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Appendices

MAIN POINTS OF THE ADVICE

The Commission for Environmental Impact Assessment considers the following points as crucial in the Environmental Impact Statement for the Tannery Sector Development Strategy for Sialkot:

- An inventory must be made, for each tannery in the investigated areas, of the present conditions and the expected conditions in the near future in terms of production capacity, input and origin of raw materials (hides, water, chemicals, et cetera) types of processes, production of leather, wear and generation of emissions (various types of solid, liquid and gaseous wastes) and the anticipated changes therein.
- The Commission proposes to describe four alternative strategies for their environmental impact ranging from no intervention to an alternative of relocation, installation of best practicable processes and technologies at the tannery sites and central recovery and treatment facilities. The description must be produced against the background of the legal, institutional and public participatory setting.
- If, in a primary evaluation, it proves realistic a fifth strategy may be worked out in which not only tanneries relocate but also all other leather-related industries relocate to an industrial estate.
- The alternatives must be evaluated and compared using clearly defined criteria.

With regard to the economic aspects of the EIS of the Sialkot tannery sector, the main points of the advice are the following:

- Alternative strategies as described in the EIS for Sialkot must be tested for their cost effectiveness. This is essential as the selection of the most optimal strategy is to be based – next to a technical, environmental and institutional rating – on the rating of its cost effectiveness;
- In order to determine the degree of financial sustainability, the ability and willingness of the beneficiaries to pay for the Operation and Maintenance (O&M) costs of the proposed alternatives, should be clearly indicated;
- Risks must be identified and classified as low, medium and high, with regard to non-recovery of O&M costs and investment costs of proposed alternative strategies. Qualification and quantification of these risks are to be based on results of sensitivity analyses.

1. INTRODUCTION

In January 1996 the Netherlands Minister for Development Cooperation requested the Netherlands Commission for Environmental Impact Assessment (the Commission) to advise on Terms of Reference for an Environmental Impact Statement (EIS), including socioeconomic, financial and institutional aspects, for a Masterplan for development of the Tannery Sector (the Masterplan) in Sialkot, Punjab Pakistan (see appendix 1). This request was made in the framework of the Netherlands assistance to the environmental rehabilitation of the tannery sector in Pakistan.

In a set of strategies the EIS must cover options for relocation, the environmental performance of in-house processes and working routines, effluent collection and treatment, solid waste management, public and occupational health improvement activities, monitoring and evaluation.
The overall objective of the Masterplan and the strategies that form its basis, is to control environmental pollution caused by tanneries and possibly other leather related activities and to comply in this way with National Environmental Quality Standards (NEQS) that are in force since the first of July 1996 and with future international requirements for leather production.

In order to cover the costs of the EIA an application for MILIEV[1]] funding will be submitted.

To formulate the advice, a working group of the Commission (for its composition see appendix 2) visited Pakistan from 14 to 26 March 1996 (for programme of the visit see appendix 3). During this visit it became clear that in 1992 the Environmental Protection Agency of Punjab had proposed to establish in the framework of the Punjab Urban Environment Programme (PUEP, a programme on World Bank funding) an effluent conveyance system and a Central Effluent Treatment Plant (CETP) for the tannery cluster at Sambrial on Wazirabad road in Sialkot.
This project proposal was submitted anticipating ratification (in May 1993) of emission standards related to air, water and noise and anticipating delegation of powers, vested with the Federal EPA under the Pakistan Environmental Protection Ordinance (1983), to the Provincial EPA's.
In compliance with World Bank directives an Environmental Impact Assessment (EIA) was applied to this project. The Environmental Impact Statement (EIS) was submitted to the World Bank in June 1993. An agreement on the loan, however, was not reached as, according to World Bank officials, tanners were not ready to pay a substantial part of the costs of the project.

A copy of the EIS became available to the Commission. The 1993-EIS related to a clearly defined project for establishment of infrastructure for an Industrial Estate and as such did not respond to the request to the Commission to advise on Terms of Reference for a Masterplan for development of the tannery sector. The EIS, however, was used in formulating the present advice.

2. JUSTIFICATION OF THE APPROACH

2.1 Scope of the EIA

During the visit to Sialkot the Commission has observed a strong commitment of the tanners organisations and the municipal authorities to address the environmental problems related to the

1 Programma Milieu en Economische Verzelfstandiging, the Netherlands Industry and Environment Programme. This programme is established to co-finance initiatives that have a direct beneficial effect on the environment. Only Dutch commercial enterprises may apply for contributions of the MILIEV programme.

tannery industry as it is functioning today not only within the city limits but also at the outskirts of the city.
On the basis of information from relevant documents and observations made during the site visit the Commission concludes that:

- Between June 1993 and March 1996 the situation in Sialkot has changed to that extent that approximately 40 new tanneries have installed in Sialkot. Establishment of more tanneries in Sialkot is anticipated. Further deterioration of the environmental situation in Kasur is no longer accepted and, as Kasur tanneries mainly produce raw materials for Sialkot Leather Industry, these tanneries tend to move to Sialkot.
- The analysis of the tannery sector within the town of Sialkot, as made in the EIS of June 1993, is of too limited a scope to formulate hard conclusions with regard to the environmental damage and hindrance they cause and with regard to the necessity and feasibility of their relocation. The EIS of 1993 assumes that the tanneries in town do not cause substantial environmental problems as the majority of them only applies finishing processes on wet blue leather[2]]. As a consequence of this assumption relocation of tanneries was not considered.
  The assumption, however, was contested by the municipal authorities during the visit of the Commission. It was made very clear to the Commission that city authorities aim at reduction of environmental pollution and hindr-ance caused by these tanneries. According to the authorities this should in the first place be done by imposing in-house measures. If the tanneries would prove incapable to improve their environmental performance the authorities strive after relocation.
- The Pakistan Tanners Association (PTA) and the Sialkot Tanners Association (STA) propose the development of a Sialkot Leather Complex on which all leather-related industries and activities would be located (see copy of the speech of the president of STA in appendix 4). This is a new proposal that merits serious consideration and comparison with the other possible development strategies for the tannery sector in Sialkot.

