ENGRO FOODS LIMITED

# ENVIRONMENTAL IMPACT ASSESSMENT OF DAIRY MILK PROCESSING AND PACKAGING PLANT IN SAHIWAL

## FINAL REPORT

JANUARY 2007



Halcrow

Engro Foods Limited

# Environmental Impact Assessment of Dairy Milk Processing and Packaging Plant in Sahiwal

Final Report

January 2007

**Halcrow Pakistan (Pvt) Limited**
3rd Floor, Nawa-e-Waqt House, Mauve Area, Sector G-7/1, Islamabad, Pakistan
Tel +92 51 220 3451-55Fax +92 51 220 3462
Mail@halcrowpk.com.pk, **www.halcrow.com**

# ES. Executive Summary

## *ES.1 Introduction*

Engro Foods Limited (EFL) intends to setup a dairy processing and packaging plant in Sahiwal tehsil of Sahiwal district. The location of proposed site is shown in **Figure ES-1**. The proposed site is serviced by main black top road, that connects Pakpattan with Sahiwal city. The site for dairy plant is located at a distance of approximately 8km south-east of Sahiwal city.

Pursuant to the requirements of the Pakistan Environmental Protection Act, 1997 (PEPA 1997), EFL commissioned Halcrow Pakistan to carry out an independent Environmental Impact Assessment study for the proposed dairy plant. The EIA report has been prepared in conformance with the requirements of PEPA 97 and the Pakistan Initial Environmental Examination and Environmental Impact Assessment Review Regulations 2000, and in line with the guidelines of the Pakistan Environmental Assessment Procedures, 1997.

The proposed plant will require an area of approximately 25 acres including areas allocated for the production and packaging plant, milk reception facility, state of the art wastewater treatment plant, guesthouse, administration buildings, and internal roads. The proposed plant will have a raw milk processing capacity of about 400,000 litres per day. The plant will produce UHT (Ultra Heat Treated) milk and UHT cream. Milk will serve as the main ingredient in all products. The raw milk will be purchased from farmers and suppliers. The milk will be supplied in tanker lorries. The main water consumption during the plant operation would be for washing and cleaning of the plant equipment and milk supply tankers, steam generation, and domestic use. The wastewater from the plant will mainly include effluent from cleaning and washing. Other sources will include domestic effluents, boiler blow down, steam condensate, and cooling water. A wastewater treatment unit comprising of a balancing tank and an activated sludge system will be used to treat effluent to the limits prescribed in the NEQS.

## *ES.2 The Proponent*

Engro Foods Limited (EFL) is fairly new incorporated but fast growing company set up for the processing of UHT Milk and other related dairy products. In 2005 EFL invested around Rs1 billion in research and setting up of a production plant in Sukkur. The packed UHT Milk was launced with a brand name of Olper's milk in March 2006. Till now it has also launched Olper's cream and Olwell (high calcium and low fat milk). EFL is a 100% subsidiary of Engro Chemical Pakistan Limited (ECPL).

ECPL is an agri-based company with its principal activities being manufacturing, purchasing and marketing of fertilizers. ECPL has investments in other joint ventures

companies which operate in producing PVC (Polyvinylchloride) resin, bulk chemical handling and NPK (Nitrogen phosphorous potassium) fertilizers. The Company operates solely in the domestic market.

## *ES.3 The EIA Methodology*

The various steps undertaken in the EIA preparation included understanding of the proposed operations; review of alternatives; review of policy, legislation and guidelines; collection and review of secondary data including the physical, biological, socio-economic and cultural environments of the area; field data collection; community consultation; impact identification; recommendations for mitigation and monitoring measures; development of a project specific Environmental Management Plan (EMP). The Terms of Reference of the EIA were also sent to the Punjab EPA for review and comments.

## *ES.4 Public Consultation*

Public consultation is an integral part of the EIA process and a regulatory requirement. Public Consultation is essentially a tool used for the purpose of information dissemination, exchange of views, and soliciting feedback and suggestions of key stakeholders about the project and the EIA. During the EIA process, meetings were held with various stakeholders to solicit and record their views and concerns for inclusion in project design at the project-planning phase. The stakeholders consulted primarily included local communities, district and tehsil administration, irrigation department, Wildlife Department, livestock, Highway and Agriculture department in Sahiwal. Their views and concerns were enquired through different consultation techniques and were incorporated into the EIA mitigation measures.

## *ES.5 Project Alternatives*

To ensure implementation of best available management and technology options, an analysis of alternatives to the proposed operation was undertaken. Alternatives considered included:

- Management options including no project option, alternative site option, and alternative timelines.
- Technological options including alternative technologies, options for utilities including water and electricity, waste management etc

The 'no project option' and 'alternative site option' were considered not feasible. The selected technology option for the proposed project has formed the basis for recommendations related to waste management.

## *ES.6 Impacts and Mitigation*

The EIA covers potential effects of the proposed project in the project area. The potential impacts related to the proposed project have been identified through professional judgement, experience, process understanding, and field observations. Impact significance has been assessed using a risk assessment approach based on the severity and likelihood of the potential impact. Mitigation measures are proposed based on regulatory requirement and industry guidelines.

Potential impacts on the environmental receptors that may arise from project activities and the mitigation measures that will be adopted to reduce or minimize all impacts have been assessed and are summarised in **Table ES-1**.

## *ES.7 Environmental Management Plan*

The EMP provides a delivery mechanism to address potential impacts of the project activities, to enhance project benefits and to introduce standards of good practices in all project activities. The EMP has been prepared with the objectives of:

- Defining roles and responsibilities of the project proponent for the implementation of EMP and identifying areas where these roles and responsibilities can be shared with other parties involved in the execution and monitoring of the project
- Developing a monitoring mechanism and identifying requisite monitoring parameters to confirm effectiveness of the mitigation measures recommended in the EIA
- Defining the requirements necessary for documenting compliance with the EMP and communicating it to all concerned regulatory agencies
- Prescribing the mechanism with which consultation with stakeholders during the project will be maintained.

## *ES.8 Conclusion*

The EIA has fully examined the project activities, the background environmental conditions of the project area and the impacts likely to arise from the project activities. Mitigation measures to help minimise the identified impacts have been recommended and an EMP has been provided for the implementation of these mitigation measures.

On the basis of the above, this EIA concludes that the residual impacts of the proposed operation will be of minor significance and careful implementation of the EMP will ensure that environmental impacts are managed and minimised and all statutory requirements are met by the project proponent.

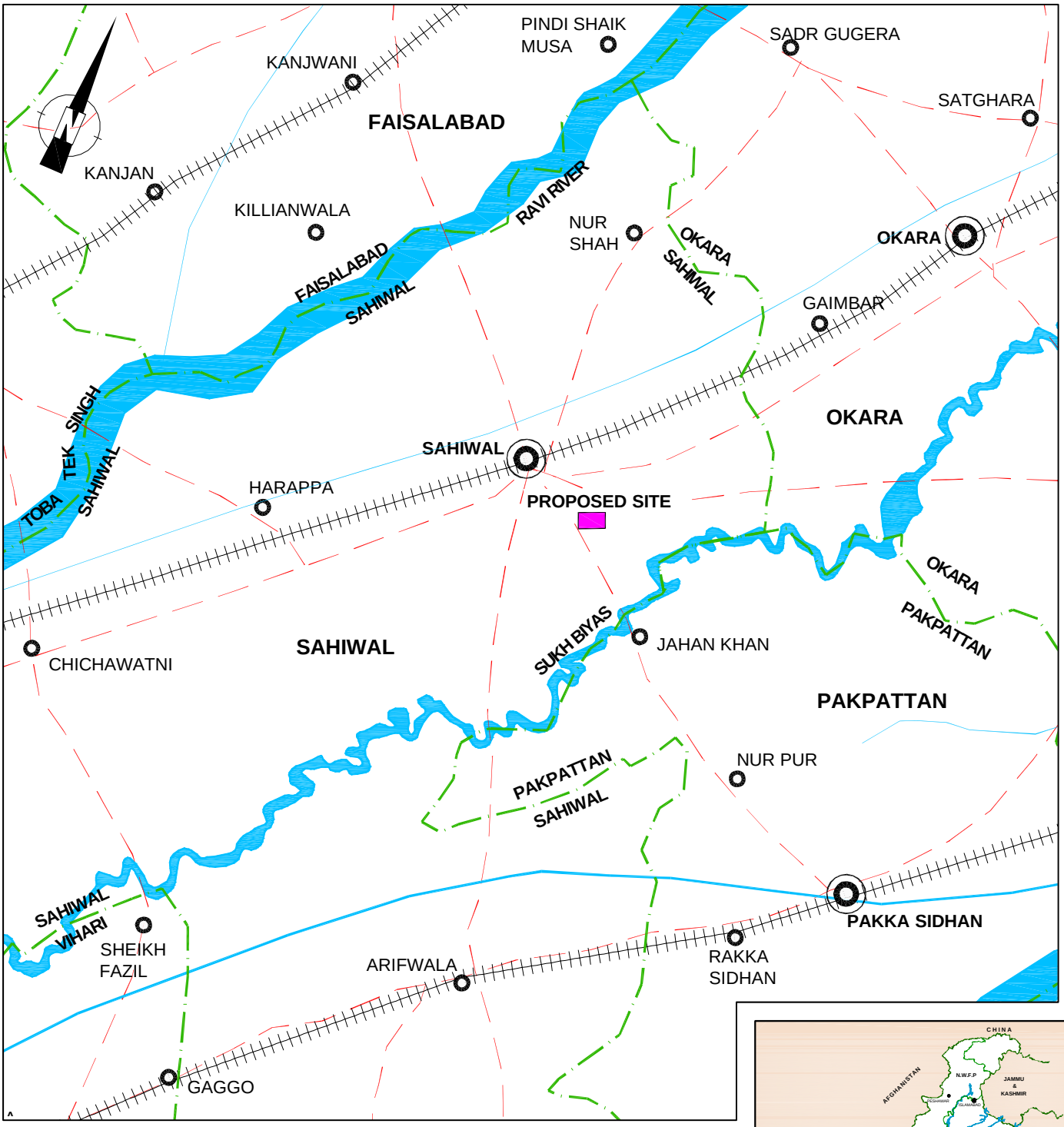
**Table ES-1: Summary of impacts and mitigation**

| Potential Impact | Sources | Recommended Mitigation Measures |
|---|---|---|
| Landform and Soils | ■ Land clearing and Earth Works | ■ Unnecessary dust generation during construction will be avoided<br>■ During construction, earthworks will be limited to within the demarcated plant area, unnecessary land uptake and clearing outside of the plant area (for parking etc) will be avoided<br>■ The plant level will be set such that cut and fill operations are minimised and excavations are used as fill material<br>■ Land area requirements for effluent pipeline will be kept to the minimum required<br>■ Good engineering practices will be adopted during effluent pipeline laying activities to ensure that unnecessary clearing of vegetation and disturbance to soils outside work areas are avoided<br>■ The backfill over pipeline will be compacted and right of way will be leveled to original condition<br>■ Topsoil of the RoW will be separately stored. This topsoil will be backfilled after proper compaction ensuring minimum loss of topsoil<br>■ Permission for pipeline laying along the ROW will be taken from Provincial highway department. In this regard recquisite Fee will also be deposited to highway department |
| Wastewater | ■ Process wastewater | ■ All mitigation measures related to water conservation and minimization will indirectly result in minimizing wastewater discharge<br>■ The wastewater will be treated using activated sludge treatment supplemented by balancing tanks and oil and grease traps<br>■ The wastewater treatment system will be designed to ensure that it can handle average and peak daily flows from the plant. To cater for peak flows, balancing tank will be used.<br>■ Treated effluent shall be discharged into Sukh Biyas after getting formal approval from the concerned department |
| Solid wastes | ■ Construction material<br>■ Packaging | ■ Solid wastes will be segregated and stored in sheds<br>■ Reusable and recyclable wastes will be provided to local contractors<br>■ All non-combustible and non reusable or non recyclable wastes will be sent to the nearest municipal landfills<br>■ Combustible wastes will be burnt in a designated area which is at a safe distance and downwind of the plant, residential community and nearby settlements |

| Potential Impact | Sources | Recommended Mitigation Measures |
|---|---|---|
| Air Quality | ■ Air emissions | ■ The exposure of construction workers to dust will be minimised by provision of dust masks and avoiding unnecessary exposure to dust<br>■ To minimise impacts generators and boilers will be kept well maintained, emissions will be monitored to comply with NEQS limits, and the emissions will be vented through vertical stacks to minimise exposure at ground level to workers<br>■ These particulates will be removed by cyclones or bag filters before the air is vented to the atmosphere.<br>■ Non-CFC gases will be used as a cooling agent for cooling of chilled water and cold storage areas.<br>■ These fugitive emissions will be avoided by following a robust leak detection and maintenance programme<br>■ All solid wastes at the plant and the guesthouse will be segregated and recyclable waste will be sent to the local recycling and reuse industry. Combustible and non-recyclable solid waste including paper, cloth etc will be Incinerated.<br>■ Incinerator will be located away and downwind of the plant and the guesthouse |
| Noise Pollution | ■ Equipment and machinery | ■ In areas with higher noise levels approprite PPE will be provided to workers.<br>■ The noise producing machinery will be subjected to a regular maintenance programme to avoid producing unnecessary noise<br>■ Wherever possible silencers will be fitted with noise producing equipment. Additional controls such as damping, screening or lagging will also be used where required<br>■ Generators will be kept in enclosures |
| Water Abstraction | ■ All activities requiring water | ■ Efficient and low water consumption technology will be selected for the plant<br>■ Approvals will be obtained from relevant authorities or associations if surface water is to be used<br>■ Groundwater wells, if installed, will be spaced more than 300m from surrounding wells<br>■ Discharge from groundwater wells (if installed) will be measured on a monthly basis, any significant reduction will indicate low water availability and hence over abstraction in which case alternatives will be sought e.g. use of surface water with reduced abstraction from groundwater wells etc.<br>■ Water consumption will be metered and monitored so that excessive water usage can be noted and rectified |

| Potential Impact | Sources | Recommended Mitigation Measures |
|---|---|---|
| | | ■ For water conservation the following measures will be taken<br>■ Avoiding water leakages in pipes, pumps, tanks etc<br>■ Installation of water guns/valves with the washing hoses at the tanker and floor washing areas (so that water can be turned off when not in use)<br>■ Washing only the milk carrying tanks instead of the whole tanker body<br>■ Possibly recycling rinse water in tanker cleaning, last rinse from previous tanker for first rinsing of next tanker<br>■ Floor washing will be kept to the minimum required and spills, leakages of materials that further require floor washing will be minimised<br>■ Using dry mopping for floor cleaning where feasible instead of cleaning by running water<br>■ Cleaning trays and other utensils in rinsing baths<br>■ Reusing cooling and utility water for general cleaning operations<br>■ Minimising water requirements during CIP by reducing rinsing times |
| Chemicals and Oil Handling and Storage | ■ Chemicals and oils | ■ All chemicals and oils will be stored in non-leaking containers or packaging and will be stored inside bunded areas with no ingress of water or direct exposure to rainfall<br>■ The bunded areas will have capacity equivalent to 120% of the product storage<br>■ All storage areas will have concrete flooring<br>■ MSDS will kept available at site and instructions related to handling and storage will be followed<br>■ Spilled material will be collected and reused if possible. If reuse is not possible the spilled material will be disposed after treatment.<br>■ Fuel and oil tanks will be regularly checked for leakages<br>■ Drip trays will be used where required and feasible<br>■ Any soil contaminated from minor spills will be collected, washed and then disposed and the wastewater drained for treatment through the wastewater treatment plant |
| Flora and Fauna | ■ Cutting of trees | ■ A Formal permission from forest department will be required if pipeline laying process involves cutting of trees along the ROW and compensation fee will be submitted to the forest department accordingly.<br>■ Project site is located in non-protected wildlife area and the present land use is agriculture & industrial, therefore no wildlife sensitivity exists |

| Potential Impact | Sources | Recommended Mitigation Measures |
|---|---|---|
| Disturbance to communities | ■ Land acquisition and changes in land use<br>■ Local economy, employment and household income<br>■ Environmental quality and nuisance for local residents<br>■ Social services and utilities<br>■ Traffic congestion and safety of road users<br>■ Use of Right of way for pipeline | ■ EFL will acquire land from the local owners and pay them compensation as per the prevailing market rates.<br>■ The land use for only the amount of land acquired will change to industrial from agriculture; the land use in the surroundings will remain unchanged i.e. agriculture.<br>■ Providing employment to locals will improve their household incomes<br>■ Dust, particulates of milk powder, spills, and wastewater overflows can have an affect on the surrounding land use. This will be avoided by adhering to the mitigation measures already proposed in the relevant sections of the EIA<br>■ The plant will have its own parking area so that the tankers do not park on the main road.<br>■ The drivers will be advised to look out for any hazards, respect driving regulations, and will also reduce speed at any critical sections to avoid any road accidents<br>■ Priority in employment to local residents living close to the project location subject to requirements of selection criteria.<br>■ Use local water sources only after complying with the relevant EIA requirements.<br>■ Avoid impediment of flow of water in canal and water crossing.<br>■ Repair/compensate any damage to canal, water channels, roads or other infrastructure.<br>■ Observe strict compliance to Engro HSE guidelines.<br>■ Train drivers in responsible and safe driving practices.<br>■ Maintain communication channels between local spiritual leaders, community elders and Engro Chemical Pakistan Limited.<br>■ Respect cultural norms.<br>■ Maintain appropriate offsets from sites of religious, cultural or archaeological significance. |





## LEGEND

- PROPOSED SITE
- DISTRICT BOUNDARY
- RIVER
- CANAL
- ROAD NETWORK
- RAILWAY TRACK
- CITY / TOWN

0 2 4 8 12 16Km

SCALE:

| Revision | By | Checked | Approved | Date | Description |
|---|---|---|---|---|---|

Drawn by : ZIH Date: 04-01-2007
Checked by : AP Date: 04-01-2007
Authorised by : JH Date: 04-01-2007

Drawing No.: ES-1
Revision:

Drawing Scale: See Above

CAD Filename: PROJECTS/PKENGRO200 Plot Scale:

Project

ENVIRONMENTAL IMPACT ASSESSMENT OF DAIRY MILK PROCESSING AND PACKAGING PLANT IN SAHIWAL

Drawing

KEY MAP

Client

ENGRO FOODS ENGRO FOOD LIMITED


Halcrow Pakistan (Pvt) Ltd.
3rd Floor Nawa-e-waqt House
Mauve Area Sector G-7/1 Zero
Point Islamabad Pakistan
Tel: +92 51 2203451-55
Fax: +92 51 2203462
E-mail: Mail@halcrowpk.com.pk
Www.halcrow.com


Halcrow

# Contents

# List of Tables



# List of Figures

# 1 Introduction

## *1.1 The EIA*

This report presents the findings of an Environmental Impact Assessment (EIA) carried out by Halcrow Pakistan (Pvt) Ltd, on behalf of Engro Foods Limited (EFL) for proposed dairy processing and packaging plant in Sahiwal Tehsil of Sahiwal District in Punjab Province.

The project area is approachable by a main black top road which connects Sahiwal with Pakpattan city. A key map showing the location of project site is attached as **Figure 1-1**. The EIA has been prepared to conform to the requirements of the Pakistan Environmental Protection Act 1997, the Pakistan Initial Environmental Examination and Environmental Impact Assessment Review Regulations 2000, and the Pakistan Environmental Assessment Procedures, 1997.

## *1.2 EIA Report Structure*

The EIA is presented in one volume along with the Environmental Management Plan (EMP). The EIA report contains sections on project description and alternatives, applicable laws and guidelines, baseline environmental conditions, public consultation, potential impacts and proposed mitigation, and conclusions.

## *1.3 EIA Methodology*

A team of EIA professionals including environmentalist, sociologist, botanist and wildlife specialist conducted the EIA. The EIA is based on primary as well as secondary data. Primary data was collected on all physical, biological and socio-economic aspects using standard field survey methods (such as walkover surveys, focus group discussions etc). The Terms of Reference for the EIA were sent to Punjab EPA, Punjab Wildlife Department and some prominent NGO's for review and comments. Consultations were also held during fieldwork with the local communities, district and tehsil administration, irrigation department, Wildlife Department, livestock and Agriculture department etc.

Assessment of all potentially significant impacts on the physical, biological and socio-economic receptors was done both qualitatively and quantitatively, as required. The mitigation measures proposed are based on best industry practices and internationally recognised guidelines for cleaner production in dairy industry. Both the contents of the EIA and the EMP conform to the guidelines prescribed in the Pakistan Environmental Assessment Procedures 1997.

## *1.4 The Proponent*

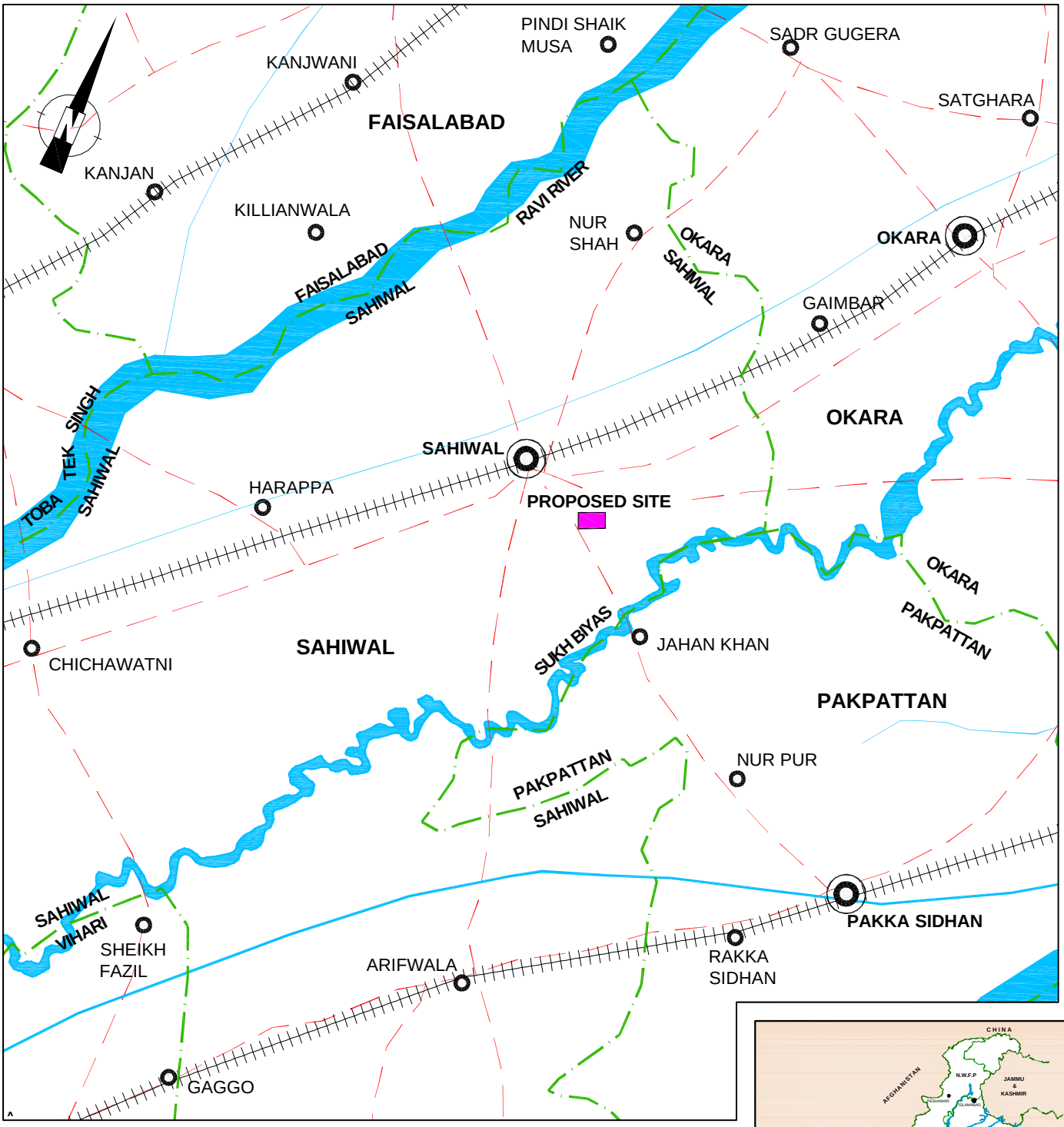
Engro Foods Limited (EFL) is fairly new incorporated company set up for the processing of UHT Milk and other related dairy products. In 2005 EFL invested around Rs1 billion in research and setting up of a production plant in Sukkur. The tetra packed UHT Milk was launched with a brand name of Olper's Milk in March 2006. EFL is a 100% subsidiary of Engro Chemical Pakistan Limited (ECPL).

