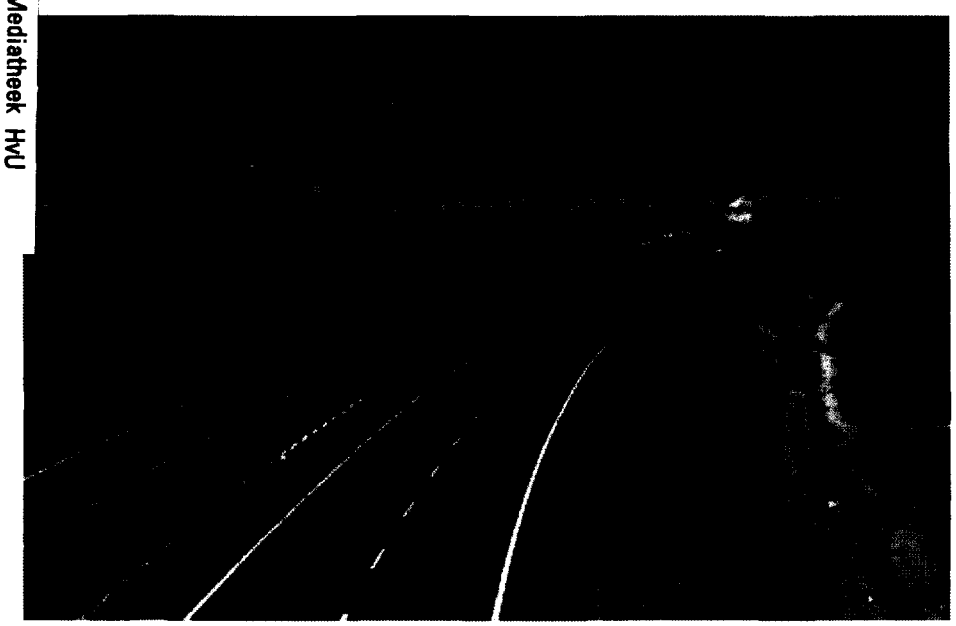
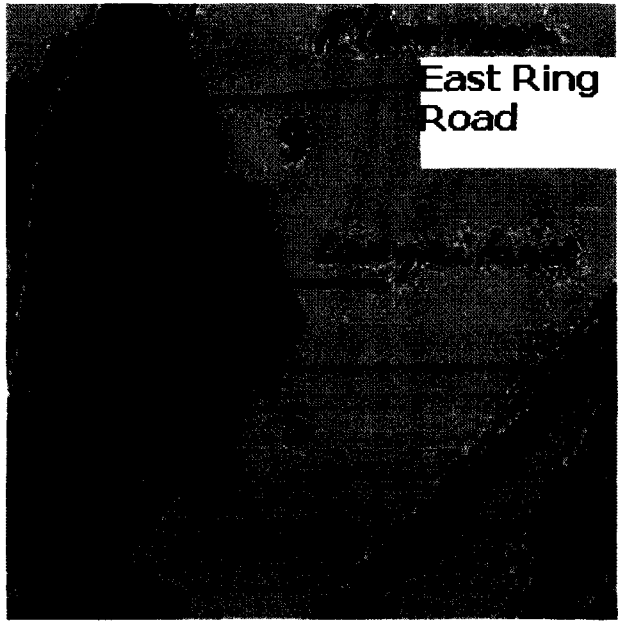
Viability Analysis for East Ring Road





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Preface

Begin with the name of the Lord Almighty, who has blessed us with a lot of things which might even we don't deserve. Indeed He is most merciful. I am very great full to Him, to give me courage and knowledge which help me to finish my Final Thesis in a good manner.

Beside a lot of motivation from my family, there are many people who help me to finish my that final part of studies. First of all I would like to thank to the **Mr.Frans Van Heerden** for his untiring efforts which finally help me to finish that project on that. He is indeed a man with a lot of knowledge and the best thing about him that I felt is that he thinks a lot for his students and motivate them to learn as much as they can.

To accomplish the part of Viability Analysis, I am very thankful to Mr. **Mr. René Camerik,** from Rijkwaterstaat. He is a man with huge respect for others and I appreciate that from my heart that he still extend a hand of help to even after I didn't keep up with the previously proposed topic under hid supervision.

There were many other people who helped me a lot; they include **Mr. Nicos** from Frederick Institute of Technology, Cyprus, and Ari from TU Delft.

"The man is a success who has lived well, laughed often, and loved much;
Who has gained the respect of intelligent men and the love of children;
Who has filled his niche and accomplished his task;
Who leaves the world better than he found it,
Whether by an improved poppy,
a perfect poem, or a rescued soul;
Who never lacked appreciation of earth's beauty or failed to express it;
Who looked for the best in others
&
gave the best he had."

May Lord bless us all.

M.Adnan Ashraf.

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Project Objectives

The motivation behind that topic is to identify the importance/utilization of East Ring Road.

For that pupose two tools are used to identified the project suitability.

- **Economical aspect:**

  The motivation to choose "Economical Tools" is to:

  (a) To ensure the economic viability of project.

  (b) The identification of most economical route.

- **Environmental aspect:**

  (a) To analyse the Environmental suitability of that project.

