Pearl Diary Farms Limited

EIS For The Proposed Pearl Diary Farms Mbarara Milk Processing Plant To Be Located On Plot 100, Folio 2, LRV 4045 Kashari Block Along Mbarara-Masaka Road, In Migamba Cell, Nyakinengo Parish, Biharwe Sub-County, Mbarara District

PREPARERS OF THIS REPORT

This Environmental Study centred on description of the project, its components and environmental setting. Analysis of the environmental impacts, and mitigation measures has been done and recommendations made by the team that undertook the study. Below is the description of the lead consultants who guided the study.

Muhumuza Moses Mugimba	BA Environmental Management, LLB, LP
Kukundakwe Wilbraod	BSc Industrial Chemistry
Asiimwe Danson B	B. Environmental Science

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Acknowledgements

The Assessment Team would like to thank all those who provided information that made it possible to prepare this EIS. In particular, the team would like to thank Migamba LC 1

Executive, neighbours to the project, the developers, Mbarara District Environment Office and the technical staff from NEMA.

Abbreviations and Acronyms

DDA	Dairy Development Authority
DNRO	District Natural Resources Officer
DWD	Directorate of Water Development
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
LC	Local Council
MAAIF	Ministry of Agriculture Animal Industry and Fisheries
MDLG	Mbarara District Local Government
NEA	National Environment Act
NEMA	National Environment Management Authority
NWSC	National Water and Sewerage Corporation
EIS	Environment Impact Statement
PDFL	Pearl Dairy Farms Limited
UEDCL	Uganda Electricity Distribution Company Limited
UNBS	Uganda National Bureau of Standards

1.0 INTRODUCTION

1.1 BACKGROUND INFORMATION

Pearl Diary Farms Limited (PAD) intend to operate Milk Processing services in Mbarara District in an effort to add value to liquid milk and ensure quality and service delivery in

the milk industry in the Western Region of Uganda. The proposed project will adhere to the standards set under the Diary Industry Act 1998 that provide guidelines for development and regulatory of processing and marketing of milk products in addition to standards set by the Uganda National Bureau of Standards (UNBS).

The plant would operate at 50% in the first year of operation and would grow at 10% annually with the target output of processing 30milion liters of milk in the first year.
The project is estimated to cost approximately Uganda Shilling Two Billion (2 Billion).

1.2 NATURE OF THE PROJECT

Pearl Dairy Farms Limited (PAD) is a Limited company registered in Uganda on April 14 2009. It intends to install and operate a milk processing plant with capacity of 200,000 litres per day in Migamba LC I, Nyakinengo parish, Biharwe Sub County, Mbarara District. The purpose of the project is to purchase the milk from the western region of Uganda and add value to the milk by processing liquid milk into milk products namely butter, cream, butter oil, ghee, skimmed milk, powdered, cultured milk products, frozen desserts and other products.

1.3 SUMMARY OF THE DEVELOPER'S DETAILS

Developer's Name:	Pearl Dairy Farm Limited
Names Of Promoters:	Mr Atul Mehra And Midland Group Of Companies
Nature Of Industry:	Dairy Processing
Contact Address:	Plot 29 B Acacia Avenue P. O. Box 7420 Kampala Uganda Tel: +256 414 349061/
Project Location	Plot 100, Folio 2, LRV 4045 Kashari Blockalong Mbarara-Masaka Road In Migamba Cell, Nyakinengo Parish, Biharwe Sub-County, Mbarara District
Project Cost:	Uganda Shilling Two Billion (2 Billion)

1.4 PROJECT AREA

The proposed project site is accessible at 5km from Mbarara Municipality on Mbarara – Masaka toad. It is located on plot 100, folio 2, LRV 4045 Kashari Block as per attached the land registration title in appendices. The project lies between 0^{0} 33.39.35 and 00 33' 54.30' by latitude and 300 42' 404' and 30^{0} 42' 180' by longtude

1.5 SCOPE OF THIS ASSESSMENT

Section 20 (3) of The National Environment Act (NEA) 1995, requires that all projects or policies that may or likely to or will have significant impacts on the environment be subjected to EIA so that adverse impacts can be eliminated so that adverse impacts can be eliminated or mitigated. This assessment complies with Ugandan statutory requirements of the NEA 1995, and requlation3 (1) of he EIA regulations, 1998.
The Scope of assessment phase comprised of the actual analysis of 5 key components.

i) Administrative/Judicial assessment in line with existing and relevant legal framework, regulations and standards.

ii) Socio-economic survey for the neighbouring households and people to get their perceptions on project interventions
iii) Environmental assessment – to document the negative and positive impacts associated to diary processing plant.
iv) Technical assessment to technical options to improve environmental performance.
v) Organizational assessment (How different stakeholders will participate in monitoring impacts of the project).

The Environmental Study includes adequate mitigation / preventive measures against, identified, potential adverse environmental impacts regarding the proposed project. The issues considered in-depth assessments during the EIA Study and preparation of the Environmental Report.

1. Identification and evaluation of all positive and negative environmental and socio-economic impacts associated with the project cycle.
2. Carrying out consultation with the immediate neighbours to the project site, lead agencies, developer and other stakeholders.
3. Assessment of the baseline conditions of the project site and the surrounding area
4. Suggesting mitigation measures for the adverse environmental and socio-economic impacts of the proposed service station
5. Analysis of project alternatives.
6. Providing an environmental management plan for the milk processing plant.
7. To establish the viability of the waste water treatment plant in mitigation of the waste water generated.
8. Producing an Environmental Report in accordance with the EIA Regulations of 1998.

1.6 PREPARATION OF THE ENVIRONMENTAL IMPACT STATEMENT

Enviro-Care and Management Limited has prepared this Environmental study which includes adequate mitigation / preventive measures against identified, potential adverse environmental impacts, regarding the proposed project.

1.7 METHODOLOGY OF THE EIA STUDY

- Printed and electronic literature survey to determine Legal & Policy Framework relevant to this proposed project.
- Determination of the characteristics of existing environment such as soils, properties, flora, drainage, aesthetics and socio-economic activities.
- Consultations with community in vicinity of the proposed project site
- Expert judgment to identify and characterize potential environmental impacts.
- Development of an Environmental and Monitoring Plan (EMP) to mitigate negative impacts and enhance the positive impacts.
- Compiling all findings in a report for submission to NEMA.

1.8 The Environmental Impact Statement

The rest of the EIS is organised as follows;

Section 2 consists of the regulations that were considered during this study;
Section 3 provides baseline information of the project site and the surrounding area;
Section 4 describes the project main components during the construction and operation phases;
Section 5 provides information on community consultations and analysis of project alternatives;
Section 6 looks at the potential negative environmental impacts and proposes preventive/ mitigation measures against potential adverse ones;
Section 7 comprises an environmental monitoring programme; and
Section 8 gives a summary and conclusions of the environmental study.

2.0 POLICY, LEGAL AND INSTITUTIONAL FRAME WORK.

2.1 INTRODUCTION

Environmental impact assessments are legal requirements and should be carried out for all developments that are likely to have negative impacts to the environment. This impact assessment of Pearl Diary Farms Limited Mbarara Milk Processing Plant falls under the third schedule of the NEA 1995 (processing and manufacturing industries including food processing plants) thus the need to undertake the study. The regulations that were considered during this exercise include:

2.2 Policy Frame work

2.2.1 Environmental Management Policy 1994

The overall goal of the policy is the promotion of sustainable economic of sustainable economic and social development that enhances environmental quality without compromising the ability of future generations to meet their own needs. One of the strategies identified to achieve this goal is the process of environmental impact assessment (EIA). The policy clearly states that an environmental Impact Assessment should be conducted for any policy or project that is likely to have adverse impacts on the environment. This statement is further embedded in the National Environment Act, Cap 153 Law of Uganda 2000 which makes EIA a Legal requirement for eligible projects and policies. The EIA for establishment of the Dairy Plant is therefore in line with the National Environmental Management Policy.

2.2.2 National Policy for conservation and Management of wetland resources 1995

Uganda was the first African country to develop a National wetlands policy. The strategy most pertinent to this study, as outlined in this policy, is transcribed below: 'Any wetland serving as a source of water supply of receiving affluent as part of a designated service to any human settlement shall be declared a fully protected wetland from any encroachment, drainage or modification'.

Explanation: wetlands can preserve the purity of water by their filtration and buffering capacity. One of the important reasons for this policy arises from the extensive drainage of wetlands for horticulture where these areas also serve as water purification centres. In addition, such drainage has led to changes to the hydrological cycle i.e. increase in floods, reduction in low flows and increase in sediment runoff.

2.2.3 Water Policy

In view of the proposed Dairy plant project, there is need to consider the provisions of the National Water Policy concerning water use and issues regarding waste water discharge from the proposed development. All measures must be taken by the developers to minimize accumulation of dangerous or toxic compounds in the sub soil capable of contaminating underground waters. The policy further states that the discharge of affluent will be subject to a permit in line with the provisions of the National Environment Act, Cap 153 and the Water Act, Cap 152. EIA is required for such developments.

The policy accords priority to water for domestic purposes, a position that is expounded upon in the water Act. It categorically states that in allocating water, water for domestic needs of a community should be reserved within the total available water from each water source.

2.3 Legal Framework

2.3.1 Constitution of the Republic of Uganda, 1995

This is the most supreme piece of legislation in Uganda. Among its key articles is article 39 which addresses matters of the environment. It states that: "Every Ugandan is entitled to a Clean and Health environment".

2.3.2 Land Act, Cap 227

The Act provides for the tenure, ownership and management of land. Land is to be utilized in accordance with the various laws listed in Section 43 including the Uganda Wildlife Act, the Water Act and the National Environment Act. Section 44 reiterates the constitutional provision creating a trust over environmentally sensitive areas as stipulated in Article 237(2) of the Constitution. Section 44 (4) prohibits Government or Local governments from leasing out or otherwise alienating any natural resource referred to in this section. Government may in terms of section 44(5), grant concessions or licenses or permits in respect of such land subject to any law. The permit would authorize use of the land in a manner stipulated by the relevant laws but would not confer ownership of the land. Use of land must conform to the provisions of the Town and Country Planning Act and any other laws (section 45).

2.3.3 Local Government Act 1997

The Local Government Act, 1997 provides for decentralization and devolution of government functions, powers and services from the Central to Local governments and sets up the political and administrative functions of local governments. The Local governments are responsible for the protection of the environment at the district level. In fact the Act empowers Local governments to enact ordinances and by-laws as long as they are in conformity with the Constitution of Uganda.

2.3.4 Town and Country Planning Act, Cap 30

The Act provides for the orderly and progressive development of land in towns and other rural areas of the country. It defines building operations to include the zoning of industries or factories and any other development in relation to any land in urban jurisdictions. Any building, construction or establishment of industries/factories must comply with the provisions of this Act.

2.3.5 Investment Code Act, Cap 92

The Investment Code Act sets out the procedure for acquisition of an investment license and the kind of information to be included in part III of the Act. It makes provision for the Investment Authority as a corporate body and distinguishes between foreign and non foreign investors. The Act in section 18(2) (d) requires the investor to take necessary steps to ensure that the operations of the business enterprise do not cause injury to the ecology or environment.

2.3.6 National Environment Act, Cap 153

The Act provides tools for environmental management that includes the conducting of EIAs. It imposes a mandatory duty on a project developer such as Pearl Diary Farms Limited to have an EIA conducted before implementing a project like the one under study.

The EIA Regulations, 1998 specify the types of projects to be subjected to EIAs. An EIA should be conducted for planned activities that may, are likely to, or will have significant adverse impacts on the environment. The EIA required should be appropriate to the scale and possible effects of the project, and therefore the National Environment Act and the regulations recognize three levels of EIA.

- An environmental impact review shall be required for small scale activities that may have significant impact;
- Environmental impact evaluation for activities that are likely to have significant impacts; and
- Environmental impact study for activities that will have significant impacts.

2.3.7 Water Act, Cap 152

The Water Act, 1995 provides for the use, protection and management of water resources and supply through coordination of all public and private activities that may influence water quality and quantity, and to allow for the orderly development and use of water resources for any activity requiring water use.

2.3.8 National Environment (Wetlands, Riverbanks and Lakeshores management) Regulation`

According to the regulations, Government or Local governments shall hold in trust for the people and protect wetlands, riverbanks and lakeshores for the common good of the citizens of Uganda. Government or Local government shall not lease out or otherwise alienate any wetlands, riverbank or lake shores.

2.3.9 National environment (Waste Management) Regulations, 1999

The regulations apply to all types of waste (non-hazardous and hazardous) and its storage and eventual disposal. Regulation 5 emphasizes waste minimization measures by making Cleaner Production a requirement for owners or operators of facilities that generate waste.

2.3.10 The National Environment (Standards for Discharge of effluent into Water or on Land) Regulation, 1999

The regulation provides for standards (maximum permissible limits) for effluent or waste water before discharge into water or on land, a general obligation to mitigate pollution, and a duty to keep records of amount of waste generated and parameters of the discharges.

