JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA
MINISTRY OF TRANSPORT AND HIGHWAYS
ROAD DEVELOPMENT AUTHORITY (RDA)

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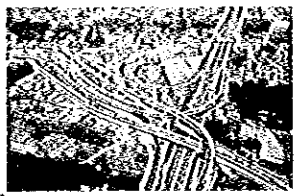
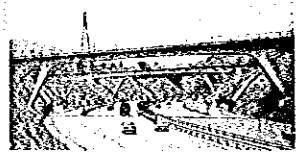
THE STUDY ON THE OUTER CIRCULAR HIGHWAY TO THE CITY OF COLOMBO

FINAL REPORT

VOLUME 5 OF 5





ENVIRONMENTAL & SOCIAL IMPACT ASSESSMENT
VOLUME I(MAIN TEXT)
VOLUME II (FIGURES, TABLES, MAPS)

FEBRUARY 2000

ORIENTAL CONSULTANTS COMPANY LIMITED

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VOLUME I

MAIN TEXT

TABLE OF CONTENTS

1. EXECUTIVE SUMMARY

Introduction

The JICA Study Team conducting the Feasibility Study of the Outer Circular Highway to Colombo has retained Engineering Consultants Limited to conduct the Environmental Impact Assessment (EIA) of the proposed highway.

The Outer Circular Highway [OCH] to Colombo was one of the several highways/expressways proposed by the RDA to fulfil the need for improving the road network to cater to the increase in traffic volume due to liberalization of imports since 1978.

The purpose of the EIA is to ensure that the potential environmental consequences of the proposed OCH are recognized early for required mitigatory action, which will be taken into consideration in project planning and designs. The present EIA assesses the existing environmental conditions in the 2 km wide corridor encompassing the proposed 100m wide right of way, identifies significant impacts on the environment, evaluates alternatives to the proposed road and recommends mitigatory measures for identified significant adverse impacts. It also presents a monitoring plan and makes a recommendation on the environmental acceptability of the road project. An environmental cost benefit analysis, a land use map on 1:20,000 scale and a map containing the environmentally acceptable trace has also been included in the EIA.

The general methodology adopted in the EIA process is as follows:

- Analysis and understanding of the Terms of Reference (TOR)
- Identification of potential impacts and preparation of a relevance matrix.
- Survey and collection of available information
- Identifying the data to be collected and procedures to be adopted
- Conducting social, ecological and hydrological field surveys
- Preparing detailed land use map
- Conducting Air and Water quality and Noise level monitoring surveys
- Identification of significant impacts
- Comparison of alternatives
- Recommending mitigatory measures
- Formulating a monitoring plan
- Making recommendations on environmental feasibility of the project.

The EIA has examined all classes of roads and ferry crossings in the study area giving due consideration to the limitations in the existing road system. The government policy on the development of the road network is to minimize traffic congestion on existing trunk roads, particularly within the city of Colombo and promote regional development. The plans developed by the Urban Development Authority (UDA) are oriented towards shifting the urban functions and populations to the outer suburbs to assist in reduction of traffic

congestion. The proposed OCH abides by the Government policy and conforms to the UDA plans.

The legal requirement for the EIA is found in the National Environmental Act No. 47 of 1980 and No.56 of 1988. The legal authority for land acquisition is provided by the land acquisition Act No.9, the Road Development Authority Act No.73, the Urban Development Authority Act No.41, Urban Development Project (special Provisions Act No.2).

Resettlement issues, previous experience of resettlement and land acquisition have also been addressed in the EIA.

Description of the Proposed Project

The major roads radiating out of Colombo have become national assets and due to absence of a highway to bypass Colombo City, through traffic causes unnecessary congestion. The aim of the proposed project is to provide a major orbital road to connect the major roads.

The proposed OCH is a 4-lane access controlled highway with provision for expansion upto 6 lanes. It will have fencing on the verges, frontage roads, intersections to connect major roads, underpasses for traffic flow on some of the C & D class roads and other infrastructure facilities of a highway.

The construction work of the OCH is scheduled to start in 2004 and end in June 2005. The construction methodology described in the EIA is typical of road construction projects.

Development of Alternatives

While 5 alternative traces were evaluated in the pre-feasibility study in 1992, the JICA Study Team examined 09 alignments in March 1999. The Interim Report submitted by the Study Team in May 1999 included the initial environmental examination report, which evaluated the environmental impacts of the 09 alignments. The Interim Report recommended alignment A5 as the most appropriate alignment, which is considered in the EIA.

The option of a railway system as an alternative to the OCH has been considered. Further, the no action alternative has also been taken into consideration.

Existing Environment and Site Description

The physical environment of the proposed project area was studied in detail by using available data and field surveys including sample analysis. While the proposed trace crosses the Kelani River and the Bolgoda Canal, the entire trace lies on the lowest peneplain, which is mainly flat, with a few low hills and undulations. The project area is in the wet zone, which benefits from the bimodal rainfall pattern of the country and contains a fair number of water bodies. A significant number of drainage paths cross the proposed trace. There

are also several minor irrigation canals crossing the trace or traversing along the trace.

The ground water levels prevailing along the trace has also been recorded. Further, two Hydrogeological units have been identified as closely associated wit the underlying geology.

The soils in the project area have been identified, and the general geology and mineral resources of the area has also been described. The water quality in the project area has been identified by field monitoring and using available data. Air quality and noise levels have been studied the same way.

Ecological resources have been recorded using available data and field surveys. The ecological habitats in the project area have been identified as Marshes, Paddy lands, Home gardens Plantation crops, Shrublands, Rivers, Streams and Lakes. The distribution of these habitats have been mapped and depicted in map 5-3-6, in volume II. The floral diversification of the project area has been established with regards to above habitats and the inventory of plants have been annexed in volume II of the project. Endemicity and the stability of plants with regard to abundance/threat have been included in the listing.

Invertebrates, fish, amphibians, birds and reptiles in the project area has been listed. Their endemicity and current status with regards to abundance/threat has been stated. The habitat of fauna in the project area has also been described.

With regard to present land use in the area, the compilation methodology of the 1:20,000 scale land use map has been detailed and the different land use areas have been quantified. Important sites, power lines, industrial sites, educational and religious places, burial grounds and recreational areas affected by the road trace have been enumerated and tabulated. The affected transport, irrigation canals, drinking water, electricity and telephone facilities, hospitals and health facilities, markets and other institutions have been identified. The general socio-economic conditions have been examined and described. The socio-economic profile in the study area including demographic characteristics social infrastructure, cultural ties income generation and employment has been summarized under this sub heading while the data compiled through surveys are tabulated in Volume II. Other infrastructure facilities such as roads has been identified and listed.

Anticipated Environmental Impacts

The anticipated impacts of the operational phase of the project have been identified with regard to the following physical, biological and social aspects of the environment.

- Surface run-off and future flood water levels
- Irrigation and flood protection works
- Inundation levels in flood plains
- Future urbanization of the sub- catchments

- Water quality changes.
- Noise and vibration levels
- Air quality changes
- Loss of habitat
- Fauna and flora
- Fisheries and aquatic life
- Community severance
- Changes in property values
- Changes in accessibility and demand for schools, religious and business institutions.
- Effect on transportation
- Effect on special social groups
- Effect on households and businesses to be relocated
- Effect on employment opportunity
- Effect on accessibility
- Fragmentation of agricultural lands
- Loss of agricultural land and production
- Changes in economic and socio -economic situation

The significant impacts on the physical resources are disruptions to the drainage pattern by the effect of the road embankment on surface run-off and flood and inundation levels in the flood plains. However, these impacts which could cause severe environmental problems can be avoided or minimized with proper engineering designs that would allow for natural flow of surface run-off and floodwaters.

The significant adverse effect on the biological resources is the impact on wetlands around Bolgoda Lake system. In addition, construction activities may cause adverse effects on the ecosystems as well as fauna and flora.

The social impact assessment was carried out to assess the likely impacts, especially adverse social impacts that may result from the implementation of proposed OCH. Three main methods were employed to collect data and information to analyze the social impacts. These are: data collection from Grama Niladharis within the study area-2 km corridor, focus group discussions with the community leaders along the identified 100 m road trace, and household survey on 432 families living along the road trace.

The analyses revealed that the proposed project might result in significant social impacts. The affect on properties in the 100 m trace will include:

- A large number of developed households;
- A moderate number of business places;
- A moderate number of industries;
- A few educational institutions (schools);
- A few religious places;

- A few cemeteries;
- And some other developed properties in a rapidly developing area in general.

Some of the major negative impacts on the existing socio-economic environment are as follows:

- A significant number of households have to be relocated and this will lead to various types of community severance. The long term established community relations would be affected.
- There will be physical as well as psychological shocks to the communities affected.
- The established livelihood system will be disrupted.
- Parts of land will be lost and some other land will be fragmented. The productivity of such lands will be affected.
- Some school buildings will be affected. This would be a problem for the children studying in the schools as well as for their parents.
- Religious places will be affected in some locations.

The impact of construction activities has been studied in detail and haulage of construction material; emission of particles; sediment generation and noise are the significant impacts identified. Extraction of construction material, particularly sand, has been sited as a major problem.

Measures to Mitigate Impacts

In a development project designed to be implemented in a highly a developed area, environmental impacts cannot be totally avoided. What is possible is to minimize such impacts to the extent possible. Therefore, mitigatory action for all the significant adverse impacts have been recommended.

The major action to be taken is to design the road trace to minimize the negative impacts on the communities and their properties and also wetlands. In the eventuality that the community is affected proper compensation should be offered to the affected communities. An effective compensation program should be implemented to the satisfaction of the affected people. Adequacy, timeliness and reliability are the main criteria to be fulfilled in implementation of the compensation program.

Overall, the RDA should employ a participatory approach to implement the mitigatory program in the field. For this an effective rapport should be built with the affected parties as well as with the grassroots level agency officials in the field. Working closely with divisional secretaries in the project area will be

a necessary condition. With the experience RDA has gained in the past road development projects it should be able to handle the problems mentioned above with the assistance of other external expertise.

The impact on the drainage pattern can be avoided or minimized to an acceptable level by providing bridges culverts and other drainage structures of the required capacity where necessary.

The impact on Bolgoda wetlands has to be avoided by shifting the road trace away from the wetland system.

However, for the impact of sand extraction mitigation suggested may not be acceptable to all stakeholders considering the additional cost involved. Further investigation in this area maybe required.

Evaluation of Alternatives

Alternative alignments have been comparatively analyzed in the initial environmental examination done earlier and a summary is included for reference. The railway system alternative was considered and rejected, as it was not economically viable as the complete railroad system will have to be built anew.

The No Action alternative was rejected, as the development need for the OCH was not fulfilled. Further, beneficial impacts as saving on travel time, decrease in air pollution levels is anticipated from OCH.

Extended Environmental Cost Benefit Analysis

The Extended Cost Benefit Analysis has considered the financial and economic costs and benefits of the project and extended the analysis to Environmental Benefit Cost. The results of the analysis indicate that the project is feasible after environmental costs and benefits are considered.

Institutional Requirements and Environmental Monitoring Program

The institutional requirement for monitoring has been identified as the establishment of a project monitoring committee (PMC) which will be responsible for the implementation of the monitoring plan. The constitution of the PMC has been suggested and the required monitoring with regard to Flood levels, Air and Water quality, and Noise level, Biological aspects, Relocation and Resettlement have been detailed.

Conclusions and Recommendations

The conclusions reached are that whereas the proposed OCH is an economically viable necessity, its adverse environmental impacts mentioned above are significant. Hence, it is essential that the recommended mitigation be implemented under close monitoring.

Based on these conclusions a recommendation has been made to the effect that the project is environmentally acceptable provided that the environmentally acceptable road trace recommended in the EIA is considered and the mitigatory action implemented. Moreover, the contract documents should include environmental safeguards and recommended Project Monitoring Committee should closely monitor the implementation of the mitigatory measures.

Further investigation is required with regard to the extraction and source of sand.

In addition, a resettlement plan including potential resettlement sites, compensation for different categories of people to be relocated and a time schedule should be formulated immediately after the determination of the final road alignment.

2. INTRODUCTION

2.1 Background

The JICA Study Team having been contracted to conduct the Feasibility Study for the Outer Circular Highway to Colombo has retained Engineering Consultants Limited for carrying out the Environmental Impact Assessment (EIA) of the proposed highway.

The need for improving the road network of the country became an essential requirement immediately after the rapid growth in traffic volume, which was brought about by the liberalization of vehicle imports in 1978. From the preliminary studies conducted to ascertain ways and means to handle this sudden increase of vehicle population, it transpired that rehabilitation and widening of existing roads to cope up with future traffic needs at a meaningful level of service is a daunting task mainly due to inherent deficiencies in the alignment and width that cannot be rectified without resorting to large scale acquisition and demolition of buildings and relocating service utilities involving greater social and economic repercussions.

In view of this, the Road Development Authority (RDA) made a recommendation to the Government of Sri Lanka for the development of a system of Alternative Trunk Roads, in 1990. The proposal was for the development of the following highways/expressways.

Inner Circular Ring Road – Improvement of Baseline Road extension southwards;

Outer Circular Ring Road;

North bound Road;

South bound Road – Alternate highway from Colombo to Galle and Matara starting from Outer Circular Ring Road;

Highway to Central Region – Alternate highway from Colombo to Kandy;

Highway to Sabaragamuwa – Alternate highway from Colombo to Ratnapura starting from Outer Circular Ring Road.

After cabinet approval for the proposal, which included the outer circular ring road, the RDA conducted the pre-feasibility of the outer circular ring road, now known as the Outer Circular Highway, through a local consultant, in 1991. As it was found that the Outer Circular Highway is feasible the RDA made a request to the Department of External Resources for financial assistance to carry out a complete feasibility study and as a result Grant Aid assistance was obtained from Japanese International Cooperation Agency (JICA). Accordingly, a study team contracted by JICA has embarked on the feasibility study, of which this EIA is an integral part.

2.2 Comparison and Selection of Alignment

The Study Team has firstly selected 9 (nine) preferred possible highway alignments. The selection has been made based on the concept of urban sustainability, which consists of the three factors of economic, social and environmental sustainability. These alignments are then evaluated based upon these factors and the comments from the RDA were also taken into consideration. The prevalent characteristics of the 9 (nine) preferred possible alignments are summarised as follows:

Alignment A1 ($a_1 - c_1 - e - f_1 - g - h_2$ approx. 49.37km)

$a_1 - c_1$ (approx. 12.09km)

This segment starts from the proposed Colombo – Katunayake Expressway junction at Nagoda, which is located in a proposed conservation area. The alignment crosses the Colombo – Puttalam Road (Route A3) near the 10km post. It then crosses two main railways headed for Negombo and Veyangoda approximately 3km north of Ragama Station and passes over high ground and rolling terrain interspersed with some paddy fields and rubber estates. It also crosses the Colombo – Kandy Road (Route A1) near the 17km post at around 1.5km from Kadawata going towards Kandy. The terrain profile varies from 3m in elevation at Nagoda near the coast and to 40m in elevation north of Ragama.

Some significant religious institutions like the Tewatte Church, Prasansaramaya, and Boys Town can be avoided by marginally shifting the segment northward. The impact on the ecosystem, both fauna and flora, is insignificant as well is the impact on plantations. However, a large number of home gardens may be affected. The impact on economic activities is significant, while the overall environmental impact is considered to be in significant.

$c_1 - e$ (approx. 14.41km)

The alignment passes over high ground and rolling terrain interspersed with some paddy fields. It crosses Route B214, A110, and the Kelani River on the way and passes at a point approximately 1,500m downstream from the existing Kaduwela Bridge. After Kaduwela, it continues to pass over high ground and rolling terrain interspersed with some paddy fields. The elevation at Kaduwela is 5m in height and is the lowest spot on this segment. The terrain then rises from Kaduwela to the north and south with undulations.

This segment runs between town and rural areas and crosses many minor roads. Site resettlement may be possible and the overall environmental impact is moderate.

e - f_1 (approx. 15.30km)

This is the fixed portion of the alignment that the RDA has already selected for the Southern Transport Corridor, which was examined in a feasibility study in 1998. The overall environmental impact for this section is moderate to low. This segment runs from the Colombo – Ratnapura trunk road approximately 2km to Alutgama, which is about 3km north-west of Bandaragama. It passes between the toe of hill and paddy fields. The terrain profile is almost flat with gentle undulations.

