are shown in Figure 12.2.2, and the results of the survey are shown in Appendix 12.2.1.

1) Suspended Particle Matter (SPM)

At the points for background air quality, A3 and A7, the average concentration of SPM per 24 hours is around 0.1 mg/m^3, lower than the permissible value of 0.2 mg/m^3. At other points, the average concentrations of SPM per 24 hours are 0.29 ~ 0.46 mg/m^3, higher than the permissible value.

2) Carbon Monoxide (CO)

The average CO concentrations at all points per 24 hours are 0.38 ~ 0.94 mg/m^3, lower than the permissible value of 5 mg/m^3. Any difference between the concentration at points for background air quality and the concentration at other points cannot be clearly noted.

3) Sulfur Monoxide (SO2)

The average SO2 concentrations at all points per 24 hours are 0.035 ~ 0.050 mg/m^3, lower than the permissible value of 0.1 mg/m^3. Any difference between the concentration at points for background air quality and the concentration at other points cannot be clearly noted.

4) Nitrogen Dioxide (NO2)

The average NO2 concentrations at all points per 24 hours are 0.008 ~ 0.023 mg/m^3, lower than the permissible value 0.1 mg/m^3. Any difference between the concentration at points for background air quality and the concentration at other points cannot be clearly noted.

5) Ozone (O3)

O3 concentrations are not found at any survey points.

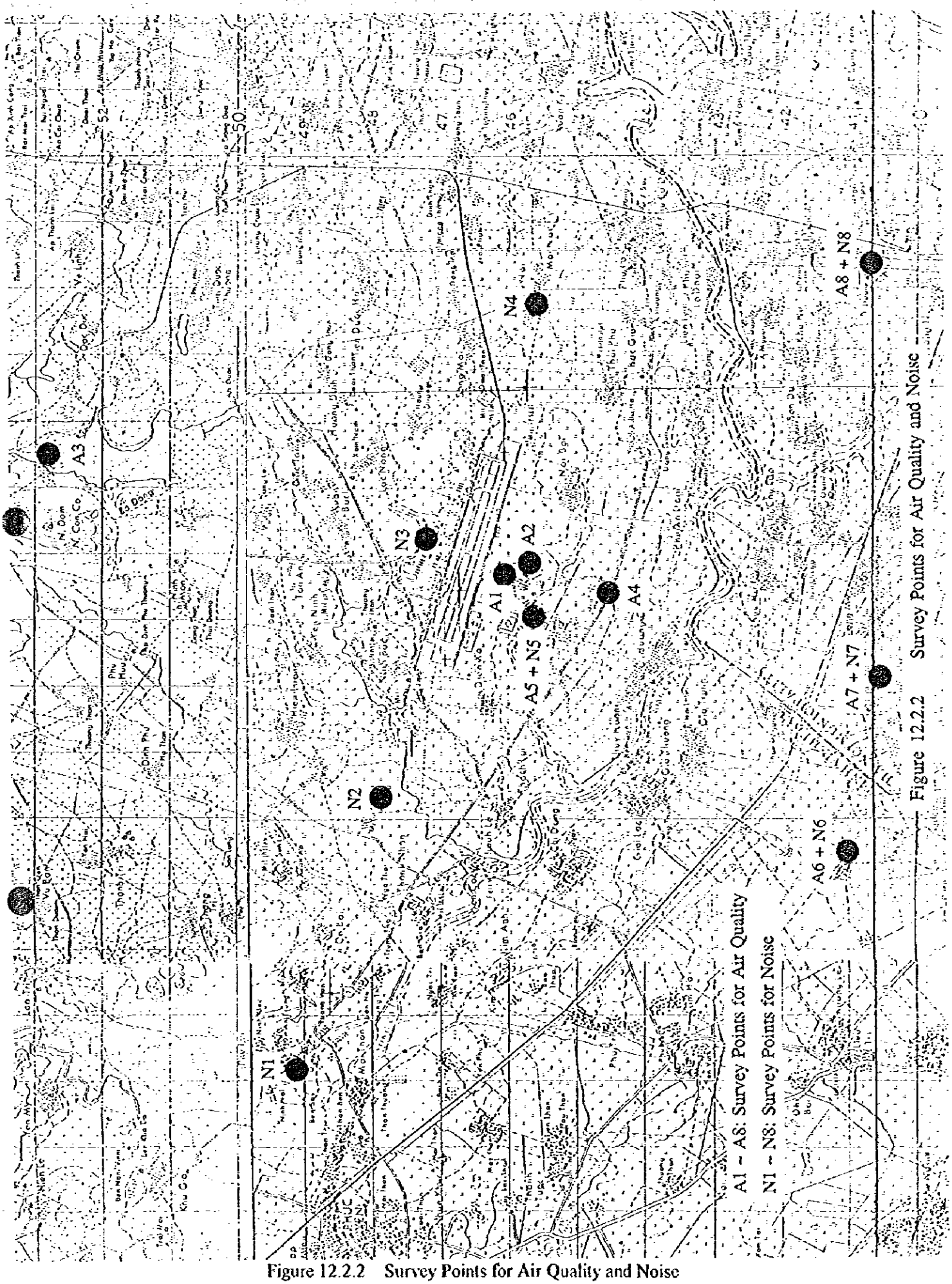

Figure 12.2.2 Survey Points for Air Quality and Noise

12.2.8 Water Quality

Water quality was measured twice at 16 locations (six locations for waste water, six locations for surface water, and four locations for groundwater) representing the dry season and the rainy season. The survey points are shown in Figure 12.2.3, and the results of the survey are shown in Appendix 12.2.2.

1) Waste Water

The concentration of SS exceeded the standard (maximum limit of waste water constituents discharging into water sources) at all survey points. The concentration of total coliforms at S2 and S3 in both the dry and rainy seasons and at S4 and S5 in the dry season exceeded the standard. The value of pH and the concentrations of COD and BOD at all points were low and within the standards.

2) Surface Water

The concentration of SS at all survey points except for H1 in the rainy season exceeded the standard (surface water quality flowing into water plants before treatment). The concentration of total coliforms at H3 exceeded the standard in the rainy season.

Most canals and ponds have a huge capacity for self-purification. At points H1, H4, H5 and H6, BOD concentrations were low (from 4.4 mg/l to 8.6 mg/l). Others (H2 and H3) have a low self-purification capacity, and the concentration of BOD exceeded the permitted value. In general, the quality of surface water resources in the survey area meets the required standards for fishery and irrigation purposes.

The results of the values of pH (except for H2 in the dry season) and conductivity at all points were within the standard.

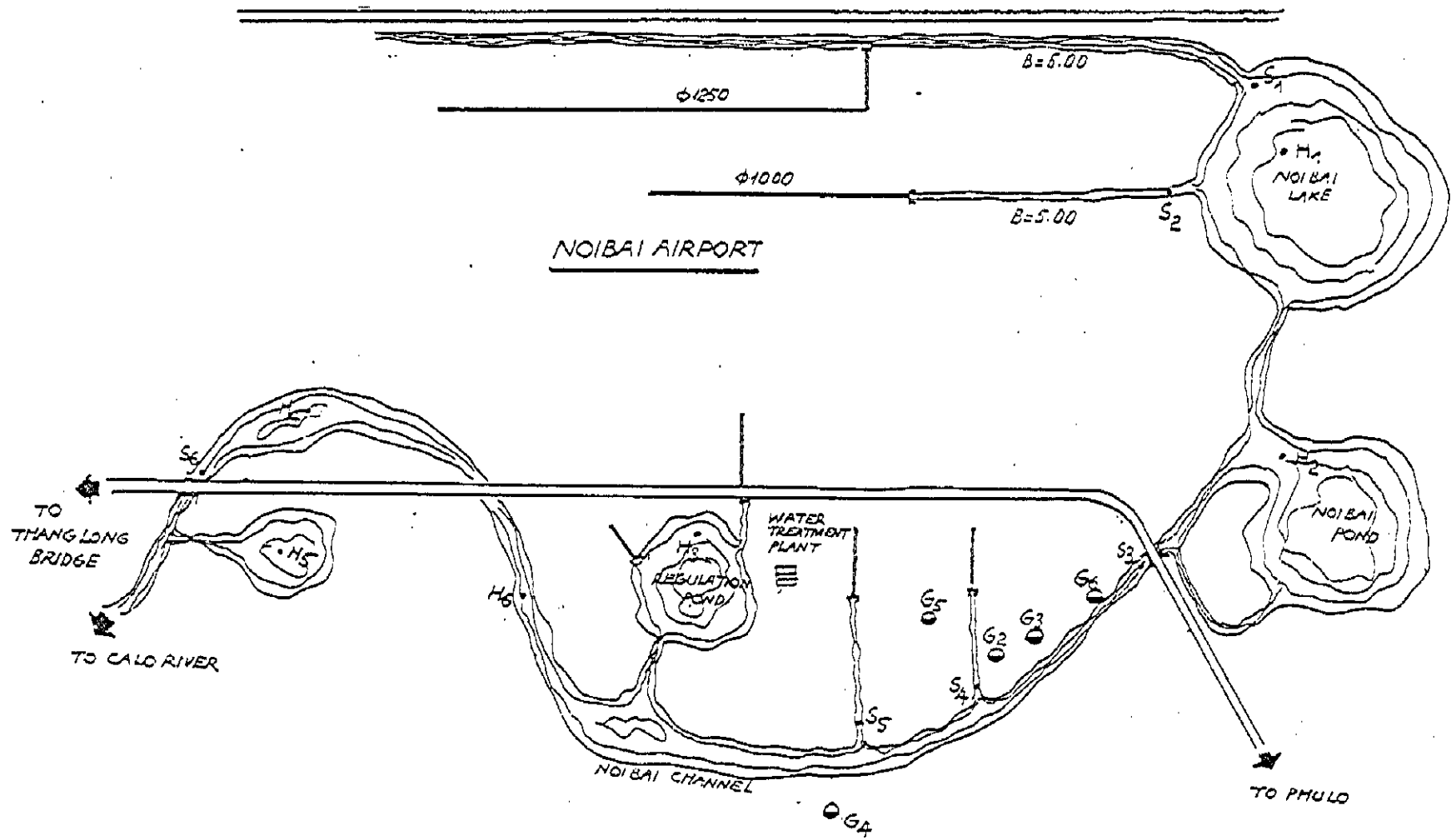

Figure 12.2.3 Survey Points for Water Quality

S1 ~ S6: Survey Points for Waste Water

H1 ~ H6: Survey Points for Surface Water

G1 ~ G6: Survey Points for Groundwater

3) Ground water

The results of the concentration of SS at all survey points except for G2 and G5 in the dry season, and the concentration of total coliforms at all points exceeded the standard (ground water quality for water supply). The results of the values of pH at all points met the standard.

12.2.9 Noise

Noise was measured at eight locations (four locations for aircraft noise, three locations for vehicle noise, and one location for background noise) during one week (24 hrs per day). The survey points are shown in Figure 12.2.2, and the results of the survey are summarized in Table 12.2.12. Table 12.2.13 shows the noise standard in Vietnam.

Table 12.2.12 Survey Result of Noise Level

Survey Point	Average Noise Level (dB(A))				Remarks
	Day Time	Night Time	Landing Time	Taking-off Time	
N1	53 ~ 56	48 ~ 50	67 ~ 71 (72 ~ 80 (TU 134))	-	aircraft noise
N2	54 ~ 58	48 ~ 50	78 ~ 89	-	aircraft noise
N3	52 ~ 54	40 ~ 42	65 ~ 70 (78 ~ 82 (TU 134))	70 ~ 80 (90 ~ 93 (TU 134))	aircraft noise
N4	50 ~ 53	43 ~ 48	-	80 ~ 90 (95 ~ 102 (TU 134))	aircraft noise
N5	65 ~ 70	43 ~ 48	-	80 ~ 85	Average vehicle traffic was 2,268 per day
N6	70 ~ 75	48 ~ 50	-	-	Average vehicle traffic was 3,553 per day
N7	50 ~ 55	45 ~ 50	-	-	background noise
N8	70 ~ 75	60 ~ 64	-	-	Average vehicle traffic was 3,250 per day

Table 12.2.13 Noise Standard

Areas	6 a.m. to 6 p.m.	6 p.m. to 10 p.m.	10 p.m. to 6 a.m.
Category I	55	50	45
Category II	65	60	50
Category III	70	65	55
Category IV	75	70	60
Category V	80	75	65

Note: Category I: Areas that need quietness such as hospitals, kindergartens, schools, libraries, research institutes.
Category II: Residential areas, hotels, offices
Category III: Business areas, surrounding areas 15 meters from the main traffic roads, markets, stations and bus stop.
Category IV: Handicraft and light industry manufacturing area
Category V: Heavy industry manufacturing area case noise (background noise) in the area when the vehicle does not operate, higher than the standard mentioned in the table above, the vehicle should not make the noise increase more than 5 dB(A) from the original noise level.

1) Background Noise

The background noise level around the existing airport is estimated at around 50 dB(A) from the results at survey point N7. This value is typical for background noise. The background noise level in the survey area meets the noise standard of Category I.

