# Selecting development options through environment-based planning approaches

*A Case Study of the Colombo-Katunayake Expressway Project in Sri Lanka*

*Ariyaratne Hewage*

## INTRODUCTION

Colombo is the capital city of Sri Lanka, situated on the West Coast of the country. The proposed high-speed road link is between Colombo City and Katunayake, the location of the international airport, which is situated about 25 km north of Colombo. The project would fulfil a long-felt need not only to facilitate passenger and freight movements between the two points, but also to ease the traffic from and to the northern part of the country.

At present the time taken to travel between the two points is between 45 minutes and one hour depending on the traffic. Travel between the Airport and City of Colombo is also hampered by the passenger and goods transport to and from Colombo and the northern part of the country. The inadequacy of the present facility will be a serious impediment to economic growth in the area and the country, as a whole.

The proposed alignment of the expressway would be 24.6 km in length with four lanes (expansion to six) each lane having a width of 3.5m. The design speed is 100 km/hr. The preferred and acceptable alignment (Western Trace) has been selected as the best option based on four primary options along with a 'No Action' Option.

The Colombo Katunayake Expressway (CKE) would pass through mostly marshy land, as well as built up land and the Negombo lagoon. Marshy areas having soft ground would undergo consolidation settlement which is a critical phase of the project. Soil movement, construction of embankments, filling of 1.9 km of the canal along with the canal deviation will be carried out. In addition, work on asphalt concrete pavement, construction of base course and sub-base course and construction of bridges over Dandugam Oya and Jaela will also be carried out.

Pre-construction activities include the construction/acquisition of offices and housing, workshops, repair facilities, warehouses/stockpiling areas, quarry sites/crushing plants, concrete batting and mixer plant, asphalt mixing plant, power and water supply, major construction equipment and a site laboratory. Sand required for the sand blanket would be obtained from offshore dredging, pumping and stockpiling at identified locations.

**See Topic 4**

**UNEP EIA Training Resource Manual**

*Screening*

The concept of an expressway was first formulated in 1989 by the Road Development Authority (RDA) and many of the earlier parameters have now changed including land use and socio-economic factors. The traffic on the existing primary road between Colombo and Katunayake (A3) increased by almost 250 per cent within the decade from 1981 to 1990 and in 1995 certain sections of the road were carrying around 40,000 vehicles per day. Taking into consideration all these factors, a new trace has been proposed. The new proposal is to construct an alternate highway between Colombo and Bandaranayake International Airport (BIA). This proposal was approved by the Cabinet of Ministers in August 1995 subject to an acceptable financing arrangement.

Several primary options which would enable high-speed transport of sufficient capacity have been evaluated to find the best option. The primary alternatives considered in the process were:

- Alternative 1 Western Trace
- Alternative 2 Eastern Trace
- Alternative 3 Improvement to existing road, A3
- Alternative 4 Improvement to the railway inter model option
- Alternative 5 'No action' option

The basic social and environmental setting for this EIA case study is as follows.

*Socio-cultural environment*

The socio-cultural environment of the project setting includes the people living in the alignment of the CKE, the community living in the sides of the north of CKE and the daily traffic that will use the CKE when it is in operation. There were 130 houses and small shops in the path of CKE and these have to be demolished and relocated.

There were another sixty families who lived in the road reservation area of the CKE and this reservation area will be acquired by the Road Development Authority (RDA). This community will be allowed to stay, but they will have to tolerate the ill effects even after the construction.

The CKE runs along highly populated areas and this will cause several problems to the community who will be separated by the path of the CKE. Certain sections of the existing A3 road were used by around 40,000 vehicles per day in 1995.

*Physical features*

The physical features of the project area includes an expanse of marshland (133 ha of Muthurajawela marsh wetland), paddy lands, agricultural land, coconut land, homestead, residential areas and the Negombo lagoon area. The CKE links Colombo, the Capital of Sri Lanka with Bandaranaike

International Airport, the only International airport of the nation and it travels through highly urbanized/industrialized areas with several key national social organizations in the vicinity.

*Biotic environment*

The biotic environment includes faunal species such as many different species of mammals, birds, reptiles, fishes, crustaceans, amphibians and other aquatic life in the wetlands (marsh/lagoon). In addition, it also includes vegetation such as trees, shrub, grasses, reeds, and cattails with aquatic vegetation such as lilies, sea-grasses etc.

Several project-related issues were identified at the proposal stage.

