

SUMMARY INITIAL ENVIRONMENTAL EXAMINATION

MANILA NORTH TOLLWAYS CORPORATION

IN THE

REPUBLIC OF THE PHILIPPINES

June 2000

CURRENCY EQUIVALENTS

(as of 25 May 2000)

| | | |
|---------------|---|----------|
| Currency Unit | – | Pesos |
| ₱1.00 | = | \$0.0233 |
| \$1.00 | = | ₱42.90 |

ABBREVIATIONS

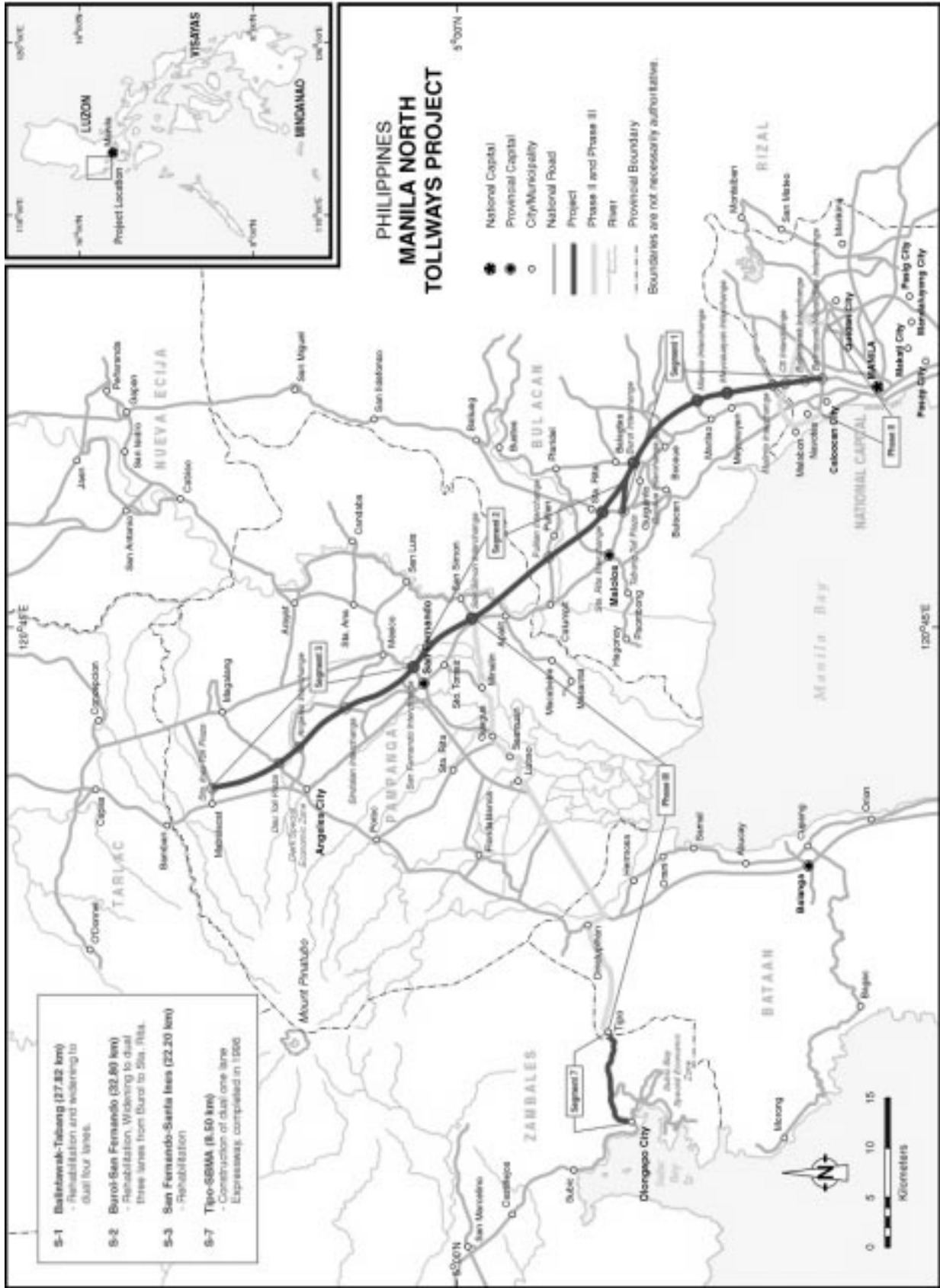
| | | |
|-----------------|---|---|
| ADB | – | Asian Development Bank |
| CO | – | carbon monoxide |
| D&C | – | Design and Construct |
| DENR | – | Department of Environment and Natural Resources |
| DOTC | – | Department of Transportation and Communication |
| DPWH | – | Department of Public Works and Highways |
| ECA | – | export credit agencies |
| ECC | – | Environmental Compliance Certificate |
| EDSA | – | Epifanio Delos Santos Avenue |
| EIA | – | environmental impact assessment |
| EIS | – | environmental impact statement |
| GRDP | – | gross regional domestic product |
| IDC | – | Independent Design Checker |
| ICE | – | Independent Certification Engineer |
| IEE | – | initial environmental examination |
| LGU | – | Local Government Unit |
| MNTC | – | Manila North Tollways Corporation |
| NCR | – | National Capital Region |
| NGO | – | non-government organizations |
| NIPAS | – | National Integrated Protected Areas System |
| NO ₂ | – | nitrogen dioxide |
| NLE | – | North Luzon Expressway |
| O&M | – | Operations and Maintenance |
| PNCC | – | Philippine National Construction Company |
| ROW | – | right-of-way |
| SBMA | – | Subic Bay Metropolitan Authority |
| SBNP | – | Subic-Bataan Natural Park |
| SIEE | – | summary initial environmental examination |
| STOA | – | Supplemental Toll Operation Agreement |
| TRB | – | Toll Regulatory Board |
| TSP | – | total suspended particles |

NOTE

In this report, \$ refers to the US dollars.