  (b) Identification of different problum and their possible solution.

problem owner

Project Objectives

- To encourage and provide opportunities for public consultation in the Economincal & Environmental aspects pf proposal before decisions are made.
- To ensure that proposed counter measures takes primary responsibility for the protection of the Environment related problums and carry the cost necessary for Environmental protection.
- To find out the Environmentally & Economically sound proposals by minimizing adverse affects and maximizing the benefits to the community.
- To provide basis for the on going Environmental management based on the conducted studies and monitoring.
- To promote awarness and education in Environmental values.
- Provide a assesment which provides a mean for promoting economic developement which will be Environmentally sustainable and Economically sound and reasonable.

Leading Questions

With respect to the project , following will be the leading questions:

- According to the conducted studies, did this road will serve its purpose ?
- What will be the potential problems by that project with respect to Environmental & Economical?
- Do we have to have make some changes in the proposed project?
- What will be the main Economical & Environmental factors?
- What will be the Potential solutions to make that project viable?

Project schema

Ministry of Transport & Water Management.

problem owner

can take

policy measures

. . .

defines

external factors

?

?

?

Design of East Ring Road.

criteria

Movability

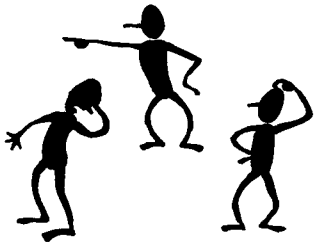
Economical

GNP/GDP

objectives

also define

stakeholders



system

- Inhabitants,Farmers
- Enviromentalists, Industrialist

Stakeholders

The possible stakeholders related to East Ring Road project will be as follows;

- **Energy Sector:**

  Thermal, hydro power generators,petroleum refineries, Nuclear plants etc.

- **Manufacturing & Processing:**

  Petrochemical complexes,Food processings plants,Industrial estates etc.

- **Transport Sector:**

  Airport,Railways, Highways etc.

- **Water Management:**

  Water supply system, Metrological department etc.

- **Waste Management:**

  Treatment plants, incineration, landfill related bodies etc.

- **Urban Developement and Tourism:**

  Land departments, Real estates, Local bodies(Gemeente) etc.

Stakeholder Companies

The potential stake holders for that project could be;

- **Energy Sector:**
  Shell, Siemens etc.
- **Manufacturing & Processing:**
  Philips, Volvo, Unilever, D.E etc.
- **Transport Sector:**
  NS, Lovers, Schipol,Mammoet etc.
- **Water Management:**
  Rijkwaterstaat, Metrological department.
- **Waste Management:**
  Local recycling companies like aoo.
- **Urban Developement and Tourism:**
  Land departments, Real estates, Local bodies(Gemeente) etc.

Key Motives

- **Energy Sector:**
  - Efficient network for providing electricity.
  - Necessary place needed for electricity infrastructure.
- **Manufacturing and Processing:**
  - Allocation of appropriate locations for industries.
  - Baisc needed insentives for begining.
- **Transport:**
  - Identification of profit oriented routes.
  - Efficient & economical network of services.
- **Water Management:**
  - Necessary infrastructure for purpose of prventing flood,preservation of fresh water resources.
  - Extensive control about water quality,waste management and contamination related issues.
- **Urban Developement & Tourism:**
  - Measures to ensure develope tourism industry.
  - Interco-ordinal network to ensure comfortabilty & mobility of tourists.

Decision Makers

The main possiable players in the decision makers will be as follows. They will sit together and negotiate on each other demands, like give and take. And finally together come to one decision to support that project.

- **Policy Makers.**
- **Engineers.**
- **Politicians.**
- **Economists.**
- **Environmentalists.**
- **Local Society Members.**
- **Planning Commisions.**
- **Concerned Ministries.**
- **Local Bodies.**

Mutual Concerns Shared by Stake Holders, Decision Makers and Problem Owner(Government)

There will many many concerns and interests by all the involved parties. But mostly they are mutually shared and are same. The main thing and the most important thing which makes the difference in between them is the Economic matters related to the projects, which are of the most concern to the Decision makers and the project owner.

(a) Operational Requirements:-

- If this new road, is the corridor location consistent with any strategic transport plan for the area?
- Does the site or corridor provide sufficient land area for present and future requirements?
- Is the site is sufficient in relation to extractive material and other building resources?

(b) Water Issues:-

- Are there any site constraints, so that on site water management is difficult?
- Are there risks of surface water pollution because of the proximity or pathways to water bodies or wetlands?
- Are there are risks of GWT problems because of shallow or rising GWTs?
- Is the site is susceptible to flooding?

(c) Geological and Soil Issues:

- Are the local topographical characteristics likely to result in design and management difficulties?
- Are there any geological characteristics which will cause difficulties in managing impacts (slippage, seismic)?

- Are there any existing soil problems e.g. contaminated soils?

(d) Transport Issues:

- Does the locational proposal enhance the efficency of the transport network including public transport?
- Can the standard and the capacity of the surrounding road network accommodate traffic likely to be generated directly or indirectly by the proposal?
- If inadequacies exist, can this road or traffic management be changed to minimize any impacts particularly on residential areas?

(e) Community Issues:

- Is this proposal likely to be compatible with surrounding existing or proposal land uses, like in case of residential area, special uses (such as schools, houspitals,community buildings),any sites of outstanding natural, enviormental,agricultural or mineral value?
- Does the proposed route avoid unnecessary dislocation of existing roads, and other infrastructure or utility networks?

