



---

## PROJECT PROFILE ON SEWAGE SERVICE- FAECAL SLUDGE DISPOSAL SERVICE

---



NOVEMBER 24, 2022

ADDIS ABEBA CITY ADMINISTRATION INVESTMENT COMMISSION  
A.A

# PROJECT PROFILE ON SEWAGE SERVICE- FAECAL SLUDGE DISPOSAL SERVICE

---

## TABLE OF CONTENT

<b>1. BACKGROUND INFORMATION.....</b>	<b>7</b>
<b>1.1 INTRODUCTION .....</b>	<b>7</b>
<b>1.2 SEWER FACILITIES IN ADDIS ABABA .....</b>	<b>7</b>
<b>1.3 ON-SITE SANITATION IN ADDIS ABABA.....</b>	<b>8</b>
<b>1.4 SLUDGE COLLECTION SYSTEM (SLUDGE TRUCKING) .....</b>	<b>9</b>
<b>1.5 PRODUCT DESCRIPTION AND APPLICATION .....</b>	<b>11</b>
<b>1.6 PROJECT LOCATION AND JUSTIFICATION .....</b>	<b>11</b>
1.6.1 <i>Location of Addis Ababa .....</i>	<i>11</i>
1.6.2 <i>Demography of Addis Ababa.....</i>	<i>12</i>
1.6.3 <i>Economic activity of Addis Ababa .....</i>	<i>12</i>
<b>1.7. WHY IS IT BENEFICIAL TO INVEST IN ADDIS ABABA? .....</b>	<b>14</b>
1.7.1. <i>The city benefit from the investment.....</i>	<i>15</i>
<b>2. MARKETING STUDY .....</b>	<b>17</b>
<b>3. PRODUCTION TECHNOLOGY AND ENGINEERING .....</b>	<b>19</b>
<b>3.1 TECHNOLOGY .....</b>	<b>19</b>
3.1.1 <i>Environmental and Social Impact Assessment .....</i>	<i>19</i>
3.1.2 <i>Service capacity .....</i>	<i>19</i>
3.1.3 <i>Service program.....</i>	<i>19</i>
<b>3.2. ENGINEERING .....</b>	<b>20</b>
3.2.1. <i>Land, buildings and civil works .....</i>	<i>20</i>
3.2.2. <i>Machinery and equipment .....</i>	<i>23</i>
<b>TABLE 8 LISTS OF EQUIPMENT REQUIREMENTS .....</b>	<b>23</b>
<b>4. ORGANIZATIONAL STRUCTURE .....</b>	<b>23</b>
4.1. <b>MANPOWER REQUIREMENT AND ESTIMATED ANNUAL MANPOWER COSTS .....</b>	<b>23</b>
<b>5. FINANCIAL ANALYSIS.....</b>	<b>24</b>
<b>5.1. GENERAL .....</b>	<b>24</b>
5.2. <b>INITIAL FIXED INVESTMENT COSTS.....</b>	<b>25</b>
5.3. <b>WORKING CAPITAL.....</b>	<b>26</b>
5.4. <b>PROJECT FINANCING.....</b>	<b>26</b>
5.5. <b>PRODUCTION COSTS .....</b>	<b>27</b>
5.5.1. <i>Utilities .....</i>	<i>27</i>
5.5.2. <i>Repair and maintenance.....</i>	<i>28</i>
5.5.3. <i>Salaries and wages.....</i>	<i>28</i>

# PROJECT PROFILE ON SEWARAGE SERVICE- FAECAL SLUDGE DISPOSAL SERVICE

---

5.5.4.	<i>Over heads</i> .....	28
5.5.5.	<i>Financial costs</i> .....	29
5.5.6.	<i>Depreciation</i> .....	30
5.6.	BREAK EVEN POINT AND ROI.....	31
5.6.1.	<b><i>Break Even point (BEP)</i></b> .....	31
5.6.2.	<b><i>Return on investment</i></b> .....	32
5.7.	<b>PROJECT COSTS</b> .....	<b>32</b>
5.8.	<b>PROJECT BENEFITS</b> .....	<b>33</b>

