- That the development in its use composition is appropriate to the location and that the built form and architectural expression of the development is to the highest possible standard
- That the Planning Scheme is sufficiently flexible so as to encourage creative responses from developer groups, and
- That its evaluative assessment and monitoring mechanisms have a capability to ensure development of a high design and architectural quality.

To this end the SEZ Co. will be required to complete a detailed design and architectural analysis of the site and its environs, in addition to informing itself of the likely implications of different combinations of land uses. The analysis shall be undertaken under the following broad headings:

- Town scape and urban structure
- Building heights
- Site planning and public spaces
- Site traffic and pedestrian movements, and
- Parking and related requirements.

7.3.4 Site Conditions

Preliminary geotechnical studies of the site features shall be contained in digest form in the planning scheme and in greater detail as part of the design based package available from the SEZ Co. A preliminary assessment has been completed as part of this Study.

7.4 The Development Process

The planning scheme will act as an invitation to participate in the exciting challenge of developing a Special Economic Zone in Chittagong. The invitation should be extended to the public and to prospective developers alike. To the public the invitation should request a positive interest, ideas and support for the realisation of the development. To prospective developers the invitation should request proposals which would be considered technically on their merits if the content is consistent with the provisions of the planning scheme.

7.4.1 Development Timescale

It should be an objective of the SEZ Co. to seek to have the zone completely developed and functioning within a reasonable period. The approval of the planning scheme by the relevant Minister should coincide with the invitation to developer groups to submit proposals for a series of development proposals for the zone area to the SEZ Co.. A period of several months should be allowed for the lodgement of submissions for the first phase of development. It is considered that a further period of several months should be allowed to the SEZ Co. in order to enable it to complete the evaluation of these proposals and reach agreement on a development programme based on a preferred set of proposals.

7.4.2 Submission of Development Proposals

The planning scheme will provide a basic preference document for the submissions. The submissions should reflect the SEZ Co.'s desire to have an integrated planning, design and development approach to the whole site. The SEZ Co. should be open to assessing submissions from individual developers proposing individual elements on their merits in relation to the overall objectives of the planning scheme. The SEZ Co. should also be prepared to act as a broker in matching separate but inter-related development proposals, and should be receptive to a range of development formulae provided they contribute to the attainment of the overall objectives of establishing a SEZ. The documentation required in connection with each submission would be specified by the SEZ Co..

7.4.3 Assessment

The SEZ Co. will be the sole judge and arbiter of submissions. The SEZ Co. will reserve the right to engage the services of distinguished persons in the architectural, urban design development and financial professions to assist in the assessment of proposals.

7.4.4 Implementation

The assessment process will involve detailed negotiations with the selected developer(s) to work out detailed proposals which will lead to the formulation of a building licence agreement for the development phase and the granting of a long lease where necessary to the developer(s) concerned on satisfactory completion of the development.

The integration of infrastructural and environmental projects with development proposal will be critical to the implementation of the project. Wherever possible, infrastructural works will be delegated to the developer concerned. However, the SEZ Co. may wish to establish a joint planning and management team to oversee the development of the public works interface. The SEZ Co. should have powers which will enable it to commit itself to special infrastructural facilities which are to share in the development risk. The SEZ Co. should do whatever is necessary and possible within its statutory remit to get the desired quality and mix of development. In this regard, the SEZ Co.'s participation and the extent of its operational control must strike an appropriate balance between the reduction of development risk and capital requirements on the one hand, and the achievement of public policy objectives on the other. In the public domain, the priority of the SEZ Co.'s own financial objectives as set by the Government may have to be weighted against the priority of realising other public policy objectives in the area of capital investment, job creation, quality of design and general environmental improvement.

7.4.5 Organisation and Management

The fulfilment of the management function required by the SEZ Co.'s very specific brief should be achieved by the recruitment of a small core of competent specialist staff reporting to a Board that should include business people and professionals, with the entrepreneurial skill and vision, which will complement the work of the permanent executive. Such a contribution from the Board of the SEZ Co. would be vital to ensure that the organisation acts effectively as both an initiator and catalyst in levering private sector funding, consolidating public sector expenditure and ensuring an optimum return and maximisation of benefit to the wider community.

The executive team shall be required to implement the policy objectives of the SEZ Co. with the effectiveness and speed required of a development corporation in a market responsive environment and in a manner which will avoid any undue delay in decision making. They will provide appropriate in-house technical capability in key management areas in a prompt efficient and confidential manner, backed by whatever external specialist consultancy advice is considered necessary in the particular circumstances of the SEZ Co.'s work.

The aim must be to build an efficient and effective public service Company, which is reasonably free of the traditional bureaucracy of the public sector and which will meet the statutory requirements of the legislation. In essence, the aim should be to create an unusual organisation model which will run on commercial lines consistent with securing an appropriate balance between public policy objectives and the commercial realities of the marketplace. The enabling

legislation must provide for flexible structures which permit public/private sector partnerships in the financing and development of the zone buildings and infrastructure. An outline of a proposed Organisation Management Structure is shown in Figure 7.1. This aspect of the establishment of the SEZ Co. will need to be developed further as part of the implementation process.

7.5 SEZ Promotion and Marketing

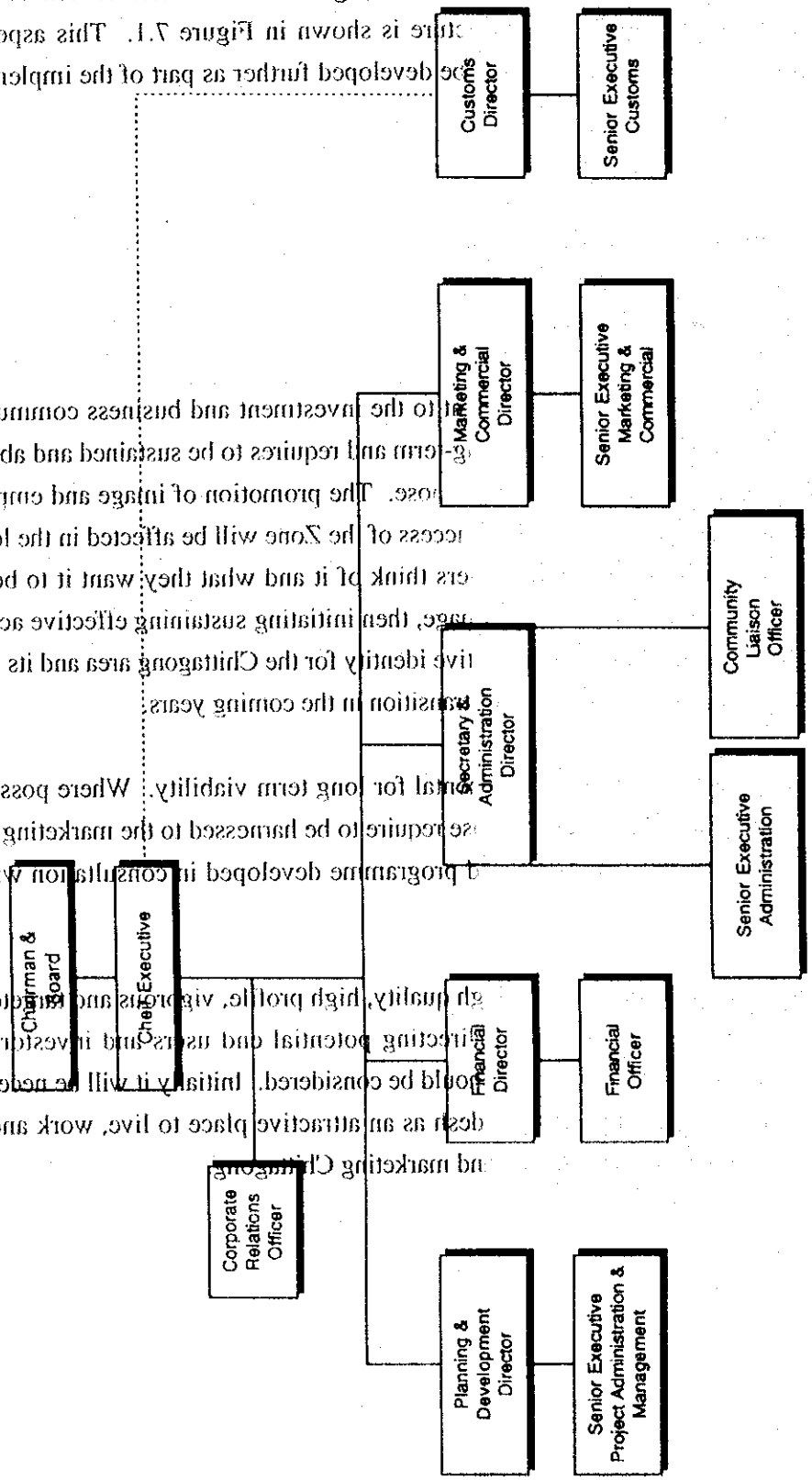
7.5.1 SEZ Image and Identity

While perceptions are very important to the investment and business community, the process of image building is necessarily long-term and requires to be sustained and above all it requires political goodwill and a unity of purpose. The promotion of image and emphasis on that promotion is crucial for success. The success of the Zone will be affected in the long term by what Bangladeshi residents and outsiders think of it and what they want it to be. If the Zone has a weak image, bad image or no image, then initiating sustaining effective action will be difficult. The creation of a strong distinctive identity for the Chittagong area and its region is essential to negotiate a successful economic transition in the coming years.

The right delivery mechanisms are fundamental for long term viability. Where possible, the existing engineering capability and skills base require to be harnessed to the marketing vehicle, in a strong and positive community backed programme developed in consultation with local interest groups.

Overall the marketing package has to be high quality, high profile, vigorous and targeted. The marketing strategy has to be oriented to directing potential end users and investors to the reasons why locating in a Chittagong SEZ should be considered. Initially it will be necessary to improve and develop the image of Bangladesh as an attractive place to live, work and spend leisure time as a prerequisite of promoting and marketing Chittagong.

Figure 7.1 Organisation Structure of the Zone Company



7.5.2 Marketing Centre

A striking high profile, visible and well-signposted entrance to any future industrial zone is essential in order to make a positive initial impact on potential investors.

It is recommended that such a high profile entrance in addition to high quality landscaping be provided for the Zone. It is also recommended that a marketing centre should be constructed beside the entrance, the design of which will reflect local architecture and traditional technologies in the Region. It would also office of the Zone Company' and act as both a reception and information centre for potential investors and visitors to the SEZ.

7.5.3 Design and Development Guidelines

It is recommended that a set of development policies and guidelines be developed which will set out the overall design philosophy of the SEZ including site planning, building development and landscaping. Such policies and guidelines will form part of the approved planning scheme and will help to ensure the orderly and attractive development of the Zone.

7.5.4 Landscaping

Landscaping can have an immediate and dramatic enhancing effect on an industrial development environment by helping to counter the effects of existing undesirable development and soften the impact of existing industrial buildings. It can make a strong promotional statement by improving the overall appearance of an industrial park and so help in the attraction of investment.

It is recommended that an integrated landscaping scheme be prepared for the overall site, including the area for future expansion, in the plant's ownership. This will provide for areas of hard and soft landscaping, including grassed areas, shrubs and trees, the location of shelter belts and berms, the sitting of recreational areas and including pedestrian/circulation routes.

7.6 Partnership

It is envisaged that the SEZ would be based on a formalised comprehensive partnership between public and private sectors. This is in recognition of the growing world-wide shift in central government policy making towards a more task oriented approach to the achievement of

positive economic initiatives involving both public and private sectors. The type of partnership being proposed is one in which an attractive range of Government incentives and an efficient and effective planning and licensing regime are used as the catalyst to encourage private sector involvement in development projects and programmes.

It is considered that such a sectoral marriage presents a viable realistic vehicle which can successfully harness the entrepreneurial skills and capital necessary to achieve the objectives of such zones. The proposed Company will have to undertake the role of encouraging, facilitating and monitoring the development in the Zone with the SEZ Co. providing the land, the planning, the organisation and incentives and are looking to the private sector to provide design, funding, development expertise, marketing, entrepreneurial flair and credibility.

The approach of the SEZ Co. must be based on the presumption that its participation and the extent of its operational control will reasonably reflect the extent to which to the developer risk and capital requirements are reduced. The greater the capacity to reduce or eliminate risk for capital requirements or to simplify the development process in terms of the factors which can cause delay or demand the time or attention of developer personnel, the more any company can expect to get for its contribution.

Monetary return on land and buildings should not be that important compared with the achievement of other public policy objectives such as employment creation and retention, private capital investment, quality of design and general environmental improvement.

New partnership instruments of this kind based on an innovative approach on both sides can, within the given Zone Area, bring under a single minded management the land use planning and the organisation of public and private investment to produce a phased and balanced development of required industrial and commercial activities. Speed and effectiveness of decision making on the part of the SEZ Co. needs to become evident over a short period, on the basis of a philosophy that is ideas and substantially market led.

7.7 Community Support and Liaison

7.7.1 Introduction

The proposals for the SEZ have the potential to transform completely the physical, economic and social environment of the Chittagong sub-region. The proposals are ambitious and visionary in scope and concept, but are also pragmatic and realistic in the context of the existing resources, both human and physical, which exist in the Chittagong area.

SEZ projects of this nature have four key features:

- Employment : the creation of new jobs
- Employability : the provision of suitable training and retraining schemes
- Enterprise : the encouragement and development of new business opportunities based as far as possible on local, indigenous businesses, and
- Environment : the development of suitable physical infrastructure and surroundings for working, living and recreation.

Unemployment is the most serious pressing social problem in Bangladesh. The proposed Company must address the tackling of this problem as a priority objective.

Towards this end, the SEZ Co., through the development of the Zone, must become involved with the people in the surrounding communities and have a clear understanding of their need to be employed and be proud of where they live and to be individualised in a humane and meaningful way in their respective communities. The local people must feel a sense of involvement and belonging in the creation of a new environment. From the outset, a comprehensive community support and liaison framework must be put in place to secure their involvement through the creation of a relevant support system.

7.7.2 Community Enterprise Development and Support

Any new support system should meet a number of key requirements if it is to facilitate the development of a successful SEZ at Chittagong.

- It must be designed to fill gaps in the existing system rather than to either replicate or duplicate the existing system. The existing gaps tend to be of two main types (i) support for small, local enterprises which are outside the remit of the main development agencies and (ii) support for enterprises of all sizes which are otherwise ineligible for support from these agencies.
- It must be organisationally and administratively coherent and avoid overlap and waste through institutional confusion.
- It must take account of and build on a realistic appraisal of local support structures which already exist on the ground in the Chittagong area. This means that it must not 'reinvent the wheel' and ignore what is already there but that it must recognise the real capacity and limitations of what exists at present.

- It must be compatible with a 'bottom up' approach, encouraging and supporting individuals and communities who wish to do something about their own economic situation. Also, it must not attempt to control, direct or regiment local initiatives from the "top".
- It must be infused with a high degree of professionalism in the difficult and painstaking task of community support and development. In particular, it must draw on the existing 'state of the art' in this regard and avoid well-meaning amateurism and a repetition of old mistakes, and
- It must involve being innovative and flexible, especially in taking risks with existing structures and public resources. This is not intended as a recipe for waste of public funds but rather a view that it may be necessary to innovate and experiment with new structures.

The development of new community support and liaison structures by the SEZ Co. should encourage a consultative and participative approach and must, therefore, meet the following requirements.

- It must fill the clear gap in relation to small, micro-enterprise and self-employment, which will meet existing and clearly defined needs in relation to the development of the SEZ while at the same time avoiding duplication with any existing system, and
- It must deliver its services at local level and be genuinely additional, proactive and promotional within the local system and with the capacity to be genuinely 'bottom-up', while utilising any such existing locally-based support mechanisms as are already in place.

The key features of any proposed system are to be as follows:

- That it would operate through locally based community groups based on identifiable local areas
- That it builds on existing groups where these exist
- That it uses groups, which are locally-based, "bottom-up" and independent
- That the SEZ Co.'s role should be one of central support rather than control or dominance, and
- That the system includes a strong partnership dimension with the existing State agencies and relevant private sector organisations.

7.7.3 The Role of The SEZ Co.

The role of the SEZ Co. should be to support these groups rather than to deal directly with the individual enterprises themselves. The existing State agencies would, in addition to their on-going functions, provide technical assistance and support to such a new structure. Effective working partnerships must be provided between the parties and clear coherent relationships established.

The SEZ Co. should, however, where necessary demonstrate a willingness to "push the boat out" in respect of promoting eligibility for assistance of appropriate enterprises, particularly in the context where such enterprises might not readily come within the definitions of eligible enterprise previously used by the assisting agencies. In addition, there should be a readiness to make a sharp distinction between eligibility for grant aid and eligibility for enterprise advice, with the remit in the latter instance stretched as widely as possible in order to relate to all types of enterprise which could facilitate the development of the SEZ.

There is now a general recognition of the need to promote employment in small enterprises for its own sake. Even where small enterprises are established and fail, there may be longer-term benefits in terms of increased awareness of the potential for enterprise developments and for the creation of an enterprise culture.