- Is there likely to be a problem with air, quality of water, or noise level to the proximity and nature nearby the land uses?
- Is the proposal likely to affect heritage values or sites of significance?

(f) Cumulative Issues:

- Is the proposal at the proposed location, in concert with other recent and planed road network improvements likely to cause problems, or contribute to existing problems (air, noise, economic hardships, inappropriate land uses)?

Land Use

NO	ACTIONS	POTENTIAL DAMAGE	PREVENTIVE MEASURES
A	Displacement of exististing uses	Loss of livelihood and cultural amenity for those persons displsced.	Adequate resettlement and compensation to allow viable life style to continue.
B	Severance	Reduce access to, and viability of, land uses.	Reinstament o access and amalgamation of served properties.
C	Indirect impacts on natural resources.	Loss of natural resources and ecosystems	Management planning and control to protect sensitive resources and ecosystems
D	Indirect land use change	Loss of traditional uses and deteriortion of enviornment from unplanned change.	Implememt strong planning controls where essential.

Transport and Traffic

NO	ACTIONS	POTENTIAL DAMAGE	PREVENTIVE MEASURES
A	Dislocation of traffic during construction	Safety and convenience for existing road users can be jeopardised.	Adequate planning of the delivery of construction materials, and the provision and signing of alternative routes for traffic.
B	Adequate planning for safe operating conditions.	Bottlenecks and congestion can led to accidents and pollution.	Adequate planning for the future traffic volumes and provision for suitable connection to the existing road links..
C	Lack of provision for the variety of road users.	Safety and convenience for existing road users can be jeopardised.	Provide adequate road space for public transport and slower non-motorised transport modes including cyclists and padestrians.

Noise and Vibration

NO	ACTIONS	POTENTIAL DAMAGE	PREVENTIVE MEASURES
A	Vehicle noise at source.	Stress and hearing loss.	Introduce and enforce national standards.
B	Noise from traffic stream.	Sleep interference and reduce speech intelligibility.	Ensure major new roads have wide road reservations, provide noise barriers and acoustic treatment to protect sensitive receptors

Air Quality

NO	ACTIONS	POTENTIAL DAMAGE	PREVENTIVE MEASURES
A	Construction.	Damage to human health.	Control dust and odour gereation by watering roads,ceasing work in high winds and adopting air quality control systems on crushing, concrete and bitumen plants.
B	Operations.	Damage to human health.	Regulate to introduce emissions at source and remove lead from petrol, increase public transport use and reduce congestion through traffic management.

Water Quality

NO	ACTIONS	POTENTIAL DAMAGE	PREVENTIVE MEASURES
A	Erosion and sedimentation.	Degradation of natural water bodies and wildlife habitats.	Minimise strom water flow onto the project site.Minimise erosion,sedimentation (e.g. artifical basins and wetlands,grass filter strips and buffers
B	Contamination from accidental spills.	Degradation of natural water bodies and wildlife habitats.	Bound storages of chemicals and collect water from different plants and make it ready to re-use.

Hazards

NO	ACTIONS	POTENTIAL DAMAGE	PREVENTIVE MEASURES
A	During Construction	Threat to human life and environment.	Carefully store chemicals and explosives and implement safety procedures for their use.
B	During Operations	Threat to human life and environment.	Road related hazards (fog, snow), should be minimised through good design and maintinance practices and operational precedures to respond to any accident.
C	Natural Hazards.	Threat to human well being	Road design parameters should allow for natural nazards e.g. land slip.

Analysis Measures

The function of the policy measures, is to determine the significance of the affects regarding consistency with standards,guidelines, goals & objectives of the East Ring Road.