2) Aircraft Noise

The noise levels at the points N2 and N4 (4.5 km from the center of the runway) at landing and taking off were noted at around 80 ~ 90 dB(A). The noise level at point N1 (10 km from the center of the runway) at landing was around 70 dB(A), 10 ~ 20 dB(A) less than that at N2. The noise level at the point N3 (500 m north of the runway) at landing and taking off was noted at around 70 dB(A), 10 ~ 20 dB(A) less than that at N2 and N4. This indicates that the aircraft noise at points under the flight path is higher than at other points. The noise levels of a TU 134 landing and taking-off were 10 ~ 20 dB(A) higher than that of other aircraft.

During the night time, there were no aircraft activities.

Figure 12.2.4 shows estimated WECPNL noise contours for the current operations. As it is assumed that about 96% of aircraft use Runway 11 for take-off and landing, noise levels are higher in the eastern area than the western area. The contour line of WECPNL 70 extends to around 8 km from the runway end.

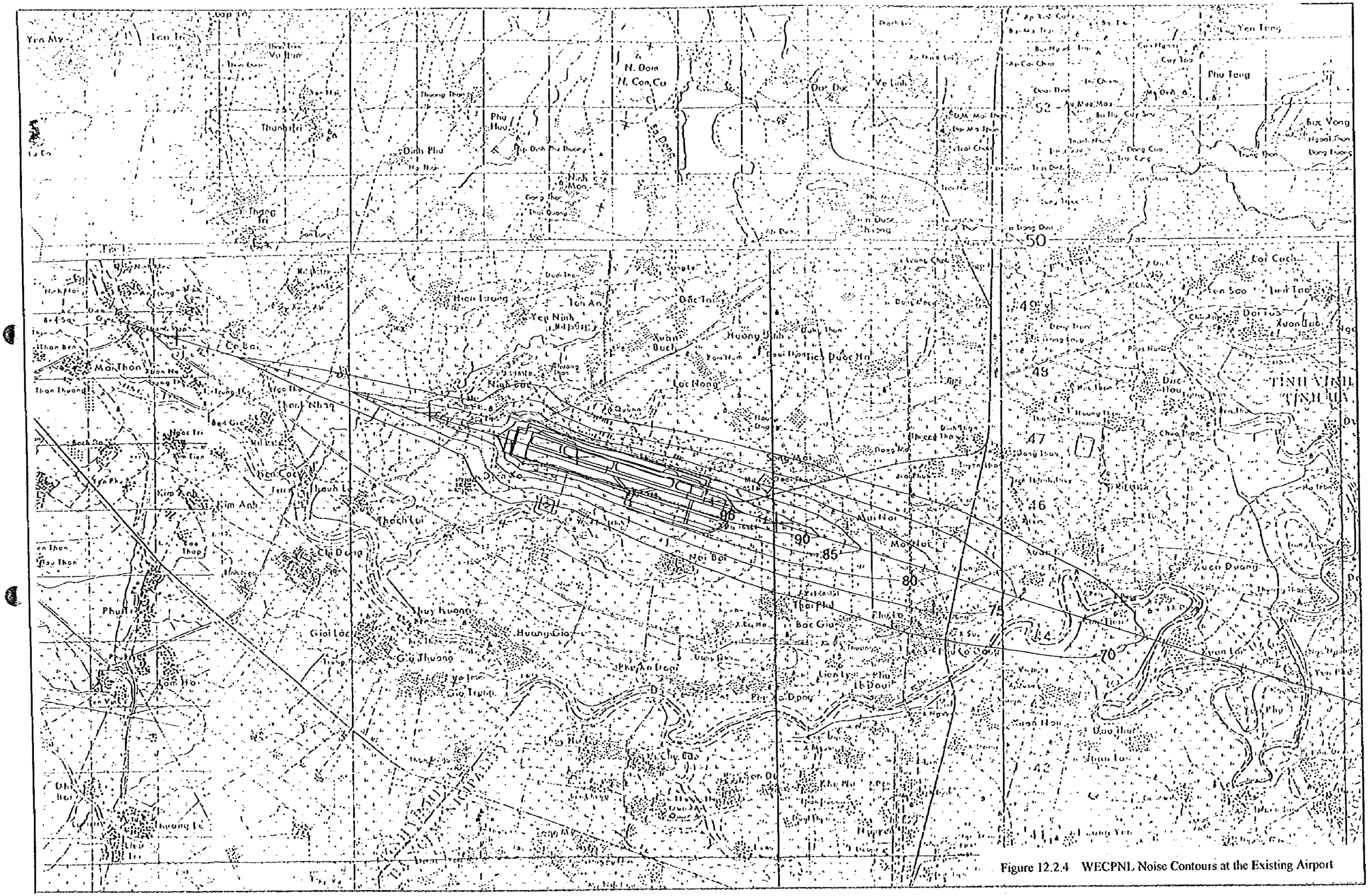

Figure 12.2.4 WECPNL Noise Contours at the Existing Airport

The surrounding area of the existing airport is outside of the categories given in Table 12.2.13. For reference, Table 12.2.14 shows the "Environmental Standard on Aircraft Noise" in Japan.

Table 12.2.14 Japanese Environmental Standard on Aircraft Noise

Area Category	Standard Noise Level (WECPNL)
I	less than 70
II	less than 75

Note: I: Areas used mainly for residence
II: Areas not used mainly for residence but needed to protect normal daily life

There are few residential areas, except the area along the Expressway (see Figure 12.2.4), and therefore it seems that the problem of aircraft noise is not significant at present.

3) Noise from Vehicles

The noise levels of vehicles along the Expressway and National Road No.3 were generally higher than those in front of the airport terminal area. The noise levels along the roads in day time are not so high. It is, however, relatively high given the traffic volume. The reasons for the relatively high noise levels of vehicles may be because of the high ratio of motorbikes, mechanical problems of cars, and/or excessive use of the horn by drivers.

The value at night time is almost the same as the background noise, except for the survey point N8 along the National Road No. 3, on which about 500 vehicles were counted during the period of 21:00-06:00.

The noise from vehicles on the Expressway and NR No.3 meets the level of Category IV or V. Therefore, it seems that the existing conditions of noise in the survey area are not so bad at present.

12.3 FORECAST AND EVALUATION

12.3.1 Resettlement

A land acquisition of about 310 ha and resettlement of about 1,000 households will be required for the Medium Term Development. These people will loose their familiar living environment and the following were major concerns about the resettlement.

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.

The CAAV's Master Plan designated Noi Bai Town as a potential resettlement site. The Noi Bai Town is a new town in the Soc Son District Master Plan and will be developed in the area a few kilometers north of the NBIA. Development of Industrial Estate and tourism/recreational facilities have been planned in the areas to the south and to the north of the new town respectively.

As the proposed resettlement site is only a few kilometers from the development site, social and cultural conditions of the new town will not be so different from their original residences, except for general trend of urbanization and modernization in and around Hanoi City. Therefore, social and cultural inadaptability to the new settlement site is considered to be not so significant, except for elderly people who may be less adaptable to the new environment.

As there are no original residents in the new town, conflict between the original residents and those resettled will not occur.

Therefore, adequate compensation is the key issue for the successful resettlement program. The compensation shall be made for the items including but not limited to the following:

a) land;
b) house;
c) crops;
d) other damaged properties;
c) direct cost of relocation; and
d) inconvenience due to the relocation.

It is considered difficult to reclaim new agriculture land in the Soc Son District. In order to provide alternative agriculture land for those who need to resettle, it would, therefore, be necessary to find farmers who wish to sell their land use rights and change their job. Fortunately, the interview survey shows only about 60% of family wanted land for agriculture. This percentage will further reduce, if attractive opportunities of other jobs are given to those who need to resettle. There will be a lot of new job opportunities related to the industrial estate and tourism developments. In addition, the airport development will also create new job opportunities. These job opportunities should be made available to those who need to resettle with the highest priority. Job training and guidance should also be provided.

Sufficient infrastructures, such as roads, water and power supply systems, schools, hospitals, and community centers, should be provided in the resettlement site to improve or at least maintain living standards.

In order to provide sufficient compensation at appropriate time, it is recommended to establish a detailed resettlement program, which includes: methods of public hearing; planning of resettlement sites; rules of compensation, provision of job opportunities and training; implementation time schedule; budgeting, etc., as soon as possible.

If an appropriate detailed resettlement program is established and implemented, deterioration of living standards after resettlement will not occur.

12.3.2 Cultural Property

There are no cultural properties in the proposed development site, and therefore no loss or damage is foreseen.

12.3.3 Water Rights and Rights of Common

The major concerns are an obstruction of fishing rights and water rights due to huge land occupation by the new airport facilities and to water pollution.

As described in Section 12.2.3, fisheries in the development site are not so active. The water demand in the airport surroundings will decrease owing to a change of land use from agriculture to airport use. In the Medium Term Development, the diversion of the irrigation channel has been planned, and a new

storm water drainage system has been designed so as to maintain the reservoir function of the Noi Bai Canal. The waste water from the new facilities will be discharged into the Noi Bai Canal after treatment to the permissible quality. Therefore, the changes in the volume and quality of water are considered to be minimal.

If appropriate compensation is made, then the impact on water rights and rights of common will not become a environmental problem.

12.3.4 Waste

1) Construction Stage

The generation of debris and construction waste is the major concern during the Construction Stage. It will be the contractor's responsibility to control and dispose of the debris and construction waste properly. Monitoring and control of the contractor is required to minimize the environmental problems due to waste.

2) Operation Stage

As described in Section 12.2.4 there is no proper solid waste treatment system in the NBIA at present. It is, therefore, required to improve the waste collection and disposal system separately from the airport development project. As the provision of an incinerator has been planned in the Medium Term Development, the Project will have a positive impact on the waste.

With regard to the waste water, an adequate sewerage system has been planned for the new facilities. It is, therefore, considered that the environmental impact from waste will be minimal.

12.3.5 Hydrological Situation

The changes in groundwater and surface water regimes were the major concerns about this issue. Although the new airport facilities require about 310 ha, around 60% of the area will remain as unpaved ground where infiltration of rain water is possible. It is, therefore, considered that the changes in groundwater and surface water regimes will not be so significant.

12.3.6 Flora and Fauna

The removal of vegetation and the extinction of species due to the removal of vegetation, change of topography, and an obstruction to breeding caused by the generation of noise and vibration are the major concerns during the Construction Stage. An obstruction to breeding and the extinction of species caused by the operation of aircraft and facilities is the major concern at the Operation Stage.

As described in section 12.2.6, the existing conditions of flora and fauna in this area are poor at present. There are few natural forests and vegetation covering this area except for farm land. There are few wild animals, because of the lack of vegetation. Even if there are threatened or endangered species in and around the development site, they will be able to move to other places. Therefore, the impact on fauna and flora is considered insignificant.

There are few forests in this area, and few large birds. Therefore, the problem of bird hazards to aircraft will not be a big problem.

12.3.7 Air Pollution

The generation of exhaust gas by construction equipment at the Construction Stage, and the generation of exhaust gas by the operation of aircraft, vehicles and facilities at the Operating Stage are the major concerns.

1) Construction Stage

Construction materials will be transported by dump trucks and other vehicles, using the roads around the existing airport and temporary construction roads. As described in Section 12.2.7, the existing conditions of air quality, except for SPM, is good. Therefore, if adequate management of dust in the site and transportation routes is implemented, there will be no problems with air quality.

2) Operating Stage

The existing conditions of air quality, except for SPM, is good and the difference between the background air quality and air quality beside the roads, aircraft and airport facilities is not substantial. It seems that the air quality in this area is not affected by exhaust gases from

various activities in and around the Airport. It is felt, from experiences at other airports, that additional exhaust gas from the aircraft and airport facilities will not cause considerable air pollution. Air pollution by vehicles will lower the air quality in the future. It is very much dependent on the volume of non-airport related traffic and the maintenance of vehicles. Therefore, it is recommended that the air quality along the airport access road be monitored, so that appropriate actions can be taken by the road authority. It is also recommended that positive land use control legislation be implemented so as to minimize public pollution at and around the NBIA.

12.3.8 Water Pollution

The generation of muddy water due to the earthworks at the Construction Stage, and the generation of waste water from the airport facilities at the Operating Stage are the major concerns.

1) Construction Stage

Muddy water will be generated from the earthworks, especially during heavy rains. In order to minimize the increase of SS in the water bodies, appropriate measures, such as construction planning to reduce the area of bare ground during the rainy season, and the provision of temporary sedimentation ponds, should be taken by the contractor. It is recommended that the water quality during the construction is monitored, so that the client can instruct the contractor to take the necessary action.

2) Operating Stage

Due to the development of the Airport, the volume of waste water will increase. However, as mentioned earlier, an adequate sewerage system has been planned for the new airport facilities, and the effluent will be treated to the permissible level before discharging into the water source. It is, therefore, considered that water pollution at the Operating Stage will be insignificant.

12.3.9. Noise Pollution

The generation of noise by construction equipment at the Construction Stage, and the generation of noise by the operation of vehicles and aircraft at the Operating Stage are the major concerns.