CONTENTS

| | Page |
|---|-------------|
| MAP | ii |
| I. INTRODUCTION | 1 |
| A. Scope of the Study | 1 |
| B. Executing Agency | 2 |
| C. Institutional and Legislative Framework | 2 |
| II. DESCRIPTION OF THE PROJECT | 2 |
| A. Project Objectives | 2 |
| B. Scope of the Project | 2 |
| C. Project Components | 3 |
| III. DESCRIPTION OF THE ENVIRONMENT | 4 |
| A. Physical Resources | 4 |
| B. Biological Resources | 5 |
| C. Sociocultural Conditions | 6 |
| IV. SCREENING OF POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES | 7 |
| A. Environmental Effects Related to Project Location and Design | 7 |
| B. Environmental Effects Related to Project Construction | 10 |
| C. Environmental Effects Related to Operation | 12 |
| V. INSTITUTIONAL REQUIREMENT AND ENVIRONMENTAL MONITORING PROGRAM | 14 |
| A. Institutional Framework and Responsibilities | 14 |
| B. Environmental Monitoring Program | 15 |
| C. Costs of the Environmental Mitigation and Monitoring Program | 17 |
| D. Public Consultation | 17 |
| VI. FINDINGS AND RECOMMENDATIONS | 17 |
| VII. CONCLUSION | 18 |



PHILIPPINES MANILA NORTH TOLLWAYS PROJECT

- National Capital
- Provincial Capital
- City/Municipality
- National Road
- Project
- Phase I and Phase II
- Road
- Provincial Boundary
- Boundaries are not necessarily authoritative.

- S-1** Baguio-Tubang (37.82 km)
 - Rehabilitation and widening to dual four lanes.
- S-2** Barot-San Fernando (32.89 km)
 - Rehabilitation. Widening to dual three lanes from dual to Six. R/Rs.
- S-3** San Fernando-Santa Ines (22.20 km)
 - Rehabilitation
- S-7** Tigo-SDMA (8.50 km)
 - Construction of dual one lane Expressway, completed in 1998



I. INTRODUCTION

1. In support of the "Philippine 2000" vision for advancement of infrastructure development in the Philippines and facilitation of the development of the Subic and Clark special economic zones, the Government recognized the need to refurbish and modernize the North Luzon Expressway, and to expand it into the Subic and Clark special economic zones.

2. Manila North Tollways Corporation (MNTC) was incorporated in 1997. MNTC was granted the franchise to finance, design, rehabilitate, expand, operate, and maintain certain roads to the north of Manila under the Supplemental Toll Operation Agreement. Under the agreement, all usufructuary rights, interests, and privileges from Philippine National Construction Company (PNCC), the original franchisee for the project roads, will be transferred to MNTC upon completion of the project roads. MNTC has the right to collect tolls on the completed project roads during the concession period, after which the project roads will revert to the Government.

3. MNTC is seeking financing for the first phase of the project roads covered under the Supplemental Toll Operation Agreement. The financing plan envisages funding and/or partial risk cover from commercial banks, export credit agencies, and multilateral agencies.

A. Scope of the Study

4. Due to the varying environmental impact assessment categories under which the road segments fall, individual environmental impact studies (EISs) were prepared and submitted to the Department of Environment and Natural Resources (DENR). These are the (i) EIS for the Subic Bay Metropolitan Authority (SBMA)-Tipo road (submitted in April 1995); (ii) initial environmental examination (IEE) for the improvement of the Balintawak-Tabang section of the NLE (submitted in March, 1995); (iii) IEE for the improvement of the San Fernando-Sta. Ines section of the NLE (submitted in September 1995); (iv) IEE for the improvement of the BuroI-San Fernando section of the NLE (submitted in May 1996); and (v) IEE for the improvement of interchanges and toll plazas along the NLE (submitted in June 1999).

5. These EISs and IEEs were also submitted and reviewed by the Asian Development Bank (ADB). An addendum report that includes the environmental management and monitoring plan and traffic management plan was also submitted to supplement the EIS and IEE documents.

6. This summary IEE is based on the EISs and IEEs prepared in accordance with ADB requirements.

7. The following road sections have been granted corresponding environmental compliance certificates (ECCs): (i) SBMA-Tipo road (June 1995); (ii) Balintawak-Tabang section of the NLE (May 1995); (iii) San Fernando-Sta. Ines section of the NLE (October 1995); (iv) BuroI-San Fernando section of the NLE (July 1996); and (v) interchanges and toll plazas in Region III (February 1999).

8. Approval for improving the interchanges and toll plazas within the DENR-National Capital Region (NCR) jurisdiction, requires submittal of additional information for review. The additional documents have been substantially completed and readied for submittal, and have been endorsed by two of the three affected cities: Quezon City and Caloocan. Valenzuela's endorsement is awaiting the results of a public consultation conducted recently with the

occupants of public market stalls encroaching on the existing right-of-way (ROW) of the southbound toll plaza of the Malinta Interchange.

B. Executing Agency

9. MNTC and the Government, through the Toll Regulatory Board (TRB), are the executing agencies of the Manila North Tollways Project.

C. Institutional and Legislative Framework

10. Existing Philippine laws; department orders and circulars; and procedures on environmental management, land acquisition, compensation, and resettlement were the guiding principles behind the preparation of the environmental impact assessment studies. Environmental management and monitoring schemes were developed in accordance with legislative requirements, as well as ADB directives and policies.

II. DESCRIPTION OF THE PROJECT

A. Project Objectives

11. The overall objective of the Project is to provide a faster and more efficient expressway system that can cope with the rapid growth of urban centers such as Manila, Clark, and Subic, and with other growth corridors in the provinces of Bataan, Bulacan, Nueva Ecija, Pampanga, Tarlac, and Zambales. To achieve this, existing roads must be improved. In several places, new alignments are needed, particularly when improvement levels are limited by economic viability and physical constraints such as terrain.

12. The main objective for improving the NLE and its interchanges and toll plazas is to improve traffic flow and vehicular efficiency along the NLE. The Subic Freeport Expressway (SBMA-Tipo road), was constructed to provide safer and faster travel to and from the Subic Freeport Zone. The SBMA-Tipo road is definitely a better alternative route than the older Olongapo-Gapan road, which is very steep and winding along the Hermosa-Dinalupihan sections and congested within Olongapo City.