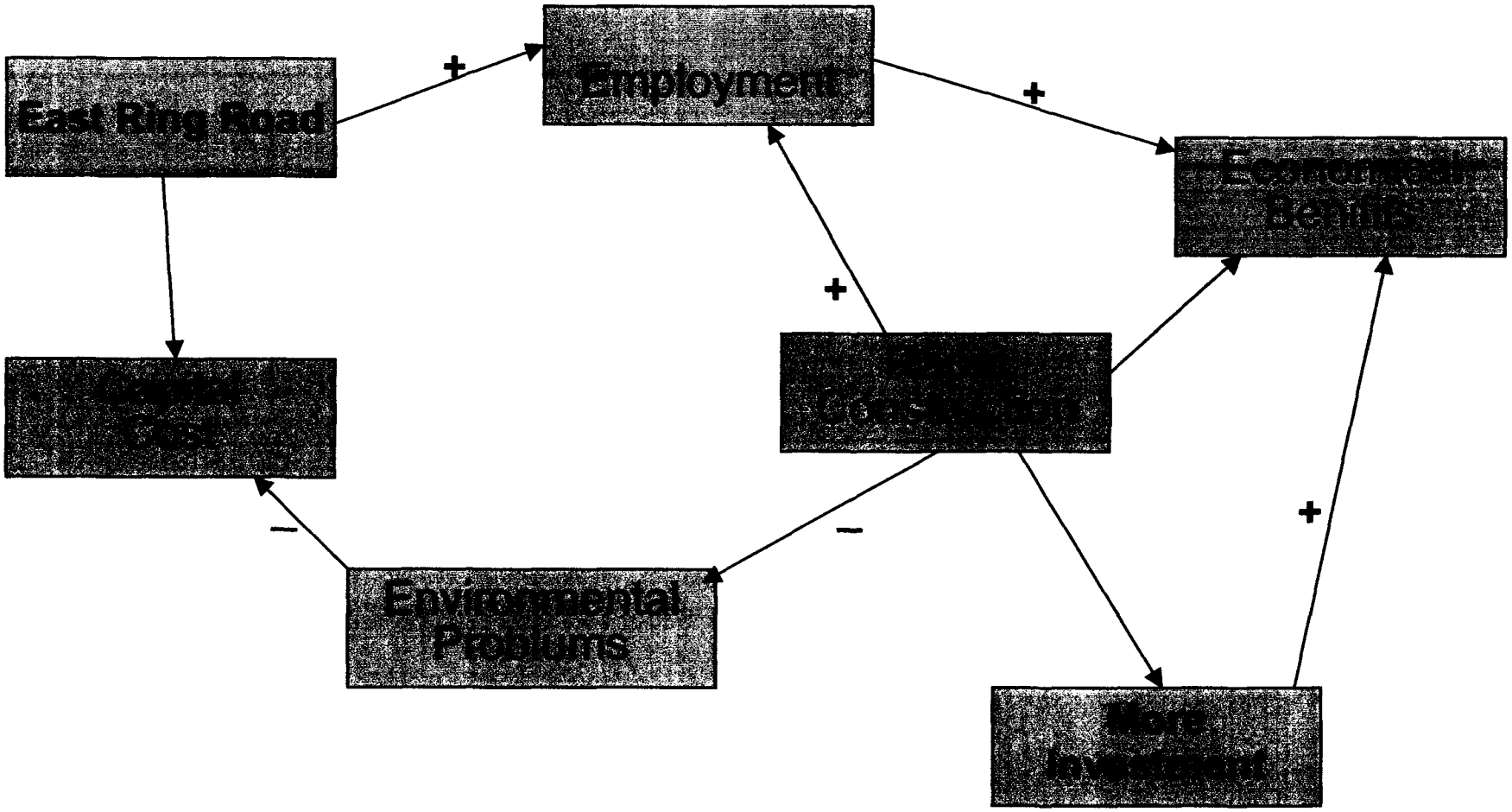
A- Economical Factors.

In economical sence, we mean that the project should be viable in means of Capital cost for that project, future expension cost etc.

B- Environmental Factors.

Identification of the environmental factors like Natural habitat disorder,Noise etc.

Schimization of Project



Slide Explanation Schimization of Project

As a result of many Industries & International companies, a big economic activity will be generated. In a wider mean the economic aspects will Positive factors, which will contribute in positive means. Some will be as follows:

Construction Industry will flourish e.g. new houses, industries, roads etc will be build.

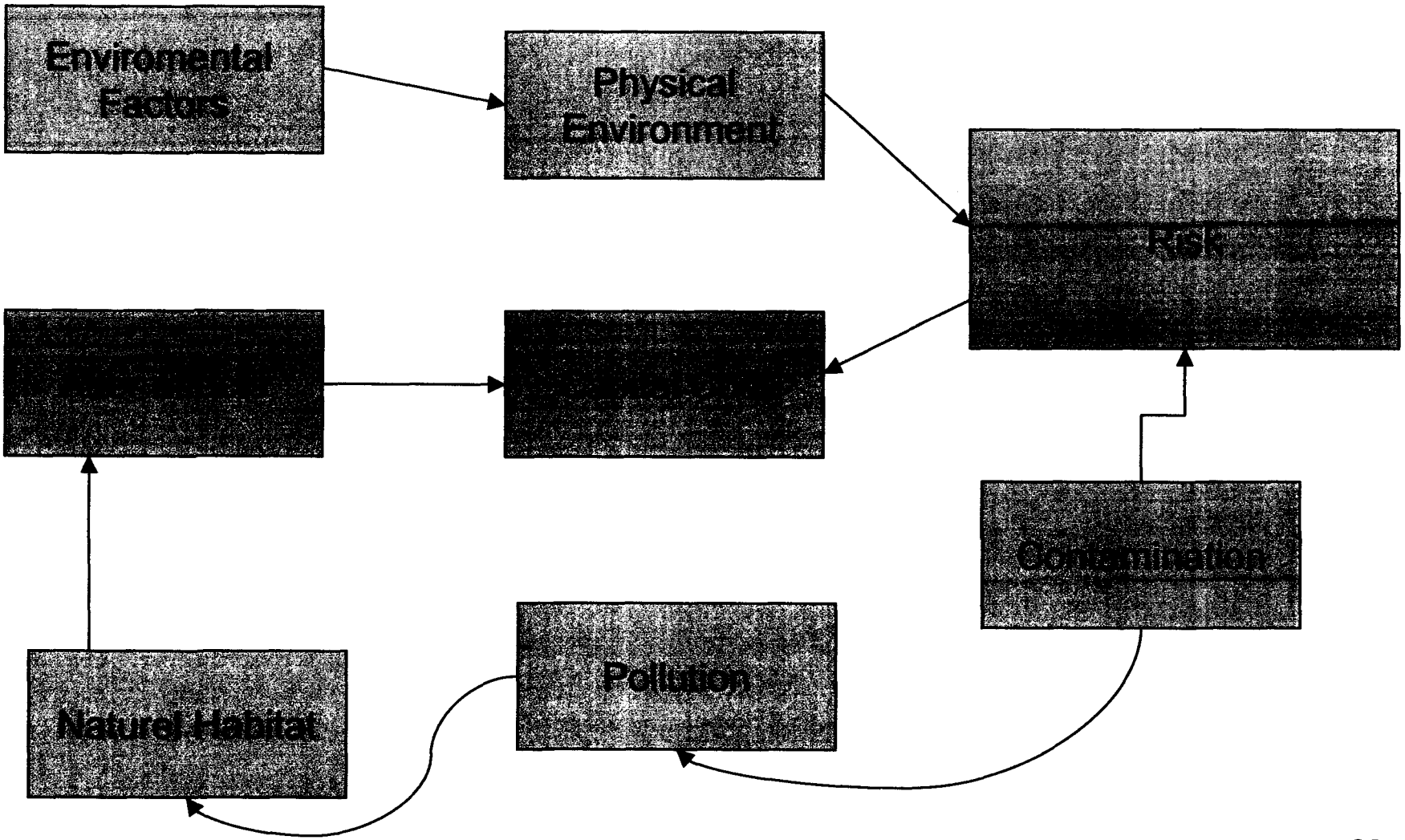
New Constructions means more Investment.