2.3.11 National Environment (Noise Standards and Control) Regulations, 2003

The regulations aim to ensure that the people of Uganda are able to enjoy a healthy and tranquil environment through the regulation of noise levels. Of relevance to the proposed project are the noise levels that govern construction activities and factory operations.

2.3.12 National Environment (Control of smoking in public places) Regulations, 2004

The smoking regulations make it an offence to expose a person to the effects of second hand smoke. It makes it a duty for operators of establishments where people are likely to be exposed to second hand smoke, to put in place clearly marked signage ("No Smoking") restricting or prohibiting the practice; or designating areas where people can smoke without exposing others to the effects of cigarette smoke (especially non-smokers)

2.3.13 National Environment (Audit) Regulations, 2006

The environment audit regulations make it a requirement for every owner or operator of a facility whose activities are likely to have a significant impact on the environment to establish an environmental management system in accordance with the regulations. The system is supposed to include; a corporate environmental management policy; a plan for the implementation of the policy; and a mechanism for developing capabilities and support systems necessary for its effective functionality.

2.3.14 Dairy Industry Act; 1998

The Act was formulated to carry out regulatory and development functions of the Dairy Sector.. The aim was to provide development and regulatory (processing and marketing) services that would ensure increased production and consumption of milk and milk products in a sustainable manner. Furthermore, the Act provides the acceptable milk standards and coordinates its enforcement in liaison with the Uganda National Bureau of Standards (UNBS).

2.3.15 Public Health Act, Cap 269

Section 7 of the Act provides the Local authorities with administrative powers to take all lawful, necessary and reasonable practicable measures to prevent the occurrence of or deal with any out break or prevalence of any infectious, communicable of preventable diseases to safeguard and promote the public health conferred or imposed by this Act or any other law.

Section 105 of the Public Health Act 2000 imposes a duty on the Local authority to take measures to prevent any pollution dangerous to the safety of any water supply that the public has a right to use for drinking or domestic purposes.

2.3.16 Occupational Safety and Health Act, 2006

The Act repealed the Factories Act, Cap 220. Among the key issues, it addresses is the protection of employees by employers in as far as safety in the work place issues are concerned. Section 13 of the Act states that: "it is the duty of an employer to take, as far as is reasonably practicable, all measures for the protection of his or her workers and the general public from the dangerous aspects of the employer's undertaking at his or her own cost".

2.3.17 Employment Act, 2006

The Act revises and consolidates the laws governing individual employment relationships and provides for other connected matters. Section 5(1) of the Act addresses the issues of forced labour. It states that; " *No person shall use or assist any other person, in using forced or compulsory labour".*

2.3.18 Workers Compensation Act

The Act provides for compensation to workers for injuries suffered and scheduled diseases incurred in the course of their employment. Section 3(1) of the Act sets out the employer's liability in as far as compensation for injury to an employee is concerned. It states that; "If personal injury by accident arises out of land in the course of a worker's employment, the injured worker's employer shall be liable to pay compensation in accordance with the Act.

2.4 Institutional Framework

2.4.1 Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)

The Ministry ensures that policies regarding the agricultural sector are put in place. It is responsible for formulating and reviewing national policies, plans, legislation, standards and programmes relating to the agricultural sector in Uganda. Further, one of the functions of MAAIF is to promote the interests of the local governments, the private sector, farmers and other sector stakeholders in relation to the agricultural sector.

2.4.2 Dairy Development Authority

The Dairy Development Authority (DDA) is a statutory body under MAAIF. Established by the Dairy Industries act of 1998, DDA has regulatory and development functions on the diary sector. DDA's vision is to achieve a dynamic, regulated, profitable and sustainable dairy industry. The Mission is to provide development and regulatory services that will ensure increased production and consumption of milk, sustainable and profitable dairy industry sector that will contribute to the economic development and improved nutritional standards in Uganda.

2.4.3 Uganda National Bureau of Standards

Uganda national Bureau of Standards (UNBS) is the institution responsible for the regulation and development of standards in Uganda. As a regulatory body, it ensures that all products (food and non-food) processed here or entering the country conforms to the national standards to ensure sustainability and a healthy environment.

2.4.4 Ministry of Tourism, Trade and Industry

The mandate of the Ministry is to: "*To formulate and support strategies, plans and programs that promote and ensure expansion and diversification of tourism, trade, cooperatives, environmentally sustainable industrialization, appropriate technology, conservation and preservation of other tradable national products, to generate wealth for poverty eradication and benefit the country socially and economically.*"

2.4.5 Directorate of Water Development

The Directorate of water development is responsible for the regulation of the development and utilization of water resources and the entire water sector in Uganda. This includes the control of pollution of water resources such as rivers, lakes etc. DWD administers the Water Act, Cap 152

2.4.6 National Water and Sewerage Corporation

The National Water and Sewerage Corporation (NWSC) is a semi-autonomous public corporation with the mandate to supply clean, safe and piped water and provide

sewerage services in Uganda as per the Water Supply regulations of 1998 and the Sewerage Regulations of 1999. Currently, its services are mainly restricted to major urban areas ie the capital city, Kampala; urban municipalities and major towns. Mbarara Municipality is one of the areas currently being served by the Corporation

2.4.7 National Environment Management Authority

The National Environment Act Cap. 153, established the National Environment Management Authority (NEMA) as the principle Agency in Uganda tasked with the management of the environment, principally, coordination, monitoring and supervising all activities in the field of the environment. NEMA operates under the Ministry of Water and Environment, and has a cross-sectoral mandate.

2.4.8 Mbarara District Local Government

The Decentralisation Policy adopted in 1993 allows for the devolution of central government functions, powers and services to local governments and sets up the political and administrative functions of local governments. The Local governments are responsible for the protection of the environment at the district level.

3.0 ENVIRONMENTAL BASELINE CONDITIONS

This chapter describes the current state of the proposed project environment and the area surrounding it.

3.1 PROJECT SITE

The proposed development site is located E030°42.138' S00°33.803' according to the GPS with an Elevation of 4422' along Mbarara-Masaka road in Migamba cell, Nyakinengo parish, Biharwe sub-county in Mbarara District 5km from Mbarara Town on Mbarara – Masaka High way. The proposed site is bordered by Koranorya trading centre with a weekly market along the Eastern flank, an animal farm of the seller of the land in the Northern, Western and Southern flank, while Mbarara weigh bridge is in the Southern flank. Below are photographs portraying the immediate neighbourhoods of the proposed site.

	
The Project site having been levelled with Koranorya Trading centre buildings forming the eastern flank	The immediate western neighbourhood – cattle farm. Similar environment is to the south of the site
	
Part of the project site and the northern neighbourhood – Cattle farm	Part of the site and the far eastern neighbourhood after Koranorya market.

3.2 GEOLOGY

The geology of the area is underlain by the basement complex with the depth of bedrock varying from 9m to 89.4 m, with an average of 35.2m, thus the extent of weathering is rather extensive. The Precambrian basement rocks consist mainly of undifferentiated acids and basis gneisses.

3.3 PHYSIOGRAPHY / DRAINAGE

The area around the site is well drained. The existing constructed drainage system along Mbarara- Masaka road drains away much of the storm water from project site. Site storm water is directed to Rwebihuru valley south of the site.

3.4 VEGETATION COVER

The vegetation can be described as a combination of bush, shrub and short grasses as the project site is currently under communal grazing. The different ecosystems at the site can be described in the range of grass savannah and acacia savannah, to post cultivation communities. The site does not consist of any vegetation type of significance and its development will not affect any vegetation cover outside the project site.

3.5 CLIMATE

3.5.1 Rainfall

The rainfall is evenly distributed over the district and the annual average precipitation of 1021 mm is estimated for the district. Two rainy seasons, main season of march- may with peak in April and secondary season, in September to December with the peak in October/ November. The main dry season occurs from June to August, secondary dry season is January and February.

3.5.2 Temperature

The district generally records around 27°C mean annual maximum temperatures. The mean annual minimum is 15.1°C. The annual highest is 33.3°C while the annual lowest is 18.2°C.

3.6 Soils

Generally the soils are sandy, clay and slightly laterite loams with thick overlying quartzite concretionally materials in raised area while clay loams characterize the low- lying plains.

3.7 SOCIO- ECONOMIC ENVIRONMENT

3.7.1 Land tenure system

The project site area is owned by the proprietor under freehold tenure system with a land title registered by the Uganda Land commission with registration Number Plot 100, Folio 2 LRV 4045 Kashari Block Mbarara District.

3.7.2 Social services and infrastructure

The area is supplied with the following utilities: the NWSC water pipeline from the main water supply from Mbarara Municipality, UEDC grid power line along the Mbarara-Masaka road; main storm water drainage system along Mbarara- Masaka road on the

southern flank of the project site, a series of mobile telephone network and Mbarara Ministry of works Weigh Bridge station.

3.7.3 Demographic Characteristics

The annual population growth rate for Mbarara District was 2.9% as per, population census 2002, with the population density of 196/sq.km.

The Banyankole, Bahiima and Bakiga are the largest tribes in the district while the Banyankole and Baganda are the dominant tribes in urban areas in the district involved in commercial/ trading business. The milk processing plant will be located near Koranorya weekly market in Koranorya trading centre, Kakiika sub-county, Kashari county, Mbarara District.

3.8 LEAD AGENCIES WITH INTERESTS IN THE PROJECT

These include: NEMA, Ministry of Works and Transport, Ministry of Water and Environment, Uganda Diary Authority, Uganda Investment Authority, Mbarara District Local Government, Koranorya up coming trading centre, with roles to oversee that the project activities conform to set standards and existing legislations. According to the information gathered in the consultation process during the preparation of this report, the construction of milk processing plant doesn't have any encumbrances and will be undertaken in an environmentally friendly manner.

4.0 PROJECT CHARACTERISTICS

4.1 INTRODUCTION

Below is a description of the activities that would be involved in the implementation of the proposed project. The execution of the project activities are a potential for environmental, ecological and social impacts. Thus, the following sections identify and describe the key activities to be completed, the environmental performance standards to be adhered to, and the facilities to be constructed and operated over the lifetime of this project.

The first phase of development of the proposed project would cover the earthworks necessary before construction works to commence. Other than plant and administration buildings, the project would also include car parks; access roads; drainage system, waste water and facial matter handling, treatment and disposal facilities; standby generator house; and perimeter fencing.

To be able to establish this milk processing plant the following activities will be undertaken.

4.2 THE CONSTRUCTION PHASE

The major activities to be undertaken during this phase include:

- Clearing of site which involves vegetation clearance; the remove of shrubs, herbs and grasses.
- Excavation of murram.
- In-filling, levelling and stabilization for foundation structures.
- Improvement of the drainage system around the site to properly direct storm water.
- Construction of water borne toilet facility system to cater for sewerage.
- Construction of hump on access road towards Mbarara- Masaka Highway.
- Construction of a milk processing factory.
- Construction of administration buildings.
- Construction of a waste water treatment plant.
- Putting in place grass island and perimeter wall.
- Installing the company signage and road signage.
- Paving the drive ways and car parks.
- Construction of standby generator house.

4.3 THE MANUFACTURING PROCESS

The project life cycle includes activities that would take place right from the construction, through the operation, to the decommissioning phases of the proposed project.

The process will comprise of the following:

- Raw milk reception
- Filtration/ clarification and storage
- Separation and standardization
- Pasteurisation
- Homogenization
- Deodorisation
- Storage and packaging

- Shipment

Standardization

The fat content of milk varies with species of cattle. In order to provide the consumer with a consistent product, the milk is standardized. To achieve standardization, milk is processed through centrifugal separators to create a skim portion and a cream portion of the milk.

Separation produces a skim portion that is less than 0.01% fat and a cream portion that is usually 40% fat, although the desired fat content of the cream portion can be controlled by changing settings on the separator. The cream portion is then added back to the skim portion to yield the desired fat content for the product. Common products are whole milk (3.25% fat), 2% and 1% fat milk, and skim milk (< 0.1% fat).