# PROJECT PROFILE ON SEWAGE SERVICE- FAECAL SLUDGE DISPOSAL SERVICE

---

## LIST OF TABLES

Table 1: Sludge collection Private Companies.....	9
Table 2: Liquid Waste Disposal Capacity (Source: Addis Ababa City Government of Water and Sewerage Authority, 2019) .....	17
Table 3: Projected and unsatisfied demand .....	18
Table 4: Service provision program in (m <sup>3</sup> ) .....	20
Table 5 Building costs .....	21
Table 6 Land lease period in Addis Abeba .....	22
Table 7 Land lease floor price in Addis Abeba .....	22
Table 8 Lists of Equipment Requirements .....	23
Table 9 Annual manpower costs .....	23
Table 10 Initial Fixed investment costs.....	25
Table 11 Utilities of the factory'000" Birr .....	27
Table 12 Overhead costs .....	29
Table 13 Depreciation in Birr"000" .....	30
Table 14 Source of revenue in Birr"000" .....	33
Table 15 Annual total production costs"000" .....	36
Table 16 Calculation of working capital .....	37
Table 17 Projected Net income statement "000" .....	38
Table 18 Debt services schedule and computation.....	39
Table 19 Projected Cash flow statement .....	40
Table 20 Total investment costs"000" .....	41
Table 21 Total Assets .....	41
Table 22 Sources of finance.....	42
Table 23 Summary of financial efficiency tests .....	42
Table 24 Calculation of payback period"000" .....	43
Table 25 Calculation of NPV at 17% D.F.....	44

# PROJECT PROFILE ON SEWORAGE SERVICE- FAECAL SLUDGE DISPOSAL SERVICE

---

## I. Executive summary

This project profile is prepared to assess the viability of running Sewerage service business, in Addis Abeba city administration. Hence Market, Technical, Organizational and Financial study was made to investigate the viability of the envisaged project.

This project profile on Sewerage service has been developed to support the decision –making process based on a cost benefit analysis of the actual project viability. This profile includes marketing study, production and financial analysis, which are utilized to assist the decision-makers when determining if the business concept is viable. Ethiopia has a private sector driven Sewerage service. According to the latest data sourced from Ethiopian investment commission there are more than 252 companies were registered to invest on dairy farming business in Ethiopia and 62 companies are on operational stage while others are on implementation and pre-implementation stages.

The location of the plant will be decided on the basis of access to materials input, infrastructure namely power, water, transport and telecom to easy access to international market. This service sector investment opportunity brief highlights the investors or Promoters of the project for the establishment of this service delivery. Accordingly, based on the market study and other considerations 20 vacuum trucks with the capacity of 4794 m<sup>3</sup>/vehicle/year are considered for this project profile.

The total investment capital including establishing the factory is Birr 125.94 million. Out of the total investment capital, the owners will cover Birr 88.15 million (30 %) while the remaining balances amounting to Birr 37.78 million (70 %) will be secured from bank in the form of term loan.

## PROJECT PROFILE ON SEWARAGE SERVICE- FAECAL SLUDGE DISPOSAL SERVICE

---

As indicated in the financial study, the cash flow projection of the project shows surplus from the first year on. The net cash flows of the project range from Birr 16.64 Million in the first year to Birr 20.40 million at the end of the 10<sup>th</sup> year of operation. At the end of the 10<sup>th</sup> year of operation period the cumulative cash balance reaches Birr 233 million. The Benefit-cost ratio and Net present value (NPV) have been calculated at 17% discount factor (D.F) for 10 years of the project activity. Accordingly, the project has NPV of 100.66 million Birr at 17%D.F. and the benefit-cost ratio of 1.5 at 17% D.F.

Therefore, from the aforementioned overall market technical and financial analysis we can conclude that the Sewerage service deliver business is a viable and worthwhile.

# PROJECT PROFILE ON SEWARAGE SERVICE- FAECAL SLUDGE DISPOSAL SERVICE

---

## **1. BACKGROUND INFORMATION**

### **1.1 Introduction**

This document was undertaken to show sludge disposal service profile in Addis Ababa. In compiling the report, information has been compiled by visiting the existing sludge disposal sites, discussion with various sludge disposal service givers and Addis Ababa Water and Sewage Authority, and review of technical documents about the sludge disposal services.

Presently, in spite of high demand and its crucial importance, number of sludge disposal service givers in Addis Ababa city is very low compared to sewage generation. This constrained the achievement of sewage management of the city and impeded accelerated progress towards waste management successes.