ECPL is an agri-based company with its principal activities being manufacturing, purchasing and marketing of fertilizers. ECPL has investments in other joint ventures companies which operate in producing PVC (Polyvinylchloride) resin, bulk chemical handling and NPK (Nitrogen phosphorous potassium) fertilizers. The Company operates solely in the domestic market.

## *1.5 Contact Details*

In case of further details or clarifications regarding this EIA, the proponent and the consultant can be reached at the following addresses:

| **Proponent** | **Consultant** |
|---|---|
| Shamsuddin A. Shaikh<br>Director Supply Chain,<br>Engro Foods Limited<br>PNSC Building<br>M.T.Khan Road<br>P.O. Box 5736<br>Karachi 74000.<br>Tel: 92-21-5611060-69<br>UAN: 111-211-211<br>Fax: 92-21-5636656, 5636758<br>Email: sashaikh@engro.com | Usman Malik<br>Principal Engineer-Environment<br>Halcrow Pakistan (Pvt) Ltd<br>3rd Floor, Nawa-e-Waqt House, Mauve Area, Sector G-7/1, Islamabad, Pakistan<br>Tel +92 51 220 3451-55<br>Fax +92 51 220 3462<br>Email: Malikmu@halcrow.com |




0 2 4 8 12 16Km

SCALE:

| Revision | By | Checked | Approved | Date | Description |
|---|---|---|---|---|---|

Drawn by : ZIH Date: 04-01-2007
Checked by : AP Date: 04-01-2007
Authorised by : JH Date: 04-01-2007

Drawing No. FIGURE 1-1 Revision

Drawing Scale: See Above

CAD Filename: PROJECTS/PKENGRO200 Plot Scale:

Project

ENVIRONMENTAL IMPACT ASSESSMENT OF DAIRY MILK PROCESSING AND PACKAGING PLANT IN SAHIWAL

Drawing

KEY MAP

Client

ENGRO FOODS ENGRO FOOD LIMITED


Halcrow Pakistan (Pvt) Ltd.
3rd Floor Nawa-e-waqt House
Mauve Area Sector G-7/1 Zero
Point Islamabad Pakistan
Tel: +92 51 2203451-55
Fax: +92 51 2203462
E-mail: Mail@halcrowpk.com.pk
Www.halcrow.com


Halcrow

# 2 EIA Scope and Methodology

## *2.1 Scope of the EIA*

This EIA investigates the impacts likely to arise from the construction and operation of Dairy Milk Processing and Packaging Plant proposed by EFL in Sahiwal Tehsil of Sahiwal district in Punjab Province. The project details have been further discussed in length in **Chapter 4** of this report. Any project activity carried out by EFL, other than those specified in this report will be the subject of a separate Environmental Assessment study.

## *2.2 EIA Team*

The EIA has been prepared by a team of environmental specialists and engineers; wildlife specialist, botanist, sociologist and water resource specialist. Project specific details and particulars were provided to the consultant by EFL.

## *2.3 EIA Methodology*

### *2.3.1 Understanding the Proposed Operation and Review of Alternatives*

Details of the proposed project activities were collected from EFL and understood by the EIA consultant. All alternatives to the proposed operations were reviewed including: the no project option, alternative site, timing, and alternative technologies to establish the environmental soundness of the project. Details of the proposed project and a review of alternatives have been provided in **Chapter 4** and **5** of this EIA.

### *2.3.2 Review of Policy, Legislation and Guidelines*

The national legislation, international agreements, environmental guidelines and best industry practices were reviewed to set environmental standards that EFL would be required to adhere to during the project. A synopsis of these is provided in **Chapter 3** of the EIA.

### *2.3.3 Review of Secondary Data*

Published and un-published information of the project area was collected in order to gain a complete understanding of existing environmental conditions in the area including the following:

- Physical environment - topography, geology & soils, surface and groundwater resources and climate;
- Biological environment – habitat types, flora and fauna within the area;

- Socio-economic environment–settlements, socio-economic conditions, infrastructure and land use; and
- Heritage aspects –sites of cultural, archaeological or historical significance.

### *2.3.4 Field Data Collection*

A team comprising of environmentalist, wildlife specialist, botanist and sociologist collected area specific primary data. Where required, the secondary data collected was also ground-truth by the experts.

A description of baseline physical, biological and socio-economic conditions of the project area is provided in **Chapters 6** of the EIA report.

### *2.3.5 Community Consultation*

The communities within the project area were consulted with during the fieldwork. The objectives of the consultation were to brief the communities about the proposed development and to collect their views and concerns regarding the same. The outcomes of the consultation are detailed in **Chapter 7** of the EIA report.

### *2.3.6 Identification and Assessment of Impacts*

Potential impacts arising from each phase of the proposed project were identified. These include effects of the proposed project activities on the physical, biological, socio-economic, archaeological and cultural environments of the area. These are detailed in **Chapter 8** of the EIA. Impacts were identified and assessed on the basis of field data, secondary data, expert opinion and previous experience of working on similar projects in Pakistan.

### *2.3.7 Recommendations for Mitigation and Monitoring Measures*

Mitigation measures to help prevent or minimize all potential adverse environmental impacts of the project were identified based on a range of options including management and monitoring practices, alternative technologies, physical controls, or compensation. The proposed mitigation measures are based on an appreciation of the sensitivity and behaviour of environmental receptors within the project area, past experience, case studies, legislative controls, environmental guidelines, and expert advice.

Monitoring measures have been recommended for residual impacts (impacts remaining after applying the recommended mitigation measures) or for impacts that cannot be accurately predicted at the EIA stage. In such cases advice on requisite monitoring measures was sought from experts involved in the EIA and case studies of similar projects elsewhere.

### *2.3.8 Development of Environmental Management Plan*

An environmental management plan (EMP) for the proposed project was prepared. The EMP provides a framework for implementing and managing the mitigation and monitoring measures recommended in the EIA. The EMP includes the following:

- A mitigation and monitoring plan
- Definition of roles and responsibilities of the proponent, contractors and monitoring teams
- Requirements for communication, documentation and training during the project
- Restrictions on design, timing and conduct of the project

.

# 3 Legislation and Guidelines

## *3.1 Introduction*

This chapter presents a synopsis of environmental policies, Acts, legislation, international conventions, and guidelines that have relevance to the proposed project.

## *3.2 National Environmental Policy, Legislation and Guidelines*

The enactment of comprehensive legislation on the environment, covering multiple areas of concern, is a relatively new and ongoing phenomenon in Pakistan. Whereas, a basic policy and legislative framework for the protection of the environment and overall biodiversity in the country is now in place, detailed rules, regulations and guidelines required for the implementation of the policies and enforcement of legislation are still in various stages of formulation and discussion. The following section presents a brief overview of the existing national policies, legislation and guidelines.

### *3.2.1 National Environmental Policy*

The National Conservation Strategy (NCS) is the primary Policy document of the Government of Pakistan on national environmental issues. The Policy was approved by the Federal Cabinet in March 1992. The Strategy also attained recognition by international donor agencies, principally the World Bank. The NCS identifies 14 core areas including conservation of biodiversity, pollution prevention and abatement, soil and water conservation and preservation of cultural heritage and recommends immediate attention to these core areas in order to preserve the country's environment.

A mid term review of the achievements of the NCS in 2000 concluded that achievements under the NCS have been primarily awareness raising and institutional building rather than actual improvement to environment and natural resources and that the NCS was not designed and is not adequately focused as a national sustainable development strategy (GoP, November 2000). The need therefore arose for a more focused National Environmental Action Plan (NEAP) required to bring about actual improvements in the state of the national environment with greater emphasis on poverty reduction and economic development in addition to environmental sustainability.

The National Environmental Action Plan was approved by the Pakistan Environmental Protection Council under the chairmanship of the President/Chief Executive of Pakistan in February 2001. NEAP now constitutes the national environmental agenda and its core objective is to initiate actions that safeguard public health, promote sustainable livelihoods, and enhance the quality of life of the people of Pakistan.

The Government of Pakistan and United Nations Development Program (UNDP) have jointly initiated an umbrella support program called the National Environmental Action Plan-Support Program signed in October 2001 and under implementation. The development objective supported by NEAP-SP is environmental sustainability and poverty reduction in the context of economic growth.

A National Environmental Policy has recently been approved by the Federal Cabinet in its meeting held during June 2005. This policy has already been endorsed by the Pakistan Environmental Protection Council during 2004. The new policy has total 171 guidelines on sectoral and cross-sectoral issues. The objectives of new policy include assurance of sustainable development and safeguard of the natural wealth of country. The following are the approved Sectoral Guidelines;

- Water Supply and Management
- Air Quality and Noise
- Waste Management
- Forestry
- Biodiversity and Protected Areas
- Climate Change and Ozone Depletion
- Energy Efficiency and Renewable
- Agriculture and Livestock
- Multilateral Environmental Agreements

### *3.2.2 National Environmental Action Plan-Support Programme (NEAP-SP)*

The Government of Pakistan and United Nations Development Program (UNDP) have jointly initiated an umbrella support program called the National Environmental Action Plan-Support Program (NEAP-SP) signed in October 2001 and implemented in 2002. The development objective supported by NEAP-SP is environmental sustainability and poverty reduction in the context of economic growth.

### *3.2.3 Pakistan Environmental Protection Act 1997*

The Pakistan Environmental Protection Act, 1997 (PEPA 1997) is the basic legislative tool empowering the government to frame regulations for the protection of the environment. The PEPA 1997 is broadly applicable to air; water; soil, marine; and noise pollution. Penalties have been prescribed for those contravening the provisions of the Act. Under the provisions of the Act, federal and provincial EPAs have been formed which ensure enforcement of the Act in their respective areas of power.

The two primary deliberations of the Act are the conduct of projects only after approval of environmental assessments from the relevant EPA and adherence with National Environmental Quality Standards (NEQS).

### *3.2.4 The National Environmental Quality Standards*

The NEQS promulgated under the PEPA 1997 specify standards for industrial and municipal effluents, gaseous emissions, vehicular emissions, and noise levels. The PEPA 1997 empowers the EPA's to impose pollution charges in case of non-compliance to the NEQS. Standards for disposal of solid waste have as yet not been promulgated.

During the project NEQS will apply to all effluents and emissions including effluents from field camps and well site, emissions from portable power generating equipment, emissions from vehicles and powered equipment, and noise levels from vehicles.

NEQS for municipal and industrial effluents, selected gaseous pollutants from industrial sources and motor vehicle exhaust and noise are provided in **Table 3-1** and **Table 3-2**.

### *3.2.5 Conduct of an EIA*

The Pakistan Environmental Protection Agency Review of IEE and EIA Regulations, 2000 (The 2000 Regulations) promulgated under PEPA 1997 were enforced on 15 June, 2000. The 2000 Regulations define the applicability and procedures for preparation, submission and review of IEEs and EIAs. These Regulations also give legal status to the Pakistan Environmental Assessment Procedures prepared by the Federal EPA in 1997.

As per Schedule II of the IEE and EIA Review Regulations (2000) {2000 Regulations}, the proposed project falls under the category of projects which require an EIA (sub-category B. 4. of the Schedule which includes all food processing industries with total cost of one hundred million rupees and above). The preparation of this EIA satisfies the requirement of the 2000 Regulation.

### *3.2.6 Approval from Punjab EPA*

As per the 2000 Regulations, EFL will be required to submit the EIA report to Punjab EPA (Punjab Environmental Protection Agency.) and seek approval on the same from Punjab EPA. 10 hard copies and 2 soft copies of the EIA report will need to be submitted to Punjab EPA. Punjab EPA will grant its decision on the EIA as per the rules and procedures set out in the 2000 Regulations. The following rules apply.

- A fee is payable to Punjab EPA for review of the EIA.
- The EIA submittal is to be accompanied by an application in the format prescribed in Schedule IV of the 2000 Regulations.

- Punjab EPA is bound to conduct a preliminary scrutiny and reply within 10 days of the submittal of the report a) confirming completeness, or b) asking for additional information, if needed.
- Punjab EPA will publish a public notice in any English or Urdu national newspaper and in a local newspaper of general circulation in the area affected by the project. The public notice will mention the following:
  - The type of project
  - The location of the project
  - The name and address of the proponent
  - The places at which the EIA can be accessed
  - The date, time and place for public hearing of any comments on the project or its EIA
- The date set for public hearing will not be earlier than 30 days from the date of publication of the public notice.
- In the review process Punjab EPA may consult a Committee of Experts, which maybe constituted on the request of the DG Punjab EPA.
- On completion of the review process and the public hearing, the decision of Punjab EPA will be communicated to the proponent in the form prescribed in Schedule VI.
- Where an EIA is approved, Punjab EPA can impose additional controls as part of the conditions of approval.
- Punjab EPA is required to make every effort to complete the EIA review process within 90 days of the issue of confirmation of completeness. However, Punjab EPA can take up to 4 months for communication of final decision.
- The approval will remain valid for the project duration mentioned in the EIA but on the condition that the project commences within a period of three years from the date of approval. If the project is initiated after three years from approval date, the proponent will have to apply for an extension in the validity period. The Punjab EPA on receiving such request grant extension (not exceeding 3 years at a time) or require the proponent to submit a fresh EIA if in the opinion of Punjab EPA changes in baseline conditions or the project so warrant.
- After receiving approval from Punjab EPA the proponent will acknowledge acceptance of the conditions of approval by executing an undertaking in the form prescribed in Schedule VII of the 2000 Regulations.

- The 2000 Regulations also require proponents to obtain from Punjab EPA, after the end of construction phase of the project, a confirmation that the requirements of the EIA and the conditions of approval have been duly complied with.
- The Punjab EPA in granting the confirmation of compliance may impose any additional control regarding the environmental management of the project or the operation, as it deems necessary.

### *3.2.7 Project Monitoring and Compliance*

During project execution EFL will be required to comply with the recommendations of the EIA and any conditions of approval set forth by Punjab EPA. Post EIA monitoring and reporting is mandatory under clause 19 of the 2000 Regulations. The Regulations require proponents of all projects to submit monitoring reports on completion of construction, yearly reports during operation, and any additional reports required by the EPA. The format and contents of such reports are not specified in the law.

### *3.2.8 Effluent and Emission Standards*

Effluent and emissions from the project activities will have to meet the National Environmental Quality Standards, 2000 (NEQS). The NEQS are provided in **Table 3-1** and **Table 3-2**.

### *3.2.9 Effluent and Emission Self Monitoring and Reporting*

a. National Environmental Quality Standards (Self Monitoring and Reporting by Industry) Rules, 2001

The rules establish pollution limits for industries in Pakistan under an honor-based self-monitoring system obliging all industries to monitor liquid effluents and gaseous emissions and submit environmental monitoring reports (in the formats set out in Schedule VI) to the relevant EPA (in this case Punjab-EPA) timely and correctly. The dairy industry is classified as "B" category for monitoring of both liquid effluents and gaseous emissions. The reporting requirements for the dairy industry are given in **Table 3-3**. All industrial units in "B" category are required to submit monitoring reports on a quarterly basis

b. Industrial Pollution Charge (Calculation and Collection) Rules, 2001

These rules ensure the correct calculation, reporting and payment of pollution charges by polluting/industrial units. As per this regulation, EFL will be liable to pay pollution charge for any pollution above NEQS. The list of parameters on which pollution charges shall apply and the method of calculating pollution charge are given in the Schedules attached to the Regulation.

c. Environmental Sample Rules, 2001

These rules authorise the Federal EPA and its authorised persons to obtain and test samples from industries to verify self-monitoring reports and calculation of pollution charges.

d. National Environmental Quality Standards (Certification of Environmental Laboratories) Rules, 2001

These rules were established as checks on environmental laboratories and require all laboratories to be certified from the Federal EPA as per the rules and criteria set out in the regulation.

### *3.2.10 Relevant Acts and Ordinances*

### *3.2.11 The Forest Act 1927*

The act empowers the provincial forest departments to declare any forest area as reserved or protected. The act also empowers the provincial forest departments to prohibit the clearing of forest for cultivation, grazing, hunting, removing forest produce; quarrying and felling, lopping and topping of trees, branches in reserved and protected forests. The project area is located outside any reserved or protected forest area therefore the project will not contravene with any provisions of the Act.

### *3.2.12 The Punjab Wildlife Protection Act, 1974*

This act provides the protection, preservation, conservation and management of wildlife in the Province of the Punjab. This act may be called the Punjab Wildlife (Protection, Preservation, Conservation and Management) Act, 1974. It extends to the whole of the Province of the Punjab. It shall come into force at once and shall be deemed to have taken effect on and from the day the Punjab Ordinances Temporary Enactment Act, 1973 (Punjab Act No. VI of 1973), in so far as it enacted the provisions of the Punjab Wildlife (Protection, Preservation, Conservation and Management) Ordinance, 1972 (Ordinance No. XXI of 1972), expired. Nothing hereinafter provided shall be deemed to authorise any person to hunt in the reserved or protected forests as constituted and declared under the provisions of the Forest Act, 1927 (Act XVI of 1927). The project area lies outside of any notified protected areas.

### *3.2.13 Punjab Land Preservation Act, 1900*

This act is to provide for the better preservation and protection of certain portions of the territories of the Punjab. It shall extend to the whole of the Province of the Punjab except the Tribal Areas.

### *3.2.14 Punjab Minor Canal Act, 1905*

This act to make better provision for the control and management of minor canals in [certain areas of West Pakistan]. It is desirable to make better provision for the exercise

of control over and for the regulation of the management of certain minor canals in certain areas of West Pakistan. It extends to the Divisions of Rawalpindi, Sargodha, Lahore, Multan, Quetta and Kalat except the Tribal Areas.

### *3.2.15 The Punjab livestock, dairy and poultry development board act, 1974*

An Act to provide for the establishment of Livestock, Dairy and Poultry Development Board in the Punjab and It shall extend to the whole of the Province of the Punjab. Under this act a board known as the Punjab Livestock, Dairy and Poultry Development Board has been established and it also underlines the power, duties and functions of the board. The Board may negotiate and obtain for its projects and companies established under section 13 of this Act loans in local and foreign currency from the local or the international financing institutions, provided that in the case of loans from international financing institutions, the Board shall act with the prior approval of Government.

### *3.2.16 The Punjab milk boards ordinance, 1963*

As soon as may be after the commencement of this Ordinance in any local area, there shall be established a milk Board to carry out the purposes of this Ordinance in that area. The Board shall be a body corporate having perpetual succession and a common seal, with power, subject to the provisions of this Ordinance, to acquire, hold and dispose of property, both movable and immovable, and shall by the said name sue and be sued. The functions of the Board shall be to ensure that an adequate supply of milk and milk products of good quality is available to the consumers of milk and milk products in the local area and for that purpose to prepare and execute schemes for regulating production, marketing and distribution of milk and milk products.

### *3.2.17 Antiquities Act 1975*

The Antiquities Act of 1975 ensures the protection of cultural resources in Pakistan. The act is designed to protect "antiquities" from destruction, theft, negligence," unlawful excavation, trade and export. Antiquities have been defined in the Act as ancient products of human activity, historical sites, or sites of anthropological or cultural interest, national monuments etc. The law prohibits new construction in the proximity of a protected antiquity and empowers the Government of Pakistan to prohibit excavation in any area, which may contain articles of archaeological significance.

No surface archaeological sites were identified in the project area during fieldwork for the EIA and hence no provision of this Act shall apply to the project.

### *3.2.18 Punjab Special Premises Preservation Ordinance, 1965*

This Ordinance is to provide for the preservation of certain premises in the Punjab. it is expedient to preserve certain premises of historical, cultural and architectural value in the Punjab and to control and regulate alterations therein and demolition and re-erection

thereof and for matters ancillary thereto; This Ordinance may be called the Punjab Special Premises (Preservation) Ordinance, 1985; It shall extended to the whole of the Punjab.

### *3.2.19 Pakistan Penal Code (1860)*

The Pakistan Penal Code (1860) authorises fines, imprisonment or both for voluntary corruption or fouling of public springs or reservoirs so as to make them less fit for ordinary use.

### *3.2.20 Canal and Drainage Act (1873)*

The Canal and Drainage Act, 1873 ((amended in 1952, 1965, 1968 and 1970) prohibits corruption or fouling of water in canals (defined to include channels, tube wells, reservoirs and watercourses), or obstruction of drainage.

### *3.2.21 Local Governments Ordinance*

Under the devolution programme, the Local Governments structure was introduced in the Province through the PLGO 2001 on August 14, 2001. The new local governments are Zila Councils and District Governments (City District Governments in the four provincial capitals), Tehsil Councils and Tehsil/Town Municipal Administrations (TMA) and Union Councils and Union Administrations. The PLGO 2001 provides clear functional jurisdiction for different local governments.

- According to the functions specified in section 40, the Zila Council in a City District shall approve plans having appropriate environmental controls and ecological balance. It will review implementation of rules and bye-laws governing environment and also review development of integrated system of water reservoirs, water sources, treatment plants, drainage, liquid and solid waste disposal, sanitation and other municipal services.
- According to the clause 53, Tehsil Officer (Infrastructure and Services) shall be responsible for water, sewerage, drainage, sanitation, roads, other than Provincial and district roads, streets and street lighting; fire fighting, park services.
- According to the functions specified in section 54, the functions and powers of the Tehsil Municipal Administration shall be to provide, manage, operate, maintain and improve the municipal infrastructure and services, including water supply and control and development of water sources; sewerage, sewage and sewage treatment and disposal; storm water drainage; sanitation and solid waste collection and sanitary disposal of solid and liquid wastes.
- According to the clause 80, Union Nazim shall report to the concerned authorities in respect of environmental and health hazards within the area of the union.

- Depending upon the economies of scale and nature of infrastructure the City District Government may vary grouping of offices and set up district municipal offices for integrated development and management of the services like Environmental control, including control of air, water, and soil pollution in accordance with federal and provincial laws and standards.
- In Sixth schedule (see section 195), pg 156 clause 48 exclusively authorise local governments to work for environmental protection.

### *3.3 International Conventions*

Pakistan is a signatory to a number of international conventions and treaties. The relevant ones include:

#### *3.3.1 Convention on Biological Diversity*

The Convention on Biological Diversity was adopted during the Earth Summit of 1992 at Rio de Janeiro. The Convention requires parties to develop national plans for the conservation and sustainable use of biodiversity, and to integrate these plans into national development programmes and policies. Parties are also required to identify components of biodiversity that are important for conservation, and to develop systems to monitor the use of such components with a view to promoting their sustainable use. The Government of Pakistan has constituted a Biodiversity Working Group under the auspices of the Ministry of Environment, Local Government and Rural Development to develop a Biodiversity Action Plan (BAP) for the country. After an extensive consultations, a draft Action Plan has been developed, which is presently under review. The Plan, which has been designed to complement the NCS (National Conservation Strategy) and the proposed provincial conservation strategies, identifies the causes of biodiversity loss in Pakistan and presents action proposals to conserve biodiversity in the country. Since the Plan is yet to be reviewed by the Cabinet, its provisions have not been finalised. The BAP recognises that at project level an EIA is used as a tool to identify environmental effects of a proposed project and to plan for reducing adverse effects. The BAP further stipulates that an EIA should be initiated at an early stage in project development cycle and that public participation in the review of potential effects is important.