1) **Construction Stage**

(1) Noise from Transportation Vehicles

Construction materials will be transported by vehicles such as dump trucks using the roads around the existing airport or temporary construction roads. Noise from these vehicles was forecasted as follows:

a) Forecast Formula:

$L50 = Lw - 8 - 20 \log l + 10 \log (\pi l / d \tanh 2 \pi l / d)$ ---------- (Formula 1)

where, L50: Medium value of noise by vehicles (dB(A))

Lw: Average power level of a vehicle (dB(A))

$Lw = 87 + 0.2 V 10 \log (a1 + 8 \times a2)$ (dB(A))

where, V: Average speed (km/hour)

a1: Small vehicle ratio

a2: Large vehicle ratio

l: Distance from sound source to point *l* (m)

d: Average interval between vehicles (m)

$d = 1{,}000 V/N$

where, N: Traffic volume (number/hour)

b) Forecast Point:

The survey point A6 on the Noi Bai - Thang Long Expressway, which has the largest traffic volume among the survey points, was observed.

c) Forecast Year:

The year 2000.

d) Forecast Condition:

Average speed (V): 50 km/hr (existing condition)

Distance from sound source to point (*l*):

Case 1: 6.5 m from the center of lane

Case 2: 16.5 m from the center of lane

Case 3 : 26.5 m from the center of lane

Traffic volume (N): 2,000 per hour

(Current traffic volume at peak hour is about 600; assume 3 times the existing traffic volume in the year 2000; assume 200 large vehicles per hour for the transportation of construction materials)

Small vehicle ratio (a1): 0.81

Large vehicle ratio (a2): 0.19

e) Calculation Results:

$Lw = 87 + 0.2 \times 50 \times 10 \log (0.81 + 8 \times 0.19) = 100.7$ (dB(A))

Case 1: $L50 = 100.7 - 8 - 20 \log 6.5 + 10 \log (\pi 6.5 / (1{,}000 \times 50/2{,}000) \times \tanh 2 \pi 6.5 / (1{,}000 \times 50/2{,}000))$

$= 75.2$ (dB(A))

Case 2: $L50 = 100.7 - 8 - 20 \log 16.5 + 10 \log (\pi 16.5 / (1{,}000 \times 50/2{,}000) \times \tanh 2 \pi 16.5 / (1{,}000 \times 50/2{,}000))$

$= 71.5$ (dB(A))

Case 3: $L50 = 100.7 - 8 - 20 \log 26.5 + 10 \log (\pi 26.5 / (1{,}000 \times 50/2{,}000) \times \tanh 2 \pi 26.5 / (1{,}000 \times 50/2{,}000))$

$= 69.4$ (dB(A))

The forecast value at the edge of the road (Case 1) is 75.2 dB(A), which is within the noise standard Category IV. The values at 10 and 20 m from the edge of the road (Cases 2 and 3) are 71.5 and 69.4 dB(A) respectively. The value at 20 m is within the category III standard. Therefore, noise pollution by the transportation vehicles is considered to be at acceptable levels.

(2) Noise from Construction Equipment

Construction equipment such as bulldozers, which will be used mainly for earthworks in the proposed site, will generate noise. Noise from construction equipment was forecasted as follows:

a) Forecast Formula:

$L = PWL - 20 \log l - 8$

where, L: Noise level at point l from sound source (dB(A))

PWL: Power level of sound source (dB(A))

l: Distance from sound source to point l (m)

$$L(SY) = 10 \log (10^{L1/10} + 10^{L2/10} + ------ + 10^{Ln/10})$$

where, L(SY): Synthetic noise level

L1, L2, - - - , Ln: L of No.1, No.2, - - -, No.n

b) Forecast Condition:

Power level of sound source (PWL): 115 dB(A)

Distance from sound source to point (*l*):

Case 1: 10 m

Case 2: 20 m

Case 3: 30 m

L1, L2, - - - , Ln: L of No.1, No.2, - - -, No. n: 3 machines

c) Calculation Results:

Case 1: $L = 110 - 20 \log 10 - 8 = 87.0$

$$L(SY) = 10 \log (10^{87/10} + 10^{87/10} + 10^{87/10}) = 91.8 \text{ (dB(A))}$$

Case 2: $L = 110 - 20 \log 20 - 8 = 81.0$

$$L(SY) = 10 \log (10^{81/10} + 10^{81/10} + 10^{81/10}) = 85.7 \text{ (dB(A))}$$

Case 3: $L = 110 - 20 \log 30 - 8 = 77.5$

$$L(SY) = 10 \log (10^{77.5/10} + 10^{77.5/10} + 10^{77.5/10}) = 82.3 \text{ (dB(A))}$$

The forecast values at 10, 20 and 30 m from the equipment are 91.8, 85.7, 82.3 dB(A), respectively. As no standards for noise from construction equipment are available in Vietnam, reference was made to the Japanese standard for noise from construction machines at the border of a construction site, that is 85 dB(A). The forecast values of the points 10 and 20 m from the construction equipment are higher than this reference value, and the value at 30 m from the equipment is lower than the reference value. Therefore, if the following are prohibited during the construction, the noise from the construction equipment will not become a big problem.

a) night works

b) more than 10 hours of operation per day

c) concentration of machines at the same place near the border of the site

d) working on Sundays and holidays

2) Operating Stage

(1) Generation of Noise by the Operation of Vehicles

Noise by airport access vehicles was forecasted as follows:

a) Forecast Formula:

The Formula 1 was applied.

b) Forecast Point:

The survey point A6 on the Noi Bai - Thang Long Expressway.

c) Forecast Year:

The year 2010.

d) Forecast Condition:

Average speed (V): 50 km/hr (existing condition)

Distance from sound source to point (*l*):

Case 1: 6.5 m from the center of lane

Case 2: 16.5 m from the center of lane

Case 3 : 26.5 m from the center of lane

Traffic volume (N): 4,000 per hour

(Assume 2 times the traffic volume in the year 2000 used in the forecast of noise at the Construction Stage)

Small vehicle ratio (a1): 0.95

Large vehicle ratio (a2): 0.05

e) Calculation Results:

$Lw = 87 + 0.2 \times 50 \times 10 \log (0.95 + 8 \times 0.05) = 98.3$ (dB(A))

Case 1: $L50 = 98.3 - 8 - 20 \log 6.5 + 10 \log (\pi 6.5/ (1{,}000 \times 50/4{,}000) \times \tanh 2 \pi 6.5/ (1{,}000 \times 50/4{,}000))$

$= 76.2$ (dB(A))

Case 2: $L50 = 98.3 - 8 - 20 \log 16.5 + 10 \log (\pi 16.5/ (1{,}000 \times 50/4{,}000) \times \tanh 2 \pi 16.5/ (1{,}000 \times 50/4{,}000))$

$= 72.1$ (dB(A))

Case 3: $L50 = 98.3 - 8 - 20 \log 26.5 + 10 \log (\pi 26.5 / (1{,}000 \times 50/4{,}000) \times \tanh 2\pi 26.5 / (1{,}000 \times 50/4{,}000))$

$= 70.1$ (dB(A))

The forecast value at the edge of the road (Case 1) is 76.2 dB(A), which is within the noise standard Category V. The forecast value at 20 m from the road edge is within the noise standard Category III. Therefore, noise pollution by the airport access vehicles is considered to be an acceptable level.

The noise level will very much depend on the volume of non-airport related traffic and maintenance of vehicles. Therefore, it is recommended that the noise along the airport access road be monitored, so that appropriate action can be taken by the road authority. It is also recommended that positive land use control legislation be implemented, so as to minimize the pollution at and around the NBIA.

(2) Generation of Noise by Operation of Aircraft

Aircraft noise in the year 2010 was forecasted by the Weighted Equivalent Continuous Perceived Noise Level (WECPNL). The WECPNL is defined by the following equation:

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

where, $\underline{dB(A)}$: Average power of noise level of all aircraft

$$N = N2 + 3\,N3 + 10\,(N1 + N4)$$

where, N1: Number of aircraft at 00:00~07:00

N2: Number of aircraft at 07:00~19:00

N3: Number of aircraft at 19:00~22:00

N4: Number of aircraft at 22:00~24:00

Key assumptions used in the forecast are as follows:

a) Runway 11L/29R will be used by domestic and military flights.

b) Runway 11R/29L will be used by international flights.

c) Runways 11L and 11R will be used about 96% of the time.

d) Number of aircraft movements will be as for the medium case forecast.

Figure 12.3.1 indicates the aircraft noise contours in the vicinity of the NBIA in the year 2010. The total area within the WECPNL 70 contour line is around 4,730 ha (excluding the airport property). The area within the WECPNL 75 contour line is around 2,380 ha. These are about twice as large as at present. The impact of aircraft noise is, therefore, considered significant, especially under the flight paths of the new runway.

In order to minimize the aircraft noise problems, implementation of positive land use control legislation will be required in the vicinity of the NBIA. It is recommended to use the following criteria in establishing a detailed land use plan.

Zone 1 (WECPNL 90 and over) : No new development permitted except for agriculture.
Zone 2 (WECPNL 75 to 90) : New development restricted to agriculture, industry and outdoor recreation only.
Zone 3 (WECPNL 70 to 75) : No new development of residential areas permitted.
Zone 4 (WECPNL 70 and less) : No restriction due to the aircraft noise pollution.

The following compensation should be made when and where the land use is restricted.

Zone 1: Compensation for relocation
Zone 2: Subsidies for sound proofing works of residences, commercial and other buildings, schools, hospitals, and community centers.
Zone 3: Subsidies for sound proofing works of schools, hospitals, and community centers.

If an appropriate land use control and sufficient compensation are made, aircraft noise pollution will not become a big problem.

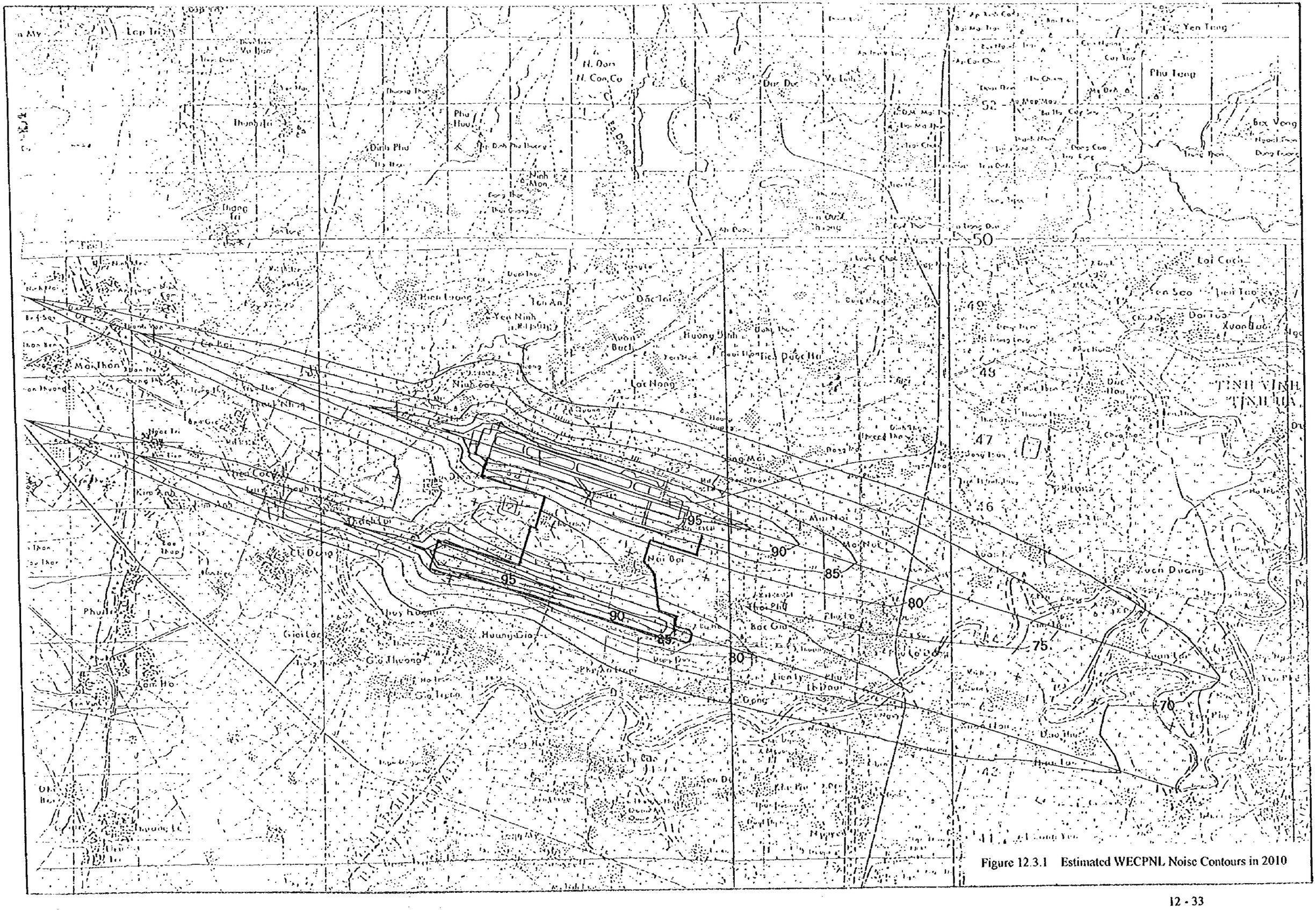

Figure 12.3.1 Estimated WECPNL Noise Contours in 2010

12.4 ENVIRONMENTAL CONSERVATION MEASURES AND MONITORING

12.4.1 Environmental Conservation Measures

In order to implement the Medium Term Development with minimum adverse impact to the environment, the following environmental conservation measures are recommended.