7.7.4 Approach to Task by The SEZ Co.

Strong links should therefore be developed with local community groups on the above basis whereby the SEZ Co. will aim to help the community at all times, informing them of progress and the full implications of the SEZ development. It is proposed that this should be achieved through the establishment of a Community Support and Liaison Committee by the SEZ Co. which would have representation from the various relevant community groups. A register of relevant community groups and their members would be established for this purpose by the SEZ Co.. This register will also act as a basis for recruitment for all training and employment opportunities for new enterprises. In addition, in order to ensure that the greatest possible benefit will accrue to the local community from job opportunities arising in the development phase of the SEZ, all development agreements between the SEZ Co. and investors in the Zone should specifically require that all building contractors and their sub-contractors involved in the development of the site would give preferential consideration to available and suitably qualified applicants from local community groups in the recruitment of their labour force.

In order to enable people in the local community to compete for permanent job opportunities, recommendations have been made elsewhere in this Report whereby the SEZ Co., in conjunction with the relevant agencies, will assist in the development of an appropriate education and training programme geared specifically to the needs of the local community in the context of the development of the SEZ.

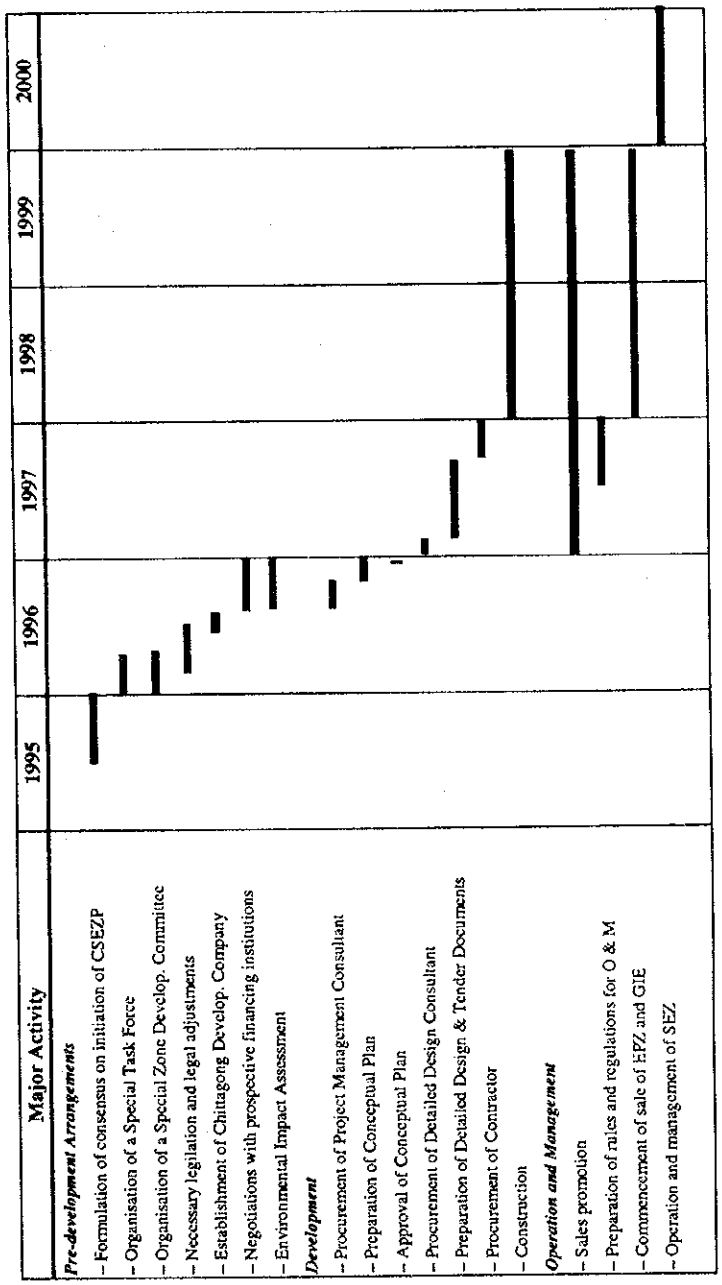
The SEZ Co. must encourage a sense of involvement in the preparation of the development plan for the Zone and extensive opportunities must be provided for such involvement in the plan making and review process for individuals, for local community groups, and for elected representatives. The development plan must be seen to evolve as a public document influenced by a local democratic process where individuals and community groups are seen to inform the development of the Zone and thus make a contribution on behalf of the overall community to the future physical and economic regeneration of the Chittagong area.

The implementation of the proposed outline proposals will require the appointment of a Community Liaison Officer within the SEZ Co. who will have direct responsibility for providing the necessary information to the various community groups, for consulting with these groups and other various agencies involved in the social and economic development of the surrounding region, and for ensuring that the inputs of the community are considered and incorporated in the successful realisation of a thriving SEZ in Chittagong.

7.8 Proposed Implementation Schedule

A proposed implementation schedule is shown in Figure 7.2.

Figure 7.2 Proposed Implementation Schedule



CHAPTER 8:
LEGISLATIVE PROPOSALS

CHAPTER 8 LEGISLATIVE PROPOSALS

8.1 SEZ Legislation General Background

Legislation for the SEZ concept as used in this study should be general in nature rather than Chittagong specific and should contain the following principal provisions:

- The designation of areas as SEZs
- The establishment of SEZ Company
- The powers of SEZ Company for the planning, development, management, and marketing of the SEZ
- The organisation and management structure of the SEZ Company
- The SEZ planning and development framework
- SEZ incentives:
  - qualifying works
  - qualifying period (ex. five years)
  - full rates remission for ten years on new and existing buildings
  - 100% tax capital allowances for capital expenditure in respect of qualifying commercial development during the qualifying period
  - tax allowance against trading income available for ten years of double the rent paid by a new lessee of qualifying commercial premises during the qualifying period
  - subject to certain conditions based on existing tax holiday legislation, qualifying activities to avail of a five year exemption from Corporation Tax from the date of start-up with Corporation Tax being phased in on a sliding scale
  - training/retraining incentives
- Permission for entities carrying on qualifying activities to operate foreign currency accounts.

8.2 Draft Special Economic Zones Law

8.2.1 Introduction

Set out hereunder is a suggested draft of SEZ legislation tailored to the particular circumstances of the People's Republic of Bangladesh and regions of Bangladesh to which it is expected to apply (e.g. Chittagong).

8.2.2 Draft Legislation

SPECIAL ECONOMIC ZONES ACT, 1996

A law that provides for the establishment, development, management and control of Special Economic Zones (SEZs) in Bangladesh and related matters.

PREAMBLE

The purpose of the legislation is to facilitate the economic development of specifically defined economic development areas by seeking to attract domestic and foreign investment with a view to increasing economic activity and employment and improving industrial technology and business systems, thereby contributing to Bangladesh's economic development.

Special Economic Zones are to be considered as constituent parts of the national territory of Bangladesh and accordingly are subject to the legislation of the People's Republic of Bangladesh.

PART I

Preliminary and General Provisions

Short Title

1. This law may be cited as the Special Economic Zones Act , 1996

Interpretation

2. In this Act:

"Special Economic Zone" means an area of land which is declared, under Section 3 of this Act, to be a Special Economic Zone.
"Licence" means a licence granted under section 23 of this Act.
"Minister" means the Prime Minister (or some other Minister if this is deemed appropriate).
"Company" means the Special Economic Zone Company.

The Establishment of a Special Economic Zone

3 (1) The Minister with the concurrence of the Minister of Finance may by order declare that on or after a specified date the lands enclosed within the limits defined by the order shall be a Special Economic Zone for the purposes of this Act.

3 (2) The Minister may with the concurrence of the Minister of Finance amend the order of the subsection 3(1) by varying the limits of the zone.

PART II

Management and Organisation

Development and Management of Special Economic Zones

4. The responsibility for the development and management of Special Economic Zones will rest with the Minister who will delegate this responsibility to each Special Economic Zone Company set up under section 5 of this Act.

Special Economic Zone Company

5 (1) An organisation known as the Special Economic Zone Company shall be established by the Minister to develop, promote and manage each Special Economic Zone. The Company shall enjoy an independent financial and administrative status and be entitled to conduct all legal transactions and procedures.

5 (2) The Company shall consist of a chairman and five ordinary members.

5 (3) The membership of the Company shall be composed of representatives drawn from public and private sector organisations as deemed appropriate by the Minister.

5 (4) The Company shall be a body corporate having perpetual succession and a common seal and may sue and be sued in its corporate name and may perform such other acts as bodies corporate may perform.

5 (5) The common seal of the Company shall, when applied to a document, be tested by the signature of a Company member and a member of the staff of the Company authorised by the Company to act in that capacity or by the signature of two members of the staff of the Company so authorised.

Duty & Functions of the Company

6 (1) It shall be the general duty of the Company to secure the redevelopment of the defined zone area and for that purpose it shall have the following functions:

(i) to establish a Special Economic Zone;

(ii) to acquire, hold and manage land in the area for its development, re-development or renewal by the Company or by any other person;

(iii) to prepare a planning scheme(s) for the development, redevelopment or renewal of the land in the area;

(iv) to develop, redevelop or renew, or secure the development, redevelopment or renewal of any land in the area or otherwise to secure the best use of any such land.

(v) To dispose of land:
(a) on completion of its development, redevelopment or renewal;
(b) to secure its development, redevelopment or renewal;
(c) to secure its best use.

(vi) to lay down the general policy for the Company within the framework of an overall national policy.

(vii) to approve the annual budget of the Company.

(viii) to approve proposals of the Company to borrow money.

(ix) to approve plans for the promotion, development and the management of the Special Economic Zone.

(x) to manage, utilise, develop and maintain the Special Economic Zone.

(xi) to encourage and promote investment within the Special Economic Zone.

(xii) to provide such infrastructure and to carry out such works of amenity development, or environmental improvement as, in the opinion of the Company, may be required to encourage people to invest, work, shop or otherwise use the facilities provided in that area.

(xiii) to receive and approve or reject applications from persons wishing to establish businesses within the Special Economic Zone.

(xiv) to issue licences to such persons to operate businesses within the Special Economic Zone.

(xv) to receive and adopt the annual accounts and annual report of the Company.

(xvi) to appoint the Chief Executive with the approval of the Minister.

(xvii) to fix the remuneration level and conditions of employment for all employees of the Company.

6 (2) In general, the Company may carry on any activity that appears to be requisite, advantageous or incidental to, or which appears to facilitate, the performance of any of its functions under this Act.

6 (3) The Company may do all such things as arise out of or are consequential on or are necessary or expedient for the purposes or functions assigned to it by or under this Act, or for purposes incidental to those purposes.

Chairman and ordinary members of Company

7 (1) The Minister shall appoint the Chairman and ordinary members of the Company.

7 (2) The Minister shall, when appointing the Chairman and ordinary members of the Company, fix the term of their office and, subject to subsections (5) and (7) below, the Chairman or ordinary members shall hold office on such terms as the Minister decides.

7 (3) A Chairman or ordinary members of the Company whose term of office expires shall be eligible for re-appointment.

7 (4) The Minister may remove Company member(s) from office at any time.

7 (5) A Company member may resign his office by notice in writing to the Minister and the resignation should take affect on a date when the Minister receives the notice.

7 (6) When a Company member has any financial interest directly or indirectly in any undertaking dealing with the Company, he shall, before exercising any functions as an Company member, declare the nature of such interest to the Company and shall comply with such directions that it may give him with regard to it.

7 (7) A Company member shall be disqualified from holding office and shall cease to hold office if he is adjudged bankrupt or makes a composition or arrangement with his creditors or is convicted of any indictable offence in relation to a company or is convicted of an offence involving fraud or dishonesty whether in connection with the company or not.

7 (8) The conditions of office applicable to Company members set out in subsections 7(6) and 7(7) above shall apply to members of committees constituted under this Act.

Special Economic Zone Planning

8 (1) The Company shall have responsibility for the preparation of a Planning Scheme for the defined zone area and shall be required to present such a scheme as soon as possible after its establishment.

8 (2) The Scheme shall consist of a written statement and a plan indicating the manner in which the Company considers that the defined zone area should be developed and in particular:

(i) the nature and extent of the proposed development (s);
(ii) the proposed distribution and location of uses;
(iii) proposals in relation to the overall design of the proposed development including the heights, the external finishes of structures and other relevant environmental matters; and
(iv) proposals relating to the roads layout, the provision of parking places and traffic management.

8 (3) In preparing a scheme under this section the Company should:

(i) comply with any general directives as given to it by the relevant Minister;
(ii) consult with the relevant regional and local authorities in their immediate area;
(iii) have regard to any existing development plans made by these authorities;
(iv) make arrangements for the making of submissions by interested persons in relation to the scheme and the considerations by the Company of any such submissions.

8 (4) The Planning Scheme shall be submitted by the Company to the relevant Minister for approval and a copy thereof shall also be sent to the regional and local authorities in the area at the same time.

8 (5) Where a scheme under this section is submitted to him by the Company, the Minister shall consider any objections made to him within one month of receiving the Planning Scheme and may modify the scheme in such manner and to such an extent as he thinks proper and may approve the scheme or the scheme as so modified.

8 (6) Once the Planning Scheme is approved by the Minister, each of the following shall be exempted from the normal planning process that would apply within the area of the local authority in which the zone area is located:

(i) the carrying out by the Company of any development in the zone area which is consistent with the scheme prepared and approved under this Section.

(ii) The carrying out of any development in the zone area by a person other than the Company and which is certified by the Company to be consistent with the scheme prepared and approved under the legislation.

8 (7) The Company shall be required to inform itself of all relevant planning and environmental considerations and especially of the impact and consequences of all development proposals on the particular area itself and on the surrounding area.

Contracts and instruments

9 Any contract or instrument, which if entered into or executed by an individual would not require to be under the seal of the Company, may be entered into or executed on behalf of the Company by any person generally or specially authorised by the Company for that purpose.

Delegation of functions

10 (1) The Company may, without prejudice to its general responsibilities under this Act, perform any of its functions through or by any of the members of its staff fully authorised by the Company in that regard.

10 (2) The Company may, without prejudice to the generality of its responsibilities, delegate functions to committees constituted by it or to any of its members or to any member of the staff duly authorised by the Company in that regard.

10 (3) The terms and conditions of every delegation made by the Company under subsections 10(1) and 10(2) above shall be subject to the approval of the Minister.

10 (4) The Company may, as it thinks proper from time to time, constitute committees for the purposes of subsection 10(2) and dissolve any such body.

10 (5) Membership of the committee may include persons who are not members of the Company or its staff.

Directives to the Company

11 (1) The Minister may give the Company such general policy directives as he considers appropriate having regard to the provisions to this Act.

11 (2) A directive under subsection 11(1) shall not apply to any individual undertaking.

11 (3) The Company shall comply with any directive and shall include in its annual report an account of the actions that it has undertaken to give effect to the directive.

Advances to the Company

12 (1) For the purposes of enabling the Company to perform its functions, the Minister of Finance may, on the recommendation of the Minister, advance from time to time to the Company such amounts as the Company may request.

12 (2) Advances under this section shall be made on such terms as to repayment, interest and other matters as may be determined by the Minister of Finance.

Other revenue

13 (1) The Company shall have the following sources of other revenue:

(i) rents and levies collected in the Special Economic Zones;
(ii) the sale of goods, services, or property by the Company; and
(iii) trading income.

Provision of sites and services by the Company

14 (1) For the purpose of providing or facilitating the provision of sites or premises for the establishment development and maintenance of a Special Economic Zone the Company may:

(i) acquire any land either permanently or temporarily and either by agreement or by compulsory order;

(ii) acquire either permanently or temporarily and either by agreement or by compulsory order any easement, way leave, water right or other rights whatsoever over or in respect of any land or water;

(iii) terminate, restrict or otherwise interfere with either permanently or temporarily and either by agreement or by compulsory order any easement, way leave, water right or other right whatsoever over or in respect of any land or water;

(iv) construct, adapt and maintain buildings and other works;

(v) provide services and facilities in connection with the land;

(vi) sell, lease or otherwise dispose of land vested in it;

(vii) assist any person to:

(a) acquire land;

(b) construct and adapt buildings and other works ;

(c) provide services and facilities in connection with land;

(viii) do any act or thing that may be necessary for or incidental to the doing or any thing that the Company by the preceding sub subsections is authorised to do.

14 (2) Payment of compensation for any land acquired, whether permanently or temporarily, to persons entitled to such compensations should be fixed in accordance with the general practice for the payment of such compensation in the People's Republic of Bangladesh.

The Company's power to accept gifts

15 (1) The Company may accept the gift of money, land or other property on such terms and other conditions as may be specified by the donor.

15 (2) The Company shall not accept a gift if the conditions attached by the donor to the acceptance of the gift are inconsistent with the functions and/or the objectives of the Company.

Borrowing

16 (1) The Company may, with the consent of the Minister and the concurrence of the Minister of Finance, borrow by arrangement with bankers or otherwise such sums as it may require for the purpose of providing for current or capital expenditure.

16 (2) In subsection 16(1) above, current or capital expenditure includes expenditure by the Company in the exercise of any of its functions whether of an administrative or capital nature.