This segment covers large land holdings that are rural in setting. Large tracts of cultivated land will be affected. The overall environmental impact is moderate.

f_1 - g (approx. 4.74km)

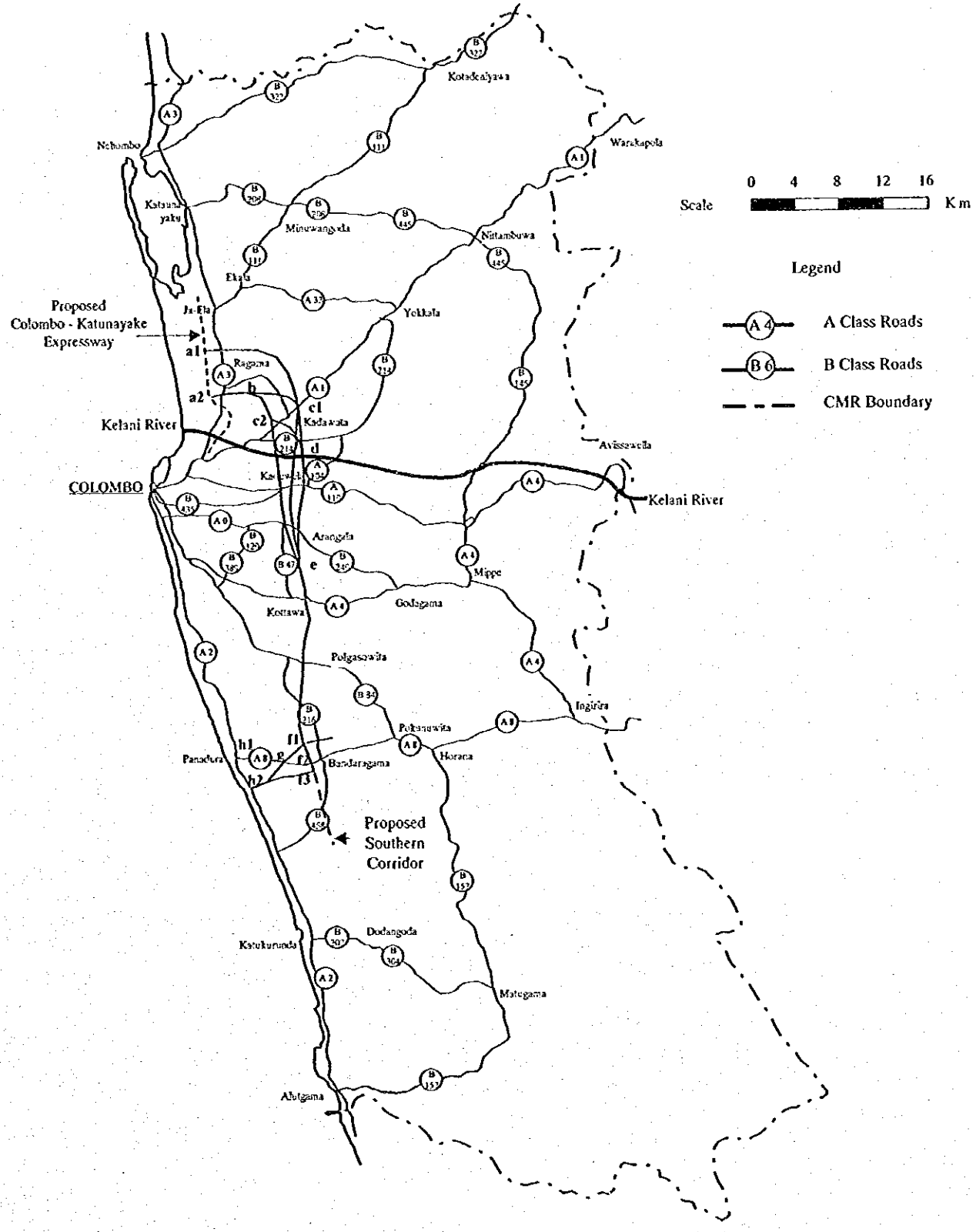
The alignment passes over high ground and rolling terrain interspersed with some paddy fields. It crosses the Bolgoda River and meets Route A8. The highest point on this segment is 20m above sea level and the lowest 0m at Bolgoda River.

The alignment mostly runs through scattered towns and rural areas. While the impact on the ecosystem may be moderate, impacts on economic activity will be insignificant. The overall environmental impact is moderate.

g - h_2 (approx. 2.83km)

This segment starts form Route A8 and ends at the Colombo –Galle Road (Route A2) near the 30km post at approximately 3km south of Panadura. It passes over high ground and rolling terrain interspersed with some paddy fields. The elevation varies between 5m to 10m.

Impacts on resettlement and economic activities may be high and the overall environmental impact is expected to be significant.



Alignment A1

Alignment A2 (a_2 – b – c_1 – e – f_1 – g – h_2 approx.46.51km)

a_2 – b (approx. 2.59km)

This segment starts from the proposed Colombo – Katunayake Expressway at Kerawalapitiya, where urban development is ongoing. The alignment crosses Colombo – Puttalam Road (Route A3) near the 8km post. It then passes through marsh area and crosses the main railway 2km south of Ragama Station. The elevation of the marsh at Nawanmhara is almost below sea level. The alignment runs through populated urban areas and industrialized areas along Route A3. Resettlement is required for part of this segment and the impact on the ecosystem may be significant, as many home gardens and marsh vegetation may be affected. The overall environmental impact will be insignificant if a large milk factory can be avoided.

b – c_1 (approx. 6.64km)

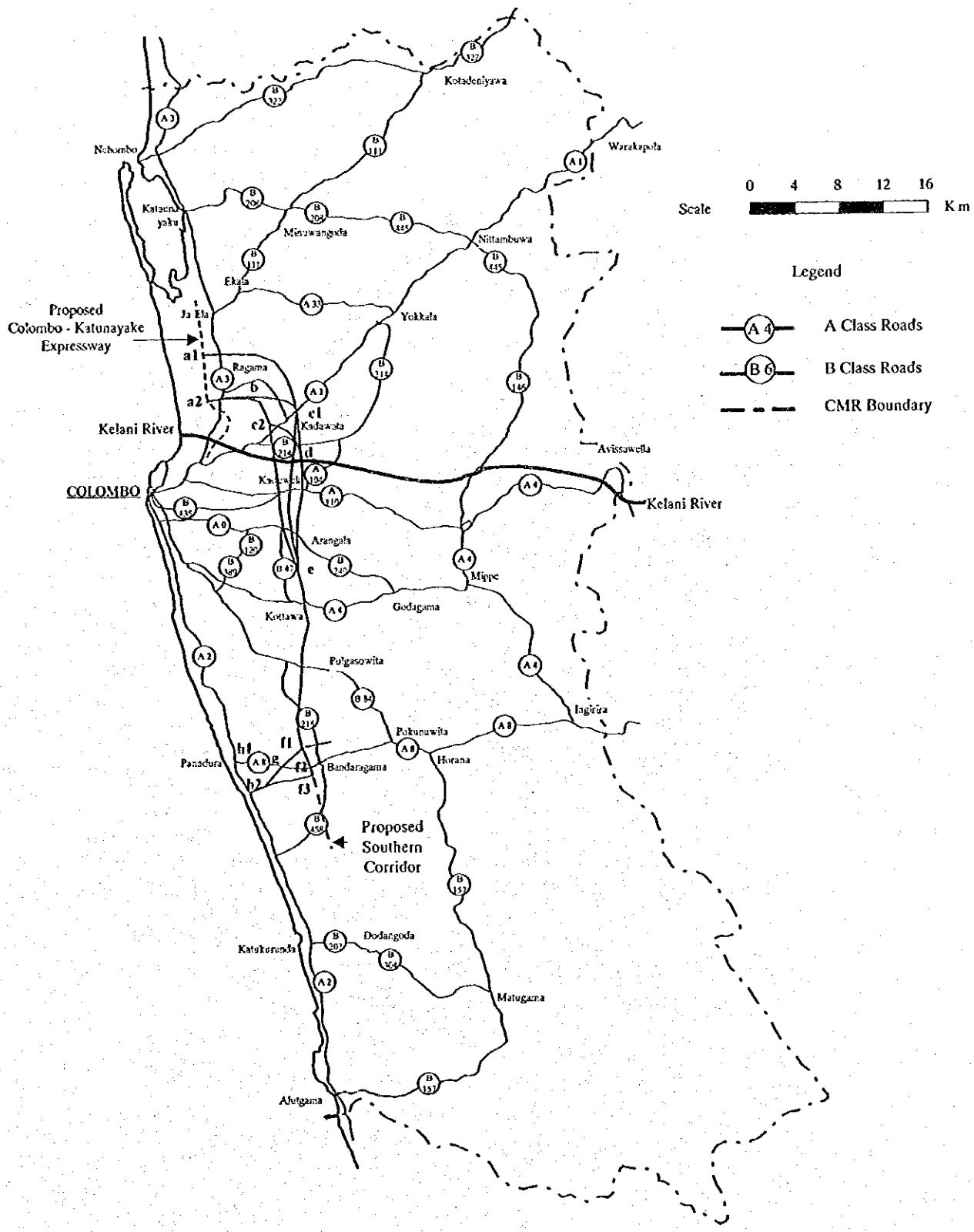
The alignment crosses Route B168 and passes over high ground and rolling terrain interspersed with some paddy fields. It also crosses the Colombo –Kandy Road (Route A1) at around 1km from Kadawata going towards Kandy. The terrain profile greatly varies, from 0m in height in paddy fields on both sides of Route A1 to 35m in height after crossing Route A1. The alignment runs through populated urban areas and industrialized areas Resettlement will be required for a part of this segment. The impact on the ecosystem is small, but economic activities will be affected. The overall environmental impact may be minimized by shifting the crossing point of Route A1 further north.

c_1 – e (approx. 14.41km)

The alignment passes over high ground and rolling terrain interspersed with paddy fields. It crosses Route B214, A110, and the Kelani River and passes about 1500m downstream from the Kaduwela Bridge. After Kaduwela, it continues over high ground and rolling terrain interspersed with paddy fields. The elevation at Kaduwela is 5m and is the lowest spot on this segment. The terrain rises from here to the north and south with undulations, and runs between town and rural areas and crosses many minor roads. Site resettlement may be necessary and the overall environmental impact is moderate.

e – f_1 & f_1 –g– h_2 (approx. 22.87km)

This alignment is the same as A1.



Alignment A2

Alignment A3 (a_2 – b – c_2 – e – f_1 – g – h_2 approx 43.71km)

a_2 – b (approx. 2.59km)

This segment starts from the proposed Colombo – Katunayake Expressway junction at Kerawalapitiya in which urban development is ongoing. The alignment crosses the Colombo – Puttalam Road (Route A3) near the 8km post. It then passes through marsh area and crosses a major railway 2km south of Ragama Station. The elevation of the marsh at Nawanmhara is almost below sea level.

The alignment runs through populated urban areas as well as industrialized areas along Route A3. Resettlement will be required for a part of this segment. The impact on the ecosystem may be significant and many home gardens and marsh vegetation may be affected. The overall environmental impact will be insignificant if a large milk factory can be avoided.

b – c_2 (approx. 3.15km)

The alignment passes through marsh area and paddy field and meets the Colombo – Kandy Road (Route A1) near the 13km post about 2km before Kadawata going towards Kandy. The terrain is almost flat, varying from 0m to 5 in elevation. Traffic congestion on the Route A1 may be aggravated and the overall negative environmental impact is expected high.

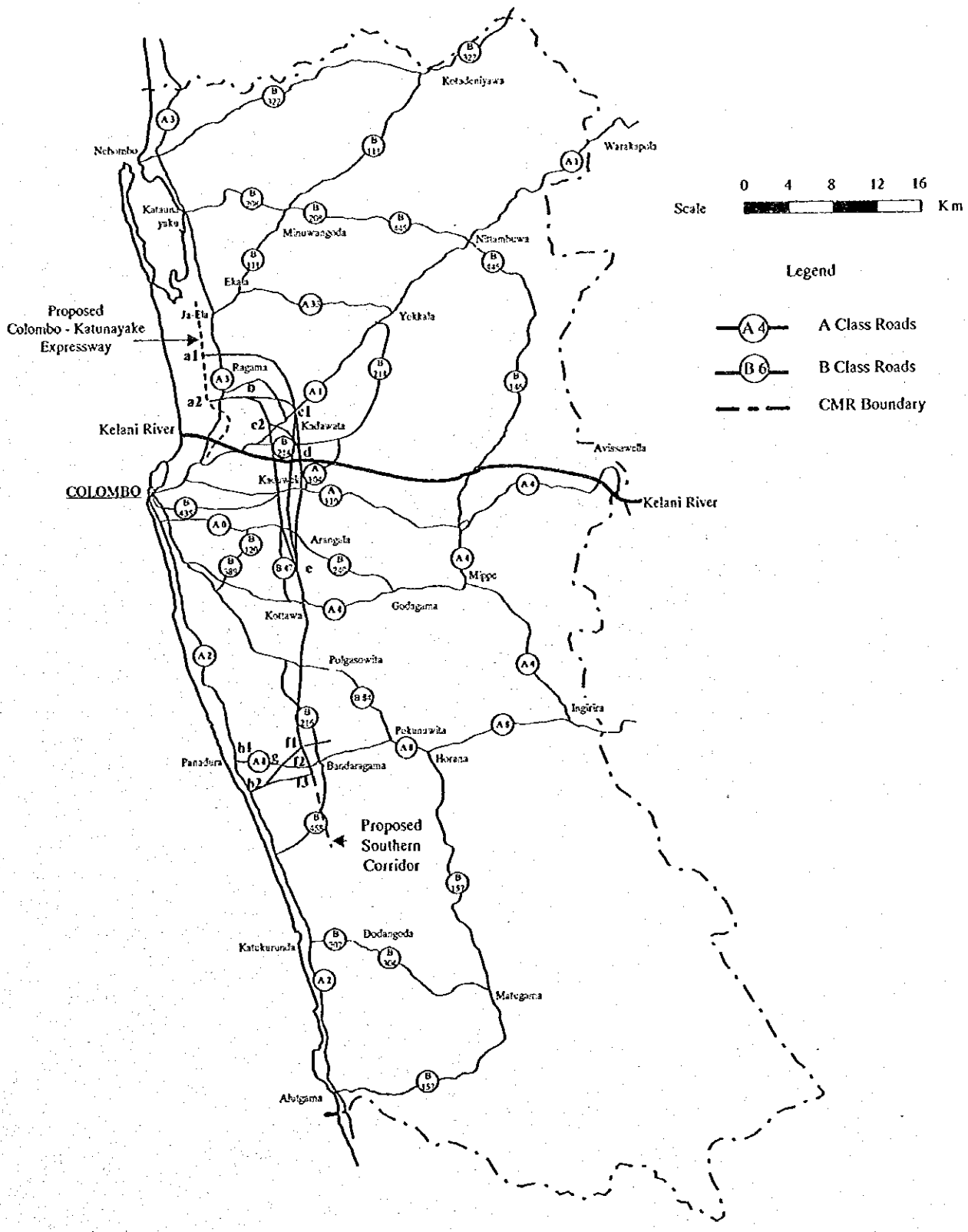
c_2 – e (approx. 15.10km)

The alignment passes through paddy field and rolling terrain. It crosses Route B214, A110, and the Kelani River on the way and passes at a point approximately 4km west of Kaduwela. After crossing Route A110, it passes between the toe of hill and a paddy field. The terrain profile is the almost same as **c_2 – d – e .**

This segment crosses highly populated towns and industrialized areas with a number of minor crossings, and there is the possibility of significant community severance occurring. The overall environmental impact is high.

e – f_1 & f_1 – g – h_2 (approx. 22.87km)

This alignment is the same as A1 and A2.



Alignment A3

Alignment A4 ($a_1 - c_1 - e - f_3 - h_2$ approx.52.46km)

$a_1 - c_1 - e - f_1$ (approx. 41.80km)

This alignment is the same as A1.