For these reasons the Commission proposes to work out and compare a number of possible strategies for this development. Consequently, in this advice the Commission advices on Terms of Reference for a strategic EIA for a sectoral development plan.
The EIA may thus include:

- an analysis of the tanneries in the municipality of Sialkot (jurisdiction of the municipality) and in the suburbs (jurisdiction of the deputy commiss- ioner)[3]];
- an analysis of the other leather related industries and activities in Sialkot (see § 5.2);
- a study of the necessity of relocation of the individual tanneries located in a residential area;
- a study of the necessity of relocation of the individual tannery-related activities or industries (see § 5.2);
- the comparison of relocation strategies, one of which would include development of a tannery industrial estate, another including development of the proposed leather complex. The comparison of the strategies will be done on the basis of sets of environmental, social, institutional and financial and economic criteria.

2.2 Simultaneous financial analysis

2 In the wet-blue stage the leather has passed through the most polluting unit operations.

3 The description of the Sialkot tanneries in the 'Techno-economic study of CETPs for tannery clusters in Punjab' is a good basis to start the analysis.

EIA usually does not include financial and economic analyses. On the contrary, the specific objective of describing environmental aspects in a separate document (the EIS) is to emphasize the importance of environmental impacts in the decision-making process on economic activities.

As the EIA for the development plan for the tannery sector in Sialkot has a strategic character, a number of alternative development strategies are to be worked out with regard to their environmental and socioeconomic impacts and their institutional and organisational consequences. However, according to the Commission, it is not useful to describe alternative strategies if these strategies are not realistic from the financial point of view. As such, any strategy must be checked for its acceptability for the stakeholders.

Moreover, it must be acknowledged that financial and economic parameters often play a decisive role in decision-making. Without adequate information on the financial consequences of the strategies as a whole, no decision will be made whatsoever.

Therefore, in this EIA procedure information will be provided not only on environmental and socioeconomic impacts and institutional consequences of the strategies. Information on financial consequences for the individual tannery and on the overall financial viability of the strategies will also be provided.

This approach has the advantage that all possible strategies are compared on all relevant parameters at one time and no strategy is 'a priori' excluded from this comparison on the basis of an analysis using a limited number of criteria.
Moreover, it has the advantage that all information required for decision-making will be available at the same time and decision-making can readily take place.

In order to sustain the objective and format of EIA, the financial analyses of the strategies will be presented in a separate document. Paragraphs 5.4.4, 6.3 and 7.3 of this advice propose Terms of Reference for this financial and economic study.

The summary results of the financial analysis will, however, co-determine the formulation of viable strategies and will be included in the table of comparison of the strategies in the EIS.

3. BACKGROUND, PROBLEM ANALYSIS AND OBJECTIVES

3.1 The background

Sialkot is an industrial city. It is the second foreign currency earner in Pakistan. The City has known a rapid development not based on town, spacial or environmental planning. Severe environmental degradation occurs in absence of adequate regulations and facilities. The town has a sewer system with 5 pumping stations, which, according to the municipal authorities, is largely insufficient. The Municipality exploits a landfill for solid waste outside the city. Households and industrial units pay 400 rupees per year for water provision and 36 rupees per year for sewer discharge. These amounts do not allow for proper exploitation and maintenance. Priorities for the municipality are: extension of the sewer system, sanitation and solid waste treatment. Possibilities to raise the fees and realise financially sound exploitation of waste water treatment and solid waste collection and disposal facilities are limited.

Within the borders of the municipality and falling under the jurisdiction of the municipal authorities some 50 small tanneries have established during the last eight years. The great majority of these

tanneries processes wet-blue skins into finished leather. These tanneries cause noise hindrance with their dying-drums. Moreover, according to the municipal authorities, they frequently cause blockages of the sewer system and air pollution from shaving dust. In January 1996 a notice was issued to the tanners to either install a water treatment plant (polluter pays principle) or to relocate. If they do not comply with the notice they are said to be prosecuted by the municipality and their licences will be withdrawn.

In the suburbs, falling under the jurisdiction of the Deputy Commissioner, approximately 90 tanneries are present of which 32 are clustered at Sambrial, on Wazirabad road. Some 90% of the tanneries in Sialkot is small. There is no industrial estate with an established estate authority in Sialkot where new tanneries can be installed. The Sambrial cluster is proposed to be developed into such an industrial estate. Some 135-200 acres of land are said to be available and the major part has already been purchased by tanners. If the infrastructure for the industrial estate is developed, tanners say they are ready to relocate and bear the cost of this relocation.

The organisation of tanners in Sialkot is strong. Most of them are member of the Sialkot Tanners Association. The PTA and STA are said to have a good relationship. It is understood that the PTA may provide management to the proposed tannery estate according to the Korangi, Karachi model.