Company's power to engage consultants or advisors

17 The Company may, out of monies at its disposal, from time to time engage such consultants or advisors as it considers necessary for the discharge of its functions.

Staff of the Company

18 (1) The Company may appoint such and so many persons to be members of the staff of the Company as it thinks appropriate from time to time.

18 (2) A member of the staff of the Company shall be employed on such terms and conditions as the Company may from time to time determine.

Annual report and accounts

19 (1) The Company such shall submit, in such a form as the Minister may direct, an annual report of its activities as soon as practicable after the end, and in any event within six months, of the financial year to which its relates.

19 (2) The Company shall keep, in such form as may be approved of by the Minister with the concurrence the Minister of Finance, all proper and usual account of monies received and expended by it.

19 (3) The accounts of the Company shall be submitted annually by the Company for audit, to an auditor appointed by the Minister with the consent of the Minister of Finance, and when so audited shall be presented to the Minister together with the auditor's report thereon.

19 (4) The auditor's report referred to in subsection 19(3) above shall be in the format prescribed by the Minister with the concurrence of the Minister of Finance.

Information

20 The Company shall supply the Minister with such information regarding the Company as he may from time to time require or request.

Exemptions

21 The Company shall enjoy all exemptions and privileges accorded to Government Ministries and departments.

Offices

22 The Company shall have its principal office within the Special Economic Zone and may establish other offices, agencies, branches or sub-offices elsewhere in the People's Republic of Bangladesh or any other country as it considers necessary for the discharge of its functions.

PART III

Licences and Miscellaneous Provisions

Licence to carry on business within Special Economic Zone

23 (1) No person shall carry on business within a Special Economic Zone unless he is the holder of a licence authorising the carrying on of that business within the Zone.

23 (2) A person who contravenes subsection 23(1) above, shall be guilty of an offence and liable to a fine not exceeding.

Granting of licences

24 (1) The Company may at its discretion, and after consultation with relevant Government departments, grant or refuse any person a licence authorising the carrying on of a business within the Special Economic Zone.

24 (2) In exercising this discretion to issue licences, the Company should have regard to the extent to which the business for which a licence is being applied contributes to:

(i) the growth of the employment in the Zone and the surroundings;
(ii) the overall benefit of the project to the local, regional and national economy;
(iii) the extent to which it uses resources and skills existing within the locality;
(iv) the overall contribution to national development; and
(v) the impact on the environment.

Applying for a licence

25 (1) Any person may apply for a licence.

25 (2) Every application shall be in writing and addressed to the Secretary of the Special Economic Zone Company.

25 (3) The application should be accompanied by such information and fees as the Company may determine appropriate.

Conditions attaching to licence

26 (1) The Company may attach to a licence such conditions as it thinks proper after consultation with relevant Government departments and interested parties.

26 (2) If a licensee does not comply with the conditions attaching to the licence, he shall be guilty of an offence and shall be liable to a fine.

Revocation or variation of licence

27 (1) The Company may at its discretion revoke a licence if:

(i) it is satisfied that there has been a breach of a condition attached to a licence; or

(ii) the licensee is convicted of an offence against the customs laws.

27 (2) Before revoking a licence, the Company shall give not less than 30 days notice of its intention to the licensee and shall consider any representations made to it by the licensee within that time.

Register of licences

28 The Company shall establish and maintain a register of licences granted under subsection 23 (1) of this Act.

Guarantees against nationalisation

29 Projects established in Special Economic Zones shall not be nationalised.

Investors

30 (1) Foreign investors can hold up to 100% of the shares in any Special Economic Zone enterprise.

30 (2) Bangladeshi investors can hold up to 100% of the shares in any Special Economic Zone enterprise.

30 (3) Bangladeshi and foreign investors will have an equal status within the Special Economic Zones.

Repatriation of profits

31 (1) Foreign investors can repatriate profits from an enterprise without restriction provided an auditor's certificate is produced certifying that the profits to be repatriated are the true profits accruing to the foreign investor as a result of a dividend being declared.

31 (2) The format of the auditor's certificate under subsection 31(1) above shall be determined by the Minister with the concurrence of the Minister of Finance.

Repatriation of capital

32 (1) Foreign investors may repatriate capital without restriction, provided that:

(i) the capital has been brought into Bangladesh from overseas;
(ii) the capital to be repatriated is realised from the sales of physical assets or shares; and
(iii) the proceeds of the sale of physical assets or shares, referred to in sub subsection 32 (1) (ii) above, represent the true value of the assets in question; and
(iv) an auditor's report is obtained stating that, in the opinion of the auditors, the capital qualifies for repatriation under the terms of sub subsections 32(1)(i) to (iii) above.

32 (2) The format of the Auditor's report under sub subsection 32(1)(iv) above shall be determined by the Minister with the concurrence of the Minister of Finance.

Foreign currency bank accounts

33 Businesses which have commenced operations within the Zone may operate foreign currency hold accounts in connection with those operations.

Tax concessions

34 (1) Enterprises established within the Special Economic Zone shall be granted full exemption from tax on profits arising on activities carried out within the Zone under the terms of the licence for a period of 5 years from the date of commencement of operations in the Special Economic Zone with the following tax rates being applied thereafter:

Year (from date of commencement) (all for example purposes only)	% of Standard Rate
6	10%
7	15%
8	20%
9	30%
10 and thereafter	40% .

34 (2) When a dividend has been paid to a person or body corporate within the People's Republic of Bangladesh, out of the profits of a Special Economic Zone enterprise and those profits are exempt from income and corporation profits tax, such a dividend shall be free of income and other taxes in the hands of a dividend holder.

34 (3) Enterprises established within the Special Economic Zone shall be entitled to claim 100% tax capital allowances (accelerated depreciation) against income tax, for capital expenditure in respect of commercial development within the Zone during the qualifying period.

34 (4) Enterprises established within the Special Economic Zone shall be granted full exemption from local property taxes in respect of existing buildings within the Zone for a period of ten years from the date of commencement of operations within the Zone.

34 (5) Enterprises established within the Special Economic Zone shall be granted full exemption from local property taxes in respect of new buildings within the Zone for a period of ten years from the date of erection of the buildings.

34 (6) Enterprises established within the Special Economic Zone shall be granted a double allowance, in determining deductible expenses for the purposes of computing income tax, for rent paid by a lessee under a new lease entered into in respect of qualifying commercial premises during the qualifying period. The double allowance shall apply for a period of ten years from the date of commencement of operations in the Zone.

34 (7) Enterprises established within the Special Economic Zone shall be granted a double allowance, in determining deductible expenses for the purposes of computing income tax, for qualifying expenditure incurred on training schemes approved by the Company during the qualifying period. The double allowance shall apply for a period of ten years from the date of commencement of operations in the Zone.

Remission of rates

35 Enterprises established within the Special Economic Zone shall be able to avail of a 100% remission of rates in respect of:

(i) qualifying existing buildings;
(ii) new qualifying buildings erected during the qualifying period;
(iii) the increase in rateable valuation of qualifying existing buildings that were enlarged or improved during the qualifying period.

Date of commencement of operations

36 The date of the commencement of the operations in a Special Economic Zone, as referred to in sections 33, 34 and 35 above, shall be specified in the operating licence.

Qualifying period

37 The qualifying period is the period of ten years commencing on the date of approval of the Planning Scheme by the Minister referred to in section 8 above.

CHAPTER 9:
FINANCIAL ANALYSIS

CHAPTER 9 FINANCIAL ANALYSIS FOR INDUSTRIAL ESTATE

9.1 Construction Cost and Financing Plan

9.1.1 Construction Cost

The construction cost are estimated at 82.2 million US$ and the land acquisition cost at 3.45 million US$ for a total area size of 275.7 ha.

9.1.2 Financing Plan

It is assumed that the land acquisition is done in 1997. The financing source for the land acquisition should be by own equity and not by long term loan. The development cost is disbursed over 2 years that is from 1998 to 1999. It is expected that out of the total development cost 70% will be needed in the first and 30% in the following year. Own equity of the development cost in the first year is 20% and next year's equity is 10%, so that total own equity is 30%.

Some 50% of the development cost in 1998 and 20% in 1999 should be financed through a long term loan. The conditionality for long term loans from the Asian Development Bank is 1% interest rate and 25 years repayment schedule and the Overseas Economic Cooperation Fund of Japan provides the same conditions for long term loans. However, it may be difficult to borrow the total amount of the development cost. Mixed financing with other sources of funds should be sought so that the interest rate becomes 7%. The duration of the repayment schedule is considered from 1999 to 2006/7, that is the same schedule as the land sales plan. So the repayment schedule should be 7 years including 1 year grace period.

	1998	1999
Own equity	20%	10%
Long term loan	50%	20%

9.2 Cost Items and Revenue Items

9.2.1 Cost Items

Cost items for financial analysis of the project are as outlined below. However, repayment of principal and interest for the short term loan borrowed from the city's capital market should be repaid the following year.

1. Construction cost (3.45 million US$ of land acquisition cost and 82.2 million US$ of development cost for the industrial estate)
2. Sales promotion cost (1% of the construction cost)
3. Operation and maintenance cost (2% of the construction cost)
4. Long terms debt (7 years repayment period including 1 year grace period and a 7% interest rate)
5. Short terms debt (1 year repayment period with a 10% of interest rate).

9.2.2 Revenue Items

Revenue items for financial analysis are as outlined below. However, if there is a positive cash flow, it should be invested in the city's capital market for one year at an interest rate of 10 %.

1. Land lease (basic fee of lease is 40 US$/m2, total benefit is 68.04 million US$)
2. Standard factory rent (basic rental fee is 3 US$/m2/month and total floor is 36,000m2)
3. Warehouse rent (basic rental fee is 3 US$/m2/month and 80 % of the 6,400 m2 of total floor is available to rent)
4. Lease of the commercial facility (65 % of total 18,000 m2 and basic fee is 10 US$/month)
5. Housing rent (family type is 25 US$/month for 1,000 units and bachelor type is 5 US$/month for 9,000 units)
6. Administration fee (is assumed at 1 US$/m2 and 170,1 ha)
7. Own equity (hole of land acquisition cost and 30% of development cost)
8. Long term debt (70% of the development cost)
9. Short term loan (if there is some shortage)

10. Operating of fund (however, if there is a positive cash flow, it should be invested in the city's capital market for one year at an interest rate of 10 %).

9.3 Financial Analysis

9.3.1 Construction Period

The construction period is 3 years including of land acquisition and the projects life is 14 years.

9.3.2 Condition of the Cost Items

(1) Land acquisition cost

Land acquisition cost is 3.45 million US$ and the cost will be incurred in 1997.

(2) Construction cost

The industrial estates will be constructed 70 % in 1998 and the remainder of 30 % in 1999, costing a total 82.2 million US$.

(3) Sales promotion cost

Sales promotion cost is assumed to be the amount of 1 % of the total construction cost each year over the years 1997 to 2002 until the land will be fully contracted. The sales promotion cost is US$ 0.82 million each year.

(4) Operation and maintenance cost

The operation and maintenance cost is assumed at 2 % of the total construction cost under full operation from 2000 onwards.

9.3.3 Revenue Flow

(1) Land sales (or long-term lease)

The price of land for sale for industrial use is set to be US$ 40/m^2 at 1995 constant prices. The purchase cost should be paid in a lump-sum manner at a time. The total land for sale is 170 ha (100 ha for GIE, 70 ha for EPZ) in the estate and the total land selling value accounts for US$ 68.04 million. It is assumed that the land will be contracted at the following rates to the total land area each year.

1998	5%
1999	25%
2000	30%
2001	20%
2002	15%
2003	5%.

(2) Rent for Standard Factory

The total floor area of 36,000m^2 of the standard factory, including common space, will be leased out at a monthly rent of US$ 3/m^2. The occupancy rate of the standard factory floor is assumed as follows:

1999	25% occupancy
2000	50% occupancy
2001	75% occupancy
2002 and after	Full occupancy.

(3) Rent for Warehouse

An area of 80% of the total floor area of 8,000m^2 of the bonded warehouse. That is 6,400m^2 will be leased. The rate is US$ 3/m^2 per month and the total rent at full occupation will be US$ 0.23 million per year. Also, similar to the standard factory operation, the warehouse occupancy is assumed at the same rate of the standard factory occupancy rates as described above.

(4) Rent for Housing

The SEZ provides the housing for the workers in the estate which accounts for 1,000 of family-type units and 9,000 of dormitory-type bachelor units. The housing rent for each type of units are as follows:

• Family type	US$ 25 per month
• Dormitory-type for singles	US$ 5 per month.

(6) Rent for Commercial Facilities

An area of 65% of the commercial facilities will be leased. The rate is US$ 10/m^2 per month and the total rent at full occupation will be US$ 1.4 million per year from 1999 onwards.

(7) Administration fee

Administration fee for common service will be charged in proportion to the land area. The rate is US$ 1/m^2. The amount of the administration fee to be collected depends on the operational rate of the licensed firms. This is assumed to be the same rate each year. The occupancy ratio will be escalated every year by 25%.

9.3.4 Cash Flow and Internal Rate of Return

Table 9.1 shows the cash flow of the project over the project life of 1997-2010 under the conditions and assumptions mentioned above. The financial internal rate of return of Return on Equity (ROE) is 2.76% and Return on Investment (ROI) is 6.44%. The ROE and ROI are modest rates. However, the requirement of industrial infrastructure is important and the benefit from the industrial estate, such as employment generation and technology transfer are strong indirect benefits.

9.3.5 Sensitivity Analysis and it's ROE and ROI

Both factors the land lease fee as a benefit stream item and the construction cost as a cost stream item are the crucial factors of this project. Hence, those items have been subjected to a 10 % increase or decrease for a sensitivity analysis.

Figure 9.1 shows the results of this sensitivity analysis, and there are three viable areas with over 9 % of ROE and ROI. In the first case, the lease fee is 40 US$/m2 with 10% reduced construction cost at US$ 74.0 million. The second case reflects a 10% increase of the lease fee with 44 US$/m2 and US$ 82.2 million construction cost. The third case reflects a 10% increase of land lease fee with 44 US$/m2 and 10% decrease in construction cost with US$ 74.0 million.

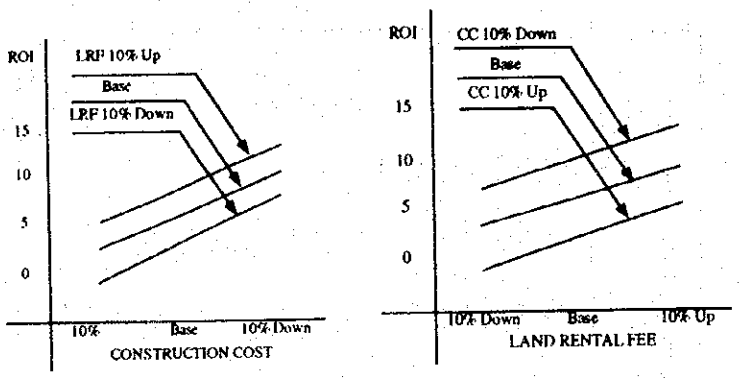
However, in the second and third cases, in which the land lease cost is assumed at 44 US$/m2, such rate would be incompatible with other Asian countries. Likewise, if a decrease of 10 % in construction cost is assumed, the implication would be poor infrastructure.

It should be also noted that if all the cost for the industrial waste treatment facilities should be included, the sales price should be increased to $61 per square meter to obtain the same level of ROI that is around 9%.