More jobs.

Factor to be addressed:

The project should be environmentally feasible, which mean increase in Capital Cost of project.

Environmental Activities



Slide Explanation Environmental Activities

Physical Environment:

Land Masses:

Concerned with project location, size etc to identify the suitable route.

Major Land Forms:

Land properties like plain, hilly etc according to which the the Road Type will be identified.

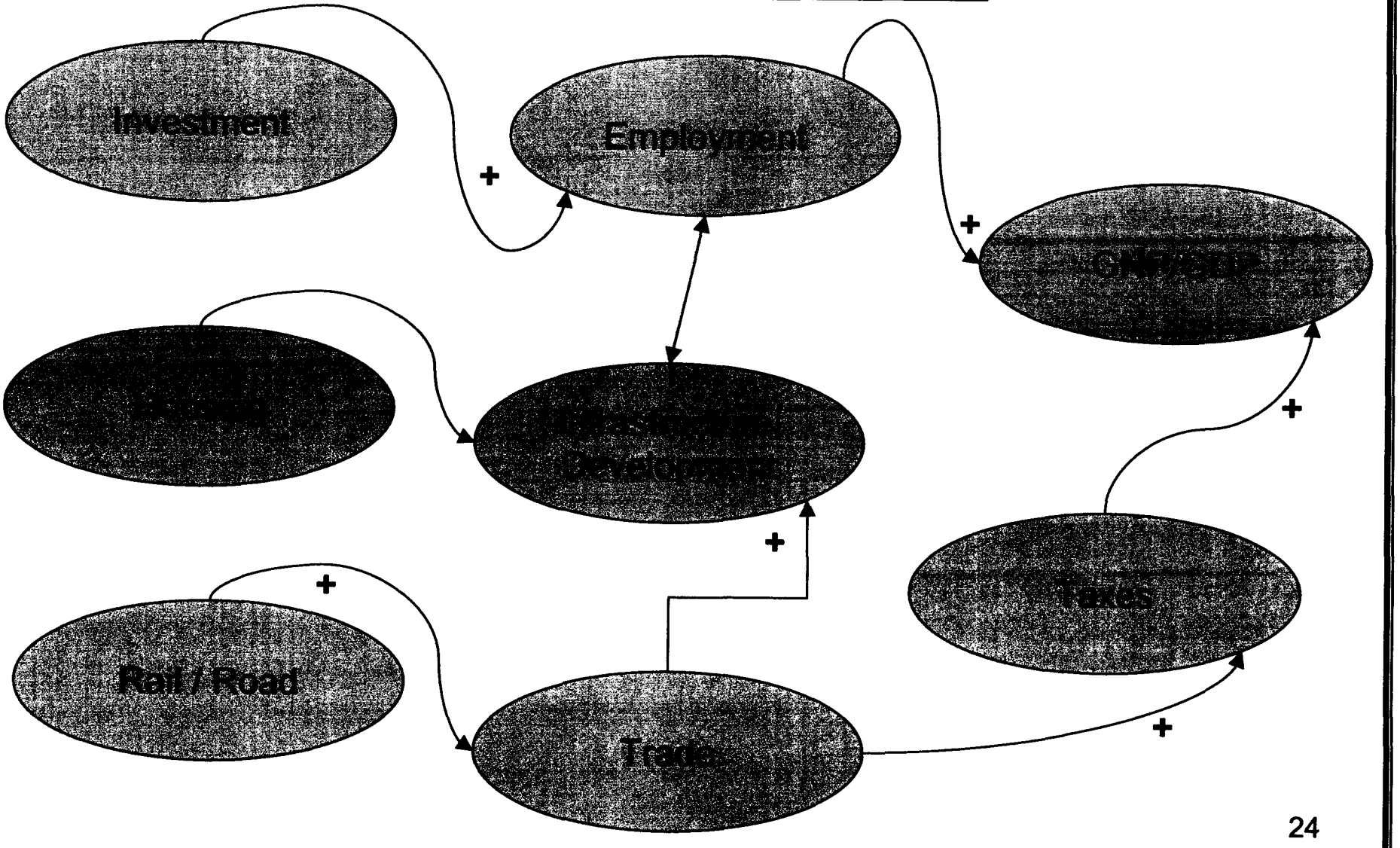
Major Drainage system and Lakes:

The drainage system should be considered as it can be a source of pollution. It can be from main land or from Meerland.