13. Once the entire expressway becomes operational, it is expected to (i) significantly reduce transport costs and improve the efficiency of vehicular and passenger movement; (ii) promote tourism; and (iii) enhance economic and industrial activities in Subic, Clark, and other growth corridors. Indirectly, the Project can also alleviate poverty through increased employment opportunities in and around the developing urban centers.

B. Scope of the Project

14. Four road segments are included in this summary IEE. Three of these are along the existing NLE. These are, (i) Segment 1—Balintawak to Tabang; (ii) Segment 2—BuroI to San Fernando and (iii) Segment 3—San Fernando to Sta. Ines. The fourth is the Subic Freeport Expressway, (Segment 7). The map shows the Project vicinity.

15. The NLE starts from the Balintawak overpass at Epifanio Delos Santos Avenue (EDSA) and ends at Sta. Ines in Mabalacat, Pampanga, with a spur road connection between BuroI and Tabang, in Bulacan. The present expressway has two carriageways, one for northbound and

one for southbound traffic. The entire NLE is approximately 83.5 kilometers long. A median divides the two carriageways.

16. Two carriageways of three lanes each way or a total of six lanes, serve the section between Balintawak and Malinta, Valenzuela. Two carriageways with only two lanes each way serve the rest of the expressway north of Burol, except the last 3 km stretch from Balem Bridge to Sta. Ines, which has only one carriageway with two lanes for northbound and southbound traffic.

17. The proposed improvements and upgrading will transform the NLE into an eight-lane expressway between Balintawak and Burol, and a six-lane expressway between Burol and Sta. Rita. The sections from Sta. Rita to Balem Bridge, Burol to Tabang, and Balem to Sta. Ines will be upgraded but will retain the current carriageway configurations. In addition, all nine bridges along the main expressway between Balintawak and Sta. Rita will be widened, and the rest improved.

18. Eleven interchanges will be improved and upgraded and two new interchanges will be constructed at Sindalan and Angeles. Balintawak, EDSA will be improved through upgraded ramps and more efficient channelization of traffic. Four new main toll plazas will be constructed (Balintawak, Bocaue, Dau, and Tabang) and new toll plazas will be provided at interchanges. The Balintawak toll plaza will be relocated farther north.

C. Project Components

1. Segments 1, 2, and 3

19. Segment 1 starts from Balintawak overpass at EDSA and ends at Burol in Bulacan and is approximately 23.5 km long. It has eight interchanges and toll plazas and one flyover: the Balintawak and Tabang toll plazas; C-5, Malinta, Meycauayan, Marilao and Burol interchanges; Bocaue interchange and toll plaza; and Novaliches flyover. This segment is under the jurisdiction of the DENR-NCR (for Quezon City, Caloocan City, and Valenzuela City), and Region III (for areas in Bulacan).

20. Segment 2 starts from Burol, Bulacan and ends at San Fernando, Pampanga, and is approximately 32 km long. It has four interchanges and toll plazas: the Sta Rita, Pulilan, San Simon, and San Fernando interchanges. This segment is under the jurisdiction of Region III (Bulacan and Pampanga).

21. Segment 3 starts from San Fernando and ends at Sta. Ines, Mabalacat, all in Pampanga. It is approximately 28 km long and has four interchanges and toll plazas: the Sindalan and Angeles interchanges, and Dau toll plaza and Sta. Ines toll plazas. This segment is under the jurisdiction of Region III (Pampanga).

2. Segment 7

22. The Subic Freeport Expressway is an 8.8 km four-lane undivided roadway. From the Subic Freeport Zone, it ends at Barrio Tipo, Hermosa, Bataan where it links with the Olongapo-Gapan Road. From Tipo it crosses a main tributary of the Jadjad River, runs southwesterly through mountainous terrain, curves to the left as the elevation decreases, and joins the Rizal Highway. Construction of Segment 7 was completed in October 1996 and the road has been open since then.

III. DESCRIPTION OF THE ENVIRONMENT

A. Physical Resources

1. Geology

a. Segments 1, 2, and 3

23. Segments 1, 2, and 3 traverse an old flood plain overlain by a recent alluvial formation. This young rock was created by the deposition of weathered rock materials by rivers, creeks, and streams.

b. Segment 7

24. Segment 7 traverses sequences of pyroclastic rocks consisting of layered tuff, agglomerates, and tuffaceous breccia, intruded by dasitic to andesitic dikes. Four sets of faults and fracture patterns are evident in the area. These structural lines are mostly marked by escarpments and other geomorphological features such as rectangular drainage patterns and steep slopes. These fault lines influence the orientation of river systems in the area.

2. Topography and Soils

a. Segments 1, 2, and 3

25. Segments 1, 2, and 3, including the interchanges and toll plazas are on portions of Bulacan and Pampanga comprising the central plain of Luzon. The terrain from Balintawak to Sta. Ines is generally flat to slightly undulating, with slopes from 0 to 15 percent.

b. Segment 7

26. The area that Segment 7 traverses is moderately rugged or medium textured topography. Dissected surfaces are marked by steep ridges and vertical cliffs, with relief ranging from 10 to 50 meters, particularly along major river channels. Slopes along sides of hills, particularly at the forested portions at the Argonaut and Binictican areas are relatively steep, ranging from 40 to 60 degrees, whereas those in the grassy areas from Jadjad River to *barangay*¹ Tipo have gentler slopes of about 20 degrees.

27. Topsoil is generally silty with thickness ranging from almost none to 0.5 meter on slopes and around 1 to 2 meters on plains and hilltops. The silty lateritic soil is generally yellowish at Binictican and grades into reddish dark brown westward toward *barangay* Roosevelt. Soil cover is generally thicker in the forested portions than in the grasslands.

3. Climate

28. The climate of the entire project area is characterized by two pronounced seasons: dry and wet. The maximum rain occurs normally from June to September, during the prevalence of the southwest monsoon season. The dry season lasts from three to six or seven months. The hottest months are April and May; the coolest months are January and February.

¹ A *barangay* is a political subdivision of a municipality.