Table 9.1 Cash Flow

FUND FLOW STATEMENT	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
CASH IN	3.45	60.94	44.35	24.63	18.72	16.62	15.88	13.68	10.90	7.62	5.47	5.62	5.87	5.89
RENTAL	0.00	3.40	19.01	23.00	16.79	13.98	7.17	3.77	3.77	3.77	3.77	3.77	3.77	3.77
LAND	0.00	3.40	17.01	20.41	13.61	10.21	3.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00
STANDARED FACTORY	0.00	0.00	0.32	0.65	0.97	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
WAREHOUSE	0.00	0.00	0.06	0.12	0.17	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23
CENTER AREA	0.00	0.00	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40
HOUSE	0.00	0.00	0.08	0.15	0.23	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
DORMITORY	0.00	0.00	0.14	0.27	0.41	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54
ADMINISTRATIVE FEE	0.00	0.00	0.43	0.85	1.28	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70
EQUITY	3.45	16.44	8.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
L/T LOAN	0.00	41.10	16.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
S/T LOAN						0.81	7.01	8.21	5.43	2.15				
FUND OPERATION OF S/T			0.26	0.78	0.66	0.13						0.15	0.40	0.42
CASH OUT	3.45	58.36	36.58	18.00	17.43	16.62	15.88	13.68	10.91	7.62	4.01	1.64	1.64	1.64
OPERATION AND MAINTENANCE	0.00	0.00	0.00	1.64	1.64	1.64	1.64	1.64	1.64	1.64	1.64	1.64	1.64	1.64
PROMOTION COST	0.00	0.82	0.82	0.82	0.82	0.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CONSTRUCTION COST	3.45	57.54	24.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INTEREST OF L/T LOAN	0.00	0.00	2.88	4.03	3.45	2.65	1.84	1.04	0.23	0.00	0.00	0.00	0.00	0.00
REPAYMENT OF L/T LOAN	0.00	0.00	8.22	11.51	11.51	11.51	11.51	3.29	0.00	0.00	0.00	0.00	0.00	0.00
INTEREST OF S/T LOAN	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.70	0.82	0.54	0.22	0.00	0.00	0.00
REPAYMENT OF S/T LOAN	0.00	0.00	0.00	0.00	0.00	0.00	0.81	7.01	8.21	5.43	2.15	0.00	0.00	0.00
CASH INCREASE OR DECREASE	0.00	2.58	7.77	6.62	1.30	0.00	0.00	0.00	0.00	0.00	1.46	3.97	4.22	4.25
ACCUMURATION	0.00	2.58	10.35	16.97	18.27	18.27	18.27	18.27	18.27	18.27	19.73	23.71	27.93	32.18
CASH FLOW-ROE	-3.45	-13.86	-0.45	6.62	1.30	0.00	0.00	0.00	0.00	0.00	1.46	3.97	4.22	4.25
IRR-ROE	2.76 (%)													
CASH FLOW-ROI	-3.45	-54.96	-5.79	22.16	16.26	14.15	13.35	4.33	0.23	0.00	1.46	3.97	4.22	4.25
IRR-ROI	6.44 (%)													

Figure 9.1 Sensitivity Analysis



CONSTRUCTION COST	LAND RENTAL FEE: 10% Down	LAND RENTAL FEE: Base= 40 USD/m2	LAND RENTAL FEE: 10% Up
10% Down	7.43 5.36	10.27 12.20	13.23 21.04
Base= 82.2 mil. USD	3.67 -3.12	6.44 2.76	9.13 9.31
10% Up	-0.96 n.a.	2.73 n.a.	5.50 -0.07

Note : uper line ROI
lower line ROE

CHAPTER 10:

PRIORITY MANUFACTURING SUBSECTORS

CHAPTER 10 PRIORITY MANUFACTURING SUBSECTORS

10.1 Subsectors to be Prioritised

The Bangladeshi existing industrial structure can be characterised as shown in Table 10.1. Heavy dependence on imported raw materials is an outstanding feature, since major industries are import-processing in the domestic market industries and re-exporting in export industries. By category of goods, durable consumer and capital goods are mostly domestic-market oriented and almost without export.

Table 10.1 Bangladeshi Existing Industrial Structure by Business Pattern and Category of Goods

	MARKET			
	DOMESTIC		FOREIGN	
	Localised Domestic Market Industries	Import-Processing Industries	Localised Export Industries	Re-Exporting Industries
Consumer Goods	Rice milling Edible salt refinery Handloom textiles Toys	Dairy products Edible vegetable oils Pharmaceuticals Cosmetics, toiletries etc. Soap & detergents	Fish processing Tea & coffee processing Carpets, rugs & mats Leather footwear	Knitwear Garments Plastic footwear Sports & athletic goods
Durable Consumer Goods	Wooden furniture Cane & bamboo furniture	Radio, TV, communication equipment Electrical appliances & housewares	None or negligible	None or negligible
Industrial Goods	Silk textiles Wooden structural products Bamboo structural products Gases Bricks Bolts, nuts, rivets, etc.	Plastics & man-made fibres Paints, varnishes, etc. Petroleum refinery Cement Iron & steel mill Iron & steel re-rolling mill Insulated wires & cables	Jute textiles Leather tanning etc Fertilizers	Ship breaking
Capital Goods	Agricultural equipment Textile machinery Industrial machinery Railroad equipment	Engines and turbines Sewing machines Office, computing machines Motor vehicles & Rickshaw Medical instruments Other precision instruments	None or negligible	None or negligible

Remark: Classification of market type is based on the related data compiled in the Census of Manufacturing Industries 1988-89, BBS

Priority industries are subsectors or product groups to be promoted appropriately towards a desirable and realistic industrialisation in Bangladesh and the Chittagong District. They include not only industries to be newly developed but also existing industries. As such, the priority industries could be identified according to the following considerations :

To take into consideration a desirable industrial structure in Bangladesh and Chittagong District (CTGD) in 2020 based on the development strategy and objectives, prioritising

the industries which can utilise comparative advantages of Chittagong District and the Chittagong Special Economic Zone (CSEZ) incorporating intensively its role as transshipment hub and processing trade centre of Bangladesh, and

To promote a realistic industrialisation through structuring strategically and efficiently individual subsectors by phasing based on the internal mechanism of industrialisation and growth potential of industries, while considering development impacts such as employment generation and formation of industrial clusters, industrial complex with close industrial linkages and synergy effects.

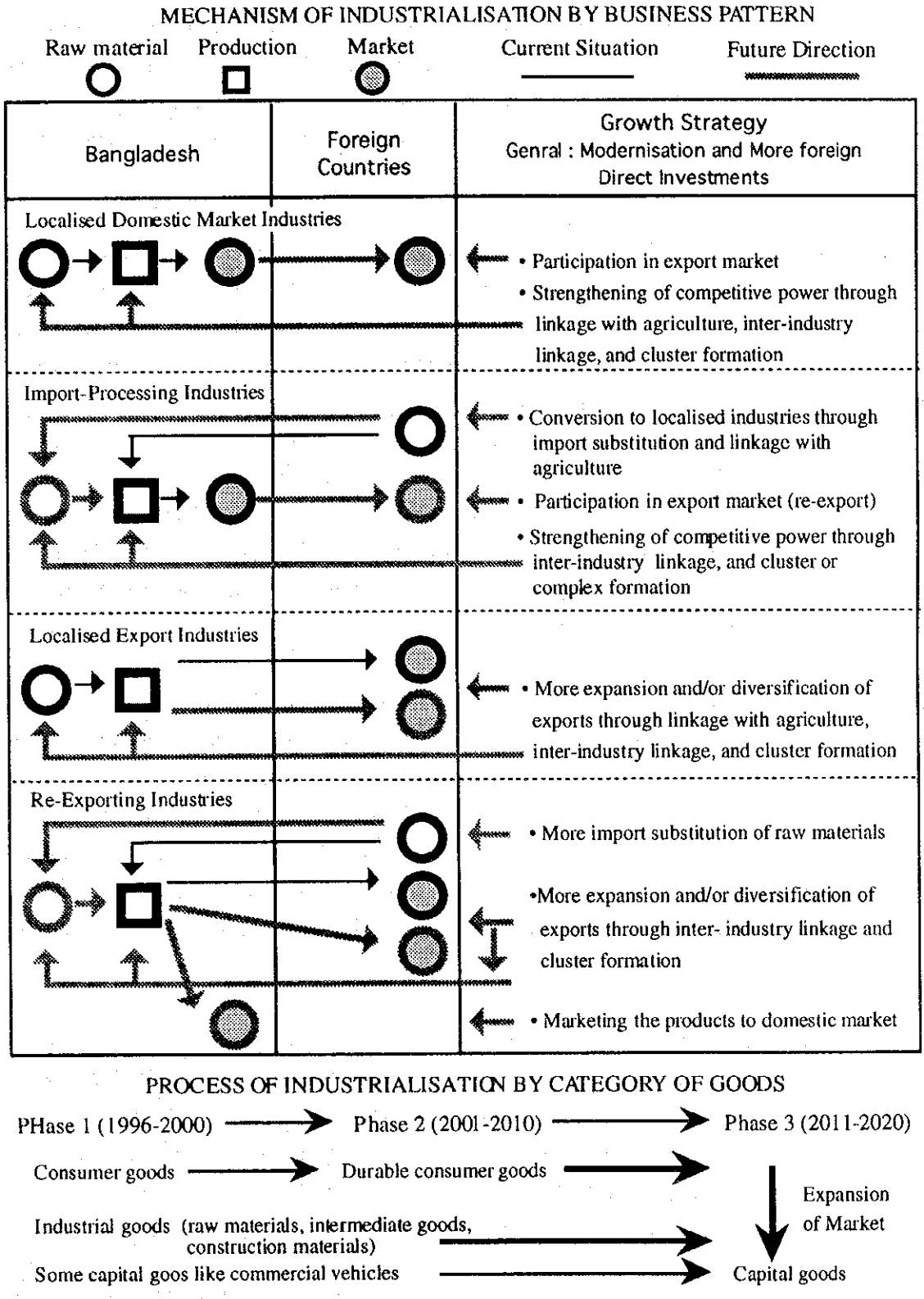
Figure 10.1 indicates the mechanism of industrialisation by business pattern and process of development by category of goods. Mdernisation and more investments are strategically important in every business pattern. Phasing comprises three terms: Phase 1 (1996-200), Phase 2 (2001-2010) and Phase 3 (2011-2020).

Localised domestic market industries should strategically participate in export markets in order to address the constraint of a limited domestic market in Bangladesh. In this context, the subsectors with export potential like edible salt refinery should be prioritised. Strengthening of competitive power is also crucial for addressing the open market policy. Therefore, priority should be placed on the subsectors to be developed through linkage with agriculture (agri-processing including wood and fish processing), inter-industry linkage (cardboard box, gases, paints) or formation of industrial cluster (handicraft, houseware).

Import-processing industries also should strategically participate in export markets utilising Chittagong's transshipment hub and processing trade functions (THPTF). It is viable to import oil seeds and raw wood from the surrounding countries like Myanmar and export the products to them. Re-exporting durable consumer goods (TV and communication equipment) will break through the constraint of limited domestic market with economies of scale in production. In addition, priority should be placed on the subsectors which can be localised through import substitution (various industrial goods), linkage with agriculture (food processing, cosmetics, medicine), and inter-industry linkage (synthetic fibre, tyres). Further in view of strengthening competitive power as domestic market industries, priority will be also placed on the subsectors expected to be developed through formation of industrial cluster or industrial complex (flour milling, edible oil and animal feeding staff).

Among localised export industries, priority should be placed on the subsectors (frozen shrimps, leather tannery, leather goods, jute textiles) with a strong necessity and/or possibility of more expansion and diversification of exports. In addition, priority should be also placed on the subsectors expected to be developed through linkage with agriculture, inter-industry linkage or

Figure 10.1 Mechanism and process of industrialisation in Bangladesh



formation of industrial cluster.

In the case of re-exporting industries, priority should be placed on the subsectors (garments, knitwear, plastic footwear) with a strong necessity and/or possibility of inter-industry linkage and formation of industrial cluster for more expansion and diversification of exports, while promoting more import substitution. Further, marketing some portion of the products to domestic market in Bangladesh should be strategically addressed.

By phasing, Phase 1 will be the term where industrial development will proceed according to recent trends and development of export industries including re-exporting will be prioritised, since the constraint of limited domestic market could not be mitigated in the short-term. As regard to domestic market industries, priority should be placed on the subsectors with strong export potential and strong need for modernisation to strengthen competitive power. By category of goods, most subsectors producing consumer goods will be prioritised for development, because the domestic market for durable consumer goods will not yet have grown enough so as to ensure economies of scale in production. In addition, priority will be also placed on the subsectors producing industrial goods (textiles and their raw materials, industrial chemicals, plastic products, electronic component/parts) for import substitution. Some subsector producing capital goods like commercial vehicles will be prioritised.

Phase 2 could be positioned as the term for establishing the foundation for further growth of manufacturing. Priority will be placed on the subsectors producing durable consumer goods based on an expansion of the domestic market, increase in middle class and progress of urbanisation. Export from Bangladesh will increase through diversification of exports led by further development of re-exporting industries and aggressive participation of localised export industries in export markets. In addition, priority will be placed on the subsectors producing industrial goods based on locally made raw materials through linkage with agriculture and inter-industry linkage.

Phase 3 will be the term where manufacturing will become the basic industry leading the growth of Bangladesh while widening and deepening its structure with strength. Priority will be placed on development of the subsectors producing durable consumer goods at a high price and their export. The subsectors producing capital goods will be prioritised as a component of strong industrial structure according to the market expansion, even though existing industries producing them in Bangladesh agglomerate to some extent but without competitive power.

Foreign direct investment (FDI) is strategically important for the industrialisation of Bangladesh and the development of priority subsectors. BOI registered 114 FDI project proposals with

Table 10.2 Foreign Direct Investment Proposals Registered with BOI (January to July in 1994)

	Number of Proposals		Investments		% Shares
	Number	% Shares	(in Mil. Tk.)	% Shares	of Foreign
GRAND TOTAL	114	100.0%	33,629	100.0%	83.7%
Manufacturing Total	99	86.8%	33,017	98.2%	83.7%
Food Processing including Tea	20	17.5%	1,002	3.0%	79.6%
Textiles	13	11.4%	14,130	42.0%	86.1%
Garments	12	10.5%	353	1.1%	43.4%
Leather and Leather products	2	1.8%	154	0.5%	69.9%
Paper Products/Packaging	7	6.1%	405	1.2%	37.8%
Chemicals	9	7.9%	14,505	43.1%	87.8%
Plastic Products	6	5.3%	37	0.1%	79.8%
Non-metallic Products	8	7.0%	803	2.4%	75.4%
Metal Products	3	2.6%	446	1.3%	41.1%
Electronics	10	8.8%	763	2.3%	68.5%
Transport Equipment	5	4.4%	357	1.1%	39.8%
Other Industries	4	3.5%	61	0.2%	55.2%
Services Total	15	13.2%	611	1.8%	82.3%
Engineering Services	2	1.8%	52	0.2%	80.8%
Other Services	13	11.4%	559	1.7%	82.5%

Source: Board of Investment

investments of 33.6 billion Taka during January to July in 1994 as shown in Table 10.2.

In terms of number of the proposals, food processing mainly consisting of edible oil, tea, frozen shrimps and dairy products is outstanding as well as textiles, garments and electronics. The proposed investments concentrate on textiles and chemicals including production of methanol and petrochemicals, and amounted to around 14 billion Taka respectively, which together accounted for 85% of the total.

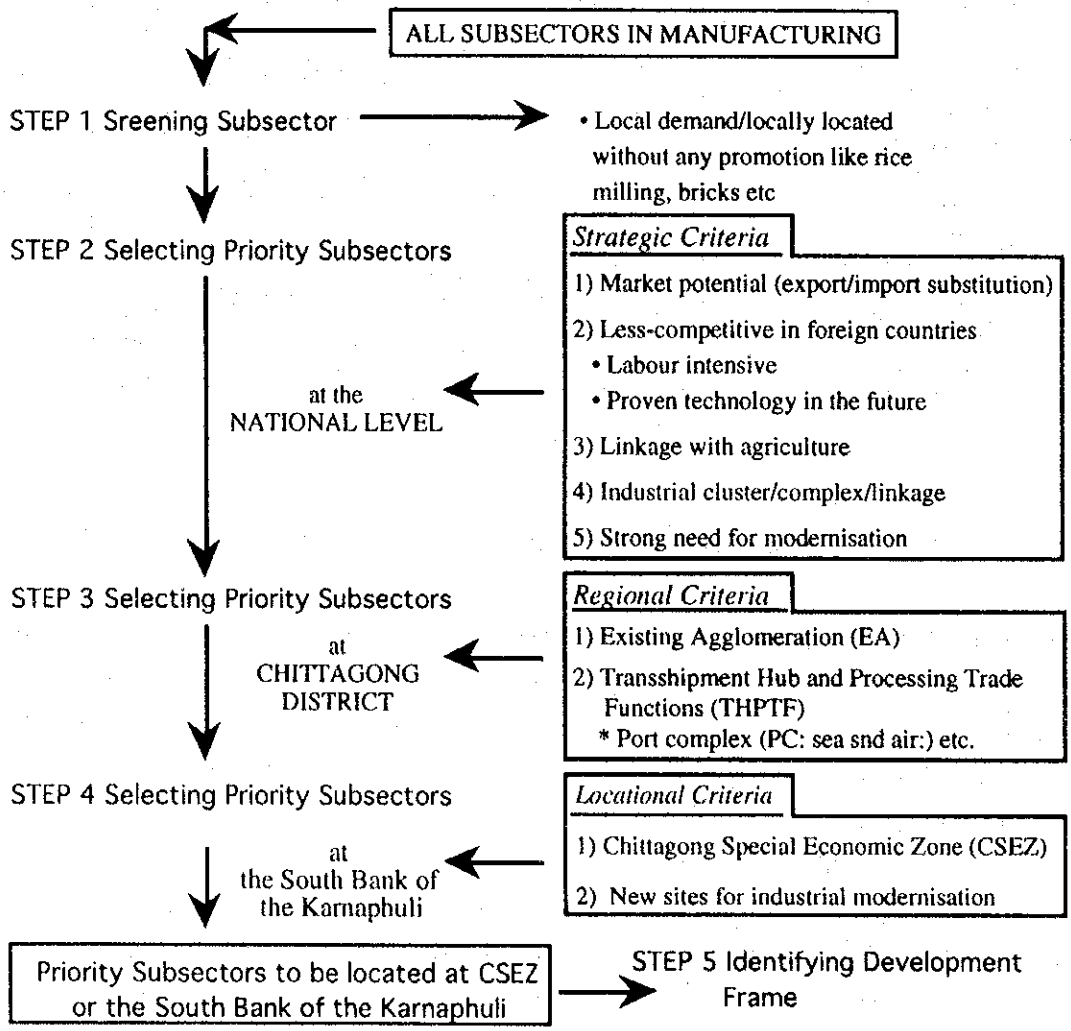
Both textiles and chemicals are mostly industrial goods and heavily dependent on imported inputs. The FDI to them with big investments and also to electronics maybe intend to substitute them. The project proposals for transport equipment are to assemble commercial vehicles including the Philippine made "Jeepny". Demand for commercial vehicles in Bangladesh will increase in the near future but it will yet take a long time for production of passenger cars to start.