Plantation Patterns:

Consideration for the Natural forest and resorts.

Economical Activities



Slide Explanation Economical Activities

Economics of every country mean value of its GNP (Growth National Product)& GDP(Growth Domestic Product). These are the indicators for the economic heath of a certain country.

Economical factors are the series of factors which together represent good economic growth, some of these are as:

Infrastructure Development: Roads & Rail links, Banks, Airport etc.

Commerce: Development of new Industries and Business etc.

Trade: Foreign and Domestic Investment.

Opportunities: More jobs and tax revenues for Govt.

Residents: New residents mean new housing schemes.

Cultural Environment: Communication patterns, settlements (related to the social behavior of society).

Example

* Noise as a Environmental Problem.

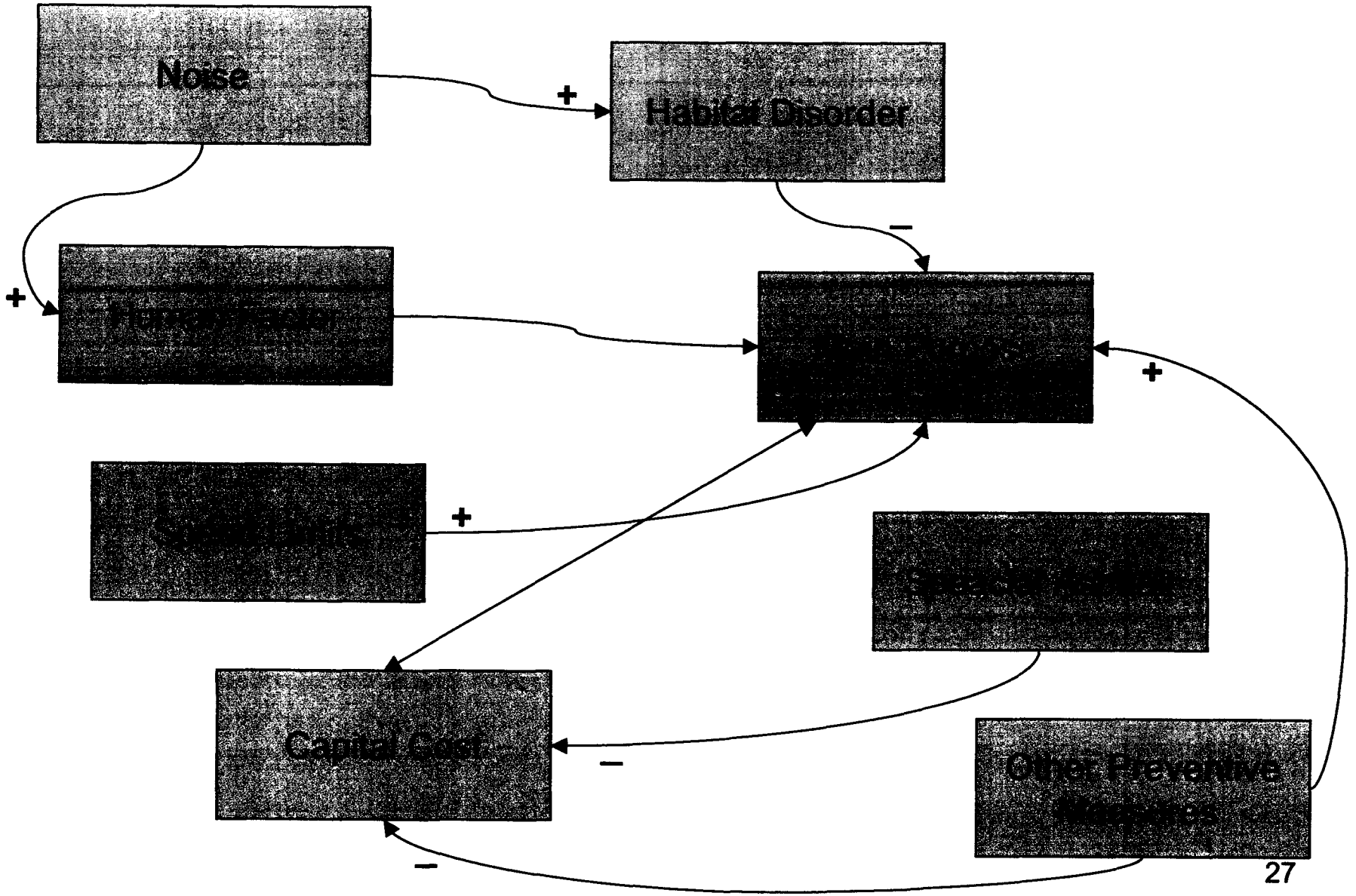
* Possible side affects.

* Solution possibilities.

Note:

Beside the mentioned two preventive measures to make the noise low like Speed Limits & Special Asphalt, the other possibilities can be like sound barriers on the either road sides.