The EIA report satisfies the requirement of the CBD in that it looks at biodiversity issues and the protection of wildlife in the EIA.

#### *3.3.2 The Convention on Conservation of Migratory Species of Wild Animals, 1979*

The Convention on the Conservation of Migratory Species of Wild Animals (CMS), 1979, requires countries to take action to avoid endangering migratory species. The term "migratory species" refers to the species of wild animals, a significant proportion of whose members cyclically and predictably cross one or more national jurisdictional

boundaries. The parties are also required to promote or co-operate with other countries in matters of research on migratory species.

The Convention contains two appendices. Appendix I contain the list of migratory species that are endangered according to the best scientific evidence available. For these species, the member states are required to endeavour to:

- Conserve and restore their habitats.
- Prohibit their hunting, fishing, and capturing, harassing and deliberate killing.
- Remove obstacles and minimize activities that seriously hinder their migration.
- Control other factors that might endanger them, including control of introduced exotic species.

Appendix II lists migratory species, or groups of species, that have an un-favourable conservation status as well as those that would benefit significantly from the international co-operation that could be achieved through intergovernmental agreements.

### *3.3.3 The Convention on Wetlands of International Importance, Ramsar 1971*

Pakistan is a signatory to the said Convention. The principal obligations of contracting parties to the Convention are:

- To designate wetlands for the List of Wetlands of International Importance.
- To formulate and implement planning so as to promote wise use of wetlands, to carry out EIA before transformations of wetlands, and to make national wetland inventories.
- To establish nature reserves on wetlands and provide adequately for their wardening and through management to increase waterfowl populations on appropriate wetlands.
- To train personnel competent in wetland research, management and wardening.
- To promote conservation of wetlands by combining far-sighted national policies with coordinated international action, to consult with other contracting parties about implementing obligations arising from the Convention, especially about shared wetlands and water system.
- To promote wetland conservation concerns with development aid agencies.
- To encourage research and exchange of data.

So far 19 sites in Pakistan have been declared as wetlands of International Importance or Ramsar Sites. None of these wetlands is located within or in close vicinity of the project area.

### *3.3.4 Convention on International Trade in Endangered Species of Wild Fauna and Flora*

This convention came into effect in March 1973 at Washington. In all 130 countries are signatory to this convention with Pakistan signing the convention in 1976.

The convention requires the signatories to impose strict regulation (including penalisation, confiscation of the specimen etc.) regarding trade of all species threatened with extinction or that may become so, in order not to endanger further their survival.

The Convention contains three appendices. Appendix I includes all species threatened with extinction, which are or may be affected by trade. The Convention requires that trade in these species should be subject to strict regulation. Appendix II includes species that are not necessarily threatened presently but may become so unless trade in specimen of these species is subject to strict regulation. Appendix III includes species which any contracting party identifies as subject to regulations in trade and requires other parties to co-operate in this matter.

The species identified during field surveys that are covered under CITES have been given special consideration in the assessment of the potential project related impacts and their mitigation.

### *3.3.5 IUCN Red List*

The red list is published by IUCN and includes those species that are under potential threat of extinction. These species have been categorised as:

- Endangered: species that are sent to be facing a very high risk of extinction in the wild in the near future, reduction of 50% or more either in the last 10 years or over the last three generations, survive only in small numbers, or have very small populations.
- Vulnerable in Decline: species that are seen to be facing a risk of extinction in the wild, having apparent reductions of 20% or more in the last 10 years or three generations.
- Vulnerable: species that are seen to be facing a high risk of extinction in the wild, but not necessarily experiencing recent reductions in population size.
- Lower Risk: species that are seen to be facing a risk of extinction that is lesser in extent that for any of the above categories.
- Data Deficient: species that may be at risk of extinction in the wild but at the present time there is insufficient information available to make a firm decision about its status.

### *3.3.6 1992 Climate Change Convention:*

The convention aims at stabilizing greenhouse gas concentration in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. To achieve the objective of the convention, all parties are generally required to develop national inventories of emission; formulate and implement national and regional programs of mitigation measures; all developed country parties and the EC were specifically obliged to take measures to limit greenhouse gas emissions by the year 2000 at 1990 levels.

The gaseous emissions from the project will conform to the NEQS and will not contribute to any significant emissions of greenhouse gases and hence will not be in conflict with the recommendations and intent of the Convention on Climate Change.

### *3.3.7 Vienna Convention on the Protection of the Ozone Layer and its Protocols 1985*

The Parties to this Convention are aware of the potentially harmful impact on human health and the environment through modification of the ozone layer and recall the pertinent provisions of the Declaration of the United Nations Conference on the Human Environment, and in particular principle 21, and are also mindful that measures to protect the ozone layer from modifications due to human activities require international co-operation and action and should be based on relevant scientific and technical considerations.

## *3.4 Environmental Guidelines*

The EIA takes into account relevant international and local guidelines in the conduct of the EIA, recommendations for mitigation measures, and development of the environmental management and monitoring plan. These include the following:

- Pakistan Environmental Assessment Procedures (1997)
- World Bank Environmental Assessment Source Book (1998) and its Updates
- World Bank Pollution Prevention and Abatement Handbook (including sector guidelines for dairy industry)
- Dairy Sector Environmental Report, ETPI, November 2000
- Cleaner Production Assessment in Dairy Processing, UNEP
- Cleaner Production Assessment in Dairy Processing, jointly published by UNEP Division of Technology, Industry & Economics (UNEP DTIE) & the Danish EPA
- Scottish Environmental Protection Agency Guidance Note IPPC S6.13 for "General Guidance for the Dairy & Milk Sector"

The World Bank guidelines recommend the following standards for noise emissions for the dairy industry:

- Noise emissions:
  - Residential and educational property boundary: 55 dBA during day and 45 dBA during night
  - Industrial or commercial property boundary: 70 dBA during day or night.

## *3.5 Corporate Policy of ECPL*

ECPL gives the highest importance to safe operations, safe work practices, protection of the environment and the health of its employees in the conduct of its business. It is, therefore, the company's policy to take actions as far as possible to prevent injury or ill health to employees, protect the environment and prevent damage to company assets. The company will adhere to the following principles to achieve safe operations and a clean and healthy environment.

- Top management will provide continuous support and commitment to the implementation of this policy.
- Safety, Environment and Industrial Hygiene will be given the highest priority (ahead of production, sales and profits) in arriving at business decisions.
- The Company will maintain and operate its facilities in a manner that protects the environment and the surrounding communities. It will comply with all laws in this regard and meet the National Environmental Quality Standards (NEQS).
- Safety, Environment and Industrial Hygiene is a major responsibility of every employee and will be considered as such in personal performance appraisals.
- The Company will provide the necessary tools and equipment to perform work safely, consistent with the objectives of this policy. It is the employee's responsibility to keep the tools and equipment in safe operating conditions and fit for use at all times.
- Training will be provided to enable employees to recognise and handle unsafe or environmentally harmful situations.
- The Company will maintain and update Safety, Environment and Industrial Hygiene rules and procedures. The employees are responsible for carrying out their work in a safe and efficient manner within the framework of these guidelines.
- A good standard of housekeeping will be maintained in all Company facilities.
- The Company will encourage contractors to abide by its Safety, Environment and Industrial Hygiene standards and regulations whilst performing tasks for the Company.
- The Company will encourage Off-the-Job Safety, Environment and Health awareness amongst its employees and their families.

- Management will from time to time, test the effectiveness of its Safety, Environment and Industrial Hygiene programs to ensure adequacy, compliance and continuous improvement in standards.

**Table 3-1: NEQS for municipal and industrial effluents[a]**

| Parameters | Into Inland Water | Into Sewage Treatment[b] |
|---|---|---|
| Temperature or temperature increase[c] | ≤30°C | ≤30°C |
| pH | 6-9 | 6-9 |
| Biochemical Oxygen Demand (BOD5) at 20°C[d] | 80 | 250 |
| Chemical Oxygen Demand (COD)[d] | 150 | 400 |
| Total Suspended Solids (TSS) | 200 | 400 |
| Total Dissolved Solids (TDS) | 3,500 | 3,500 |
| Grease and oil | 10 | 10 |
| Phenolic compounds (as phenol) | 0.1 | 0.3 |
| Chloride (as $Cl^-$) | 1,000 | 1,000 |
| Fluoride (as F) | 10 | 10 |
| Total cyanide (as CN-) | 1.0 | 1.0 |
| An-ionic detergents (as MBAS)[e] | 20 | 20 |
| Sulphate ($SO_4$) | 600 | 1000 |
| Sulphide (S-) | 1.0 | 1.0 |
| Ammonia ($NH_3$) | 40 | 40 |
| Pesticides[f] | 0.15 | 0.15 |
| Cadmium[g] | 0.1 | 0.1 |
| Chromium (trivalent & hexavalent)[g] | 1.0 | 1.0 |
| Copper[g] | 1.0 | 1.0 |
| Lead[g] | 0.5 | 0.5 |
| Mercury[g] | 0.01 | 0.01 |
| Selenium[g] | 0.5 | 0.5 |
| Nickel[g] | 1.0 | 1.0 |
| Silver[g] | 1.0 | 1.0 |
| Total Toxic metals | 2.0 | 2.0 |
| Zinc | 5.0 | 5.0 |
| Arsenic[g] | 1.0 | 1.0 |
| Barium[g] | 1.5 | 1.5 |
| Iron | 8.0 | 8.0 |
| Manganese | 1.5 | 1.5 |

| Parameters | Into Inland Water | Into Sewage Treatment[b] |
|---|---|---|
| Boron[g] | 6.0 | 6.0 |
| Chlorine | 1.0 | 1.0 |

**Source**: Qadar (2003)

**Notes**

[a] All values are in mg/l, unless otherwise defined

[b] Applicable only when and where sewage treatment is operational and BOD5=80 mg/L is achieved by the sewage treatment system

[c] The effluent should not result in temperature increase of more than 30°C at the edge of zone where initial mixing and dilution take place in the receiving body. In case zone is defined, use 100 meters from the point of discharge

[d] Assuming minimum dilution 1:10 on discharge, lower ratio would attract progressively stringent standards to be determined by the Federal Environmental Protection Agency. By 1:10 dilution means, for example that for each one cubic meter of treated effluent, the recipient water body should have 10 cubic meter of water for dilution of this effluent

[e] Modified Benzene Alkyl Sulphate; assuming surfactant as biodegradable

[f] Pesticides include herbicide, fungicides and insecticides

[g] Subject to the total toxic metals discharge should not exceed level of total toxic metals

**Table 3-2: NEQS for selected gaseous pollutants from industrial sources**[a]

| Parameter | Source of emission | Standard |
|---|---|---|
| Smoke | Any | 40% or 2 Ringlemann scale or equivalent smoke number |
| Particulate matter[b] | Boilers and furnaces: | |
| | Oil fired | 300 |
| | Coal fired | 500 |
| | Cement kilns | 300 |
| | Grinding, crushing, clinker coolers and related processes, metallurgical processes, converter blast furnaces and cupolas | 500 |
| Hydrogen chloride | Any | 400 |
| Chlorine | Any | 150 |
| Hydrogen fluoride | Any | 150 |
| Hydrogen sulfide | Any | 10 |
| Sulfur oxides[c] | Sulfuric acid/Sulfonic acid plants | 5,000 |
| | Other plants except power plants operating on oil and coal | 1,700 |
| Carbon monoxide | Any | 800 |
| Lead | Any | 50 |
| Mercury | Any | 10 |
| Cadmium | Any | 20 |
| Arsenic | Any | 20 |
| Copper | Any | 50 |
| Antimony | Any | 20 |
| Zinc | Any | 200 |
| Oxides of nitrogen[d] | Nitric acid manufacturing unit | 3,000 |
| | Other plants except power plants operating on oil or coal: | |
| | Oil Fired | 400 |

| Parameter | Source of emission | Standard |
|---|---|---|
| | Coal fired | 600 |
| | Cement kilns | 1,200 |

**Source:** Qadar (2003)

**Notes:**

[a] All values are in mg/Nm$^3$, unless otherwise defined

[b] Based on the assumption that the size of the particulates is 10 micron or more

[c] Based on 1% sulphur content in fuel oil. Higher content of sulphur will cause standards to be pro-rated

[d] In respect of the emissions of the sulfur dioxide and nitrogen oxides, the power plants operating on oil or coal as fuel shall, in addition to NEQS specified above, comply with the following standards

**Table 3-3: Priority Parameters for Dairy Industry**

| S.No. | Priority Paramters | |
|---|---|---|
| 1 | **Liquid Effleunts** | |
| | 1. Effluent Flow | 5. TSS |
| | 2. Temperature | 6. TDS |
| | 3. pH | 7. Oil and Grease |
| | 4. $BOD_5$ | |
| 2 | **Gaseous Emissions – Process** | |
| | None | |
| 3 | **Gaseous Emissions – Fired equipment** | |
| | 1. CO | 3. $SO_x$ |
| | 2. $NO_x$* | 4. Particulates |

**Notes:**

All parameters to be reported on a **quarterly basis**

Industry using Chromium in its cooling water will also report Chromium (trivalent, hexavalent)

Metal analyses of all gaseous emissions to be carried out once in two years

* Only where fuel contains hydrogen sulphide more than 20ppm

# 4 The Proposed Project

## 4.1 Project Location

The proposed project area of dairy plant and wastewater pipeline is located in Tehsil and District Sahiwal of Punjab Province. The location of proposed project area and its surrounding is shown in **Figure 4-1**. The proposed site is serviced by a black top road that connects Sahiwal with Pakpattan city. The site for dairy plant is located at a distance of approximately 8km south-east of Sahiwal city. Approximately 7km long wastewater pipeline will be laid between dairy plant and Sukh Biyas for the disposal of treated effluent into Sukh Biyas. The pipeline will be laid along the left Right-of-Way (ROW) of Sahiwal-Pakpattan road. The alignment of proposed pipeline is also shown in **Figure 4-1**.

## 4.2 Project Schedule

Due to market forces and high demand for the dairy products, the proposed plant will need to be commissioned on a fast track. The construction work is expected to start after getting approval from EPA and other concerned departments.

## 4.3 Plant Size and Layout

The proposed plant will require an area of approximately 25 acres including areas allocated for the production and packaging plant, milk reception facility, guest house, administration buildings, and internal roads. A tentative layout of the plant is shown in **Figure 4-2**.

## 4.4 Products and Raw Materials

The proposed plant will have a raw milk processing capacity of about 400,000 litres per day. The plant will produce UHT (Ultra Heat Temperature Treated) milk and UHT cream. Milk will serve as the main ingredient in all products. The raw milk will be purchased from farmers and suppliers. The milk will be supplied in tanker lorries.

## 4.5 Plant Construction

As detailed earlier, the construction of the plant will commence after getting approval from EPA and other concerned departments. The construction will involve minimal earthworks (land clearing, levelling, and excavations); construction of sub-structures (foundations) and super-structures for the main plant, administration buildings, small guesthouse etc; construction of internal roads; construction of ancillary systems (water and wastewater treatment units etc); and peripheral walls. The construction will use and

employ standard construction raw materials (cement, sand, steel reinforcement, bricks etc) and construction practices.

### *4.6 Pipeline*

Approximately 7km long pipeline of 6 in diameter will be laid to dispose off treated wastewater of dairy plant into Sukh Biyas. The pipeline will be laid along the left ROW of Sahiwal-Pakpattan road between dairy plant and Sukh Biyas.

Activities involving pipeline laying, commissioning and operation will include the following:

- Transportation of pipes, construction materials, construction machinery and personnel.
- Right of way (ROW) preparation.
- Installation (trenching, laying and backfilling).
- Testing and commissioning.

A brief description of these activities is as under:

Permission for pipeline laying along the ROW will be taken from Provincial highway department. In this regard a Fee will also be deposited to highway department. Moreover a Formal permission from forest department will be required if pipeline laying process involves cutting of trees along the ROW and compensation fee will be submitted to the forest department accordingly.

The laying of pipeline will be done by a local construction contractor and is estimated to span over duration of approximately 1.5 months till commissioning. The construction contractor will employ a crew of around 10 people for pipeline laying. Local people will be hired for skilled and unskilled jobs as and when required during the project.

The pipes will be transported to the site on trucks. The construction material and construction machinery will also be transported to the site on trucks. Water consumed during pipeline laying will be transported to the site from the nearest local wells.

ROW for the proposed pipeline will be cleared of vegetation and levelled before the trenching operation is started. A trench approximately 2 ft wide and 3 ft deep will be excavated to install the wastewater pipeline. The topsoil removed along the RoW will be placed in a separate pile and will be used during backfilling. The pipeline will be laid along the near side of the trench and welded together. Joined sections of the line will then be shifted into the bottom of the trench by pipe layers or/and cranes moving along the line.

Once the pipeline has been installed, it will be tested for any leakages before backfilling. In case fiberglass or polyethylene pipes are used burial will be with a minimum of 3ft soil

cover and a 1 ft sand cushion underneath the pipes for added support. At water crossings the pipeline will be normally laid 3ft below its bed level. .

## *4.7 Process Description*

### *4.7.1 Milk Supply and Handling*

The raw milk will be procured from farmers who will supply milk to the milk collection centres, from where milk will be transported to the plant site via tanker lorries. Approximately up to 40 tanker lorries, each of average capacity of 10,000 litres will arrive at the site every day where the raw milk will be tested for fat content, odour and other parameters. The milk meeting the required specifications will be stored in chillers at 6°C for subsequent processing. The tanker lorries after decantation will be washed with water.

### *4.7.2 UHT Milk*

The manufacturing of UHT milk will involve the following processes.

a. Pasteurisation

The chilled milk will be heated to a temperature of 75-85°C in a pasteuriser to kill pathogenic bacteria. The milk will be then cooled in the same equipment to 4-6°C. Heating and cooling is achieved by steam and chilled water. The pasteuriser is provided with a regeneration system to get maximum heat transfer efficiency in the heat-cool cycle.

During pasteurisation cream is also separated from the milk through a centrifugal cream separator. This cream will be further used to produce UHT cream or sold as bulk cream.

b. Bactofugation, Standardization and Homogenisation

Harmful bacteria will be removed from the pasteurised milk through bactofugation. In addition, fat content of the milk will be adjusted to the required level and then it will be homogenised at 150 bars pressure to allow even distribution of fat globules in the milk.

c. UHT Treatment

The milk will be heated to a temperature of 140°C for 2-4 seconds. This will kill all bacteria in the milk. The milk will be then cooled and stored in aseptic tanks.

d. Packing

The UHT milk will be aseptically packed in tetra packs using specialised packaging machines. The tetra pack film will be sterilised by hydrogen peroxide solution. The packed milk will be stored for a few days so that any problems are detected before the milk is supplied to the market.

### *4.7.3 UHT Cream*

The cream separated from the pasteurised milk will be pasteurised by heating it to a temperature of 95°C and then further heated to higher temperatures to produce UHT cream. The process is similar to the production of UHT milk. The UHT cream is cooled to 30-40ºC, stored in aseptic tanks, and packed for distribution to the market.

## *4.8 Utilities*

### *4.8.1 Electricity and Power*

Plant will run on captive power generation, as uninterrupted power supply is needed for smooth operation. Natural Gas/Diesel generators/WAPDA Electric Supply will be employed for meeting complete requirement of the plant and guesthouse. Electricity from WAPDA Electric Supply Corporation and diesel generator will be used for emergency purposes only. Total power requirement is estimated to be approx 2.5MW. It is planned to install three gas generators capable of producing 3 MW of electricity. One of the three generators will be kept at standby. One diesel generator is also expected to be installed for standby purposes. Fuel consumption of one diesel generator to be used over full load capacity (100%) is 406.6 litres/hr and over 75% load capacity is 309.2-litres/hr. Typical emissions of diesel generator to be used is given in **Table 4-1**.

### *4.8.2 Water Consumption and Supply*

Approximately 1000 cum of water will be required on a daily basis. The main water consumption will be for washing and cleaning of the plant equipment and milk supply tankers, cooling water, steam generation, and domestic use. No credible estimates on the water consumption during construction of the plant are available. However, water consumption during construction would be insignificant compared to the water consumption during plant operation.

## *4.9 Ancillary Operations and Facilities*

### *4.9.1 Boilers and Steam Generation*

Natural Gas/Diesel operated boilers will be used for steam generation. The main use of steam will be in pasteurisers, UHT plants and CIP (during hot water rinsing cycles). Nearly 90% of the steam condensate will be reused; the remaining 10% of feed water will be from raw water supply. The raw water will be treated as per requirement through reverse osmosis process.

### *4.9.2 Cleaning and Washing*

At all dairy plants, cleaning and washing is of utmost importance as any contamination or left over residue can be a potential source of culture media for bacteria to grow. Two types of cleaning procedures will be adopted at the plant:

a. General Cleaning

This will involve general cleaning of all workplaces, floors, washing of empty containers, and washing of tanker lorries supplying raw milk. This will be done on a regular basis throughout the plant operation.

b. Cleaning in Place (CIP)

After any production cycle or shut downs, all equipment, vessels, milk tankers and pipelines will be cleaned by a specific CIP procedures. This can be automated or manual and short duration or long duration depending on the requirement. In each CIP process all lines and vessels are flushed with cycles of warm water and caustic soda and nitric acid to remove any contamination or left over residue.

### *4.9.3 Water Treatment*

Water will be treated to make it suitable for boiler feed and use in process. Furthermore, site water analysis will be carried out and appropriate treatment process for potable water, will be selected and installed.

### *4.9.4 Wastewater Treatment*

The wastewater from the plant will mainly include effluent from cleaning and washing. After processing of every batch of milk the equipment needs to be cleaned due to inherent nature of milk. This process is called CIP (cleaning in place). CIP water contains lots of impurities such as fats, debris etc. Other sources will include domestic effluents, boiler blow down, steam condensate, and cooling water. EFL will set up a wastewater treatment plant to control the effluent quality below NEQS limits. The process flow diagram of treatment plant is shown in **Figure 4-3**. Photographic record of EFL's existing wastewater treatment plant installed at Sukkur dairy Plant is provided at the end of this chapter. The process description of the wastewater treatment plant is given below:

a. Static Screen

Static screen is used to remove large size solid pollutants and debris, which represent a significant fraction of the total pollution load.

b. Dissolved Air Flotation Unit

It separates free oil, emulsified oil and fat from water by means of dissolved air flotation. Air bubbles are injected at the bottom of the unit and as a result sludge layer is formed at the water surface which is scrapped off by a skimming device.

c. Equalization Basin

The purpose of equalization basin is to level or minimize the variation in pollution load and influent flow. Due to mixing equipment, a special part of equalization basin, solids are kept in suspension and odour emission and foam formation is prevented.

d. pH control

Automatic acid dosing system is installed to control the pH of effluent water.

e. Biological Treatment

It offers specific circumstances for the floc forming bacteria against their filamentous competitors. Food/Mass ratio, oxygen and flow-characteristics are so optimized, that the floc forming bacteria outgrow the filamentous bacteria.

f. Aeration Basin

In the aeration basin the floc forming bacteria converts the absorbed BOD/COD.

g. Clarifier

Clarifier separates mixed liquor into biosludge and water by means of sedimentation. A part of the biosludge has to be recycled back for two reasons, 1) the organisms (biosludge) themselves represent a certain BOD/COD value. 2) the majority of the organisms must be circulated back into the system to take up and convert pollution again. The remaining portion of sludge is considered as a good quality fertilizer. The sludge will be loaded in tractor trolleys and sold to farmers.

### *4.9.5 Others*

The plant will include administration buildings, a small guesthouse and internal roads etc. as ancillary facilities.