*Social conflicts*

Two main groups of communities are affected by this project. The first are those involuntary resettlers to be relocated because their houses will be demolished (130 houses and six small shops). Sixty five percent of the dwellings are shanties built by squatters. Eighty per cent of residents are employed in temporary occupations and more than 77 per cent earn around Rs. 3000/= per month (approx. US$45).

The remaining families (in 60 houses), allowed to stay in the road reservation (expressway) acquired by RDA, will be vulnerable to ill effects even after the construction.

*Ecological issues*

The expressway passes through the ecologically sensitive habitats of wetlands, such as the Muthurajawela Marsh, ponds, streams, brackish water swamps, network of canals and the Negombo Lagoon etc.

In addition to loss of area of the existing habitats, the biological diversity on both sides of the express way would be affected by noise and other impacts. Large quantities of sea sand will be dredged off shore to fill the roadway and this may cause damage to coral reefs, benthic habitats, etc. Seawater from the sand stockpiling may also affect the ecology in the area. The expressway runs through the lagoon for a distance of 1.4 km and would isolate a narrow strip (3 per cent) from the main lagoon area.

Other impacts on ecological resources are obstruction of storm water flow, obstruction of animal paths, disturbance of animals by noise during construction and operational phases, disruption of water flow in the old Negombo Canal, and contamination of aquatic habitats with pollutants such as oil, cement, tar, lead, zinc, iron, rubber and solid litter.

*Hydrological issues*

The existing railway track and the A3 road already act as barriers. The expressway will cause only marginal increase to free flow of water. The

crossings of the express way at old Negombo canal, local drainage canals and major streams will cause congestion of water flow.

*Policy issues*

Two major policy issues needed to be addressed before granting approval for the implementation of the project:

- It is proposed to maintain the proposed expressway as a toll-road and thus to charge a fee from the vehicles using it. Since this is the first time a fee levying system on a roadway has been introduced, there may be some resistance to it. The government should take a firm decision to go ahead with the proposal since it has several long-term benefits.
- The expressway runs through the conservation zone of the Muthurajawela wetlands affecting the Muthurajawela Visitor Centre (MVC) and separating the permanent building from the nature trial area. In addition, during the construction phase MVC may lose its attraction for visitors, and the boat trips along canals will have to be suspended.

**PROCESS AND PROCEDURAL CONTEXT**

There are several major requirements established by the EIA and other existing institutional framework for the project, as follows:

*Legal requirements*

Projects for the construction of national and provincial highways involving a length exceeding 10 km fall within the prescribed list for EIA as published under National Environmental (Approval of Projects) Regulations No.1 of 1993. Under the provisions of section 23Z of the National Environmental (Amendment) Act of No.56 of 1988 the preparation of an EIA is a mandatory legal requirement for projects prescribed by the Minister in charge of environment.

The EIA will have to be implemented through a designated Project Approving Agency (PAA) as prescribed by the Minister under section 23Z of the NEA. The CEA acts as the PAA for this project and the Road Development Authority (RDA)) is the project proponent for the CKE. (A list of statutes relevant to the assessment is given in the annex).

*Preliminary information*

The project proponent is required to submit preliminary information on the project. This should include a description of the nature, scope and location of the project accompanied by location maps and other details as required by the PAA. This would also include the magnitude of the proposed project, use of natural resources, employment opportunities, operation method of

the project etc. The preliminary information would enable the authorities to decide whether the project falls within the prescribed project list.

*Designation of Project Approving Agency (PAA)*

Depending on the type of the project, the Central Environment Authority (CEA) appoints another government agency from among the identified list of agencies as the PAA. An agency which will have any special interest in the project promotion is not considered eligible for appointment. In this case the CEA acted as the Project Approving Agency. Since the Road Development Authority was the project proponent the Ministry of Transport and Highways was not appointed as the PAA in order to avoid any biases towards the approval of the project.

*Scoping*

Scoping is done through an inter-agency meeting of all relevant agencies. In regard to CKE, the relevant agencies are CEA, Wildlife Department, Urban Development Authority, Water Supply and Drainage Board and Sri Lanka Land Reclamation Board and other relevant agencies. Scoping meetings were held to identify significant issues, type of analysis and mitigatory measures to be considered. This was also used to determine reasonable alternatives that should be considered in the EIA and also set the Terms of Reference (ToR) for EIA. In addition this is the forum to communicate with the developer about the requirements of EIA and to inform the community.