Increase in coverage of sludge disposal services is important to the city present and future demand. In Addis Ababa, the demand for sludge disposal services are expected to increase considerably in the next few decades as a result of increased population growth, urbanization, increased number of septic tank facilities and increasing income levels. Therefore, in a city like Addis Ababa, it is important to identify gaps and potential for sludge disposal services.

### **1.2 Sewer Facilities in Addis Ababa**

Addis Ababa City has limited sewerage lines and the areas that benefitted from the existing lines are mainly Bole, Lideta, Old Airport, Mekanisa, Kera and some areas in the central part of the city. There are over 1,157 kms of secondary sewer lines ( $\leq 300$  mm diameter) connected to the main sewer lines of 131 km ( $>300$  mm diameter) going to the wastewater treatment plants. The truck sewer lines vary in diameter from 350 mm up to 1,500 mmm the majority being 400 mm and 600

# PROJECT PROFILE ON SEWAGE SERVICE- FAECAL SLUDGE DISPOSAL SERVICE

---

mm. About 10% of the trunk sewer lines are not functioning. The tertiary sewer lines (160 mm diameter) are about 215 km. Sewer lines /networks of greater than 300 mm diameter is managed by sub processes found in AAWSA head office while sewer networks less than or equal to 300 mm diameters is managed by branch offices.

Akaki Sewer Catchment, located southwest of Addis Ababa, has a modest sewer network that drains to Chefe WwTP, recently commissioned (April 2022). Kaliti Sewer Catchment, located northwest of Addis Ababa, contains the largest sewer network that drains into Kaliti WwTP. In recent years, major construction projects have greatly upgraded to the Kaliti sewer network.

The sewer network in the Eastern Wastewater Catchment is also very limited. The Yeka Abado, Yeka Ayat, Bole Ayat, and Sunshine Condominiums projects are supplied by a 28.7kilometer trunk sewer that empties into Kotebe Ponds.

Internal sewer networks drain to decentralized WwTPs in several condominium projects in the three Catchments. Currently, according to AAWSA, there are over 168,909 customers that are connected to the sewerage lines of the system. There has been abrupt increase in sewer connection customer starting from year 2010 until this time. There are also 555 communal as well as about 370 mobile and public toilets in the city.

## **1.3 On-site Sanitation in Addis Ababa**

According to previous Wastewater Master Plan (2002, updated 2005), there is no sanitation zoning since the whole City was covered by centralized sanitation. The figures on the access of sanitation vary between one source to another. Among the most relevant, we can cite:



## PROJECT PROFILE ON SEWAGE SERVICE- FAECAL SLUDGE DISPOSAL SERVICE

---

- AAWSA estimate (2020): the actual sewer service coverage by sewer consumers vs household is between 20 to 25% in the city of Addis Ababa. Therefore, 75 to 80 % of the population relies on-site sanitation systems.
- CSA (2005): less than 3% of the population is served by the sewerage network. Most households (about 75%) have pit latrines discharging to open drains, about 15% have flush toilets and septic tanks, these likewise often discharging to open drains, whereas a significant minority (about 5%) resorts to open defecation. Public toilets are not common, but pit latrines are often shared between several households. However, this data are outdated.

### 1.4 Sludge collection system (Sludge Trucking)

As mentioned earlier, although there are more sewer lines that are under construction to increase the sewerage service coverage, the use of vacuum truck service is also very high compared to the number of services provided by such system. Currently, according to the information from AAWSA there are about 109 (only a maximum of 63 are active on daily basis) government owned and over 286 privately operated vacuum trucks (with a capacity of 8 to 16 m<sup>3</sup>) owned by a total of 218 registered companies that are serving the population of the city. The private operators are providing De-sludging services for Business entities and hotels institutions and AAWSA is providing licenses for them Most of these private companies have established an association and are working in a group. Table below provides information about the cost for sludge removal, their coverage area and some of them who represent the group of private companies.