1) Before the Project (As Soon As Possible)

a) Improvement of the solid waste disposal system including methods of storing, transportation and final disposal.

b) Establishment of environmental standards for aircraft noise and rules of compensation.

2) Preparation Stage (After the Decision of Project Implementation)

a) Establishment of a detailed resettlement program including the method of public hearing; planning of the resettlement site, job opportunities and training; budgeting for compensation; implementation time schedule; etc.

b) Establishment of a land use plan around the development site.

c) Establishment of a traffic control and a land use plan along the airport access roads with close coordination with the road authority.

d) Attention to the environmental issues during the detailed design and tender documentation.

e) Implementation of a survey of underground cultural properties.

3) Construction Stage

a) Checking of the contractor's construction plan from the environmental viewpoint.

b) Monitoring of the proper implementation of environmental mitigation measures by the contractor.

c) Periodic measurement of water quality at the construction site, and noise level along the airport access roads used for material transportation.

3) Operation Stage

a) Periodic measurement of aircraft noise around the NBIA.

b) Periodic measurement of noise levels along the airport access road.

c) Management of aircraft operations including introduction of low-noise aircraft, and maintaining the flights on standard courses.

12.4.2 Monitoring System

As mentioned in the previous section, various kinds monitoring are required in the various stages of the Project. Environmental monitoring should be conducted by an independent organization. It is recommended that the NBIA Environmental Committee be established for monitoring. The committee may consist of members from the Ministry of Science, Technology and Environment, Ministry of Construction, Hanoi People's Committee, and CAAV. Actual measurements may be contracted out to a consultant. The committee should advise the project's executing agency on the environmental issues to be considered.

CHAPTER 13 PLANNING OF MANAGEMENT, OPERATIONS AND TRAINING

CHAPTER 13 PLANNING OF MANAGEMENT, OPERATIONS AND TRAINING

13.1 GENERAL

An airport is a transportation terminal which provides linkages with surface modes of transportation and with the Air Navigation System (ANS). An airport can also be considered as an integrated system with its **primary products being Groundside, Airside and Terminal Airspace Capacity.**

Groundside Capacity is for passengers and freight. It is produced and safeguarded by providing services for passengers prior to embarkation and after disembarkation, and for freight prior to loading and after unloading. Airside Capacity is for aircraft. It is produced and safeguarded by providing services for aircraft between departing from the terminal stand and take-off, or from landing to arrival at the terminal stand. Terminal Airspace Capacity is also for aircraft. It is produced to enable the safe and efficient movement of arriving and departing aircraft between the airport and the air route system.

Secondary products of the airport system are those commercial services which, while distinct from capacity production, nevertheless represent an important source of revenue and funding source for capacity production. Typical hardware components required for producing commercial services are retail outlets in terminals, hotels and industrial parks located on land owned by the airport operating authority.

Facilities and equipment such as runways, terminals, air traffic control towers and rescue and firefighting equipment are examples of the **hardware** components needed to produce and safeguard capacity. The **software** components necessary for producing both capacity and commercial services comprise personnel, organizational structures, contracts and operating plans and procedures.

The total airport system functions best when both the the hardware and software components are designed and established in a complementary fashion. Most of the Phased Development Plan for the Noi Bai International Airport (NBIA) addresses hardware needs. This chapter addresses much of the software needs and, in keeping with the the practices used at the best of modern airports throughout the world, these will be discussed and specified in terms of the most efficient and effective production of capacity and commercial services.

13.2 ORGANIZATION

13.2.1 Commentary on Current Organization

Organization is necessary to make the most efficient and effective use of all available resources to achieve the desired outputs. An organization, therefore, is not an end in itself but a means to an end and should always be considered in this context. Major organizational issues at the NBIA need to be reviewed in turn as a prerequisite to developing an appropriate organizational structure.

1) Span of Control

The current organization of the Northern Airports Region (NAR) appears in Figure 3.8.1. It can be seen that the Director General (DG) of the NAR has a very wide span of control with a total of 14 subordinate managers reporting to him, 10 departmental chiefs at NBIA and the managers of each of 4 domestic airports.

Span of control is the term used in management practice to describe the number of managers and other subordinates a senior manager reporting has directly to him or her. It is important because, if the span of control is too wide, this can indicate that there is insufficient delegation of authority to subordinate staff. This can result in the senior manager being excessively overburdened by having to deal with a wide range of relatively minor matters, at the expense of being able to focus on matters of immediate high significance and important strategic issues.

Typically, the director of an international airport of the size of the NBIA would have a span of control of 5 or less, or half of that at the NBIA before even the domestic airport managers are considered.

2) Roles of Departments

(1) Line and Staff Functions

The organization of any large entity comprises components for performing line and staff functions. A line function is one involved directly in the production of the main outputs of the entity; in the case of an airport these outputs are capacity and commercial services. A staff function is one which primarily facilitates the activities of those departments responsible for line functions. Common staff functions are financial management, human resource management (recruitment, training, labour relations etc.), planning, administration, informatics and legal services. The distinction between line and staff functions is not always clear cut. For example,

planning can be considered either as a line or staff function depending on the context in which it occurs.

At the NBIA, the departments with line functions (i.e.responsible for producing and safeguarding capacity and for producing commercial services) appear in Table 13.2.1.

Table 13.2.1 Departments with Line Functions

	Groundside Capacity	Airside Capacity	Terminal Airspace Capacity	Commercial Services
Airport Management	x	x		x
Airport Directory	x	x		
Security Services	x	x		
Emergency Services		x		
Air Navigation Services			x	
Construction	x	x		x
NAR Secretariat	x	x		x

This table serves to illustrate the fragmentation of responsibility at the NBIA for the primary line function of capacity production. Five separate departments are responsible for producing groundside capacity. Six separate departments are responsible for producing airside capacity. Only terminal airspace capacity production is unified under the ANS department.

The departments responsible for staff functions are Finance, Labour and Planning. The NAR Secretariat also mainly performs staff functions as follows:

a) Administration;
b) Legal Services;
c) Cultural and Sports Centre Management;
d) Health Centre Management;
e) Vehicle Fleet Management;
f) Nursery School Management; and
g) Registry Functions.

A small number of the NAR Secretariat's staff, however, also manage foreign investment activities which contribute to producing both capacity and commercial services.

The level of commercial services' production is currently very low and is shared between three departments.

(2) Operational and Engineering Activities

Many of the actvitities which take place at airports can also be categorized as either operational or engineering in nature.

As the name implies, Operational activities are those which operate facilities and equipment. They also frequently involve direct contact with users.

The responsibility for airport operations is currently shared between the Airport Directory, Emergency Services, Security Services and Air Navigation Services Departments, each reporting separately to the DG/NAR. The Airport Directory is responsible for both groundside and airside operations, including liaison with Vietnam Airlines which conducts all ground handling functions and, the border control agencies, i.e. Customs, Immigration and Public Health services.

Engineering activities involve the design, procurement, construction and installation of facilities and equipment and their subsequent maintenance throughout their operational life.

The responsibility for maintaining the facilities and equipment dedicated to the NBIA is divided between the Airport Management Department and the Air Navigation Services Department but the division is not always rational. The Airport Management Department is responsible for maintaining all electrical systems except for runway lighting which is the reponsibility of the ANS Department. The ANS Department is responsible for maintaining all electronic equipment except for terminal video systems for which the Airport Management Department is responsible. This situation is further confused by the fact that all of the electronic equipment dedicated to the Approach and Area Control Centre (AACC) is maintained by a separate organization which comes under the control of the National Air Navigation Department. Finally, despite its engineering role, the Construction Department has no maintenance responsibilities.

One problem with the organizational fragmentation of engineering services is that the groups responsible for designing, procuring, constructing and installing facilities and equipment often do not pay sufficient attention to the associated maintenance needs over the operational life, particularly in terms of personnel, procedures, training, the provision of spare parts, and repair and overhaul programes. All facilities and equipment have a generic life cycle which is illustrated in Figure 13.2.1. Too often maintenance needs are not addressed until the facility or equipment is near to commissioning. This usually results in either maintenance being neglected, leading to

reduced performance and a shortened operational life, or in expensive measures to hurriedly establish an effective maintenance progam. It is necessary to start to address maintenance issues during the Project Definition Phase and progressively develop the maintenance program throughout the subsequent phases so that a viable and cost-effective programme is in place at the time of commissioning. One way to help achieve this is to make a single group responsible for all engineering activities throughout the facility or equipment life cycle, rather than have one group responsible for design, procurement, construction and installation, and a separate group responsible for maintenance.

(3) Commercial Services

As previously mentioned, the level of commercial services' production as the NBIA is low with only 14% of the revenues being derived from non-aeronautical activities. One reason is that a number of activities which produce non-aeronautical revenues, such as ground transportation and hotel services, do not come under the authority of the NAR. Another reason is that the organization and the level of expertise currently available does not support revenue generating actvities such as marketing and sales. Many of the most efficient airports throughout the world now generate well over 50% of their revenues from non-aeronautical services, providing funds for improving services to users, improved pay and benefits to employees, and higher profits for the airport owners. Particular attention needs to be paid to increasing the NBIA's non-aeronautical revenues.

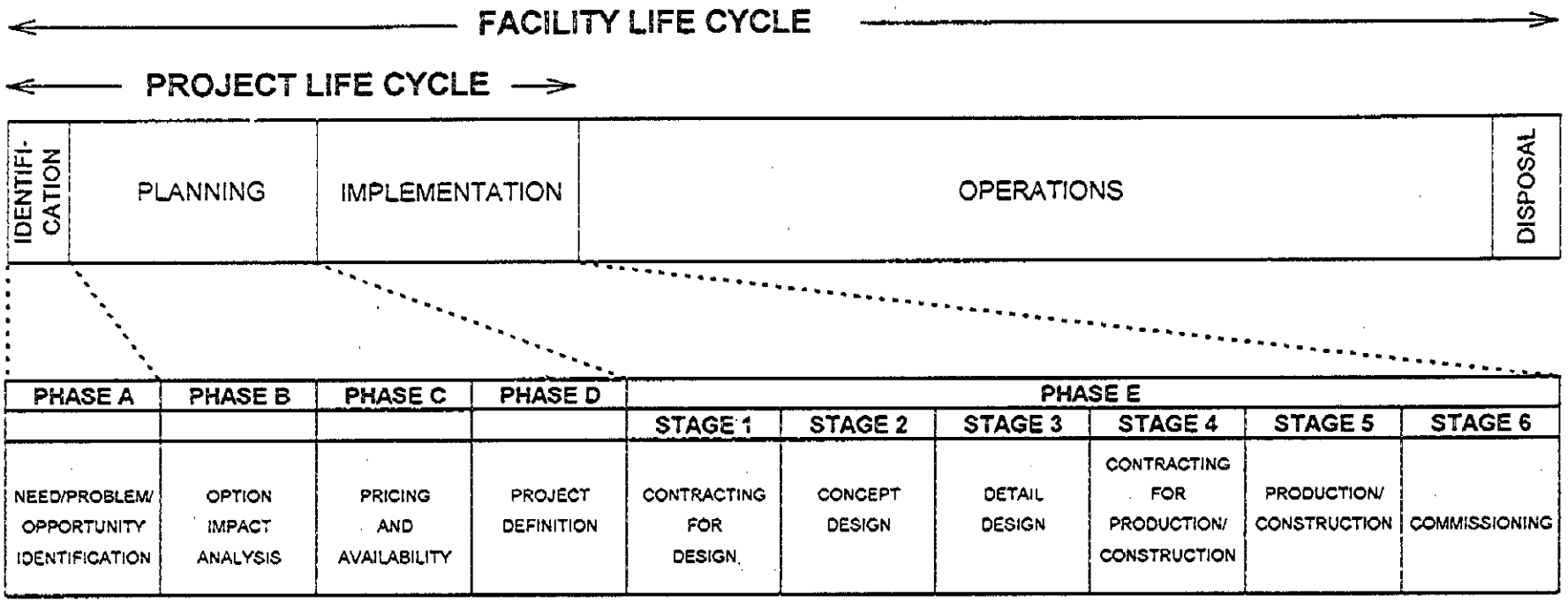

Figure 13.2.1 Facility Life Cycle Management

13.2.2 Organizational Development

The primary objective of organizational design is optimizing the effective and efficient production of capacity and commercial services. From the foregoing discussions it can be realized that this can be achieved by designing an organization for the NBIA which will meet the following sub-objectives:

a) group and consolidate functions which produce similar services;
b) reduce the DG/NAR's span of control;
c) adopt the concept of unified responsibility for facility engineering life cycle management; and
d) enhance revenue generation from commercial services.

The proposed organization for the NAR (and therefore for the NBIA) appears in Figure 13.2.2. It can be seen that this reduces the number of NBIA managers reporting directly to the DG/NAR from 10 to 4. The functions of each of these consolidated departments will be described briefly in turn.

1) Airport Operations

This department would be responsible for all operational functions related to the production of groundside, airside and terminal airspace capacity at the NBIA. It would be managed by a director and would comprise the following 4 sections, each headed by a chief:

a) **Surface Operations** responsible for groundside and airside capacity operations;
b) **Air Navigation Services** responsible for Terminal Air Traffic Services, Flight Information Services, and Preflight Briefing and Meteorological Services;
c) **Emergency Services** responsible for all Rescue and Firefighting Services; and
d) **Security Services** responsible for all groundside and airside security operations.