3.2 Problem, problem analysis and scope for improvement

3.2.1 **Problem analysis**

Before realistic and adequate strategies to solve the environmental problem can be formulated the extent and character of this problem must be known and the capability and willingness of all the actors to accept the strategies must be sensed. This requires collection of base line information on the current situation in the sector, a prognosis of the developments in the next 5 years and intensive communication with the actors: the tanners, their associations and the authorities.

Part of the baseline information has already been collected by the PTA and a problem analysis has been made in the study 'Introduction of cleaner technologies in tannery clusters of Punjab' that was published in June 1995. This document proposes implementation of a general programme for promotion of a selected set of in-house measures to clean up tanning processes. This programme was meant to cover the whole of Punjab. In October 1995 a 'Techno-economic study of CETP for tannery clusters in Punjab' has been published.

In these PTA-studies the problem analysis has made clear that the importance of the environmental problem is directly related to the technology used in the tanneries, to the discipline with which these technologies are applied and (partly) to the location of tanneries in residential areas.

It is the opinion of the Commission that relocation of tanneries without in-house improvements will not solve the environmental problem but rather transfer it. This means that the control of environmental pollution must start in the tanneries by adopting improved technologies and better working routines. According to the PTA and the Commission cleaner technologies and better working routines are presently available.

3.2.2 The tannery in-house problem and scope for improvement

As a result of the PTA-studies the in-house problem may thus be defined as possible reluctance to adopt cleaner technologies and reluctance to adopt more disciplined working routines. In the EIS this problem must be analysed as follows:

- **The scope of the problem**
  In the PTA studies substantial quantitative information on the problem is provided. On the basis of this information and information to be collected in the framework of this EIS a quantification must be given of significance of the environmental problem, specified according to type of waste stream generated/ emission caused and specified for each of the residential areas and the industrial estate where tanneries are located.
- **Possibilities to reduce the problem**
  The EIS must assess the feasibility of introduction of cleaner technology and analyse (assess the reasons for) possible reluctance against adoption thereof.

For the following reasons an individual approach is necessary:

- The EIS must describe the processes, the technologies used and the working routines practised, giving a description of their environmental performance. The technology and processes, especially also chemical processes used are specific for a given tannery.
- Resistance against adoption of cleaner technology is also an individual feature of the tannery.
- Probably only cost-effective alternatives for processes, technologies and routines presently in use will be acceptable for the tanner. These cost-effective solutions must be designed for each individual tannery[4]] and fit in its planning. Realistic reduction figures for environmental pollution can only be obtained from an individual approach.

Only when the problem-analysis is made on an individual basis, the realism and the impacts of strategies can be fully assessed. Confidentiality and discretion in handling sensitive information are prerequisites. An industrial counselling team may collect this information as a separate activity, not linked to EIS-writing.
The Commission believes that for this individual problem analysis the following information is required:

Existing processes:

- origin of raw material (place/country);
- type(s) of tanning processes (vegetable, chrome, et cetera);
- type of raw material (cow, buffalo, sheep, goat / raw, semi-finished);
- type of end product (wet blue or finish);
- installed capacity[5]] in (square metres of) hides or skins processed per day;
- unit processes applied;
- in-house measures already taken.

and on the basis of installed capacity:

- chemicals (qualitative/quantitative) in unit processes used;
- water consumed (in litres/day, or litres/[hide or skin]/day);

4 Related to type of raw material used and market segment served.

5 Installed capacity gives an indication of the maximum production capacity possible. Therefore, this is the capacity that will result in the maximum load to the effluent treatment plant.

- waste water produced (in litres/day, or litres/[hide or skin] /day and seasonal variations) (composition)[6]];
- mass of solid waste produced, differentiated to origin of solid waste[7]].

overall process changes envisaged in next five years in terms of:
- origin of raw material (place/country);
- type of raw material (raw skins, semi-finished, finish);
- type of end product (wet blue or finish);
- installed capacity in (square metres of) hides or skins processed per day;
- unit processes applied (including possibilities for high-exhaust tanning).

and on the basis of new installed capacity:
- chemicals (qualitative/quantitative) in unit processes used;
- water consumed (in litres/day, or litres/[hide or skin]/day);
- waste water produced (in litres/day, or litres/[hide or skin] /day and seasonal variations) (composition)[9]];
- mass of solid waste produced, differentiated to type of solid waste[10]].

Detailed process changes envisaged:
- application of cleaner unit processes and consequences of each in terms of impact on:
  - water consumption;
  - chemical usage;
  - effluent quality (COD, inorganic substances, metals);
  - solid waste produced;
- possibilities for segregation of liquors (salt stream, chromium stream, et cetera) and solid waste flows;
- availability of physical space for application of cleaner unit processes.

Miscellaneous:
- financial feasibility of envisaged process changes;
- ability to finance process changes.

Coupling of the in-house improvements as much as possible to ISO[8]] 9001/2 and ISO 14001 requirements would give the tanning industry in Pakistan a comparative advantage on international markets.

3.3 The necessity to relocate

Relocation of an industry is a costly and quite extensive operation. From the analysis it becomes clear whether an individual tannery is capable to improve its environmental performance and to reduce hindrance to such an extent that relocation to an industrial estate is no longer required. The EIS must present the list of tanneries that may remain operational at their present location and a list of tanneries that must in any case be relocated.