4. River Systems

a. Segments 1, 2, and 3

29. The natural drainage flow north of San Fernando is generally northwest to southeast in contrast to the northeast to southwest drainage pattern for the rest of the NLE. From Balintawak to Sta. Ines, the following major river systems and tributaries drain the northeastern portion of the project area before they empty into Manila Bay on the southwest: (i) Tullahan River, (ii) Malaking Sapa, (iii) Meycauayan River, (iv) Marilao River, (v) Bulacan River, (vi) Bocaue River, (vii) Bigaa River, (viii) Angat River, (ix) Pampanga River, (x) Pau River, (xi) San Fernando River, (xii) Abacan River, (xiii) Balem River, and (xiv) Quitanquil River.

b. Segment 7

30. The area is drained by three major river systems, forming three watersheds. The Malawaan watershed drains to the west through the nearly parallel Malawaan, Binictican, and Boton rivers, and on to Olongapo Bay. The central portion of the alignment is covered by the Almacen watershed through Jadjad River. The Sta. Rita watershed covers the eastern portion of the area. Drainage patterns are generally fingerlike to pondlike due to the influence of faults and fractures.

A. Biological Resources

1. Forests, Forest Biodiversity, and Habitat

a. Segments 1, 2, and 3

31. Areas traversed by segments 1, 2, and 3 do not have forests or undisturbed natural habitats. The entire influence area (i.e., immediate vicinities east and west of the NLE) has been converted to mixed residential-commercial and industrial, and agricultural (rice and sugarcane fields) use. Acacia, narra, mangium, dapdap, eucalyptus and other trees occur along the roadsides.

b. Segment 7

32. The portion of Segment 7 from Rizal Highway at Binictican to the SBMA perimeter fence fall within the Subic Watershed Forest Reserve, which is managed by the SBMA. The rest of the alignment (from the perimeter fence to Tipo) lie within the Roosevelt National Park, managed by DENR. These protected areas, together with the Roosevelt National Park, are being proposed for inclusion under the National Integrated Protected Areas System (NIPAS), under the biogeographic zone called the Subic-Bataan Natural Park (SBNP).

33. In accordance with the NIPAS Law of 1992, the SBNP is divided into five management zones: (i) strict protection, (ii) restoration, (iii) special use, (iv) multiple use, and (v) marine conservation. The area Segment 7 traverses a multiple-use zone. Based on the management plan for the SBNP² paved roads are allowable in the multiple-use zone category.

² Subic-Bataan Natural Park (SBNP). 1993. *Management Plan for the Subic-Bataan Natural Park*. Manila

34. Out of 8.8 km, only 1 km of the constructed road traverses upland type forest formation. Starting from Binictican, mixed secondary forest grades into residual dipterocarp forest. The rest of the alignment mainly consists of low Molave-type forest, and grasslands, with patches of shrubs and herbs. Portions of the alignment that traverse forested areas are within the SBMA jurisdiction, whereas portions that are mostly devoid of trees and are covered with cogon fall within the SBNP.

35. The constructed road also traverses a small marshland (approximately 2 hectares) opposite the George Dewey High School. Based on interviews and actual field observation, the marshland is a source of crabs, shrimps, crayfish, tilapia, catfish, and mudfish.

36. Although these forested portions and the marshland are also habitats of numerous wildlife species, the constructed road did not traverse any areas known to have rare or endangered species. A bridge was constructed over the marshlands to mitigate the impact on its ecosystem.

2. Aquatic Resources

a. Segments 1, 2, and 3

37. Subsistence fishing is practiced along rivers between the Angat River at Pulilan and the San Fernando River in Pampanga. The marshlands along segment 2 between the Candaba Swamp and San Fernando also provide freshwater resources (fish, frogs, vegetables, etc.) and serve as a temporary sanctuary to birds during their seasonal migration. Small fishponds have recently been developed in the area.

b. Segment 7

38. Most of the creeks and rivers that drain the area have water only during periods of rain, except for Dulungan Creek (a major tributary of Jadjad River). Thus, only a few species are found in these water bodies, including shellfish, frogs, leeches, and guppies. There are no known endangered aquatic organisms in the project area.

B. Sociocultural Conditions

39. Socioeconomic conditions will be discussed on a larger scale, say, by city/municipality, or region, as direct benefits of the Project will be of a regional scope rather than in small pockets. Thus, the number of direct beneficiaries will greatly exceed the number of project affected persons.

1. Population

40. Metro Manila had 9.8 million people in 1996, with a population growth ranging from 2.6 percent to 5.0 percent per year from 1980 to 1995. Of the 18 municipalities of Metro Manila, the following topped the growth rate with 7.6 percent or more per year: (i) Caloocan (North), (ii) Las Piñas, (iii) Malabon, (iv) Mandaluyong City, (v) Navotas, (vi) Parañaque, (vii) Pasig, and (viii) Valenzuela.

41. Region III (Central Luzon), recorded a total population of 6.9 million in 1995, with Bulacan having the highest number at 1.8 million. Average annual growth rates are: Region III, 2.26 percent; Bulacan, 3.46 percent; and Nueva Ecija, 2.78 percent.

2. Socioeconomic Conditions

42. In 1997, the incidence of poor families, or the proportion of poor families to the total number of families for the NCR was 7.1 percent. In terms of gross regional domestic product (GRDP), the NCR registered, ₱836 million (\$19.5 million), or a high 30.6 percent of the national total.

43. In the same year, Region III registered a 16.8 percent incidence of poor families. The GRDP for Region III in that year was ₱202,671 (\$4,725), or 8.4 percent of the national total.

3. Archaeological, Historical, and Cultural Values

44. There are no known significant archaeological sites in the project areas. No known historical or cultural sites will be negatively affected by the Project. Access to some of them may be enhanced.

4. Use of Transport Infrastructure

45. Rapid urbanization in Metro Manila and nearby regional growth centers resulted in a significant growth in road traffic. For over two decades, the NLE has been a reliable road link between Metro Manila and the rest of Northern Luzon, and connects developing areas of Central Luzon. These areas could have rapid increases in industrial, tourism, and agricultural activities. The areas consists of 47 key municipalities from the provinces of Bataan, Bulacan, Nueva Ecija, Pampanga, Tarlac, and Zambales.