2) Commercial Services

This department would be responsible for all activities related to bringing new aeronautical and non-aeronautical businesses to the NBIA and other NAR airports. Such business would be in the form of more:

a) scheduled carrier services;
b) non-scheduled carrier services;
c) general aviation activity; and
d) non-aeronautical businesses to produce concession income.

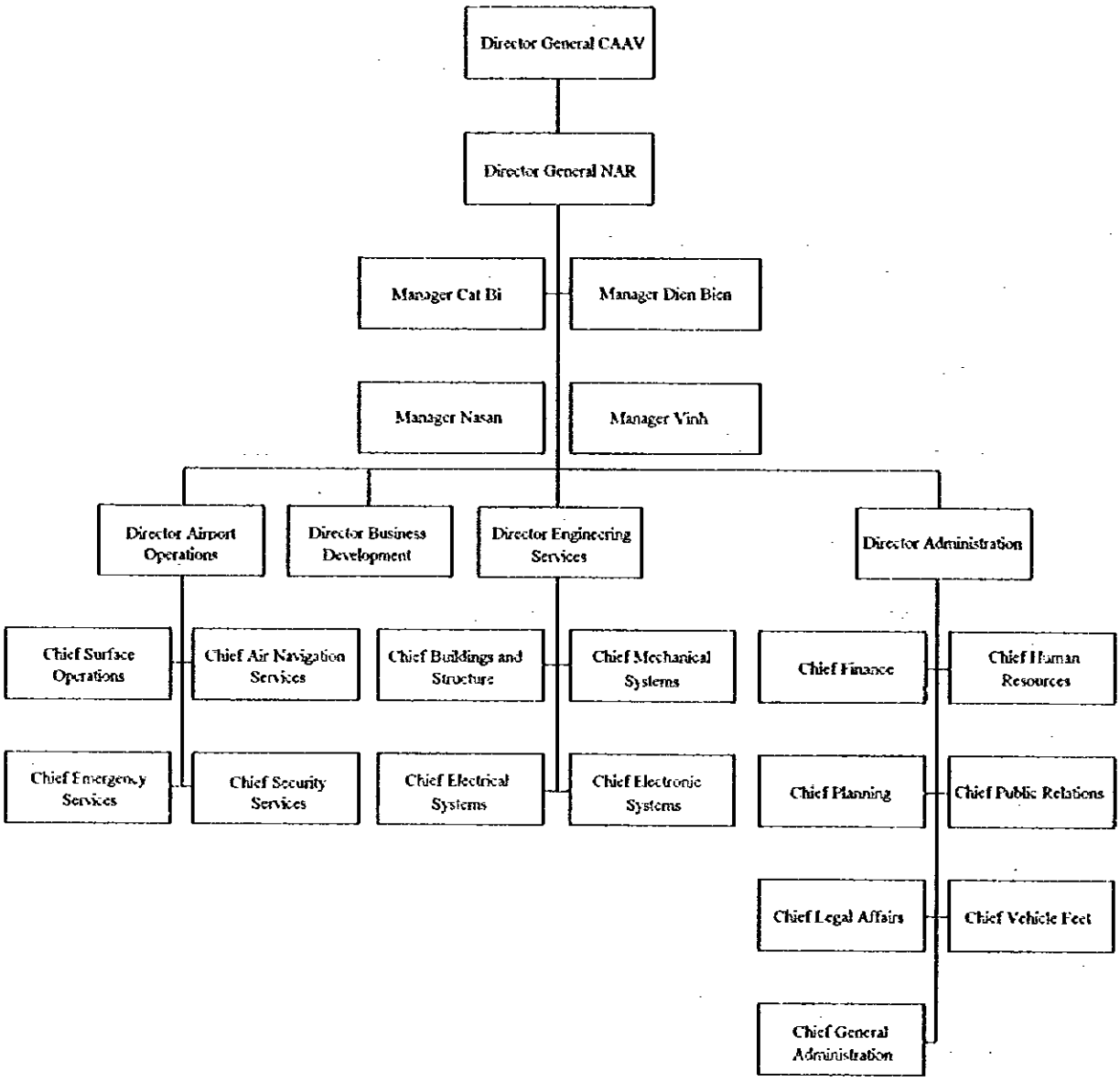

Figure 13.2.2 Proposed Organization for the Northern Airport Region

It would also be responsible monitoring and managing the agreements with companies providing commercial services to ensure that product quality and customer satisfaction are maintained and revenues are maximized.

It would be a small department initially with staff trained and experienced in marketing, sales and contract negotiations but, because of the potential benefits it could bring to the NAR, it should be managed by a director reporting directly to the DG/NAR. It could grow further in relation to its success in bringing new business to the NAR.

3) **Engineering Services**

This department would be responsible for all engineering activities related to the life cycle management of all facilities and equipment regardless of whether these are used for producing capacity or commercial services or both. It would be managed by a director and comprise the following 4 sections, each headed by a chief:

a) **Buildings and Structures** responsible for the the design, construction and maintenance of all buildings, pavements and other structures, including water and sewerage systems;

b) **Mechanical Systems** responsible for the specification, procurement, installation and maintenance of all fixed and mobile mechnical equipment, including internal combustion engines and turbines for electrical power generation, RFF and all other vehicles;

c) **Electrical Systems** responsible for the specification, procurement, installation and maintenance of all electrical generation and distribution equipment, together with electrically powered systems such as airfield and runway lighting, baggage conveyors and elevators; and

d) **Electronic Systems** responsible for the specification, procurement, installation and maintenance of all electronic systems including any associated software for computer based systems. This includes not only Communication, Navaid and Radar Systems used to provide ANS, but also electronic equipment used in airport terminals, such as video display systems and telephone systems.

Traditionally, ANS organizations at airports have had been and, in most locations, continue to be responsible for maintaining their own equipment. There are many reasons for this: first, these organizations were once the sole users of almost all of the electronic equipment at airports when

vacuum tube technology was in widespread use; and second, completely separate organizations were and often still are responsible for providing ANS at airports. With the development of microelectronic technology over the last 30 years, however, electronic systems now have many applications other than for the Communications, Navaid and Radar equipment used for ANS. In some countries, such as the United Kingdom and Vietnam, the airport owners are also reponsible for the Terminal ANS. For both reasons, a good case can be made to make the Engineering Services Department responsible for all electronic systems, including those used for ANS.

Many large and complex systems used at airports, such as electrical generation and distribution and large air conditioning systems, integrate electrical, mechanical, electronic and even structural sub-systems. By having all the engineering expertise resident in one department, those resources can be allocated flexibly to provide services as needed.

4) Administration

This department would be responsible for the provision of all staff services and for any other functions, such as public relations, which do not logically fall within the scope of the responsibilities of the other 3 departments. It would be managed by a director and would comprise the following 6 sections, each headed by a chief:

a) Finance;
b) Human Resources;
c) Planning;
d) Public Relations;
e) Legal;
f) Vehicle Fleet; and
g) General Administrative and Secretariat Services.

13.2.3 Organizing for Production and Intra-organizational Communications

It needs to be emphasized that the proposed organizational structure which appears in figure 13.2.2 is intended to represent responsibilities for producing services and for the efficient and effective management of the all of the resources of production. It does not represent production processes nor does it represent a rigid depiction for all communications between the various organizational components of the NAR and NBIA.

Figure 13.2.3 integrates the various major organizational components into the basic production and financial management structure for the NBIA. It can be seen that the Airport Operations, Commercial Services and Engineering Services organizations fulfill the line functions necessary for direct creation

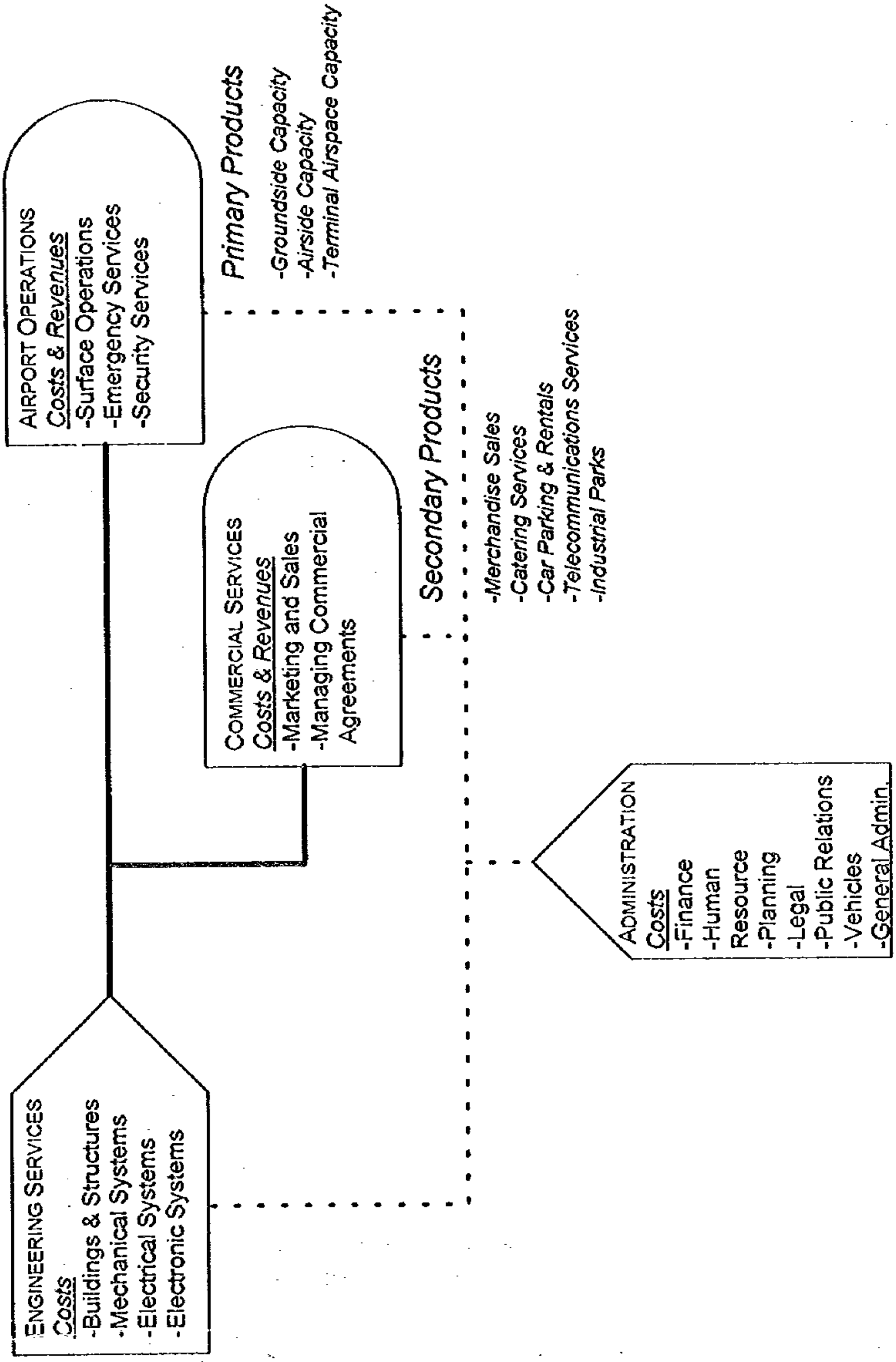

Figure 13.2.3 Airport Production and Financial Management Structure

of the Primary and Secondary products. It can also be clearly seen that the Engineering Services organizations are part of the production structure for both Primary and Secondary products. The Administration organizations facilitate the production functions of these line organizations. The detailed design of production processes and, therefore, the direction and coordination of the activities involved will require the continuous cooperative efforts of all of the directors and their subordinate managers. This can best be achieved by an adopting policies which encourage open communications between directors and managers at all levels, regardless of formal organizational structures. This can be enhanced by putting in place efficient and effective management information systems which will be addressed in **Section 13..3 Financial Management.**

13.2.4 Contracting Out

In each of the brief descriptions provided above on the proposed departments the term "responsible for" has been used to mean that the services may be provided by NBIA staff members or under contract, whichever is the most cost-effective option. It should be noted that many of the most efficient and profitable airports throughout the world now contract out many functions and services. The concerned departmental director and section chief should be primarily responsible for determining which services under their responsibility should be contracted out and, in this regard, should be responsible for the both the contracting process and subsequent contract management. The Finance Section, within the Administration Department should be responsible for ensuring that any contracting action complies with existing financial and other relevant regulations.

13.3 FINANCIAL MANAGEMENT

13.3.1 Need for Financial Management

There is a now a well established international trend for airports to operate as business enterprises rather than as bureaucratic governmental organizations. Operating in a commercial environment means producing goods or services in response to users needs, at a prices the users are willing to pay and which will: cover all production costs, provide funds for future development and pay dividends to shareholders. To be effective, an organizational structure must have a compatible financial management system so that managers responsible for certain functions can easily monitor and control associated expenses and revenues. A sound financial management system will also provide an important means of performance assessment thereby encouraging improvements in efficiency and effectiveness.

As clearly indicated in Section 3.9 of this report, the current financial management system for the NAR does not adequately meet these needs. These deficiencies are well known to many NAR officials. The

Planning and Investment Department at the NBIA is already formulating plans to introduce an improved financial management system. This section of the report is intended to provide guidance in this regard from a managerial perspective, recognizing that the actual establishment of such a system will require considerable professional accounting expertise.