6 The average waste water discharge and composition may best be estimated via conversion factors, for example based on data in the Kanpur project and/or from literature, and on the processing capacity for each type of process.

7 A similar approach as used for estimation of waste water production can be used to estimate solid waste components.

8 International Organisation for Standardisation.

3.3.1 The expected cumulated problem for the proposed industrial estate

As all parties agree on the necessity, establishment of an industrial estate will be foreseen in all the strategies. For development of the industrial estate the information on actual emissions and on emissions after implementation of in-house improvements[9]] is of interest. To the expected future pollution loads emanating from existing industries at the location, the expected pollution loads of industries relocating from Sialkot to the proposed industrial estate (calculated on the basis of application of best practicable in-house technology) should be added. Moreover, a motivated prognosis must be made of pollution loads from industries moving in from other cities. Also anticipated pollution loads of industries that will establish in the next 10 years must be added. Separate listings must be made for tanneries and other leather related activities.
This information may best be presented in tabular form. The cumulated figures for all tanneries may be presented in a similar table.

3.4 Objectives of the Masterplan

The goal of the Masterplan is to reduce environmental problems caused by tanneries and possibly other leather related industries. This goal must be made more specific defining objectives by:

- setting targets for reduction of specific waste streams and other emissions per individual tannery/activity. This can for instance be done by assessing maximum reductions allowed for by available best technology and subsequent fixing of a target reduction percentage to be achieved by every individual tannery in a fixed and known time period.
- setting targets and timetables for the development of the industrial estate to which tanneries/industries will be relocated. Targets must address area required, capacity and system choice for central facilities like effluent treat-ment, solid waste collection, treatment and disposal and the like. Timeta-bles must address phasing of the development and deadlines.
- setting targets and timetables for relocation of tanneries incapable to comply with NEQS.

The law indicates that liquid industrial and municipal effluent must comply with NEQS. Important penalties are said to threaten sewage dischargers, whether private or government bodies, if NEQS are not met. Cost-effective realisation of this standard will thus have to be fixed as one of the objectives of any Masterplan for the tannery sector of Sialkot.

4. SETTING OF THE MASTERPLAN AND THE PROJECT

4.1 Legal setting

The EIS must enumerate the laws and regulations that are applicable for the activities undertaken under the Masterplan and a concise description must be given of their implication for the tanneries (enforcement/penalties if discharge standards are not met).
The EIS must also list the policy decisions that have been made in the past and will be made in the near future that may influence the implementation of the Masterplan.

The EIS must describe voluntary and non-voluntary requirements with regard to environmental performance of production processes for tannery as required by consumer countries (eg. Eco-label). The EIS must also indicate to what extent the Masterplan may assist tanneries to comply with ISO requirements, for example ISO 14001, referring to environmental management systems.

9 In kgs pollutants, nuisance and noise levels.

The EIS must describe how the Masterplan relates to and fits in development plans of the municipal authorities (the Municipal Corporation) of Sialkot.

4.2 Institutional setting

The EIS must describe the institutional structure that is presently responsible for central services to the tanning industry. Responsibilities, tasks and available means must be specified for each contributing institution.
Special attention should be given to institutions for law enforcement and regulatory control. A description must be provided of the mandate given by the government to these institutions.

4.3 Overview of donor assistance to the environmental sector

With special reference to the tanning sector in Pakistan the EIS must present an overview of assistance programmes in the field of industrial pollution control and cleaner production which have been or are being developed with international donor assistance. Also those programmes that have not materialized must be mentioned (for example the World Banks project to assist Sialkot Industrial Estate).

4.4 Public involvement

Different groups are affected by the environmental consequences of the functioning of tanneries. Labourers in the tanneries, residents in and around the tanneries, residents downstream the sewers carrying effluent, farmers who have their land inundated with effluent or who have to irrigate with polluted water, fishermen, environmentalists representing affected ecosystems, et cetera.
In the EIS their opinions on the various strategies must be reflected in order to play their role in decision-making (see also chapter 8). The opinions may be collected by organizing public hearings in their respective residential areas and by summarizing in the EIS the results of these hearings. Opinions may also be collected by actively visiting and discussing with key representatives of affected groups. Special attention must be paid to vulnerable groups in the society (eg. women, children labourers, who may not have direct possibilities to express their views and defend their interests). The EIS must describe how the public was involved in EIS-writing and where and how the opinions of affected groups influenced the contents of the EIS.

5. STRATEGIES

5.1 Introduction

The EIS is meant to provide information on the environmental, social and economical effects and the institutional implications of a number of realistic strategies for the development of the tannery industry in Sialkot and its surroundings. Realistic means that there is a fair chance that they are feasible and that they will materialize.

In this chapter the Commission proposes strategies to be worked out and compared to one another. During EIS-writing it is not unlikely that other strategies prove to be equally or more realistic than the strategies proposed by the Commission. Additional strategies may therefore be included in the EIS.

One of the strategies or a combination of strategies must be developed as the strategy most friendly to the environment. In this strategy measures must be foreseen to improve its environmental performance to a maximum.