FDI data compiled in Table 10.2 lack investments in durable consumer goods, probably because the coverage period of the data is short and production of durable consumer goods is mostly monopolised by the manufacturing public corporations. However, the main reason may be that the domestic market is not yet big enough so as to ensure economies of scale in production of durable consumer goods in Bangladesh.

10.2 Process of Prioritising Subsectors

The following five steps as illustrated in Figure 10.2 could be taken for prioritising the subsectors for development, based on the considerations mentioned in the previous section.

Figure 10.2 Steps and Criteria for Prioritising Subsectors



The first step is to screen some subsectors which are local market-oriented like rice milling, bakery products and bricks. They have a strong tendency to locate their factories within or around the local market area according to the increase in demand. This type of subsectors are developed and located without any special promotional activities.

The second step has the following five criteria corresponding to the conditions to be priority subsectors at the national level mentioned in the previous section:

(1) The market potential has two components, one for export including re-exporting and the other for import substitution. The market potential will be affected not only by progress in domestic market expansion, but also by the Government policy.

(2) The low competitiveness of some subsectors in foreign countries represents a possibility of shifting their factories into Bangladesh. Labour-intensive subsector with a large employment generation effect, such as garments which is also the major re-exporting industry in Bangladesh, have invested in developing countries. The majority of such investments were made in Korea and Taiwan in 1970s, ASEAN countries in 1980s, and China in 1990s. In addition, subsectors with proven technology, not limited to labour-intensive ones, are also viable in Bangladesh, since their survival is threatened according to the progress of technological innovation in developed countries.

(3) The linkage with agriculture represents forward (market) and backward (raw materials) linkages between manufacturing and agriculture. The development of agri-processing industries is one of the focal points of the Bangladeshi industrial policy.

(4) Industrial cluster, complex or linkages are broken down as follows:
- "Industrial cluster" represents the cluster formation supported by specialised division of work among small and cottage industries in the same area,
- "Industrial complex" represents organised and integrated production among related industries, and
- "Industrial linkage" represents a potential for import substitution, especially for industrial goods through inter-industry linkage.

(5) There is a strong need for modernisation for enhancing the subsector's competitiveness or survival.

The third step is to prioritise subsectors at Chittagong District level out of those at the national level by prioritising the subsectors which are already agglomerated in Chittagong or which will be attracted to Chittagong's locational conditions, that is transshipment hub and processing trade functions.

The fourth step, based on the priority subsectors at Chittagong District level, is to select those to be located in the Chittagong Special Economic Zone (CSEZ) or the South Bank of the Karnaphuli with a more liberalised free zone than EPZ and positioned as new sites for industrial modernisation conducive to the 21st century's dynamic and active industrial base in Bangladesh and South Asia. The major priority subsectors will comprise export or re-exporting industries as

well as existing subsectors needing modernisation and relocation for integrated and competitive production.

The fifth step will identify the development frame for new sites at the South Bank or CSEZ consisting of the following items: factory sites, the gross value added (GVA), employment generation, consumption of gas, electricity, water and fuel except for gas and traffic volume.

10.3 Prioritised Subsectors ans Development Frame of CSEZ

The results of the above mentioned approaches prioritising the subsectors for a desirable and realistic industrialisation are shown in Table 10.3 to 10.4. The Chittagong Special Economic Zone (CSEZ) to be the new core for industrialisation contains the three sites to be newly developed (site No.1, No.4 and No.5), the total factory site area of which amounts to 750 ha. The followings are the subsectors to be located at the site No.1 that will be initially developed:

• **EPZ** (Factory site: around 100 ha)

- Textile/Light industries
  garments including caps, leather footwear, plastic footwear, sports & athletic goods, toys, pens (felt) & other office goods, umbrellas, and leather goods
- Electrical/Electronic industries
  electronic/electric components, and other electrical apparatus & supplies like tape player
- Metal/Machinery industries
  insulated wires & cables for machinery and equipment, steel processing distribution centre (shearing and slitting), ship/boat building & repairing or structural metal products, and other machinery industries including repair and maintenance services

The above subsectors concentrate on light industries, mainly because heavy industries utilising the functions of EPZ are not expected to be locate in Phase 1 or in the short term.

• **GIE** : New site mainly for industrial modernisation (Factory site: around 70 ha)

- Food processing
  agri-processing, fish processing/frozen shrimps,
  food processing complex comprising edible vegetable oils, flour milling and animal feeding staff based on raw material balance for economies of scale in production, an

integrated new cluster of edible salt refineries by relocation with joint facilities such as storage facility like silo and others,

dairy products,

- Wood import-processing estate

  wooden furniture and wood product based on raw wood to be imported from the surrounding countries like Myanmar, which abounds in forest resources,

- Metal/Machinery industries

  structural and other metal products.

Table 10.3 Priority Subsectors in Bangladesh and Chittagong District toward 2020 (1)

EA : Chittagong's Existing Agglomeration ■ : Chittagong District
THPTF : Chittagong's Transshipment Hub and Processing Trade Functions
△ : New Sites at the South Bank of the Karnaphuli

[Localised Domestic Market Industries]

Phase I (1996-2000), 2 (2001-2010), 3 (2011-2020)	PRIORITY SUBSECTORS AT NATIONAL LEVEL: Export potentials	Less competitive in foreign countries	Linkage with agriculture	Industrial cluster /complex	Strong need for modernisation	PHASE 1 2 3	CHITTAGONG: Attractive factors	Priority Industries
Localised domestic market/ Consumer goods								
Agri-processing	○		○			□ → →	EA	■△
Edible salt refinery	○		○	Cluster	○	□ → →	EA/THPTF	■△
Handloom textiles	○		○	Cluster	○	□ → →	EA	■
Indigenous medicines	○		○	Cluster		□ → →	EA	■
Pottery and china	○	○		Cluster		□ → →		
Cuttery & hand tools				Cluster		□ → →		
Metal houseware		○		Cluster	○	□ → →		
Handicrafts	○	○	○	Cluster		□ → →	EA	■△
Pens & other office goods	○	○				□ → →	THPTF	■△
Jewellery/precious stone polishing	○	○		Cluster	○	□ → →	EA/THPTF	
Toys	○	○		Cluster		□ → →	EA/THPTF	■△
Umbrellas etc.	○	○				□ → →	EA/THPTF	■△
Localised domestic market/ Durable Consumer goods								
Wooden furniture	○	○	○	Cluster	○	□ →	EA/THPTF	■△
Cane & bamboo furniture	○	○	○	Cluster		□ →		
Localised domestic market/ Industrial goods								
Silk textiles	○	○	○	Cluster		□ → →		
Cotton textiles	○	○	○		○	□ → →	EA	■
Cordage, rope & twine	○	○	○			□ → →	EA	■△
Pulp & paper	○		○		○	□ → →		
Bamboo structural products		○	○	Cluster		□ →		
Paper products	○		○	Linkage		□ → →	EA/THPTF	■△
Gases				Linkage		□ → →	EA	■
Paints	○			Linkage		□ → →	EA	■
Glass and glass products					○	□ →	EA	■△
Metal products		○		Cluster	○	□ →	EA	■△
Bolts, nuts, rivets, etc.		○			○	□ →	EA	■△
Localised domestic market/Capital goods								
Agricultural machinery & equip.			○		○	□	EA	■
Metal & wood working machinery					○	□	EA	■
Textile machinery	○				○	□ →	EA	■
Industrial machinery					○	□	EA	■
other general machinery					○	□	EA	■
Railroad equipment					○	□		

[Import-Processing Industries]

Phase I (1996-2000), 2 (2001-2010), 3 (2011-2020)	PRIORITY SUBSECTORS AT NATIONAL LEVEL: More substitution/ Export	Less competitive in foreign	Linkage with agriculture	Industrial cluster /complex /linkage	Strong need for modernisation	PHASE 1 2 3	CHITTAGONG: Attractive factors	Target Industries
Import-processing/Consumer goods								
Dairy products	Substi.		○		○		EA/THPTF	■△
Edible vegetable oils	Export		○	Complex	○	□ → →	EA/THPTF	■△
Flour milling				Complex	○	□ → →	EA/THPTF	■△
Pharmaceuticals	Re-export		○			□ → →	EA/THPTF	■△
Cosmetics, Soap etc	Substi.		○		○	□ → →	EA/THPTF	■△
Other plastic products	Substi.				○	□ → →	EA/THPTF	■△

Remark: Classification of market type is based on the related data compiled in the Census of Manufacturing Industries 1988-89, BBS

Table 10.4 Priority Subsectors in Bangladesh and Chittagong District toward 2020 (2)

EA : Chittagong's Existing Agglomeration ■ : Chittagong District
THPTF : Chittagong's Transshipment Hub and Processing Trade Functions
△ : New Sites at the South Bank of the Karnaphuli

[Import-Processing Industries: continued]

Phase 1 (1996-2000), 2 (2001-2010), 3 (2011-2020)	PRIORITY SUBSECTORS AT NATIONAL LEVEL							CHITTAGONG	
	More substi-tution/ Export	Less competi-tive in foreign	Linkage with agriculture	Industrial cluster /complex /linkage	Strong need for moderni-sation	PHASE 1 2 3		Attractive factors	Priority Industries
Import-processing/ Durable consumer goods									
Radio, TV, communication equip.	Re-export	○	Goods at low price may be viable in Phase 1.		○	□ →		EA/THPTF	■△
• Audio equipment									
• VTR casset deck									
• Telephone equipment									
Electrical appliances & housewares	Re-export	○			○	□ →		EA/THPTF	■△
• Air conditinners									
• Cooking apparatus									
Other electrical apparatus & supplies	Re-export	○			○	□ →		EA/THPTF	■△
Photographic goods/watches etc.	Re-export	○			○	□ →		EA/THPTF	■△
Import-processing/Industrial goods									
Animal feeding staff	Substi.		○	Complex	○	□ →	→	THPTF	■△
Wood products	Export		○	Cluster	○	□ →	→	EA/THPTF	■△
Synthetic fibre	Substi.			Linkage		□ →	→	THPTF	■△
Other industrial chemicals	Substi.					□ →		EA	■△
Other rubber products	Substi.	○			○	□ →		THPTF	■△
Tyres & tubes	Substi.	○		Linkage	○	□ →		THPTF	■△
Petroleum refinery	Re-export			Linkage	○	□ →		EA	■
Cement	Substi.	○			○	□ →	→	EA	■△
Iron & steel basic industries	Substi.	○			○	□ →		EA/THPTF	■△
Other iron & steel	Substi.	○			○	□ →	→	EA/THPTF	■△
Insulated wires & cables	Substi.				○	□ →	→	EA/THPTF	■△
Mold and die	Substi.					□ →			
Batteries	Substi.					□ →	→	THPTF	■△
Electronic/Electrical components	Substi.	○			○	□ →	→	THPTF	■△
• Semiconductors									
• Integrated circuit assembly									
• Printed circuits									
• Condensers									
• Miniature bearings									
• Micromotors									
• Sensors									
• Displays									
• Small fans									
• Connectors									
• Switches									
Ship/boatbuilding & repairing	Re-export	○			○	□ →	→	EA	■△
Import-processing/Capitall goods									
Engines and turbines	Substi.		Motor vehicles will be classified into durable consumer goods after starting production of passenger car.		○	□ →		THPTF	■△
Electrical industrial machinery	Substi.				○		□	EA/THPTF	■△
Office, computing machines	Re-export	○			○	□ →		THPTF	■△
Sewing machines	Substi.				○		□	EA/THPTF	■△
Motor vehicles	Substi.				○	□ →	→	EA/THPTF	■△
Motor cycles & auto rickshaws	Substi.	○		○	○	□ →	→	EA/THPTF	■△
Cycles & pedicabs	Re-export			○	○	□ →	→	THPTF	■△

Remark: Classification of market type is based on the related data compiled in the Census of Manufacturing Industries 1988-89, BBS

Table 10.5 Priority Subsectors in Bangladesh and Chittagong District toward 2020 (3)

EA : Chittagong's Existing Agglomeration ■
THPTF : Chittagong's Transshipment Hub and Processing Trade Functions

[Localised Export Industries] △ : New Sites at the South Bank of the Karnaphuli

Phase 1 (1996-2000), 2 (2001-2010), 3 (2011-2020)	PRIORITY SUBSECTORS AT NATIONAL LEVEL						CHITTAGONG	
	More Export	Less competitive in foreign countries	Linkage with agriculture	Industrial cluster /complex /linkage	Strong need for modernisation	PHASE 1 2 3	Attractive factors	Priority Industries
Localised-export/Consumer goods								
Fish processing/Frozen shrimps	○	○	○	Cluster	○	□ → →	EA/THPTF	■△
Tea & coffee processing			○	Cluster	○	□ → →	EA	■
Carpets, rugs & mats		○			○	□ → →	EA	■
leather goods	○	○	○	Cluster	○	□ → →	EA	■△
Leather footwear	○	○		Cluster	○	□ → →	EA/THPTF	■△
Localised export/Industrial goods								■
Jute trxtiles	○		○	Cluster	○	□ → →	EA	■
Textile dyeing, bleaching, etc.				Linkage	○	□ → →	EA	■△
Leather tanning & finishing	○			Cluster	○	□ → →	EA	■△
Fertilizers	○	○				□ → →	■	■

[Re-exporting Industries]

Phase 1 (1996-2000), 2 (2001-2010), 3 (2011-2020)	PRIORITY SUBSECTORS AT NATIONAL LEVEL						CHITTAGONG	
	More Export	Less competitive in foreign countries	Linkage with agriculture	Industrial cluster /complex /linkage	Strong need for modernisation	PHASE 1 2 3	Attractive factors	Priority Industries
Re-exporting/Consumer goods								
Knitwear	○	○		Cluster		□ → →	EA/THPTF	■△
Garments/Caps, hat etc	○	○		Cluster		□ → →	EA/THPTF	■△
Plastic footwear	○	○		Cluster		□ → →	EA/THPTF	■△
Sports & athletic goods	○	○				□ → →	EA/THPTF	■△
Re-exporting/Industrial goods								
Ship breaking	○	○		Cluster	○	□ → →	EA/THPTF	■

Remark: Classification of market type is based on the related data compiled in the Census of Manufacturing Industries 1988-89, BBS

The estimated development frame of the three sites within CSEZ in around 2010 is shown in Table 10.5 to 10.6. The frame is estimated based on the following considerations:

(1) Demand for factory site

The total factory site area of the three sites is 750 ha. The demand for the factory sites is estimated considering the growth/investment potential and economies of scale in factory production by the individual priority subsectors..

(2) Employment and the gross value added (GVA) generation

Employment is estimated based on the parameter of worker per unit size of factory site by the individual priority subsector, while referring to the results of the primary questionnaire survey conducted by the Study Team (SST). Most factories are assumed to adopt a two shifts operation per day. GVA is derived from labour productivity in future, the base data of which are the ones compiled in the Census of Manufacturing Industries 1988-89 (CMI 88-89).

Table 10.6 Development Frame of New Sites at the South Bank or CSEZ (1): in around the year 2010

		Land (ha)	Employ-ment	GVA ('000 Tk.)	GAS ('000 QFT)	Electricity (KW)	Water (m3/D)
THREE SITES TOTAL	TOTAL	747.69	127,181	26,850,224	31,918,696	186,137	122,781
	EPZ Total	400.91	90,658	19,141,361	4,981,435	70,405	25,530
	Textile/Light Industies	194.65	50,966	10,101,096	3,612,456	43,964	14,155
	Electrical/Electoronic	134.26	32,095	5,716,446	63,913	17,917	6,906
	Metal/Machinery	72.00	7,596	1,063,753	1,305,065	8,524	4,469
	GIE Total	346.78	36,523	5,569,318	26,937,262	115,732	97,251
	Food Processing	62.30	8,078	1,034,479	118,077	20,757	18,584
	Textile/Light Industries	48.97	5,106	548,917	69,632	3,003	24,197
	Wood Processing	21.81	1,420	58,884	119,024	1,247	569
	Chmicals	48.25	4,175	762,585	69,410	36,804	32,488
	Metal/Machinery	93.13	8,695	633,540	662,375	17,753	7,267
	Others Industries	72.33	9,048	2,530,914	25,898,744	36,169	14,147
SITE No.1	TOTAL	170.38	29,723	5,701,638	1,352,331	37,841	22,609
	EPZ Total	100.64	21532	4352710	1174584	16790	4938
	Textile/Light Industies	52.82	14,338	2,587,850	884,300	11,433	2,613
	Electrical/Electoronic	20.88	5,709	1,462,109	4,453	3,628	856
	Metal/Machinery	26.95	1,485	302,751	285,831	1,728	1,469
	GIE Total	69.73	8,191	1,348,928	177,747	21,051	17,670
	Food Processing	55.15	7,113	1,285,577	110,642	20,095	17,136
	Wood Processing	10.90	710	39,256	59,512	623	284
	Metal/Machinery	3.68	368	24,095	7,593	333	250

(3) Demand for gas and electricity

These are estimated based on the parameter of consumption per unite size of the estimated GVA, while taking into consideration the progress of saving energy. The base data for these are compiled in the CMI 88-89 and the results of the SST.