$f_1 - f_2$(approx. 2.88km)

The alignment passes through paddy and boggy areas along the Bolgoda River and meets Route A8 near the 8km post 2km west of Bandaragama. The terrain profile varies from 2m to 10m high in elevation.

Some impacts on fauna and flora may be expected, while the impacts on economic activity are expected to be insignificant. The overall environmental impact is moderate.

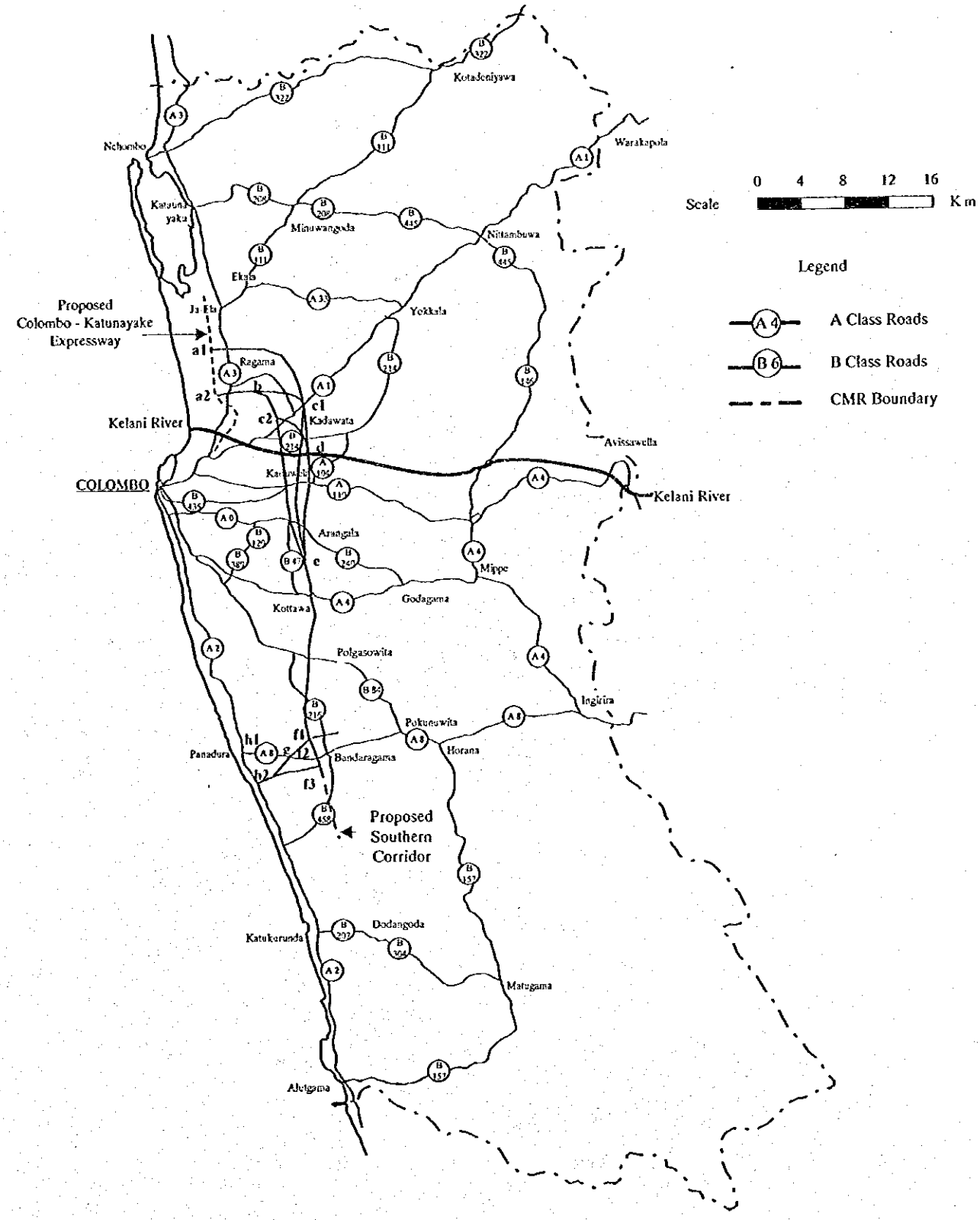
$f_2 - f_3$(approx. 0.78km)

The alignment passes through paddy and boggy areas on the east edge of Bolgoda Lake. The terrain profile varies from 2m to 10m in elevation. Some impacts on fauna and flora may be expected, while the impact on economic activity is expected to be in significant. The overall environmental impact is moderate.

$f_3 - h_2$(approx. 7.00km)

The alignment is located on the morshy edge of Bolgoda Lake and crosses the Bolgoda River. This section extends from the proposed Southern Transport Corridor junction to Colombo – Galle Road (Route A2). The lowest point is below sea level and is located at the Bolgoda River. The terrain rises up from there towards Route A2

The impact on the ecosystem is expected to be high, while the impact on resettlement may be moderate.



Alignment A4

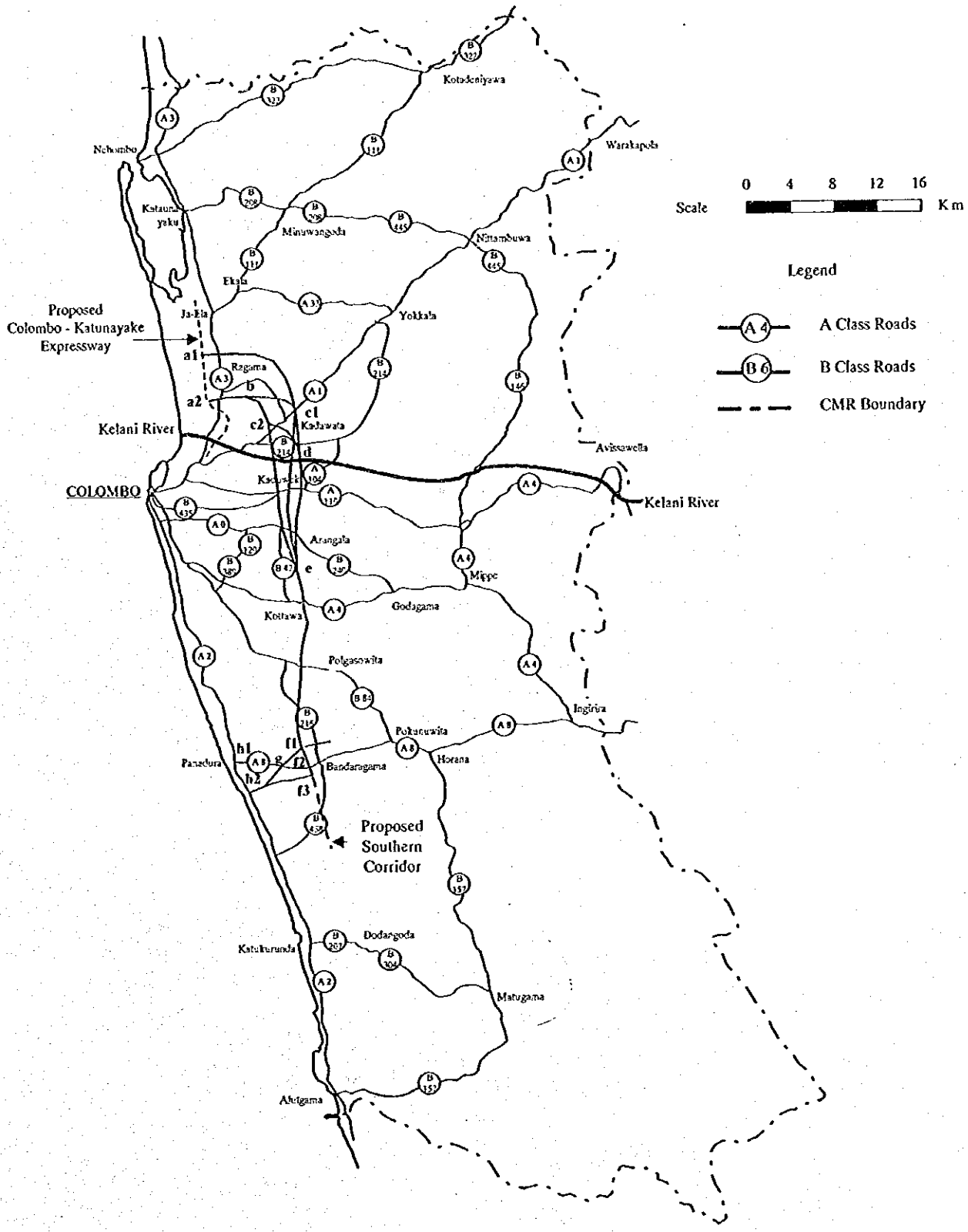
Alignment A5 (a_2– b – c_1 – e – f_3- h_2 approx.49.60km)

a_2– b – c_1 – e– f_1 (approx. 38.94km)

This alignment is the same as A2.

f_1 - f_2 – f_3& f_3- h_2(approx. 10.66km)

This alignment is the same as A4.



Alignment A5

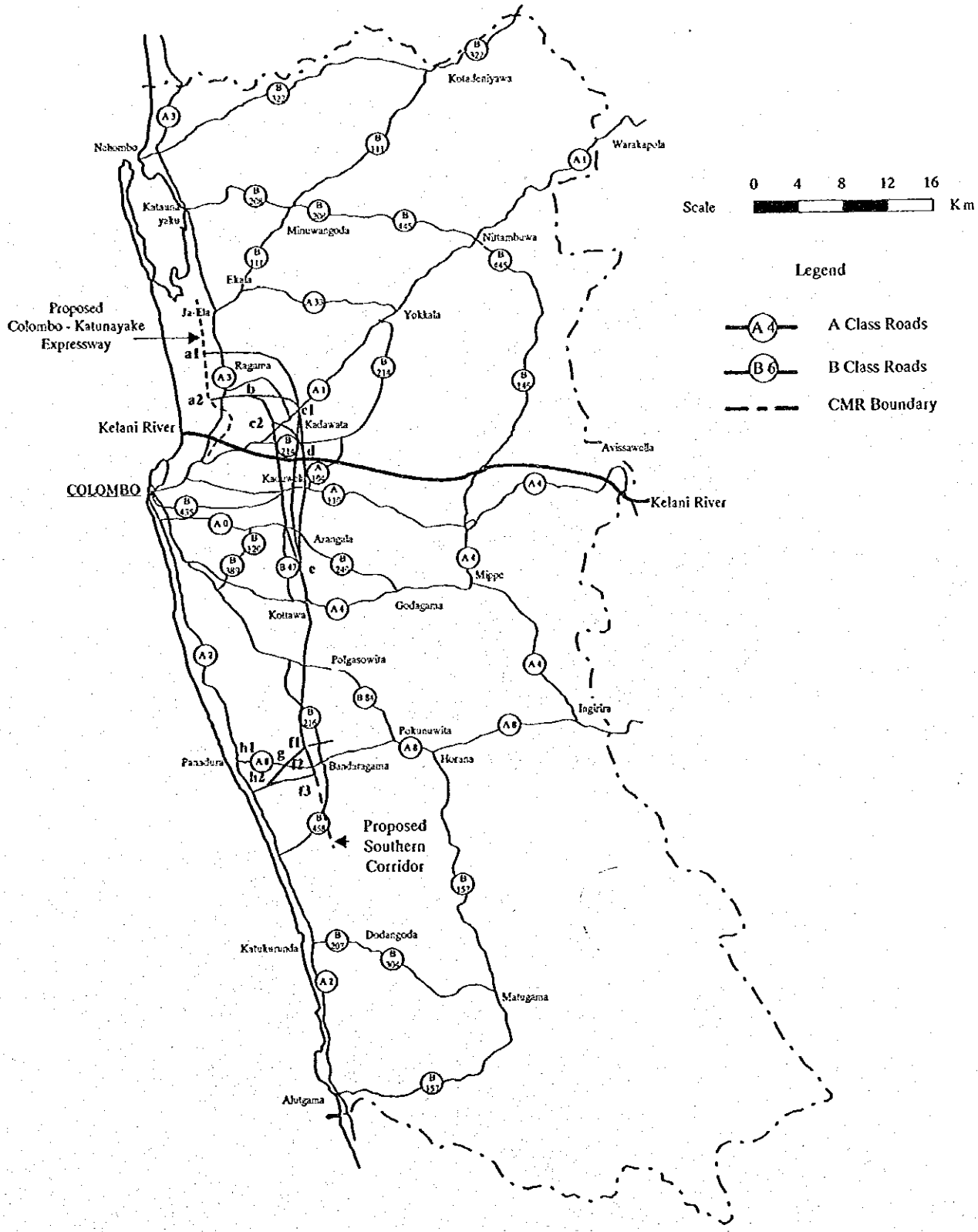
Alignment A6 (a_2– b– c_2 – e – f_3- h_2 approx.46.80km)

a_2– b– c_2 – e – f_1 (approx. 36.14km)

This alignment is the same as A3.

f_1 - f_2 – f_3& f_3- h_2(approx. 10.66km)

This alignment is the same as A4 and A5.



Alignment A6

Alignment A7 ($a_1 - c_1 - e - f_2 - g - h_1$ approx.52.58km)

$a_1 - c_1 - e - f_1$ (approx. 41.80km)

This alignment is the same as A1 and A4.

$f_1 - f_2$(approx. 2.88km)

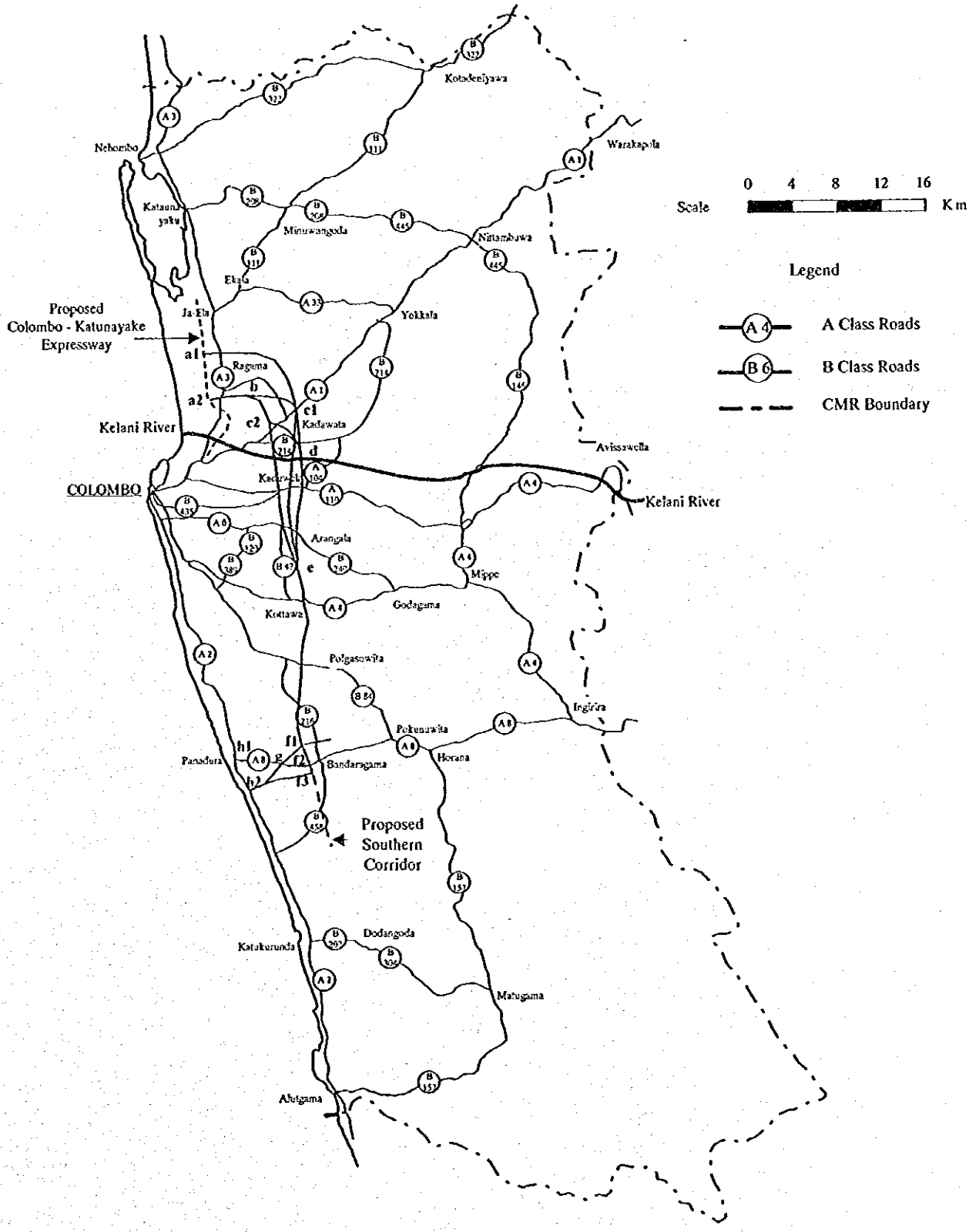
The alignment passes through paddy and boggy areas along the Bolgoda River and meets Route A8 near the 8km post 2km west of Bandaragama. The terrain profile varies from 2m to 10m in elevation. Some impacts on fauna and flora are expected, while the impact on economic activity is expected to be insignificant. The overall environmental impact is moderate.