13.3.2 Outline of Financial Management Concepts

The financial management system will need to have two components: one for financial accounting; and another for managerial accounting.

1) Financial Accounting

Financial accounting is historical accounting in that it provides a means of tracking revenues and expenditures, and of using this information to provide consolidated profiles of the total financial status of the business in the form of statements which detail assets, liabilities and equity, and profits and losses. Important indicators can be derived from these statements such as: return on assets employed, share price/earnings ratios and debt/equity ratios. These and other indicators provide a means for owners to set performance targets for the business and to assess performance against those targets.

2) Management Accounting

Management accounting is accounting for decision-making. It involves planning, programming and budgeting of both expenditures and revenues over various periods for the whole business enterprise, and major constituent components of the enterprise. Actual expenditures and revenues are than regularly assessed against budgeted amounts so that variances can be identified and corrective managerial action taken as appropriate.

A management accounting system requires the establishment of a hierarchy of Responsibility Centres, each of which specifies the expenditures and or revenues associated with defined activities for which a particular manager is responsible. For example, the NAR would be represented by one major responsibility centre for the DG/NAR. This would be disaggregated into subordinate responsibility centres, such as one for each domestic airport and one for each of the four departmental directors at the NBIA. For the larger domestic airports or departments, it may be appropriate to further disaggregate into subordinate responsibility centres at the section level. Once established, each responsibility centre manager would have a budget which is compatible with his/her organizational responsibilities. Each manager would be expected to manage the activities necessary to fulfill those responsibilities over the budget period (usually one

year), together with the associated expenditures and revenues. Each manager would also be responsible for completing periodic performance reports showing expenditure and revenue variances and any corrective actions taken or intended. These would be submitted to his/her superior who is also the next manager up in the responsibility centre hierarchy; therefore, performance reports are rolled up to produce a single report for the whole NAR.

A management accounting system also provides a useful means for capturing and presenting expenditure and revenue data in formats which facilitate analysis for improving performance and for planning purposes.

Figure 13.2.3 shows the basic proposed financial management structure of the NBIA. The responsibility centres established for the Directors of Airport Operations and Commercial Services would have both cost and revenue components because these organizations are where the primary and secondary products are finalized, distributed and sold to customers. The revenues thereby generated, however, will be used to fund all production costs, including those incurred by the Engineering Services and Administration organizations. From this figure, it can be seen that all organizational components are directly engaged in cost control. Both the Engineering Services and Administration organizations also have a real, if apparently less direct, role in revenue generation because their efficiency and effectiveness will contribute to determining the levels of quantity and quality of the final products. These in turn will affect the revenue generating capability of the airport.

13.4 GREATER AUTONOMY FOR THE NBIA

13.4.1 Rationale for Greater Autonomy

An improved organizational structure and a compatible financial management system will yield few benefits unless the NAR and, therefore, the NBIA operate with greater freedom from current governmental constraints. More autonomy is required with respect to: developing capacity production, exploiting new sources of business to enhance both aeronautical and non-aeronautical revenues, setting price levels and managing human resources.

No manager of any business can operate in complete freedom, regardless of whether the business is privately or governmentally owned. It must first be managed in accordance within governmental regulatory frameworks covering such areas as operational safety; environmental protection, employee safety and welfare; and financial accounting practices. If the business operates as a full or partial monopoly it may also be subject to some form of economic regulation. Secondly, it must be managed to

meet the corporate goals and in accordance with the corporate policies and strategies set by the Board of Directors who represent the owners. If the regulatory and corporate frameworks are excessively constraining these tend to inhibit efficiency and effectiveness, and become otherwise counterproductive. This is presently the case for the NAR, particularly regarding economic and financial issues, and where the Government of Vietnam (GOV) is both the owner and the regulator.

13.4.2 Provisions for Greater Autonomy

Any plan to give greater autonomy to the NAR should ideally include the following provisions:

a) all aeronautical charges should be established based on the economic costs of producing the relevant services and should be uniformly applied to all users;

b) rental charges should be based on the economic costs of providing and maintaining the relevant space or facility and should be uniformly applied to all users;

c) allow the NAR Management to enter into contracts with all current and future concessionaires at the NBIA, and negotiate concession fees based on market rates;

d) allow the NAR Management progressively greater freedom to identify and attract new businesses to the NBIA to increase both aeronautical and non-aeronautical revenues;

e) allow the NAR Management greater freedom to access the commercial debt markets to fund airport development activities;

f) allow the NAR Management to set the salary and benefit levels of NBIA staff;

g) allow the NAR Management to determine whether to provide services using NAR staff or by contracting out;

h) allow the NAR Management to set staffing levels for the various activities conducted at the NBIA; and

j) allow the NAR to retain all revenues other than what is required to pay taxes, with any surpluses to be used in the following order of priority: reducing aeronautical charges and/or improving services, performance pay for staff, and dividend payments to the government.

Adoption of provisions a) and b) above will eliminate the current inefficient practice of cross subsidizing travel by government officials, and the services and facilities provided to Vietnam Airlines.

13.4.3 Public Policy Obligations and Cross Subsidization

Many governments require airports to fulfil public policy obligations for social, economic and security reasons. The decision to mandate such obligations is an accepted role of any government but it is neither reasonable or efficient to require airports to fund such obligations through cross subsidization from their other revenue sources. An airport's obligation to funding public policy should be through the taxation

system, the same as for any other corporate entity. Such obligations should be carefully costed and separately funded under agreements between the various levels of government and the airport organization.

It should be a long term goal for every airport in the NAR to be financially self-sustaining. Again, this would mean progressively eliminating cross subsidization between NAR airports and also negotiating public policy funding agreements with governmental authorities as required.

13.5 RESPONSIBILITY, AUTHORITY AND ACCOUNTABILITY

13.5.1 Balancing Responsibility, Authority and Accountability

If a manager at any level is made responsible for achieving certain goals and objectives, he or she is entitled to have the necessary authority to fulfil that responsibility. Much of Section 13.4 was devoted to delegating authority to the DG/NAR who, in turn, can further delegate some elements of this authority to his senior subordinate managers. If the GOV, as the airport owner, is willing to delegate to him the authorities listed in 13.4, it is reasonable for the GOV to expect him, in return, not to misuse these authorities and to be accountable for the performance of the NAR. **It is a fundamental principle of decentralized management that there should be a commensurate match between the authority delegated and the accountability expected in return.**

13.5.2 Achieving Accountability

Accountability is best achieved by establishing performance targets for each manager and requiring periodic reporting of achievements against those targets. Failure to achieve these targets could result in a range of actions from providing further assistance to the manager, if the reasons for failure are outside of his/her control, to disciplinary action, if failure is due to incompetence or negligence. Conversely, a system of incentives can be established for exceeding performance targets. To be viable, performance targets should be periodically established between a manager and his/her superior manager, or with the business owner.

Performance targets require performance indicators. General financial performance indicators for any business were covered in Section 13.3.2. A range of performance indicators specific to airport operations are available, the most common being:

a) cost per aircraft movement;
b) revenue per aircraft movement;
c) cost per enplaned and deplaned passenger;
d) revenue per enplaned and deplaned passenger;
e) cost per enplaned and deplaned tonne of cargo; and
f) revenue per enplaned and deplaned tonne of cargo.

The most appropriate means to negotiate and establish performance targets is during the periodic planning, programming and budgeting process which is part of the managerial accounting system described in Section 13.3.2. This is normally conducted annually.

Another method of achieving managerial accountability is through periodic audits. Independent audits of consolidated financial statements should be conducted annually. Internal audits, which are really management assessments, should be conducted on a cyclical basis with each audit usually focussing on a particular aspect of a businesses operations, such as: inventory controls, contract management, management of employee pay and benefits etc.

It is often incorrectly assumed that a decentralized management system with a high degree of delegated authority means a potentially dangerous loss of control by the owners. In fact, the reverse is true, if the foregoing concepts are properly applied.

13.6 STAFFING

13.6.1 Need to Deal with High Staffing Levels

As indicated in Section 3.8.2 of this report, the staffing complement of 856 persons is very high by any comparable norms in other countries and a number of reasons are offered for this. As part of a comprehensive strategy for transforming the NBIA into an efficient modern airport this issue needs to be addressed.

This section of the report will prescribe indicative staffing levels as targets to be applied with appropriate modifications over time.

13.6.2 Approaches for Determining Staffing Levels

The most accurate way to determine appropriate staffing levels is to conduct detailed analyses of all current positions in terms of the tasks performed by each incumbent to help achieve his/her departmental goals, and the level of effort required. This data would then be used to identify: task duplications, task redundancies, additional tasks which should be carried out, improvements in work methods etc. This process would take much more time and effort, however, then is available for the Study.

The approach taken to determine indicative staffing levels was to review the staff complements by function for each of the NBIA departments, and then identify areas where efficiencies could be achieved based on the commonly accepted best practices used at airports elsewhere. Each of the areas will be discussed briefly in turn.

1) Departmental Managers

All departments are headed by a chief and most departments also have one or 2 deputy chiefs, in addition to section heads within some departments. All deputy chief positions have been eliminated. When the chief is temporarily absent then his/her work could performed by one of the section heads or another subordinate staff member.

2) Regulations, Plans and Procedures

There are a large number of staff dedicated to preparing regulations plans and procedures. This is probably attributable to a continuation of the approach of managing by decree and regulation which is indicative of a Command and Control Economy but counter productive in a market environment. All organizations need a body of regulations, plans, procedures and other such work instruments to function efficiently but, when these are developed to excess, productivity can

be seriously impaired. No such instruments should be developed or modified without some form of prior cost-benefit analyses, and the all of those in existence should be periodically reviewed with a view to eliminating those which are no longer relevant. Managers themselves should be primarily responsible for developing such instruments and use subordinate staff or outside assistance as required. Many of the positions dedicated to this work were eliminated.

3) Administration

Some line departments have a large number of personnel dedicated to administration which are in addition to the personnel in staff departments who are primarily engaged in performing administrative functions. As in the case for regulations, plans and procedures, excessive administrative work is symptomatic of a bureaucratic rather than a product oriented organization. Administration can be reduced by eliminating unnecessary tasks, automating other tasks and by having all other staff share in performing necessary administrative functions. A number of administrative positions were eliminated.

4) Watchkeeping

A very large number of staff in both the Airport Management and Air Navigation Departments are employed as watchkeepers on a rotating shift basis, primarily at navaid and airport utility sites. In the case of navaids, this is mainly due to the lack of remote control and monitoring equipment, but this deficiency will be resolved within the next year or so when most of the existing navaids will be replaced. In the case of electrical power generation and distribution sites, watchkeepers appear to be unnecessary. Standby power units can activate automatically in the event of line power failures. It would be more efficient to position staff at a central location, such as at or near the main power house, from where they could travel to the other sites for routine and emergency maintenance. A large number or the watch keeping positions were eliminated.

5) Shift work

Because most of the services at airports are provided continuously or over extended periods during any one day, it is necessary that many staff work shifts. Excessive shift work, however, is expensive and often unnecessary.

For departments responsible for facility maintenance, it is often more cost effective to have only one or a few persons available for evening and night shifts. They can respond to any equipment failures and if they are sufficiently knowledgeable on the equipment in question they can restore it to service. If not, they can call out a qualified person or, if back-up equipment is available,

corrective action can be taken the following day. A properly established maintenance organization will have policies in place to guide the duty engineer or technician under such circumstances.

There is even some flexibility for staffing shifts for operational functions. While there should be full and continuous shift manning for functions such as Airport Security and Rescue and Firefighting Services, it would be possible to reduce the staffing levels for other functions during regular periods of light traffic. This could apply to Preflight Briefing and Meteorological Services and it is often possible to staff a two-position Air Traffic Control Tower with one person during light traffic periods.

In computing staffing requirements for functions where shift work was required the following factors were taken into account:

a) the number of persons required for each shift;
b) a standard work-week of 48 hours;
c) an annual leave allowance of 3 weeks per person per year;
d) average sick leave and miscellaneous leave of 10 days per person per year;
e) eight days of public holidays per person per year;
f) training outside of shift hours was factored in at 15 days per year for Air Traffic Controllers and Maintenance Engineers/Technicians, and 10 days per year for RFF and Preflight Briefing personnel; and
g) an 8% staff turnover each year due to retirements, resignations, promotions etc.

13.6.3 Indicative Staffing Target

In developing indicative staffing targets for the NBIA prior to the completion of major additional facilities and equipment, the following assumption or exclusions have been made:

a) completion of all imminent projects as well as those in progress to replace the Air Traffic Control Tower and all existing electronic navaid equipment, and to install Approach Radar;
b) Approach Control is located in the ATC tower;
c) a PAR is installed to replace the existing GCA and it will be operated and maintained by NBIA staff and not by military personnel;
d) because of the importance of airport security and the serious weaknesses in this function at the NBIA, this is the only large department where no reductions have been made; however, it is almost certain that efficiencies could still be achieved through improved training, procedures, organization and automation; and

e) staffing of the nursery school, cultural centre and medical centre have not been included since these are not usually functions performed by airport organizations. This does not mean to imply, however, that the NBIA should not continue to provide these services but just that these have been excluded from staffing calculations.