Table 1: Sludge collection Private Companies

Name of organization	a) Dinknesh private sewer trucks association
----------------------	--

## PROJECT PROFILE ON SEWARAGE SERVICE- FAECAL SLUDGE DISPOSAL SERVICE

	<p>b) Ethio Private sewer truck association</p> <p>c) GS private Limited company</p> <p>d) Africa Private sewer truck service</p>
Cost per household for sludge removal	<p>The cost varies depending on the capacity of trucks distance from the desludging location to the treatment plant.</p> <ul style="list-style-type: none"> <li>▪ For the truck capacity of 8m<sup>3</sup> — Birr 1,500.00 per household</li> <li>▪ For the truck capacity of 16m<sup>3</sup> to 22m<sup>3</sup> — Birr 2,500.00 to Birr 3,000.00 per household</li> </ul>
Coverage area	All parts of Addis Ababa and places that are outskirts of the city
Sludge discharge area	Kality and Kotebe WWTP compound
Number and capacity of vacuum trucks	Total number is 200 (10 of them are capacity of 16 to 22m <sup>3</sup> and the remaining 190 are capacity of 8m <sup>3</sup> )

According to regulations No. 31/2002, AAWSA shall render sludge disposal services by vacuum trucks by collecting charges provided. The following conditions should be fulfilled:

- the applicant for the services shall ensure that the maximum accessible distance between the cesspool and the most possible place where vacuum trucks can operate shall not be more than (40) forty meters,
- the sludge to be collected from the pit latrine shall always pertain to liquid effluents and capable of being pumped.

# PROJECT PROFILE ON SEWAGE SERVICE- FAECAL SLUDGE DISPOSAL SERVICE

---

## **1.5 Product Description and Application**

A sanitation system deals with human excreta from the time it is generated until it is used or disposed of safely. The third component of a sanitation system addresses safely emptying fecal sludge from on-site sanitation technologies, and then transporting the sludge for treatment, use or disposal.

Emptying (also called collection) and transporting fecal sludge is a critical link in a sanitation system. Great efforts are being made in Addis Ababa to reduce open defecation by building on-site sanitation technologies, like pit latrines and septic tanks. However, it is not enough to only build an on-site technology to ensure good sanitation and protect public health. The technologies will eventually fill up with fecal sludge. Yet, emptying full technologies and safely managing the fecal sludge is an essential service.

Some on-site sanitation technologies, like septic tanks and aqua privies, are designed to be emptied periodically. For other technologies, like pit latrines, people need to decide whether to empty the pit or dig a new one. Emptying is a common practice in densely populated areas like Addis Ababa where households are not connected to a sewerage system or do not have the space to dig a new latrine pit when the old one is full. For this purpose, well-equipped and protected service providers are required to empty on-site sanitation technologies and transport the sludge to a treatment, use or disposal site. Thus, existence of adequate sludge disposal service providers is important.

## **1.6 Project Location and Justification**

### **1.6.1 Location of Addis Ababa**

Addis Ababa is the seat of the Ethiopian federal government. It is located on the central highlands of Ethiopia in the middle of Oromia Region. The absolute location is around the intersection point

# PROJECT PROFILE ON SEWAGE SERVICE- FAECAL SLUDGE DISPOSAL SERVICE

---

of 9°1'48''N latitude and 38°44'24''E longitudes. This is very near to the geographical center of the country. It is, therefore, equidistant to the peripheral areas or is equally accessible to almost all parts of Ethiopia. Addis Ababa is located on a well-watered plateau surrounded by hills and mountains. The city is in the highlands on the edge of the Ethiopian rift valley or the eastern slopes of the Entoto Mountain ranges bordering the Great Rift Valley. The total area of Addis Ababa is about 540 km<sup>2</sup> of which 18.2 km<sup>2</sup> are rural. Addis Ababa's built-up urban area spans 474 km<sup>2</sup>. It is also the largest city in the world located in a landlocked country.

## **1.6.2 Demography of Addis Ababa**

According to the CSA (2013) population projection, Ethiopia's total population reaches about 105 million people in 2022. Of the total population 22.9% (24 million people) live in urban areas. Ethiopia's urban population is expected to triple by 2037 (World Bank, 2015). Addis Ababa hosts an estimated 3,859,638 people. Currently, Addis Ababa is experiencing an annual growth rate of 3.8% and is estimated to reach 4,696,629 inhabitants by 2032 (CSA, 2015).

## **1.6.3 Economic activity of Addis Ababa**

The transformation of Addis Ababa has especially been rapid since 1991. According to the data from the city's Bureau of Finance and Economic Development (2006), per capital income of Addis Ababa has grown from USD 788.48 in 2010 to USD 1,359 in 2015. The city also achieved a decline in the poverty index from a high of 29.6 in 2012 to 22.0 in 2014. Moreover, the current poverty headcount index for Addis Ababa is estimated at 18.9 while the poverty severity account for 5 and 1.8 index points respectively. Even though, the poverty status of Addis Ababa has an improvement over previous years, there is still much work to be done to curb both the incidence and severity of poverty.