Pasteurization

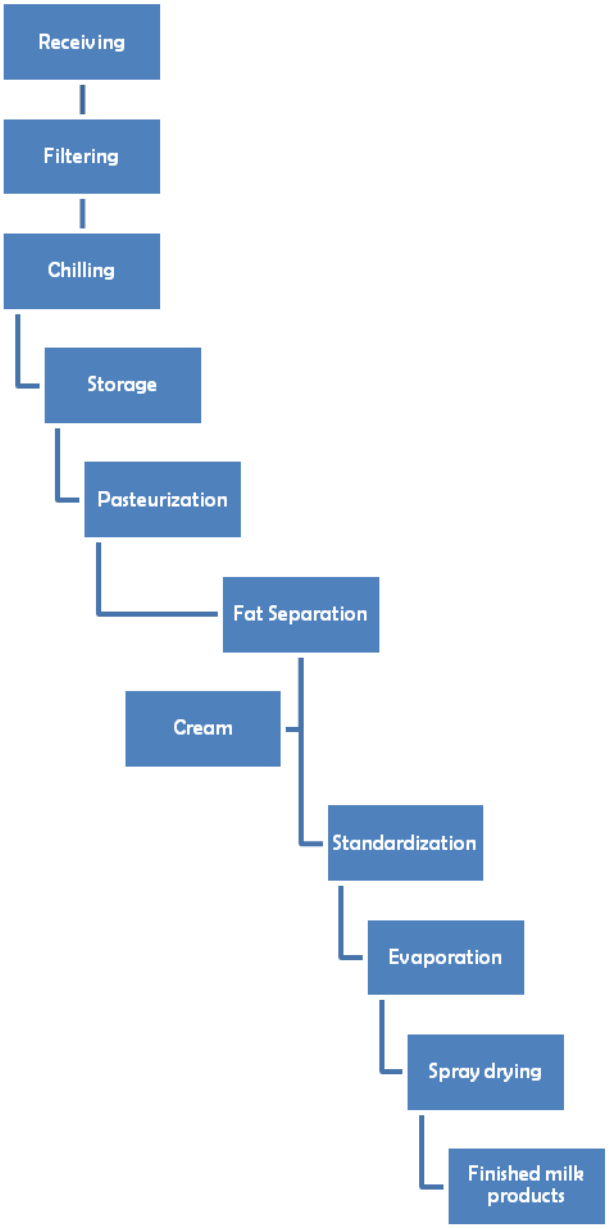
Milk is pasteurized using a high temperature short time (HTST) continuous process of at least 161°F (71.6°C) for 15 seconds. These conditions provide fresh tasting milk that meets the requirements for consumer safety. Higher heat processes, such as ultra-pasteurization or aseptic processing, are used to extend the shelf life of refrigerated products or allow for storage at room temperature, respectively, but may impart a cooked flavor to the milk.

Homogenization

The purpose of homogenization is to reduce the milk fat globules size to less than 1.0 μm which allows them to stay evenly distributed in milk. Homogenization is a high pressure process that forces milk at a high velocity through a small orifice to break up the globules. The result of homogenization is the creation of many more fat globules of a smaller size.

Milk will be processed to the intended products; liquid milk & Milk products, namely cream, butter, butter oil, ghee, cheese, skimmed powder, full cream, milk powder, cultured milk products, frozen desserts & other dairy products.

Below is the diagrammatic representation of the manufacturing process



A lot of wastewater will be generated during milk processing hence one of the major activities during the operational phase will be wastewater treatment.

WASTE WATER TREATMENT

The plant wastes shall be generally dilutions of milk or milk products together with detergents lubricants, chemicals, boiler blow down & washings of purging from heat transfer units and domestic effluent. Dairy industry wastes are characterized by relatively high organic demand.

The unit will discharge 500,000 litres of effluent per day. The main source of effluent is

- CIP of Tankers

- CIP of Milk processing equipments
- CIP of UHT/ Yoghurt/ Ice Cream equipments
- CIP of Evaporator and dryer

Process waste water

Quantity of milk processed	:	200,000 ltrs/day
Waste water co-efficient	:	2.5
Waste water generation	:	500,000 ltrs/day

Sanitary waste water

Non-residential workers	:	60
Waste water generation	:	1800 LPD
Residential Workers	:	40
Waste water generation	;	3200 LPD

Total waste water generated : 505,000 Litres Per Day

POLLUTION POTENTIAL OF WASTE WATERS

The parameters of concern in the wastewaters are PH, fats (O & G), suspended solids, dissolved solids, BOD and COD. The pollution aspects of each are summarized below:-

pH

In wastewater treatment employing biological processes, pH must be controlled with in a range favourable to the particular organism involved. The optimum pH for most micro – organisms is 7.0 with the range being 6.5 to 9.0. Thus for biological treatment the pH shall always have to be maintained in this range. Neutralization shall have to be resorted to as and when required.

Fats

While every precaution should be taken not to waste milk fat during dairy processing, dairy plant effluent inevitably contains fats. Removal of this fat is a necessary precursor to the treatment and disposal methods and are not easily decomposed by bacteria. They are compounds of carbon, hydrogen and oxygen in both receiving waters and waste-treatment plants. If they are not removed before discharge of the waste, they tend to coat surface and can interfere with the biological life in the waters and create unsightly floating matter and films.

Suspended solids

Disregarding any possible toxic effects attributable to substances leached out by water, suspended solids may kill fish, and by clogging the gills and respiratory passages of various aquatic fauna. Such oxygen depletion in turn results in the killing of fish, shell – fish and other aerobic organisms.

Dissolved solids

Most of the dissolved solids in dairy waste are organic in nature and are easily biodegradable. Thus they exert a heavy oxygen demand on the receiving waters causing noxious gases and odors. Pollutants such as acids alkaline heavy metals etc and various types of organic can make receiving waters unusable and may possibly destroy aquatic life and to osmotic effects which cause dehydration of tissue cells.

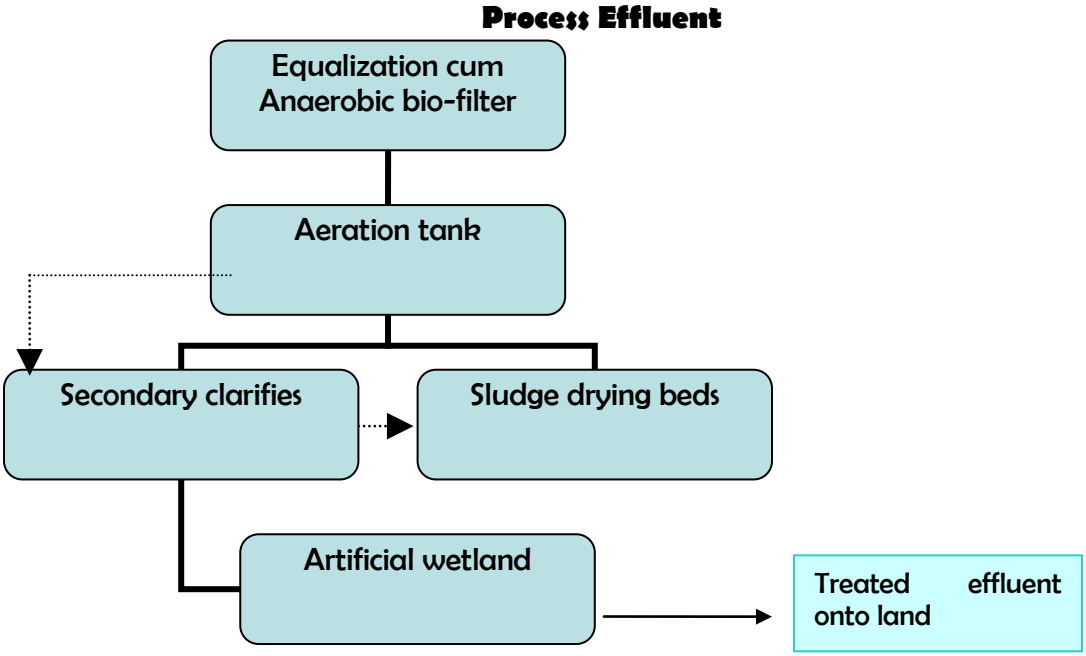
BOD & COD

These parameters are an indirect measure of the organic content generally carbonaceous of the wastewaters. These parameters measure the oxygen utilization of the organics present and hence indirectly indicate the possibility of oxygen depletion in the receiving water body. Whole milk has a high BOD about 1,000,000 mg/l thus even dilute milk solutions have a marked polluting effect. The major constituents which contribute to the BOD of dairy wastes are lactose, milk fat, protein and lactic acid. The BOD for untreated dairy wastes is most, frequently 50 to 70% of the COD value, but percentages as high as 80% and as low as 20% have been reported.

Waste Water Treatment Scheme

The Process for effluent treatment will comprise of the following:

- Screening and grit removal
- Sedimentation
- Biological treatment
- Sludge Digestion and disposal
- Tertiary treatment by constructed wetland as stipulated below:-



4.4 THE OPERATION PHASE

During the operation phase, regular maintenance activities at the dairy plant will be done to improve efficiency and minimize adverse effects to the environment. This will include but not limited to:

- Regular removal of sludge and solid sediments in the waste water treatment plant.
- Collection, storage and disposal of generated solid waste.
- Periodic upgrading and maintenance of emergency/ safety support systems namely first aid kit and fire fighting equipments.

- Proper maintenance of the physical structures namely administration block, factory, water borne toilet, washing rooms, waste water treatment plant, and generator room.
- Regular de-silting of storm water drainage system especially the side drainages along access road and drive-ways.
- Maintenance of grass-island to keep the green environment on the dairy plant.
- Laboratory testing of raw milk and milk products for compliance to set standards.
- Waste water quality testing at established monitoring points prior discharge into land and water.
- Periodic soft landscaping for site beautification activities of planting ornamental flowers and plants.

5.0 COMMUNITY CONSULTATIONS AND PUBLIC DISCLOSURE AND PROJECT ALTERNATIVES ANALYSIS

5.1 COMMUNITY CONSULTATIONS AND PUBLIC DISCLOSURE

Details of community views within the area of influence and those of other respondents are given in this section.

One consultative meeting was held on site. This enabled us to get views of different groups of people at the same time in addition to capturing a lot of information in the shortest time possible. Informal consultations were held with milk producers as to whether establishment of this milk processing plant would be beneficial to them.

As expected, the milk producers welcomed the proposal of establishment of this milk processing plant but were quick to add that treatment of the waste water should be done

Community members were very positive about the establishment of this milk processing plant and wanted the construction process to start as soon as possible.

The responses from sector agencies Mbarara District in particular was that long-term positive attributes associated with the establishment of this milk processing plant outweigh the negative impacts as long as the recommended measures are properly and effectively implemented. In particular they requested the need for a waste water treatment plant for the generated effluent.

The local leaders requested for employment of the local people during the construction and operation phases. Views of the people are highlighted in the table below.

Person Consulted	Designation/ Institution	Issues/ Comments Raised
Mwangu Isaac	Developer representative	Informed the members products to be produced. Requested co-operation of all stakeholders in the implementation of project. Assured employment to local residents.
Aftab A Siddiqui	Project Manager	- Assured members of first priority in recruitment. -need of faster process of EIA Study
Andrew Sinda	Neighbour/ seller of project land	- Requested for proper fencing of project area. -impacts of wastewater to environs -security concerns associated with factory workers.
Musingwire Jeconious	DNRO/NEMA INSPECTOR	-mitigation of all negative impacts associated with the project. -construction of artificial wetland as a final disposal point for wastewater. -acceptance of the project by all

		stakeholders. - securing EIA certification before commencement
Iddi Saturday	Resident Rwebihuro LC1	-immorality incidences in the area. -water use conflict on the existing NWSC pipeline. -welcomed the project.
Goriath Itima	Resident Rwebihuro LC1	-welcomed the project. -requested for employment opportunities -traffic accidents to road users.
Musiime Deo	Former LC111Chairperson, Kakiika Sub-county	- Welcomed the project. Employment opportunities for local residents. -wastewater treatment. - dust pollution during construction phase.
Benon Katsigazi	Neighbour/ LC1official representative	-welcomed the project. - Increase of income generating activities. -pollution of land and water.
Barigye Julius	Neighbour of project	- Welcomed the project. -employment opportunities.
Rubanyegyeza Salango	Neighbour of project	-welcomed the project. -project will raise land value in the area.
Kamanyire Edmond	LC1 Secretary for defence	-improvement of security in the area. -wastewater handling.
Kiiza Zabron	Neighbour	- Road accidents due to increased traffic. -employment opportunities

LCI REPRESENTATIVE ADDRESSING THE MEETING

THE PROJECT REPRESENTATIVE BRIEFING THE COMMUNITY MEMBERS ABOUT THE PROJECT

THE PROJECT MANAGER DISPLAYING THE APPROVED BUILDING PLAN TO THE COMMUNITY

5.2 ANALYSIS OF PROPOSED ALTERNATIVES

5.2.1 Do nothing option

The option refers to the situation without the project or if the project were not to go ahead as proposed. With this option, the standard of living of the farmers would not improve as the gate prices of their milk will not increase, a situation of few existing dairy processing plants have been able to exploit and continue to exploit.

5.2.2 Establishing a Diary Processing Plant.

The option would be in line with the status quo whereby numerous milk collecting centres has low capacity of processing milk products in the country rendering them inefficient. In most cases, milk remains un collected for days living farmers with no where else to deliver their milk but to sell it to vendors before it goes bad. Therefore, from the social Economic and environmental point of view, Pearl Dairy Processing Plant would be more viable. The potentially adverse impacts from the proposed operation would be minimized or eliminated using the suggested mitigation measures in the subsequent chapter

6.0 CONSTRUCTION PHASE IMPACTS

6.1 Ecological impacts

Terrestrial ecology

Flora

Most of the vegetation at the site has been modified by anthropogenic activities into animal grazing area. Construction activities will result in some vegetation being destroyed.

Fauna

The terrestrial fauna in the area are cows grazing in the area owned by the seller of the land to developer and birds. The cows will be confined in the remaining part of the land and for birds there are no trees being used for nesting so the impacts on them will be insignificant.