$f_2 - g - h_1$ (approx. 7.90km)

The alignment starts from Route A8 near the 8km post 2km west of Bandaragama and ends at the Colombo – Galle Road (Route A2) near the 27km post at Panadura. The Panadura – Bandaragama – Horana – Ingiriya - Ratnapura (Route A8) road is one of the trunk roads that connects Panadura, and it runs from Galle Road (Route A2) to Ratnapura (i.e., the Provincial Capital of Sabaragamuwa Province).

The road section from Panadura to Ingiriya, the 34km post, will be rehabilitated starting from 1999. The scope of work for rehabilitation is listed below.

(1) Widening of the road pavement to a 2-lane standard
(2) Improving the alignment at critical sections
(3) Providing well-constructed road shoulders
(4) Rehabilitation of existing road pavement and provision of a wearing surface
(5) Improvement of culverts, bridges, and drainage



Alignment A7

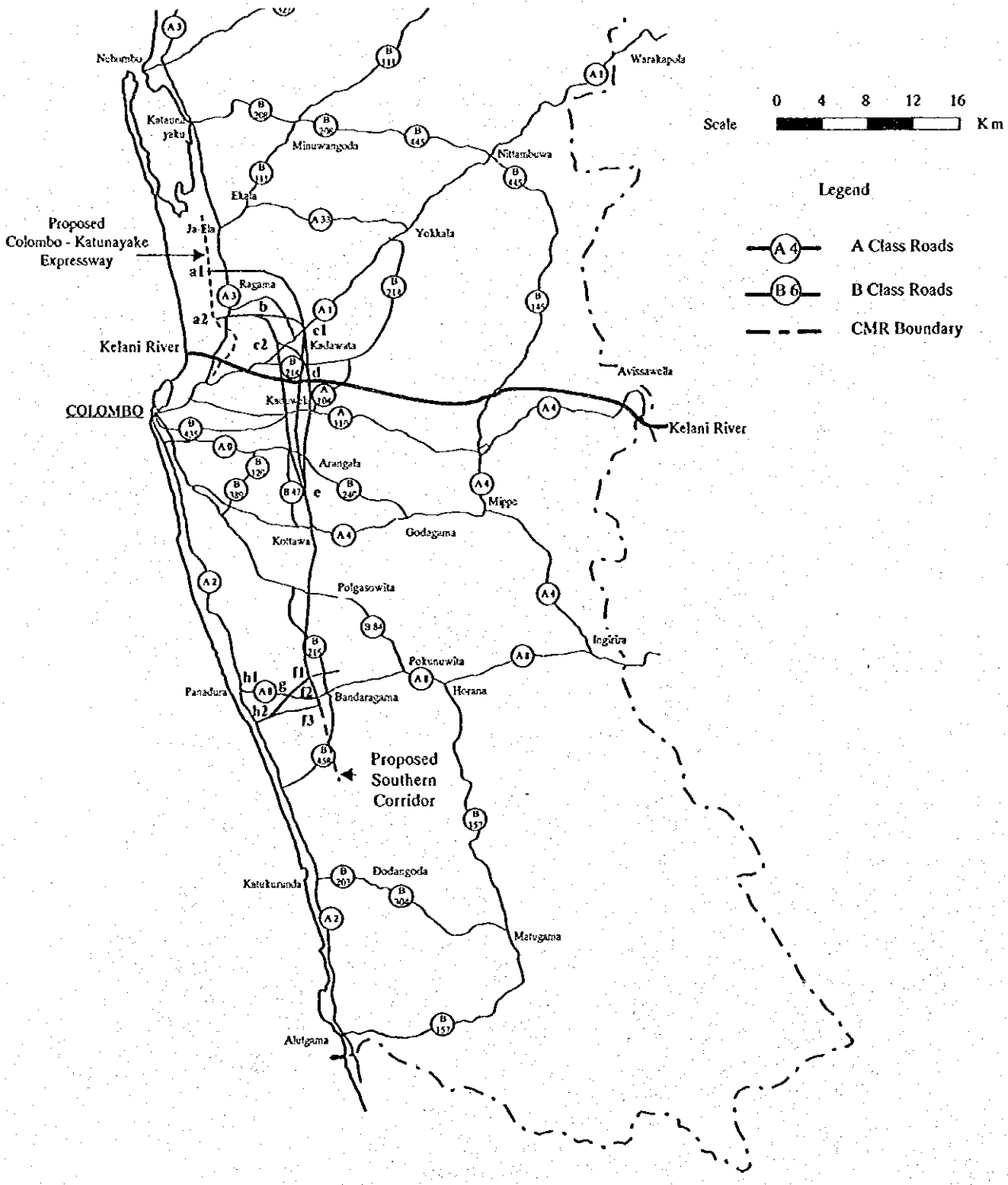
Alignment A8 (a_2 – b – c_1 – e – f_2 – g – h_1 approx.49.72km)

a_2 – b – c_1 – e – f_1 (approx. 38.94km)

This alignment is the same as A2 and A5.

f_1 - f_2 & f_2 – g – h_1 (approx. 10.78km)

This alignment is the same as A7.



Alignment A8

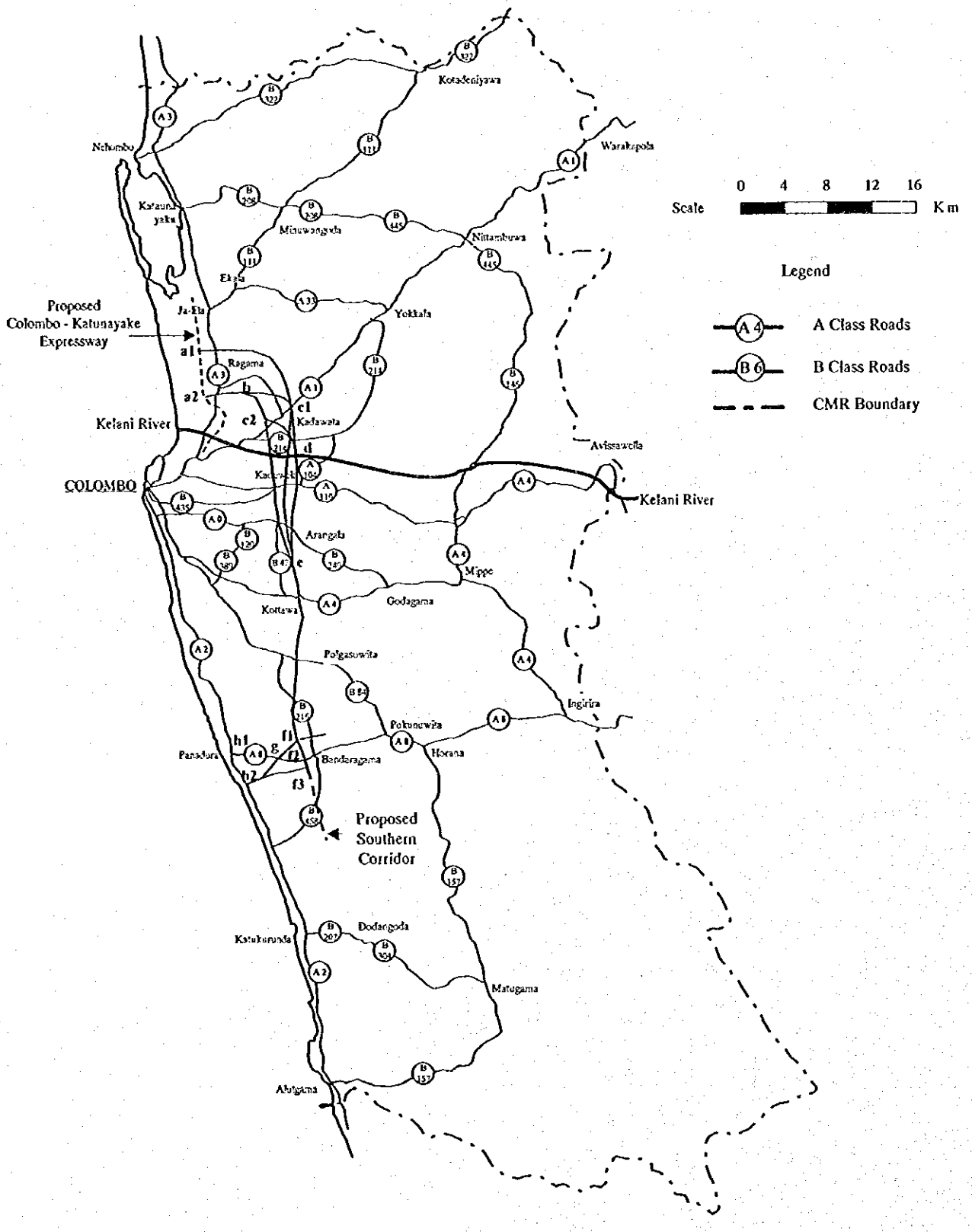
Alignment A9 (a_2 – b – c_2 – e – f_2 – g – h_1 approx.46.92km)

a_2 – b – c_2 – e – f_1 (approx. 36.14km)

This alignment is the same as A3 and A6.

f_1 - f_2 & f_2 – g – h_1 (approx. 10.78km)

This alignment is the same as A7 and A8.



Alignment A9

Evaluation of Preferred Possible Alignments

The 9 (nine) preferred possible alignments are compared using a grade-point rating system. That is, the relative impacts for each of the alignments are first evaluated using a non-metric grading system (i.e., A, B, C, etc.) for the following factors:

① Construction Cost

② Land Acquisition and Compensation Cost

③ Traffic Impacts

(Note: These costs were estimated for comparison purposes and final costs are different from these.)

The assigned grades for each of the factors are then converted into metric scores. Each grade has been assigned the following score:

A+ 98, A 95, A− 92
B+ 88, B 85, B− 82
C+ 78, C 75, C− 72

The most preferred alignment is selected based on the summation of these scores. The alignment with the highest total number of points is considered to be the most appropriate OCH alignment. A comparison of the 9 (nine) alignments using this system is described below.

(1) Engineering and Cost

Comparable costs for all 9 alignments have been developed as shown in Tab. Preliminary Project Cost Estimation for OCH, based on construction quantities obtained from a 1/10,000-scaled topographic map. The Highway Schedule of Rate of the RDA for 1998 applies to the unit cost for the estimation. Land acquisition cost has been newly worked out employing 1994 aerial photograph maps, which indicate the land-use pattern for 1994. Land use consists of such categories as urban areas, homesteads, rubber and coconut land settlements, etc.

As a result of the engineering costs estimation, A7, A8, and A9 were determined to be the most economical alignments, since use of existing highway A8 would be possible. A1, A4 and A7 would be comparatively costly, since these are longer alignments and much excavation work is anticipated.

In terms of engineering evaluation, there are some different observations regarding these alignments concerning the proposed bridge crossing of the Bolgoda River. A1, A2, and A3 would require long-span bridges to cross the Bolgoda River, since their alignments pass over wider sections of the river. On the other hand, A4, A5 and A6 would be located at the narrowest cross-sections of the Bolgoda River.

As for the evaluation based on engineering and costs for the alignments, excluding A7, A8 and A9, alignment A6 has the greatest merit. The reason why alignment A6 is the most preferred is its comparatively shorter alignment,

resulting in lower direct construction costs. Alignments A5 and A9 are the second most appropriate alignments in terms of engineering and costs.

On the other hand, alignment A9 is the most cost-effective, since it would utilise the existing Route A8. However, it has the fatal defect of requiring high compensation costs because it is running through highly populated areas. Alignment A5, although it is comparatively long, is cost-effective due to a superior design profile. However, A5 will require soft-soil countermeasures.

(2) Traffic Impacts

An evaluation of the traffic impacts for the 9 alternative OCH alignments is carried out, which is shown in a table below.

Evaluation of the Traffic Impacts for the 9 OCH Alternative Alignments

Impact Evaluation Item	A1	A2	A3	A4	A5	A6	A7	A8	A9
Impact on Area-Wide Traffic	C (75)	C (75)	C+ (78)	C (75)	C (72)	C- (72)	C (75)	C (75)	C- (72)
Impact on OCH Traffic	C+ (78)	C (75)	C- (72)	C (75)	C (75)	C (75)	C (75)	C (75)	C- (72)
Sufficiency as a Greenbelt	A (95)	B (85)	C (75)	A (95)	B (85)	C (75)	B+88 (88)	B- (82)	C- (72)
Total Score	248	235	225	245	235	222	238	232	216

Note: Score for each grade is given in parentheses.

As the above table indicates, the impact of the OCH on area-wide traffic does not vary much over any of the alternatives. Moreover, the impact seems to be insignificant. That is, even with the construction of the OCH, average travel speeds are only a little over 9 km/h, indicating that the road network is experiencing chronic congestion. On the other hand, without the OCH in 2010, travel speeds would be about 2km/h slower, or about 7 km/h. This is a substantial difference in an urban setting.

As for the impact that each of the 9 alternatives would have on the OCH itself, as the. table shows, A1 would have the highest score, which is due to it having the highest average speed and the lowest congestion rate. However, these are still low in terms of the absolute levels of service provided. That is, the average speed for A1 is only about 26 km/h, while its capacity is exceeded by more than a factor of 3. It should be noted here that the farther out the alignments are from Colombo, the higher the levels of service for the OCH. That is, for alignments A1, A4, and A7, which are the most distant from the center of the city, the average speed for these routes is 25.32 km/h. On the other hand, for alignments A3, A6, and A9, which are the closest to the center of Colombo, average travel speed is 22.05 km/h, while for the middle-distant alignments of A2, A5, and A8, average speed is 23.05 km/h. It should also be mentioned that for those routes that utilize the existing Route A8 (i.e., A7, A8, A9), the average rates of congestion for the OCH are the highest, reflecting the insufficient of capacity of

this route. Finally, congestion for the city as a whole is less on average if an alignment is located father out; although, the differences in this average between the most-distant and middle-distant alignments is insignificant.

As for the greenbelt function, the table indicates that the most-distant and middle-distant alignments would be able to serve this role best, with the former group being more superior. These alignments are located far enough away from Colombo to serve as a future boundary that would contain future sprawl and that could support the existence of independent growth centers. The other alignments (i.e., A3, A6, and A9) are located too close to Colombo to play such a role.

In conclusion, Alignment A1 is chosen here as the most preferred alignment due to its higher overall score, which reflects the fact that it has the highest levels of service and is the most capable of serving as an effective greenbelt.

(3) Overall Evaluation

From the above-mentioned analyses, it can be said that the conclusions of the engineering cost and traffic impact examinations are different. The former recommends Alignment A6, while the latter recommends A1 as the most preferred alignment. Alignment A6 is one the alignments from the group most proximate to Colombo, while A1 is one of the alignments from the group farthest from Colombo. However, from the viewpoint of overall balance and future growth, both of these are rejected for the following reasons:

1) Despite A6 being the most economical alignment, it is incapable of playing the crucial role of a greenbelt. Moreover, it, like the other alignments most proximate to Colombo (i.e., A3 and A9), passes between Kadawata and Kiribathgoda on Route A1, which is a highly congested section of road. Therefore, this alignment or any of the most proximate alignments, would likely aggravate this already congested situation further, since the OCH will be a substantial source of both traffic attraction and generation.
2) Although the most-distant alignments may be superior in terms of average speed and lower congestion, the costs required for their construction are simply too high. In addition, the average level of congestion for the middle-distant alignments is almost the same as for this alignment.