*Preparation of Terms of Reference (ToR) for EIA*

The ToR was prepared by the PAA after the scoping stage of the EIA process. CEA professional staff members served on the committee on ToR preparation. In addition, the CEA also granted its formal approval to the ToR after having reviewed it thoroughly.

*Public participation*

The provision for public participation is contained in the NEA. On receipt of the EIAR the PAA will make preliminary assessment of its adequacy as measured by the ToR. If found adequate, the notice of the availability of the EIAR for public review will be announced in the gazette and in newspapers in Sinhala, Tamil and English languages. Thirty working days are allowed for public review. At the end of the public comment period, the PAA will decide whether the case warrants a public hearing. The public comments received during the period of 30 days will be sent to the project proponent for review and response, all the substantive comments received on the draft will be attached to the final draft.

*Technical Evaluation Committee (TEC)*

The PAA appoints a TEC comprised of professional staff from the PAA and the CEA plus other invited subject matter experts. The TEC reviewed the EIAR and the public comments received. The TEC also asked for more

information on the project proposal from the proponent for further review. On the basis of recommendations made by the TEC, the PAA approved the EIA subject to certain conditions being met.

*Decision making*

The PAA will grant approval for the project subject to specified conditions or will refuse approval for the project (giving reasons for the non-approval). A project proponent who is aggrieved by the refusal can appeal to the Secretary of the Minister in charge of Environment. A member of the public aggrieved by a decision to grant approval for a project has to seek recourse through the courts.

*Mitigatory measures*

As a requirement of the EIA, the proponent prepared a mitigation plan indicating how he was proposing to limit some of the project's adverse impacts on the environment. Accordingly, the proposed mitigatory measures for resettlement of people, construction of Muthurajawela Visitors' Centre, regular testing of water quality of water bodies, noise reduction devices and other measures will be monitored by the Road Development Authority.

*Monitoring Plan*

As part of the final EIA, the proponent submitted a monitoring plan for implementing the proposed mitigation measures. The members of CEA, RDA and other relevant agencies will serve as the monitoring committee.

(A flow chart depicting the EIA process is at Figure 1)

**APPROACHES TAKEN**

The issues related to this project have been addressed in different ways. The various strategies and methods used in this process are discussed below.

*Selection of the best option*

Four different reasonable options were considered together with the 'no action' alternative:

- Option 1 - Access controlled express way to the west of Colombo - Negombo Road A3, (Western Trace).
- Option 2 - Access controlled express way to the east of Colombo - Negombo Road A3, (Eastern Trace).