Aquatic Ecology

Flora

The project is not within the fragile ecosystem of the wetland but the surface run –off could affect the Rwebihuru seasonal wetland 1 km off the project site. The impact is insignificant because the valley bottom of the project will be maintained under vegetation cover.

Fauna

There is no aquatic fauna in the area as the project site is on the main dryland and thus no impact accruing from the project.

6.2 Physical impacts

Air Quality

Levelled sites with remains of murram and exposed area from vegetation cover loss will have significant negative effects on the air quality. The soil and dust could be easily blown by wind thus affecting the ambient air quality in the environment.

Water quality

De-vegetation is likely to lead to soil being eroded from the site to lower parts of the site leading to siltation of Rwebihuro seasonal stream.

Soil and geology

Murram that is excavated from the site could block and disrupt the flow of the water in the seasonal stream. Borrow pits from which murram is to be extracted will also render such area susceptible to severe soil erosion.

Hydrology

The paved surfaces for access route and park yard will prevent water infiltration from within and from upstream run off. This will add on the run off into the valley which will change the hydrology of the area.

Landscape and visual amenity

Land clearance and infilling activities will change the nature of the landscape at the site which will improve visual amenity in the project area. However, offsite extraction of murram will leave behind borrow pits which will be an eyesore in the landscape.

Dust Pollution

The levelling and construction exercise could lead to a mission of dust which has impact to the working community and surrounding environment. This might affect the physiological processes of the plants and animals in the adjacent neigbourhood.

Noise

Traffic flow, tipping of construction materials and preparation of concrete slab of the foundation of major infrastructure will generate substantial amount of noise that might disrupt sensitive receptors in the neighbourhood especially residents in Koranorya Trading centre.

Solid Waste

Construction debris and remains of packaging of building materials such as cement are likely to be the most significant type of waste. There is a possibility of such wastes becoming public nuisance and attracting vermin in the area.

Traffic

Traffic on Mbarara -Masaka Highway could be disrupted by heavy construction vehicles emerging from the site or branching from the high way towards the site. Not only will that lead to abrupt slowing down of traffic on the main road, but it could also manifest itself into accidents.

6.3 Socio Economic Impacts

Employment

Direct and indirect employment opportunities will be provided for those employed in the construction and those supplying building materials and food stuffs respectively.

In-Migration of workers

The proposed project has the potential to attract the number of in-migrant workers to the area especially non skilled labour. This could lead to tensions and immorality within the existing community especially in the competition for the jobs and accommodation provision.

Construction Accidents

A lot of machines movable and immovable will be utilized in the construction phase. These are associated with occupational hazards which might lead to accidents with negative consequences on workers health.

Local Economy

The Local supplied materials like, cement, stone aggregates, murram, transportation services, agricultural produces and steel bars will offer local business and increase the local economy through multiplier effect.

6.4 OPERATION PHASE

6.4.1 Ecological Impacts

Terrestrial ecology

Flora

Routine soft landscaping will be carried out as part of site beatification activities. There is likelihoodness of introduction of invasive ornamental flowers and plants which might affect the native plant species.

Fauna

Poor management of milk packaging materials and discharge of waste water is likely to attract certain birds such as marabou and vermin to the area. These could easily transmit diseases to the existing avian population within the neighbourhood.

Aquatic Ecology

Flora

Discharge of untreated waste water from effluent treatment system might impact on Rwebihuro seasonal wetland. However, improper operation of the effluent treatment plant along with poor handling of storm water could result in vegetation being submerged.

Fauna

Discharging of improperly treated effluent into the aquatic system may create toxic effect into the water which may kill aquatic organisms due to clogging of the gills and respiratory passages and depletion of oxygen.

6.4.2 Physical Impacts

Air quality

Odour emissions, energy consumption, exhaust gasses and dust from dairy processing plant are the most significant environmental aspects that tend to have a negative impact on air quality. A considerable amount of energy is consumed with atleast 80% being used for thermal operations such as the generation of hot water and production of steam for processes such as pasteurization, evaporation and milk drying. The consumption of energy at the proposed facility will not only lead to the depletion of fossil fuel resources but also the generation of greenhouse gases which cause air pollution.

Refrigerants

The operation will rely on the use of refrigeration systems for preserving milk. Refrigerants could either be CFC base or ammonia. If CFC based refrigeration system is used, there is a risk of leakage and release into the atmosphere thus destroying the ozone layer.

Water Quality

The effluent or wastewater from dairy processing operation has the concerns on these parameters pH, COD, BOD, and dissolved suspended solids.
The effluent generated will eventually be discharged on land and drain into Rwebihuro seasonal wetland which is a tertiary tributary into the River Rwizi. This could result in compromising the water quality and affect the aquatic life.

Solid Waste

Solid waste will mainly be from non-conforming products and product losses such as milk spillages, filter residues, sludge from centrifugal separators (e.g dirt particles, blood and

udder cells), discarded cuts and wax residues from cheese production, and sludge from wastewater treatment.

Packaging might also account for a significant proportion of the soil waste and this will mainly arise from incoming raw materials and production line damage.

Soil

Runoff from the Plant if not properly channelled could erode some soil from certain areas around the plant

Hydrology

Increased water run-off due to sealing of surfaces (roofs, paved paths and yards) will impact on the discharge from the plant as well as small streams below the site.

Landscape and Visual amenity

Periodic soft landscaping will be carried out at the site grass and some ornamental plants thus enhancing and beautifying the site. There is the potential that invasive species might be introduced that will lead to the native species being wiped out altogether.

Noise

Milk processing equipments are major sources of noise and vibration at the dairy processing plant. Such noise coupled with that generated by the traffic associated with the delivery and collection of milk and milk products from the plant could prove a nuisance to the residents adjacent to the plant.

Traffic

The 24 hour operation that is envisaged to take place at the plant coupled with the amounts of milk to be processed are likely to give rise to a substantial traffic load in the vicinity of the dairy plant. This could result into vehicular accidents.

6.4.3 Socio Economic Impacts

Employment

A number of skilled and semi skilled opportunities will be created once the Dairy processing plant becomes operational, although the number of opportunities will be fewer when compared to the construction phase.

Improved farm gate prices for milk

The local people will have chance to sell most or all of their milk, no more raw milk will be poured out of frustration.

Value Addition

Adding value to milk through the production of milk products such as yoghurt, butter and cheese as opposed to solely producing market milk will go along way towards enhancing East African Common market opportunities.

Occupational Health and Safety

Physical, chemical and biological hazards are some of the occupational hazards that workers might get exposed to them. The most significant hazards will be accruing from toxic chemicals and fluctuations in room temperatures.

Economy

The Local and National economies will be boosted by the project especially given the factor that once the plant is put up and running, there is likely to be direct impact on the economy as a result of increased milk production at the farms as well as milk processing out put.

Food safety impacts

Poor hygiene practices by the milk handlers at the milk processing facility especially those that are likely to lead to cross contamination will also have a negative effect on the quality of milk or milk products.

Farmer Education

A resource centre will be set up at the facility to serve as a one stop shop where farmers can be taught and furnished with information on better milk production, milk handling and animal husbandry techniques.

7.0 MITIGATION MEASURES

A number of mitigation measures that are aimed at preventing, remedying or reversing the adverse environmental impacts of activities associated with the various phases of the project are proposed below:

7.1 Construction Phase

Mitigation of Ecological Impacts

- For vegetation cover loss, re-vegetation will be promoted for zoned areas for grass islands while the lower parts of the project site will be retained under natural vegetation cover.
- The trees lost in the site clearing will be replaced by planting ornamental trees and shrubs approved by the relevant authority to avoid invasive plant species.
- The impact of surface run off to the hydrology of the area will be mitigated by re-directing run off into soil stabilizing grasses and natural vegetation in the project area.

Mitigation of Physical Impacts

- Negative effect of dust to air quality will be averted by periodic wetting of dust prone areas in the project area.
- Effects of soil erosion on the water quality should be prevented but ensuring that some of the vegetation at the site is retained as it would help check the speed of run off and prevent siltation of the stream.
- The effect of Surface run off from the construction site should be harvested and soaked into the ground to facilitate natural infiltration. Series of drainage channels should be put in place to avoid the flooding down stream.
- On change of landscape and visual amenity of the area, landscaping, re-levelling, and reshaping the cliff should be enhance.
- On noise pollution, the use of noisy equipment should be restricted to day light and where possible such equipment should be fitted with silencers. Vehicular related noise should be curtailed by ensuring smooth flow of traffic as part of traffic management plan.
- On the issue of poor solid waste management, waste prevention should be used as the main strategy for dealing with potential solid waste problem at the construction site. Appropriate waste disposal facilities should be provided at the site and their content disposed off an approved land fill within Mbarara Municipality.
- For vehicular accidents, temporary traffic signage with the words " Be aware of turning heavy construction vehicles" should be put in place on Masaka-Mbarara Highway

Social Economic Impacts

- Problems associated with in-migration should be prevented by ensuring that local workers are given priority when it comes to filling up employment opportunities.
- To prevent construction accidents, the first option should be in safety hierarchy, accidents should be prevented by eliminating the hazards that are likely to cause them.

7.2 Operational Phase

Mitigation of Ecological Impacts

- To prevent the spread of invasive plant species, during landscape beautification activities, local species should be used which are better adapted to the conditions of the area.
- On the issue of scavenging birds and their associated effects, the milk and its products should not be discharged along with waste water which tends to attract avian population.
- The issue of land and water pollution by wastewater should be mitigated by operating an efficient effluent treatment plant specified in the report.

Mitigation of Physical Impacts

- Energy consumption effects on air quality should be minimized by promoting cleaner production technologies that reduce the dairy plant demand for energy.
- The impact of the odour related emission, should be mitigated through the following measures
  - ❖ Ensuring that areas or activities that are likely to generate odour are enclosed or where possible operations are under vacuum.
  - ❖ A high degree of hygiene should be maintained in the entire processing line
  - ❖ Removal of fats should be a necessary precursor to the treatment and disposal methods.
  - ❖ Stocks of waste and by products should be minimized and stored for short periods
  - ❖ Wastewater facilities should be adequately maintained to the set environmental standards
- On refrigerants, the use of CFC based refrigerants should be avoided and the National Management Regulations should be adhered to. Less hazardous refrigerants such as ammonia should be used coupled with a closed circuit cooling system that is free of leaks.
- On water quality, a combination of pollution prevention measures with end of pipe measures should be used to address water quality impacts. Waste treatment plants should be constructed with a constructed wetland as its tertiary treatment system.
- Discharge of effluent into land and water should be according to the standards of discharge into such systems.
- Prevention of solid waste should be at the fore front of addressing solid waste problem. Sorting of the waste and disposing them in different marked containers. Sludge from centrifugal separators should be adequately managed and disposed of safely at an authorized landfill facility within the municipality.
- Run off incidences from sealed surfaces should be prevented by promoting rain water harvesting system.
- Noise pollution within the processing line should be prevented by providing protective gears to workers and by mounting anti vibrations on noisy machinery.

Socio Economic Impacts

- Occupational health and safety hazards should be minimized by conducting adequate safety trainings to the workers, coupled with provision of PPE.

- On food safety and hygiene of the milk products, milk should be preserved while being transported from the farm, processing plant and the cooling chain should be un broken. Milk testing should be done at the milk reception area to ensure that only good quality milk is received and then forwarded for processing.
- Hazard analysis critical control points (CCPC) will have to be established at the milk processing facility as part of a wider food safety management system
- An on-site laboratory should also be put in place for testing milk quality and other parameters that are crucial for the efficient running of the dairy processing plant.

7.3 Decommissioning

At the end of the project life cycle or end –of-life of the project, it will be decommissioned. The following measures would be put in place to minimize its impacts;-

- Soil remediation measures should be employed where possible to rid the soil at the site pollutants if any.
- Adequate containment of demolition debris so as to minimize its impact on air quality and the safety of workers. Workers involved in the demolition process will have to be provided with PPE as a safety measure.
- Measures to retrofit some of the decommissioned equipment should be explored as opposed to its outright disposal into the environment; and
- A good proportion of environmentally friendly building materials should be incorporated in the building design from the outset as these can biodegrade.

8.0 ENVIRONMENTAL MONITORING PLAN

8.1 INTRODUCTION

The monitoring plan has been prepared taking into account the chronology of the project activities as prepared by the developer. The recommendations in this PB will provide a basis of tracking progress of the proposed project activities with regard to sound environmental practices and mitigation measures. This will be done with the support of supplementary documents such as specific architectural and engineering plans and designs for civil and mechanical works to be undertaken on the site.