Based on the above, it is clear that only a middle-distant alignment (A2, A5, and A8) should be considered for construction. For the following reasons, Alignment A5 is recommended as the most preferred alignment:

1) As previously mentioned, Alignment A8 would utilize National Route A8 as the southern part of the OCH. However, as pointed out, Alignment A8 has one of the lowest average OCH speeds and one of the highest rates of congestion. This is due to National Route A8 having insufficient capacity to deal with the traffic that the OCH will attract and generate. For this reason, it is suggested that this alignment not be considered as a candidate for most preferred route. Moreover, the total score for this alignment is less than that for the others.

2) As for A2, although its total score is equal to that for A5, it has an important flaw. That is, the southern tail end of A2 will duplicate or run in parallel with the Southern Transport Corridor, which would be uneconomic and burdensome. That is, the location of the southern tail end of A2 would result in travel inefficiencies, since drivers wanting to access the Southern Transport Corridor via A2, which is another important function of the OCH, would have to backtrack and therefore consume extra time and fuel in reaching their destination.

(For reference, if Alignment A5 were made into a 6-lane facility, congestion would decrease from 3 to 5% in Colombo as a whole.)

Alignment A5, which was selected above as the most preferred alignment, is evaluated below from an environmental and social viewpoint, as well.

Alignment A5 passes through eight DS Divisions, which are Wattala, Mahara, Kelaniya, Biyagama, Kaduwela, Homagama, Panadura and Bandaragama. The total population, which is affected by the project, is about 1,145,700 (estimated beneficiaries in the year of 2010).

The environmental and social characteristics of each segment have been identified, based on the findings of IEE, as stated below.

a 2– b:
Almost half the length of this segment passes through the Galaudapita Marsh. The impact on the ecosystem, both fauna and flora, is expected to be significant. Many home gardens and marsh vegetation may also be affected. According to the IEE, no species are in danger of extinction, has been identified in the Galaudapita Marsh. However, various kinds of important migratory birds have been identified.

The rest of the segment runs through populated urban areas as well as industrialized areas. Resettlement will be involved for a part of the segment. There is a milk factory around b, which will cause resettlement and affect local economic activities.

The overall environmental and social impact will not be significant, since appropriate measures can be taken for the marsh and the milk factory can be avoided.

b – c 1 :
This segment runs through populated urban and industrialized areas. Resettlement will be involved. There are not many minor road crossings. The impact on the ecosystem is insignificant. The segment crosses north of Kadawatha, which may aggravate traffic congestion between Kadawatha and Kibathgoda.

Economic activities will be affected also, due to the fact that the segment passes through urban and industrialized areas.

The overall negative environmental impact can be minimised by shifting the crossing point with A1 further north. There are no other major impacts and hence it is the best segment to use.

c 1 – e:

Most of the length of this segment cuts across home gardens, coconut land and small areas of rubber plantation. Consequently, the scale of resettlement will not be significant. However, dust pollution by construction machinery will be higher than other areas.

This segment also has a significant number of minor roads. The proposed project might affect these minor community roads, which will cause significant negative impacts on community life; unless, the project takes into consideration these feeder roads into it's planning.

The segment also crosses the Kelani River. Environmental protective measures will be necessary for new bridge construction.

Around c 1 , near Makola South Town, there are some commercial buildings, which might be resettled. There is also a low-tension line crossing at this point, which the project should take into consideration.

Morcover, at the crossing point along Athurugiriya Road, there is a high-tension line, which the project should take into consideration.

The expected overall environmental and social impact is moderate.

e – f 3:

Since most of the length of this segment cuts across paddy field, which are parts of large land holdings, the scale of resettlement will not be significant.

Some impact on economic activities is expected where large tracts of cultivated land are acquired.

Impact on fauna and flora is insignificant.

At Kottawa, near the Manchi Biscuit Factory, there is the Sri Lanka Broadcasting Transmission Center and telecom lines.

In Diyagama, Watara Temple, Atagahawatta, Polkotuwa, Kamburugoda, Pitolagoda and Maswick, there are high-tension power lines, which the project should take into consideration.

The overall environmental and social impact is moderate.

f 3 - h 2:

This segment mostly passes through paddy land, and home gardens close to Aluthgama, Bellana, Eriyawatta and Pinwatta. Accordingly, it is considered that the scale of resettlement will not be significant.

Preliminary Project Cost Estimation for Outer Circular Highway (case 1)

	Items	No.	Description	Unit	Unit Price (x10 ^3 Rs)	Total (A 1)			Total (A 2)			Total (A 3)			Remarks
						Quantities	unit	cost (x10 ^3 Rs)	Quantities	unit	cost (x10 ^3 Rs)	Quantities	unit	cost (x10 ^3 Rs)	
i	Earth works	1	Cutting (Hilly and/or Rolling)	m	56.97	11,810.00	m	1,145,191.02	7,710.00	m	747,622.59	4,800.00	m	465,445.97	
		2	Sidelong (Steep Hilly)	m	36.50	2,390.00	m	87,233.35	2,490.00	m	90,883.28	2,243.00	m	81,858.45	
		3	Low Embankment (paddy)	m	59.34	21,880.00	m	1,298,353.51	23,580.00	m	1,399,231.07	27,280.00	m	1,618,788.11	
		4	High Embankment (Lowland area)	m	69.00	6,490.00	m	447,823.24	4,790.00	m	330,519.77	2,100.00	m	144,904.28	
		5	High Embankment (Approching to Interchange)	m	98.95	3,700.00	m	366,097.58	4,200.00	m	415,570.68	3,150.00	m	311,678.01	
		6	Embankment with Vertical Drain (Marshy and/or Soft soil area)	m	110.59	0.00	m	0.00	1,000.00	m	110,894.74	2,300.00	m	255,057.90	
			SUB TOTAL (Earth works)			46,270.00	m	3,344,699.10	43,770.00	m	3,094,722.13	41,870.00	m	2,877,632.73	
ii	Road works	1	- Sub base 300 mm	m3	0.42	234,588.90	m3	98,996.52	221,913.90	m3	93,647.67	212,280.90	m3	89,582.54	
		2	- Base course 200 mm	m3	1.71	142,511.60	m3	243,649.23	134,811.60	m3	230,484.70	128,959.60	m3	220,479.65	
		3	- Asphalt concrete (wearing course 100 mm Including prime/tack coat)	m2	0.63	754,201.00	m2	472,129.83	713,451.00	m2	446,620.33	682,451.00	m2	427,233.11	
		4	- Shoulders (40 mm Asphalt Concrete, 200 mm Base course)	m2	0.36	277,620.00	m2	99,244.15	262,620.00	m2	93,881.92	251,220.00	m2	89,806.63	
		5	- Kerb and Center Median	m	22.25	46,270.00	m	1,029,507.50	43,770.00	m	973,882.50	41,870.00	m	931,607.50	
		6	- Frontage Road	m	3.82	46,270.00	m	176,751.40	43,770.00	m	167,201.40	41,870.00	m	159,943.40	
		7	-Cross Road Treatment	m2	3.84	22,510.00	m2	86,370.87	19,290.00	m2	74,015.73	15,430.00	m2	59,204.91	
			SUB TOTAL (Road Works)			0.00	8.00	2,206,649.50	0.00		2,079,734.24	0.00		1,977,857.73	
iii	Bridge Works	1	- 5 m span	Nos.	16,680.00	0.00	Nos.	0.00	0.00	Nos.	0.00	0.00	Nos.	0.00	
		3	- 6m span	Nos.	21,705.00	0.00	Nos.	0.00	0.00	Nos.	0.00	0.00	Nos.	0.00	
		4	- 7m span	Nos.	22,875.00	1.00	Nos.	22,875.00	1.00	Nos.	22,875.00	3.00	Nos.	68,625.00	
		5	- 10 m span	Nos.	26,775.00	1.00	Nos.	26,775.00	1.00	Nos.	26,775.00	1.00	Nos.	26,775.00	
		7	- 13.5m span	Nos.	41,025.00	1.00	Nos.	41,025.00	1.00	Nos.	41,025.00	1.00	Nos.	41,025.00	
		8	- 16m span	Nos.	49,230.00	2.00	Nos.	98,460.00	2.00	Nos.	98,460.00	2.00	Nos.	98,460.00	
		8	- 50m span	Nos.	528,000.00	0.00	Nos.	0.00	0.00	Nos.	0.00	0.00	Nos.	0.00	
		9	Kelani Ganga crossing	Nos.	1,032,000.00	1.00	Nos.	1,032,000.00	1.00	Nos.	1,032,000.00	1.00	Nos.	1,032,000.00	
		10	Bologoda Gabga crossing	Nos.	1,187,000.00	1.00	Nos.	1,187,000.00	1.00	Nos.	1,187,000.00	1.00	Nos.	1,187,000.00	
			SUB TOTAL (Bridge)			0.00	6.00	2,408,135.00	0.00		2,408,135.00	0.00		2,453,885.00	
	Viaduct (RailWay) Works		- Viaduct (Railway) Length: 450m	Nos.	400,000.00	6.00	Nos.	2,400,000.00	7.00	Nos.	2,800,000.00	6.00	Nos.	2,400,000.00	
			SUB TOTAL (Viaduct)			0.00	6.00	2,400,000.00	0.00		2,800,000.00	0.00		2,400,000.00	
	Underpass Works		- 5.5x5.0 m (Vehicle Underpass)	Nos.	25,750.00	11.00	Nos.	283,250.00	11.00	Nos.	283,250.00	14.00	Nos.	360,500.00	
			- 3.0x2.5 m (Pedestrian Underpass)	Nos.	13,500.00	52.00	Nos.	702,000.00	54.00	Nos.	729,000.00	58.00	Nos.	783,000.00	
			SUB TOTAL (Underpasses)			0.00	6.00	985,250.00	0.00		1,012,250.00	0.00		1,143,500.00	
iv	Interchange Works		- Interchage	Nos.	350,000.00	6.00	Nos.	2,100,000.00	6.00	Nos.	2,100,000.00	6.00	Nos.	2,100,000.00	
			- Junction	Nos.	245,000.00	1.00	Nos.	245,000.00	1.00	Nos.	245,000.00	1.00	Nos.	245,000.00	
			SUB TOTAL (Interchange)			0.00	0.00	2,345,000.00	0.00		2,345,000.00	0.00		2,345,000.00	
v	Drainage works		- 600 mm (L)	Nos.	117.23	0.00	Nos.	0.00	0.00	Nos.	0.00	0.00	Nos.	0.00	
			- 600 mm (H)	Nos.	156.31	0.00	Nos.	0.00	0.00	Nos.	0.00	0.00	Nos.	0.00	
			- 900 mm (L)	Nos.	255.26	10.00	Nos.	2,552.58	13.00	Nos.	3,318.36	14.00	Nos.	3,573.61	
			- 900 mm (H)	Nos.	340.36	7.00	Nos.	2,382.50	6.00	Nos.	2,042.15	3.00	Nos.	1,021.07	
			- 1200 mm (L)	Nos.	381.39	60.00	Nos.	22,883.15	92.00	Nos.	35,087.49	195.00	Nos.	74,370.23	
			- 1200 mm (H)	Nos.	508.51	87.00	Nos.	44,240.75	82.00	Nos.	41,698.18	18.00	Nos.	9,153.26	
			- 1.8x1.8 m (Box-Culvert)	Nos.	3,800.00	0.00	Nos.	0.00	0.00	Nos.	0.00	0.00	Nos.	0.00	
			SUB TOTAL (Drainages)			0.00	0.00	72,058.99	0.00		82,146.18	0.00		88,118.18	
vi	Miscellaneous		- Traffic signals and control facilities	m	1.95	46,270.00	m	90,226.50	43,770.00	m	85,351.50	41,870.00	m	81,646.50	
			- Traffic illumination	m	3.25	46,270.00	m	150,516.31	43,770.00	m	142,383.81	41,870.00	m	136,203.11	
			- Lane marking and Road Sings	m	0.49	46,270.00	m	22,672.30	43,770.00	m	21,447.30	41,870.00	m	20,516.30	
			- Gurd rails, Fencing and km posts	m	8.10	46,270.00	m	374,787.00	43,770.00	m	354,537.00	41,870.00	m	339,147.00	
			SUB TOTAL (Miscel.)			0.00	8.00	638,202.11	0.00		603,719.61	0.00		577,512.91	
Construction cost			Total Construction Cost			0.00	8.00	14,399,994.69	0.00		14,425,707.16	0.00		13,863,506.55	
			Construction Cost per km.			0.00	8.00	291,675.00	0.00		310,163.56	0.00		317,170.13	
vii	Contingencies	1	Phisical Contingencies 20%	Ls.		1.00	Ls.	2,879,998.94	1.00	Ls.	2,885,141.43	1.00	Ls.	2,772,701.31	
		2	Price Contingencies(Price Escaration) 10%	Ls.		1.00	Ls.	1,439,999.47	1.00	Ls.	1,442,570.72	1.00	Ls.	1,386,350.65	
			SUB TOTAL (Contingencies)			0.00	8.00	4,319,998.41	0.00		4,327,712.15	0.00		4,159,051.96	
ix	Engineering Services		Engineering Services 10%	Ls.		1.00	Ls.	1,871,999.31	1.00	Ls.	1,875,341.93	1.00	Ls.	1,802,255.85	
			SUB TOTAL (Engineering service/Supervision)				8.00	1,871,999.31			1,875,341.93			1,802,255.85	
vi	Land Acquisition & Compensation		Land Acquisition	Ls.			Ls.	6,760,086.00		Ls.	6,431,329.00		Ls.	6,157,686.00	
			Compensation	Ls.			Ls.	3,936,762.00		Ls.	3,228,293.00		Ls.	3,037,890.00	
							0.00	0.00			0.00			0.00	
			SUB TOTAL (Land Acquision/compensation)				8.00	10,696,848.00			9,659,622.00			9,195,576.00	
Project Cost			Total Project Cost				Rs	31,288,843.41		Rs	30,288,383.23		Rs	29,020,390.36	
			Project Cost per km.				Rs	633,762.21		Rs	651,223.03		Rs	663,930.23	

Preliminary Project Cost Estimation for Outer Circular Highway (case 2)