## *4.10 Process Chemicals*

No chemicals will be used in the production of UHT milk and UHT cream. The usage of chemicals will be required only in ancillary operations including: disinfection, washing and cleaning, water treatment, and wastewater treatment. The list of main chemicals that will be used is as follows:

- Caustic soda: as cleaning solution in CIP
- Nitric acid: as cleaning solution in CIP
- Hydrogen peroxide: sterilization of tetra pack films and vessels
- Sodium chloride: regeneration of resin in ion exchanger
- Detergents: for cleaning and washing
- Sulphuric acid for pH control of wastewater

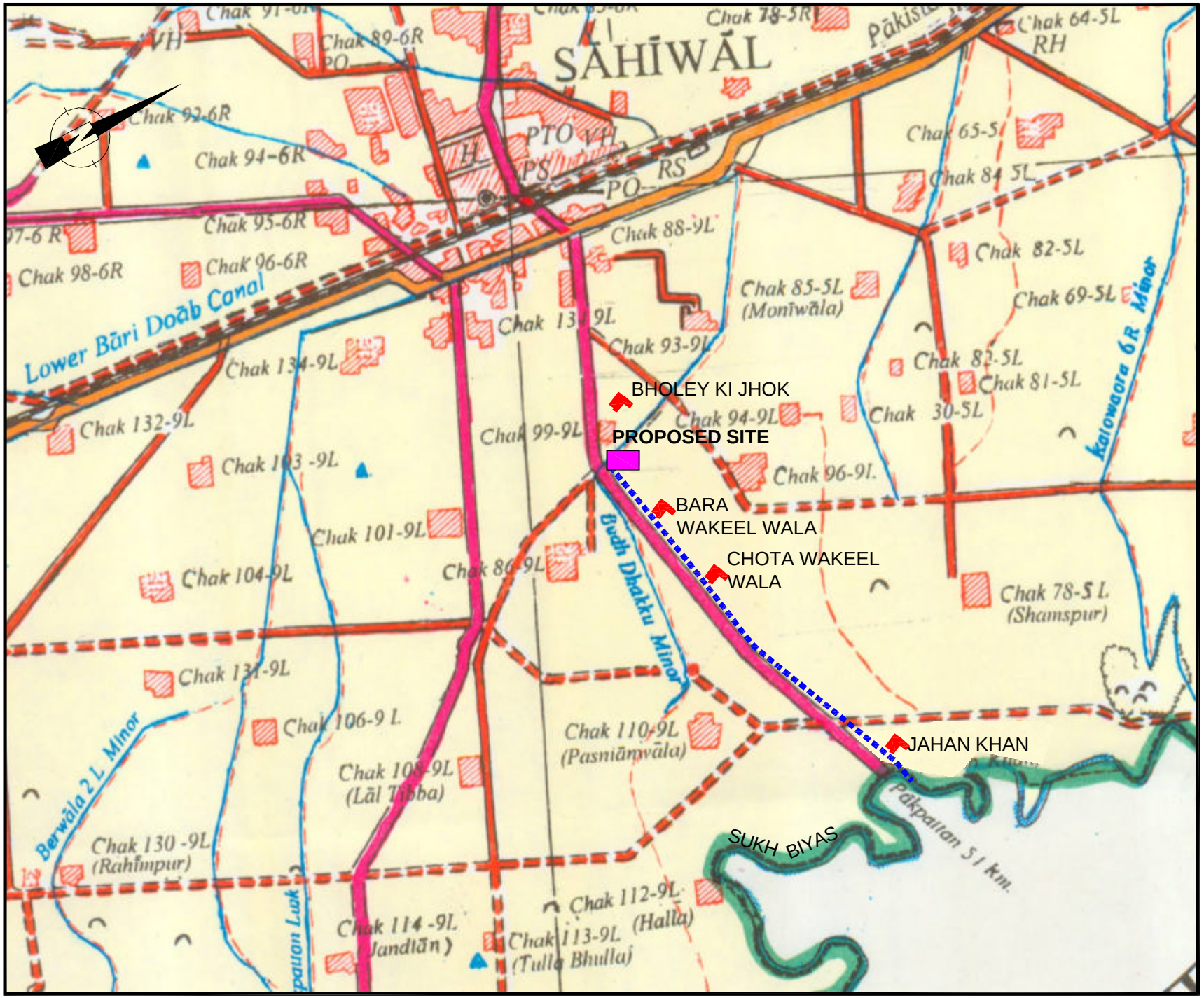
Workers will be provided with proper PPE including gloves, mask, safety goggles etc while handling and using these chemicals.

## *4.11 Workforce*

The plant will employ a total workforce of approximately 150 permanent staff during operation. During construction, a total permanent workforce of up to 20 people is expected, while local un-skilled and semi-skilled labour from the vicinity will be hired on a need basis.

**Table 4-1: Typical Emissions from Diesel Generator**

| Parameter | Emission Rate |
|---|---|
| Carbonmonoxide | 249.8 mg/$m^3$ |
| $NO_x$ | 4387.9 mg/$m^3$ |
| Particulate Matter | 21.1 mg/$m^3$ |
| Hydrocarbons | 52.5 mg/$m^3$ |
| Exhaust Flow Rate | 330.1 $m^3$/min |
| Temperature of Exhaust | 509.8$^0$C |




## LEGEND

- PROPOSED SITE
- PROPOSED EFFLUENT PIPELINE ALIGNMENT
- DISTRICT BOUNDARY
- ROAD NETWORK
- COMMUNITIES
- SUKH BIYAS RIVER
- CANAL
- RAILWAYLINE

0 1 2 4 6Km

SCALE:

| Revision | By | Checked | Approved | Date | Description |
|---|---|---|---|---|---|

Client

ENGRO FOODS LIMITED


Halcrow Pakistan (Pvt) Ltd.
3rd Floor Nawa-e-Waqt House
Mauve Area Sector G-7/1
Zero Point Islamabad.
Tel + 92 51 220 3451-5
Fax + 92 51 220 3462
www.halcrow.com


Halcrow

Project

**ENVIRONMENTAL IMPACT ASSESSMENT OF DAIRY MILK PROCESSING AND PACKAGING PLANT IN SAHIWAL**

Drawing

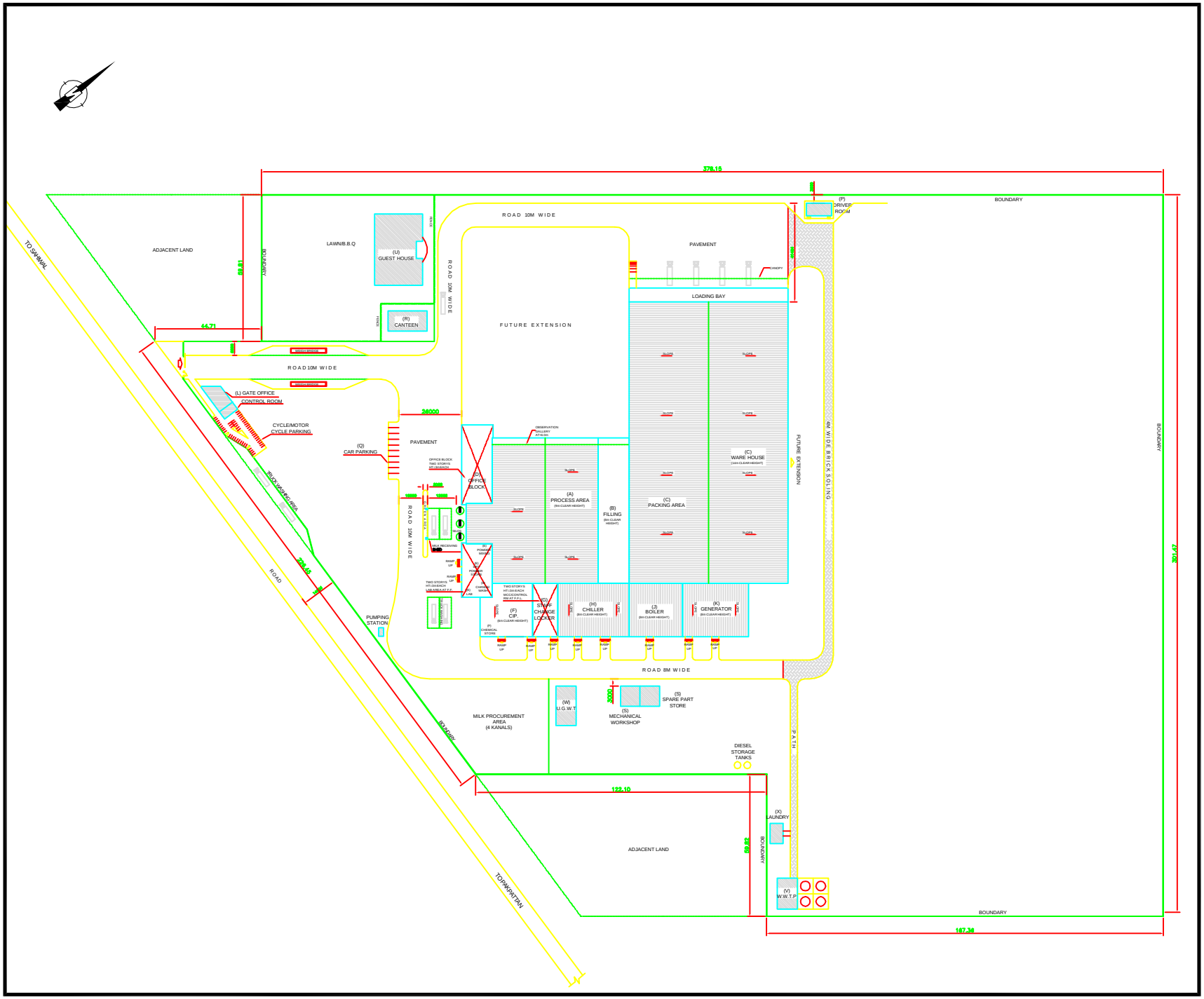
**PROJECT AREA MAP**

| | |
|---|---|
| Drawn by ZIH | Date: 04-01-2007 |
| Checked by AP | Date: 04-01-2007 |
| Authorised by JH | Date: 04-01-2007 |

Drawing No. **FIGURE 4-1** Revision

Drawing Scale: See Above Plot Scale:

Cad Filename:projects/PKENGR0200




## SCHEDULE OF AREAS

| SN0. | BUILDING | AREA |
|---|---|---|
| A | PROCESS AREA | 2750 sq.m |
| B | FILLING | 670 sq.m |
| C | WARE HOUSE/PACKING AREA | 8300 sq.m |
| D | OFFICE BLOCK (TWO STORYS) | 880 sq.m |
| E | LAB AREA (TWO STORYS) | 600 sq.m |
| F | CIP./CHEMICAL STORE | 433 sq.m |
| G | STAFF CHANGE LOCKER (TWO STORYS) | 500 sq.m |
| H | CHILLER | 620 sq.m |
| J | BOILER | 385 sq.m |
| K | GENERATOR | 630 sq.m |
| L | GATE OFFICE | |
| M | WEIGH BRIDGE/CONTROL ROOM | |
| N | TRUCKS PARKING | |
| P | DRIVER ROOM | |
| Q | CAR PARKING | |
| R | CANTEEN | |
| S | MECHANICAL WORKSHOP | |
| U | GUEST HOUSE | |
| V | W.W.T.P | |
| W | U.G.W.T | |
| X | LAUNDRY | |

## SCHEDULE OF LEVELS

| | |
|---|---|
| AVERAGE GROUND LEVEL | 99.200m |
| EXTERNAL ROAD LEVEL | 100.000m |
| INTERNAL ROAD LEVEL | 100.200m |
| BUILDING F.FL | 100.650m |

| Revision | By | Checked | Approved | Date | Description |
|---|---|---|---|---|---|

Client

ENGRO FOODS LIMITED


Halcrow Pakistan (Pvt) Ltd.
3rd Floor Nawa-e-Waqt House
Mauve Area Sector G-7/1
Zero Point Islamabad.
Tel + 92 51 220 3451-5
Fax + 92 51 220 3462
www.halcrow.com


Halcrow

Project

**ENVIRONMENTAL IMPACT ASSESSMENT OF DAIRY MILK PROCESSING AND PACKAGING PLANT IN SAHIWAL**

Drawing

**PLANT LAYOUT**

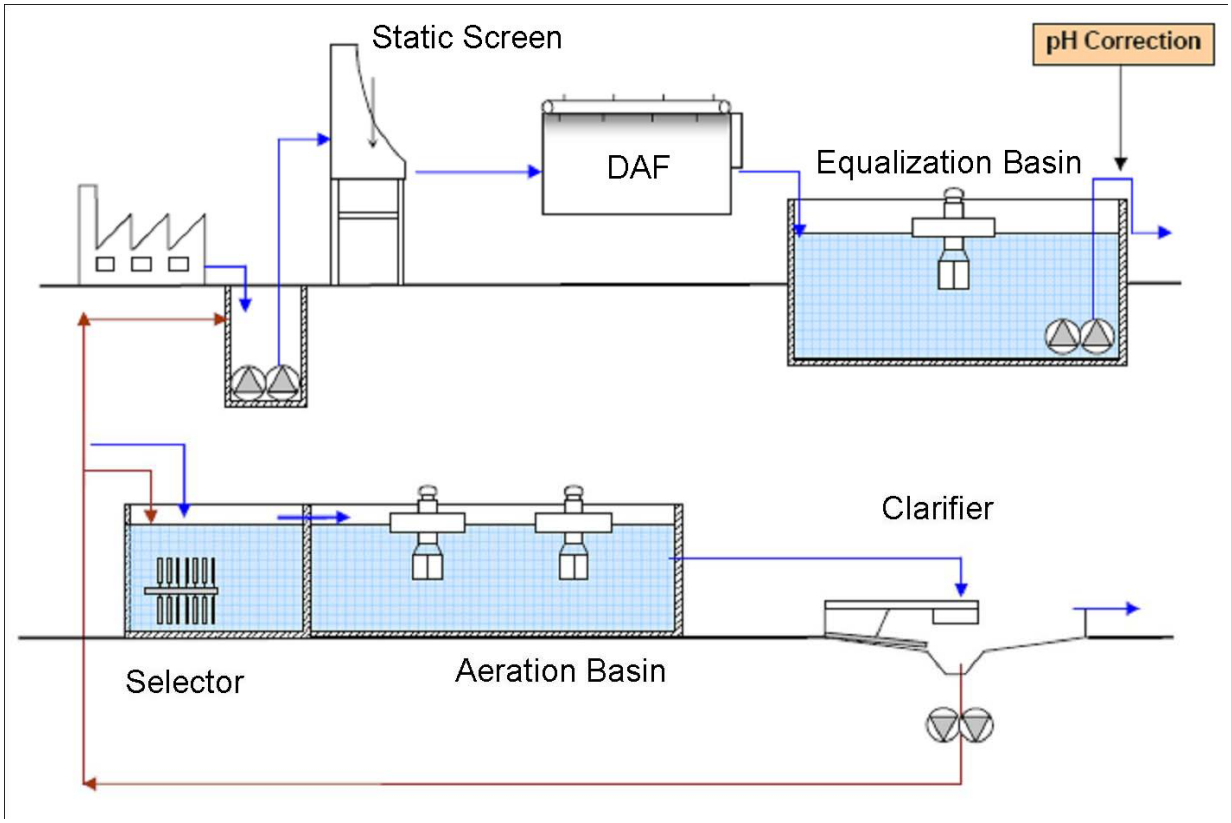
| | |
|---|---|
| Drawn by ZIH | Date: 04-01-2007 |
| Checked by AG | Date: 04-01-2007 |
| Authorised by JH | Date: 04-01-2007 |

Drawing No. **FIGURE 4-2** Revision

Drawing Scale: NTS. Plot Scale:

CAD Filename: PROJECTS/PKENGRO200

**Figure 4-3: Process Flow Diagram of Wastewater Treatment Plant**



## Photographs-Dairy Processing and Packaging plant

Photograph 4-1: Milk Reception Point


Photograph 4-2: UHT Unit


Photograph 4-3: CIP

Photograph 4-4: Tray Packer

Photograph 4-5: UHT Milk storage

Photograph 4-6: Product loading in trucks

## Photographs-Wastewater treatment plant


Photograph 4-7: Wastewater Influent Pit

Photograph 4-8: DAF Unit

Photograph 4-9: Equalization Basin

Photograph 4-10: pH control (Acid Dosing)


Photograph 4-11: Aeration Basin

Photograph 4-12: Clarifier

# 5 Review of Alternatives

## *5.1 Project Alternatives*

Alternatives are generated and examined to determine the best method of achieving project objectives, while minimising environmental impacts (WB December 1996[1]). Alternatives that are generally reviewed for private sector projects include alternative site, timing, and technology. The analysis of some of the alternatives is not as exhaustive or strategic as would be required for public sector projects as the decision to invest in a particular sector is made by the project proponent. In some instances there will be an overlap between alternatives and mitigation measures, as alternative design, location, timing are also a way of impact mitigation.

### *5.1.1 Do-Nothing Alternative*

Dairy is one of the growing segment of livestock sub-sector and important component of Pakistan's economy. Pakistan is the fifth largest producer of milk in the world. Milk is a major part of our food consumption and an important element of our daily diet. In Pakistan as a food group, milk is second only to cereals in terms of per capita consumption. The per capita availability of milk at present is 185 litres, which is the highest among the South Asian countries. Pakistan, despite being the fifth largest milk producing country in the world, ranks low in terms of production of processed milk. Less than 3% of the total milk supplies in the country are processed through any form of treatment. Milk production in Pakistan has seen a constant increase during the last two decades. Recently, consumer preferences have changed in the favor of packaged dairy products, which ensure better hygiene and good value for money. There are almost 17 dairy plants operating in the country, which are insufficient to meet the local demand of processed milk and related products. As a result the country spent approximately 500 million Rupees in 2001-2002 alone on the import of milk related products.

In the Pakistan's Federal budget for the year 2006-07 dairy production is being exempted from sales tax while there would be no custom duty and sales tax on dairy and livestock equipment. Duty on packaging material of dairy products is being reduced to five percent. Moreover Livestock and Dairy Development Board as well as Pakistan Dairy Development Company have been launched with 3600 million rupees. These companies would establish 1200 model dairy farms and about 3000 animal husbandry farms. In the present situation the do-nothing situation is highly un-favourable. There is a large and untapped potential in the dairy industry. With a population of 160 million, a significant

1 World Bank December 1996. *Analysis of Alternatives in Environmental Assessments.* Environment Assessment Sourcebook, Update 17. The Environment Department, World Bank

demand for dairy products exists in Pakistan. Punjab is the leading province in milk production with a share of around 80%. The proposed dairy plant will benefit the local consumers in that it will supply them with the much in demand supply of clean, hygienic milk that is safe for consumption and will also contribute to the improvement of the country's balance of payments.

### *5.1.2 Alternative Technology*

No significantly different alternate technologies are available for processing UHT Milk and UHT Cream and hence the selected technology is the only alternative available.

Similarly the Biological wastewater treatment is the recommended/suitable for dairy wastewater because dairy wastewater is high in dissolved organic matter .The BOD in the effluent is in the range of 150mg/l to 1400mg/l and alkaline in nature (ETPI 2000).

However alternatives are available for selection of fuel for power generators and boilers. Power generators under consideration for the project can run on natural gas and diesel. Similarly boilers can run on natural gas and diesel also. The preferred fuel options for generators and boilers is natural gas and diesel since diesel is a cleaner fuel than furnace oil and natural gas is also a environmental friendly fuel.

### *5.1.3 Alternative Project Timelines*

Consideration of alternative timings for construction or operation of a project are necessary in cases where there are social, physical or biological receptors that may be sensitive to the project at a particular time and the postponement of the project in these times can avoid any potential significant impacts (such as breeding seasons of threatened animals, flooding etc). No such considerations are necessary for the project as no significant sensitivities exist in the area that cannot be mitigated by management or physical controls.

### *5.1.4 Alternative Sites*

A total of four sites were studied and evaluated both by the proponent and the EIA team. These sites were evaluated from the perspective of impacts of the plant on the surrounding environment (on air, land, water etc) and vice versa. Three sites are located in Sahiwal district whereas the fourth one is located in Pakpattan district.

The dairy production operations are sensitive to the environmental quality of the surroundings and presence of any sensitive environmental receptors in close vicinity, point of discharge for effluent as well and the presence of odoriferous activities near the plant can affect the product quality. Other factors include the land area availability according to the requirement (25acres in this case) and approachability by main road for safe movement of heavy traffic. Of the four sites studied the proposed site in Sahiwal district (situated at a distance of 8km from Sahiwal city on Sahiwal-Pakpattan road ) is

evaluated to be the best possible option as it is according to the land area requirement and this site is approachable by main black top (Sahiwal-Pakpattan road). Treated effluent could easily be discharged into Sukh Biyas through 7km long pipeline laid along the left right of way of Sahiwal-Pakpattan road that flows at a distance of approximately 7km from proposed site.

# 6 Baseline Environmental Conditions

## *6.1 Physical Environment*

### *6.1.1 Physiology, Soil and Land Use*

Sahiwal lies between river Ravi and Old Sukh Bias river. The river Ravi forms the north-western boundary for the whole length of district**,** with district of Faisalabad and Toba Tek Singh on its farther banks. On the south-east runs the Sukh Bias separating district from the Pakpattan and Vehari districts. On the north-east, south-west and east-south lies the districts of Okara, Khanewal and Pakpattan respectively.

It is a flat plain formed by the Ravi. The general height of the area is about 150m above the sea level. The silt carries by the river Ravi compared with the other rivers of the old Punjab is small in quantity and deficient in fertilizing quality.

According to Geological map of Pakistan, soil of the region consists of recent alluvium of unconsolidated surficial deposits of silt, sand and gravel of Indus basin belonging to quaternary geological time scale.

According to land use map of Pakistan, Sahiwal falls in category of irrigated general cropping.

The proposed project area (Milk processing plant site and wastewater pipeline area) lies in Tehsil and District Sahiwal. The site for dairy plant is located on the east-south boundary of the district and towards east of main Sahiwal-Pakpattan road. It is presently used for agricultural and small industries. Small industries include rice processing plant, cotton ginning industry and oil extraction plant. The existing industrial machinery at site will be relocated to new site by the owner.. Partial construction of the proposed site will be demolished and construction material will be sold locally while partial construction will be retained and used by EFL. Total of 25 acres of land would be acquired for the proposed dairy plant. Presently 6 acres of land is being used for industrial purposes consisting of small cotton ginning plant, rice processing plant and oil extraction plant. Rest of the land is being used for agricultural purposes. The agricultural land consists of an orchard of oranges, guavas and mangoes over 14 acres of area and fields for cultivation of Potato. The land use in the surrounding of proposed project area is mostly agricultural and industrial up to a small extent. The site for dairy plant is bounded by small industries and poultry farm on north side, community towards south side and agricultural fields in eastern and western direction. Along the alignment of pipeline, land is generally used for agricultural, small industries, markets and housing purposes.

### *6.1.2 Climate*

a. Climate

The climate of the district is hot and dry. The summer season starts from April and continues till October. May, June and July are the hottest months. The mean maximum and minimum temperature for these months are about 42 & 28 degrees centigrade respectively. The winter season lasts from November to March. December, January and February are the coldest months. Minimum and maximum temperatures for this period are about 5 to 22 degree centigrade respectively. Dry, hot and dusty winds are common during summer.

Various meteorologists have developed classification schemes to describe local climatic features of Pakistan. Classification based on one of the schemes is described below.

Shamshad (1998) has classified the climate of Pakistan on the basis of characteristic seasons found in the country. Taking into account topography, proximity to the sea, rainfall, temperature, and winds, Shamshad has defined eleven climatic zones for Pakistan. Under his scheme, the project area falls under climatic zone classified as 'Semiarid lowlands'. The low land receives smaller rainfall between 254-635 mm. Agriculture is the main occupation of this zone. Irrigation is practiced to overcome the shortage of water. Infact, the irrigation system of the upper Indus basin has greatly improved the condition of the crop of the area. In this climatic zone the temperature starts falling after June, when the monsoon showers commences, and the post monsoon period is cooler than the pre monsoon.

b. Meteorological Stations and data

Recent metrological data with long term records of Lahore, Faisalabad and Multan stations is used to get an idea of climatic conditions prevailing in the region. These stations are located to the north-east, north and south-west of the project area respectively. These stations are maintained by the Pakistan Meteorological Department (PMD). The data and analysis provided below is based on a 20-year record (1984 to 2004) obtained from the PMD.