After making the assessments and computations as indicated previously, target staffing levels were developed for each of the 10 departments at the NBIA. These appear in Table 13.6.1 alongside the current levels.

Table 13.6.1 Current and Future Staffing Levels

	Current Staffing Levels	Target Staffing Levels
Airport Management	139	77
Air Navigation	283	68
Airport Directory	22	10
Emergency Services	72	49
Security Services	141	141
Construction	10	8
Planning	16	10
NAR Secretariat	141	45
Labour	9	9
Finance	23	16
TOTALS	856	433

It should be emphasized that these target figures are indicative only, with a probable overall accuracy of plus or minus 10%.

By way of a comparison, Brisbane Airport in Australia has a total staffing complement of 112 persons, but this does not include any staff for all ANS and for Terminal Operations, since these functions are performed by other organizations. Also some of the security functions are performed by the state police force. If all of these functions were performed by the airport organization, as at the NBIA, the total staff would probably increase by about 155 to 247. Brisbane has an annual passenger throughput of about 8 million compared with about one million at the NBIA. This means that it handles about 8 times the traffic level of the NBIA with about 28% of the total current staffing complement of the NBIA and about 57% of the total target staffing complement the NBIA. Even though Brisbane is a modern, efficient and profitable airport located in a developed country, these comparisons still serve to indicate that the target of 433 persons for the NBIA, to be achieved over a period of time, is not unreasonable.

If the target staffing levels were reallocated to the new organizational structure as per Section 13.2.2, then the distribution would be as follows:

a)	Airport Operations	269 persons
b)	Business Development	8 persons
c)	Engineering Services	77 persons
d)	Administration	76 persons
	Total	433 persons

13.7 STRATEGY FOR DEVELOPING A MANAGERIAL AND ORGANIZATIONAL FRAMEWORK

13.7.1 Need for Change Management

Sections 13.2 to 13.6 covered the development needs of terms of: Organization; Financial Management; Greater Autonomy for the NBIA; Responsibility, Authority and Accountability; and Staffing. These collectively represent the main components of a future Managerial and Organizational Framework. It is evident that there are many interrelationships between each of these areas, therefore, any changes need to be carefully harmonized. The changes are philosophical and attitudinal in nature as well as institutional. They will have a considerable impact on all NBIA staff members and so must also be managed with great skill and sensitivity. In the wider context the pace and scope of any changes will also be governed by:

a) the state laws of Vietnam;
b) the social context of Vietnam; and
c) international civil aviation laws and conventions.

The most sensitive issue in the proposed changes is that of staff reductions.

13.7.2 Staff Reduction Programmes

Airports and other transportation facilities worldwide, which have been traditionally owned and operated by governments have, over the last 10 to 15 years, had to deal increasingly with funding constraints and pressures to improve the quality and scale of services. This has required them to be managed in a more commercial manner by increasing revenues through efficiency improvements, rather than increasing user charges, and reducing costs. Many have had to reduce costs by staff reductions. Fortunately, experience elsewhere has also clearly shown that maintaining or reducing staffing levels can be accomplished not only with minimal labour turmoil and unrest but also with significant improvements in the compensation and future career prospects of those staff members who continue to be employed.

Ideally, staff reductions should be made without resorting to forced lay-offs. The easiest way to accomplish this is to allow overall staffing levels to reduce through natural attrition, such as retirements and resignations. Positions vacated in this way can either be eliminated or, if it is necessary to hire replacements, an equivalent number of other positions need to be eliminated elsewhere in the overall organization. While this method of staff reduction is inexpensive, it is also slow and can be difficult to manage, because natural attrition rates are determined by the ages or decisions of employees and not by managers.

The most successful staff reduction programmes are those based on having a system of incentives to encourage personnel to voluntarily leave their employment. For older staff, who are within 5 to 10 years of their normal retirement age, this can be through early retirement programmes whereby they retire early and can immediately start to draw their pensions, either with no penalties or reduced penalties. For younger staff, the incentives can be:

a) a lump sum payment based on their final salary and years of employment;
b) an offer of alternative employment without loss of pay or benefits;
c) paid retraining programmes; or
d) some form of combination of these.

13.7.3 Adjusting Target Levels

Another factor to be taken into account at the NBIA is that, as the airport expands, more staff will be required. The target levels indicated previously can, therefore, be considered as reference levels which can be increased with expansion. For planning purposes, adjustments to these reference levels can best be made through a formula with the percentage increases being determined by multiplying the current reference level by the forecast traffic growth for the year under consideration less a productivity improvement factor. Figures for both of these appear in table in Appendix 9.7.6 under columns 5 and 6.

13.7.4 Determining Actual Staffing Levels

Actual as against planned staffing levels should ultimately be determined by activity and task analyses, and by decisions as to whether it is more cost effective to perform a particular activity using NBIA staff or by contracting out. The biggest overall incentive to efficiently manage staffing levels, however, would emerge if the NBIA was to be operated as an autonomous business enterprise. Under these circumstances, the DG/NAR and other senior managers would be assessed on the performance of that enterprise and, therefore, be under continuous pressure to increase revenues and to reduce costs, including labour costs. While the NBIA continues to be operated as an over regulated governmental organization, however, the

natural tendency will be to increase rather reduce staff, as is usually the case with similarly structured organizations elsewhere.

13.7.5 Implementation of Managerial and Organizational Changes

The best approach would be to design and implement the strategy as a discrete project since, as already mentioned, complex changes of this magnitude need to be managed very carefully over time.

While the first step would be to select a reasonable time frame for implementation. Four years from the time of a decision to proceed appears to be an appropriate period.

The major project activities and constituent tasks would be as follows:

Activity 1: Establish clear corporate goals and objectives for the NBIA. This will involve the following major tasks:

- 1.1 Preparation of a comprehensive statement of corporate goals and objectives primarily in terms of capacity production and the development of business activities.
- 1.2 Submit the statement for review and approval by the appropriate government agency.

Activity 2: Conduct the detailed design of the new organization based on the proposal described in Section 13.2.2. This will involve the following major tasks:

- 2.1 Prepare goals and objectives and a description of the activities needed to meet these for each of the four new NBIA departments: Airport Operations, Business Development, Engineering Services and Administration. These departmental goals and objectives should relate directly to the corporate goals and objectives.
- 2.2 Determine the organizational structure within each of the 4 departments in terms of the number of sections and sub-sections (if any) are required. This determination should be guided by the target staffing levels rather than current staffing levels.
- 2.3 Prepare goals and objectives and a description of the activities needed to meet these for each of the sections and sub-sections, with the goals and objectives relating directly to those of the next level up in the organizational structure.
- 2.4 Identify all staff positions within the new organizational structure and prepare job descriptions for each.

Activity 3: Implement the new organizational structure. This will involve the following major tasks:

- 3.1 Staff all managerial and supervisory positions. Preferably, all such positions in the new organizational structure should be considered vacant and then staffed on the merit principle only.

3.2 Assign all other staff to the new organizational units. At this time there will probably still be more staff than the number of positions in the new organization. All staff, however, should either be assigned to the organization most appropriate to their training and experience, or alternatively pools of surplus staff could be established to be managed according to the staff reduction programme which should be in place by this time.

Activity 4: Design and implement a staff reduction programme. This will involve the following major tasks:

4.1 Using the reference level of 433 for 1995 established in 13.6.3, set reference levels for each of the years over which the staff reductions will take place using the formula given in Appendix 9.7.6.

4.2 Identify the staff members who will be surplus to requirements.

4.3 Design and cost the staff reduction programme based on a system of incentives.

4.4 Implement the programme. At the beginning of each year review and adjust the planned figures based on such factors as: actual traffic levels, the progress of development projects, activity and task analyses, contracting out decisions etc.

Activity 5: Establish the NBIA as an autonomous corporate business enterprise. This will involve the following major tasks:

5.1 Determine the ownership structure of the new entity, i.e. full ownership by the national government, mixed national and local government ownership or mixed government and private ownership.

5.2 Appoint an interim board of directors to manage the transition to an autonomous entity.

5.3 Incorporate the new entity under national laws.

5.4 If the new entity is to be partially privately owned, arrange to sell the requisite number of shares through the capital markets.

5.5 Appoint the full and continuing board of directors.

5.4 Prepare a business plan for the new entity for approval by the board of directors. This shall include: authorities to raise capital on the commercial debt markets and financial, and financial and operational performance indicators.

Activity 6: Establish a Financial Management System for the NBIA. This will involve the following major tasks:

6.1 Design a financial accounting system, including the provision of appropriate electronic data processing systems, in accordance with the NBIA's corporate charter and national laws.

6.2 Test and implement the financial accounting system.

6.3 Design a management accounting system for the NBIA, including the provision of appropriate electronic data processing systems. This will be compatible with the new

organizational structure and include: planning, programming and budgeting systems, responsibility management centres, financial transaction authorities and performance reporting systems.

6.4 Test and implement the management accounting system.

A plan for the proposed project for the Comprehensive Restructuring of the Management and Organization of the NBIA appears as Figure 13.7.1.

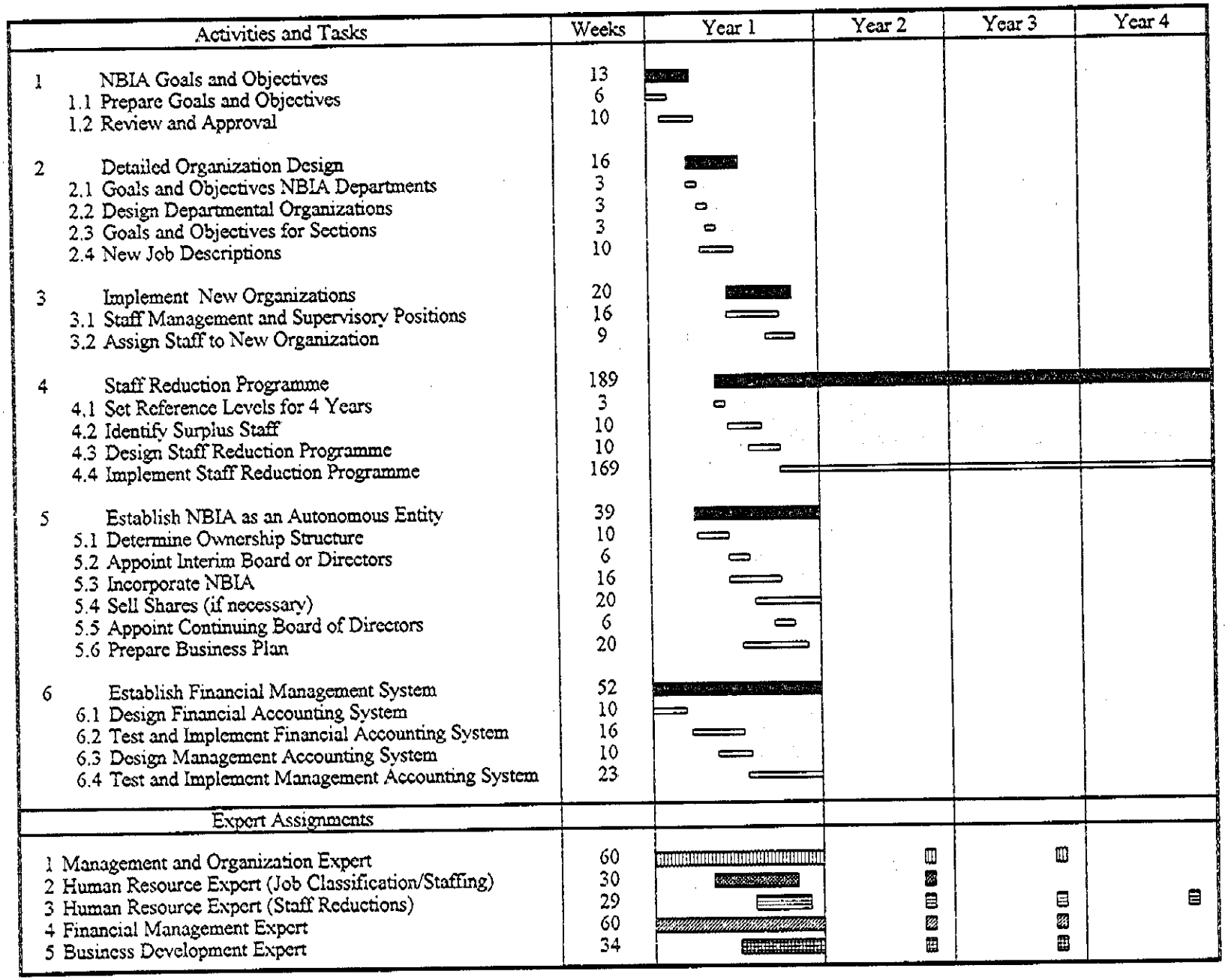

Figure 13.7.1 Project for the Comprehensive Restructuring of the Management and Organization of NBIA

13.7.6 Expert Assistance and Training

It is very evident that a project to develop a new and comprehensive managerial and organizational framework for the NBIA would require the availability of considerable expertise to plan and implement successfully over a 4 year period. Because of the close interrelationship between the various tasks, the assistance should also be provided on an integrated basis from one organization with a well established record of successful management consultancy work for international airports. The expertise would be required in the areas and for the durations in work months (wm) indicated below:

a) Management and Organization Expert and Team Leader: Year 1 - 12wm, Year 2 - 1wm, Year 3 - 1wm;
b) Human Resource Expert (specializing in job classification and staffing): Year 1 - 6wm, Year 2 - 1wm;
c) Human Resource Expert (specializing in designing and implementing staff reduction programmes): Year 1 - 4wm, Year 2 - 1wm, Year 3 - 1wm, Year 4 - 1wm;
d) Financial Management Expert: Year 1- 12wm, Year 2 - 1wm, Year 3 - 1wm; and
e) Business Development Expert: Year 1 - 6wm, Year 2 - 1wm, Year 3 - 1wm.