Analysis for Noise Control



Decision Making Factors

There will be following factors, on the basis of which the decision will be make about the viability of the East Ring Road.SOme of the main factors will be;

Land Use Practices	Transport and Traffic
Noise and Vibration	Air Quality
Soil Stability	Water Quality
Ground Water matters	Flooding Management
Water Supply	Flora and Fauna
Social	Landscape and Visual amenity.
Heritage Values	Hazards
Economic Issues	Waste Management

Explanation of the Decision Making Factors

Roads form a primary link for the movement of people and goods in World. Major roads are taken here to include motor ways, major rural roads and major urban arterial roads. These guidelines will assist proponents to identify the key issues that need to be addressed as well as alternatives that should be considered.

1- Road Siting:

Siting of a road is the most critical decision in road construction. It will largely determine the type and magnitude of environmental and social impacts that will result from road construction. Alignments through lands of indigenous peoples, critical wild lands and wildlife habitat, lands unsuited to probable land use changes that will occur by both planned and unplanned development stimulated by the road, and locations where there are potential natural hazards should be avoided. Decisions on road siting frequently involve rapid screening and appraisal of many proposed locations and road specifications, and should involve a wide range of line agencies and levels of organization. Siting involves the collection of data on the climate, soil, geology, hydrology, biology/ecology, and social factors (land and resource use patterns, local economy, class and economic structure, local administrative or power structures) of the sites proposed for construction. Remote sensing information sources and qualified interpreters are particularly useful for these functions.

2- Land Use:

Roads on the outskirts of cities and towns are also subject to massive development, which causes road safety and infrastructure servicing problems, and is usually associated with visual degradation. New industry tends to locate where land is available and infrastructure exists; highway corridors are natural choices. Roadside commercial development takes place in response to speculation that improved access and greater visibility will bring more customers. Because of its unplanned nature, induced development proceeds without comprehensive consideration of impacts. Other infrastructure, especially which needed for waste management, may not exist. Social services may become overloaded. Individual induced developments (unplanned) also generate traffic, possibly overloading the very roads and highways which led to their existence in the first place.

3- Transport and Traffic:

The construction and subsequent use of road projects can affect the operation of the overall road network, road safety and vehicle movement patterns. During construction, care needs to be given to the routes by which construction material is brought to the site, and to the provision, identification and signing of alternative routes if existing traffic is to be disrupted.

Special measures maybe needed to ensure road safety on approach routes to the site, and on alternative routes, which may need to cope with high levels of

truck traffic and construction equipment. Predictions of the likely usage of an improved or new facility, and the traffic impacts on adjacent roads, are essential if traffic impacts at the operational stage are to be managed. The predictions should include an allowance for induced land use change in the vicinity of the road, and the contribution of additional traffic from that land use. Where major new routes are provided, the adequacy of connections to the existing road network should be investigated to avoid bottlenecks when the new route is opened to traffic.

Construction procedures to avoid the disruption of local traffic should be planned and implemented. Measures to reduce road safety hazards on approach routes and alternative routes should be identified and undertaken. The adequacy of connections from new routes to the existing road network should be ensured and special attention given to the needs of slower alternative transport modes.

3- Noise and Vibration:

Noise arising from major roads can cause significant concern amongst both urban and rural residents. In urban environments the noise can arise from both cars and trucks, and may be increased by the condition of the road pavement, the traffic flow conditions (stop–start traffic causes additional noise), and the unnecessary use of horns. In rural areas the impact of new routes is particularly noticed, with a quiet rural acoustic environment being suddenly transformed by a new road.

Vibration is associated with the blasting of rock during construction and other construction activity. It can also result from the tire–road interaction of heavy vehicles. Traffic vibration is usually only an issue where routes are in very close proximity to sensitive buildings. Vibration can result in damage to buildings, and to the well being of adjacent residents.

The management of noise impacts requires a two pronged approach. Vehicle design and maintenance is essential to reduce noise at source, and this is a national responsibility. At the project level, thought needs to be given to the selection of routes which minimized noise impacts on sensitive receptors (particularly hospitals and schools). Where such receptors cannot be avoided, mitigation measures can include noise barriers and acoustic treatment of buildings. For new roads in undeveloped areas, the road reserve should be wide enough to allow for tree planting and landscaping along each side, which will also provide physical separation of the road from future development which will occur along the road.

4- Air Quality:

Air emissions from operating traffic constitute a major source of air pollution for urban areas, and include nitrogen oxides, hydrocarbons, carbon monoxide, lead, sulphur dioxide and particulates. When concentrations of the above chemicals are contained by an inversion layer and subject to ultraviolet radiation from the sun, photochemical smog results.

The physical effects of air pollution on humans range from discomfort to death, depending on the levels and length of exposure, and the sensitivity of the individual.

The emissions contribute to eye irritation, headaches, heart disease, upper respiratory illness, asthma and reduced pulmonary function. The use of lead in petrol causes atmospheric levels of lead to increase, with wide ranging health effects, particularly in infants who may suffer brain development impairment. While the effects of nitrogen oxides, lead, increased attention has recently been focused on the health effects of poly-aromatic hydrocarbons and particulates.

Potential measures to reduce operational air emissions include:

- Measures to reduce emissions at source through regulation and vehicular maintenance programs, and the reduction of lead in petrol.
- Measures to reduce congestion and increase public transport use;
- Improvement of the efficiency of traffic through the use of transit lanes, dedicated bus lanes, truck routes, and other forms of traffic management and road pricing.