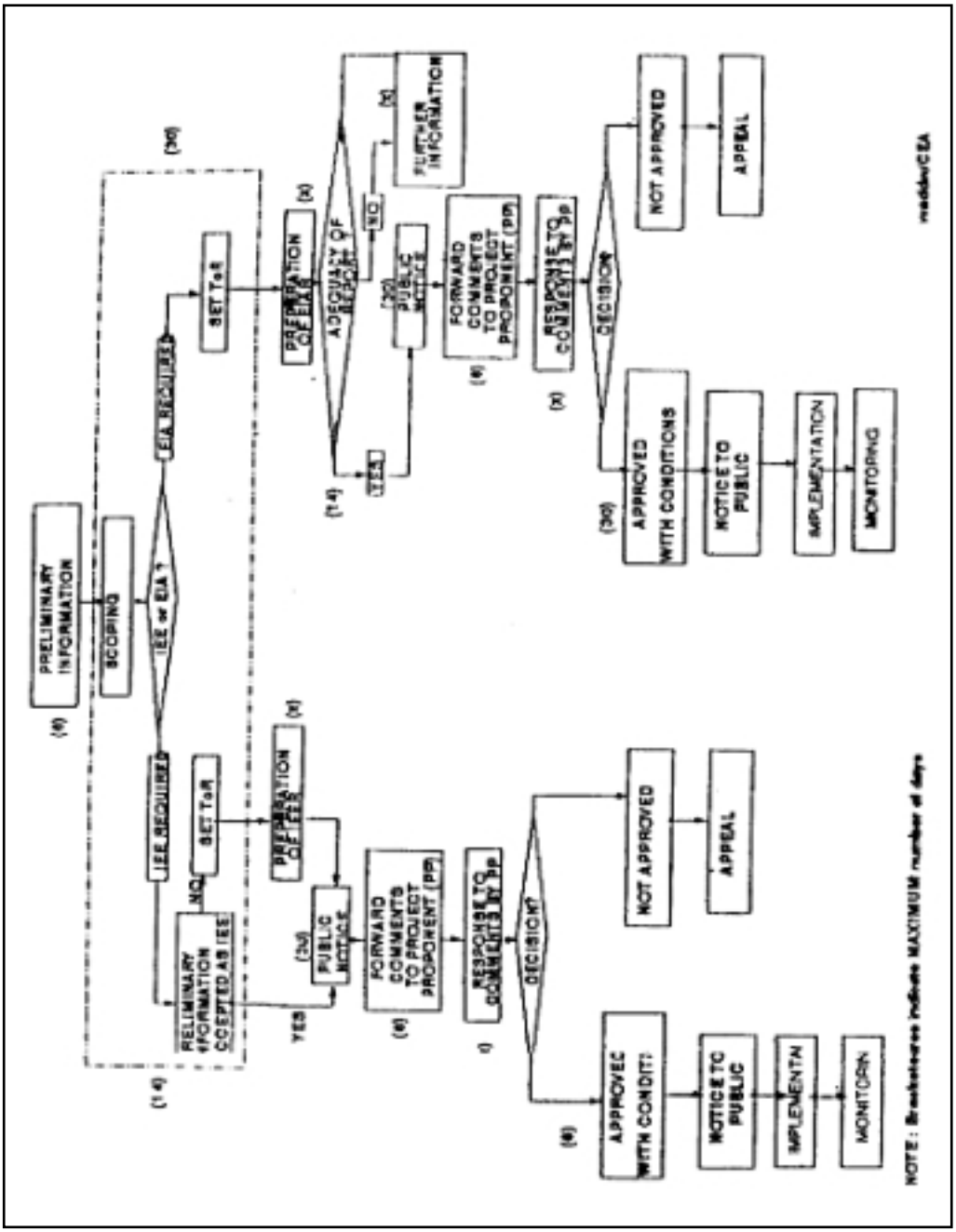


*Figure 1: The EIA/IEE process*

- Option 3 - Improvements to the existing Colombo - Negambo Road A3 (widening of the Road, better traffic control measures etc.).
- Option 4 - Improvement to the railway between Colombo and Katunayake. (More locomotives, and rolling stocks laying an additional track and improved signaling).
- Option 5 - 'No action' alternative.

All five options were evaluated on the basis of ecological, hydrological, socio-economic, engineering and economic criteria. A comparison of options according to different parameters is shown in Figure 2.

The economic appraisal is based on social cost benefit analysis. The benefit and cost of each alternative is calculated, and compared, to identify the most beneficial option. To conduct a cost benefit analysis a base line (no action alternative) option is selected, against which all the other options were measured. In this case the existing level of the A3 road and the railway system in 1996 is taken as the base line.

Based on the comparison of the above evaluations, controlled express way to the west of Colombo-Negombo road A3 was selected as the best option.

*Re-settlement of displaced people*

The resettlers (inhabitants of the 130 houses and six small shops) will be provided with better housing and other facilities close to the original settlement as far as possible. Some of them will be employed in the CKE (Construction and Operational stages). The people who live in permanent houses ear-marked to be demolished will be faced with loss of property, loss of income (agriculture, fishing, etc.), disruption of the social structure etc. They will be paid reasonable compensation, based on current valuations. New land for re-settlements will be provided with water, sanitation, access roads and electricity for those who request land.

*Noise reduction*

Noise barriers will be installed to reduce the noise to acceptable levels in places close to dwellings, schools and religious places.

*Construction of over passes*

It is also proposed to provide links through vehicular and pedestrian overpasses to minimize the separation of communities on either side of the expressway. Proper signaling and traffic management measures will be used to reduce the inconvenience caused by the congestion during construction.

*Drainage and flood control*

Local drainage canal crossings will be provided with culverts to avoid drainage congestion and these will also serve as pathways and refuges for fauna (animals) crossing the CKE. Major stream crossings would be provided with sufficiently wide bridges to permit floods to be discharged without upstream inundation. A short segment of a bypass canal will be constructed to ensure the hydraulic continuity of the old Negambo Canal. The horizontal alignment of the canal will be merged with the existing canal by a smooth transition curve. The runoff of the CKE will be sent through a system of wet ponds to minimize much of the pollutants.

*Protection of the eco-system*

No new access roads will be built to the construction sites through the marsh. Strict waste control programmes will be implemented at the construction sites as a safe guard to prevent adverse effects. Measures will be taken to minimize damage to coral reefs in laying pipelines to dredge sea sand. Evacuation pumping will be carried out simultaneously with the pumping of a sand/water mix to minimize percolation from escaping seawater in sand stockpiling area. Two underpasses will be built into the CKE to permit tidal mixing and navigation, in order to mitigate ill effects on the isolated strip of the lagoon.