46. Presently, the NLE pavements periodically need costly overlays to maintain an acceptable level of riding comfort and safety. The segment nearest to the fast growing NCR area has more traffic than it can accommodate properly. This is most apparent at peak period, when long queues occur near interchanges and traffic moves very slowly in between.

47. The widening at segments 1 and 2 as well as the upgrading and improvement of the whole system, is undertaken to meet these needs through increased capacity, improved safety, better operational efficiency, and restored riding quality.

IV. SCREENING OF POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

A. Environmental Effects Related to Project Location and Design

1. Locational Issues

a. Segments 1, 2, and 3

48. Since the improvement of segments 1, 2, and 3 will be done within the existing road ROW, no adverse environmental effects related to location selection is envisioned. Although segment 1 will be widened, the additional lanes to be constructed will be taken from the center island and the present shoulder of the expressway. Only the new toll plaza and interchanges, with their improvements will need limited additional land.

49. For materials, the contractor will rely on commercially operated quarry and borrow sites and local suppliers within a 50 km radius of the NLE, depending on the ease of access to the work site. Embankment materials mostly consist of lahar, which is plentiful in the Pampanga areas. Crushed aggregates will be brought from Bataan, Bulacan, and Pampanga.

50. Locally available materials from existing quarries and nearby sources will be used to ensure that construction support operations will be conducted well along established routes and sites to avoid new major impacts from the construction.

b. Segment 7

51. The alignment of Segment 7 was chosen within a very limited, narrow strip given the rugged terrain and structural constraints present. The road traverses a multiple use zone, which is appropriate for a transport corridor (paras. 32-33).

52. Construction materials were obtained from local suppliers. Earth for embankment and backfill areas was obtained from material excavated for the roadway. Aggregates for the subbase and base course were obtained from the Cabangon River in Iba, and Cabalan River in Olongapo, both in the province of Zambales; and the Pinulot River in Dinalupihan, Bataan. Rock fill was obtained from the Boton area inside the SBMA. Quarry sites and the quality of materials were approved by the Department of Public Works and Highways through the independent design checker and independent certification engineer.

2. Impacts on Air Quality

53. As in any construction stage, earthmoving activities will temporarily increase the total suspended particle levels due to the removal of ground cover and exposure of loose, dry earth. Levels of exhaust gas emissions such as hydrocarbons, carbon monoxide (CO), and nitrogen dioxide (NO₂) will also increase as a result of the operation of heavy equipment and vehicles.

3. Impacts on Natural Vegetation and Wildlife

a. Segments 1, 2, and 3

54. Except for a few trees and vegetation around interchanges and toll plazas, construction will have no major impact on natural vegetation and wildlife within the proposed improvement area. Trees and vegetation will be installed after the construction (para. 98).

b. Segment 7

55. Loss of vegetation was when this segment was built, since there are no open areas within the corridor where an alternative alignment could have been located. The type of trees and shrubs that were cut are found abundantly in the other parts of the forest. Nevertheless, a reforestation program was implemented, and the proponent planted 10 trees for every tree that was cut. The reforestation area designated by the Ecology Center of the SBMA is in the foothills of Mount Sta. Rita. The Ecology Center required replanting with mahogany, acacia, and agoho species. A high 80 percent survival rate was recorded as of May 1999 (para. 65).

4. Impacts on Land Use and Relocation

a. Segments 1, 2, and 3

56. No significant change in land use is expected along the NLE since the alignment will not change. Although additional ROWs will be secured for the interchanges and toll plazas, the ROWs will be limited to areas needed for these facilities, and thus are not expected to induce any significant change in land use.

b. Segment 7

57. Although road construction normally attracts development along the traversed corridor, this is not expected along Segment 7 because it is within a protected area—the SBNP. Section 12 of the NIPAS Law (Republic Act No. 7586), requires any activity that is outside the scope of the management plan for protected areas to have an ECC before implementation.

5. Encroachment on Historical and Cultural Sites

58. The project will not encroach on historical and cultural sites since none of these are within the needed ROW.

6. Interference With Drainage Patterns and Water Quality

a. Segments 1, 2, and 3

59. Improvement works along the NLE will not involve the construction of any new bridges that will interfere with the drainage patterns in the project area. Therefore no significant impact is expected to occur along these waterways during construction.

b. Segment 7

60. About six waterways were traversed by Segment 7. Of these, only the Dulungan Creek, a major tributary of the Jadjad River, flows all year round. During the placement of culverts and construction of bridges, erosion and sedimentation increased, as expected, along the waterways. These impacts were unavoidable and temporary. The unimpeded, natural flow of clear water, which is now observed along the sites of these bridge and culverts, indicates that these water bodies have recovered from the impacts of construction activities. Even the slopes of riverbanks have recovered and are now thickly vegetated with plants native to the area.

61. The Argonaut Bridge was constructed to minimize impacts to this marshland's ecological system.

7. Visual Effects and Aesthetics

a. Segments 1, 2, and 3

62. Visual impacts will be minimal since works will be done along the existing expressway.

b. Segment 7

63. The clearing, stripping, and cutting along vegetated areas will be aesthetically displeasing in the short term. However after proper revegetation, landscaping, and maintenance efforts, Segment 7 has been restored and is aesthetically pleasing. In one section, the aesthetic and scientific values were improved as the cogon was removed, some interesting natural rock made visible, and soil was replanted with vetiver grass.

B. Environmental Effects Related to Project Construction

1. Natural Vegetation and Wildlife

a. Segments 1, 2, and 3

64. Except for removal of a few trees near interchanges and toll plazas, there will be no major impacts on natural vegetation and wildlife.

b. Segment 7

65. During construction of Segment 7, old growth dipterocarps and secondary forest species were cut along a 1 km by 60 meter wide strip equivalent to about 6 hectares. As part of its commitment to protect and enhance the environment, MNTC replanted trees in the foothills of Mount Sta. Rita (para. 55). Compared to the normal 1:1 reforestation ratio set by DENR, MNTC agreed to a 1:10 ratio, since the area is within a protected watershed forest reserve. The replanted trees are now about 3-5 m tall, and cover part of the once barren hills.