5.2 Preliminary evaluation of the realism of strategies

It is the desire of the PTA and the STA to develop the location at Sambrial as a leather complex, sheltering all leather related industries. This desire must be taken seriously and at least one of the strategies must respond to it. On the moment of preparation of the site visit the Commission was not aware of the wish to develop the location at Sambrial as a leather complex. During this visit there has been no opportunity to visit any other leather related activity than tanneries. As a consequence the Commission has no insight in the environmental urge for relocation of these activities. Neither is there insight in the willingness and capability to relocate.
The Commission advises to assess, as a first step in the EIA process, the realism of this desire. In this primary assessment the following points must be addressed:

- area needed per industry/activity; total area needed for all leather related industries;
- locations where required area is available;
- estimated costs of purchase and development of the industrial estate per hectare;
- sources of finance for development of the estate;
- the willingness of industrialists, traders and the like to relocate;
- costs of relocation and financial capacity of industries and enterprises to relocate.

If the proposal proves to be realistic, a detailed analysis of the non-tannery leather related activities (hide markets, chemical manufacturing and trading, garment industries, et cetera) must be presented in the EIS. This analysis must be done for every specific industry and activity and can be done on the analogy of the analysis for the tanneries as described above. This analysis must provide information on required layout of the estate, on capacities of central facilities and on phasing of relocation.

5.3 Strategies proposed by the Commission

In addition to the 'strategy most friendly to the environment' (see § 5.1), the Commission proposes to work out five strategies.

Some common features of all strategies are:

- targets for in-house emission reduction must be set;
- a location must be selected for an industrial estate.
  This location is selected on the basis of the following criteria:
  - accessibility;
  - available area to meet the requirements of expected establishments of tanneries, related activities and central facilities;
  - environmental criteria.

  In the development of the estate influx of industries and activities from elsewhere and establishment of new industries and activities in the next 10 years must be taken into account.
- capacities/systems for central facilities (Effluent conveyance, CETP, chrome recovery, solid waste collection and disposal) must be selected;
- financial feasibility for individual industries must be determined;
- required management structures must be described;
- funding of estate development must be identified.

5.3.1 The no-action alternative

In this alternative no action is undertaken to intervene in the situation that is developing at this moment. The no action alternative is equal to the autonomous development and must be considered as the reference situation.

5.3.2 No relocation, in-house improvements and installation of CETP's in the city and in Sambrial

Relocation of the tanneries has already been discussed for many years. Yet the majority of the tanneries is still functioning within the city limits, although some of them possess plots in the industrial estate and for even more tanneries plots have been reserved.
There is a clear reluctance to move over to the estate and it is beyond the capacities of the municipal authorities, the PTA or other bodies to force the tanners to move. In this strategy tanners are allowed to remain operational within the city limits on the condition that they implement those in-house arrangements that are necessary to prevent nuisance to neighbouring residents and that allows uncompromised continuous and proper functioning of the city sewer system. Emissions of chromium are stopped. Moreover, emissions that may hamper the functioning of the city sewer system and the CETP are stopped as well. The Government raises the necessary funds to rehabilitate, operate and maintain the sewer system and to operate and maintain a number of those tanneries that have not adopted these improvements as a result of a PTA in-house improvement promotion programme. Funding for establishment of CETP's is sought and found. EPA Punjab is strengthened by the Central Government and given the facilities to enforce NEQS for both the industrial estate and the city.

5.3.3 Tannery Complex Development Strategy (TCDS)

The objective of this strategy is to concentrate all tanneries on one single location in order to reduce environmental pollution and nuisance in town and in order to promote development of central facilities. As a consequence all tanneries functioning within the borders of the town of Sialkot relocate in the long run to an industrial estate. This relocation is phased. The most polluting tanneries are relocated upon completion of the infrastructure of the industrial estate. Others are given a certain time period to relocate, counting from the date of completion of the infrastructure. All tanneries that relocate are obliged to adopt best practicable in-house technology in their new tanneries. The industrial estate is developed as Tannery Complex with adequate central services. The Complex is managed by an entity established by the tanners associations.

5.3.4 Relocation of tanneries with wet processes only

This strategy is equal to the strategy mentioned above (TCDS) but relocation of tanneries is limited to relocation of tanneries with wet processes only (dry processes cause less nuisance).

5.3.5 Leather Complex Development Strategy (LCDS)

This strategy is only worked out when it has proven to be realistic on the basis of a primary evaluation (see § 5.2). The objective of the strategy is to concentrate all leather related industries and activities on one single location in order to reduce environmental pollution in the town, in order to promote development of central facilities, to optimise production processes and transport and underline the strength and importance of the leather sector in Sialkot. As a consequence all leather related activities functioning within the borders of the town of Sialkot relocate in a preplanned sequence to an industrial estate. The relocation is phased. The most polluting activities and activities of central interest (hide market, chemical production and trade, et cetera) are relocated upon completion of the infrastructure of the industrial estate. Others are given a definite time period to relocate, counting from the date of completion of the infrastructure. All industries and activities that relocate are obliged to adopt best practicable technology in order to reduce emissions. The industrial sector is to be developed and managed as a Leather Complex with adequate central services, which might be more elaborate that in the strategy mentioned under § 5.3.3.

5.4 Description of the strategies

A description of each of the strategies must be given specifying the following points:

5.4.1 Phasing and time schedule

A description must be given of the phasing of implementation of the strategy and an estimation must be given of time period needed for every phase and the full implementation of the strategy.

5.4.2 Technical aspects

Four groups of technical aspects must be described for the strategies.
Conditions for the viability of each strategy must be defined.