8.2 ENVIRONMENTAL MONITORING PLAN

The Table below shows Environmental Monitoring Plan for Pearl Diary Farms Ltd

Impact To Be Monitored	Mitigation Measures	Environmental Indicator	Responsibility	Time Frame
Water	-Treatment of	Records from the	-NEMA	Immediately

pollution in nearby stream	wastewater prior to disposal on land/water -Establishment of an artificial wetland	monitoring points established after wastewater treatment plant	DWD Developer Mbarara District Local Gov't	after commissioning
Solid waste management	Proper maintenance of disposal facilities	Indication of use of the disposal facilities	Developer Local Authorities	Immediately
Soil erosion incidences due to surface run off	Rainwater harvesting from roof catchment & re-vegetation of the area after construction Regulated release of storm water	Reduced incidences of soil erosion and gulley eruptions	Developer MDLG	Immediately
Noise and dust	-Watering dust prone areas & restriction of construction in day time -Provision of PPE to workers	Records of complaints against noise and dust levels	Developer NEMA DNRO	Immediately
Loss of vegetation and other land cover	-Planting of trees & establishing grass islands -establishment of artificial wetland	-No. of trees planted -Percentage of site area under green cover	Developer DNRO	Once construction activities are over
Accidental fall over due to changes in landscape and cliff	-Landscaping and grading the cliff -Erecting parameter fence/live fence along the steep flank	Records of accidents due to cliff or project activities	Developer Local Authorities	Immediately
Health & safety of workforce	-Provision of PPE & training of workforce -Provision of first Aid Kits & HIV AIDS counselling services	Records of accidents & ill health in and around project area	Developer Local authority	Immediately
Vehicular accidents	-Provision of signages along Masaka-Mbarara Highway -Provision of humps on access road from the plant to the high way	Records of vehicular accidents No. of speed humps established along the access road	-Developer -Local authority	Immediately
Site Rehabilitation	Restoration of the quarried site	Restored environment at the material source point	Developer MDLG	Immediately
Over use of water in the pipeline	Application of wider pipe line from NWSC for adequate water supply in the area	Records of water scarcity incidences	Developer Local authority NWSC	Immediately
Contaminated water of the stream	Ensure an operational waste water treatment plant Routine monitoring of surface & underground	Records of waterborne diseases incidences in the area.	Developer DNRO DWD Local authority	Immediately

	water in project area			

8.3 THE MONITORING TEAM

The core team for monitoring should include the following officials: NEMA Officials, DWD, Uganda Dairy Development Authority, UNBS, District Natural Resources Officer/ Mbarara, Sub-county Chief Biharwe, Health Assistant Biharwe Sub-county, Local Environment Committee of Biharwe Sub-County, and the developer.

9.0 CONCLUSIONS AND RECOMMENDATIONS

The findings of the EIA study indicate that the expected negative environmental impacts of this project are insignificant and most of them can easily be mitigated during the design and construction phases.

If the proposed preventive/ mitigation measures are implemented it is possible to develop this Dairy plant in an environmentally friendly manner. Once implemented, the project will bring additional beneficial impacts to the project area.

The core monitoring team should ensure that any other impacts, which come up during the operation phase are quickly addressed by the owner of the project.

Basing on the above findings it is recommended that NEMA approves this project.

10.0 REFERENCES

1. The National Environment Act Cap 153,
2. Environment Impact Assessment Guidelines, 1997.
3. Environment Impact Assessment Regulations, 1998
4. The National Environment (Waste Management) Regulations, 1999
5. Mbarara District Environment Profile, 1997.
6. Environment Standards and Preliminary Environment Impact Assessment For Water Quality And Discharge Of Effluent Into Water And Land, 1998.
7. Atlas of Uganda, 1967.
8. State of Environment Report for Uganda, 2001/2002
9. The Public Health Act, 1964
10. The Land Act, 1998
11. The Forest Act 2003
12. The Investment Code, 1991
13. The water Act Cap 152
14. The Town and Country Planning Act, Cap 30
15. The Factories Act
16. The National Environment (Wetlands, River Banks and Lake Shores Management) Regulations, 2000
17. The Water Resources Regulations, 1998
18. The Water (Waste Discharge) Regulations, 1998
19. World Bank (1996) Environmental Assessment Sourcebook Update No. 17 Analysis of Alternatives in Environmental Assessment Environment Department, World Bank, Washington D.C., USA.10pp
20. Previous Site Study Reports

11.0 Appendices

- Consultees contacted during the conduct of this study
- Confirmation of Land ownership
- Recommendation For Project Development From Area LCI Chairman
- Details of the Wastewater Plant

Appendix 1

Consultees contacted during the conduct of this study

Attendance list

s/n	Name	Tel no	Title	signature
1	Mwangu Isaac	0703-960067	Rep. for Developer	[signature]
2	AFTAB. A. SIDDIQUI	0772441156 0712441156	P. Manager.	[signature]
3	Nicholas Bangirana	0784157253	Acting Chman	[signature]
4	Andrew Tinda	0772427865	Neighbour	[signature]
(0784553845) 5	Kiiza Gordon	0784553845	"	[signature]
6.	Ntegyerize Gordon	0782304085	"	[signature]
7	BATINGIRE	0752673032	"	[signature]
8	R. Rubanyegyeza	0752-606440	Peasant	[signature]
9	I PIMA TOLIAN	0752387620	Neighbour	[signature]
10	Saturday Wilo	0752814165	Neighbour	[signature]
11	Guma-Gumisiriza Davis	0752480632	Student/Vacist	[signature]
12.	Katsigazi Bena	0776860212	C/m N.R.M.	[signature]
13	Pr. Bwirizaya	0776400442	" "	[signature]
14	MR BARIGYE J	0772377815	Neibour	[signature]
15	MUSIIME BEOK	0772487536 0772487536	c/Person well Movement Ruwampa	[signature]
16.	Kamanyire Edmond	0782 / 0755 529606	Defence Sec.	[signature]

Appendix 2

Confirmation of Land ownership

THE REPUBLIC OF UGANDA

LRV.1001/9
LEASEHOLD REGISTER

Volume 1045 Folio 2

REGISTRATION OF TITLES ACT.

CERTIFICATE OF TITLE

DESCRIPTION OF LAND

The Leasehold land edged red on the plan attached hereto and situate and known as follows:-

~~Street~~ PLOT Number: 100
~~Road Name:~~ KASHARI BLOCK 7
~~Township/Municipality/City:~~ AT. BIHARWE
District: MBARARA Area: APPROX:6.081HECTARES

TERM from 1ST JULY, 1977 for 49 years and ——— months at the rent and subject to the covenants and conditions contained or implied in Lease Number bound up herewith and to the incumbrances (if any) entered in the Incumbrance Register.

Easements

PROPRIETORSHIP

Date, time and Inst. No.	Name and Address of Proprietor	Signature of Registrar
REGD.13.11.09 AT.2.20PM INST.420849	~~ANDREW RUBAMEGYEZA GIIDA OF C/O HUNTER AND GRETE ADVOCATES OF P.O.BOX 7026, KAMPALA.~~	Ag. Commissioner For Land Registration
REGD.2.2.2010 AT.3.52P.M INST.424113	PEARL DIARY FARMS LTD OF P.O.Box 7420, KAMPALA	Registrar of Titles

Date of issue: 24TH NOVEMBER, 2009.

Registrar of Titles.

Owner's Copy

RENT
~~INCUMBRANCES~~

Date, time and Inst. No.	Particulars	Signature of Registrar
REGD.13.11.09 AT.2.20P.M. INST.420849	GROUND RENT FOR PLOT 100 IS NOW SHS. 10,000/-P.A. W.E.F. 2009	Ag. Commissioner For Land Registration

MP ... LW/6597..........

Please have Shs. 25/= Revenue Stamps affixed before return.

UGANDA

REGISTRATION OF TITLES ACT

UGANDA LAND COMMISSION

LEASE BY URBAN AUTHORITY

This Lease made the 16th day of February one thousand nine hundred and Seventy eight under and subject to the Public Lands Act and the rules made in accordance therewith BETWEEN UGANDA LAND COMMISSION a body incorporated by the ~~Urban Authorities~~ said Act (hereinafter called "the Lessor") of the one part, and SULAIMANI KYAKUNE.. MBIRINGI, of P.O. Box 394, Mbarara,

(hereinafter called the Lessee) of the other part. WITNESSETH as follows:—

1. In consideration of the sum of Shillings Nine hundred fifty eight, (Shs. 958/=) paid to the Lessor by the Lessee on or before the execution of these presents (the receipt whereof the Lessor doth hereby acknowledge) and also in consideration of the rent hereby reserved and of the covenants and conditions hereinafter contained on the part of the Lessee to be observed and performed, the Lessor hereby demises unto the Lessee ALL THAT piece of land ~~in the Municipality/Township of~~ at Biharwe, Kishasha, Rubaya, Kashari, East Ankole and known as Plot Number 26 Kashari Block 7, containing approximately 47.9 hectares,

as the same is more particularly delineated on the plan annexed hereto and thereon edged with red (hereinafter called "the said land") TO HOLD the same unto the Lessee ~~(as joint tenants/tenants in common in~~) for the term Five (5). ~~years and~~ ~~months~~ from the 1st day of July one thousand nine hundred and seventy seven YIELDING AND PAYING therefor during the said term the yearly rent of Shillings four hundred seventy nine (Shs. 479/=) payable by two equal half-yearly payments in advance on the first day of January and the first day of July in every year.

2. THE LESSEE HEREBY ~~JOINTLY AND SEVERALLY~~ COVENANTS with the Lessor as follows namely:

(a) to observe and perform all the conditions and covenants implied by law in this lease or otherwise herein contained or referred to,

(b) to ~~erect~~ develop on the said land ~~buildings (hereinafter called "the said buildings") of a value of not less than Shillings (Shs. =======)~~ in accordance with plans and specifications which shall be approved by the Lessor, to the satisfaction of the lessor,

7. When the Lessee shall have complied with the development covenant hereu and there shall not at the time be any existing breach or non-observance on the part of the Lessee of the covenants and conditions in this lease whether expressed or implied the said term shall be en. Forty nine (49) years ~~and~~ ~~months~~ from the said 1st day of July one thousand nine hundred and seventy seven automatically and this lease shall thenceforth be read and construed as if the said term of forty nine years ~~and~~ ~~months~~ had been originally granted hereby.

IN WITNESS WHEREOF the Common Seal of the Lessor has hereunto been affixed and the Lessee has hereunto set his hand ~~has/have hereunto set his/her/their hand/s caused his/her/their Common Seal to be affixed~~ hereto the day and year first above written.

The COMMON SEAL of the UGANDA LAND COMMISSION was hereunto affixed in the presence of us:—

Col. JUMA ORIS ABDALLA (PSC)(DSO)
Minister of Foreign Affairs/
holding the portfolio of
Ministry of Land and Water Resources
~~Mayor/Chairman~~

Town Clerk.

SIGNED by the said SULAIMANI KYAYUNG.. MBIRINGI in the presence of :—

WITNESS:—

Name ....

ADDRESS Box 220 Mbarara

Occupation A.R.T.

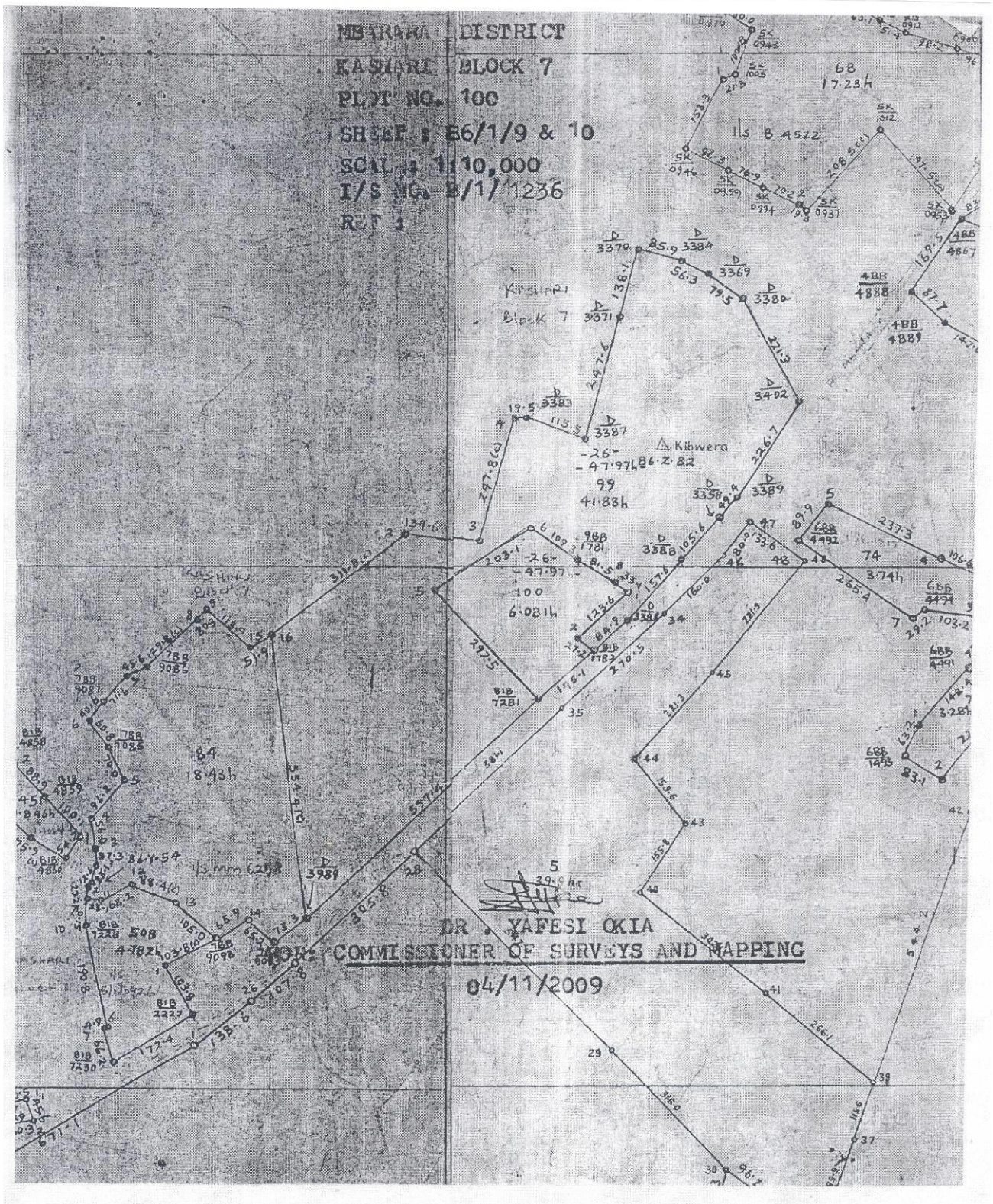
Instr. No. 201723
12:30 16-2-78
CR/T 16/2/78