Climatic parameters for the three stations are summarised in **Table 6-1**. The average annual rainfall varies from 653mm for Lahore to 207.3mm for Multan. In recent years (2000-2005), annual average rainfall has been less than the long term average. Average annual rainfall from 2000-2005 is shown in **Table 6-2**. Most rainfall occurs in the summer monsoon from June to September as indicated in **Table 6-3**.

### *6.1.3 Air Quality and Noise*

The proposed site is located on Sahiwal-Pakpattan road at a distance of approximately 3.3km from Sahiwal by pass and 8km from Sahiwal city. As indicated earlier the project area falls under climatic zone classified as 'Semiarid lowlands'. In this zone surface winds

are usually light and it takes a long time for the visibility to improve when obstructed fog or dust haze. In summer, instability type dust storms (locally called Andhis or Jhakars) are common. The squalls associated with these storms sometimes cause severe damage to the light structures and trees. In spite of this danger, the climate is not unhealthy. Other sources of air pollution within the area could be the vehicular emissions from vehicles travelling on Sahiwal-Pakpattan road and dust emission due to their movement on nearby dirt tracks. There are number of small and large industrial units in the district. The proposed site is located in a sparsely populated area with scattered small industries and raw material storage areas in its surrounding. Small industries scattered within the district include flour mills, cotton ginning factories, rice mills, brick kilns, oil mills, milk collection and chilling centres.

The noise from the small scattered industries in the vicinity of the project area is not significant.

### *6.1.4 Water Resources*

a. Surface Water Resources

Two rivers passing along the district boundaries are the Ravi and Sukh Biyas. Irrigation in the district depends on Lower Bari Doab Canal (LBDC) which also flows through the Sahiwal District.

*The Ravi*

The Ravi has a longer course but is a much smaller river. Its banks are generally well defined and its course is considerably less tortuous than it used to be before the river was harnessed at Balloki. The bed is less sandy than that of the Sutlej and silt deposited by the floods is of exceedingly good quality.

The perennial flow in the Upper Bari and the Lower Bari Canals and the Balloki Sulemanki Link leave very little water in the river downstream of Balloki in the cold season.

*The Sukh Biyas*

The Sukh Biyas is smaller than the Sutlej. Water of the Sukh Biyas was also given to India under Indus Basin treaty, therefore, almost entire year it remains dry except in rainy season. Presently Sukh Biyas is being used as a drain for disposal of wastewater by number of industries. The Sukh Biyas also forms the boundary of Pakpattan and Sahiwal district. The proposed site is situated at a distance of approximately 7km from the Sukh Biyas.

*LBDC (Lower Bari Doab Canal)*

The Lower Bari Doab Canal (LBDC) takes off from the left bank of river Ravi at Balloki Barrage. The LBDC has been operational since 1917. It serves a gross area of 740,674ha (1,829,465 acres) and a command area of 675,667ha (1,668,897 acres). The 201km (124.6

miles) long canal is unlined in its entire length. One branch and 55-distributary or minor channels off-take directly from the main canal. Most of the system is gravity fed, 7 lift stations serve high lying ground in upstream reaches. The total length of the distribution system is 1,822km. These channels deliver irrigation supplies into tertiary channels or watercourses through 3,233 outlet structures.

After the Indus Water Treaty in 1960 which gave India the water rights on the rivers Ravi and Sutlej, the LBDC falls under the Mangla Command receiving water through inter-river transfer links from the rivers Jhelum and Chenab. The only water that Pakistan receives in the Ravi are the excess flood supplies, however, with the construction of the Thein (Ranjit Sagar) dam by India in 2001, these are expected to reduce as well. The main LBDC passes through the Sahiwal city.

The proposed site is situated at a distance of approximately 7.8km from LBDC and approximately 1.7km from 9/L (distributary of LBDC) and 180m from the minor of 9/L. Irrigation command area of proposed project area comes under 9/L distributary of LBDC. The canal water availability at the proposed project site is 18hrs/day, therefore it is used as a source of irrigation at the proposed site.

b. Groundwater

The ground water resources of the project area comprise of hand pumps and private tube wells. The water table varies from 30 to 70 ft and its quality is slightly saline. Tube wells are generally installed to a depth of 150ft and more. The proposed site and surrounding area is irrigated by tube wells and canal water. One tube well is also installed at the proposed site to cater the needs of the irrigation Two deep tube wells (one operational and one standby) would be installed at the proposed site to cater the water needs of dairy plant.

*Groundwater Potential*

According to hydrogeological map of the area (Source: WAPDA), groundwater yield in the vicinity of the project area varies between 50-150 $m^3$/hr down to the 150m and the aquifer is moderately thick and extensive.

*Groundwater Quality*

The water samples were collected from tube wells located at proposed plant site and nearby area for analysis. The results of water samples are attached at the end of the chapter.

c. Water supply schemes

Government water supply schemes exist in major towns of the Sahiwal. One tube well and pipeline network has recently been installed by government to supply water to the community of the project area. However water connections have not been given to the community till now. Private hand pumps and tube wells have been installed by the communities for domestic use.

### *6.1.5 Waste Disposal Facilities*

a. Solid Waste

General practice of solid waste disposal in the major towns of the district is to collect and disposed off by openly dumping it at scattered locations. No solid waste collection and disposal services exist in the project area.

b. Wastewater

Major towns of the Sahiwal are provided with sanitation facilities i.e. collection and conveyance for disposal in to irrigation canals at various locations. Additionally most of the wastewater is transported to a location outside of Sahiwal city, from where it is supplied to agricultural fields. No proper treatment and disposal facility for wastewater exists in Sahiwal district. Sukh Biyas is being used as wastewater drain by the number of industries in the Sahiwal and Pakpattan District as well as by the Industries in the vicinity of the project area. The project area comprise of agricultural land therefore no sanitation facility exists in the area and its surroundings. As indicated earlier that proposed site is located at a distance of approximately 7km from the Sukh Biyas, therefore the treated effluent generated from dairy processing plant will be disposed off in the Sukh Biyas, conveyed via pipeline laid along the right of way of Sahiwal-Pakpattan road. The permission to dispose off treated effluent in the Sukh Biyas will be sought from irrigation department. During the site visit the XEN (Development) irrigation department was consulted to discuss the issue of wastewater disposal of the proposed dairy processing plant. The XEN agreed to allow the wastewater disposal in Sukh Biyas after proper treatment (within NEQS limits) and getting formal approval from the department. In this regard EFL will have to submit an annual fee to the irrigation department for the disposal of wastewater.

## *6.2 Biological Environment*

The proposed site for the dairy processing industry is located outside any notified protected area and mainly comprised of an old factory surrounded by Agriculture land. Beside agriculture fields, a well-established irrigation system including canals and watercourses exists in the area with planted trees flanking them. The distribution of avifauna and reptiles is heavily influenced with the human interventions and cropping pattern.

### *6.2.1 Data Sources*

a. Review of Secondary Data

Secondary data was extensively reviewed which provides a detailed insight into the biological environment of the area. Studies include works of Roberts (1967) and Schaller (1977). Information on other secondary data sources consulted during the EIA study is provided in the references section of the EIA report.

b. Consultation with Concerned Departments

In order to discuss the concerns and present threats to biological environment, meetings were arranged with wildlife, forest, highway and irrigation departments.

c. Field Visits

The survey team collected primary field data during December 2006 to record the different aspects of ecology of the area including floral and faunal attributes. Photographic records of field visit during the EIA study is shown at the end of this chapter.

### *6.2.2 Habitats and Flora*

The project area is located in tropical thorn forest vegetation zone of Pakistan (Roberts 1991) which now has been completely altered and now under agriculture and other human use. During field visit only one major habitat i.e. agriculture fields was noticed with linear plantations along watercourses and channels. Since the project site is located on a main road, vehicular traffic and movement of local people have further influenced the habitat.

a. Description of Project Site/agricultural fields & orchards

Major crops cultivated in the area include cotton, wheat, sugarcane, hybrid fodder and rice replacing the natural tropical thorn vegetation. However, examples of the original natural vegetation can be seen in isolated pockets such as graveyards and un-commanded relatively high areas. A small orchard of citrus, guava, black plum and mangoes has also been planted at project site. Vegetables such as potatoes have also been cultivated at a small patch of proposed site. In addition to the cultivated crops and orchards, linear plantations of Poplar, Eucalyptus, Kikar and Shisham are common in the vicinity of project area.

Scattered avifauna was observed in agriculture fields and these species are only those, which have adapted to human inhabitation and vehicular traffic. The crop patterns and fruit season influence the distribution of birds. Fruit eating birds are greatly attracted when black plum trees are bearing fruit. The birds noted in agriculture areas are Common myna, House crow, House sparrow, Collared dove, Little brown dove and Red vented bulbul.

### *6.2.3 Fauna*

a. Birds

A total of 20 species of birds were recorded from the project area. A complete list of bird species observed in the project area can be seen in **Table 6-4**. With respect to avian fauna the most preferred habitat was agriculture fields close to linear plantation where from they get shelter and nesting sites. This area may also receive other species of birds during migratory season.

Overall, the project area is not very rich in avifauna. However, the number of species may be doubled with the arrival of migratory birds. Majority of the birds recorded are common in Pakistan and their presence in the project area is also in good numbers. Common birds include Common myna, House crow, House sparrow, Red-vented Bulbul, Pied Bushchat, Collared dove, Little brown dove and Indian tree pie. Most of these species were recorded in agriculture lands and on linear plantations close to human settlements.

b. Mammals

Only four mammalian species in the project area could be recorded from project site during field survey. All the four reported /observed mammalian species are commonly observed in the area. Dense crops like sugarcane provide shelter to Asiatic jackal, Indian crested porcupine and in some cases Wild boar. Grain stores and other stocks of edible items attract the rodents which are commonly noticed in close vicinity of human habitations. However such spots are not common in the project area as most of the plains are under irrigated agriculture and fruit orchards. However warehouses and abandoned buildings are the main shelter for such species which have altered their life style and have learnt to fetch food for their survival.

In comparison, the status of mammalian species (in terms of presence and abundance) in the project area is very poor. A complete list of the mammalian species observed/reported in the project area can be seen in **Table 6-5**.

c. Reptiles

Only three species of reptiles were recorded during the field visit. Like mammals, the project area is very poor in reptile population as entire area is under cultivation or extensive human use. Reptiles usually avoid the vehicular traffic which is frequently observed on roadside of project area. The agriculture practice, with extensive pesticide use hardly gives any chance for reptiles to flourish. However, the old buildings and trees are the shelter for these reptiles living in cracks or other cavities. A list of the reptilian species observed/reported in the project area can be seen in **Table 6-6**.

A photographic record of the faunal survey carried out during the EIA site visit is provided at the end of this chapter.

## *6.3 Socio-economic and Cultural Environment*

Sahiwal was originally known Gugera after the name of small village on the left bank of the Ravi river. It became a regularly administered area in 1849. With the advent of railways, the headquarter was shifted in 1865 to the present site known as Sahiwal, which was a small settlement of local 'Sahu' tribesman, and was named Montgomery after the name of Sir Robert Montgomery who was then Lieutenant Governor of the

Punjab. Honouring the wishes of the people of the district on 14th November 1966, the Government reviewed its old name, Sahiwal.

Sahiwal is mainly an agricultural district. A network of tube wells irrigates the district, in addition to the LBDC canal its distributaries, minors and sub minors. The agriculture in the district is heavily mechanized, capital-intensive and increasingly focusing on cash and value-added crops, such as, cotton, rice, sugarcane and fruits. The principle vegetables grown in the district are potatoes, cauliflower, pumpkins, radish, ladyfingers, onion, carrot, peas, and turnips. The main fruits grown in the district are mangoes, banana, watermelon, lemon, malta, guava and orange.

A random sampling survey was carried out with in the proposed project area and in its surroundings to collect first hand reliable and authentic socio economic data of the area. For this purpose a semi-structured interview schedule was used. Data from other published literature sources and the district census report have also been used. The information was collected with the objective to obtain a clear and complete understanding of the social and economic conditions of the locals, assess the vulnerability of the local communities and identify the concerns of locals regarding the proposed activity.

During the socio-economic field visit substantial information were collected that were required to understand the socio-economic conditions of the area and the impacts of the project on local communities. Since the socio-economic assessment and recommendations for mitigation measures primarily addresses the issue despite of individual/community. Issues related to individual/community will be mitigated through an on-site mechanism suggested in the EIA. The local residents will be able to register their complaints and grievances during the project and the individual or community not covered in this study will receive due compensation or mitigation for its complaint. Socio-economic environment and infrastructure of the project area is shown in **Figure 4-1**. A photographic record of the socio-economic environment of the project area is shown at the end of this chapter.

### *6.3.1 Location and Surroundings*

The proposed project area (Milk processing plant site and route of wastewater effluent pipeline) lies in Tehsil and District Sahiwal. Total land to be acquired for the plant site is 24 acres, 2 kanal and 17 marlas. The site is located at a distance of approximately 8km from district headquarter of Sahiwal and 7 km from Sukh Biyas. The site for dairy plant is located on the east-south direction of the district and towards east of main Sahiwal-Pakpattan road. It is presently used for agricultural and small industries. The 6 acres land of proposed site is being used for plants installed for rice processing, cotton ginning, and oil processing while 18 acres, 2 kanal and 17 marlas of land is being used for agricultural

purposes. The land is quite fertile and being irrigated by a 9/L (tributary of LBDC). One tube well is also installed to cater the needs of irrigation at proposed site.

The site for dairy plant is bounded by small industries and poultry farm on north side, community on south side and agricultural fields in eastern and western direction. The nearest community is situated at a distance of 200m from the proposed plant site in south direction. The population of this community comprise of approximately 80 individuals.

### *6.3.2 General Characteristics of the Area*

The known and populated town nearest to the proposed project area includes Wakil Wala (Badha and Chota), Jahan Khan and Bholey Ki Jhook of Sahiwal Tehsil. The communities of these villages mostly fulfil their daily needs from Sahiwal city, the nearest main commercial centre to proposed project area.

a. Major Biraderies

The oldest inhabitants of the district were the pastoral tribes along the Ravi and Sutlej river, who occupied well defined tracts in the district in pre-colonization days. They variously described themselves either as Jats or Rajputs, the distinction being tribes included the Kharals, the Sials, the Wattoos, the Khaggas, and the Kathias. Those on the Sutlej river included the Wattoos, the Joyas and the Hans. The colonization has dispersed these tribes all over the district.

Apart from these pastoral tribes, the other important old inhabitants of the district are the Arains, the Kambohs, the Chishtis, the Bodlas, the Syeds and Gujars. Other tribes of the district included the Baloch, the Bhattis, the Afghans, the Wazirs, the Khokhars and the Dogars.

In surveyed villages it is observed that main biraderies (castes) inhabiting close to the project area are *Johia, Baloch, Wattoo, Rajput, Jats, Wazir* and *Arain*.

According to 1998 census the Muslims population of district Sahiwal is 96.7%, out of which *Sunni* sect is more prevalent through out the whole district. Other dominant minorities in the district are Christians and Ahmadis and some other schedule casts in very small number.

b. Basic Amenities

The town and villages nearest to the project area are inter-connected through Sahiwal-Pakpattan black top road. The access to most of the villages in the district Sahiwal is provided through metalled roads. The district is also served by a railway line. The main railway line from Karachi to Peshawar passes through the district along the Shahra-e-Pakistan. It directly connects the district headquarter Sahiwal with its tehsil headquarter.

Electricity and telephone facilities landline/wireless are present in most parts of the district. Mobile phone facility has also been introduced in the area. Pipeline of Natural Gas also runs close to proposed project site along Sahiwal-Pakpattan road. Natural gas is provided in major towns of district only and facility is not available in small villages and in the surveyed areas near to project site, thus wood is predominantly used for cooking purposes. Some of the households also use LPG gas cylinders but their use is very limited due to high prices of LPG and readily available raw wood.

c. Languages

Punjabi is the dominant language in the district representing 98.1% population. Other dominant languages spoken in the district are Urdu, Pushto and Saraiki with a percentage of 1.4, 0.4 and 0.1 respectively. Other languages spoken in the district are Sindhi, Balochi, Brahvi and Dari etc. The proportion of people speaking Urdu, Siraiki and other languages except Punjabi and Pushto are more in urban area than in rural areas. The locals in rural areas follow their norms and values very rigidly/strictly than that of urban areas. But with the passage of time and development trends, these societal values have changed and are not followed as rigidly as these used to be in the past.

d. Water usage

The LBDC is the main source of irrigation in the district. It runs throughout the Sahiwal and Chichawatni tehsils parallel to Pakistan railway main line connecting Lahore with Karachi. In most of the areas significant quantity of canal water is available except the lands situated at the tails of minors, where irrigation water shortage is experienced mostly in dry seasons. Irrigation is also done by means of well and electric tube wells. The proposed project area is irrigated by canal irrigation while private tube wells have also been installed to overcome the deficiency of water for agricultural purposes.

Drinking water supply schemes have been developed by Government which mostly serve the population residing in major towns/villages of the district. The pipeline of the drinking water supply scheme has also been installed in the proposed project area and in the near future connections would be given to the local communities of the area. The percentage of population enjoying piped water facility through out the district is just 19.5. The remaining population fulfil their domestic water need from groundwater wells and hand pumps.

e. Pattern of Settlements

Settlements are mainly in the form of large and complex clusters/Pinds/villages. At places, these clusters are big blocks of 100 plus household while at other places small blocks of 5 to 10 households also exist. Generally aggregation of settlements is based on kinship relations, with each settlement being inhabited by descendents from the same family lineage. All the villages nearer to the proposed project site have usually two parts, the core and the suburbs. Usually the core contains the bulk of population while the

suburbs have cluster of houses along the roadsides where usually one family resides. There are two considerations for moving outside the core village. Firstly, to have easy access to the family's farmlands and roads; secondly as the population of a household grows denser; it requires more space for living. Another consideration is that of petty quarrels which compels a group of people to live outside the core village.

f. Demographic Profile

On the basis of 1998 Census, the total population of district Sahiwal was 1,843,194. The average annual growth rate was 2.1 percent. The average household through out the district consists of 6.9 persons per household, depending on type of household. In surveyed area near the proposed project site, the house structures are mostly kaccha in nature (60-70%) while the rest 30-40% are pakka/semi pakka houses.

g. Education

There are about 1434 educational institutions in the district in public sector; imparting education from the level of Mosque/Primary up to postgraduate levels. The private sector is also playing its role in the provision of education enhancement from primary level to college level with approximately 404 institutions throughout the district. The education facilities present in district Sahiwal are listed in **Table 6-7**.

The communities of the project area use local educational institutes for primary and middle level education and visit Sahiwal for higher level education. However people prefer to get enrolled their children at educational institutes of Sahiwal city for better quality of education.

h. Health

There is one District Head Quarter (DHQ) Hospital, one GHA Qayyum Hospital, one Tehsil Head Quarter (THQ) Hospital Chichawatni . Apart from these hospitals there are 10 Rural Health Centre (RHC), seventy five Basic Health Units (BHU), one Government Civil Dispensary, one Mobile Dispensary, eighteen Sub Health Centres, two Maternity Community Health Centre and one DT.B Centre in the district.

During a meeting with Medical Officer Sahiwal, he informed that acute respiratory diseases, gastroentitis, diarrhoea, viral diseases are the most common diseases in the district.

i. Economy of the Area

Economy of the project area is primarily dependent on agriculture and people are directly or indirectly involved in agricultural activities. A network of tube wells irrigates the district, in addition to a well-established canal irrigation network in the district. The canal water as well as groundwater is used for irrigation purposes in the areas. Mostly landowners have installed their own tube wells for irrigation purposes in addition to

canal irrigation system since they receive little quantity of canal water as compared to their requirements.

The existing standards and management levels of agriculture in the influence area of the proposed project is comparatively high. The agriculture in the district is heavily mechanized, capital-intensive and increasingly focusing on cash and value-added crops, such as cotton, rice, wheat, vegetables, sugarcane and fruits. The principle vegetables grown in the district are potatoes, cauliflower, pumpkins, radish, ladyfingers, onion, carrot, peas, and turnips. The main fruits grown in the district are mangoes, banana, watermelon, lemon, guava and orange.

As farmer's community of the district is very hard working and the area available for cultivation is very much fertile, therefore the production per acre is high and possesses great potentials for agricultural production provided sufficient water and fertilizers inputs is available. Fertilizers and pesticides are widely used for agricultural purposes.

Apart from agricultural district Sahiwal is playing key role in dairy related products. The practice of livestock rearing is carried out both for household dairy needs as well as commercial purposes. Most of the household in rural areas of the district owns usually cows, buffalos, goats and sheep. According to Executive District Officer (Agriculture) 2005 census report, buffaloes are the dominant milk producing livestock followed by cattle and goats and sheep respectively. **Table 6-8** shows the census of livestock being reared in the district. The government has established five veterinary hospitals, twenty nine dispensaries, one mobile dispensary and two animal insemination centres to ensure local and in time treatment facilities for the livestock of the district.

Other occupations involve the public and goods transport, government service, shop keeping and as daily-wagers. However the bulk of working force is engaged in labour and transport in different commercial centres in Pakistan.

j. Shrines & Graveyards

Each village has a separate graveyard on the outskirts in the Shamilat (combined land of one family or more) normally near to pind (village). However, one finds a small cluster of graveyards in areas inhibited by people living outside the core village. They keep their graveyards near themselves so that they can visit the graves of their dear ones for offering 'Fateha' (Prays). The graveyards are customarily visited on Eid's (annual festivals) mornings and other special occasions.

k. Archaeological Sites

Following three notified archaeological sites and monuments are located in Sahiwal district:

i. Mounds, Harappa, Sahiwal

ii. Mir Chakar's tomb, Satghara, Sahiwal

iii. Tomb of Syyed Daud Kirmani, Shergah, Sahiwal

Following two monuments in Sahiwal have been declared as "Special Premises" by the Government of Punjab.

i. Shrine of Hazrat Ala-ud-Din Mauj Darya

ii. A ruined mosque of so called Suri period at Dhawa Sharma, Tehsil Chicha Watni

No archaeological site or monuments is located in the vicinity of the project area.

l. NGOs

There is only one prominent NGO (Punjab Rural Support Programme, PRSP) working in the Sahiwal district.

**Table 6-1: Main Climatic Features**

| Parameter | Lahore | | Faisalabad | | Multan | |
|---|---|---|---|---|---|---|
| | Month | Value | Month | Value | Month | Value |
| Mean Daily Max Temp (°C) | Jan | 6.33 | Jan | 5.49 | Jan | 5.95 |
| Mean Daily Min Temp (°C) | June | 39.42 | Jun | 40.18 | Jun | 42.14 |
| Max Mean Monthly Rainfall (mm) | July | 191.4 | July | 79.7 | July | 51.9 |

Source: Pakistan Meteorological Department.

**Table 6-2: Average Annual Rainfall 2000-2005**

| Month | Rainfall (mm) | | | |
|---|---|---|---|---|
| | Lahore | Multan | Faisalabad | Average |
| Jan | 13.7 | 4.2 | 8.0 | 8.6 |
| Feb | 26.7 | 12.6 | 20.2 | 19.8 |
| Mar | 21.5 | 4.1 | 14.2 | 13.3 |
| Apr | 4.4 | 3.5 | 15.3 | 7.7 |
| May | 26.5 | 9.7 | 4.8 | 13.7 |
| Jun | 67.0 | 14.4 | 93.9 | 58.4 |
| Jul | 214.6 | 39.4 | 50.3 | 101.4 |
| Aug | 84.9 | 23.3 | 48.6 | 52.3 |
| Sept | 36.9 | 23.4 | 33.0 | 31.1 |
| Oct | 2.4 | 0.0 | 0.7 | 1.0 |
| Nov | 5.1 | 0.1 | 0.9 | 2.0 |
| Dec | 3.2 | 2.4 | 1.0 | 3.2 |
| Total | 509.9 | 137.1 | 290.7 | 312.6 |

Source: Pakistan Meteorological Department.