1. Tanneries environmental performance

   This paragraph of the EIS must present a quantitative overview of the in-house technologies[10]] and processes that will be implemented at the various phases of implementation of the strategy. Development of related industrial activities (transport and storage of chemicals, hide markets, garment and other industries) in the city of Sialkot and/or at the industrial estate outside Sialkot must be included in the overview.
   The in-house performance must be characterized by describing:
   - in-house technologies and arrangements adopted;
   - water use (reductions realized and quantified);
   - material reuse;
   - emissions (reductions realized and quantified);
   - waste streams (reductions realized and quantified).

10 Including pretreatment facilities, chrome recovery or high exhaust chrome tanning.

Resulting overall reduction of environmental pollution and nuisance and remaining environmental pollution and nuisance must be quantified[11]].

2. Solid waste collection, treatment and disposal

This section must present qualitative and quantitative information on:
- the systems for waste collection, treatment and disposal (evaluation of available landfills) and its operational and maintenance requirements;
- the systems for the reuse of waste streams (how can and will other industries use tannery waste);
- the possibilities to streamline and consolidate the collection of both the domestic and the industrial solid wastes in the city of Sialkot and of industrial solid waste in the industrial area.

3. Effluent collection and conveyance

This section must present a quantitative and qualitative (corrosiveness and toxicity) overview of the tannery effluent production points/locations inside Sialkot and at the industrial estate outside Sialkot. Moreover, an overview must be given of the development of the quantity of waste water produced (10 years), the existing sewer lines (type of system) and their capacity (dry weather flow and peak flows allowed for), the operational condition and operation, maintenance (O&M) and O&M-training requirements, and their possible needs for repair/upgrading in Sialkot and the industrial area. Qualitative and quantitative information on the discharge of the effluent at the sewer outfalls (treated and not treated) must also be provided.

4. Central effluent treatment

If installation of CETPs is part of the strategy, the options for central effluent treatment systems in both Sialkot and the industrial estate must be looked at, for example in terms of:
- types of potentially suitable systems;
- capacities;
- operation and maintenance, including O&M-training requirements and their costs;
- environmental impacts of the effluent in the receiving water bodies;
- impacts of rainwater flow on operational conditions of systems.

5.4.3 Institutional and organisational aspects

A thorough description must be given of management aspects of the facilities and the components of the strategy.
The EIS must further describe:
- the institutional and organisational infrastructure required to implement the strategy for each of its components;
- the tasks and responsibilities that will be attributed to each body that will contribute to execution and management of the activities. Moreover, the educational and training requirements should be specified, including their costs and financing sources.

It is understood that the PTA may take up the responsibility for management and cost recovery of facilities at the industrial estate (Korangi model).
The EIS must describe:

11 Cumulated emissions from tanneries and related industries in kgs solids in effluent and solid waste (specified), kgs polluting chemical substances (specified) in effluent and solid waste, direct emissions to soil and air including noise and dust, traffic intensity, et cetera.

- the responsibilities for law enforcement, monitoring and pollution control under the various strategies;
- the relation between the responsibilities taken up by the proposed management structure for the strategy and the responsibilities taken up by the government agencies;
- the legal basis of management by the PTA and the legal options available to the management structure to warrant cost recovery of central facilities.

The EIS must present an assessment of risks of failure of the managerial structure as proposed for the various strategies.

The next paragraph will address investment and O&M costs according to the strategy. A description must be given as to how these costs will be recovered, on what basis and who will be the responsible party. Alternative cost recovery systems may be described.

5.4.4 Economic and financial aspects

Next to technical, environmental and institutional aspects, economic aspects play an important role in project decision-making. Alternatives described in the EIS are deemed unrealistic if they are financially not viable. In other words, any efforts made to improve the environmental situation involving the tannery sector in Sialkot, must be financially viable: individual tanners are unlikely to accept an alternative measure or technique, if its financial viability has not been clearly demonstrated.

For the alternatives as a whole (i.e. the complete set of measures to be taken in an alternative), the EIS for the Sialkot tannery sector must first give an indication of their financial effectiveness through a cost effectiveness analysis, and secondly, give an indication of the financial viability of the alternatives by way of a financial analysis at the tannery level.

A cost effectiveness analysis (CEA) is applied when costs can be monetarized but the benefits cannot, as is the case in selecting the best possible alternative for the Sialkot tannery sector. CEA is therefore to be used to select the alternative with the lowest monetary cost per unit of physical benefits. Briefly, the application of the CEA requires that expected outlays for investments, recurrent costs and any other cost element for each alternative, are available in monetary terms over a certain period of time. With respect to benefits of reduced waste water pollution for the economy as a whole, two possibilities need to be distinguished:

- Benefits are known in quantitative, physical terms for each individual alternative. For example: decrease and/or quality improvement in cubic metres of waste water according to alternative used by the tannery sector over time. In that case the discounted total costs per unit (cubic metres) of benefits – according to alternative used – can be calculated (average incremental cost method).

- Benefits are quantitatively and qualitatively similar for all alternatives. In that case CEA is confined to calculating the total discounted incremental costs for each alternative.

An important criterion in the selection of alternatives, next to the CEA, is that a financial analysis is to show that the alternative is financially viable. Results of the financial analysis are to be shown clearly per alternative and per tannery category: (i) the effect of an alternative on the financial performance of the business; (ii) the ability of the business to pay for the incremental costs during the entire economic lifetime of the alternative; and (iii) the risks of non-compliance by the private sector of proposed activities to be undertaken to achieve the objectives as indicated per alternative.