	Items	No.	Description	Unit	Unit Price (x10 ^3 Rs)	Total (Alternative 4) Quantities	unit	cost (x10 ^3 Rs)	Total (Alternative 5) Quantities	unit	cost (x10 ^3 Rs)	Total (Alternative 6) Quantities	unit	cost (x10 ^3 Rs)	Remarks
i	Earth works	1	Cutting (Hilly and/or Rolling)	m	96.97	12,910.00	m	1,251,855.72	8,810.00	m	854,287.29	5,900.00	m	572,110.67	
		2	Sidelong (Steep Hilly)	m	36.50	2,480.00	m	90,518.29	2,558.00	m	94,168.22	2,330.00	m	85,043.39	
		3	Low Embankment (paddy)	m	59.34	20,750.00	m	1,231,299.61	22,458.00	m	1,333,177.16	26,150.00	m	1,551,734.20	
		4	High Embankment (Lowland area)	m	69.00	5,990.00	m	413,322.22	4,298.00	m	296,818.75	1,600.00	m	110,403.26	
		5	High Embankment (Approching to Interchange)	m	98.55	5,600.00	m	494,727.00	5,500.00	m	544,199.78	4,450.00	m	438,307.03	
		6	Embankment with Vertical Drain (Marshy and/or Soft soil area)	m	110.89	2,880.00	m	319,376.85	3,864.00	m	428,311.59	5,180.00	m	574,434.75	
			SUB TOTAL (Earth works)			50,010.00	m	3,801,099.68	47,518.00	m	3,551,122.71	45,610.00	m	3,334,033.31	
ii	Road works	1	- Sub base 300 mm	m3	0.42	253,550.70	m3	106,998.40	240,875.78	m3	101,648.55	231,242.70	m3	97,584.42	
		2	- Base course 200 mm	m3	1.71	154,030.80	m3	263,343.38	146,330.80	m3	250,178.84	140,478.80	m3	240,173.79	
		3	- Asphalt concrete (wearing course 100 mm including prime/tack coat)	m2	0.63	815,163.00	m2	510,292.04	774,413.00	m2	484,782.54	743,443.00	m2	465,395.32	
		4	- Shoulders (40 mm Asphalt Concrete, 200 mm Base course)	m2	0.36	300,060.00	m2	107,266.05	285,064.00	m3	101,903.82	273,660.00	m2	97,828.52	
		5	- Kerb and Center Median	m	22.25	50,010.00	m	1,112,722.50	47,518.00	m	1,057,097.50	45,610.00	m	1,014,822.50	
		6	- Frontage Road	m	3.82	50,010.00	m	191,038.20	47,518.00	m	181,468.20	45,610.00	m	174,230.20	
		7	-Cross Road Treatment	m2	3.84	22,560.00	m2	86,562.72	19,349.00	m2	74,267.58	15,480.00	m2	59,396.76	
			SUB TOTAL (Road Works)					2,378,223.28			2,251,308.82			2,149,431.52	
iii	Bridge Works	1	- 5 m span	Nos.	16,680.00	4.00	Nos.	66,720.00	3.00	Nos.	50,040.00	3.00	Nos.	50,040.00	
		3	- 6.0m span	Nos.	21,705.00	1.00	Nos.	21,705.00	1.00	Nos.	21,705.00	1.00	Nos.	21,705.00	
		4	- 7m span	Nos.	22,875.00	4.00	Nos.	91,500.00	4.00	Nos.	91,500.00	6.00	Nos.	137,250.00	
		5	- 10 m span	Nos.	26,775.00	0.00	Nos.	0.00	0.00	Nos.	0.00	0.00	Nos.	0.00	
		7	- 13.5m span	Nos.	41,025.00	1.00	Nos.	41,025.00	1.00	Nos.	41,025.00	1.00	Nos.	41,025.00	
		8	- 16m span	Nos.	49,230.00	5.00	Nos.	246,150.00	5.00	Nos.	246,150.00	5.00	Nos.	246,150.00	
		8	- 50m span	Nos.	528,000.00	1.00	Nos.	528,000.00	1.00	Nos.	528,000.00	1.00	Nos.	528,000.00	
		9	Kelani Ganga crossing	Nos.	1,032,000.00	1.00	Nos.	1,032,000.00	1.00	Nos.	1,032,000.00	1.00	Nos.	1,032,000.00	
		10	Bologoda Gabga crossing	Nos.	1,187,000.00	0.00	Nos.	0.00	0.00	Nos.	0.00	0.00	Nos.	0.00	
			SUB TOTAL (Bridge)					2,027,100.00			2,010,420.00			2,056,170.00	
	Viaduct (RailWay) Works		- Viaduct (Railway) Length; 450m	Nos.	400,000.00	5.00	Nos.	2,000,000.00	6.00	Nos.	2,400,000.00	5.00	Nos.	2,000,000.00	
			SUB TOTAL (Viaduct)					2,000,000.00			2,400,000.00			2,000,000.00	
	Underpass Works		- 5.5x5.0 m (Vehicle Underpass)	Nos.	25,750.00	11.00	Nos.	283,250.00	11.00	Nos.	283,250.00	14.00	Nos.	360,500.00	
			- 3.0x2.5 m (Pedestrian Underpass)	Nos.	13,500.00	57.00	Nos.	769,500.00	59.00	Nos.	796,500.00	63.00	Nos.	850,500.00	
			SUB TOTAL (Underpasses)					1,052,750.00			1,079,750.00			1,211,000.00	
iv	Interchange Works		- Interchage	Nos.	350,000.00	7.00	Nos.	2,450,000.00	7.00	Nos.	2,450,000.00	7.00	Nos.	2,450,000.00	
			- Junction	Nos.	245,000.00	1.00	Nos.	245,000.00	1.00	Nos.	245,000.00	1.00	Nos.	245,000.00	
			SUB TOTAL (Interchange)					2,695,000.00			2,695,000.00			2,695,000.00	
v	Drainage works		- 600 mm (L)	Nos.	117.23	0.00	Nos.	0.00	0.00	Nos.	0.00	0.00	Nos.	0.00	
			- 600 mm (H)	Nos.	156.31	0.00	Nos.	0.00	0.00	Nos.	0.00	0.00	Nos.	0.00	
			- 900 mm (L)	Nos.	255.26	9.00	Nos.	2,297.32	12.00	Nos.	3,063.18	13.00	Nos.	3,318.36	
			- 900 mm (H)	Nos.	340.36	7.00	Nos.	2,382.50	6.00	Nos.	2,042.15	3.00	Nos.	1,021.07	
			- 1200 mm (L)	Nos.	381.39	63.00	Nos.	24,027.31	95.00	Nos.	36,231.65	198.00	Nos.	75,514.39	
			- 1200 mm (H)	Nos.	508.51	84.00	Nos.	42,715.21	79.00	Nos.	40,172.64	15.00	Nos.	7,627.72	
			- 1.8x1.8 m (Box-Culvert)	Nos.	3,800.00	0.00	Nos.	0.00	0.00	Nos.	0.00	0.00	Nos.	0.00	
			SUB TOTAL (Drainages)					71,422.34			81,509.53			87,481.53	
vi	Miscellaneous		- Traffic signals and control facilities	m	1.95	50,010.00	m	97,519.50	47,518.00	m	92,661.50	45,610.00	m	88,939.50	
			- Traffic illumination	m	3.25	50,010.00	m	162,682.53	47,518.00	m	154,558.83	45,610.00	m	148,369.33	
			- Lane marking and Road Sings	m	0.49	50,010.00	m	24,504.90	47,518.00	m	23,279.90	45,610.00	m	22,348.90	
			- Gurd railes, Fencing and km posts	m	8.10	50,010.00	m	405,081.00	47,518.00	m	384,831.00	45,610.00	m	369,441.00	
			SUB TOTAL (Miscel)					689,787.93			655,505.43			629,098.73	
Construction cost			Total Construction Cost					14,715,383.24			14,724,415.70			14,162,215.09	
			Construction Cost per km.					280,506.73			296,843.22			302,613.43	
vii	Contingencies	1	Phisical Contingencies 20%	Ls.		1.00	Ls.	2,943,076.65	1.00	Ls.	2,944,883.14	1.00	Ls.	2,832,443.02	
		2	Price Contingencies(Price Escaration) 10%	Ls.		1.00	Ls.	1,471,538.32	1.00	Ls.	1,472,441.57	1.00	Ls.	1,416,221.51	
			SUB TOTAL (Contingencies)					4,414,614.97			4,417,324.71			4,248,664.53	
ix	Engineering Services		Engineering Services 10%	Ls.		1.00	Ls.	1,912,999.82	1.00	Ls.	1,914,174.04	1.00	Ls.	1,841,087.96	
			SUB TOTAL (Engineering service/Supervision)					1,912,999.82			1,914,174.04			1,841,087.96	
vi	Land Acquisition & Compensation		Land Acquisition	Ls.			Ls.	7,242,971.00		Ls.	6,914,214.00		Ls.	6,640,571.00	
			Compensation	Ls.			Ls.	3,807,335.00		Ls.	3,898,866.00		Ls.	2,908,463.00	
			SUB TOTAL (Land Acquiion/compensation)					11,050,306.00			10,813,080.00			9,549,034.00	
Project Cost			Total Project Cost				Rs	32,093,304.03		Rs	31,868,994.45		Rs	29,801,001.58	
			Project Cost per km.				Rs	611,767.14		Rs	626,391.82		Rs	636,773.54	

Preliminary Project Cost Estimation for Outer Circular Highway (case 3)

	Items	No.	Description	Unit	Unit Price (x10 ^3 Rs)	Total (A 7)			Total (A 8)			Total (A 9)			Remarks
						Quantities	unit	cost (x10 ^3 Rs)	Quantities	unit	cost (x10 ^3 Rs)	Quantities	unit	cost (x10 ^3 Rs)	
I	Earth works	1	Cutting (Hilly and/or Rolling)	m	96.97	12,410.00	m	1,203,371.76	8,310.00	m	805,803.33	5,400.00	m	523,626.71	
		2	Sidelong (Steep Hilly)	m	36.50	1,100.00	m	40,149.24	1,200.00	m	43,799.17	950.00	m	34,674.34	
		3	Low Embankment (paddy)	m	59.34	17,950.00	m	1,065,148.33	19,650.00	m	1,166,025.89	23,350.00	m	1,385,582.93	
		4	High Embankment (Low land area)	m	69.00	5,990.00	m	413,322.22	4,290.00	m	296,018.75	1,600.00	m	110,403.26	
		5	High Embankment (Approching to Interchange)	m	98.95	4,000.00	m	395,781.60	4,500.00	m	445,254.30	3,450.00	m	341,361.63	
		6	Embankment with Vertical Drain (Marshy and/or Soft soil area)	m	110.89	780.00	m	86,497.90	1,780.00	m	197,392.54	3,080.00	m	341,555.80	
			SUB TOTAL (Earth works)			42,230.00	m	3,204,271.05	39,730.00	m	2,954,294.08	37,830.00	m	2,737,204.68	
II	Road works	1	- Sub base 300 mm	m3	0.42	214,106.10	m3	90,352.77	201,431.10	m3	85,003.92	191,758.10	m3	80,938.80	
		2	- Base course 200 mm	m3	1.71	130,068.40	m3	222,375.34	122,368.40	m3	209,210.81	116,516.40	m3	199,205.76	
		3	- Asphalt concrete (wearing course 100 mm including prime/tack coat)	m2	0.63	688,349.00	m2	430,906.47	617,599.00	m2	405,396.97	616,629.00	m2	386,099.75	
		4	- Shoulders (40 mm Asphalt Concrete, 200 mm Base course)	m2	0.36	253,380.00	m2	90,578.79	238,380.00	m2	85,216.56	226,980.00	m2	81,141.26	
		5	- Kerb and Center Median	m	22.25	42,230.00	m	939,617.50	39,730.00	m	883,992.50	37,830.00	m	841,717.50	
		6	- Frontage Road	m	3.82	42,230.00	m	161,318.60	39,730.00	m	151,768.60	37,830.00	m	144,510.60	
		7	-Cross Road Treatment	m2	3.84	20,760.00	m2	79,656.12	17,540.00	m2	67,300.98	13,680.00	m2	52,490.16	
			SUB TOTAL (Road Works)					2,014,805.60			1,887,890.34			1,786,013.84	
III	Bridge Works	1	- 5 m span	Nos.	16,680.00	2.00	Nos.	33,360.00	2.00	Nos.	33,360.00	2.00	Nos.	33,360.00	
		3	- 6.0m span	Nos.	21,705.00	0.00	Nos.	0.00	0.00	Nos.	0.00	0.00	Nos.	0.00	
		4	- 7m span	Nos.	22,875.00	3.00	Nos.	68,625.00	3.00	Nos.	68,625.00	5.00	Nos.	114,375.00	
		5	- 10 m span	Nos.	26,775.00	0.00	Nos.	0.00	0.00	Nos.	0.00	0.00	Nos.	0.00	
		7	- 13.5m span	Nos.	41,025.00	1.00	Nos.	41,025.00	1.00	Nos.	41,025.00	1.00	Nos.	41,025.00	
		8	- 16m span	Nos.	49,230.00	3.00	Nos.	147,690.00	3.00	Nos.	147,690.00	3.00	Nos.	147,690.00	
		8	- 50m span	Nos.	528,000.00	0.00	Nos.	0.00	0.00	Nos.	0.00	0.00	Nos.	0.00	
		9	Ketani Ganga crossing	Nos.	1,032,000.00	1.00	Nos.	1,032,000.00	1.00	Nos.	1,032,000.00	1.00	Nos.	1,032,000.00	
		10	Bologoda Gabga crossing	Nos.	1,187,000.00	0.00	Nos.	0.00	0.00	Nos.	0.60	0.00	Nos.	0.00	
			SUB TOTAL (Bridge)					1,322,700.00			1,322,700.00			1,368,450.00	
	Viaduct (RailWay) Works		- Viaduct (Railway) Length; 450m	Nos.	400,000.00	5.00	Nos.	2,000,000.00	6.00	Nos.	2,400,000.00	5.00	Nos.	2,000,000.00	
			SUB TOTAL (Viaduct)					2,000,000.00			2,400,000.00			2,000,000.00	
	Underpass Works		- 5.5x5.0 m (Vehicle Underpass)	Nos.	25,750.00	11.00	Nos.	283,250.00	11.00	Nos.	283,250.00	14.00	Nos.	360,500.00	
			- 3.0x2.5 m (Pedestrian Underpass)	Nos.	13,500.00	46.00	Nos.	621,000.00	48.00	Nos.	648,000.00	52.00	Nos.	702,000.00	
			SUB TOTAL (Underpasses)					904,250.00			931,250.00			1,062,500.00	
IV	Interchange Works		- Interchage	Nos.	350,000.00	6.00	Nos.	2,100,000.00	6.00	Nos.	2,100,000.00	6.00	Nos.	2,100,000.00	
			- Junction	Nos.	245,000.00	1.00	Nos.	245,000.00	1.00	Nos.	245,000.00	1.00	Nos.	245,000.00	
			SUB TOTAL (Interchange)					2,345,000.00			2,345,000.00			2,345,000.00	
V	Drainage works		- 600 mm (L)	Nos.	117.23	0.00	Nos.	0.00	0.00	Nos.	0.00	0.00	Nos.	0.00	
			- 600 mm (H)	Nos.	156.31	0.00	Nos.	0.00	0.00	Nos.	0.00	0.00	Nos.	0.00	
			- 900 mm (L)	Nos.	255.26	8.00	Nos.	2,042.07	11.00	Nos.	2,807.84	12.00	Nos.	3,063.10	
			- 900 mm (H)	Nos.	340.36	7.00	Nos.	2,382.50	6.00	Nos.	2,042.15	3.00	Nos.	1,021.07	
			- 1200 mm (L)	Nos.	381.39	54.00	Nos.	20,594.83	86.00	Nos.	32,799.18	189.00	Nos.	72,081.92	
			- 1200 mm (H)	Nos.	508.51	83.00	Nos.	42,206.70	78.00	Nos.	39,664.12	14.00	Nos.	7,119.20	
			- 1.8x1.8 m (Box-Culvert)	Nos.	3,800.00	0.00	Nos.	0.00	0.00	Nos.	0.00	0.00	Nos.	0.00	
			SUB TOTAL (Drainages)					67,226.10			77,313.29			83,285.29	
VI	Miscellaneous		- Traffic signals and control facilities	m	1.95	42,230.00	m	82,348.50	39,730.00	m	77,473.50	37,830.00	m	73,768.50	
			- Traffic illumination	m	3.25	42,230.00	m	137,374.19	39,730.00	m	129,241.69	37,830.00	m	123,060.99	
			- Lane marking and Road Sings	m	0.49	42,230.00	m	20,692.70	39,730.00	m	19,467.70	37,830.00	m	18,536.70	
			- Gurd railes, Fencing and km posts	m	8.10	42,230.00	m	342,063.00	39,730.00	m	321,813.00	37,830.00	m	306,423.00	
			SUB TOTAL (Miscel.)					582,478.39			547,995.89			521,789.19	
Construction cost			Total Construction Cost					12,440,731.14			12,466,443.61			11,904,243.00	
			Construction Cost per km.					236,605.77			250,732.58			253,713.62	
VII	Contingencies	1	Phisical Contingencies 20%	Ls.		1.00	Ls.	2,488,146.23	1.00	Ls.	2,493,288.72	1.00	Ls.	2,380,848.60	
		2	Price Contingencies(Price Escaration) 10%	Ls.		1.00	Ls.	1,244,073.11	1.00	Ls.	1,246,644.36	1.00	Ls.	1,190,424.30	
			SUB TOTAL (Contingencies)					3,732,219.34			3,739,933.08			3,571,272.90	
IX	Engineering Services		Engineering Services 10%	Ls.		1.00	Ls.	1,617,295.05	1.00	Ls.	1,620,637.67	1.00	Ls.	1,547,551.59	
			SUB TOTAL (Engineering service/Supervision)					1,617,295.05			1,620,637.67			1,547,551.59	
VII	Land Acquisition & Compensation		Land Acquisition	Ls.			Ls.	6,696,503.00		Ls.	6,376,846.00		Ls.	6,094,202.00	
			Compensation	Ls.			Ls.	5,227,348.00		Ls.	4,518,879.00		Ls.	4,328,476.00	
			SUB TOTAL (Land Acquisin/compensation)					11,923,951.00			10,895,725.00			10,422,678.00	
Project Cost			Total Project Cost				Rs	29,714,196.53		Rs	28,722,739.36		Rs	27,445,745.48	
			Project Cost per km.				Rs	565,123.56		Rs	577,689.85		Rs	584,647.69	

However, this segment passes through marshy areas close to the northern periphery of the Bolgoda Lake, which is designated as a national conservation area. The impact on the ecosystem of the marsh area may be significant.