**Table 6-3: Monsoon Rainfall**

| Station | Average Annual Rainfall (mm) | Rainfall in Monsoon (July-Sep) | |
|---|---|---|---|
| | | mm | % |
| Lahore | 653.2 | 498 | 76 |
| Multan | 207.4 | 149 | 72 |
| Faisalabad | 323.3 | 243 | 75 |

Source: Pakistan Meteorological Department.

**Table 6-4: List of Birds observed/reported in the Project Area**

| No | Common Name | Scientific Name | Status | | Occurrence | | | | Listing | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Migratory | Resident | Common | Abundant | Less Common | Rare | WPA | IUCN Red List | CMS Appendix | CITES Appendix |
| 1 | Bank Myna | *Acridotheres ginginianus* | | x | | x | | | | | | |
| 2 | Black Drongo / King Crow | *Dicrurus macrocercus* | | x | | x | | | | | | |
| 3 | Black Kite | *Milvus migrans* | | x | | x | | | x | | | II |
| 4 | Black-Shouldered Kite | *Elanus caeruleus/E.leucurus* | | x | x | | | | x | | | II |
| 5 | Cattle Egret | *Bubulcus ibis* | | x | x | | | | x | | | III |
| 6 | Collared Dove | *Streptopelia decaocto* | | x | | x | | | | | | |
| 7 | Common Babbler | *Turdoides caudatus* | | x | | x | | | | | | |
| 8 | Common Quail | *Coturnix coturnix* | x | | x | | | | | | | |
| 9 | Hoopoe | *Upupa epops* | | x | x | | | | | | | |
| 10 | House Crow | *Corvus splendens* | | x | | x | | | | | | |
| 11 | House Sparrow | *Passer domesticus* | | x | | x | | | | | | |
| 12 | Indian Robin | *Saxicoloides fulicata* | | x | x | | | | | | | |

| No | Common Name | Scientific Name | Status | | Occurrence | | | | Listing | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Migratory | Resident | Common | Abundant | Less Common | Rare | WPA | IUCN Red List | CMS Appendix | CITES Appendix |
| 13 | Indian Roller | *Coracias benghalensis* | | x | x | | | | | | | |
| 14 | Indian Tree-Pie | *Dendrocitta vagabunda* | | x | x | | | | | | | |
| 15 | Indian/Common Myna | *Acridotheres tristis* | | x | | x | | | | | | |
| 16 | Little Brown Dove | *Streptopelia senegalensis* | | x | | x | | | | | | III |
| 17 | Purple Sunbird | *Nectarinia asiatica* | | x | x | | | | | | | |
| 18 | Red-vented Bulbul | *Pycnonotus cafer* | | x | | x | | | | | | |
| 19 | Red-wattled Lapwing | *Hoplopterus indicus* | | x | | x | | | | | | |
| 20 | Rose-ringed Parakeet | *Psittacula krameri* | | x | | x | | | | | | III |

**Table 6-5: List of Mammals observed/reported in the Project Area**

| No | Common Name | Scientific Name | Occurrence | | | | Listing | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Common | Abundant | Less Common | Rare | WPA | IUCN Red list | CITES Appendix |
| 1 | Asiatic jackal | *Canis aureus* | x | | | | | | III |
| 2 | Five stripped palm squirrel | *Funambulus pennantii* | x | | | | | | |
| 3 | Indian porcupine | *Hystrix indica* | x | | | | | | |
| 4 | House mouse | *Mus musculus* | x | | | | | | |

**Table 6-6: List of Reptiles observed/reported in the Project Area**

| No | Common Name | Scientific Name | Listing | | |
|---|---|---|---|---|---|
| | | | WPA | IUCN | CITES App |
| 1 | Spotted Indian House Gecko | *Hemidactylus brookii brookii* | | | |
| 2 | Garden Lizard | *Calotes versicolor* | | | |
| 3 | Indian or Bengal Monitor | *Varanus bengalensis* | x | | I |

**Table 6-7: Educational institutes of District Sahiwal**

| No. | Level | Male | Female | Private Sector |
|---|---|---|---|---|
| 1 | Masjid/Maktab Schools | 82 | 01 | - |
| 2 | Primary Middle/Elementry Schools | 362 | 574 | 345 |
| 3 | High Schools | 98 | 44 | 59 |
| 4 | Higher Secondary Schools | 12 | 11 | - |
| 5 | Community Model School | - | 44 | - |
| 6 | Degree Colleges | 3 | 2 | - |
| 7 | Post Graduate Colleges | 1 | | - |
| | **Total** | **558** | **676** | **404** |

Source: Executive District Officer (Education)

**Table 6-8: Livestock Census of District Sahiwal**

| No. | Name of Species | Total Number |
|---|---|---|
| 1 | Buffaloes | 510383 |
| 2 | Cattle | 185556 |
| 3 | Sheep and Goat | 610013 |
| 4 | Horses and Mules | 83613 |
| 5 | Camels | 1047 |
| 6 | Poultry | 509876 |
| | **Total** | **1900488** |

Source: Executive District Officer (Agriculture)

## Photographs of the Proposed Site and Surroundings -Physical Environment

View of existing factory at site

View of orchard and vegetables field at proposed site

View of distant view of factory at site

Sahiwal-Pakpattan road

Right of way for pipeline

Another view of ROW for pipeline

9L-Distributary

LBDC (Lower Bari Doab Canal)

Government tube well installed for water supply

Hand pump- a common source of groundwater abstraction

A well at proposed dairy plant site

Sukh Biyas

## Photographs-Biological Environment

Orange orchard at site

Guava and mango tree at site

Cattle egrets

Collared dove

Indian Roller

Five striped palm squirrel

## Photographs-Socioeconomic and Infrastructure


Engro's Farmer facilitation centre under one roof on Sahiwal-Pakpattan Road

A private livestock farm near the proposed site


Flour Mill on Sahiwal-Pakpattan Road

Oil Mill in the vicinity of proposed site


Cotton being transported to collection depot.

Government College Sahiwal

Brick kiln near the proposed site

View of Bholey ki Jhok Community

View of community Bara Wakeel Wala

Tea hotel along right of way

View of Jan Khan Village near Sukh Biyas

Sahiwal-Pakpattan road


Milk collection center of Gourmet


Milk collection center of Haleeb


Milk collection center of Nestle

Abdul Qayyum hospital Sahiwal

Transformer and power transmission line at existing factory

Harrapa Mounds

ENGRO
LABORATORY

**Engro Chemical Pakistan Ltd. - DAHARKI**

**User ID:** RAK



**Date :**

**Time:**

# Analytical Report

**Section:** Engro Foods Limited
**Product:** **Water**
**Lab #:** 06/018
**Field ID:** Sample # 01

**Received on:** 30/Oct/2006
**Analysed on:** 03/Nov/2006

**Quantity:** N/A
**From:** Shahbaz A Khan

| Test | Result | Unit | Specification | Comments |
|---|---|---|---|---|
| pH | 7.7 | | - | |
| TH | 176 | ppm | - | |
| Chlòride | 20 | ppm | - | |
| Conductivity | 805 | µS/cm | - | |
| Total D.Solids | 430 | ppm | - | |
| Total S.Solids | 0 | ppm | - | |
| Sulphate | 98 | ppm | - | |
| Silica | 23 | ppm | - | |
| Calcium Hardness | 84 | ppm | - | |
| Magnesium | 92 | ppm | - | |
| Sodium | 98 | ppm | - | |
| T.Iron | 0.16 | ppm | - | |

Analysed by: **MY**

Approved by: _____

Date: 03/Nov/2006

Remarks: _____

ENGRO
LABORATORY

**Engro Chemical Pakistan Ltd. - DAHARKI**

**User ID:** RAK


**Date :** 03/Nov/2006
**Time:** 05:25:32 PM

# Analytical Report

**Section:** Engro Foods Limited
**Product:** **Water**
**Lab #:** 06/019
**Field ID:** Sample # 02

**Received on:** 30/Oct/2006
**Analysed on:** 03/Nov/2006
**Quantity:** N/A
**From:** Shahbaz A Khan

| Test | Result | Unit | Specification | Comments |
|---|---|---|---|---|
| pH | 7.6 | | - | |
| TH | 168 | ppm | - | |
| Chlòride | 128 | ppm | - | |
| Conductivity | 1875 | µS/cm | - | |
| Total D.Solids | 1050 | ppm | - | |
| Total S.Solids | 0 | ppm | - | |
| Sulphate | 350 | ppm | - | |
| Silica | 17 | ppm | - | |
| Calcium Hardness | 80 | ppm | - | |
| Magnesium | 88 | ppm | - | |
| Sodium | 330 | ppm | - | |
| T.Iron | 0.10 | ppm | - | |

Analysed by: **MY**

Approved by: _____

Date: 03/Nov/2006

Remarks: _____

# 7 Stakeholder Consultation

## *7.1 Benefits of Consultation*

There is a growing consensus that timely and broad-based stakeholder involvement is a vital ingredient for effective environmental assessment, as it is for project planning, appraisal and development in general. The World Bank has found that public participation in EIA tends to improve project design, environmental soundness and social acceptability (WB May 1999[2]). Conversely, EIAs that fail to be inclusive tend to have less influence over planning and implementation, and consequently result in higher social and environmental costs.

Placing sufficient emphasis on stakeholder involvement in the EIA process can also improve the predictive quality of environmental assessments. This is because the prediction of impacts using EIA often requires multi-year information and good quality baseline data. Yet one of the most common problems with "conventional" environmental assessment is that time and financial limitations, and project cycle schedules, constrain the collection of such data. Hence predictions are often based on a "snapshot" picture, which can be misleading or inaccurate. In contrast, assessments that involve different stakeholder groups, including those in local communities, have greater potential to access a wider information resource-base, and in some cases, generations of cumulative knowledge of their local environment (IIED, September 1998[3]).

## *7.2 Legal Requirement for Public Consultation*

Public consultation is mandatory under the 2000 Regulations for all EIA studies. The Pakistan Environmental Assessment Procedures 1997 in its guidelines for Public Consultation further deliberate on the requirement for public consultation.

## *7.3 Public Consultation during the Project*

Consultations were held with the project proponent, regulators, government agencies, NGOs and local communities during the field visit of this EIA study. The outcomes of consultations with individual departments are summarised in this section. These have been used in the EIA for the understanding of the project area environment, expectations of different stakeholder groups, key sensitivities and proponent's expected obligations. The list of stakeholders consulted during the EIA process is shown in **Table 7-1**. The pictures of public consultation are given at the end of this section.

2 World Bank May 1999. *Public Consultation in the EA Process: A Strategic Approach*. Environmental Assessment Sourcebook, Update 26. The Environment Department, World Bank

3 IIED September 1998. *A Directory of Impact Assessment Guidelines*. International Institute of Environment and Development. Nottingham: Russell Press, Second Edition

a. Consultations with EFL Staff

Meetings were held with Mr. Ehsan-us-Sattar (Administration Manager, EFL Sahiwal) and Mr Shehbaz Ahmad Khan (Corporate Affairs Manager, EFL Sahiwal).

Pertinent details of the project were obtained from these people including location, size, processes, products, technology, production capacity etc. The EFL staff was involved with the EIA team in the environmental review of various alternative sites, field surveys for data collection, and the impact prediction and design of mitigation measures.

During discussions with EFL staff in Sahiwal it was informed that there will be a minor increase in traffic on the local roads and should not create any significant problems as the present load is not too heavy. Total milk requirement per day would be 400,000 litres. Milk will be collected from specified spots in Sahiwal, Pakpattan, Okara, and Khanewal, etc. The team was also informed that the company has earlier carried out a survey for potential milk supply places.

The EFL site staff also maintained that there would not be any significant environmental problems due to the Plant, as all relevant environmental laws would be strictly followed.

b. Mr. Nadeem Ahmad, Regional Manager, Engro Chemical Pakistan Limited, Sahiwal

The EIA team visited ECPL office to meet Mr. Nadeem who briefed the team regarding welfare activities being carried out by the group in the region.

He informed that ECPL had been working for community development in this region including provision of winter uniforms to needy students through NGO, maintenance and repair work in Government School, time to time donations for PRSP and Blind Association, donation for medical trust and provision of furniture for DHQ hospital Sahiwal.

c. Rai Hasan Nawaz, District Nazim, Sahiwal

The EIA team accompanied by Mr Shehbaz Ahmad Khan (EFL Corporate Affairs Manager, Sahiwal) met the District Nazim at his office. The main purpose of the meeting was to apprise the District Nazim of the proponent's activities and to seek his advice on all related issues.

Mr. Rai welcomed the idea of proposed developmental activity and assured that district management/administration will extend full cooperation to EIA team during the study and EFL during construction and operation phases of milk plant.

d. Mr. Hameed Amjad Warraich, DCO Sahiwal

EIA team accompanied by Mr Shehbaz Ahmad Khan (EFL Corporate Affairs Manager, Sahiwal) visited DCO office in Sahiwal. The EIA team briefed DCO regarding the EFL proposed project activities. DCO promised to extend his all support for establishment of dairy industry, as this will help the local community of the area in enhancing dairy

business. Further he added that development of industry will decrease the unemployment rate of the area.

e. Mr. M. Farooq Javed, DO (Agri) Sahiwal

The purpose of meeting with District Officer Agriculture was to brief him regarding EFL's proposed activities and collect information on various ruminants in the district, recent livestock statistics, and various breeds.

The EDO (A) welcomed the idea and termed the venture as first of its kind not only in Sahiwal as well as other surrounding districts. He opined that the required quantity of milk could be easily met from the various surrounding districts of the belt. He informed that buffaloes are abundantly found in the Sahiwal and other surrounding districts, which is the main source of fresh milk in the area. He further added that the average daily milk production is quite high in Sahiwal. Similarly the Sahiwal breed cow also produces above average milk and is found in sufficient numbers in the district. The population of various ruminants in the district can be seen in **Table 6-8**.

Mr. Javed suggested that through cultivation of Motgrass, Sada Bahar and Multi cut Bajra could fulfil the ever-growing need of green fodder for livestock, which have significant potential for improved milk production.

f. Dr. Khalid Pervez, Medical Officer (MO) Sahiwal

The purpose of meeting with MO Sahiwal was to get information on most common health related issues and to inform him about EFL's proposed activities. MO indicated that common diseases of the area include acute respiratory diseases, gastroentitis, diarrhoea and viral diseases.

g. Dr. Ghulam Mustafa, Deputy District Officer (Livestock), Sahiwal

The purpose of meeting with DDO (L) was to get information on most common disease of various ruminants in the district and to inform him about EFL's proposed activities.

Dr. Mustafa welcomed the idea of setting up of dairy plant in the district and provided details regarding common diseases of cattle and buffaloes. He briefed the team about the causes, its cure and available facilities for livestock vaccination against these diseases in the area. According to Dr. Mustafa, Gal Goto (Heamolagic Septesemia), Foot and Mouth, and Hemoglobonoria (red water or bleeding in urination) are fatal diseases in the district, while Worm Infestation and Mineral deficiency are the other common diseases of cattle and buffaloes. The common diseases of sheep and goat in district are Pneumonia, goat fox and sheep fox.

h. Engineer Ghulam Sarwar, XEN irrigation (Development), Sahiwal Division

The XEN (Development) was approached to ascertain the rules regarding waste water / effluent disposal in water in Sukh Biyas drain. The drain falls under administrative control of XEN Development, Sahiwal Division of Punjab Irrigation department.

Mr. Sarwar briefed that the team regarding the waste water disposal law of Punjab Irrigation Department. He indicated that industries are disposing off effluent in Sukh Biyas after getting formal approval from the department. He pointed out that permission would only be granted for disposal of wastewater in any water body coming under the jurisdiction of irrigation department by following the conditions stated below:

- Effluent must be treated before its disposal.
- The proponent will pay a pre-determined annual fees per cusec of wastewater discharge in favour of irrigation department.

i. Mr. Fahim Naseem, Environmental Protection Officer/Assistant Director (EPO/AD) Sahiwal

The EIA team met Mr. Fahim Naseem (EPO/AD) at his office in Sahiwal. The main purpose of the meeting was to inform Environmental Protection Agency of the proponent's activities and to seek their advices on all related issues.

Mr. Fahim welcomed the idea of setting up of Agro based industry in the area and provided information regarding EIA/IEE review process in Punjab.

j. Mr. Ahmad Nadeem Director EPA-Punjab, Lahore

The EIA team visited EPA office to meet with Mr. Ahmad Nadeem who is looking after the Director EIA position in EPA Punjab. The main purpose of the meeting was to inform EPA regarding the proponent's activities and discuss the EIA process for approval.

Mr. Nadeem was very optimistic regarding the establishment of dairy based industry in agricultural belt and briefed the team regarding the review process of Environmental Assessment studies.

k. Dr. Shagufta, Director EPA-Punjab, Lahore

The EIA team also met Dr. Shagufta (Director EPA) who is also looking after the review process of EIA and IEE for southern Punjab along with her primary responsibility of Director (ML&I) in EPA Punjab. The main purpose of the meeting was to brief her regarding the proponent's activities and discuss the EIA submission and approval process.

Dr. Shagufta informed the team that proponent would submit the study to DG EPA Punjab along with review fees. As the proposed project lies in southern Punjab, therefore the Director EIA will forward the report to her for further processing as she is looking after the EIA/IEE southern Punjab section. Accordingly she will forward the report to EPO/AD Sahiwal for further review and arrangement of public hearing. The EPO/AD will make necessary arrangements for public hearing at local level with approval of EPA authorities. The comments recorded during public hearing will be compiled and submitted along with recommendation to DG EPA for decision.

l. Mr. Liaqat Ali Khan Sulehri, DFO Sahiwal Division

Meeting was held with DFO Sahiwal Division with the objectives to inform and record his concerns regarding the EFL proposed activity. The DFO indicated that the proposed site is out of any notified protected area.

Mr. Liaqat further informed that plantation along all provincial and national highways are the property of forest department, therefore its protection is the primary responsibility of forest department. Damaging/cutting any tree/plantation along road side is a crime and punishable act under forest act and for cutting of any tree along road sides, a formal permission will be required from forest department.

m. Mr. Niaz Hussain, Regional Manger PRSP, Sahiwal

A meeting was held in the office of Mr. Niaz Hussain and the EIA team informed him about the proposed activities in the capacity of representative of Non Governmental Agency in the area.

The discussion mainly revolved around the present industrial practices, environmental problems due to industries in the area, environmental hazards specifically related to milk processing plants, concerns of civil society organizations on industrialization and various mitigation measures.

He stressed that all the environmental legislations and practices must be met by the proponent. He further added that the company should provide maximum employment to locals and deliver maximum indirect benefits to the local communities. He also requested that EFL should commence community development programmes in the area.

n. Mr. M. Arif Naik, Tehsil Municipal Officer (TMO), Sahiwal

The EIA team visited TMO Sahiwal office to meet with Mr. M. Arif Naik. The main purpose of the meeting was to inform TMO regarding the proponent's activities.

Mr. Naik was very optimistic regarding the establishment of dairy based industry in agricultural belt and briefed the team regarding the waste disposal facilities of Sahiwal city. According to Mr. Naik the municipal waste of Sahiwal city is collected but not disposed off properly and no facility exist in the rural areas of the district.

o. Dr. Nazir Ahmad, Administrator Rahimia Welfare Society

A meeting was held in the office of Dr. Nazir Ahmad and the EIA team informed him about the proposed activities in the capacity of representative of Non Governmental Agency in the area.

Dr. Nazir Ahmad also briefed the EIA team regarding the activities and health services provision for the poor community of the area.

The discussion mainly revolved around the present industrial practices, environmental problems due to industries in the area, environmental hazards specifically related to milk

processing plants, concerns of civil society organizations on industrialization and various mitigation measures.

He stressed that and the proponent must follow all the environmental legislations and guidelines and should follow best available environmental practices. He further added that the company should provide maximum employment to locals and deliver maximum indirect benefits to the local communities. He also requested that EFL should commence community development programmes in the Sahiwal area.

p. Zafar Iqbal Chaudhry, XEN Punjab Highway Authority Sahiwal

Meeting of EIA team was held at XEN highways office Sahiwal. XEN and SDO Highways (Khawar Zaman Khan) were present during the meeting. EIA team briefed both the officials about the project and informed that company wants to install the wastewater pipeline along the left ROW of Sahiwal-Pakpattan road. The XEN commented that the EFL would have to submit the proposed alignment of the pipeline and then the matter would be discussed with PHA higher management for approval. Approval would be granted subject to the submission of fee that would be paid to Punjab Highways Authority.

Further XEN added that EFL would have to contact forest department if cutting of trees along the alignment of the proposed pipeline would be required. Moreover, compensation fee for cutting of trees will be paid to the forest department.

q. Khurshid Qaisrani, District Wildlife Officer, Sahiwal

EIA team contacted district wildlife officer to have any idea of notified wildlife protected areas in the project area. Mr Qaisrani was briefed about the proposed project activities and location of project site. District wildlife officer informed that no notified wildlife protected area falls in the proposed project area. Therefore, wildlife department would not have any concern related to the proposed project activities. Mr Qaisrani encouraged the idea of development activity in the area.

r. Mr. Aftab Rasool Tarar, Deputy Director (HQ), Wildlife and Parks Department, Lahore

DD (HQ) was briefed regarding the proposed project activity. The DD indicated that the proposed site is out of any notified protected area, and suggested for the protection of environment, especially the effluent from dairy plant which must be treated to the acceptable levels before discharging into Sukh Biyas.

s. Muhammad Farooq Bhatti, Assistant Director (AD) Wildlife Multan

EIA team met Mr Bhatti at Lahore wildlife office. He was briefed about the proposed project activities in Sahiwal. Mr Bhatti told that Sahiwal region comes under his jurisdiction and wildlife department would not have any concern regarding the proposed project activities.

t. Hammad Naqi Khan, Director WWF Lahore

EIA team visited WWF office Lahore and briefed Mr. Naqi about the proposed project activities. Mr Naqi was informed that TOR for the proposed activities have been sent earlier in the name of DG WWF. Mr Naqi requested a copy of TOR's (which was later sent to him). He further informed that incase of any concerns these will be communicated to the EIA team. Mr Naqi also inquired about the disposal of wastes. He was told that wastewater would be disposed off in Sukh Biyas after proper treatment through wastewater treatment plant installed by EFL and solid wastes would be burnt at EFL incineration facility. Mr Naqi welcomed the idea of proper disposal of wastes.

u. Community Consultation

The communities residing near the proposed site and along the alignment of pipeline were visited as part of the community consultation survey. The objectives of consultation was to promote better understanding of the proposed operation through explaining its objectives and its potential positive and negative impacts; identify and address concerns of all interested and affected stakeholders; provide a mechanism to resolve issues identified by communities, before project plans are finalized and development begins, thereby, avoiding public out cry and resentment; instil trust between various stakeholders and the proponent to promote cooperation.

All the people with whom meetings were held were open to the idea of development in the project area. Some of the concerns raised during the community consultation are mentioned priority wise as follows:

- Locals favored the proposed activity in the area;
- The water quality in the nearby areas is saline and locals have no approach to clean piped water for domestic purposes;
- Women are mostly involved in agricultural activities and might face problem in their mobility during the construction and operation activities;
- Availability of employment to the locals during the project activities was stressed;
- The community demanded for financial aid to enhance daily milk production and increase livestock population
- No objections were raised regarding the project during the communities' survey.