(4) Demand for fresh water

These are estimated based on the results of the SST and existing model factories. The demand by the non-water-intensive priority subsectors is estimated by the parameter of consumption per worker taken from the Japanese statistics of manufacturing.

(5) Demand for fuel except for gas

These are estimated based on the parameter of consumption per unite size of the estimated GVA, while taking into consideration the progress of saving energy. The base data for these are compiled in the CMI 88-89 where fuel comprises fire wood, coal coke, furnace oil, diesel oil, kerosene and other petroleum oil. The consumption data of fire wood and coal coke compiled by tonnage is converted to calorie base and then oil base.

Table 10.7 Development Frame of New Sites at the South Bank or CSEZ (2): in around the year 2010

			Cargo Total		Out-going		Exports		In-coming		Imports	
		FUEL (kl)	OUT (ton)	IN (ton)	LAND (ton)	SHIP (ton)	SHIP (ton)	AIR (ton)	LAND (ton)	SHIP (ton)	SHIP (ton)	AIR (ton)
THREE SITES TOTAL	TOTAL	49,109.6	4,173,294	4,295,693	3,025,718	1,147,576	512,755	49,837	1,918,811	2,376,882	3,078,713	23,510
	EPZ Total	8,959.0	385,974	420,290	342,143	43,832	160,083	45,123	414,111	6,180	213,024	23,177
	Textile/Light Industies	209.4	108,899	114,336	108,899		81,808	10,207	114,336		84,867	3,897
	Electrical/Electoronic	8,083.0	109,799	112,979	109,799		34,618	34,916	112,979		51,670	19,280
	Metal/Machinery	666.6	167,276	192,975	123,444	43,832	43,656		186,795	6,180	96,487	
	GIE Total	40,150.6	3,787,320	3,875,402	2,683,576	1,103,745	352,671	4,714	1,504,700	2,370,702	2,865,689	333
	Food Processing	7,706.1	704,805	746,939	573,849	130,955	86,077		465,554	281,385	467,155	
	Textile/Light Industries	104.5	191,490	228,776	191,490		42,717	4,714	223,943	4,833	72,177	
	Wood Processing	895.7	219,345	241,280	219,345				193,024	48,256	48,256	
	Chmicals	20,322.6	319,768	263,894	319,768				263,894		152,391	333
	Metal/Machinery	10,714.4	353,941	392,485	328,026	25,914	26,865		262,610	129,875	188,650	
	Others Industries	407.2	1,997,971	2,002,027	1,051,096	946,875	197,012		95,675	1,906,353	1,937,060	
SITE No.1	TOTAL	4,827.0	879,911	934,678	719,090	160,821	124,793	10,587	627,660	307,018	533,311	5,776
	EPZ Total	1,766.5	78,216	81,160	48,580	29,636	42,257	10,587	79,655	1,505	41,523	5,776
	Textile/Light Industies	59.2	27,165	28,523	27,165		21,732	2,716	28,523		16,383	1,061
	Electrical/Electoronic	1,598.6	16,351	16,760	16,351		5,570	7,870	16,760		7,201	4,715
	Metal/Machinery	108.6	34,700	35,877	5,065	29,636	14,955		34,372	1,505	17,939	
	GIE Total	3,060.5	801,695	853,518	670,509	131,185	82,536		548,005	305,513	491,789	
	Food Processing	2,567.8	689,721	730,348	558,766	130,955	82,306		448,962	281,385	467,155	
	Wood Processing	447.8	109,673	120,640	109,673				96,512	24,128	24,128	
	Metal/Machinery	44.9	2,301	2,531	2,071	230	230		2,531		506	

Note: Fuel consumption except for gas is converted to oil base.

(6) Cargo volume

This is estimated based on the parameter of cargo volume per worker supposed by taking into consideration the results of the SST, model factories, increase in productivity and progress of mechanisation. Cargo volume by transport means is estimated based on dependence on imported raw materials, exporting ratio and transport mode by the individual priority subsectors to be located at EPZ and GIE.

The site No.1 to be initially developed will have a total employment size of around 30,000 workers to produce the gross value added (GVA) of 5.7 billion Taka per year. Such development would result in the demand for utilities amounting to electricity capacity of 37,800 kW and fresh water supply of 22,600 m^3 per day. The fuel consumption per year is estimated at gas of 1.35 billion cubic feet ton, and others (oil converted base) of 49,100 kl. The out-going cargo volume per year from the site No.1will be around 880,000 ton (719,000 ton by land and 161,000 ton by sea) containing 125,000 ton exports by sea and 10,600 ton exports by air. The in-coming cargo volume per year to the site No.1 will be 935,000 ton (628,000 ton by land and 307,000 ton by sea) containing 533,000 ton imports by sea and 5,800 ton imports by air.

CHAPTER 11:

ENVIRONMENTAL CONSERVATION & PROTECTION

Chapter 11 ENVIRONMENTAL CONSERVATION AND PROTECTION

11.1 Introduction

11.1.1 Objectives

The objective of environmental consideration is to prevent unnecessary destruction of the cultural heritage and the natural environment which tend to be affected in locating industrial estates, roads and ports, and to minimise the environmental impact by taking preventive measures in constructing and operating them.

11.1.2 Methodology

As for the methodology of environmental consideration, an Initial Environmental Examination (IEE) is adopted in planning.

IEE is a reconnaissance level Environmental Impact Assessment (EIA). It means, in designing an industrial development project, to evaluate qualitatively the possibility for and the extent of environmental impact which may be caused by the execution of the project on the basis of existing information and data. Furthermore, IEE also includes deciding whether an EIA is required, and if necessary, suggesting the work plan of the examination.

The IEE is, making reference to the Bangladesh IEE guideline, carried out basically based on JICA environmental guidelines.

11.1.3 Scope

This is the IEE for the industrial estate development, which is a main element within the industrial development project. The evaluation of the possibility of an impact on the cultural heritage and natural environment in locating the industrial estate site is reported in Volume 1 of this Report.

11.1.4 Conditions to enforce IEE and EIA of Bangladesh

The type and the size of the industries, which require IEE or EIA is designated in the "Environmental Guidelines for Industries". The objective of this guideline is to indicate the precautions needed to minimise the adverse environmental risks and its content is as follows:

- To inform the entrepreneurs of requirements for industrial units laid down by the Government of Bangladesh for the protection of the environment during the course of future industrial development.
- To identify industrial site considerations that will apply to the new industries.
- To identify certain types of industries that require IEE or EIA.
- To indicate the types of industries that shall require detailed design of an industrial waste treatment unit to get clearance.
- To indicate the types of units which shall require an "Effluent Discharge Consent", an "Emission Consent", or a "Hazardous Materials Storage and Handling Consent" from the Department of Environment before being commissioned, or put in to operation.
- To indicate the types of units which shall require "Site clearance/consent" from the Department of Environment.

The locational criteria and the requirements of EIA for different types and sizes of industrial units are given in Table 11.1.

There are three categories of locational criteria, that is A: No restriction of location, B: The criteria for medium impact units, C:The criteria for high impact units. The criteria of categories B and C are as follows. (The leftmost letters in Table 11.1)

B-Locational criteria for medium impact units. Such units are to be preferably located in the industrial area approved by DOE. In other places they are required to satisfy the following conditions in order to obtain clearance from DOE. They shall not require land-use conversion of any forest, plantation, and so on. All the manufacturing, storage, and other facilities shall be concentrated together in the minimum possible landsite and this area shall be surrounded by a green belt of a minimum 15 m width on all sides. The outer boundary of the unit shall be at least 250m away in any direction and at least 500 m away in dominant wind direction from any residential or commercial settlement of above 100 persons. The outer boundary of the unit shall be at least 500m away from sea, river and others, and at least 5 km away from the Environmental Sensitive Area or other areas declared by the Ministry of Environmental and Forest (MEF).

Table 11.1 Environmental Requirements for Different Types and Sizes of Industrial Units

Product/Process Category	Environmental Requirements		
	For Large Units	Medium Units	For Small Units
Manufacture of dairy products	B −4*	B −3*	A −3
Canning and preserving of fruits and vegetables	B −3*	B −3*	A −2
Canning, preserving and processing of fish, crustacea and similar foods.	B −4*	B −3*	A −3*
Manufacture of vegetable and animal oils and fats/oil-refinering Hydrogenation.	B −4*	B −3	A −2
Grain mill products-Rice Mills	B −2	B −2	A −2
Manufacture of made-up textile goods except wearing apparel	A −2	A −2	A −2
Knitting mills	B −2	A −2	A −2
Manufacture of Textiles not elsewhere classified	B −3	B −3	B −2
Manufacture of wearing apparel except footwear	B −2	B −2	A −2
Manufacture of leather products and leather substitutes	B −4	B −3	A −2
Manufacture of footwear, except vulcanized, modeled rubber or plastic footwear	B −4	B −3	A −2
Manufacture of wood and cork products NEC	B −3	B −2	A −1
Manufacture of furniture and fixtures, except primarily of metal	B −3	B −3	A −2
Iron and steel basic industries	C −6*	C −5*	B −3
Manufacture of electrical appliances and housewares	B −4	B −3	A −2
Manufacture of electrical appliances and supplies NEC	B −4	B −3	A −2
Ship building and repairing	B −4	B −3	A −2
Manufacture of sporting and athletic goods	B −4	B −3	A −2
Processing of Shrimp and frog legs	A −2	A −2	A −2
Manufacture of Salt	B −2*	B −2	B −2

Note:All types of industries shall be classified as large, medium, and small scale on basis of their capital investment, power-load, and manpower employment.

Criteria	Units	Ranges for the Size-Categories		
		Large	Medium	Small
Capital Investment	Lakh Taka	Above 100	20-100	Below 20
Power Load	KW	Above 500	50-500	Below 50
Manpower employment	Numbers Per day	Above 100	20-100	Below 20

Source:DOE,1991

C-Locational criteria for high impact units. Such units are to satisfy the following conditions in order to obtain clearance from DOE. Land-use conversion of forest, plantation and others should not be involved. The manufacturing, storage and other services should all be concentrated in the minimum possible land area which should be surrounded on all sides by a green belt of at least 60m width. The outer boundary of the unit shall be at least 3 km away in any direction and at least 5 km away in dominant wind direction from any residential or commercial settlement of over 5,000 persons. Also the total population in a 10 km radius area around shall not exceed 10,000. The outer boundary of the unit premises shall be over 100m away from highway, railway or airport, over 500 m away from sea, river or others, and over 10 km away from the Environmental Sensitive Area or others declared by MEF. The unit shall not be located in area having critical groundwater conditions so declared by MEF. In any case whatsoever, the unit shall have to provide adequate proof that they shall not pollute the groundwater.

There are 6 classifications of requirement for an EIA, that is 1,2 : there is no requirement, 3:IEE is needed, 4:rapid EIA is needed, 5,6:comprehensive EIA is needed. The level in DOE office for grant is different according to each classification. (The rightmost numerals in Table 11.1)

The classes, where these numbers carry an asterisk mark have to include a detailed design of their pollution control or treatment systems and an environmental management plan along with the EIA.

11.2 Summary of the Project

11.2.1 Outline of the Region

The industrial estate Site is located at Rangadia, Upazilla Anwara, District Chittagong. It is about 20km Southeast to Chittagong City and on the East bank of the Karnaphuli. Since the Site is in the hilly area and the altitude is higher than the surroundings, there is little danger of flood and the ground is firm. The Site is land from which KAFCO cut earth for construction of their plant and it has scarcely any green cover. On the South side of the Site the road connecting CUFL with the local road runs East and West, so the access to the national road via the local road is easy. The West side of the Site faces to the Karnaphuli and it is suitable for using water transport.

The Bangladesh Marine Academy and the cement plant are adjacent to the West side, and the facilities of KAFCO and CUFL are situated on the South side. There are mangrove forests along the Karnaphuli. Furthermore, the WAPDA embankment is on the West side.

• Size of Project Area :	about 460ha
• Outline of the Project :	see "11.2.2 Component of the Project and Outline"
• Estimated Time of Project :	in the year 2000 onward
• Expected Type of Industries :	textile/light industries, electronics, metal/machinery, food processing, wood processing
• Executing Agency :	proposed Chittagong Development Company
• Related Environment Organization :	Ministry of Environment and Forest in The People's Republic of Bangladesh.

11.2.2 Component of the Project

(1) Land Construction

An area of 280ha of land will be constructed and the quantity of the earth banked or removed is to be balanced within the Site. There is no need for filling the Karnaphuli.

(2) Access Roads

As for the access road, the road on the South side of the Site is to be widened to a road 28 meters wide and with 4 lanes.

(3) Water Intake System

A water intake facility with the volume of 24,900 m3/day is to be newly provided. The intake point is located at the Mousa Baro Uthan Area on the east bank of the Karnaphuli. The source of the water is groundwater.

(4) Waste Water

A waste water treatment facility with a capacity of 22,610 m3/day is to be newly established. This treatment facility will treat BOD, COD, SS, T-N and T-P discharged from the factory facilities, and domestic waste water from the worker's housing. The

discharge point is located at the point around 2.9 km above the estuary of the Karnaphuli. The treatment system type is common.

(5) Anti-Air Pollution Facility

An anti-air pollution facility for the whole industrial estate is not to be provided. As to discharge gas from the factories located in the estate, toxic substance such as oil and heavy metal will be treated by each factory so as to meet the discharge standard of Bangladesh.

(6) Solid Wastes

Solid wastes from the factories and the housing are divided into those which can be recycled and those which cannot be recycled. The latter will be buried in the waste disposal area in the Site.

(7) Housing

Houses for about 10,000 industrial estate workers are to be newly constructed in the Site.

(8) Others

26 ha of estates and green tract are to be provided. A green belt of 10 to 15m width will be established along the boundary within the Site.

11.3 Summary Condition of the Project Area

11.3.1 Social Condition of the Project Area

(1) Land Use

The industrial estate Site is located at Rangadia, Upazilla Anwara, District Chittagong. It is about 20 km Southeast to Chittagong City and on the East bank of the Karnaphuli. The site is in the hilly areas and since is land from which KAFCO cut earth for construction of their plant, it has scarcely any green cover. There are very small settlements and cultivated land within the Site. Although it is said that there were historically Buddhist remains, no investigation of their buried cultural assets have been

carried out and it is difficult to identify their location. The Bangladesh Maine Academy is adjacent to the West side of the Site and Chittagong Airport is on the opposite bank of the Karnaphuli.

(2) Economic Activity

As regards industrial activities, a cement plant is adjacent to the West side, and KAFCO and CUFL facilities are situated to the South of the Site. Some scattered small industrial development like brick kilns has taken place. Agricultural activities mainly concern growing of rice inside the WAPDA embankment. There are small economic activities like shops, rickshaws and auto rickshaws along the roads connecting CUFL to the local road. Fishing activities are observed in the Karnaphuli.

(3) Property/Rights/Local Customs

CWASA takes 91,000m3/day of water from the Halda river, a tributary of the Karnaphuli (at the point around 800m above the junction). CUFL takes 28,800m3/day of water from the Karnaphuli at the point around 30km above the estuary. As religious facilities there are Islamic mosques in the surrounding settlements.

(4) People/Population

In 1991 Chittagong District had 573 million and Upazilla Anwara had 246 thousand population. There are very small settlements but none of the minorities.

(5) Transportation

On the South side of the Site the road runs East to West, which connects CUFL to the local road and then joins to the national road. There is Chittagong Airport on the opposite bank of the Karnaphuli River, and the port of Chittagong exists 5 km up the River. The railway is 14km northeast of the Site.

(6) Land Ownership

Almost all the Site is the State-owned land.

11.3.2 Natural Conditions of the Project Area

(1) Weather

The climate of Chittagong region is marine tropic monsoon, and of high temperature and high humidity. It is divided into three seasons.; they are summer months of high temperature and high humidity between March and May, rainy monsoon of high temperature and high humidity between June and October and winter between November and February which are relatively cool and dry.

Annual rainfall, average temperature and humidity are 2,900mm; 19.3C-32.5C, and 74 to 88%, respectively. The dominant wind direction is mainly N and NE from October to May, and is S and SW from April to September. The area experiences frequent periods of calm (or low winds) in the evenings from October to April.

(2) Landscape/Geology

The Site is located on the hill at an altitude of 10 to 15 m, which belong to the Chittagong foothills, and hassandy soils. The surrounding is in the Chittagong coastal tidal floodplain and extends linearly between the Chittagong hills and the Bengal Bay.