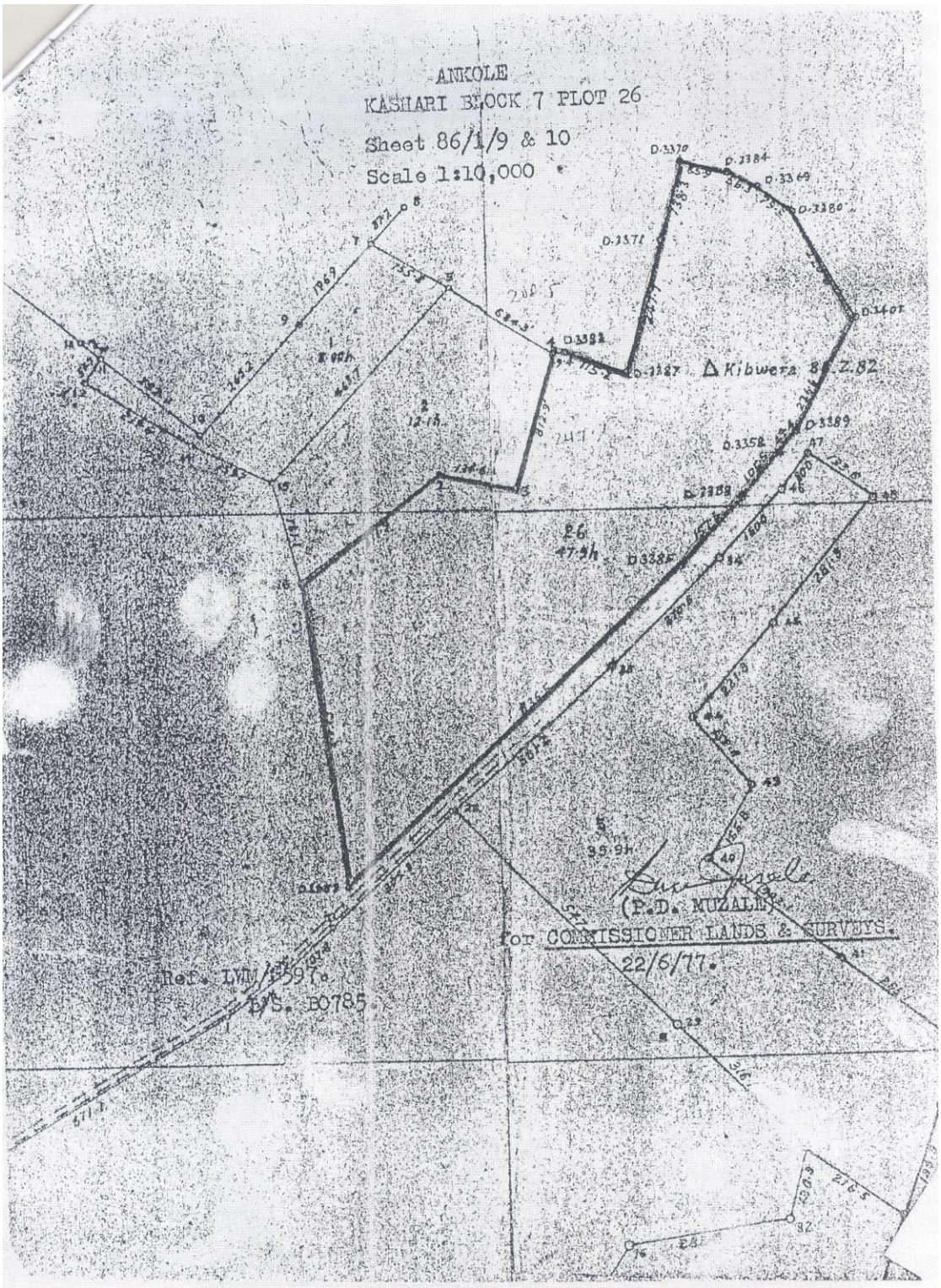
CERTIFIED ...
Leasehold R.V. 1001 Fol. 9

GPRU—1050—60M—1-76. (A/5-7L)

for Registrar ...
Chief Registrar of Titles
15/3/78

Prepared by Conveyancer
Lands ... Dept.
... Kampala CB


MBARARA DISTRICT
KASHARI BLOCK 7
PLOT NO. 100
SHEET : B6/1/9 & 10
SCALE : 1:10,000
I/S NO. B/1/1236
REF :
Kashari Block 7
Kibwera
DR. YAFESI OKIA
COMMISSIONER OF SURVEYS AND MAPPING
04/11/2009


ANKOLE
KASHARI BLOCK 7 PLOT 26
Sheet 86/1/9 & 10
Scale 1:10,000
Kibwera
(P.D. MUZALE)
for COMMISSIONER LANDS & SURVEYS.
22/6/77.
Ref. LVM/1597.
D/S. 80785.

(c) to complete the said ~~buildings for occupation and use~~ development to the satisfaction of the Lessor on or before the 30th day of June one thousand nine hundred and eighty two,

(d) not without the prior written consent of the Lessor to use or suffer to be used the said land ~~and buildings~~ or any part thereof otherwise than for Dairy Farming,

(e) not without the prior written consent of the Lessor to erect any engine or machinery on the said land ~~or in the said buildings~~ save and except such engine or machinery as shall be necessary to or consistent with the user of the said land ~~or buildings~~ as stipulated herein,

(f) in addition to any covenant implied herein the Lessee shall not, until he has completed the said ~~buildings and obtained a final occupation permit in respect thereof,~~ development sell or sublet or part with the possession of or suffer anyone to use or confer on anyone an equitable interest in or in any way mortgage the said land ~~or buildings~~ or any part thereof without having first obtained the written consent of the Lessor,

(g) to keep insured the said buildings to the full value thereof in a responsible insurance office against loss or damage by fire and upon the request of the Lessor to produce the policy of such insurance and the receipt for the last premium and to cause all sums received in respect of such insurance to be forthwith laid out and expended in rebuilding or repairing or otherwise reinstating the said buildings and to make up any deficiency in such sums out of the Lessee's own money,

(h) not to make or allow to be made any alterations or additions to any of the said buildings nor to cut, injure or demolish or allow to be cut, injured or demolished the roof or any of the walls or floors thereof without the prior written consent of the Lessor,

(i) not at any time during the said term to use, exercise or carry on or permit or suffer to be used, exercised or carried on in or upon the said land ~~or buildings~~ or any part thereof any noxious noisome or offensive art trade business occupation or calling or to allow any act matter or thing whatsoever to be done at any time during the said term in or upon the said land ~~or buildings~~ which shall or may be or grow to the annoyance nuisance grievance damage or disturbance of the occupiers or owners of the adjoining lands and properties.

3. IT IS HEREBY EXPRESSLY declared and agreed as follows:

(i) that if this lease be enlarged as hereinafter provided, the rent herein reserved shall be revisable by the Lessor at any time after the expiration of the first Five (5) years of the said term and at intervals of not less than Ten (10) years thereafter,

(ii) that the cost of re-aligning covering in or protecting any public or private services which may be on or pass under or over the said land and of any works incidental thereto shall be the liability of the Lessee.

(iii) that compensation to customary tenants, if any, shall be borne by the lessee,

THE REGISTRATION OF TITLES ACT

LRV: 4045
Folio: 2
Plot No: 100

TRANSFER

We, I ANDREW RUBANYEGYEZA SINDA of P.O. Box 7062 Kampala
(*Address*)

.....
Son of/daughter of

RUBANYEGYEZA BASHEGYI of clan being the registered proprietor of the land comprised in the above Title in consideration of the sum of Uganda Shillings 418,000,000/= and paid to me by the Purchaser on or before the execution of these presents the receipt whereof we hereby acknowledge **DO HEREBY TRANSFER** all that piece of land (part of land) comprised in the above Title which is delineated to the plan annexed hereto and thereon edged in red and now numbered Plot 100 to PEARL DIARY FARMS LIMITED (herein called "the Purchaser") of P.O.BOX 7420 Kampala Uganda
(*address*)

Son of N/A of N/A clan to **HOLD** to the Purchaser for all my estate and interest herein.

Dated this 4th day of December, 2009

SIGNED by the said
In the presence of } 4/12/2009
Signature of Vendor

Witness :
Address :
Qualification :

SIGNED by the said
In the presence of } .....
Signature of Purchaser

Witness :
Address :
Qualification :

Appendix 3

Recommendation For Project Development From Area LCI Chairman

Migamba L.C 1,
Nyakinengo Parish,
Biharwe Subcounty,
Mbarara District.
07/ 07/ 2010

THE EXECUTIVE DIRECTOR,
NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY,
P.O. BOX 22255,
KAMPALA.

RE: AUTHORISING THE ESTABLISHMENT OF PEARL DAIRY PLANT IN MIGAMBA L.C 1 NYAKINENGO PARISH, BIHARWE SUBCOUNTY MBARARA

Following the community consultation meeting held on 06/ 07/2010 with the Developer of Pearl Dairy plant the residents welcomed the project as the golden chance for gaining employment opportunities. In the same vain I do hereby welcome the project and authorize its commencement with immediate effect.

Thanks for your Co-operation in the matter.

MIGAMBA L.C.I NYAKINENGO
DATE 07-07-10
BIHARWE-KASHAARI

.....

BYAMUGISHA NICKSON
Tel: 0752-613113
CHAIRPERSON L.C 1

Appendix 4

Details of the Wastewater Plant

EFFLUENT TREATMENT SCHEME

WASTE WATER TREATMENT PLANS

M/S PEARL DAIRY
UGANDA

EFFLUENT TREATMENT SCHEME

1.0 WASTE WATER QUANTITY & QUALITY

The pant wastes shall be generally dilutions of milk or milk products together with detergents lubricants, chemicals, boiler blow down & washings of purging from heat transfer units and domestic effluent. Dairy industry wastes are characterized by relatively high organic demand. They are also variable in quantity & composition.

The nature of waste generated by the various processes operated by the dairy industry is generally quite similar reflecting the overwhelming effect of the wasted milk and dairy products however different processes affect the detailed composition. Waste from the milk receiving section contains mostly whole milk that from butter section mixtures of whole milk, creams, butter milk, etc. thus the strength of volume of wastes from any plant depends on the processes carried out, on the volume of milk handled, on the condition & type of equipments, the waste reduction practices the attitude of the management and staff and the amount of water used in cooking and washing. For any one plant, published data can, therefore, give an approximate guide to expected waste discharge.

The unit will discharge **500,000 liters per day effluent**. The main source of effluent is

- CIP of Tankers
- CIP of Milk processing equipments
- CIP of UHT/Yoghurt/Ice Cream equipments
- CIP of Evaporator and dryer

The cooling water is proposed to be completely recirculated with occasional purging. These purging are however to be used for floor washings and are therefore accounted for in the co-efficient of wastewater adopted. The sanitary waste water discharge is expected to be around
5.0 M3/D.

1.1 EFFLUENT CHARACTERISTICS

Process waste waters:

Quantity of milk processed : 200,000 ltrs/day
Waste water co-efficient : 2.5
Waste water generation : 500,000 ltrs/day

Sanitary wastewater

Non-residential workers : 60
Waste water generation : 1800 LPD

Residential workers : 40
Waste water generation : 3200 LPD.

Total waste water generated : 505,000 LPD

1.2 POLLUTION POTENTIAL OF WASTE WATERS.

The parameters of concern in the wastewaters are PH, fats (O & G), suspended solids, dissolved solids, BOD and COD. The pollution aspects of each are summarized below.