2. Land Use and Settlements

a. Segments 1, 2, and 3

66. All improvement works for the mainline will be within the NLE's ROW. Since the widening will be toward the center islands and outer shoulders, no settlements will be displaced and no change in land use is expected.

67. The additional ROWs for the interchanges and toll plazas will be limited to areas needed for these facilities, and are not expected to bring about any significant change in land use. However, at the Malinta interchange, a makeshift structure is encroaching on the NLE ROW. This structure which has 25 stall holders, is referred to as the Paso de Blas Public Market.

68. TRB has consulted with the stall holders and concerned barangay officials. TRB will issue a letter to the barangay requesting that encroached portion of the NLE ROW be turned over to TRB. TRB has expressed its willingness to assist the affected stall holders in accordance with established procedures and existing laws. A barangay resolution endorsing the proposed improvement works along the Malinta interchange is being prepared.

69. MNTC will submit to ADB for its guidance, the following documents: (i) certification from the TRB that it will deliver the Malinta area ROW free of any obstruction and impending social issues, and (ii) copy of the barangay resolution.

b. Segment 7

70. Prior to the construction of Segment 7, affected settlers were compensated for their cost of moving. All the right-of-way for Segment 7 is on public land and less than 10 houses were affected.

71. Although Segment 7 was constructed through forested land, no change in land use is expected because it is within a protected area. Even the immediate vicinities of the area are within the SBNP. As such, strict measures to avoid human encroachment were included as a condition in the ECC issued. One of the measures taken was fencing of the entire segment 7.

3. Health and Safety

72. Health and safety impacts such as the spread of malaria and other contagious diseases brought by migrant workers, unsanitary domestic waste disposal, and construction-related accidents may occur if appropriate environmental management measures are not diligently implemented.

73. To minimize such risks, the following measures will be carried out: (i) the contractor will submit medical certificates for all its laborers before employment; (ii) a health and safety program will be incorporated in the environmental management and monitoring plan that the contractors is required to submit; (iii) the contractor is to spot check construction sites and camps and submit results as part of the monitoring report; (iv) the contractor will provide necessary personal protective paraphernalia such as safety boots, heavy duty gloves, dust/gas masks, goggles, ear muffs, and the like to the labor force; and (v) the contractors will conduct training and seminars on occupational health and safety practices. These measures will be stipulated in the construction contracts.

4. Erosion and Silt Control

a. Segments 1, 2, and 3

74. Since only improvement works will be involved, the risk of extensive erosion and siltation is minimal, compared to such risks with construction of new roads. Nevertheless, standard erosion and siltation control measures will be included in the construction contracts.

b. Segment 7

75. In some sections of segment 7, steep cuts were unavoidable. To avoid/minimize erosion and siltation, (i) temporary erosion control features were provided, (ii) berms and chutes were constructed; and (iii) vetiver grass was planted along cut slopes and embankments.

5. Nuisance to Nearby Properties

a. Segments 1, 2, and 3

76. Since there are limited populated areas near the construction areas, nuisance will mostly be dust, gaseous emissions, noise, and vibration, and traffic congestion that will affect NLE users. These can be mitigated by (i) spraying of water on loose, exposed soil to avoid dust resuspension; (ii) regular maintenance of heavy equipment, and (iii) proper implementation of the traffic management plan.

b. Segment 7

77. Since no settlements are within or near the construction area, nuisances such as dust, gaseous emissions, noise and vibration were confined to the construction workers. The workers were provided with dust masks, and ear muffs. Water was regularly sprayed on exposed cut slopes, embankments, and loose soil. Vehicles and heavy equipment were maintained regularly.

6. Interference with Utilities, Traffic, and Blockage of Access Ways

a. Segments 1, 2, and 3

78. Utility lines such as electrical, communication, and water lines will be affected at 16 toll plazas and interchanges. Relocation of the affected utilities will be closely coordinated with the utility companies so that impacts will be minimized.

79. Three power transmission line segments need to be relocated at the proposed Bocaue toll plaza, and at the Sindalan and Angeles interchanges. Another 12 secondary distribution lines will be affected at Novaliches, Malinta, Meycauayan, Marilao, Bocaue, Tabang, Sta. Rita, Pulilan, San Simon, San Fernando, Angeles, Dau interchanges.

80. About seven telephone lines and communication cables will need relocating in Balintawak, Malinta, Meycauayan, Bocaue, Pulilan and Angeles. The only water line that will be affected will be that at Balintawak. Four water wells will be affected, at Meycauayan, Tabang, San Fernando, and Sindalan.

81. Along the main NLE, some street lighting along the median may be affected. Impacts on the local roads will be minimal and will be limited to merging points of ramps at interchanges.

b. Segment 7

82. The detailed engineering design of the Subic Freeport Expressway minimized the need to relocate utilities. During the construction, only one National Power Corporation electric pole was relocated. Traffic was not affected since this was a new alignment traversing mountainous terrain. Two barangay roads (Purok IV road and Sta. Rita road) could have been affected by the construction of the new road, but this was properly addressed with the construction of the Sta. Rita overpass and the Purok Farm crossing. Access roads were developed during the construction of the two bridge crossings, to avoid inconvenience to the residents.

C. Environmental Effects Related to Operation

1. Operation and Maintenance Capacity

83. The operation and maintenance (O&M) of the Project will be the sole responsibility of MNTC. However, MNTC should coordinate closely with other government agencies, particularly those involved in monitoring. These agencies are (i) DENR, (ii) local government units (LGUs), and (iii) Department of Public Works and Highways.

2. Noise, Vibration, Air Pollution, Run-Off, and Spills of Hazardous Materials

84. Impacts of noise, vibration, and air pollution generated by vehicular traffic can be minimized by planting trees to act as natural barriers on both sides of the NLE (for portions with few or no trees). In segment 7, almost the entire alignment has natural barriers in the form of trees and hills. Spills of hazardous materials (e.g., accidents involving oil tankers) can be avoided/minimized by continuously and diligently monitoring adherence to the prescribed speed limits, and other traffic signs. The O&M company will immediately remove stalled vehicles from the expressway.