In carrying out the financial analysis, the analysis is to be based on the with/ without situation: execute the proposed activity or do nothing. It is therefore important that the 'without' situation is

properly defined and analysed. It is furthermore important to consider the 'without' situation during the economic lifetime of an alternative. This long term view is particularly relevant for the tannery sector because of changing market conditions, both for inputs and outputs (quantities, prices, taxation, legislation, et cetera). This means that no assumption can be made that the financial situation and the rate of disposal of effluents by the tannery sector, remains largely unchanged during the 'without' situation.

As there is a large number of tanneries in the target area, representative samples of different categories of tanneries will suffice to carry out the overall costs effectiveness analysis and financial analysis.

It is proposed that the analyses themselves are presented in detail in a separate study, complementary to the EIS. A summary of the results of the cost-effectiveness analysis and the financial analysis is to be presented in the EIS with reference to the economic study. Summary results should at least show in impact matrix format: (i) total (discounted) incremental costs per unit of benefit or per alternative depending on the possibilities; (ii) degree of financial sustainability classified as high, medium and low.

In case alternatives are considered for financial assistance from the Netherlands MILIEV programme, the study must provide sufficient relevant data, following the criteria as used in the MILIEV programme (appendix 5). This means that the commercial, financial and economic viability of the (project) alternative must be indicated, including sensitivity analyses.

For strategies in which assistance to tanneries is foreseen, the kind of assistance and the form in which this assistance would best be given must be assessed.

5.4.5 Comments on the strategies and preconditions for implementation

For each of the strategies the EIS must present a motivated comment on its feasibility and sense of realism. Moreover, the EIS must present the preconditions for implementation of each strategy.

6. THE PRESENT SITUATION OF THE ENVIRONMENT AND ITS AUTONOMOUS DEVELOPMENT

6.1 General

The EIS must contain a description of the current situation of the environment and its development if no action will be undertaken (the autonomous development). This description serves as basis for comparison of the environmental and socioeconomical impacts of the various strategies. **The description must be limited to those aspects that may be influenced by or that influence the strategy[12]] and must cover the complete affected area.** This area may differ per aspect. The study areas must be indicated on maps. If on certain aspects adequate information is available in existing documents a synthesis of the information must be presented in the EIS and the document must be referenced.

In order to enhance the quality of the presentation of the EIS it is advisable to illustrate the existing situation (natural environment and the health situation) and the subsequent impacts of the strategies on this situation per aspect on transparent maps (overlays).

6.2 Natural environment

In the EIS the following aspects must be addressed:

- climate;
- emissions related to tannery activities;
  - air quality (dust, pathogens, odour, chemical pollutants) and number of people affected;
  - noise and nuisance (rats, et cetera) and number of people affected;
- hydrology, hydrogeology in relation to ground water extraction (ground water levels) and in relation to effluent discharges and solid waste deposits (pollution);
- drainage and road situation;
- degree and extent of pollution of aquifers and soil;
- degree and extent of pollution of receiving water bodies;
- relation between emissions of pollutants and agricultural production (including also residues of pollutants found in agricultural products);
- fish resources and the extent to which they are affected by actual pollution (residues found in fish and other water organisms);
- (rare) ecosystems and protected areas threatened.

6.3 Socioeconomic and economic environment

(Terms of Reference for the socioeconomic study)
In this paragraph information must be provided with regard to the socioeconomic conditions prevailing in the tannery sector in Sialkot. The following aspects must be quantitatively and qualitatively addressed:

- macro-economic importance of leather sector;
- future economic development of the tannery sector;

12 Limitations must be motivated.

- critical development bottlenecks (lack of raw material, import restrictions, foreign competition, et cetera);
- employment;
- social and economic situation of workers and their families;
- level of education and skill of workers;
- perception of workers with regard to current working conditions and possibilities to change conditions;
- degree of organisation of the tannery workers and bottlenecks for organisation;
- economic situation of affected groups (farmers, fishermen, neighbouring communities) and possible causal relations between tannery pollution and this situation;
- social and economic situation of vulnerable groups (women, children);
- perception within these groups of their position and possibilities to change this position;
- viability of small tannery enterprises (risk of having to close business).

6.4 Health and safety aspects

The following aspects must be quantitatively and, if data are available, qualitatively addressed:

- health situation of communities affected as compared to communities not affected (the health situation of vulnerable groups, children and women, should be addressed separately);
- preventive and curative in-tannery measures for occupational health and safety;
- the resulting occupational health situation (the health situation of vulnerable groups, children and women, should be addressed separately).

6.5 Institutional environment

An assessment must be presented of the capacity of the institutions that will be involved in the implementation of the strategies to assume the responsibilities and perform the tasks attributed to them in relation to this implementation. An assessment must also be made with regard to the capacity of law enforcing bodies and of the manner of law enforcement.

7. IMPACTS OF THE STRATEGIES

7.1 General

Both positive and negative impacts must be described. The impacts must be assessed and described for every specified strategy. The research methods applied to assess the impacts must be discussed and their reliability quantified. Impacts must be qualified and quantified as much as possible.

7.2 Impacts on the natural environment

Impacts of the strategies on the following environmental aspects must be addressed:

- surface water and ground water quality (biological and chemical pollution);
- ground water level;
- air quality (dust, pathogens, odour, chemical pollutants);
- number of people affected by noise;
- number of people affected by dust;
- soil pollution from tanneries (chemical pollutants);
- drainage and road quality;
- ecosystems and protected areas;
- aesthetic values;
- agricultural production and the hygienic quality of agricultural products.