PH

PH is a term used rather universally to express the intensity of the acid or alkaline condition of a solution. Of a solution. It is a way of expressing the hydrogen-ion concentration, or more precisely, the hydrogen-ion activity. It is important in all most every phase of environmental engineering practice. In wastewater treatment employing biological processes, pH must be controlled with in a range favorable to the particular organism involved. The optimum pH for most micro- organisms is 7.0 with the range being 6.5 to 9.0. Thus for biological treatment the pH shall always have to be maintained in this range. Neutralization shall have to be resorted to as and when required.

Fats

While every precaution should be taken not to waste milk fat during dairy processing, dairy plant effluent inevitably contains free fat. Removal of this fat is a necessary precursor to the treatment and disposal methods and are not easily decomposed by bacteria. They are compounds of carbon, hydrogen and oxygen in both receiving waters and waste – treatment plants. If they are not removed before discharge of the waste they tend to coat surface and can interfere with the biological life in the waters and create unsightly floating matter and films.

Suspended solids

Disregarding any possible toxic effects attributable to substances leached out by water, suspended solids may kill fish, and by clogging the gills and respiratory passages of various aquatic fauna. By blanketing the stream bottom, the solids will kill eggs, young ones and food organisms and will destroy spawning beds. Indirectly, suspended solids are inimical to aquatic life because they screen out life affecting photosynthesis. Also by carrying down and trapping excreta and decomposing organic wastes on the bottom they promote and maintain the development of noxious conditions and oxygen depletion. Such oxygen depletion in turn results in the killing of fish, shell-fish and other aerobic organisms.

Dissolved solids

Most of the dissolved solids in dairy waste are organic in nature and are easily biodegradable. Thus they exert a heavy oxygen demand on the receiving waters causing noxious gases and odors. Pollutants such as acids alkaline heavy metals etc and various types of organic can make receiving waters unusable and may possibly destroy aquatic life and to osmotic effects which cause dehydration of tissue cells.

BOD & COD

These parameters are an indirect measure of the organic content generally carbonaceous of the wastewaters. These parameters measure the oxygen utilization of the organics present and hence indirectly indicate the possibility of oxygen present and hence indirectly indicate the possibility of oxygen depletion in the receiving water body. Whole milk has a high BOD about 1, 00,000 mg/l. thus even relatively dilute milk solutions have a marked polluting effect. The major constituents which contribute to the BOD of dairy wastes are lactose, milk fat, protein and lactic acid. The BOD for untreated dairy wastes is most,

frequently 50 to 70 % of the COD valve, but percentages as high as 80% and as low as 20% have been reported.

1.3 WASTE WATER TREATMENT SCHEME:

The liquid waste disposal is a serious problem. To reduce liquids, amount of water used in the plant should be kept to minimum, and the liquid and solids waste handled separately. All coarse particles are screened on rotary or vibrating screen and the waste water is allowed to flow directly to the sewerage system or to agriculture lands or may be settled in a tank before allowing overflowing. Settling sludge method removes the fine solids (with lowered BOD). Sediment is periodically removed and disposed off. If the tank is large enough the overflow shall have very low BOD, due to the microbiological treatment, and pollution shall be controlled. Incorporation of air, nitrogen, and phosphorous compounds give a very good result. A clear problem free effluent shall be obtained which can simply drained.

Different Process for effluent treatment:

1) Screening and grit removal:

Large solid matters and heavy sediments are removed by screening and grit removal process. This is essential to protect and safeguard the subsequent treatment units.

2) Sedimentation

Organic matter present in the waste in the form of suspended solids is removed in the sedimentation tanks. It is physical method of separation achieved by allowing the waste to remain in more or less quiescent condition.

3) Biological treatment

This is the most important stage of treatment. This can be achieved by two processes – Activated sludge process and Filtration. The former is carried out by mechanical surface aeration process or by injecting air or oxygen, and the latter by rotary sprinklers.

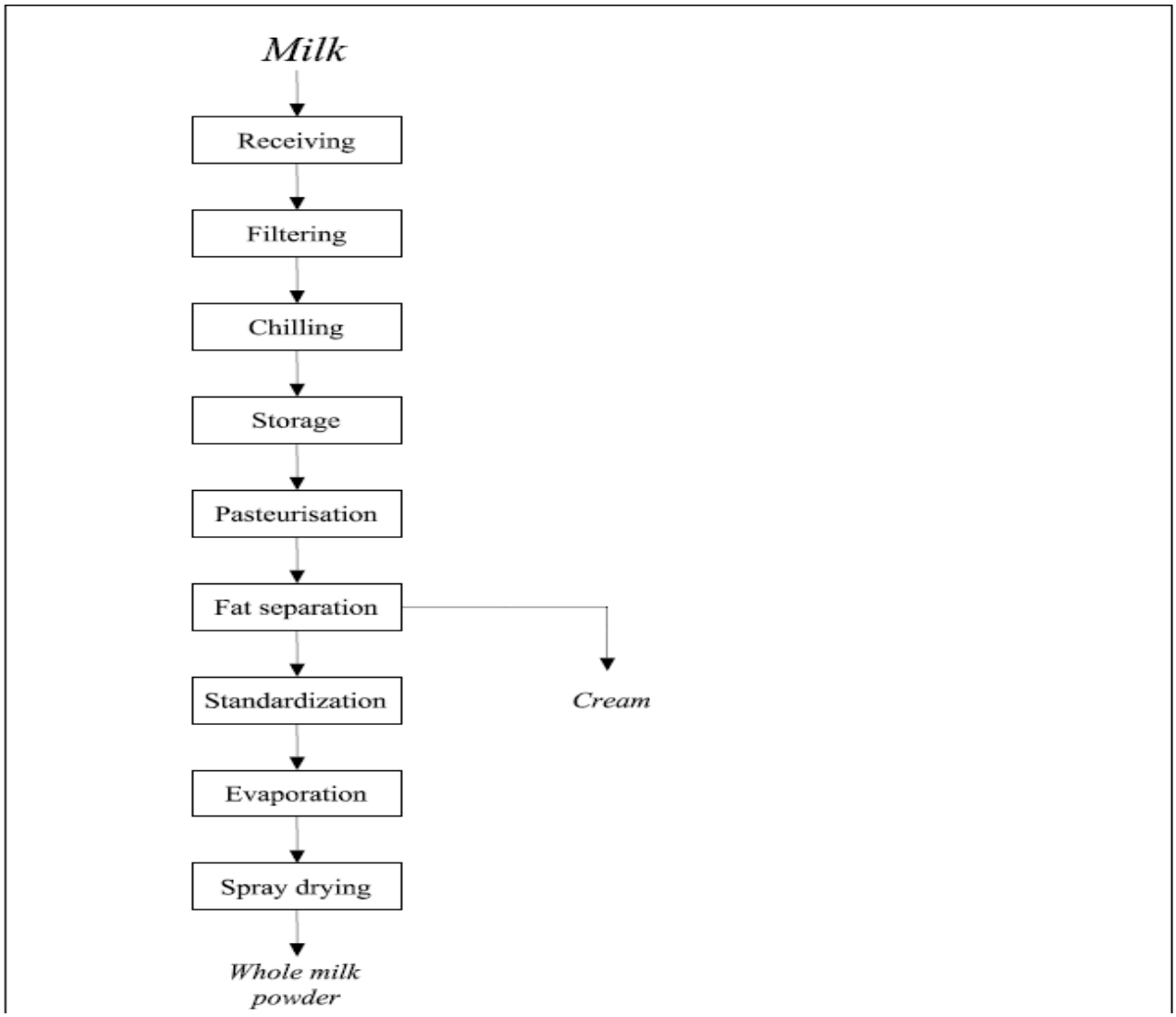
In both the above processes the organic matter present in the settled waste is converted into insoluble substances.

4) Sludge Digestion & Disposal

The sludge digestion and disposal of sludge from a wastewater plant is the most complicated process.

2.0 THE INDUSTRY

The Dairy will process a maximum of 200 m^3 of milk in a day to produce whole milk powder concentrate Milk and Cream etc.



3.0 SOURCES AND NATURE OF POLLUTION

3.1 Water Pollution

The washing process (main contributor to the effluent generation) will be carried out once in a day. The material flow is basically through manual transfers. As such, the effluent volume co-efficient (m^3 of effluent per m^3 of milk processed) is expected to be about 2.5. Therefore, the effluent will be moderately high in organic strength (as indicated by BOD and COD), mostly of biodegradable nature.

As the washing will be carried out in batch, the most of the effluent will be released in batches rather than being generated continuously.

The expected characteristics of effluent are as under

1.	Flow	< 500 m^3/day
2.	PH	6.5 - 8
3.	BOD	800 – 1000 mg/l
4	BOD_5 /COD ratio	0.65
5	COD	1800 – 2000 mg/l

6	TSS	300 mg/l
7	Nitrogen	40 mg/l
8	Phosphorus (as PO_4)	10 mg/l
9	Oil & Grease	50 mg/l

The effluent, after treatment, is meant to be discharged onto land for Irrigation or CETP or Open Drain as under. As such the industry must satisfy the following standards (as stipulated by the (Uganda Pollution Control Board) for the discharge of the treated effluent;

		Central Effluent Treatment Scheme	**Irrigation/ Open Drain**
1	pH	5.5 – 9	5.5 - 9
2	BOD_5 20ºC	<100 mg/l	< 30 mg/l
3	TSS	< 100 mg/l	< 100 mg/l
4	Oil & Grease	< 10mg/l	< 10 mg/l

4.0 THE POLLUTION CONTROL SYSTEM

4.1 Water Pollution Control System

The effluent treatment system is proposed to have

a) collection-cum-equalization
b) Anaerobic stabilization (up flow anaerobic bio-filter0
c) Aerobic stabilization (activated sludge process – aeration tank followed by secondary clarifier)
d) Sludge filter-cum-drying beds

The effluent will be received into a collection-cum-equalization tank (to buffer large variations in effluent flow). Then, it will be pumped into anaerobic bio-filter for first stage biological treatment. The pumping will be done continuously at near average flow level.

This will be followed by aerobic stabilization through conventional activated sludge process, which will comprise of an aeration tank followed by a secondary clarifier. The wastewater will be clarified in a secondary clarifier to obtain treated wastewater. The settled sludge (from secondary clarifier underflows) will be either recycled back (to maintain desired microbial population in the aeration tank) or wasted.
The waste sludge from secondary clarifier will be subjected to sludge filter /dying beds. To reduce sludge handling requirements, some of the excess sludge may be fed to anaerobic bio-filter for digestion/stabilization.

4.1.1. Up flow anaerobic bio-filter (UABF)

Anaerobic filters are characterized by the presence of stationary packing material, in which biological solids can attach to or be kept within the interstices. The mass of micro-organisms attached to the support material, or kept in their interstices, degrades the substrate (organic matter) contained in the effluent. The most common configuration uses vertical up flow through the packing medium. The effluent is introduced (distributed) at the bottom, flows through a filter layer (packing medium) and discharged through the upper part. The packing medium results in very high residence time of the micro-

organisms in the reactor. A significant portion of the biomass is found as suspended floes, which are held in empty spaces of the support medium (interstitial retention).
In order to overcome the limitation of substrate diffusion, inherent in attached biomass process, large volume reactors is not provided with any support medium (usually below the packed bed) to allow for suspended floes or granules of the biomass – resulting in hybrid reactor. This also overcomes the possibility of blockage or hydraulic short circuits due to accumulation of biomass at the bottom of the reactors.

The specific surface area of the packing, for optimum results, averages about 100 m^2/m^3
The advantages of up-flow attached growth anaerobic reactors are high COD loadings, relatively small reactor volumes, lower reactor costs, operational simplicity, and very less operational cost.

The maintenance requirements include reconditioning of packing media (a the industry operations are seasonal in nature) and removal of sludge accumulated at the tank bottom, before its start up every year.

4.1.2. Activated Sludge Process (ASP)

Conventional activated sludge process comprising of – aeration tank (a reactor in which micro-organisms responsible for treatment are kept in suspension and aerated), clarifier (for liquid-solid separation) and a recycle system for returning solids removed from the liquid solid separation back into the reactor – will be used.
An important feature of the ASP is the formation of flocculent settle able solids (of biomass) that can be removed by gravity settling.