Most of the assistance would be given in Year 1. Assistance in the later years would be in the form of progress checks and help in dealing with specific problems which may occur during implementation.

The total estimated cost of 50 wm for experts would be US$ 832,500. This would include fees, living expenses, assignment travel and communications costs (telephones, fax, correspondence, report publishing etc). It does not include in-country travel, office equipment and salaries of local staff.

A total of 36 months of overseas study tours and training would be required as follows for a total estimated cost (excluding air fares) of US$ 147,600:

a)	Senior Airport Management	4 mo.
b)	Intermediate Airport Management	8 mo.
c)	Financial Management	6 mo.
d)	Human Resource Management	6 mo.
e)	Airport Marketing and Business Development	6 mo.
f)	Contract Management	6 mo.

13.8 OPERATIONAL ISSUES

13.8.1 Aviation Security

A number of serious deficiencies in security functions at the NBIA were outlined in Section 3.8.4 of this report, representing a general lack of compliance with the Standards and Recommended Practices for Security which appear in Annex 17 to the Chicago Convention on International Civil Aviation. Because of this, no reductions in the current staffing of the Airport Security Department have been recommended.

It was noted that only about 25% of the present perimeter of the airport has been fenced and there appeared to be no clear plan to complete the perimeter fencing. The New Development Plan, however, does make provision for perimeter fencing for any southern area development. While complete perimeter fencing is important, it has been the experience at many airports in developing countries that unless there is an effective system of perimeter surveillance either electronically and/or by security patrols, then fencing is frequently breached and stolen. For this reason the provision of suitable methods of surveillance should accompany any perimeter fencing projects.

The major security problems at the NBIA are not, however, attributable to a lack of fencing or even security equipment but to a inadequacies in organization, procedures and training. Because of the scope and seriousness of these problems, outside expert assistance should be sought to resolve them. This expert should undertake the following tasks in cooperation with a counterpart authority identified by the GOV:

a) conduct a security audit at the NBIA to identify specific areas of non-compliance with Annex 17, making reference to earlier audits by ICAO and other organizations, and any follow-up actions taken;

b) design and help establish a responsibility framework and organizational structure for security at the NBIA which, among other things, eliminates jurisdictional conflicts and promotes cooperation between the various agencies of government involved in aviation security activities;

c) prepare a set of security procedures and plans for the NBIA;

d) design and conduct a series of in-country seminars and training programmes for aviation security staff, including staff from organizations other than the CAAV as appropriate;

e) arrange one overseas study tour of 2 weeks duration and a training programme, also of 2 weeks duration, for a small number of national aviation security staff (3); and

e) design and conduct at least on major exercise to test the adequacy of the security services at the NBIA.

It is estimated that this assistance would require at least 6 work months in-country and would cost US$ 95,500. This would include fees, living expenses, assignment travel and communications costs (telephones, fax, correspondence, report publishing etc). It does not include in-country travel, office equipment and salaries of local staff.

The total estimated cost of the study tour and overseas training programme (excluding air fares) would be US$ 12,300.

13.8.2 Facilitation

An outline of the current situation regarding facilitation at the NBIA appears in Section 3.8.5 of this report. While there are fewer problems with facilitation than with security, it is clear that significant improvements can be made. It has been found elsewhere that airport facilitation and, therefore airport throughput rates and customer satisfaction, can be improved significantly through better organization, procedures and training, and with minimal capital outlays.

The most important prerequisite for efficient facilitation is a high level of cooperation between the airport authorities and the various border control agencies (Immigration, Customs and Public Health). Each usually come under different governmental departments and which naturally give the highest priority for exercising their respective control functions. The most effective mechanisms for achieving the required level of cooperation are National Facilitation Programmes, and National Air Transport and Airport Facilitation Committees, established as per the Standards and Recommended Practices for Facilitation which appear in Annex 9 to the Chicago Convention on International Civil Aviation. None of these have been established in Vietnam. The border control agencies contacted during the field survey were not even aware of the existence of Annex 9. Traditionally, very little in the way of international technical assistance has been offered for airport facilitation in Vietnam or elsewhere. This is most regrettable given the high yields that such assistance produce.

Consideration also needs to be given to streamlining specific border control procedures. While it is considered necessary to inspect originating checked baggage for security reasons, most governments do not require such inspections by the Customs organization. Vietnam is still an exception in this regard. A number of other fairly simple measures to improve facilitation are now becoming commonplace. For example, many countries now use a the dual channel (red/green) system for screening arriving baggage whereby passengers with nothing to declare proceed through the green channel, and those with items to declare proceed through the red channel. The Customs authorities exercise their control by reserving the right to make spot checks of any baggage passing through the green channel. Facilitation can be further improved by simplifying and integrating the border control documentation that passengers need to

complete on arrival, and also by having one official conduct inspections on behalf of all border control agencies. Vietnam has yet to adopt any of these measures.

It also needs to be recognized that the first and last officials from the host country that international travellers encounter are border control officials who can, therefore, significantly influence a traveller's image of the country for better or worse. For this reason, more states now provide special training in interpersonal skills, public relations etc. to border control officials so that their conduct, appearance, proficiency and demeanour will be exemplary. This is another matter worthy of attention by the GOV.

It is recommended that the assistance of an expert be sought to undertake the following tasks in cooperation with a counterpart authority identified by the national government:

a) design and help establish a National Air Transportation Facilitation Programme, including a National Air Transportation Committee and a Facilitation Committee for the NBIA;
b) prepare a set of plans and procedures for covering facilitation activities at the NBIA;
c) design and conduct a series of in-country seminars and training programmes on airport facilitation to be jointly attended by airport and border control staff; and
d) arrange one overseas study tour of 2 weeks duration for about 5 airport and border control staff to visit airports with highly regarded facilitation programmes.

It is estimated that this expert would require at least 4 work months in-country and cost an estimated US$ 65,500. This would include fees, living expenses, assignment travel and communications costs (telephones, fax, correspondence, report publishing etc). It does not include in-country travel, office equipment and salaries of local staff.

The total estimated cost (excluding air fares) of the study tour would be US$ 10,250.

Because of the close interrelationship between airport security and facilitation, it is strongly recommended that the experts in both areas be provided concurrently and from the same organization.

13.8.3 Facilities and Equipment Maintenance

Problems related to the maintenance of facilities and equipment at the NBIA were outlined in Section 3.8.6 of this report.

A major source of such problems is the fragmented responsibilities for maintenance inherent in the present organizational structure. This was discussed further in Section 13.2 and also specifically addressed in the proposed new organizational structure whereby an Engineering Services Department would be

responsible for all engineering activities, including maintenance, related to the life cycle management of all facilities and equipment. This organizational structure also functionally consolidates all engineering activities by discipline (buildings and structures, mechanical, electrical and electronic) regardless of which operational organization at the NBIA uses a particular facility or item of equipment. Since all are under one department, however, flexible multidisciplinary engineering support can still be made available for complex systems. Finally, by having the same managers responsible for equipment maintenance as well as for equipment procurement, this will encourage the practice of striving for commonality in equipment models and types which will greatly facilitate subsequent maintenance programmes.

The practice of having planned maintenance programmes involving the periodic inspection, testing and conduct of preventive maintenance routines has not been widely adopted at the NBIA, particularly regarding vehicles, and runways, taxiways and aprons. These should be established by the new Engineering Services Department as a matter of some urgency and outside assistance should also be sought in this regard through the assignment of experts in the maintenance management of: buildings and structures, mechanical systems (including vehicles), electrical systems and electronic systems. In each case, the expert would be required to work with appropriate section head in the Engineering Services Department to complete the following tasks:

a) design and implement planned maintenance programmes for major equipments and facilities, including the preparation of maintenance routines if these are not available from manufacturers' manuals;
b) identify which maintenance and repair work can best be contracted out, prepare technical specifications for tendering for such contracts and assist in the evaluation of proposals as required;
c) identify the requirements for inventories of spare parts and consumable supplies, and prepare item specifications where necessary;
d) identify the requirements for tools and test equipment, and prepare item specifications where necessary;
e) assist in the procurement of spare parts, consumables, tools and test equipment; and
f) arrange overseas study tours of 2 weeks duration for 6 engineering managers to airports known to have efficient and effective maintenance programmes.

It is estimated that these experts would require at least 6 work months in-country for each of the 4 disciplines to be covered for a total cost of US$ 382,000 (US$ 95,500 each). This would include fees, living expenses, assignment travel and communications costs (telephones, fax, correspondence, report publishing etc). It does not include in-country travel, office equipment and salaries of local staff.

The total estimated cost (excluding air fares) of the study tours would be US$ 12,100.

With respect to planning the maintenance of future facilities and equipment, it is recommended that budgeting for annual maintenance costs should be a percentage of total procurement or construction costs as follows:

a)	Building and civil works	1%
b)	Utilities	3%
c)	Fuel supply system	3%
d)	Firefighting vehicles	3%
e)	Major maintenance equipment	3%
f)	Electronic systems	5%
g)	Special equipment (e.g. baggage conveyance systems)	5%

13.9 TRAINING

13.9.1 Need for a Training Plan

Specific training needs, have already been addressed for each of the critical managerial and operational areas covered earlier in this chapter.

This section of the report will briefly outline some of the major considerations that should be taken into account by the NAR Management when developing training plans and strategies to the year 2000.

A sound training and human resource development plan will meet the following criteria:

a) target the most critical areas in terms of safety, security, and operational and commercial efficiency;

b) concentrate on developing in-country training programmes which can be taken over and sustained by national staff; and

c) provide for some short and long term overseas training to carefully selected staff in areas which are most likely to provide the best return on the high costs that such training incurs.

3.9.2 Local versus Overseas Training

Training is an important but costly investment. In establishing a long term training plan for civil aviation in a developing country, the most pressing issue to be addressed after determining what training is required is where training should be conducted. Using the NAR's own cost estimates which appear in Section 3.8.3, overseas training is over ten times more expensive than in-country training

As a general rule, it is most cost effective to establish training programmes in-country to be managed and conducted by national instructors in those disciplines which require large numbers of staff. The most significant of these are: Air Traffic Services; Aeronautical Information Services (preflight briefing etc.); Rescue and Firefighting; and Security. It also applies to English language training. Such training programmes can be initially established using expert assistance from outside and can be conducted at the National Civil Aviation Training Centre or on site or in both locations. The TRAINAIR programme operated by ICAO provides an excellent system whereby complete training packages prepared by various CATC's are shared for use elsewhere. The National CATC should join this program if it has not already done so.

Training which is required periodically, but not in high volumes and requires little in the way of specialized training equipment, can also be conducted in-country by outside experts from foreign training institutions. This includes training programmes for: managers; airport operations officers; and air transport officers.

The location of training can be discretionary depending on local circumstances. Regarding electronic systems for example. If a large number of a particular type or model are procured then it is usually more cost effective to procure one system for in-country training. This usually applies to communications systems and many navaids such as VOR, DME or NDB's. For systems used in smaller numbers, it is more often more cost effective to send personnel for training overseas. This would apply to large radar systems and possibly to ILS's.

Overseas training is highly prized but very expensive unless it is donated or subsidized through technical cooperation programmes. As already mentioned it is the preferred option for low volume training on expensive systems. It is also valuable as a means of exposure to best practices in particular disciplines either through formal training or well structured study tours. The best return can be obtained on overseas training if the candidates selected are the best suited for transferring their newly acquired knowledge and skills to their compatriots subsequent to their return. Since the language of instruction is English for most overseas training programmes, English language capability is an important consideration when selecting candidates.

13.9.3 Training Allocations for Planning Purposes

If the GOV establishes an objective for the NBIA to reach, over a 4 year period, a level of operational and commercial efficiency which is comparable to the better airports in the South East Asia Region, then a commensurate investment in training will be required. It is recommended for planning purposes, therefore, that each position in the target staffing base (433 persons to be adjusted annually based on

traffic increases and productivity factors) be allocated an indicative 6 weeks of full time training per year, over this period. This will include official training conducted both during and after normal working hours. It will also include the training recommended earlier in this Chapter.

13.10 CONCLUSION

Over the next 15 to 20 years or so, large amounts of money will be invested in developing the total physical infrastructure of the NBIA. The return on that investment will be determined in large measure by the quality of the management of the many activities which are necessary for the efficient operation and maintenance of those assets, whether for airport capacity production or for activities for generating non-aeronautical revenues. This chapter has described the major actions which need to be taken to achieve this objective. Considerable changes are required but these are achievable provided that the GOV is prepared to make the necessary commitments. Carefully selected and tasked foreign expertise, together with a complementary in-country and overseas training programmes for national staff, will greatly facilitate and expedite the change process. The total estimated cost of securing that expertise and of implementing the recommended overseas training programmes is US$ 1,558,000 over a 4 year period.