**Table 7-1: List of Stakeholders Consulted During Visit**

| S.No | Name | Designation | Department/Organization |
|---|---|---|---|
| 1 | Mr. Ehsan-us-Sattar | Admisnistration Manager, Sahiwal | Engro Foods Ltd. |
| 2 | Mr. Shehbaz Ahmad Khan | Corporate Affairs Manager, Sahiwal | Engro Foods Ltd. |
| 3 | Mr. Nadeem Ahmad | Regional Marketing Manger, ECL, Shiwal | Engro Chemicals Pakistan Ltd. |
| 4 | Rai Hassan Nawaz | District Nazim | Sahiwal |
| 5 | Mr. Hameed Amjad Wariach | DCO | Sahiwal |
| 6 | Mr. M. Farooq Javed | DO Agriculture (E) | Sahiwal |
| 7 | Mr. Abdul Qadoos Khalid | DDO Agriculture (E) | Sahiwal |
| 7 | Dr. Khalid Pervez | MO at EDO (Health) | Sahiwal |
| 8 | Dr. Ghulam Mustafa | Deputy District Officer | Livesstock Department Shiwal |
| 9 | Engineer Ghulam Sarwar | X.En Development | Department of Irrigation, Sahiwal Division |
| 10 | Mr. Fahim Naseem | Assistant Director / EPO | Sahiwal & Pakpattan |
| 11 | Mr. Ahmad Nadeem | Director EIA | EPA-Punjab, Lahore |
| 12 | Dr. Shagufta | Director ML&I | EPA-Punjab, Lahore |
| 13 | Mr. Aftab Rasool Tarar | Deputy Director (HQ) | Wild life and Parks Department, Lahore |
| 14 | Mr. Niaz Hussain | Regional Manger | PRSP, Sahiwal |
| 15 | Liaqat Ali Sulehri | DFO Forest | Sahiwal |
| 16 | M. Arif Naik | TMO | Sahiwal |
| 17 | Dr. Nazir Ahmad | Adminitrator, Rahimia Welfare Society | Sahiwal |
| 18 | Khurshid Qaisrani | District Wildlife Officer | Wildlife Department Sahiwal |
| 19 | Mr Aftab Rasool Tarar | Deputy Director HQ Wildlife | Wildlife HQ Lahore |
| 20 | M Farooq Bhatti | AD Wildlife Multan | Wildlife Department Multan |
| 21 | Zafar Iqbal Chaudhry | XEN Highways | Punjab Highway Authority, Sahiwal |
| 22 | Hammad Hasan Naqi | Director WWF | WWF (World Wide Fund) Lahore |

## Photographs-Public Consultation

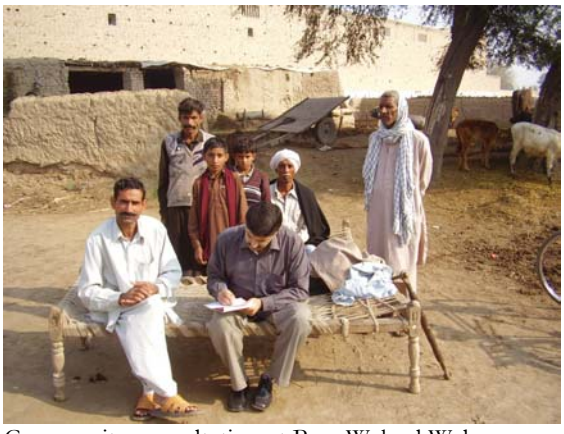
Meeting with District Nazim Sahiwal

X En Development, Irrigation Department

Consultation with DCO Sahiwal

Meeting with District Forest Officer Sahiwal

Meeting with TMO Sahiwal



Community consultation at Bara Wakeel Wala

Meeting with EDO Agriculture

Meeting with Medical Officer Sahiwal

# 8 Potential Impacts and Mitigation

## *8.1 Introduction*

The potential impacts related to the proposed project have been identified through professional judgement, experience, process understanding, and field observations. Impact significance has been assessed using a risk assessment approach based on the severity and likelihood of the potential impact. Mitigation measures are proposed based on regulatory requirement and industry guidelines.

A summary of the impact significance is provided in **Table 8-1** below where the impacts have been categorised as Low, Medium or High. None of the impacts fall in the High significance category. Low significance impacts are those that have either low severity or low likelihood of occurrence and can be controlled by standard mitigation practices. Medium significance impacts would need close attention and special mitigation and monitoring.

**Table 8-1: Impact Significance Matrix**

| No. | Potential Impact | Significance | | |
|---|---|---|---|---|
| | | Low | Medium | High |
| 1 | Landform and soils | | | |
| 2 | Air quality | | | |
| 3 | Noise | | | |
| 4 | Water abstraction | | | |
| 5 | Wastewater disposal | | | |
| 6 | Solid waste disposal | | | |
| 7 | Chemical and oil handling and storage | | | |
| 8 | Flora and fauna – general | | | |
| 9 | Flora and fauna – protected species | | | |
| 10 | Socio-economic – positive impacts | | | |
| 11 | Land use and land acquisition | | | |
| 12 | Environmental quality and nuisance | | | |
| 13 | Social services and utilities | | | |

| No. | Potential Impact | Significance | | |
|---|---|---|---|---|
| | | Low | Medium | High |
| 14 | Traffic congestion and road safety | | | |
| 15 | Cultural environment | | | |

## *8.2 Potential Impacts and Mitigation – Physical Environment*

### *8.2.1 Landform and Soils*

The proposed dairy plant site occupies a fairly levelled agricultural land with mainly silty or sandy soils. The construction of the plant at the proposed site will not lead to any significant alterations in the existing landform or topography.

For the pipeline potential sources of soil erosion may include clearing of land along the right of way – which will be 10ft. The pipeline will run along the Sahiwal-Pakpattan road to the Sukh Biyas. Due to the relatively flat topography, potential for soil erosion will be minimal. However a certain level of soil loss can be expected from poorly compacted backfills over buried pipeline. In order to minimize this soil loss, it is recommended that laying activities should be planned keeping into consideration two key principles 1) to minimize disturbance to soil by minimizing land clearing and 2) to minimize loss of soil from disturbed areas by ensuring soil binding. The soil surface initially disturbed should be sealed or compacted by engineering means. On the basis of the above it can be assessed that on a macro level soil erosion from pipe laying activity will not be a significant issue as trenches will be backfilled and compacted with 150 mm cover.

Detailed mitigation measures based on these principles are listed below.

- Unnecessary dust generation during construction will be avoided
- During construction earthworks will be limited to the demarcated plant area, unnecessary land uptake and clearing outside of the plant area (for parking etc) will be avoided
- The plant level will be set such that cut and fill operations are minimized and excavations are used as fill material
- The plant will have a storm water collection system so that the storm water effluent has minimal sediment load
- Land area requirements for pipelines will be kept to the minimum required
- Good engineering practices will be adopted during effluent pipeline laying activities to ensure that unnecessary clearing of vegetation and disturbance to soils outside work areas are avoided

- Topsoil of the RoW will be separately stored. This topsoil will be backfilled after proper compaction ensuring minimum loss of topsoil
- The backfill over pipeline will be compacted and right of way will be leveled to original condition

### *8.2.2 Air Quality*

There will be five sources of air emissions during the construction and operation of the plant and pipeline. Impacts from each source and proposed mitigation measures are discussed separately below.

**Dust** - During construction (and especially during earthworks) dust will be generated which can be potentially harmful to human health (both for the workers and the surrounding population). There are no major communities in the immediate surroundings of the proposed site; however, the construction workers will be exposed to dust. The exposure of construction workers to dust will be minimised by provision of dust masks and avoiding unnecessary exposure to dust. Vehicles speed will be regulated and monitored to minimize dust emissions.

**Flue gases -** The generators and boilers used during the operation will emit exhaust emissions including particulate matter, Hydro Carbons, oxides of nitrogen, sulphur, and carbon (NOx, SOx, COx). As Dairy Industry falls in Category-B therefore its emissions will be monitored and reported to EPA on quarterly basis. The emissions to be monitored include SOx, NOx, CO and particulates. All of these pollutants can potentially affect human health. Potential receptors to these pollutants will be the permanent residents at the plant, plant workers and nearby communities. To minimise impacts generators and boilers will be kept well maintained, emissions will be monitored to comply with NEQS limits, and the emissions will be vented through vertical stacks to minimise exposure at ground level.

**Fugitive emissions of hydrogen peroxide and cooling agents** – hydrogen peroxide used for sterilization of tetra packs will be scrubbed with water and effluent drained to the wastewater treatment plant. Non-CFC gases will be used as a cooling agent for cooling of chilled water and cold storage areas. The emissions of these may occur in the form of leakages or during maintenance operations. These fugitive emissions will be avoided by following a robust leak detection and maintenance programme.

**Burning of domestic and industrial wastes** – Incomplete (lack of Oxygen) and uncontrolled open burning of the solid waste especially aluminium foils and plastics can generate undesirable gaseous by products. All solid wastes at the plant and the guest house will be segregated and plastics, aluminium foils, glass, metal etc will be provided to local contractors from where they will be sent to the local recycling and reuse industry. All kind of combustible and non-recyclable solid waste including waste paper, cloth,

cardboard, packaging material etc will be incinerated. The left over aluminium foil will be then collected and sold.

### *8.2.3 Noise*

Noise levels in most parts of dairy plants are reported to be high (ETPI 2000[4]). The noise values at different locations of dairy plants measured by ETPI (2000) are as follows:

- Generator room: 104-110 dB(A)
- Ammonia compressor: 91-93 dB(A)
- Pasteurization section: 87-92 dB(A)
- CIP room: 90-97 dB(A)
- UHT section: 92-97 dB(A)
- UHT control room: 87-92 dB(A)
- Tetra pack filling section: 83-89 dB(A)
- Boiler house: 89-93 (dBA)

The OSHA standard for exposure to occupational noise (29 CFR 1910.95) specifies a maximum noise level of 90 (dBA) for duration of eight hours per day. Hence in areas with higher noise levels or longer shifts earplugs and earmuffs will be provided to workers. Since there are no communities or other receptors within close proximity to the proposed plant site it is also expected that World Bank standards for noise at property boundaries will be met, however, these will be monitored during the plant operation and any mitigation measures required will be taken. The noise producing machinery will be subjected to a regular maintenance programme to avoid producing unnecessary noise; where possible silencers will be fitted with noise producing equipment; additional controls such as damping, screening or lagging will also be used where required. Generators will be kept within enclosures to minimise dispersion of noise.

### *8.2.4 Water Abstraction*

Indiscriminate discharge of contaminated process wastewater is the biggest environmental concern at dairy industries. Approximately 1000 cu m of water will be required on a daily basis for the proposed project during full swing operation. The main water consumption will result from washing and cleaning of the plant equipment and milk supply tankers, cooling water, steam generation, and domestic use.

Industry currently uses only 2% of the total water consumption in Pakistan. Most industrial water is derived from privately owned wells, although a substantial amount is

4 Dairy Sector Environmental Report, ETPI, November 2000

also taken from the canal system (National Water Policy 2000). The National Water Policy encourages the decision makers to make available and reserve sufficient supplies of water for industry on priority basis to promote industrial development and economic growth. The Policy also requires that a water licensing system and water rates be formulated for the industry so that there is efficient use of the water resource by the industry and also calls for urgent attention to the need for industrial wastewater treatment prior to discharge in freshwater bodies.

During field survey it was noted that ground water is mainly used for domestic and agricultural purposes in the area. The water table varies from 30 to 70 ft and its quality is slightly saline. Tube wells are generally installed to a depth of 150ft and more. EFL plans to use groundwater for project use after treating it to the desirable levels. The groundwater is recharged by a network of irrigation canals and channels in the Sahiwal district (It is estimated that approximately 35% of the irrigation water is lost through seepage to groundwater aquifers).

To control and monitor water usage and avoid wastage the following measures will be taken:

- Efficient and low water consumption technology will be selected for the plant.
- Approvals will be obtained from relevant authorities or associations if surface water is to be used.
- Groundwater wells, if installed, will be spaced more than 300m from surrounding wells.
- Discharge from groundwater wells (if installed) will be measured on a monthly basis, any significant reduction will indicate low water availability and hence over abstraction in which case alternatives will be sought e.g. use of surface water with reduced abstraction of from groundwater wells etc.
- Water consumption will be metered and monitored so that excessive water usage can be noted and rectified.
- Unnecessary use and wastage should be avoided and for that awareness among management and workers is must.
- For ***water conservation*** the following measures may be adopted
  - Avoiding water leakages in pipes, pumps, tanks etc
  - It is estimated that reduction in water consumption up to 20-50$m^3$/day can be achieved by installing water guns/valves at the milk containing tanker washing area, recycling of last rinse for first washing of the next tanker and using first rinse of the tanker container washing in the process because it contains large quantity of milk contents after taking needed precautions

- It is anticipated that by optimizing Cleaning in place (CIP) procedures approximately 25% of water savings can be obtained .As the last rinse water in CIP process is clean, it could be stored and reused as first rinse water for next CIP process. It is possible to reuse the cleaning solutions that contain expensive chemicals such as caustic soda and nitric acid. It is estimated that approximately 50% consumption of chemicals can be reduced.
- CIP of the milk carrying tanks instead of the whole tanker body
- The most important factor in reducing wastewater strength is the adoption of dry clean-up techniques[5].
- Possibly recycling rinse water in tanker cleaning, last rinse from previous tanker for first rinsing of next tanker.
- Floor washing will be kept to the minimum required and spills, leakages of materials that further require floor washing will be minimized.
- Using dry mopping for floor cleaning where feasible instead of cleaning by running water.
- Cleaning trays and other utensils in rinsing baths.
- Reusing cooling and utility water for general cleaning operations.
- Minimizing water requirements during CIP by reducing rinsing times.
- Using continuous rather than batch processes to reduce the frequency of cleaning.
- Using high pressure rather than high volume for cleaning surfaces.
- Using compressed air instead of water where appropriate.
- Reusing relatively clean wastewaters (such as those from final rinses) for other cleaning steps or in non-critical applications.
- The cooling water and utility water that comes from compressors, condensers and pumps can be reused in various places like for floor washing, vessel rinsing, and tanker cleaning and also for irrigation propose.

### *8.2.5 Wastewater*

Generation of wastewater at dairy industries is characterised by very large volumes of discharge, besides the pollution loading from various dairy processes. In this respect, it is not only the quality (pollution load) but also the quantity (hydraulic load) aspect of the effluent that needs to be looked into. Estimates show that the proportion of the water discharge at a typical dairy industry per unit of processed milk ranges from 5.5:1 to 30:1.

5 Scottish Environmental Protection Agency Guidance Note IPPC S6.13 for "General Guidance for the Dairy & Milk Sector"

However, with newer and more efficient technologies this rate can be brought down to 3 times the milk processed per day (ETPI 2000). According to UNEP Cleaner Production Assessment in Dairy Processing, the typical water consumption range is 1.3–2.5 litres water/kg of milk intake in a reasonably efficient plants in developed world and by adopting the water conservation techniques mentioned in the report (previous section), water consumption can be reduced to as little as 0.8–1.0 litres water/kg of milk intake[6]. EFL will use the best available and reasonable technology in the proposed plant. Hence, the total wastewater generation will be approximately 1000 $m^3$/day.

A large quantity of water is circulated for cooling of different equipment like compressors, homogenisers and heat exchangers in dairy industries. Temperature of water gets heated up to 28ºC - 40ºC and is discharged as wastewater stream. Cooling water is relatively clean and unpolluted stream (ETPI 2000[7]). Moreover steam condensate will not be wasted and discharged as wastewater and it will be returned to boiler as feed water. Boiler blowdown will be done on intermittent basis and it mainly contributes to the high TDS value in the wastewater stream.

Typical wastewater generated from dairy plants is mostly alkaline and contains BOD, COD, TSS, TDS, TKN, and chlorides as pollutants. Typical ranges of these pollutants and their comparison with NEQS limits are provided below.

**Table 8-2: Typical concentration of pollutants in dairy wastewater**

| S.No. | Parameter | Concentration | NEQS |
|---|---|---|---|
| 1 | $BOD_5$ mg/l | 150-1400 | 80 |
| 2 | COD mg/l | 500 – 4000 | 150 |
| 3 | Oil and Grease mg/l | 20-400 | 10 |
| 4 | Sulphate mg/l | 300-1200 | 600 |
| 5 | pH | 7-10 | 6-9 |
| 6 | TSS mg/l | 200-3000 | 200 |
| 7 | TDS mg/l | 800-5000 | 3500 |
| 8 | TKN mg/l | 7-30 | - |
| 9 | Chloride mg/l | 100-1700 | 1000 |

**Source:** ETPI 2000

The direct discharge of untreated pollutants into any freshwater body can harm the aquatic life, the water quality and the health of the end users. Generally, wastewater treatment facilities have not been installed by Pakistan's dairy industries and wastewater discharges without any pre-treatment[8]. EFL will install a wastewater treatment plant

6 Cleaner Production Assessment in Dairy Processing, jointly published by UNEP Division of Technology, Industry & Economics (UNEP DTIE) & the Danish EPA.
7 Dairy Sector Environmental Report, ETPI, November 2000
8 Cleaner Production Opportunities in Pakistan's Dairy Industry

based on the activated sludge technology and supplemented by balancing tanks and oil and grease traps to treat the wastewater to the NEQS limits. The NEQS, however, do not specify limits for microbial content, for which World Bank standard of 400 MPN of Coliform bacteria/100ml will be used and achieved.

EFL will also self-monitor the treated effluent and submit quarterly reports to the Punjab EPA as per the self-monitoring and reporting regulation. The treated effluent after meeting the NEQS (for discharge into inland waters) will be discharged into the Sukh Biyas, which is allowed as per the local laws, where the effluent will receive more than the minimum 10 times dilution as required by the NEQS. Achieving the NEQS limits and more than the minimum 10 times dilution in the receiving body will ensure that the water quality is not affected. Achieving the NEQS will also mean that the disposal of the treated wastewater does not contravene with the provisions of the Canal and Drainage Act, 1873 (amended in 1952, 1965, 1968 and 1970).

At present all domestic and most of the industrial sewage in this portion of Sahiwal district is being disposed off into the Sukh Biyas River (directly or indirectly) without any treatment.

Mitigation measures for wastewater reduction, treatment, reuse and disposal are as follows:

- All mitigation measures related to water conservation and minimization will indirectly result in minimizing wastewater discharge. The wastewater will be treated using activated sludge treatment supplemented by dis-infection, balancing tanks and oil and grease traps
- Treated effluent shall be discharged into Sukh Biyas after getting formal approval from the concerned department.
- It is possible to reuse the cleaning solutions that contain expensive chemicals such as caustic soda and nitric acid. In doing so, minor addition of fresh chemicals, after every cycle, has to be the practiced. In this way saving in term of chemical usage and water consumption can be achieved. Also wastewater stream and pollution load can ultimately be minimised.
- The NEQS limits of disposal into inland waters and World Bank limit for bacteriological content of 400 MPN/100ml will be achieved.
- The wastewater treatment system will be designed to ensure that it can handle average and peak daily flows from the plant. To cater for peak flows, balancing tank will be used.
- The sludge from the activated sludge treatment system or balancing or sedimentation tanks will be dried, disinfected/matured and disposed into municipal landfills.

- To reduce use of water during operation and pollution load in waste water, the following simple and Best Available Techniques (BAT) in equipment design are suggested[9]:
  - Optimization of water pressure at jets and nozzles
  - Automatic water supply shut off on trigger operated spray guns or hoses
  - Use of high-pressure/low-volume systems
  - Automatic dosing of chemicals at correct concentrations
  - Internal recycling of water and chemicals
  - Continuous cleaning of recirculated solutions
  - Water-efficient spray devices

### *8.2.6 Solid Wastes*

Solid wastes production will include paper, packaging materials, metals scrap, construction materials etc. Issues related to burning of solid wastes and associated air emissions have already been discussed in the chapter. If left in the open and improper disposal these wastes can reduce the environmental and aesthetic quality of the area. To minimise such impacts, all solid wastes will be segregated and reuse and recycled where feasible.

Mitigation measures related to solid waste management include:

- Solid wastes will be segregated and stored in sheds
- All damaged cartons, waste office stationary should be collected, piled at a specified place and should be sold for reuse into paper industry instead of open burning
- Reusable and recyclable wastes will be sold to local contractors
- Plastics, aluminum foils or packing, and other similar material will not be burnt and shall be provided to local contractors from where they will be sent to the local recycling and reuse industry
- The proponent should make arrangements for composting of green waste in a properly designed composting facility.
- Combustible wastes will be properly incinerated

### *8.2.7 Chemicals and Oil Handling and Storage*

Chemicals and oil usage in the project is discussed in Chapter 4. These will be handled with care and stored inside bunded areas to contain any accidental spills. The spilled

9 Scottish Environmental Protection Agency Guidance Note IPPC S6.13 for "General Guidance for the Dairy & Milk Sector"

material may be recovered for reuse or drained with the wastewater streams and treated through the wastewater treatment plant.

Mitigation measures that will apply include:

- All chemicals and oils will be stored in non-leaking containers or packaging and will be stored inside bunded areas with no ingress of water or direct exposure to rainfall
- The bunded areas will have capacity equivalent to 120% of the product storage
- All storage areas will have concrete flooring
- Wherever possible raw materials and product should be kept out of the wastewater system[10].
- MSDS will be kept available at site and instructions related to handling and storage will be followed
- Spilled material will be collected and reused if possible. If reuse is not possible the spilled material will be disposed after proper treatment.
- Fuel and oil tanks will be regularly checked for leakages
- Drip trays will be used where required and feasible
- Any soil contaminated from minor spills will be collected, washed and then disposed and the wastewater drained for treatment through the wastewater treatment plant

## *8.3 Potential Impacts and Mitigation – Biological Environment*

### *8.3.1 General*

The proposed plant site lies in a non-protected wildlife area. The present land use is agriculture and industrial and hence there exists human presence and activity. The bird species and terrestrial mammal and reptile species common to the area have a fair spatial presence throughout the country and hence impacts on these species due to land uptake and acoustic and sensory disturbance will not be significant.

## *8.4 Potential Impacts and Mitigation – Socio-economic and Cultural Environment*

### *8.4.1 Macro Level Socio-economic Impacts*

The proposed project investment is significant. It will improve the investment scenario in the district and the province and will also provide direct and indirect benefits to the suppliers and contractors. The project is also in line with the country's strategy for the improvement and enhancement of the dairy sector and will provide the general public access to hygienic milk and milk products. It will also reduce the import of powder milk and other related products and will also possibly open up similar investments by other

10 Scottish Environmental Protection Agency Guidance Note IPPC S6.13 for "General Guidance for the Dairy & Milk Sector"

parties in the dairy sector. The dairy farm industry and the business of the suppliers of raw milk will also benefit from the project.