The overall environmental and social impact may be moderate.

Consequently, it is confirmed that Alignment A5 should be recommended as the most appropriate alignment for the Outer Circular Highway.

2.3 Purpose and Scope of the EIA

In general the purpose of the EIA is to ensure that environmental consequences of the proposed development work are recognised early and taken into consideration in the project design. The present EIA was undertaken at the behest of the RDA to evaluate the environmental impacts of the proposed Outer Circular Highway to the City of Colombo, compare reasonable alternatives to the proposed road in terms of environmental consequences, and to recommend mitigatory measures to avoid or minimise the adverse impacts. In the EIA process, the information presented in the EIA and its recommendations has already assisted and will also assist the planners to make decisions that are based on understanding of environmental consequences of the proposed road and take actions that protect, restore and enhance the environment.

The present EIA assesses the existing physical, biological and social environmental conditions in the proposed 100 m wide road trace and 1 km wide corridor on either side of the trace, identifies significant impacts of the projects on the environment, evaluates alternatives to the proposed road, recommends mitigatory measures for the adverse impacts, presents a monitoring plan and gives a recommendation on the environmental acceptability of the proposed project. Further, a land use map on the 1:20,000 scale has been prepared to assist the planners to estimate the extent of the environmental effects and also the environmental cost. An environmental cost benefit analysis has also been included to facilitate the decision making process. Though not specified in the Terms of Reference the EIA team has endeavoured to map out an environmentally acceptable trace which would minimise the potentially adverse social and other environmental effects.

2.4 General Methodology Used in the EIA

The scope of the EIA having been established by the Terms of Reference (TOR) prepared by the Central Environmental Authority (CEA), the EIA team analysed the TOR in detail and identified the potential significant impacts to be studied. A survey was carried out to collect available information on the proposed road including the Initial Environmental Examination Report, the Pre Feasibility report and the Interim Report of the feasibility study. The team also deliberated on the primary data to be collected and procedures to be followed in collecting information, particularly in reference to social aspects.

Field surveys to gather data on social aspects were carefully planned so as not to aggravate the community unease already generated in certain Divisional Secretary (DS) divisions.

Primary data on ecology and bio-diversity and social aspects was collected through field surveys conducted with the assistance of field investigators. Ecological surveys were carried out in the 2-km wide corridor (the study area) enclosing the 48.4-km length of the road trace. Demographic and socio-economic data were collected by two separate surveys. A sample household survey and participatory rural appraisal collected information directly from the community within the right of way (ROW) while surveys were also carried out to collect information from the Grama Niladaris (GN) of the affected GN divisions and respective Divisional Secretariats.

Information on hydrology and infrastructure facilities in the affected area were verified and updated by field visits while land use in the 2 km corridor was mapped by aerial photo interpretation and intensive verification field visits. A 1:20,000 scale map was prepared including all the land use data and other details required for the environmental assessment.

The 09 alternative traces evaluated in the Initial Environmental Examination (IEE) carried out in November 1998/February 1999 was considered by the EIA team in addition to other alternatives to the proposed road. Though 08 of the alternative traces were not recommended by the Interim Report of the Feasibility Study of the Outer Circular Highway to the City of Colombo, these alternatives were again compared with the recommended alignment with respect to environmental and social impacts as well as traffic impacts and engineering aspects. The No Action alternative, too, was compared with the build alternatives.

To obtain a clear understanding on the potential environmental impacts the project work was categorised into three stages on the basis of implementation and all activities under each category were identified and listed. Likewise the environmental impacts of the identified activities were also identified and listed. The environmental impacts of each identified project activity were assessed and a relevance matrix was developed. This matrix was employed to decide on the significant impacts, which should be addressed in detail.

The list of project activities and identified impacts are given below and the relevance matrix is presented as figure 2-3.

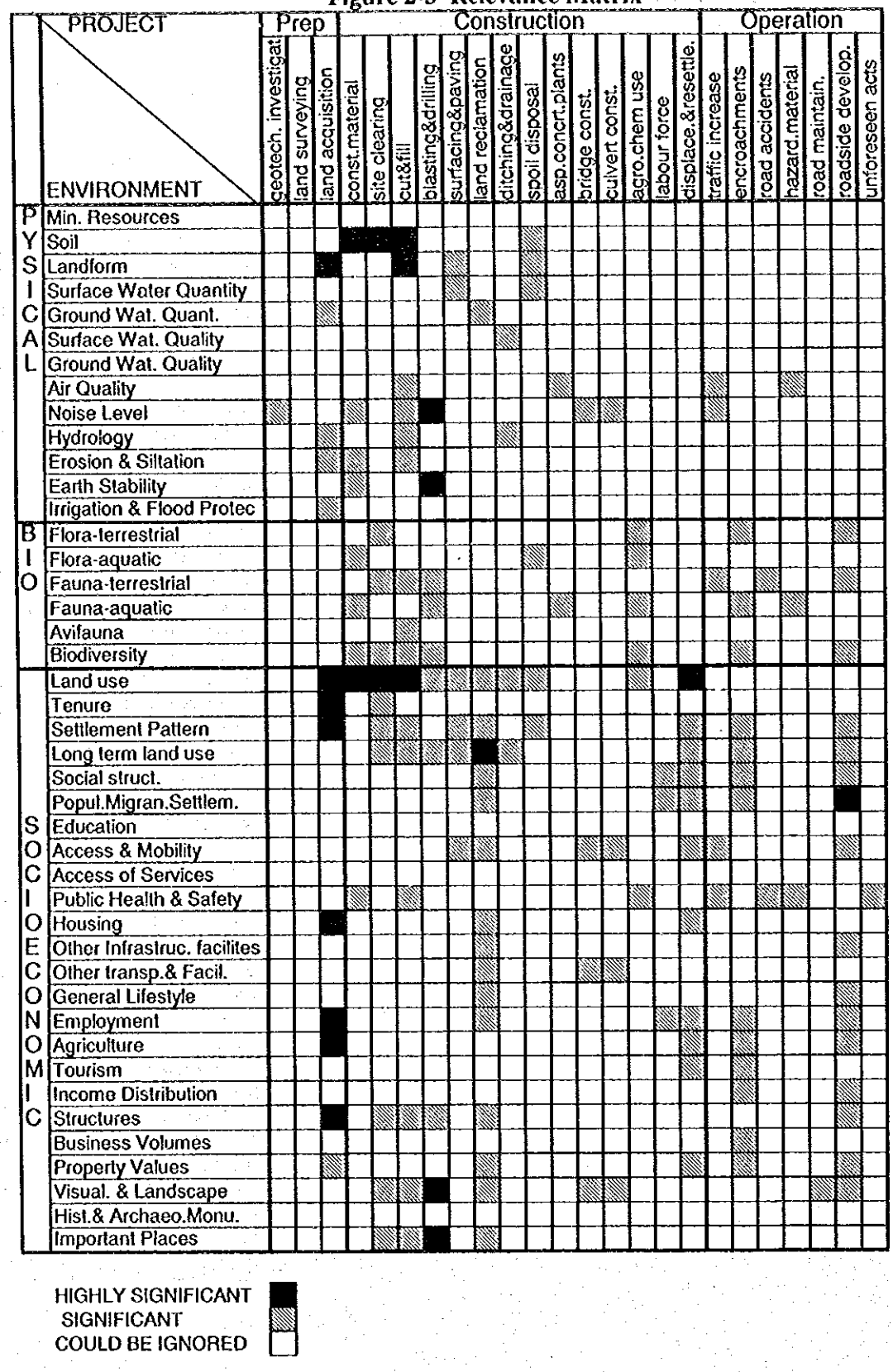
2.4.1 Project Activities

The implementation of the project could be divided into three different but interconnected stages. The Pre-construction or Preparatory Stage where preparatory and investigative work will be carried out, Construction Stage which will include all construction and earth work and also land reclamation and resettlement activities, and Post-construction or Operation Stage are the three stages. The activities of each of these stages are as grouped below.

Preparation Stage Activities:

-Land Surveying
-Geotechnical Investigation
-Land Acquisition

Figure 2-3 Relevance Matrix



Construction Stage Activities:

-Relocation and Resettlement of People
-Site Clearing
-Construction Material Extraction, Handling, Transportation and
-Stockpiling
-Cut and Fill
-Blasting and drilling
-Surfacing and Paving
-Land Reclamation
-Ditching and Drainage
-Disposal of Spoil
-Operation of Asphalt and Concrete Plants
-Bridge Construction
-Culvert Construction
-Use of Agro-chemicals in Landscaping
-Provision of Services and Utilities for Labour Force

Operation Stage Activities:

-Generated and Diverted Traffic
-Encroachment to Previously Inaccessible Areas
-Road Accidents
-Hazards of Transportation of Hazardous Materials
-Maintenance of the Road
-Roadside Development
-Floods, Earthquakes and other Unforeseen Acts

2.4.2 Environmental Impacts

The environmental aspects, which could be affected by the above activities, are also categorized into three distinct but interrelated groupings.

Physical Aspects:

-Soils
-Landform
-Mineral Resources
-Air Quality
-Noise Level
-Quantity of Surface Water
-Quantity of Ground Water
-Quality of Surface Water
-Quality of Ground Water
-Floods, Hydrology and Drainage Pattern
-Soil Erosion, Siltation and Sediment Runoff
-Earth Stability
-Irrigation and Flood Protection Works

Biological Aspects:

-Flora-Terrestrial
-Flora-Aquatic
-Fauna-Terrestrial
-Fauna-Aquatic
-AviFauna
-Bio-diversity

Socio -Economic Aspects:

-Land Use Pattern
-Land Tenure
-Settlement Pattern
-Long Term Plans for Land Use
-Social Structure, Local Life Style and Values
-Population, Migration and Settlement
-Education
-Accessibility and Mobility for Normal Activities
-Accessibility of Special Services as Police, Fire Protection & Hospitals
-Public Health and Safety
-Housing
-Other Infrastructure Facilities as Water Supply, Wastewater and Solid waste disposal, Power supply etc.
-Other Modes of Transport and Transportation Facilities
-General Lifestyle
-Employment
-Agriculture
-Tourism
-Income Distribution
-Structures
-Business Volumes
-Property Values
-Visual Intrusion and Landscape
-Historic and Archaeological Monuments
-Places of Worship and Religious Interest

By evaluating the impact of the project activities on the identified environmental aspects the level of significance of such impacts was determined and mitigatory action for significant adverse impacts were recommended. A monitoring plan was prepared to monitor the implementation of mitigatory action and residual impacts. Finally, a recommendation was made on the environmental acceptability of the project.

2.5 Existing Roadway System

The existing roads within the corridor of the proposed alignment, as per classification of roads by the Road Development Authority, consist of Class A, B, C, D, E and other roads.

Table 2.4 gives the classification of roads, the administrative authorities responsible for construction, improvement and maintenance of roads and structures, type of construction, design-paved width and total length in the districts of Colombo, Gampaha and Kalutara.

Table 2.4 Classification of Roads

CLASSIFICATION	ADMINISTRATIVE AUTHORITY	TYPE OF CONSTRUCTION	DESIGN WIDTH (M)	LENGTH IN KM		
				COLOMBO	GAMPAHA	KALUTARA
Class A	RDA	Paved	5.50 – 7.30	99	161	80
Class B	RDA	Paved	5.50 – 6.70	170	473	259
Class C	PRDA	Paved (99%)	4.00 – 5.50	311	447	479
Class D	PRDA	Mostly paved	3.05 – 4.00	122	452	194
Class E	PRDA	Unpaved	3.05 – 4.00	--	5	--
	LA	Paved/ Unpaved	--	4339		1963
	PS	Mostly Gravel	--			
Private Roads	PO/CI	Mostly Gravel/Earth	--			

RDA - Road Development Authority
PRDA - Provincial Road Development Authority
LA - Local Authorities
PS - Pradeshiya Sabha
PO - Private Owners
CI - Corporate Institutions

The total length of roads are as per Transport Sector Planning Study of December 1986 (RDA – 1986 and Local Authority – 1978)

The center line of the proposed corridor crosses the following A and B Class Roads:

CLASS OF ROAD	LOCATION OF ROAD	NAME OF ROAD
A3	Between km 7 and 8	Peliyagoda – Puttalam
B168	Between km 1and 2	Kadawatha-Ragama-Welisara
B 58	Between km 0 and 1	Kadawatha – Ganemulla
A1	Between km 16 and 17	Colombo – Kandy
B169	Between km 02 and 03	Kadawatha-Mawaramandiya
B262	Between km 01 and 02	Makola – Udupila
B 214	Between km10 and 11	Kelaniya-Mudungoda
A110	Between km 15 and 16	Colombo – Hanwella [Low Level]
B263	Between km 02 and 03	Malabe-Kaduwela
B240	Between km 18 and 19	Kotte – Bope
A4	Between km 21 and 22	Colombo-Ratnapura-Wellawaya-Batticoloa
B239	Between km 05 and 06	Kottawa-Talagala
B84	Between km 26 and 27	Colombo – Horana
B216	Between km 04 and 05	Kesbewa-Kindelpitiya-Bandaragama
A8	Between km 8 and 9	Panadura – Ratnapura
A2	Between km 29 and 30	Colombo-Hambantota-Wellawaya

In addition to the above, the proposed road is to connect the Colombo-Katunayake Expressway near Kerawalapitiya at the Northern end and connect the proposed North-South Southern Transport Corridor near Rambukkana at the Southern end.

Hence, 6 interchanges have been proposed for the following A Class roads:

A3, A1, A110/B240, A4, A8 and A2 and 02 more for future highways – Colombo – Katunayake Expressway and the Southern Transport Corridor.

In addition to the above, the following box culverts [5 m x 70 m] crossings have been identified for vehicles/pedestrians:

ALTERNATIVE 5 [SEGMENTS	STATION (in kms)	LENGTH (in kms)	VEHICLE	PEDESTRIANS
a2-b	0 – 2+590	2.590	0	4
b – c1	2+590 – 9+230	6.640	2	7
c1-e	9+230 – 23+640	14.410	2	14
e-f1	23+640 – 38+940	15.300	6	17
f1-f2	38+940 – 41+820	2.880	0	3
f2-f3	41+820 – 42+600	0.780	0	0
f3-h2	42+600 – 49+600	7.000	0	10
TOTAL		49.600	10	55

[Source – Progress Report – 1999]

In segment b-c1, the 02 vehicle underpasses are at 5 + 190 for B168 and at 6+790 for B58.

In segment c1-e, the 2 vehicle underpasses are at 8+430 for a C Class road and at +230 for B169

In segment e-f1 the six vehicle underpasses are at 23 +030 [C] 25+430 [C], 26+830 [C], 29+430[C], 31+430 [D], 31 + 830 [C].

There were several existing ferry crossings [10 No.] listed in close proximity of the 10 km corridor under the IEE / ISE study by Engineering Consultants in March 1999. This figure will now reduce as the corridor is 2 km and the following locations are listed.

2.5.1 Ferry Crossings

DS DIVISION	NO. CROSSINGS	RIVER	NO. OF USERS/DAY	NO. OF BOAT SERVICES /DAY
Kelaniya	2	Kelani	1200	100 [2 boats]
Biyagama	1	Kelani	80	15
Kaduwela	3	Kelani	150	15
Kolonnawa	2	Kelani	60-70	10-15
Bandaragama	1	Bolgoda Oya	150	10-15
Panadura	1	Bolgoda Oya	100	15

From field observations it is evident that none of these ferry crossings exist within the 2-km corridor of the proposed road.