*Muthurajawela Visitor Centre*

Construction of a new visitors' centre away from the CKE is proposed. This will be in a suitable location selected by the Wetland Conservation Project in consultation with the Department of Wildlife Conservation. An overhead bridge to be constructed over the Nonage Ela canal will provide access to the nature trail area.

**RESULTS AND IMPLICATIONS**

Several approaches were used in the EIA process to ensure proper management of the environment. Most of the approaches enabled the project proponent and the government to improve the project through introducing modifications before the project commenced its operations.

*Establishment of a future national requirement*

The urgent requirement of a high-speed link between Colombo and Katunayake was established by the EIA study. The towns close to the International Airport are rapidly expanding residential and industrial areas. The existing links (the A3 road and the railway track for passenger and goods transport ) between Colombo and Katunayake are unable to meet even the present demand while incurring substantial financial loss to the economy. Considering the projected demand for the future it has been established as an urgent requirement of a high-speed link (expressway) between Colombo and Katunayake.

*Selection of the best option*

It has been proved that the Western Trace (CKE) was the best option out of the four on the basis of economic performance and minimum environmental impacts. Five reasonable options for enhancing the transport link were considered in the study . They are the two alternate traces (Western and the Eastern Trace) for an access control express way, improvements to the existing A3 road and the railway, and the 'no action' alternative. It has been proved that the railway improvement will not be able to meet the objectives without a parallel upgrading of the entire national railway network. The widening of the existing A3 road which runs through highly populated

areas with unlimited access to satisfy the projected requirements would be impossible as this will cause unacceptable social impacts of a high magnitude. Comparison of the two remaining traces proved that the Western Trace is preferred as it will cost substantively less, and cause low environmental and social impacts.

*Secondary alternatives*

Secondary alternatives for four segments of the selected option (Western Trace) have also been identified to minimize detrimental social and environmental impacts. As certain segments of the selected Western Trace cause serious consequences secondary alternatives were considered for four segments of the Western Trace. The alternatives which would help minimize adverse impacts could be implemented with reasonable cost. It has also been directed that secondary alternatives within the proposed trace should be selected so that the trace will not traverse the Muthurajawela sanctuary.

*Fish breeding*

In order to protect the fishing breeding area, a bridge of appropriate width will be constructed in the Madabokka area of the Negombo Lagoon. This would help free movement of fish from the mangroves to the lagoon. It has been shown that the measures recommended in the report are not sufficient to compensate for the ill effects caused to fish production. As such, PAA has requested the project proponent to implement the following measures:

- Any loss in productivity resulting from the loss of sea grasses should be compensated by establishing a similar area in close proximity within the estuary.
- To compensate the decrease in organic production due to loss of mangroves by replanting Rhizophora to an acceptable level.

*Baseline data*

A base line survey of flood levels, inundation duration, water spread areas along the trace and the project area will be carried out for the preparation of the final designs of the expressway. In addition, mapping of expected flood detention inundation areas and assessment of flood duration changes will be carried out and this data will be submitted to CEA for monitoring.

*Other considerations*

The following areas for action were also identified. There was a need to:

- obtain approval of the Sri Lanka Land Reclamation and Development Corporation for the final drainage management plan prior to implementation;
- ensure the construction methods are suitably modified to minimize turbidity and inflow of additional sediment into the lagoon;

- identify suitable land area along the lagoon verges for expanding the water area to compensate for loss of water area for the construction of CKE;
- compensate for any loss in productivity resulting from the loss of sea grasses by establishing a similar area in close proximity within the estuary;
- compensate for the decrease in organic production due to loss of mangroves by replanting Rhizophora to an acceptable level;
- further improve the proposed resettlement and compensation package by an additional compensation to be paid to those families whose livelihood will be directly affected (vegetable cultivators, boutique keepers, fishermen, etc.) and to establish new income sources;
- payment of an additional compensation to all families whose houses to be demolished as a 'settling down' allowance, to mitigate for disruption of their livelihood etc;
- establish a clear channel of communication between the project proponent and the community affected through out the resettlement process; and
- monitor the resettlement process to be continued to a reasonable period in order to alleviate difficulties of the resettlers after resettlement.