(3) Water Resources

On the West side of the Site is the Karnaphuli, which originates in Kaptai Lake in Chittagong Hill and which has an average flow of 83 million m3/day. The Bengal Bay is situated 5 km South to the Site. The Site is near the estuary of the Karnaphuli and under the tidal influence of the seawater inflow.

(4) Soils

The Site has brown hill soils, while the surrounding has grey piedmont soils and grey floodplain soils.

(5) Vegetation

The Site is land from which KAFCO cut earth for construction of their plant and trees were cut down. As a result, rainfall has caused topsoil erosion and the land has scarcely any green cover. In the surrounding there are no natural forests, but vast paddy fields and homestead forests surrounding the settlements which are scattered

among the paddy fields. These homestead forests are afforested secondary forests, but some of them are big trees with a diameter of about 50 - 120cm at the breast height.

(6) Precious Biological Species/Fragile Nature

The Site has scarcely any green cover and there is no habitat of precious animals and plants. One mangrove forest patch is situated on the West side of the Site, along the Karnaphuli. Only a part of the patch is natural forest and it seems that the Marine Academy has planted trees around the forest. This is precious as a scenery resource and can be expected to be a sanctuary for birds and other wild animals. There is another patch of mangrove forests on the South side of CUFL.

11.3.3 Existing Pollution of the Project Area

(1) Air Pollution

Air pollution is getting more serious due to the smoke discharged from the industries and the vehicles in Chittagong City. Especially the pollution from vehicles is becoming worse as the number of vehicle ownership and usage increase.

The Department of Environment monitored the quality of ambient air in January 1994 on 2 points of the industrial area, one point of the residential area and one point of the commercial area. The results of chemical analysis of ambient air by DOE is given in Table 4. in Vol.1 of the Report.

The S.P.M (Suspended Particle Matter) value in the industrial area is from 2 to 20 times as much as the value in the residential area and the commercial area. The S.P.M value of 4 sampling points is higher than Bangladesh air standard quality. This shows that pollution caused by smoke discharged from the industrial facilities is getting serious.

The SOx (Sulfur Oxides) and NOx(Nitrogen Oxides) value in the industrial area is from 3 to 8 times as much as the value in the residential area, but the value in the industrial area is at equal level to that in the commercial area. This shows that the pollution in the industrial and commercial area is caused by the exhaust gas from vehicles. The SOx and NOx value of 4 sampling points is lower than Bangladesh air standard quality.

(2) Water Pollution

With remarkable industrialisation and urbanisation in recent years, discharge of huge quantities of untreated effluents, which is due to lack of sewerage system and a pollution control system, has resulted in water pollution in the canals in Chittagong and in the Karnaphuli.

(a) Sources of the Pollution

The sources of the pollution in the canals and the Karnaphuli are divided into 3, domestic waste water, the industrial waste water and the other waste water.

Chittagong has no underground sewerage pipe line and neither has the City any sewage treatment plant. Therefore, the domestic waste water such as sewage or human excreta, are collected into the 5 canals through drains and then discharged into the Karnaphuli. As a result, the pollution due to human excreta, for example E.Coli, is caused in the canals and the Karnaphuli.

There are 5 industrial areas in Chittagong, that is Kalurgat, Sholashahar-Nasirbad, Fouzderhat, Patenga and the CEPZ situated on the bank of the Karnaphuli and along the coast of the Bay of Bengal. The main industries are tanneries, textile, oil refinery, TSP, urea, chemical, fish processing, jute, steel, paper, rayon, and others. Few of these industries have somewhat effective pollution control systems and discharge their untreated wastes directly into the drains or the River. The tanneries are the main source of pollution and the pollution caused by chromium is especially serious.

In addition to the domestic and the industrial waste water, ship repair at Chittagong port also adds considerable pollution loads particularly in terms of oil and rust. The water from the 2 disposal sites in the City is also the pollution source especially during the rainy season.

(b) Canals and Rivers

The Department of Environment (DOE) regularly monitors the quality of water in the Rivers Karnaphuli and Halda, and also in some canals.

In all the canals BOD level is higher than environmental standard 6 mg/l (fishing water) and the quantity of E.Coli is uncountable. The water of almost all the canals is very black and with virtually no oxygen. This result indicates the serious pollution of the canals caused by human excreta.

In the Karnaphuli, the levels of E.C., Chloride, Total Alkalinity, D.O. are higher than the environmental quality standard value (fishing water) at all the points except that near T.S.P. This applies to the Halda. The S.S. level is between 22 mg/l and 272 mg/l and indicates the influence caused by the flow of soil and sand from the area along the rivers. At the point near T.S.P in Patenga, the levels of E.C., chloride, total alkalinity are higher than the environmental quality standard value (fishing water) at the low tide. This indicates the heavy pollution load caused by T.S.P. At the high tide the levels of the above-mentioned items are lower than the environmental quality standard value. This can be explained by the reason; the Karnaphuli is under such influence of tide that the pollutants from Chittagong city are mixed with and thinned by sea water, with the result that the extent of the pollution of the river is lightened.

(3) Noise/Vibration

Traffic congestion is heavy in Agrabad and New Market in Chittagong City, so noise caused by the traffic is serious along the roads. On the other hand, in the industrial area noise and vibration caused by the operating machines has become obvious. But it seems that no measures have been taken since monitoring has not been carried out and there is no grasp of the condition.

In the surrounding of the Site there are the factories of KAFCO, CUFL and others, but almost all the land is rice paddy and the population is small, so noise and vibration has not become an obvious problem.

(4) Soils Pollution

Since the solid waste from Chittagong City is filled in the way of digging holes in the ground and dumping the waste into them, there is fear that ground and groundwater pollution may be caused by the oxidative water from the waste. On the

other hand, it is said that in the industrial area the untreated waste water from the factories has polluted the soils of the waterway and the canals, and that the trees planted along them have been affected.

(5) Offensive Odor

The problem of offensive odor has become serious because of the insufficiency of the sewerage system and the illegal waste dumping in Chittagong City . It seems that monitoring has not been done and no measures have been taken.

(6) Environmental Pollution Complaint

In the surrounding of the Site it is complained that the wells for drinking and irrigation water have dried up because of drawing groundwater by KAFCO. There is also a complaint that high ammonia concentration has caused fish kills in the area of the Karnaphuli below the discharge point of CUFL.

11.3.4 Restriction Of the Project Area

(1) Restriction of the Site and the Surrounding

There is no restriction in the Site and the surrounding.

(2) Special Regional Restrictions

Within the Site there are no habitats of the species under CITES(Washington Convention), areas under Convention of Wetlands of International Importance (Ramsar Convention), National Parks, nor other nature conservation areas. In the surrounding Bostami turtles under CITES live in the Bostami pond in Chittagong City.

11.3.5 Specific Notes of Environmental Impacts in the Close Area.

An IEE for Karnaphuli Fertiliser Company Limited which is adjacent to the Site was carried out in 1991.

11.4 Evaluation of Environmental Impact

The activities and factors, which may cause an environmental impact in executing this project are reclamation, land occupancy, operation of construction equipment and vehicles under construction. After operation land occupancy, operation of distribution vehicles, operation or maintenance of the factory facilities and the inflow of people and commodities are mentioned.

We selected the items, which may cause an impact from each of these activities and factors and evaluated quantitatively the possibility of the impact. Table 11.2 shows the selected items and the evaluation of each item as is described below.

11.4.1 Social Environment

(1) Resettlement

The causes of resettlement are reclamation and land occupancy in developing the industrial estate. The possible environmental impact are loss of living foundation of the inhabitant to be relocated, socio-economical and living-cultural inadaptability to the new resettlement area, friction between permanent residents and relocated people, and deterioration of living standard due to poor compensation.

In this project resettlement arises, since there are very small settlements at the foot of the hills West of the Site. The information such as the number of the inhabitant to be relocated and the existence of a site proposed for resettlement is insufficient, but the impact is estimated to be very small judging from the scale of the settlements. Its is necessary hereafter to investigate the number of the inhabitants to be relocated, the existence of proposed site for resettlement and so on.

(2) Minorities

The causes of the impact on the minorities are reclamation and land occupancy in the industrial estate development. The possible environmental impacts are loss of living foundation of the inhabitants to be relocated, infringement of their customs, friction or trouble in the surrounding as a result of the preceding impacts, a crisis of the minorities' existence and loss of the subjects of academic research.

Table 11.2 Environmental Impact Items

		Activities which may cause impacts / Environmental Items	Overall Evaluation	Before Operation		After Operation			
				Reclamation and Spatial Occupancy	Operation of Construction Equipment and Vehicles	Spatial Occupancy	Operation of Vehicles	Operation and Maintenance of Associated Facilities	Accumulation of People and Goods
Social Environment	1	Resettlement	△	△		△			
	2	Minorities							
	3	Economic Activities							
	4	Rights of Common	△	△		△			
	5	Split of Communities							
	6	Traffic							
	7	Public Facilities	○		○		○	○	
	8	Friction among the inhabitants	△						△
	9	Population							
	10	Cultural Heritage	△	△		△			
Natural Environment	11	Landslide							
	12	Soil Erosion							
	13	Groundwater	△					△	
	14	Hydrological Situation							
	15	Vegetation							
	16	Precious Animals and Plants							
	17	Environmentally Vulnerable Areas	○	○		○		○	
	18	Landscape							
Pollution	19	Air Pollution	○		○		○	○	
	20	Water Pollution	○					○	
	21	Soil Pollution							
	22	Noise and Vibration							
	23	Ground Subsidence							
	24	Offensive Odor							
	25	Wastes							

Note: ○ : The environmental impact is expected.
△ : Unknown (Not clear at this moment due to unspecified designs, but need to be detailed designed).
No mark: The environmental impact is insignificant, and no need to be a study of the EIA.

Since there are no inhabitants of minorities in this project site and resettlement is unnecessary, there will be no impact.

(3) Economic Activities

The causes of the impact on economic activities are loss of agricultural land or forestry resulting from reclamation and land occupancy in the industrial estate development and new productive activities. The possible impact is a decline in production and loss of employment opportunities due to loss of the production basis, that is agricultural land or forestry, and a bad influence on relative or local industries caused by the new activities in the estate.

In this project site there is neither agricultural land nor forestry, so there will be no impact on economic activities such as agriculture and forestry. Besides, a good influence on relative or local industries is expected since this project leads to the activation of the local economy.

(4) Right of Common

The causes of the impact on right of common are reclamation and land occupancy in the industrial estate development. The possible environmental impact is restriction and loss of hunting or collecting ground due to reclamation and land occupancy.

As to this project the possibility of the impact can not be evaluated, since the situation of right of common is unknown. Therefore, the study of its situation is necessary afterwards.

(5) Split of Communities

The causes of the impact is interception of existing regional transportation caused by the construction of the industrial estate and the access roads. The possible impacts are interruption of communication among the split residents, inconvenience in the daily life customs and interruption of economic exchange.

The surrounding of this project site is thinly populated and economic activities are small. People's movement from one place to another is still limited particularly among the villages. Since the Site is not situated at an important point of road traffic, there will be no impact.

(6) Traffic

The cause of the impact on traffic is concentration of construction vehicles for building materials transport and distribution vehicles after operation. The possible impacts are traffic congestion and accidents due to concentration of construction and distribution vehicles.

As to this project, the traffic of the distribution vehicles from the Site after operation is estimated to be about 6,000 cars/day, and they will use the road running East and West on the South side of the Site. This road is now 5.5 m wide, but is to be widened to 28 m with 4 lanes through this project. And the local and national roads in connection with this road are also to be widened or maintained.

Therefore, traffic congestion and accidents will ease by maintenance of the surrounding roads though the distribution of vehicles will increase after operation. For the above mentioned reason, there will be no impact on traffic.

(7) Public Facilities

The causes of the impacts on public facilities is environmental pollution such as air pollution, noise and vibration. It is caused by increases on the traffic in the surrounding area due to the concentration of the vehicles for building materials transport under construction or of the distribution vehicles after operation, and the operation of the industrial estate.

The possible impacts are increase of traffic congestion and accidents in the surrounding of the public facilities due to a rise in traffic, and influence on the health of the facilities' users resulting from the environmental pollution in the surroundings.

As to this project the Marine Academy and Islamic mosques are along the boundary on the West side of the Site, and the housing for the workers of KAFCO is along the road South to the Site. Therefore there will be an impact on the surrounding due to air pollution, noise and vibration under construction or after operation.

(8) Friction among the inhabitants

The causes of friction among the inhabitants are different interests between beneficiaries and non-beneficiaries, between supporter and opponent, or permanent

residents and relocated people, and inflow of outsiders like workers for construction or the factories. The possible impacts are friction or opposition among the inhabitants having an interest.

Since this project is now at the planning stage and it is difficult to obtain the information such as intention of the inhabitants and of the people to be relocated, its influence cannot be evaluated. So it is essential to get this information afterwards.

(9) Population

The causes of the impacts on population is inflow of the workers for the industrial estate construction and the factories. The possible impacts are population increase due to the workers' inflow, friction between local residents and transferring workers and shortage of social infrastructure caused by a sudden increase in population.

In this project, the number of the workers and their families, who will live within the Site is estimated to be a maximum of 10,000 people. Although many workers of the industrial estate construction or the factories have transferred to this area due to the construction of KAFCO and CUFL, and of the housing for their workers, the influence by the inflow has not been observed. Therefore, even if this project will be executed, it will only augment the population of this area, which is already on the increase, and there will be no impact caused by the workers' inflow. On the other hand, there will be no influence as to the social infrastructure such as water works, sewer, and electricity, since they are to be equipped within the Site.

(10) Cultural Heritage

The causes of the impacts on cultural heritage are reclamation and land occupancy due to the industrial estate development. The possible impact is damage to or loss of the cultural heritage.

As to this project it is said that the monastery called Paudit Bihar of about the 7-8th century may be buried in the hilly area including the Site, on the East bank of the Karnaphuli. The coastal area of Chittagong and its surrounding were known as the country called Harikela from about the 7th century, and they say that it gathered monks from foreign countries such as China as an international centre of Buddhism study. The government of Bangladesh has not investigated this area due to insufficiency of financial and human resources. On the other hand, the route change of the Karnaphuli

and natural disaster like cyclone has caused disturbance. So it is difficult to identify the location of the remain. Since there is only a historical possibility of the remains' existence and the location is unknown, the impact on the cultural heritage caused by this project cannot be evaluated. An investigation is necessary such as reconnaissance of the hills within the Site and prospecting the potential points.

11.4.2 Natural Environment

(1) Landslide

The causes of the landslide is damage to the stability caused by topographical and geographical change due to excavation or filling work in reclamation. The possible impacts are slope failures, resultant collapse of the structures, and those on water-basin use or agriculture in the downstream region due to silt inflow.

This project may damage the land stability by excavation or filling work in reclamation, but with the measures such as gentle slopes in the created land, tree planting in the uncovered area, and the equipment of rain drainage system, danger of slope failures is expected to be small.

(2) Soil Erosion

The causes of soil erosion are deforestation, vegetation cover removal, and exposure of topsoil due to construction work. The possible impacts are washing out of the topsoil and water suspension by rain.

This project may cause soil erosion by excavation or filling work in reclamation, but with measures such as gentle slopes in the created land, tree planting in the uncovered area, and the provision of a rain drainage system, soil erosion resulting from reclamation will not occur. Besides, after operation of the industrial work, there will be no impact on soil erosion, because of the measures such as a green belt within the Site, positive tree planting or ground covering.

(3) Groundwater

The causes of the impacts on groundwater are the change of the groundwater flow and lowering of the groundwater table due to drafting for industrial water intake.

The possible impacts are effect on the use of the wells and land subsidence resulting from lowering of the groundwater table caused by drafting.

This project will sink 7 wells to draft groundwater for industrial water intake and it will draft the total amount of 24,900m3/day. Since the hydrogeological situation is unknown, it cannot be evaluated, whether this project may have influence on the groundwater table by drafting and on the wells in the surrounding. So it is essential to do a hydrogeological survey such as boring and detailed analysis of the confined aquifer, its depth, its structure, its recharge capacity and its storage capacity.

(4) Hydrological Situation

The causes of the impacts on the hydrological situation are loss of green cover due to deforestation and reclamation, change of catchment area and industrial or domestic drainage inflow. The possible impacts are lowering of the water-holding capacity due to loss of green cover, change of hydrological regime and water level caused by drainage inflow and increase of flood damage possibility.

In reclamation of this project the water-holding capacity of the Site will not change so much, because of the measures such as ground covering at places, which have no green. After operation of the industrial estate, the concrete pavement of the facilities' site and of the Site will increase the amount of runoff, but the measures such as equipment of estates or a green belt are to be taken and the increase extent will not be so great. Although industrial and domestic drainage is to be discharged into the Karnaphuli, its amount is 22,000 m3/day and very small compared with the river discharge of 83 million m3/day, so there will be no impact on hydrological regime and water level.

(5) Vegetation

The cause of the impact on vegetation is the removal of vegetation due to reclamation in developing the industrial estate. The possible impact is destruction of the ecosystem.