There are 2 Railway Crossings on the proposed trace. They are at 2+590 – Colombo – Ragama/Colombo Peradeniya [double track] and at 25+300 [approx.] for the KV Line [single track]. These crossings will be viaducts of 450m length.

2.5.2 Limitations of Existing Road System

As the proposal is to construct 6 interchanges initially and 02 more future highways the limitations of the following roads have been considered:

PROPOSED INTERCHANGES	LOCATION ON PROPOSED TRACE	C/W WIDTH/EXISTING ROW
A3	0 + 800	15.4m/21m
A1	4 + 600	7.1m/12m
B240	20 + 430	7.7m/10.7m
A4	21 + 830	7.0m/8.5m
A8	36 + 310	6.0m/10.0m
A2	44 + 090	13.4m/21.0m

2.6 Government Policy on Development of Road Network

As mentioned earlier, the liberalization of vehicle imports after 1978, resulted in a rapid increase of vehicles causing heavy increase in traffic volumes on the road network system of Sri Lanka. In 1981, the Highways Department, which had the responsibility of the main road system of the country, was discontinued with the formation of the Road Development Authority.

The Colombo Master Plan Study by UNDP from 1974 to 1978 under the Ministry of Local Government and Housing/Town and Country Planning outlined several infrastructure, town, and road and tourism development programs.

The Road Development Authority has carried out a previous study on transport and highways with the assistance of local and foreign consultants - Sri Lanka Transport Sector Planning Study (SLTSPS), 1987. This study included all modes of transport and had inter-modal transport proposals, railway improvement proposals and identified new highways and a section on Greater Colombo Area Urban Transport System.

Of the proposals the roads relevant to this project are:

- Improvement of Baseline Road and extension to connect with Galle Road [A2]
- Colombo/Katunayake Expressway
- North-South by-pass to the City of Colombo

Since 1987, the RDA has carried out pre-feasibility studies on:

- Baseline Road Improvement & Extension Project [1991]
- Colombo/Katunayake Expressway [1991]
- Outer Circular Highway [1993]
- North-South by pass [1993]

The RDA/GOSL policy is to minimize traffic congestion on existing trunk roads radiating from Colombo by the Outer Circular Highway, which will connect these trunk roads, approximately 11 to 29 km away from Colombo. Further, it is expected that the Outer Circular Highway will also encourage regional development and a more balanced urban economy.

2.7 Conformity of Proposed Outer Circular Highway to UDA Plans

The Colombo Master Plan Study, completed in 1978, formed the basis of urban development in the Colombo Metropolitan Region. The Urban Development Authority (UDA) updated this study in 1988.

The UDA's as well as the Government's aim is to shift from central Colombo the urban functions and population to the outer suburbs in order to reduce traffic congestion and control urban sprawl in Colombo.

The OCH will connect present growth centers and UDA planned future growth centers. As all 'A' class roads will be connected to the OCH, though traffic will be diverted away from the center of Colombo, which in turn would reduce traffic congestion.

The OCH will also form a 'Green Belt' between the area inside the OCH and the area outside as a 'green area'.

The OCH would also provide a quick and convenient way of travelling for residents on the periphery of the OCH to reach their destinations by-passing Colombo City and in an environmentally friendly route.

2.8 Legal Requirements on Environmental Assessments

The legal requirements for environmental assessment in Sri Lanka is found in the following statutes:

- The Coast Conservation Act , No 57 of 1981;
- The National Environmental Act, No, 47 of 1980 & 56 of 1988;
- The Fauna and Flora Protection Ordinance, No. 2 of 1937

Out of these the National Environmental Act (NEA) is the most relevant statute. The Coast Conservation Act would apply only in the event of projects that are situated within the coastal zone and the Fauna and Flora Protection Ordinance would apply only in the event of projects situated within 1 mile from the boundary of a National Reserve declared under that Ordinance.

Part IVC of the National Environmental Act No. 47 of 1980 as amended by Act No. 56 of 1988 this contains the relevant law relating to the approval of projects. The scheme as set out in the project requires that "prescribed projects" that are prescribed by gazette regulation should require "approval" in terms of the NEA prior to their "implementation". The regulations for the purpose of setting in place the scheme are contained in the Gazette Extraordinary No. 772/22 of 24.06.93. The relevant project approving agencies (PAA) are contained in the Gazette Extraordinary No. 859/14 of 23.02.95. The Central Environmental Authority (CEA) and the Ministry to which the subject of Highways is assigned are two such PAAs.

Relevance of Part IVC of the NEA to the present project – In terms of Gazette No. 772/22, the present project is a prescribed project requiring approval since it is for the "construction of national and provincial highways involving a length exceeding 10 kilometers". In addition, depending on the final route selected, the project may involve the reclamation of land, wetland area exceeding 4 hectares and/or the involuntary resettlement exceeding 100 families other than resettlement effected under emergency situations; which are also prescribed projects in terms of the aforesaid Gazette.

The approval for projects is to be obtained from the appropriate PAA concerned or connected with such prescribed project. However, a project proponent (PP) may not function as a PAA. In respect of projects where an Environmental Impact Assessment (EIA) is required, the PAA may grant an approval only with the concurrence of the CEA.

Preliminary Information (PI) – The initial information of a project received by the PAA is the "Preliminary information" submitted by the PP.

Environmental scoping – Here the PAA subjects the preliminary information received from the PP to a scoping for the purpose of setting the Terms of Reference (TOR) for the IEE or the EIA as the case may be. This consists of determining the range and scope of proposed actions, alternatives, and impacts to be discussed in an IEE or an EIA. At the scoping stage the PAA may take into consideration the views of State agencies and the public. Based on the TOR prepared after a scoping, the PP prepares an IEE or an EIA as required by the PAA.

Initial Environmental Examination (IEE) – This is defined in section 33 of the NEA as a written report assessing the possible impacts of the project on the environment with a view to determine whether such impacts are significant and as such requiring the preparation of an EIA and including further details, descriptions, data maps, designs and other information and details as prescribed by the Minister.

Environmental Impact Assessment Report (EIA) – Section 33 of the NEA defines this report as a written analysis of the predicted environmental consequences of a proposed prescribed project, which contains:

- an environmental cost benefit analysis if such an analysis has been prepared
- a description of the project
- a description of the avoidable and unavoidable adverse environmental effects of the project
- a description of the alternatives to the activity which might be less harmful to the environment together with the reasons why such alternatives were rejected
- a description of any irreversible or irretrievable commitments of resources required by the proposed project.

Environment – Once more section 33 of the NEA contains the definition of this term. It is defined as the physical factors of the surroundings of human beings including the land, oil, water, atmosphere, climate, sound, odors, tastes and the biological factors of animas and plants of every description. Therefore, the impact on the above environmental factors needs to be addressed in an environmental assessment.

The completed EIA is made public and opened for public comment for a period of 30 days. The comments received from the public are forwarded to the PP for review and response.

In the present instance preliminary information has been submitted to the PAA in the form of an Initial Environmental Examination Report and scoping has been done before preparation of the Terms of Reference (TOR). Therefore what is being submitted to the PAA should conform to the requirements of an

Environmental Impact Assessment in terms of the regulations contained in Gazette No. 772/22.

2.9 Land Acquisition

The Land Acquisition Act, No. 9 of 1950 - The law relating to land acquisition is contained in the Land Acquisition Act No. 9 of 1950. The process of acquisition is briefly outlined below.

Taking immediate possession of land – The Land Acquisition Act provides for the Minister to make an order for taking immediate possession of land on the grounds of urgency after notice of investigation or notice of intention to acquire has been exhibited. This Order however may be challenged in Court.

Claims for compensation – Claims for compensation are inquired into by the acquiring officer. The acquiring officer inquires into:

- The market value of the land;
- The claims for compensation;
- The respective interest of persons claiming compensation;
- Any other matter which needs investigation for the purpose of making an award.

Any claim or dispute may be referred to Court for determination. An appeal lies from the decision of Court to the Court of Appeal.

Award – On the basis of the decision on the claims the acquiring officer makes an award. An appeal may be referred to the Board of Review constituted under the Land Acquisition Act against such an award on the ground that the compensation allowed to him is insufficient. The decision of the Board may be appealed against to the Court of Appeal on a question of law.

Exchange of land – Any person to whom compensation is payable as above may enter into an agreement with the acquiring officer to accept a transfer of land belonging to the State, in lieu of the whole or a part of such compensation.

Market Value – Several decisions apply to the question of determining the Market Value. No clear test has been indicated for deciding the market value. However, several criteria have been suggested in this respect in cases brought under the previous Land Acquisition Ordinance No. 3 of 1876. This Ordinance is now repealed. The following are some such considerations in determining market value as indicated incase law:

- Extent, situation, relative position, adaptability for any particular use, the use made of the property immediately adjoining it. A test suggested is the price that any one would give for it at a public auction. Another is the price given at recent sales for pieces of land similarly situated but this depends on the circumstances attending such sales. The rent and the rate

Of interest. These were called indicative of the line of inquiry and were not considered an exhaustive list of criteria. [1]

- The best use to which the land can be put.[2]
- Any fact that may reasonably affect an estimate of the value of the land may be taken into consideration, provided that it is not rendered irrelevant by surrounding circumstances.[3]

The Road Development Authority Act, No 73 of 1981 – This Act which establishes the Road Development Authority, contains provisions where any land is required to be acquired for the purpose of the business of the Road Development Authority and where the Minister approves of the proposed acquisition by an Order published in the Gazette, that property may be acquired under the Land Acquisition Act for a public purpose and be transferred to the Authority. In such an instance, the Road Development Authority should pay any sum payable for the acquisition, under the Land Acquisition Act.

The Urban Development Authority, No. 41 of 1978 – This provides for the acquisition of land within an Urban Development Area for the purposes of the Urban Development Authority. The actual acquisition is carried out in terms of the Land Acquisition Act for a public purpose. The declaration of an Urban Development Area is carried out by an Order published in the Gazette by the relevant Minister. Where the public notice of the intention to acquire, as required under the Land Acquisition Act is published within five years of the publication of the Order declaring an area as an Urban Development Area, the market value of the land for the purpose of compensation is the market value the land would have had on the date of declaration of the area as a Urban Development Area increased in reasonable amounts on account of any improvements carried out after that date.

Urban Development Projects (Special Provisions) Act, No. 2 of 1980 - This law provides for the declaration of lands urgently required for carrying out Urban Development Projects. Where the President, upon recommendations made by the Minister in charge of Urban Development, is of the opinion that any land or lands are urgently required for the purpose of carrying out an urban development project which would meet the just requirements of the general welfare of the people, the President may publish an Order in the Gazette declaring such land or lands in such area as may be specified are required for such a purpose. Where such an Order is published it restricts the remedies available to a person in respect of such land or lands in that:

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1 *The Government Agent, Southern Province v. Silva et al*; 3 NLR 235.

2 *Bailey v. Ferdinandus*; 3 NLR 356.

3 *Government Agent v. Perera*; 7 NLR 313.

- remedy, redress or relief in any court is limited to compensation or damages;
- no interim orders may be made having the effect of restraining, staying or impeding the acquisition, the carrying out of any work or the implementing of such project.

However, the power of the Supreme Court in fundamental rights jurisdiction remains unaffected. Further, the power of the Court of Appeal in issuing writs in terms Article 140 of the Constitution is also to be exercised by the Supreme Court.

Once an order has been published by the President the law provides for steps to be taken under the State Lands (Recovery of Possession) Act in order to take possession of land specified in the Order for the purpose of carrying out or assisting the urban development project.

2.10 Resettlement

This is an issue that has been given special consideration in the environmental assessment process. Any activity, which causes the involuntary resettlement exceeding 100 families other than resettlement effected under emergency situations, becomes by such resettlement alone a prescribed project requiring approval under Part IVC of the NEA. In the matter of an ***Appeal under Section 23DD of the National Environmental Act by Rajawella Holdings (Pvt.) Ltd.,*** it was held that adequate measures should be incorporated into the community development plan to cover the interim period (i.e. the period between displacement and resettlement). However, in that Appeal even though the technical evaluating committee expressed concerns on the chosen re-settlement site, the site was accepted since according to the developer no alternative site was available. Therefore, clearly resettlement was considered as part of the EIA. In ***S.C. Amarasinghe and three others vs. the Attorney General and three others***[4] which was in relation to the construction of the Colombo Katunayake Express Way it was urged that 2500 families would be affected by the project. Satisfactory steps for resettlement was referred to by the Supreme Court though no criteria or guidelines were laid down by Court.

The Environmental Guidelines for Road and Rail Development in Sri Lanka published by the CEA contains guidelines for the assessment of Relocation (Resettlement) Impacts. Where relocation is unavoidable, the following issues are to be addressed in relation to each alternative action:

Number of households to be relocated and their socio-economic profiles. A distinction to be made between rented properties and owned properties;

- Availability of comfortable, safe, sanitary and affordable housing for the displaced parties. This discussion to include the price ranges, sizes of

[4] Reported in the South Asian Environmental Law Reporter, Vol. 1(1), First Quarter, 1994.

- homes (e.g., number of rooms), location relative to present homes, and accessibility;
- Anticipated loss of employment caused by acquisition of business, industrial or domestic premises necessitating relocation, and actions taken to compensate affected parties;
- Numbers of commercial and industrial ventures to be relocated, their descriptions, size of premises, number of their employees, their revenues/ sales and their special needs such as water and power;
- Availability of sites for relocating displaced businesses and the cost/benefit analysis of relocating them (e.g., loss of/gain in patrons, change in travel/delivery times).
- A statement that the acquisition of property and relocation will be conducted in accordance with the existing laws and regulations such as the Urban Development Law No.41 of 1978), and that Resources are available for compensating all residential and commercial displacees without discrimination;
- A discussion of the financial and other incentive programs that will be developed to minimize the impact must be included, regardless of whether or not alternate sites and/or buildings are available. This discussion may also consider other sources of assistance available to those displaced. The said guidelines also contain guidance for assessing Social Impacts and Economic Impacts.

2.11 Previous experiences in Road Projects Involving Resettlement and Land Acquisition

The Colombo – Katunayake Expressway Project included issues of resettlement and land acquisition. In this project an order was made in terms of the Urban Development Projects (Special Provisions) Act by the President that lands specified in the schedule were urgently needed for the purpose of carrying out an urban development project, namely the Colombo – Katunayake Expressway Project. This matter was challenged by certain affected residents by an application made to the Supreme Court in *S C Amarasinghe and three others v. The Attorney General and three others.* The Petitioners stated that 2,500 families would be affected by the said Order of the President. That application was decided in March 1993, prior to the regulation No. 772/22 of 24.06.93. Thus there were no clear "prescribed projects" or "project approving agencies" at that stage. However, the carrying out of an environmental assessment, amongst other things, had been handed over to a consultant, Japan Bridge Structure Institute Inc. The CEA had already indicated that the EIA lacked certain information and requested that it be updated prior to making it available to the public. Particularly the CEA had indicated that:

- resettlement aspects had not been covered adequately;
- how to deal with the various categories of people coming under this project and the assurance given will have to be incorporated in the report.

A TOR had been prepared for the resettlement aspects not adequately addressed in the EIA which included a detailed study of the area affected by the development and the sites involved in resettlement of the people affected, the population characteristics, the existing facilities, the major economic activities in the area, rehabilitation policy, land availability for relocation and alternative sites for relocation.

Amongst other matters the Supreme Court held it that:

- possession to lands can be obtained under the Urban Development Projects (Special Provisions) Act read with the State Lands (Recovery of Possession) Act only after the lands referred to in the Order made by the President becomes vested in terms of the Land Acquisition Act;

- The Order made by the President does not in itself have an adverse impact on the citizen's property, liberty or livelihood; it does not deprive him of or affect title to, or possession of his property; his legal remedies under Article 140 remains unimpaired; he is not subject to any disadvantage whatsoever and he will have an opportunity of submitting objections when steps are taken under the Land Acquisition Act.

Further, the Respondents to that application informed Court that no action will be taken to obtain possession of the land required for the project until an EIA, satisfactory to the CEA, had been prepared and made available for public scrutiny for 30 days