**LESSONS TO BE LEARNED**

Several lessons can be learned from experience of the EIA of CKE. Some of the key points are discussed below.

*The EIA process improves the project planning*

It has been shown from this project that the EIA has been very useful in improving project planning. Five different reasonable alternatives (options) were to considered when selecting a preferred alternative, which was socially, economically and environmentally acceptable. The preferred option was modified to suit the EIA requirements and practical situations.

If the proponent had tried to implement a single option he would have been faced with serious problems from the Community, Government Agencies and NGOs. It can therefore be clearly concluded that the EIA process has helped to modify the project at planning stage that enabled to produce an acceptable solution to address the issue.

*An incomplete EIA delays the implementation of the project*

The EIAR prepared for this project was not complete and therefore the Technical Evaluation Committee of the PAA has recommended various

types of additional information and studies to be conducted in hydrological sociological and economical aspects. An EIA should include a review of several feasible alternatives, all reasonable likely impacts, recommended mitigatory measures that can be implemented, and should ensure that other necessary approvals are obtained concurrently with the EIA process.

*Proponents interactions with the community is vital for a good EAIR*

The project proponent was able to select options with limited social impacts that can be mitigated within a reasonable cost by having direct dialogue with the affected parties. But if the project proponent had established a good, continuous rapport with the affected communities from the beginning he could have offered a more acceptable resettlement plan and could have thereby avoided delays which occurred in the project. In this case, the project-approving agency has recommended additional compensation to improve the settlement plan.

*Ecological issues should also be given the same due consideration as social issues*

It is interesting to note that the EIA process had forced the project proponent to give the same weight to the ecological issues as to social issues when selecting a preferred option for the project. In this case the alignment of the CKE has been shifted to pass through the environmental sensitive Muthurajawela Marsh, Negombo Lagoon conservation zone to avoid detrimental environmental impacts caused by passing through an urbanized area.

*Involvement of political authority in decision making*

In this particular issue, the highest political authority, the President of the country, who intervened in the project as a matter of national interest was convinced of the need to protect the environment. She therefore instructed the project-approving agency to select an option which had low social as well as ecological impacts. This intervention led to the selection of the most preferred alternative for the project. It can therefore be concluded that if facts are properly presented to the political authorities they will make better decisions for long-term benefits for the country.

| | O P T I O N S | | | | |
|---|---|---|---|---|---|
| IMPACTS ON | WESTERN TRACE | EASTERN TRACE | IMPROVE ROAD A3 | IMPROVE RAILWAY | 'NO BUILD' |
| Hydrology | ● | ● | | | |
| Fauna and Flora | ● | • | | | |
| Humans | • | ● | ● | • | • |
| Land Use | • | ● | ● | • | |
| Visual Amenity | • | ● | ● | • | ● |
| Noise Level | • | ● | ● | • | ● |
| Air and Water Quality | • | • | ● | • | ● |
| Economy | • | ● | ● | • | |
| Other Considerations | | | Note: The circle size reflects the severity of the impact | | |
| Engineering Considerations | • | ● | ● | • | • |
| Achieve Aims and Objectives | | ✓ | ✓ | | |

*Figure 2: Comparison of adverse environmental effects from the five options considered*

ANNEX 1

Some statutes relevant to the present assessment

- National Environmental Act No.47 of 1980 as Amendment No.56 of 1988.
- Coast Conservation Act No.57 of 1981 as Amendment of 1988

- Board of Investment Act No.49 of 1992 (which replaced the GCEC-Act No.4 of 1978)
- The Road Development Authority Act 1981
- The Urban Development Authority Law 1978
- Urban Development Projects (Special Provision) Act No.2 of 1980
- The Greater Colombo Economic Commission Law No.4 of 1978 (Amended Act No.49 of 1992 which established the Board of Investment)
- Land Acquisition Act No.9 of 1950 as amended.
- Flood Protection Ordinance No.4 of 1924 (as amended)
- Sri Lanka Land Reclamation and Development Corporation Act No.52 of 1982.
- Fauna and Flora Protection Ordinance No.2 of 1934 as amended by Acts Nos.44 of 1964, 1 of 1970 and 49 of 1993.

LIST OF RELEVANT PUBLISHED PAPERS AND OTHER SOURCE MATERIAL

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***The author:***

Ariyaratne Hewage
Executive Director Development
Mahaweli Authority of Sri Lanka, 500, T.B.Jayah Mawatha
Colombo 10
SRI LANKA

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**mitigatory measures**

**social impacts**