This project site is uncovered hilly area and has scarcely any trees or green cover, so there will be no impact on vegetation in reclamation. Besides, the state of vegetation will be improved compared with the present state since the foundation of a green belt, tree planting and ground covering are to be positively carried out.

(6) Precious Animals and Plants

The causes of the impacts on the precious animals and plants are the removal of the precious species or endemic animals and plants caused by reclamation in developing the industrial estate, and their decrease or extinction due to the changes of the habitats. The possible impacts are extinction of precious species or endemic animals and plants, and influence on biodiversity.

Since this project site is uncovered hilly area which has scarcely any trees or green cover and there are neither precious species nor endemic animals and plants, there will be no impact.

(7) Environmentally Vulnerable Areas

The causes of the impacts on environmentally vulnerable areas such as natural forest, wetland, and mangrove forest are the topographical and geographical change and the removal of vegetation due to land reclamation or filling up the river in the industrial estate development. The possible impact is destruction of precious environment.

There are no natural forests within the Site, but a mangrove forest is situated at the West point of the Site, along the Karnaphuli. Only a part of the mangrove forest is natural vegetation and almost all of it has been planted by the Marine Academy. There are only two mangrove forests along the Karnaphuli, that is one at the West point of the project site and one on the south side of CUFL, and they are precious environmental resources as habitats for animals and plants. This project has a plan to construct port facilities along the Karnaphuli, and when the work such as reclamation is necessary, there will be an impact on the mangrove forests.

(8) Landscape

The causes of the impacts on landscape are topographical change and loss or change of vegetation due to reclamation in developing the industrial estate, the appearance of new artificial structures such as factory facilities and roads. The possible impacts are obstruction of precious landscape, and as a result, depreciation of a place of scenic beauty or of cultural heritage, and influence on tourism. As to this project there will be change of landscape due to the reclamation of the hilly area and the appearance of the factory facilities and roads. However, there is no precious landscape resources within the Site and the present landscape which is uncovered and desolate will be

changed to modern landscape with many trees through the execution of this project, so the landscape will be improved compared with the present state.

11.4.3 Environmental Pollution

(1) Air Pollution

The causes of air pollution under construction is exhaust gas from construction equipment or vehicles, while the causes after operation are soot and smoke from the factory facilities and exhaust gas from the distribution vehicles. The possible impacts are deterioration of the living environment caused by the thickening of the air pollutant density and health problems of the local residents.

The exhaust gas from the factory facilities of this project is mainly discharged from the boilers to burn natural gas. Natural gas discharges less amount of SOx and NOx than heavy oil, coal, and others, so it is clean fuel for the environment. When the density of exhaust gas is above Bangladesh standard for industrial emission(see Table 11.3), the gas is to be treated at each factory and then discharged at the density below the standard. So the impact on the air in the surrounding of the Site caused by the factory facilities will be small.

On the other hand, the traffic of the distribution vehicles from the Site after operation is estimated to be 6,000 cars/day, and they use the road running East and West on the south side of the Site. This road is now 5.5m wide, but is to be widened to 28m with 4 lanes through this project. Therefore, impact on the surrounding of the road due to car fumes will be kept small by the widening of the road though the distribution vehicles is expected to increase after operation.

The surrounding of the Site is so far a rural district and a good environment, but lately the factory construction such as KAFCO and CUFL succeeded. There are public facilities like the Marine Academy in the surroundings. Therefore, examination of the impact on the air in the surroundings due to the factory facilities is essential also to keep the present environment.

Table 11.3 Bangladesh Standard Values for Industrial Emission

Parameters/Determinants	Unit	Standard Value
Ammonium Sulphate	mg/Nm3	NYS
Antimony Particulate	mg/Nm3	20
Arsenic particulate	mg/Nm3	20
Boiler soot and dust: - Coal boiler	mg/Nm3	500
- Gas boiler	mg/Nm3	100
- Oil boiler	mg/Nm3	300
Cadmium particulate	mg/Nm3	20
Carbon monoxide	mg/Nm3	
Cement dust	mg/Nm3	300
Chlorine	mg/Nm3	150
Copper particulate	mg/Nm3	50
Fluoride (as total F)	mg/Nm3	25
Fluoride gases	Kg/ton of P2O5	1
Hydrochloric acid mist/fume	mg/Nm3	400
Hydrogen fluoride	mg/Nm3	150
Hydrogen sulfide	mg/Nm3	10
Iron dust	mg/Nm3	NYS
Kiln soot and dust: - Blast furnance	mg/Nm3	500
- Brick kiln	mg/Nm3	1000
- Cokeoven	mg/Nm3	500
-Lime kiln	mg/Nm3	250
Lead particulate	mg/Nm3	50
Mercury particulate	mg/Nm3	10
Nitric acid mist/fume	mg/Nm3	1000
Oxides of Nitrogen	Kg/ton of weak HNO3	3 *a
Phosphate particulate	mg/Nm3	NYS
Smoke	Ringeman Scale	40%
SPM from power plant	mg/Nm3	150 *b
SPM from phosphate fertiliser	mg/Nm3	150
SPM form urea fertiliser plant	mg/Nm3	50
SPM from Aluminium plant	mg/Nm3	250
Sulphur Dioxide	mg/Nm3	*c
Sulphuric acid mist	mg/Nm3	50
Vinyl chloride	mg/Nm3	10
Zinc particulate	mg/Nm3	200

Note:*a : for nitric acid plant - 3, for has firing boiler - 150 ppm, liquid firing boiler - 300 ppm, solid firing boiler - 600 ppm,metal heting furnace - 200 ppm.*b : for plants of 200 MW or more - 150,Which are less than 200 MW,it is 350 mg/Nm3.*c : Power plant - 120,Sulphuric Acid ;plant, Double conversion, double absorption. 4 Kg/ton of H2SO4(100%),single conversion,single absorption - 10 Kg-ton of H2SO4. Smelter plant - 0, Power plant through stack height. H=14(q) for plant less than200 MW; For plant 200-500 MW - 220 m,and 500 MW and above - 275 m.Q=SO2 emission in Kg/h, H=stack height in months.
Source:DOE,1991

(2) Water Pollution

The causes of the impacts on water pollution are washing out of soils and of turbid water by rain under construction, and discharge of industrial drainage from the factory facilities and of domestic drainage after the industrial estate operation. The possible impacts are deterioration of the Karnaphuli basin environment, and the resultant influence on fishery or agriculture.

As to this project, the drainage from the industrial estate is that from the factory facilities, which is due to washing the raw materials such as fish, shrimp, and vegetable in the food processing plants, and domestic drainage from the housing for 10,000 workers within the Site. When the density of the toxic pollutants like oil and heavy metal discharged from the factory facilities is above Bangladesh standard value for industrial effluent (see Table 11.4), they are to be treated at each factory's treatment facilities and then discharged at the density below the standard. BOD, COD, SS, T-N, T-P from the factory facilities are to be gathered with domestic drainage from the workers' housing, treated at the drainage treatment facilities within the Site, and then discharged at the density below the standard. Therefore, the impact on the Karnaphuli water quality will be small. However, the untreated drainage from many factories in Chittagong City and domestic drainage from the citizen flow into the Karnaphuli river, and the water quality is gradually deteriorating. Therefore the examination of the impact on the Karnaphuli water quality due to discharge from the factory facilities is necessary also to keep the present basin environment.

(3) Soils Pollution

The causes of the impacts on soil pollution are discharge of industrial drainage including toxic substances, and discharge or filling up of toxic waste. The possible impacts are influence by rain on water basin-use, agriculture and fishery in the downstream region, and groundwater pollution resulting from infiltration.

As to the factories within this project site, when the density of industrial drainage including toxic substances is above Bangladesh standard value for industrial effluent (see Table 11.4), the drainage is to be treated at each factory's treatment facilities and then discharged at the density below the standard. The toxic waste is to be treated at each factory and will not flow into the soil. Accordingly there will be no soil pollution.

Table 11.4 (1) Bangladesh Standard Values for Industrial Effluent

Parameters/determinants	Unit	Standard value		
		Discharge into inland surface Water	Discharge into public sewer	Discharge on land (irrigable and non irrigable)
Acidity	mg/L	NYS	NYS	NYS
Alkalinity(total)	mg/L	NYS	NYS	NYS
Alumunium	mg/L	1	1	1
Ammonia (free as NH3)	mg/L	5	5	15
Ammonical Nitrogen(as N)	mg/L	50	75	75
Arsenic	mg/L	0.2	0.05	0.2
Barium	mg/L	1.5	1.5	1.5
B.O.D *a	mg/L	50	250	500
Boron	mg/L	2	2	2
Cadmium	mg/L	0.05	0.5	0.5
Carbon dioxide(CO2)	mg/L	3	5	NYS
Chloride	mg/L	600	600	600
Chlorine(free)	mg/L	1	1	1
Chlorine(residual)	mg/L	1	1	1
Chromium(Hexavalent)as Cr6	mg/L	0.1	1	1
Chromium(Total)	mg/L	0.5 *b	1	1
COD	mg/L	200	400	400
Coliform(faecal)	number/100ml	100	100	100
Coliform(Total)	number/100ml	10000	10000	10000
Colour	Hazen unit	light *c brownish	Not objectionable	light brownish
Copper	mg/L	3	3	3
Cyanide(as CN)	mg/L	0.2	2.5	1
Detergents	mg/L	10	10	1
D.O	mg/L	4.5-8	1.5-8	4.5-8
EC	micro mohms/cm	1200 *d	1200	1200
Formaldehyde	mg/L	NYS	NYS	NYS
Fluoride(as F)	mg/L	10	15	10
Hydrogen sulfide(H2S)	mg/L	1	1	1
Iron	mg/L	2	2	2
Kjeldahl Nitrogen (Total)(as N)	mg/L	150	150	150
Lead	mg/L	0.1	1	0.1
Magnesium	mg/L	125	125	125
Manganese	mg/L	5	5	5
Mercury	mg/L	0.01	0.01	0.01
Nickel	mg/L	1	2	1

Note:*a : Paper & pulp-75, sugar - 100, Distillery - 500, Food processing units - 100 , Fish canning - 100, Starch - 100 Tanning - 100 *b : - zino Industry 2, *c : Paper and pulp - little bit of yellowish brown, *d : salt processing industries - 2000, chrome tanning - 1000

Source:DOE,1991

Table 11.4 (2) Bangladesh Standard Values for Industrial Effluent

Parameters/determinants	Unit	Standard value		
		Discharge into inland surface Water	Discharge into public sewer	Discharge on land (irrigable and non irrigable)
Nitrate(as NO3)	mg/L	250	250	350
Nitrite(as NO2)	mg/L	1	1	1
Odour		To be absent	Not offensive	To be absent
Oil and grease	mg/L	10 *e	50	15
Organophospho rous compounds	mg/L	NYS	NYS	NYS
Organochlorine compounds	mg/L	Absent	Not detectable	Not detectable
PH		6-9	6-9	6-9
Phenolic compounds (as C6H5OH)	mg/L	2	5	2
Phosphate (Dissolved)	mg/L	5	35	35
Phosphorous	mg/L	8	8	15
Radioactive materials *f -Gross Alpha activity	Bq/L	NYS	NYS	NYS
- Gross Beta Gama activity	Bq/L	NYS	NYS	NYS
Selinium	mg/L	0.05	0.05	0.05
Silver	mg/L	1	1	0.5
Sodium carbonate(resudual)	mg/L	5	5	5
S.S	mg/L	150	500	200
Sulfide (as S)	mg/L	1	2	2
Sulphate(as SO4)	mg/L	1000	1000	1000
Tar	mg/L	NIL	NIL	NIL
T.D.S	mg/L	2100	2100	2100
Temperature *g	℃	40,45	40,45	40,45
Tin	mg/L	5	5	5
TS	mg/L	2250	2600	2300
Zinc	mg/L	5	10	10

Note:*e : Refinery and lubricant oil factory - 15, *f : Detailed values on radionuc lides basis will be set up by the Bangladesh Atomic energy commission in due course.*g : 0° C during summer ,45° ℃ during winter.
Source:DOE,1991

(4) Noise and Vibration

The causes of the impacts on noise and vibration are, under construction, operation of construction equipment and concentration of on-site vehicles. And the causes after operation are operation of the factory facilities and concentration of distribution vehicles. The possible impacts is deterioration of the living environment in the surroundings and along the access road.

As to this project, the traffic of the distribution vehicles from the Site after operation is estimated to be 6,000 cars/day, and they use the road running East and West on the South side of the Site. This road is now 5.5 m wide, but is to be widened to 28 m with 4 lanes through this project. Therefore, impact on the surrounding of the road due to car noise and vibration will be kept small by the widening of the road though the distribution vehicles is expected to increase after operation.

(5) Ground Subsidence

The cause of the impact on ground subsidence is land reclamation at the weak ground area. The possible impacts are subsidence of the surface and influence on the structures resulting from the subsidence.
This project site is in the hilly area and has no weak ground such as paddy and wetland, so the surface of the reclaimed land will not subside.

(6) Offensive Odor

The causes of offensive odor are exhaust gas including offensive odor materials from the factory facilities, and offensive odor materials from the facilities' drainage, the drainage treatment facilities, and waste filling site, after the industrial estate operation. The possible impact is deterioration of the living environment due to offensive odor.

As to offensive odor from the factory facilities, drainage treatment facilities and waste filling site of this project, when the density of offensive odor materials at the Site boundary is above Bangladesh standard value for odor (see Table 11.5), each facilities will take the measures such as deodorisation and lower the density at the Site boundary below the standard. Accordingly the impact on the surrounding due to offensive odor from the industrial estate site will be small.

(7) Waste

The cause of waste is generation of waste dumps due to reclamation under construction, and industrial waste from the factory facilities after the industrial operation. The possible impacts are illegal dumping of waste dumps, resultant soil erosion, illegal dumping of industrial waste, and resultant diffusion and outflow of the industrial waste.

As to this project, since the amount of the soil banked or cut is to be balanced within the Site, there will be no generation of waste dumps. The waste from the factory facilities and the housing is divided into those which can be recycled and those which cannot recycled. The latter is to be filled up within the Site. So there will be no impact due to waste.

Table 11.5 Bangladesh Standard Values for Odor

Parameters/ Determinants	Unit	Standard Value
Acetaldehyde	ppm	0.5 - 5
Ammonia	ppm	1.0 - 5.0
Hydrogen sulfide	ppm	0.02 - 0.2
Methyl Disulfide	ppm	0.009 - 0.1
Methyl mercaptan	ppm	0.02 - 0.2
Methyl sulfide	ppm	0.01 - 0.2
Styrene	ppm	0.4 - 2
Trimethylamine	ppm	0.005 - 0.07

Source:DOE,1991

11.5 Conclusion

11.5.1 Overall Evaluation

The items on which there will be an impact due to the execution of this project are as follows.

- Social Environment : Public Facilities
- Natural Environment : Environmentally Vulnerable Areas
- Environmental Pollution : Air Pollution, Water Pollution.

Further, we cannot evaluate at the moment the possibility of impact on resettlement, right of common, friction among the inhabitants, cultural heritage, groundwater, and environment under construction, but it is necessary to investigate and examine them afterwards.

11.5.2 Examination of the necessity of Environmental Impact Assessment

An EIA will be required afterwared in order to examine in more detail the impacts resulting from the items on which there will be influence caused by this project and from the items which need to be investigated and examined because the information is now insufficient. The work plans for EIA of each item are as follows, and their total cost is estimated to be about 1,000,000 Taka.

(1) Social Environment

(a) Resettlement

It is necessary to investigate the number of the inhabitant to be relocated, the existence of the proposed site for resettlement and so on.

(b) Right of Common

It is necessary to investigate the state of right of common within the Site.

(c) Public Facilities

It is necessary to grasp the kind and the scale of the public facilities in the surrounding, and the extent of the problems near the facilities such as air pollution, noise/vibration, and offensive odor.

(d) Friction among the Inhabitants

It is necessary to get information such as intention of the local residents and the people to be relocated.

(e) Cultural Heritage

The investigation is necessary, that is reconnaissance of the hills in the Site, boring the point with every possibility of burying, and so on.

(2) Natural Environment

(a) Groundwater

Detail analysis is required as to confined aquifer, its depth, structure, recharging capacity, and storage capacity by hydrogeological investigation such as boring.

(b) Environmentally Vulnerable Areas

It is necessary to grasp the inhabit situation of animals and plants through ecological investigation of the mangrove forests. Furthermore, the scale of the extinction is to be evaluated based on a detailed facility plan, and when the extinction is expected, afforestation in about same scale as the extinction area is to be planned.

(3) Environmental Pollution

(a) Air Pollution

It is necessary to grasp the air and meteorology in the surrounding, and to evaluate quantitatively the diffusion density of exhaust gas to the surrounding from the factory facilities, and distribution vehicles.

(b) Water Pollution

As to the Karnaphuli, it is necessary to grasp the water quality and hydrological regime both in the downstream and in the upstream region from the discharge point of the industrial estate, and to evaluate quantitatively the diffusion density of discharge from the factory facilities.

(c) Impacts under Construction

It is necessary to evaluate quantitatively the diffusion density of exhaust gas from construction equipment or vehicles and the level of noise or vibration to the public facilities in the surrounding of the Site.