7.3 Socioeconomic and economic impacts

(Terms of Reference for the socioeconomic study).
Assessed must be the impact on:

- overall employment and poverty within the area of influence of the tanneries;
- small tannery enterprises;
- overall working conditions within the tannery sector;
- medium and long term economic development of the tannery sector;
- medium and long term effect on the country's economy as a whole (tax revenues, foreign exchange earnings, savings on foreign exchange, et cetera);
- income distribution;
- position of women and children labourers;
- level of education, skill and awareness of labourers and effects thereof;
- economic position of affected groups (farmers, fishermen, et cetera).

7.4 Health and safety aspects

Assessed must be the impact on:

- the health impacts on previously affected communities (if relevant the health situation of vulnerable groups, children and women, should be addressed separately);
- preventive and curative in-tannery measures for occupational health and safety;
- the resulting occupational health situation as compared with national and international standards (if relevant the health situation of vulnerable groups, children and women, should be addressed separately).

8. COMPARISON OF THE STRATEGIES

The impacts of the strategies must be mutually compared. The comparison must be presented in a diagram/ table. The criteria on which the strategies are compared are as much as possible quantified. The scores on the criteria must be motivated.
From public participation activities organized in the context of this EIA, the weight that is given to the criteria by the general public or interest groups may be derived. Other sets of weights may be given by other stakeholder groups. These sets must be presented in the EIS and sensibility analysis may be applied upon them.

In the comparison of the strategies the following criteria must be included:

Development tannery sector

- compliance with national targets;
- compliance with international import requirements (Eco-label, et cetera).

Environmental performance

- % of (re)use of (raw) materials:
  - chemicals per chemical;
  - raw material;
  - waste.
- remaining emissions (quantified):
  - to the air (odour, dust);
  - to the soil and ground water per contaminant;
  - solid waste per stream;
  - number of affected people by noise and nuisance.
- compliance with standards and regulations:
  - solid waste disposal;
  - CETPs (NEQS, international [CEE]).
- environmental effects of:
  - calamities (worst case);
  - disfunction of institutional structures (worst case).

Health aspects

- resulting health environment/health hazard:
  - in house;
  - external.
- compliance with standards on labour health and sanitary conditions:
  - ILO, WHO, National legislation.

Technological aspects

- risks of malfunctioning of the installations;
- level of skilled labour required and training needs;
- the extent to which the chosen technology can be incorporated in the existing system (frequent power cuts, choking of outfall lines, et cetera).

Economic aspects

Tanneries

- investments required;
- physical environmental benefits (volume and quality of waste water);
- effect on O&M costs;
- effect on revenues;
- financial viability.

Central facilities

- investments required and financial plan;
- commercial viability;
- financial sustainability;
- economic analysis;
- risks of non-recovery of O&M costs and investment costs.

Social aspects

- overall employment and poverty within the area of influence of the tanneries;
- small tannery enterprises;
- overall working conditions within the tannery sector (including occupational health);
- position of women and children labourers;
- level of education, skill and awareness of labourers and effects thereof;
- economic position of affected groups (farmers, fishermen, et cetera).

Institutional and organisational feasibility

- complexity and cost of the required modifications of the institutional infrastructure;
- complexity/manageability of collective technical and in-house technical infrastructure;
- complexity/manageability of the organisational infrastructure;
- complexity/manageability of in-house operational organisation;
- risk of institutional mal- and disfunction. Adequate/inadequate powers; inefficient freedom of operation on commercial lines; inadequate cooperation with other organisations involved;
- risk of non-compliance with (national) legal requirements and standards;
- risk of non-compliance with international requirements for leather production;
- risk of occurrence of cost run offs and of financial deficits on account of O&M in particular.

9. GAPS IN KNOWLEDGE, EVALUATION AND MONITORING

In the EIS gaps in knowledge and information must be identified. The importance of this information for decision-making must be evaluated.

An evaluation plan must be presented in the EIS. This plan must foresee evaluation at the end of each phase foreseen in the execution of a strategy.
The evaluation may concern the following points:

- development of legislation;
- institutional build-up, staffing and training;
- progress in adoption of in-house technology and working routine change;
- construction activities;

- government support.

The EIS must indicate the agencies responsible for these evaluations.

In the EIS an environmental monitoring plan must be presented, independent of the strategy that will be chosen. This plan must include monitoring of:
- emissions of tanneries and CETPs;
- law enforcement and application of legal penalties;
- recovery of O&M costs;
- management and functioning of CETPs;
- cost-effectiveness of introduced technologies;
- efficiency of facilities after implementation of the chosen strategy.

The monitoring plan must indicate the agencies responsible for its implementation and the way implementation is funded.

10. SUMMARY, FORMAT AND PRESENTATION OF THE EIS

A non-technical summary must be included in the EIS. This summary must address the major subjects of the EIS, using comprehensive maps, tables and diagrams, and be written in such diction that it provides non-technicians and decision makers with a clear insight in the issues treated. The summary must be translated into Sindhi and Urdu.

It is suggested that the EIS is written in the same format as this advice for Terms of Reference. Also in the EIS itself the use of maps, tables and diagrams may considerably increase comprehensiveness and is therefore recommended.
In the EIS descriptions must be concise and limited to the essentials.