5- Soil Stability:

The soils and geology of the area through which the alternative possible road alignments are proposed should be investigated and surveyed thoroughly to determine:

- If contours, terrain stability, slope gradient and length pose potential problems.
- The physical and chemical properties of the soil such as soil depth, particle size.
- Distribution, permeability, pH and salinity.
- The suitability of soils for revegetation (the soil survey will also identify materials such as sandy clays, sands and rock, which may be a source of material for road and concrete construction).

Proposed measures to minimize soils impacts include:

- Measures to prevent wind and water erosion including programming of works to minimize the need for soil stockpiling.
- Stabilization works for cuttings, embankments.
- Revegetation and rehabilitation measures.
- A maintenance program for all erosion control works.

6- Water Quality:

This section is particularly relevant for proposals impacting directly or indirectly on natural water bodies (rivers, lakes and wetlands). The characteristics and existing water quality of the natural water bodies which could be affected by the construction or operation of the proposal should first be determined. Then a description of the potential sources of pollution, an assessment of magnitude and probable frequency of pollution events, including;

- Sedimentation and increased turbidity from run-off from stockpiles, access roads, the road construction, landscaping activities.
- Contaminated discharge from workshops, vehicle washing facilities, temporary concrete,
- bitumen or crusher plants, equipment, fuel and chemical storage and refueling areas;
- Use of reclaimed water for dust settling and wash-down;
- Run-off containing oils, greases, heavy metals, rubber and asbestos deposited on the road
- surface during normal vehicular operation;
- Accidental spillage of chemicals, fuels and other potential pollutants, litter and dumping of rubbish.

The impacts on water quality as a result of road construction, operation and maintenance on water users (e.g. drinking water or irrigation) should also be considered.

Design and Management measure to cop with impacts due to water;

- Measures to manage storm water and to minimize on-flow onto the facility, and from it;
- Measures to minimize sedimentation, erosion, artificial wetlands.
- Measures to prevent contamination of water from accidental spills of chemicals or waste material;
- Measures to manage water and run-off from concrete, bitumen and crushing plants.

6- Ground Water:

If groundwater is vulnerable because of its depth, overlying geological characteristics, or the presence of recharge areas in the vicinity of the site, or if local groundwater is used as drinking water, issues which may need to be considered include:

- Baseline information on groundwater aquifers (e.g. quality, movement patterns, users).
- Potential sources of pollution and potential pathways (e.g. contamination from seepage from fuel storage, or contaminated surface water.
- Any use of groundwater.
- The likely impacts on the groundwater and any users from the potential pollution or change in the water table.

Measures to minimize adverse groundwater include;

- Measures to prevent groundwater contamination including t sealing of fuel and chemical storages and concrete and bitumen plant areas.

- Provision of alternative water supplies to any adjacent user whose groundwater sources have been affected by the construction.
- Careful design so that any changes to the groundwater regime do not cause ground Instability.

7- Strom Water Management and Flooding:

If the road facility is likely to affect storm water management in the area, or the area is flood prone, it may be desirable to undertake an integrated storm water management strategy with the local storm water management authority. Issues which may need to be considered include:

- The effect of any change in storm water management as a result of the proposal on the water balance in any natural water system;
- The likely magnitude and frequency of flooding;
- The vulnerability of any facilities or construction staging areas to flooding.
- The potential impacts of inundation of the facility both on and off-site during construction and on completion;
- The potential of the proposal to alter natural flood or overland flows or change the flood liability of the surrounding area both upstream and downstream from works such as land formation, elevated sections, levees, culverts, drains or underpasses (consider flood levels , flow direction and velocities, and downstream scouring).
- The potential for the proposal to provide flood mitigation benefits.

Mitigation of adverse storm water and flooding impacts can best be achieved by careful design, and the provision of adequate water-way area to take storm flows under bridges and around or under embankments.

8- Economic Issues:

Issues which may need to be considered in road design, include:

- The costs and benefits of providing, operating and maintaining the road facility relative to significant non-monetary costs and benefits should be described and quantitatively assessed. The analysis should consider.
    - Construction and maintenance costs, and flow on effects from the need to augment or increase the maintenance budget for local or regional roads.
    - Operational costs and benefits such as travel time savings, accident savings, and savings in vehicle operating costs (i.e. fuel and maintenance).
- Environmental and social costs and benefits such as the effects on human health, habitat value, and amenity.
- Where the road proposal is likely to have an impact on a particular region, community or local economy, economic studies which consider impacts on existing and future development and settlement patterns, such as:
    - The potential impacts on property values.
    - The stimulation of residential and tourist developments.
    - Impacts on, and arising from, agriculture and forestry.
    - Impacts on commercial and industrial activity resulting from changes in freight transport options, changes in haulage costs, and accessibility.
    - Any additional employment as a result of the proposal.
    - Town bypasses resulting in the loss of passing trade for retail businesses.
- The proposed funding arrangements for the scheme, and the financial implications of any user tolls or charges which are levied.

Significant adverse economic impacts will usually result in a proposal being abandoned. If a proposal is to be implemented, but has some significant adverse impacts, assistance packages to assist the sector adversely affected should be prepared and implemented. In the interests of equity, no sector of the community should be left worse off for the public good.

Conclusion

- After doing that analysis based on described factors , the finding are as,

  - The Proposed East Ring Road will serve best to it purpose both Environmentally and Economically.

  - Some preventive measures have been adviced to the potential problums, which will help to declare that route to be most feasiable and economical one in all means.