### *8.4.2 Socio-economic Impacts Specific to the Project Area*

a. Land acquisition and changes in land use

Up to 25acres of land will be required for the proposed plant and ancillary operations and facilities. The present land use is agriculture and industrial and the land ownership is with local people. EFL will acquire land from the local owners and pay them compensation as per the prevailing market rates. The land use for only the amount of land acquired will change to industrial from agriculture; the remaining land use in the surroundings will remain the same i.e. agriculture and industrial. There is no other land uses planned for the proposed site. Pipeline of wastewater will be laid with permission of Punjab highways authority along the right of way of Sahiwal-Pakpattan Road. The right of way will be levelled and compacted as close to the original condition after the installation of pipeline. Similarly cutting of tree along the right of way, if required will be done with formal approval of forest department. Fee for the usage of right of way and compensation for the cutting of tree if any will be paid to highway and forest department respectively.

b. Local economy, employment and household income

The local economy will benefit from the development of the proposed project since it will utilise local services (skilled and unskilled labour, contractors etc), materials, and equipment. The project will also generate employment opportunities for local communities and will improve household incomes in the nearby settlements.

c. Environmental quality and nuisance for local residents

Presently in the surrounding of the proposed site and along the alignment of pipeline there are few settlements and small markets. However, air emissions, noise, wastewater, solid wastes, dust etc can be a source of deteriorated environmental quality and increased nuisance for the public. Dust, spills, and wastewater overflows can have an affect on the surrounding land use and community. This will be avoided by adhering to the mitigation measures already proposed in the EIA.

d. Social services and utilities

The project is not expected to compete with the locals in the available social services and utilities. The plant will have its own water supply, electricity supply, wastewater treatment systems, and basic medical facilities. The water abstraction by the plant is assessed to have no significant adverse impacts on the water availability in the area. However, water abstraction should be monitored and designed to ensure that it does not reduce water intake of farmers in the area.

e. Traffic congestion and safety of road users

The present traffic load on the Sahiwal-Pakpattan road servicing the proposed site is low. Considering that there will be only up to 40 tankers reaching the site every day no significant traffic congestion is anticipated. However, the plant will have its own parking area so that the tankers do not park on the main road. The drivers will look out for any hazards, respect driving regulations, and will also reduce speed at any critical sections to avoid any road accidents.

f. Cultural Environment

There are no protected or otherwise sites of cultural or archaeological significance at the site or within 1km surroundings and hence no related impacts will occur.

g. Social Issues

Communities and settlements exist in the nearby vicinity of the proposed site and along the alignment of proposed pipeline. During field survey consultations were held with communities of the proposed project area. Everybody welcomed the idea of proposed project in their area and requested for giving due share in the employment. During the construction phase, pipeline installation and operation phase, any issues raised by the locals will be amicably addressed and resolved.

# 9 Environmental Management Plan

## *9.1 Objectives of the EMP*

The EMP provides a delivery mechanism to address potential impacts of the project activities, to enhance project benefits and to introduce standards of Best Environmental Practices (BEP) in all project activities. The EMP has been prepared with the objectives of:

- Defining roles and responsibilities of the project proponent for the implementation of EMP and identifying areas where these roles and responsibilities can be shared with other parties involved in the execution and monitoring of the project
- Developing a monitoring mechanism and identifying requisite monitoring parameters to confirm effectiveness of the mitigation measures recommended in the EIA
- Defining the requirements necessary for documenting compliance with the EMP and communicating it to all concerned regulatory agencies
- Prescribing the mechanism with which consultation with stakeholders during the project will be maintained.

## *9.2 Structure of the EMP*

The EMP consists of the following:

- Organizational Structure and Roles and Responsibilities;
- Environmental Monitoring Programme and Reporting
- Communication and Documentation
- Stakeholders Consultation Programme
- Change Management Plan

## *9.3 Roles and Responsibilities*

### *9.3.1 General*

a. Roles and responsibilities of Engro Foods Limited (EFL)

As project proponents, EFL will be responsible for ensuring the implementation of the EMP. The Director Supply Chain of EFL will be responsible for the overall environmental performance during the proposed project. He can delegate his responsibilities to HSE Engineer, who will have functional responsibilities on site for health, safety, environmental, and social matters.

b. Roles and responsibilities of contractors

For the proposed project, EFL may appoint contractors for the construction, commissioning, and maintenance of the plant. The contractors will be responsible for implementation of, or adherence to, the provisions of the EIA relevant to their respective areas of services.

### *9.3.2 Planning and Design of the Operation*

a. Design of the Operation

Design of the operation includes the activities described in the EIA. Following approval of the EIA, any changes in the operation or the requirements of the EIA will be handled through the Change Management Plan provided in the EMP.

b. Approvals

Obtaining No objection Certificate (NOC) from Environment Protection Agency Punjab (Punjab EPA) will not relieve EFL or its appointed contractors or suppliers of any other relevant legal obligations and hence EFL and its contractors and suppliers will obtain all other relevant clearances and necessary approvals required by the Government of Pakistan/Government of Punjab prior to commencing or during the project.

c. Contractual Provisions

Adherence to the requirements of the EIA and EMP in terms of environmental mitigation will be required from all project contractors and suppliers and thus EMP will form part of their contracts with EFL.

### *9.3.3 Implementation of the Operation*

a. Co-ordination with Stakeholders

EFL will ensure that co-ordination required with the project stakeholders on environmental and social matters as required by the EMP is maintained throughout the operation.

b. Environmental Management Systems

EFL and the contractors will ensure that the mitigation measures mentioned in the EIA are adhered to and organisational HSE Management Systems are implemented during the proposed project. The contractors will abide by the relevant contractual provisions relating to the environment.

c. Monitoring

EFL and its contractors and suppliers will ensure that monitoring of the project activities is carried out according to the monitoring programme given in the EMP.

d. Emergency Procedures

EFL will prepare contingency plans to deal with any emergency situation that may arise during the operation and communicate these to the regulatory agencies if required by these agencies.

e. Training

EFL and its contractors and suppliers will be responsible for the selection and training of their staff who are capable of completing the project activities in an environmentally safe manner. EFL and its contractors and suppliers will be responsible for providing induction to their staff members on the EIA, the EMP and their implementation provided in the EMP.

f. Communication and Documentation

EFL will ensure that the communication and documentation requirements specified in the EMP are fulfilled during the operation.

## *9.4 Environmental Monitoring*

### *9.4.1 Objectives*

The objective of environmental monitoring will be as follows:

- To check compliance with the EMP by self-monitoring or inspecting activities of the project on a daily basis. This will be called Compliance Monitoring
- To monitor and report effluents and emissions from the plant operations
- To monitor actual impacts of the project on selected sensitive receptors so that impacts not anticipated in the EIA or impacts which exceed the levels anticipated in the EIA can be identified and appropriate mitigation measures can be adopted in time. This objective will be achieved through Effects Monitoring

### *9.4.2 Compliance Monitoring*

Compliance Monitoring will be carried out to ensure compliance with the requirements of the EIA. EFL staff and contractors will carry out the inspection on a routine basis.

### *9.4.3 Effluents and Emissions Monitoring*

EFL will monitor and reports its effluents and emissions, as per the local self-monitoring regulations and report these to the Punjab EPA. The sampling and testing will be done at in house laboratory of EFL.

### *9.4.4 Effects Monitoring*

Considering the environmental conditions of the project area and the assessment of potential impacts of the project made in the EIA, the following monitoring programme will be undertaken:

- Water abstraction and consumption – the water abstraction will be metered and monitored and in the event of any unusually high water abstraction a water audit will be conducted to identify high water consumption areas, reasons thereof, and measures to reduce the high water consumption. In case groundwater wells are installed, reduced discharges will be noted and alternative strategies might be used such as using a combination of ground and surface water.
- Noise – EFL will measure noise levels within the plant on a quarterly basis (and earlier in case of complaints by workers or local communities) and the surrounding properties to ensure that the OSHA standards are being met.

## *9.5 Environmental Reporting*

The requirements related to environmental reporting after approval of the EIA are as follows:

- After receiving approval from Punjab EPA, EFL will acknowledge acceptance of the conditions of approval by executing an undertaking in the form prescribed in Schedule VII of the 2000 Regulations.
- After the end of construction phase of the project, EFL will obtain a confirmation from Punjab EPA that the requirements of the EIA and the conditions of approval have been duly complied with. The Punjab EPA in granting the confirmation of compliance may impose any additional control regarding the environmental management of the project or the operation, as it deems necessary.
- EFL will prepare and submit an annual report each year to Punjab EPA summarizing the production details, any plant modifications or extensions, details of the effects monitoring and environmental performance of the plant operations etc
- EFL will furnish self-monitoring reports to Punjab EPA for liquid effluents and gaseous emissions on a quarterly basis.

## *9.6 Public Consultation*

### *9.6.1 EIA Disclosure*

After submission of the EIA to Punjab EPA, Punjab EPA will advertise in a newspaper a public notice indicating a date for a public hearing and the place where copies of the EIA can be found for review purposes. Any interested party can also contact EFL at the following address for electronic copies of the EIA report:

> Shamsuddin A. Shaikh (Director Supply Chain, Engro Foods Limited, 6th Floor PNSC Building, M.T.Khan Road, P.O. Box 5736, Karachi 74000. Tel: 92-21-5611060-69, UAN: 111-211-211, Fax: 92-21-5610688, 5610401, Email: sashaikh@engro.com)

### *9.6.2 Public Hearing*

In pursuance to clause 10 of the 2000 Regulations, Punjab EPA after receiving the subject EIA from the proponent and issuing the confirmation of completeness will publish in national English and Urdu newspaper, a public notice mentioning the type of the project, its exact location, the name and address of the proponent, and the places at which the EIA can be accessed. The notice will fix a date and time and place for the public hearing for any comments on the project or the EIA. Any comments received by the Punjab EPA during or before the public hearing will be collated, tabulated and duly considered by the Punjab EPA in granting its decision on the EIA.

### *9.6.3 Post EIA Approval Consultation*

After approval of the EIA, EFL will report environmental performance of its project to Punjab EPA as per the EMP and applicable laws. This would serve as a communication channel with Punjab EPA. EFL will also encourage any visits by Government Departments or other interested stakeholders to review and verify adherence to mitigation measures related to impacts on physical, biological or socio-economic receptors of the area.

## *9.7 Site Inductions*

For the EMP to be implemented, EFL staff and required staff from EFL contractors and suppliers will be given induction trainings on the contents, purpose and implementation mechanism of the EMP.

## *9.8 Change Management Plan*

The EIA recognizes that changes in the EMP may be required during the future up gradation phase or increase in the capacity and/or product range to meet the increasing demand of dairy products. Therefore a Change Management Plan has been provided to manage such changes. The management of changes is discussed under two separate headings, changes to the EMP and changes to the Operation.

### *9.8.1 Changes to the EMP*

The EIA and the EMP have been developed based on the best possible information available at the time of the EIA study. However, it is possible that during the construction and operation phase some aspects of the EMP may need to be changed owning to their non-applicability in a certain area of operation or the need for additional mitigation measures during the construction and operation phase. In such cases following actions shall be taken.

A meeting will be held between EFL and the contractor. During the meeting the proposed deviation from the EMP, planning and designing will be discussed and agreed upon by all parties.

Based on the discussion during the meeting, a change report will be produced collectively, which will include the original EMP clause/plan or design, the change that has been agreed upon, and the reasons for the change.

The report will be signed by all the parties and will be filed at the site office. All relevant project personnel will be informed of the change.

### *9.8.2 Changes to the Operation*

The change management system recognizes three orders of changes.

a. First Order

A first order change is one that leads to a significant departure from the project described or the impacts assessed in the EIA and consequently require a reassessment of the environmental impacts associated with the change.

Examples of such change include:

- Change in location of the proposed plant

*Action Required*: Environmental impacts of the proposed change will be reassessed and sent to the Punjab EPA for approval.

b. Second order

A second order change is one that does not result in the change in project description or impacts that are significantly different from those detailed in the EIA. Examples of second order changes include:

- Increase in processing capacity above 50%
- Increase in product range such that assessment of impacts become invalid and some additional mitigation measures are envisaged
- Change in alignment of effluent pipeline
- Operation of Generators only on diesel fuel
- Extension in site area

*Action Required*: The required action for such changes is to reassess the impact of the activity on the environment and specify additional mitigation measures if required and report the changes to the Punjab EPA. Punjab EPA will review the change management statement and communicate any concerns. If EPA agrees with the assessment, it does not have to send a formal approval. 15 days after submission of the change management statement, the change will be implemented unless a communication to the contrary has been received from EPA.

c. Third Order

A third order change is one that does not result in impacts above those already assessed in the EIA, rather these may be made on site to minimise the impact of an activity such as:

- Increase in project workforce
- Increase in capacity less than 50% of the processing capacity
- Change in layout plan of plant
- Change in material of effluent pipeline

The only action required for such changes will be to record the change in the Change Record Register.

**Table 9-1: Mitigation management matrix**

| No. | Mitigation Measures | Action | Timing |
|---|---|---|---|
| **1** | **Land and Soil** | | |
| 1.1 | Unnecessary dust generation during construction will be avoided | Check water sprinkling | Construction phase |
| 1.2 | During construction earthworks will be limited to within the demarcated plant area, unnecessary land uptake and clearing outside of the plant area (for parking etc) will be avoided | Ensure strict compliance | Construction phase |
| 1.3 | The plant level will be set such that cut and fill operations are minimised and excavations are used as fill material | Check compliance | Construction phase |
| 1.4 | The plant will have a storm water collection system so that the storm water effluent has minimal sediment load | Check provision of storm water collection system | Planning and Design phase |
| 1.5 | Land area requirements for effluent pipeline will be kept to the minimum required | Ensure Compliance | Construction phase |
| 1.6 | Good engineering practices will be adopted during effluent pipeline laying activities to ensure that unnecessary clearing of vegetation and disturbance to soils outside work areas are avoided | Ensure Compliance | Construction phase |
| 1.7 | The backfill over pipeline will be compacted and right of way will be leveled to original condition | Ensure Compliance | Construction phase |
| 1.8 | Topsoil of the RoW will be separately stored. This topsoil will be backfilled after proper compaction ensuring minimum loss of topsoil | Ensure Compliance | Construction phase |
| **2** | **Air Quality and Noise** | | |
| 2.1 | The exposure of construction workers to dust will be minimised by provision of dust masks and avoiding unnecessary exposure to dust. | Check dust mask | Construction phase |
| 2.2 | To minimise impacts generators and boilers will be kept well maintained, emissions will be monitored to comply with NEQS limits. The emissions parameters to be monitored include Sox, NOx, CO and particulates. | Ensure regular tuning of generators and conduct exhaust emission test on quarterly basis | Construction phase and Entire operation |
| 2.3 | Exhaust emissions from generators and boilers will be vented through vertical stacks to minimise exposure at ground level. | Check provision of vertical stacks emissions | During installation of generators and boilers |
| 2.4 | Use Non-CFC gases as a cooling agent for cooling of chilled water and cold storage areas | Check compliance | During selection of Cooling equipment and machinery |
| 2.5 | The fugitive emissions will be avoided by | Regular check up of | Entire operation |

| No. | Mitigation Measures | Action | Timing |
|---|---|---|---|
| | following a robust leak detection and maintenance programme | pipes | |
| 2.6 | In areas with higher noise levels or longer shifts earplugs and earmuffs will be provided to workers. | Check safety measures (earplugs & earmuffs) | Entire operation |
| 2.7 | The noise producing machinery will be subjected to a regular maintenance programme to avoid producing unnecessary noise; where possible silencers will be fitted with noise producing equipment; additional controls such as damping, screening or lagging will also be used where required. | Check additional / Safety measures | Entire operation |
| 2.8 | Generators will be kept within enclosures to minimise dispersion of noise. | Ensure Compliance | Construction and operation phase |
| **3** | **Water Abstraction and Waste Water Disposal** | | |
| 3.1 | Efficient and low water consumption technology will be selected for the plant | Check water usage recod | Entire operation |
| 3.2 | Approvals will be obtained from relevant authorities or associations if surface water is to be used | Check record | During construction phase and entire operation |
| 3.3 | Groundwater wells, if installed, will be spaced more than 300m from surrounding wells | Check compliance | During construction Phase |
| 3.4 | Discharge from groundwater wells (if installed) will be measured on a monthly basis, any significant reduction will indicate low water availability and hence over abstraction in which case alternatives will be sought e.g. use of surface water with reduced abstraction of from groundwater wells etc | Check water usage and discharge records | Entire operation |
| 3.5 | Water consumption will be metered and monitored so that excessive water usage can be noted and rectified | Check water usage recod | Entire operation |
| 3.6 | Unnecessary use and wastage should be avoided and for that awareness among management and workers is must | Check training log | Entire operation |
| 3.7 | Avoiding water leakages in pipes, pumps, tanks etc | Regularly check pipes, pumps and tanks for leakage | Construction and entire operation |
| 3.8 | Installation of water guns/valves with the washing hoses at the tanker and floor washing areas (so that water can be turned off when not in use) | Check water usage recod and ensure compliance | Entire operation |
| 3.9 | Washing only the milk carrying tanks instead of the whole tanker body | Ensure compliance | Entire operation |

| No. | Mitigation Measures | Action | Timing |
|---|---|---|---|
| 3.10 | The most important factor in reducing wastewater strength is the adoption of dry clean-up techniques. | Check water usage record and ensure compliance | Entire operation |
| 3.11 | Possibly recycling rinse water in tanker cleaning, last rinse from previous tanker for first rinsing of next tanker | Check water usage record and ensure compliance | Entire operation |
| 3.12 | Floor washing will be kept to the minimum required and spills, leakages of materials that further require floor washing will be minimised | Check water usage record and ensure compliance | Entire operation |
| 3.13 | Using dry mopping for floor cleaning where feasible instead of cleaning by running water | Check water usage record and ensure compliance | Entire operation |
| 3.14 | Cleaning trays and other utensils in rinsing baths | Check water usage record and ensure compliance | Entire operation |
| 3.15 | Reusing cooling and utility water for general cleaning operations | Check water usage record and ensure compliance | Entire operation |
| 3.16 | Minimising water requirements during CIP by reducing rinsing times | Check water usage record and ensure compliance | Entire operation |
| 3.17 | Using continuous rather than batch processes to reduce the frequency of cleaning | Ensure compliance | Entire operation |
| 3.18 | Using high pressure rather than high volume for cleaning surfaces | Check water usage record and ensure compliance | Entire operation |
| 3.19 | Using compressed air instead of water where appropriate | Check water usage record and ensure compliance | Entire operation |
| 3.20 | Reusing relatively clean wastewaters (such as those from final rinses) for other cleaning steps or in non-critical applications | Check water usage record and ensure compliance | Entire operation |
| 3.21 | All mitigation measures related to water conservation and minimization should be adhered with. This will indirectly result in minimizing wastewater discharge. | Check compliance | Entire operation |
| 3.22 | It is possible to reuse the cleaning solutions that contain expensive chemicals such as caustic soda, and nitric acid. In doing so, minor addition of fresh chemicals, after every cycle, has to be the practice. In this way saving in term of chemical usage and water consumption can be achieved. Wastewater stream and pollution load can ultimately be minimised | Check chemical usage records and periodically test effluents | Entire operation |

| No. | Mitigation Measures | Action | Timing |
|---|---|---|---|
| 3.33 | The NEQS limits of disposal into inland waters and World Bank limit for bacteriological content of 400 MPN/100ml will be achieved | Periodic testing of effluents | Entire operation |
| 3.34 | The wastewater treatment system will be designed to ensure that it can handle average and peak daily flows from the plant. To cater for peak flows, balancing tank will be used | Check effluent quality periodically | Entire operation |
| 3.35 | The sludge from the activated sludge treatment system or balancing or sedimentation tanks will be dried, disinfected/matured and disposed into municipal landfills | Ensure compliance | Entire operation |
| 3.36 | To reduce use of water during operation and pollution load in waste water, the following simple and Best Available Techniques (BAT) in equipment design are suggested:<br>▶ Optimization of water pressure at jets and nozzles<br>▶ Automatic water supply shut off on trigger operated spray guns or hoses<br>▶ Use of high-pressure/low-volume systems<br>▶ Automatic dosing of chemicals at correct concentrations<br>▶ Internal recycling of water and chemicals<br>▶ Continuous cleaning of recirculated solutions<br>▶ Water-efficient spray devices | Ensure compliance | Entire operation |
| 3.37 | Effluent to be discharged in Sukh Biyas should be monitored and reported to EPA on quarterly basis. | Ensure testing and reporting on quarterly basis | Construction phase and Entire operation |
| **4** | **Solid Wastes** | | |
| 4.1 | Solid wastes will be segregated and stored separately for appropriate disposal | Check compliance | Construction phase and Entire operation |
| 4.2 | All damaged cartons, paper waste should be collected, and should be sold for re- use into paper industry instead of open burning | Ensure compliance | Construction phase and Entire operation |
| 4.3 | Reusable and recyclable wastes will be sold to local contractor | Check compliance | Construction phase and Entire operation |

| No. | Mitigation Measures | Action | Timing |
|---|---|---|---|
| 4.4 | Plastics, aluminum foils or packing, and other similar material will not be burnt and shall be provided to local contractors from where they will be sent to the local recycling and reuse industry | Ensure compliance | Construction phase and Entire operation |
| 4.5 | The proponent should make arrangements for composting of green waste in a properly designed composting facility | Check composting facility | Entire operation |
| 4.6 | Combustible wastes will be properly incinerated | Check compliance | Entire operation |
| **5** | **Chemicals and Oil Handling and Storage** | | |
| 5.1 | All chemicals and oils will be stored in non-leaking containers or packaging and will be stored inside bunded areas with no ingress of water or direct exposure to rainfall | Ensure compliance | Entire operation |
| 5.2 | The bunded areas will have capacity equivalent to 120% of the product storage | Check compliance | During design and construction |
| 5.3 | All storage areas will have concrete flooring | Check compliance | During construction |
| 5.4 | Wherever possible raw materials and product should be kept out of the wastewater system | Check compliance | Entire operation |
| 5.5 | MSDS will kept available at site and instructions related to handling and storage will be followed | Ensure compliance | Entire operation |
| 5.6 | Spilled material will be collected and reused if possible. If reuse is not possible the spilled material will be disposed after proper treatment | Ensure compliance | Entire operation |
| 5.7 | Fuel and oil tanks will be regularly checked for leakages | Check compliance | Entire operation |
| 5.8 | Drip trays will be used where required and feasible | Ensure compliance | Entire operation |
| 5.9 | Any soil contaminated from minor spills will be collected, washed and then disposed and the wastewater drained for treatment through the wastewater treatment plant | Ensure compliance | Construction and Entire operation |
| 5.10 | Training should be provided to all house keeping and plant staff on waste management. | Check training log | Entire operation |
| 5.11 | Training will be provided to staff members about the chemical nature, handling, and remedial measures (incase of spill). | Check training log | Entire operation |
| 5.12 | Best industrial practices will be followed during the operation | Check store record<br>Inspect store to verify record | Entire operation |
| **6** | **Socio-economic and Infrastructure** | | |
| 6.1 | Permission will be taken from Highway | Ensure Compliance | Before Pipeline |

| No. | Mitigation Measures | Action | Timing |
|---|---|---|---|
| | department and Forest department for use of ROW (for pipeline installation) and cutting of trees along the ROW if any respectively | | installation |
| 6.2 | Social issue if raised any during the construction phase will be duly adressed | Ensure Compliance | Construction phase |
| 6.3 | Compensation for the land acquired will be paid to the owner | Ensure Compliance | Land acquisition phase |
| 6.4 | Dust, particulates of milk powder, spills, and wastewater overflows can have an affect on the surrounding land use. This will be avoided by adhering to the mitigation measures already proposed in the relevant sections of the EIA | Ensure Compliance | Construction and Operation phase |
| 6.5 | The plant will have its own parking area so that the tankers do not park on the main road | Ensure Compliance | Operation phase |
| 6.6 | The drivers will be advised to look out for any hazards, respect driving regulations, and will also reduce speed at any critical sections to avoid any road accidents | Training to drivers | Construction and Operation phase |
| 6.7 | Priority in employment to local residents living close to the project location. | Ensure Compliance | Construction and Operation phase |
| 6.8 | Use local water sources only after complying with the relevant EIA requirements. | Ensure Compliance | Construction and Operation phase |
| 6.9 | Repair/compensate any damage to canal, water channels, roads or other infrastructure | Ensure Compliance | Construction phase |
| 6.10 | Observe strict compliance to Engro HSE guidelines. | Ensure Compliance | Construction and Operation phase |

# 10 Conclusions

The EIA has fully examined the project activities, the background environmental conditions of the project area and the impacts likely to arise from the project activities. Mitigation measures to help minimise the identified impacts have been recommended and an EMP has been provided for the implementation of these mitigation measures. On the basis of the above the conclusion of this EIA is that the residual impacts of the proposed operation will be of minor significance and careful implementation of the EMP will ensure that environmental impacts are managed and minimised and all statutory requirements are met by the project proponent.