85. During the operation phase, the daily vehicular emissions are not expected to cause significant deterioration of the air quality. With the phase out of leaded gasoline announced in February 2000 and the anticipated implementation of the Philippine Clean Air Act of 1999, the air quality in Metro Manila and its immediate vicinity is likely to improve. Part of the Government's project on improving Metro Manila is air quality (financed by ADB) is the introduction of a motor vehicle inspection system, upgrading of the ambient air quality monitoring system, funding of air pollution monitoring equipment, and improvement of the campaign againsts smoke belching vehicles. MNTC will be actively involved in helping the Government monitor vehicular emissions. In addition to this, MNTC will also be an active participant, together with the concerned LGUs, stakeholders, and DENR, in campaigns against smoke belching, which will be formulated during the preparation of DENR's air quality control action plan.

3. Land Use and Settlements

a. Segments 1, 2, 3

86. Since the NLE is an existing highway, social impacts are expected to be very minimal. Changes in land use may be induced by the improvement of the expressway, but will not be very significant. Such changes are more likely to be induced by the economic growth of the host municipalities, and changes in their development plans than by upgrading the NLE.

b. Segment 7

87. No change in the existing land use of the project area is expected (para. 57).

4. Social Impacts

88. The beneficiaries of this Project are the host municipalities and the entire NCR and Region III. Since the NLE is the only expressway going to the north, even regions south of the NCR and north of Region III may benefit from the improvement. This can translate into vast savings in vehicle operating costs and consequently the transport costs of goods coming from and going to these regions. The host LGUs and barangays will benefit through increased taxes from the operation of the expressway. The benefits of local communities (host and immediate cities and municipalities), particularly the road users include (i) improved accessibility in terms of safety, timeliness, and convenience; and (ii) in the long term, improved quality of life and delivery of social services and increased in employment opportunities as a result of economic growth of the host cities and municipalities. In short, the overall positive impacts are expected to significantly outweigh the negative impacts. However, an efficient monitoring scheme must be implemented to assure these benefit eventuate.

V. INSTITUTIONAL REQUIREMENT AND ENVIRONMENTAL MONITORING PROGRAM

A. Institutional Framework and Responsibilities

1. Construction Phase

a. Proponent

89. MNTC, as the proponent, will bear full responsibility for ensuring that the Project complies with all the conditions stipulated in the ECC and meets all the mitigation and monitoring requirements described in the environmental reports. MNTC will liaise with the government agencies, i.e., DENR (Community Environment and Natural Resources Office, Provincial Environment and Natural Resources Office, and Environment Management Bureau), TRB, LGUs, (provincial city, municipal, and barangay officials), non-government organizations (NGOs), and the other stakeholders in implementing and monitoring the compliance to with the conditions stipulated in the ECC.

b. Contractor

90. During project implementation and construction, the contractor will assure that the Project complies with all the conditions stipulated in the ECC and will ensure that all mitigation and monitoring requirements described in the environmental reports are complied with. The contractor, as part of its design and construct contract with MNTC, will prepare a comprehensive environmental mitigation, monitoring, and management plan that includes a comprehensive traffic management plan for the construction phase, and will strictly enforce compliance with that plan during the construction phase.

c. Consultant

91. An environmental consultant with extensive experience in environmental assessment and monitoring of infrastructure projects will be engaged by MNTC to periodically audit the implementation of the mitigation measures and monitoring plan by the contractor. The consultant will also help strengthen the capacity of MNTC and its contractor by providing training in social and environmental baseline studies and long-term monitoring.

2. Operation and Maintenance Phase

a. Concessionaire

92. MNTC, as the concessionaire, will ensure that the Project complies with all the conditions stipulated in the ECC and meets all the mitigation and monitoring requirements described in the environmental reports. MNTC will continue to liaise with the different government agencies, i.e., DENR, TRB, LGU's, NGOs, and other stakeholders in implementing and monitoring the compliance with the conditions stipulated in the ECC.

b. Operator

93. The O&M company will assure that (i) the Project complies with all the conditions stipulated in the ECC during the concession period, and (ii) all mitigation and monitoring requirements described in the environmental reports are complied with. The contractor, as part

of its contract with MNTC, will prepare a comprehensive environmental mitigation, monitoring, and management plan that includes a comprehensive traffic management plan for the O&M phase, and will strictly enforce compliance with that plan during the O&M phase.

c. Consultant

94. An environmental consultant with extensive experience in environmental assessment and monitoring of infrastructure projects will be engaged by MNTC to periodically audit the implementation of the mitigation measures and monitoring plan by the operator.

B. Environmental Monitoring Program

95. Since the setting and type of construction activities vary for segments 1-3 (existing expressway, improvement works only) and segment 7 (watershed reservation, construction of a new road), two types of monitoring schemes were prepared. Construction and improvement works in the interchanges and toll plazas will generally follow the environmental monitoring program for segments 1, 2, and 3, except that it will have additional provisions regarding social impacts associated with ROW acquisition procedures.

1. Segments 1, 2, and 3

96. The following parameters will be monitored during the construction phase:

- (i) air quality (total suspended particles [TSP], NO₂, CO, and hydrocarbons);
- (ii) noise levels and vibration;
- (iii) water quality (total suspended solids, dissolved oxygen, oil & grease);
- (iv) implementation of the traffic management plan;
- (v) solid waste (construction spoils and domestic wastes) management;
- (vi) payments for improvements and damage;
- (vii) interference with utilities (electricity, water, and telephone lines); and
- (viii) decommissioning and abandonment.

97. The MNTC contractor will bear the cost of installing the monitoring stations during construction. During the entire construction period, MNTC will submit quarterly environmental monitoring reports to DENR. The reports will include the status of the parameters to be monitored. During this period, any violation of the conditions stipulated in the ECCs will be penalized in accordance with existing environmental laws. Subsequent violations could result in suspension of construction activities.

98. During the operation phase the following parameters will be monitored:

- (i) air quality (TSP, NO₂, CO, and hydrocarbons);
- (ii) traffic flow and vehicular efficiency; and

- (iii) aesthetics (landscaping and planting of trees along the road).