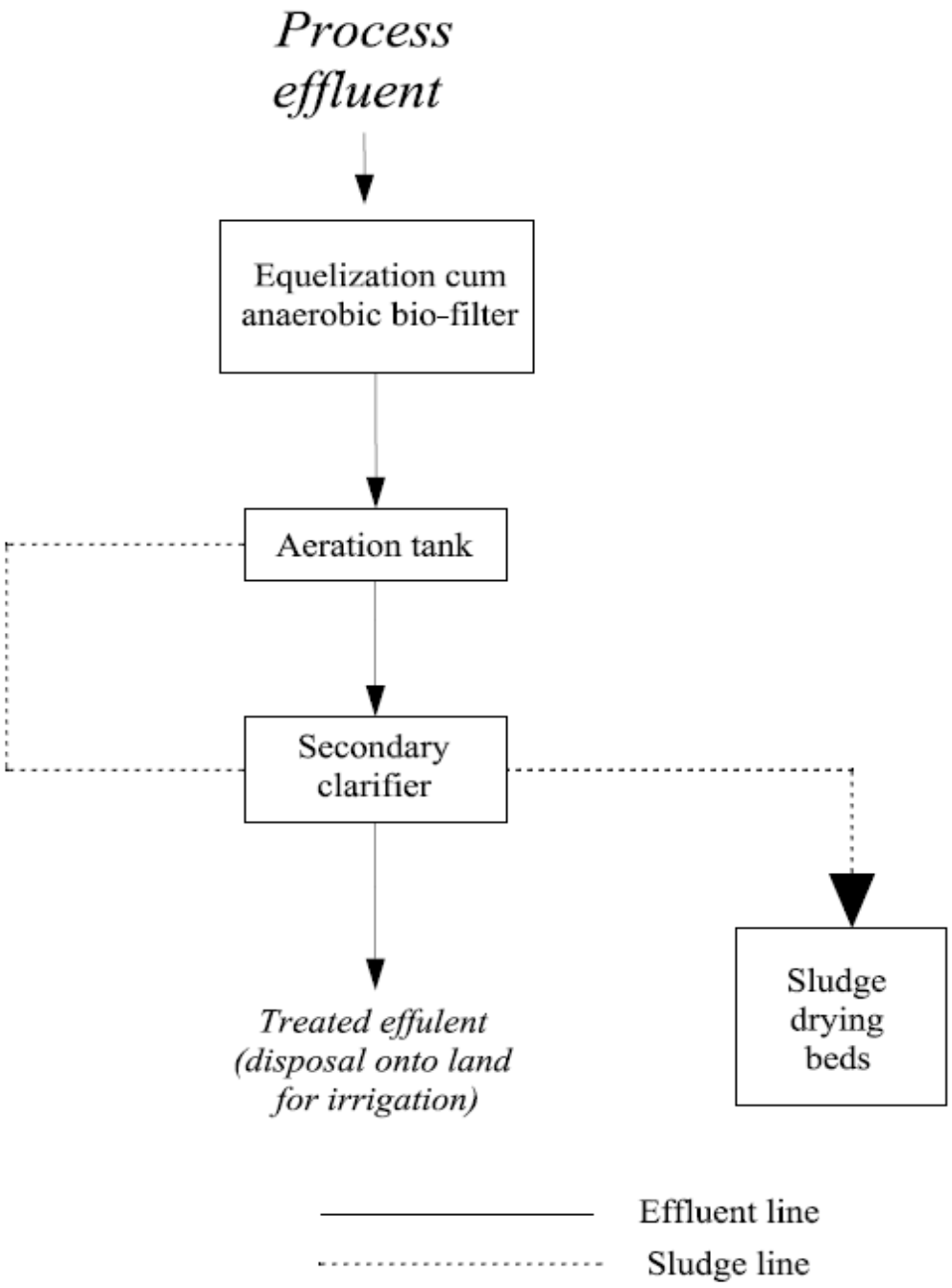


Figure-2: Effluent treatment system

5.0 DESIGN & SPECIFICATIONS OF POLLUTION CONTROL SYSTEM

5.1 Water Pollution Control System

The modeling and design of the air pollution control system is based on the following considerations/ assumptions

a) The effluent characteristics are as stated previously
b) The treated effluent must conform to the standards prescribed
c) The design quantity of wastewater to be handled by the treatment facility will be 500 ± 10% m^3/day
d) Flow peaking factor - 4
e) While the specifications and operating parameters, being specified hereunder, represent theoretically optimized values, there may be some variation in any of these during actual erection/commissioning (to suit site conditions) and operational fine tuning of the system. Every effort will be made to ensure that the system's performance does not get affected adversely.

5.1.1. Equalization-cum-Anaerobic Bio-filter

The process may be expected to provide large variation in flow rate. At times, slug discharges are also expected. An equalization tank will be required for balancing. High BOD levels suggest the need for two stage biological treatment.

An anaerobic bio-filter can serve the additional purposes of flow equalization. The anaerobic stabilization will also take care of excess oil and grease in the effluent

The reactor specifications are:

1	BOD/COD Loading	1000/2000 mg/l
2	HRT required	36 hrs
3	Tank Volume	800 m^3
4	Specific Surface area of Filter Media	> 90m^2/m^3
5	Volume of Filter Media	150m^3
6	Minimum depth of the tank	4m
7	Nutrient Ratio (BOD: N: P)	100:5:1
8	Treatment efficiency (COD removal)	>60%

The tank dimensions will be worked out to suit the space availability subjected to the above mentioned specifications.

5.1.2. Aeration Tank

The aeration tank is a part of activated sludge process. The tank will be rectangular in plan with completely mixed flow regime. The specifications of the tank are as under;

1	BOD Loading	600 mg/l
2	Operation Regime	Conventional Aeration
3	MCRT	6 days
4	F/M	0.3
5	MLSS	3000 mg/l
6	MLVSS/MLSS Ratio	0.8
7	HRT	~ 16 hours
8	Tank Volume	~ 480m^3
9	Oxygen Requirement	~ 700 Kg/day
10	Nutrient Ratio (BOD_5: N: P) required	100:7:1
11	Treatment Efficiency (BOD_5) removal)	> 90%

The tank dimensions will be worked out to suit the space availability subjected to the above mentioned specifications

5.1.3. Secondary Clarifier

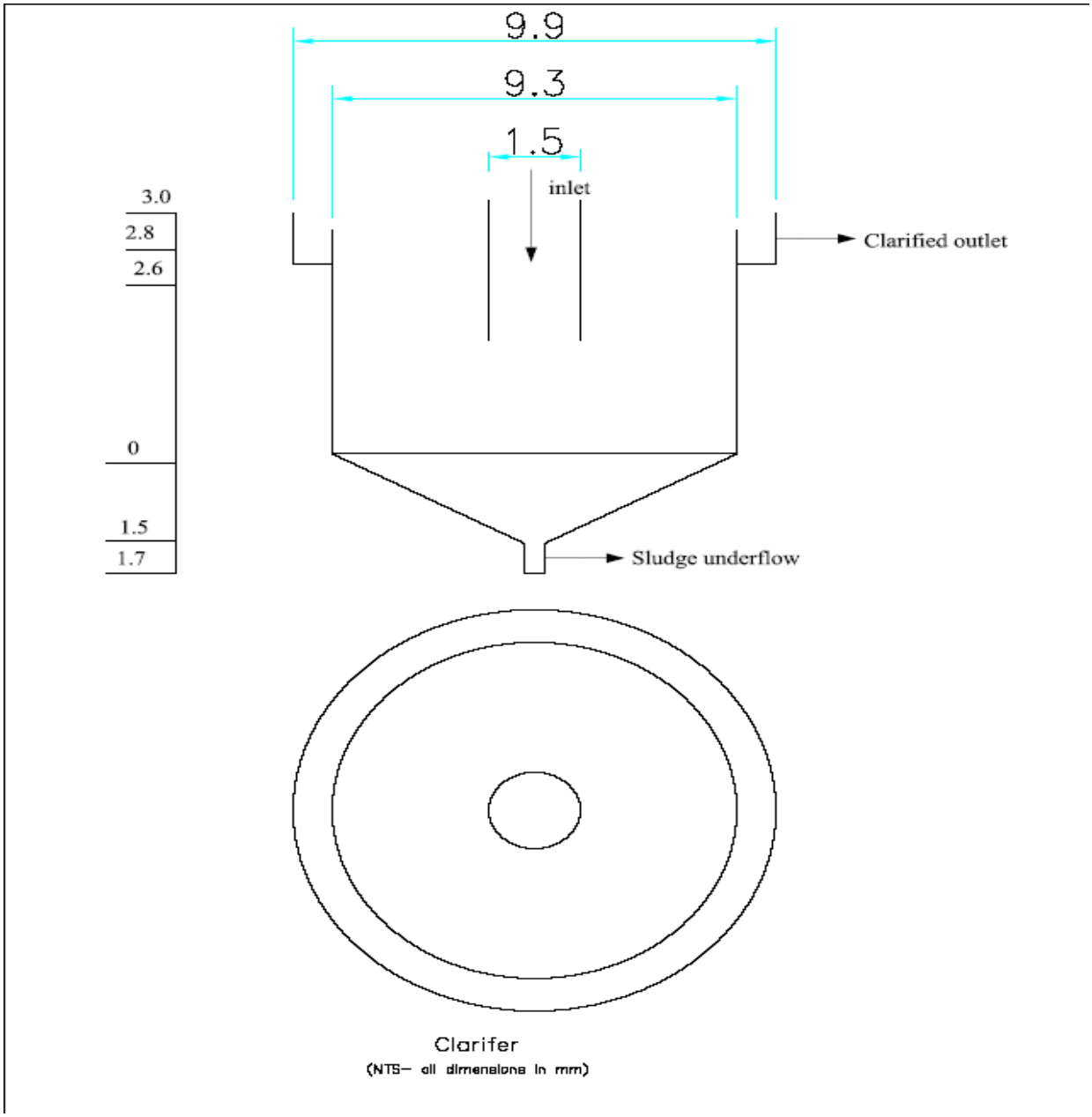
The secondary settling unit is meant to separate the solids from the mixed liquor from the aeration tank. The process is very critical for the efficient operation of the ASP
The clarifier will be cylindrical in geometry with conical bottom. Suitable sludge scraping mechanism will be provided to facilitate sludge collection at the clarifier bottom.
The clarifier can be described as under:

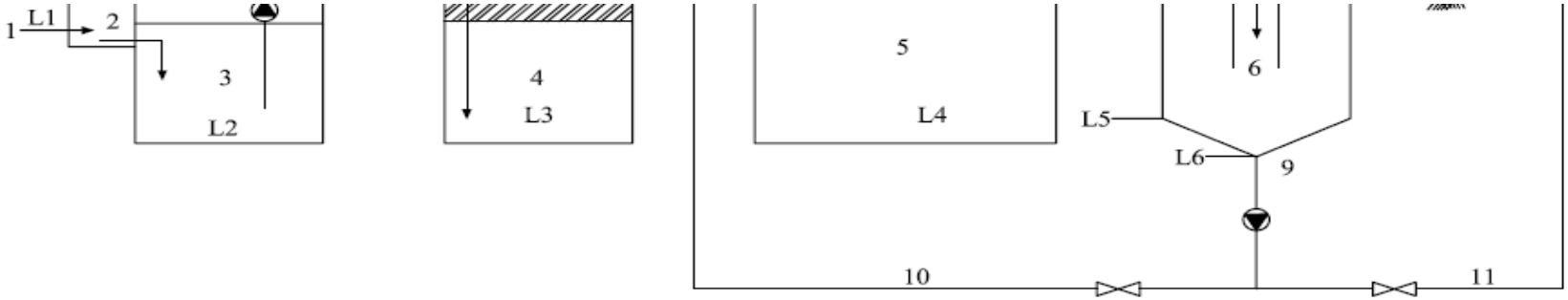
a)	Design Over flow Rate	16 m^3/m^2 day
b)	Peaking Factor	1.5
c)	Design Flow at (P.F)	45 m^3/hr
d)	Settling Area Required	67.5 m^2
e)	Diameter of the clarifier	9.3 m
f)	Vertical depth of clarifier	2.5 m

The separated solids (under flow) are either recycled back into the aeration tank or are wasted (to adjust for the excess sludge generated) onto sludge filter beds
Some of the excess sludge may be fed to UABF for its digestion. This will significantly reduce daily sludge handling requirements.

5.1.4. Sludge Drying Beds

The beds are meant to dry the underflow solids wasted from the secondary clarifier. Total surface area required is 50 m^2
The bed will comprise of graded sand on underlying gravel packing. The depth of packing will be 0.15 m of gravel (20-25 mm) at the bottom over which 0.1m of bajri (~10mm) and 0.3m of graded sand (coarser underneath the finer) at the top
Arrangement will be provided to collect the underflow (filtrate) of the beds and feed it to the anaerobic bio-filter.


9.9
9.3
1.5
inlet
3.0
2.8
2.6
0
1.5
1.7
Clarified outlet
Sludge underflow
Clarifer
(NTS– all dimensions in mm)



Suggestive hysraulic profile of effluent treatment plant

Milk union plant

1 – Raw sewage inlet	7 – Treated effluent outlet
2 – Screening chamber	8 – Sludge drying beds
3 – Collection tank	9 – Sludge underflows
4 – Anaerobic bio–filter	10 – Sludge recycle line
5 – Aeration tank	11 – Sludge wastage line
6 – Secondary clarifier	12 – Underflow from SDBs

GL = Ground lavel		L5 = L3–3.5m	
L1 = inlet invert		L6 = L3–5m	
L2 = L1–3m		L7 = L3–0.5m	
L3 = GL+1.5m		L8 = GL+1.5m	
L4 = L3–5m		L9 = L8–1m	

FOOD & BIOTECH ENGG. (INDIA) PVT.LTD.
Drawn RAJ 19/02/09
Chk.by MKS 19/02/09
Appr.by RPS 19/02/09
NTS
Project : M/s PBE
SHEET :- 1 OF 1

Pearl Dairy Farms Limited.