99. Air quality monitoring stations will be established based on the homogeneity of the area in terms of pollutant sources (i.e., areas with high traffic volumes and low mobility, vis-à-vis areas with low traffic volume and high mobility). The O&M company will bear the cost of installing the monitoring stations during the operation phase. Monitoring activities will be conducted until a reasonably established trend is obtained. Monitoring of traffic flow and vehicular efficiency, and of aesthetics, will form part of the regular toll road O&M works.

100. During operation, MNTC will submit quarterly monitoring reports to DENR and ADB. DENR, the Department of Transportation and Communication, and the concerned LGUs will be directly responsible for instituting measures to reduce pollutant levels. They will also be in charge of apprehending violators of environmental laws.

2. Segment 7

101. During the construction phase, MNTC engaged an environmental consultant to evaluate project implementation and report on the status of ECC compliance. The report focused on slope stability, water quality and assimilative capacity of creeks and rivers, waste disposal, and status of payments to improvements. The report was reviewed by ADB.

102. The following parameters will be monitored during the operational phase:

- (i) air quality sampling and analysis (TSP, NO₂, CO, and hydrocarbons);
- (ii) hydrology and drainage engineering (regular maintenance of drainage systems such as storm drains, ditches, culverts, etc.);
- (iii) slope protection and stability (vegetation along slopes, and talus materials); and
- (iv) aesthetics (maintenance of regenerating forest and designated reforestation area).

103. Item (i) will be monitored until a fairly well established trend is attained. Item (iii) will be continued until the slopes are established through natural processes and engineering intervention, or are covered with stabilizing vegetation. Items (ii) to (iv) will be part of regular road maintenance works.

104. Since the alignment is within a protected area, MNTC will submit quarterly monitoring reports to the SBMA Ecology Center and DENR reflecting progress on monitoring activities, and an assessment of the appropriateness of mitigating measures adopted. Recommendations to improve mitigation efforts will be included in the reports.

105. An annual report, containing summaries of the reports submitted to DENR and the SBMA Ecology Center, will be submitted to ADB. This report will include a compilation of environmental monitoring reports for the construction and operation phase of Segments 1, 2, and 3, together with reports for the operation phase of Segment 7.

C. Costs of the Environmental Mitigation and Monitoring Program

1. Compensatory Planting for Affected Forestry Land in Segment 7

106. SBMA through its Ecology Center, required reforestation as compensation for the trees cut due to the construction of the alignment (para. 55). The reforestation was accomplished by an experienced private corporation during a period of three years from the date of planting up to the turn over and acceptance by SBMA. The reforestation cost (₱2.5 million including monitoring) was borne by MNTC.

2. Monitoring Costs

107. MNTC will engage a consultant with extensive experience in EIA studies of infrastructure projects, to conduct an independent audit of the environmental monitoring program for the segments under study. To ensure impartiality, the audit will be held in coordination with the DENR Environmental Quality Division. The monitoring costs will be as follows: (i) ₱50 million (about \$1.17 million) for the construction and operation phase of segments 1, 2, and 3; and (ii) ₱10 million (about \$233,000) for the operation phase of segment 7.

D. Public Consultation

1. Segments 1, 2, and 3

108. DENR did not require public consultation for the main NLE because there are no settlements within construction area. For the interchanges and toll plazas, disclosure of project details was limited to the heads of the LGUs, to avoid triggering land speculation. Social acceptability was therefore obtained from the affected constituents through their LGUs.

2. Segment 7

109. Provisions for public consultation programs under existing Philippine environmental laws were all complied with.

VI. FINDINGS AND RECOMMENDATIONS

110. In general impacts on the environment can be considered minimal, particularly for segments 1, 2, and 3, since the Project will involve only improvement works. Furthermore, environmental assessments were thoroughly undertaken, and DENR's stringent requirements were met before the ECC was issued.

111. For segments 1, 2, and 3

- (i) improvement works in segments 1, 2, and 3 on the main road will all be within the ROW, and will be toward the existing median and shoulders;
- (ii) a comprehensive traffic management plan will be prepared to ensure minimal and controlled disturbance to vehicular traffic along the NLE; and
- (iii) ECCs have been obtained for all segments of the work.

112. For segment 7

- (i) a substantive inventory of valuable, baseline information on the forest reservation area was taken to establish the baseline data needed to monitor the Project's environmental impact;
- (ii) project location and design took careful consideration of the pristine condition of the watershed;
- (iii) the alignment is within the multiple use zone of the protected area, which allows the construction of paved roads;
- (iv) DENR has granted ECC;
- (v) culverts and bridges were constructed for drainage and to allow mobility and provide safety to Aeta people and wildlife in the forested areas;
- (vi) less than 10 houses were affected by the project, all of which are occupying lands owned by the government, and payments to the affected people were made before the commencement of construction activities;
- (vii) provision is made for self-monitoring as well as monitoring by third parties from construction through operation phases to ensure protection and enhancement of the environment; and
- (viii) for the interchanges and toll plazas
 - (a) Design criteria provided for minimal disturbance to human settlements and considered favorable topographic and geologic characteristics; and
 - (b) ECCs for all interchange and toll plaza sites have been obtained, except for those within the NCR, which are issued as soon as the required additional information is supplied.

VII. CONCLUSION

113. Positive impacts of the Project significantly outweigh the adverse impacts, as reflected (i) in the environmental assessment studies, and (ii) DENR's issuance of ECCs (even for a segment traversing a protected area). For the improvement works, the only possible significant adverse social impact would be traffic congestion along the existing expressway during construction. This however, can be mitigated by proper implementation of the traffic management plan. With the alignment within the protected area, potential adverse impacts identified in the EIS were mitigated during the construction phase and mitigation will continue during operation. The most recent monitoring report indicates that the affected ecosystems are recovering well from the unavoidable impacts of construction. This is evidenced by the (i) abundant young, natural vegetation indicating natural regeneration; (ii) slopes of riverbanks, cut sections, and embankments having mostly achieved their natural angle of repose, and being stabilized with natural and introduced vegetation (vetiver); and (iii) the flow and quality of rivers and creeks traversed by the highway being back to their normal condition.

114. The report concludes that proper implementation of mitigating measures can minimize adverse impacts to acceptable levels, as shown by the good recovery in Segment 7. To ensure sustainability of the project benefits, an effective monitoring scheme must be followed.