## PROJECT PROFILE ON SEWARAGE SERVICE- FAECAL SLUDGE DISPOSAL SERVICE

---

The major contributor to the economic growth of the city is the implementation of publicly financed mega urban projects like condominium housing, the Light Rail Transit, the international airport and industrial zone development (The state of Addis Ababa, 2017). The existence of international large and medium-size enterprises in and around Addis Ababa have also significant role in creating huge opportunity for employment and technology transfer. Furthermore, there are strong demand for goods and services following the existence of many embassies and inter-governmental organizations like the African Union, the United Nations Economic Commission for Africa.

The manufacturing sector's contribution to Addis Ababa's GDP is high. Despite the fact that 86% of the industries in the city are micro and small scale (cottage and handicrafts, and small-scale), the majority of the country's large and medium scale industries are found in the city. Noticeable increases are also registered currently in other aspects of industrial growth.

The service sector is both the largest contributor to the city's economy and the largest employer. It contributes to 76.4% of the city's GDP while industry's share makes up (almost all) the rest. This sector is dominated by three major sub-sectors: Transport and communication; Real estate, Renting and Business services; and Trade, Hotel and Restaurants. According to the state of Ethiopian Cities 2015 report, the service sector has also been responsible for more than 50% of the growth in the estimated annual growth of the city's GDP. Although 75% of employment in the city is also generated in the service sector, a large proportion of the employed work in low skill and low paying jobs as shop salespersons, petty and 'gullit' traders, sales workers in small shops, domestic helpers or doorkeepers and restaurant service workers.

## PROJECT PROFILE ON SEWARAGE SERVICE- FAECAL SLUDGE DISPOSAL SERVICE

---

Analysis of the economic structure of Addis Ababa reveals that the services sectors (63%) dominates with industry (36%) in second place indicating that these sectors account for almost all of the Addis Ababa's GDP (The State of Addis Ababa, 2017).

Addis Ababa has a great share in the economy of the country due to its attractiveness to businesses, companies, individuals and foreign direct investment. Overall primacy index of the city is 24.8 based on urban employment and unemployment survey (CSA 2015). According to the State of Addis Ababa 2017 report, the simultaneous high rates of economic growth and urbanization in Addis Ababa indicates a likely further rising dominance of the city in Ethiopia's economy as well as growing agglomeration of economic activities in and around the city.

### 1.7. Why is it beneficial to invest in Addis Ababa?

Addis Ababa is the largest and most economically significant city in the country. Ethiopia's urban population share is only 17 percent (as of 2012, World Bank 2015). The city is the only urban area in Ethiopia capable of delivering scale economies in terms of concentrated demand, specialization, diversity and depth of skills, innovation, and technology transfers. Thus, investors will be benefited in getting capable human power from the market.

The capital is the country's main industrial hub. The city dominates industrial capacity in almost all the branches of light manufacturing that Ethiopia prioritizes. As a result Addis Ababa completely dominates production in various subsectors. This can be taken as the political and social stability of the city.

## PROJECT PROFILE ON SEWARAGE SERVICE- FAECAL SLUDGE DISPOSAL SERVICE

---

Overall, the city has a beautiful environment, favorable location, and strong industrial base. Its advantage as an economic powerhouse of the country and human resource center are the most attractive features for local and overseas investors.

Moreover, investors will be getting a comprehensive set of incentives for priority sectors. These include:

- Customs duty free privilege on capital goods and construction materials, and on spare parts whose value is not greater than 15% of the imported capital goods' total value.
- Investors have the right to redeem a refund of customs duty paid on inputs (raw materials and components) when buying capital goods or construction materials from local manufacturing industries.
- Income tax exemption of up to 6 years for manufacturing and agro-processing, and up to 9 years for agricultural investment.
- Additional 2-4 years income tax exemption for exporting investors located within industrial parks and 10-15 years exemption for industrial park developers.
- Loss Carry forward for half of the tax holiday period. Several export incentives, including Duty Draw-Back, Voucher, Bonded Factory, and Manufacturing Warehouse, and Export Credit Guarantee schemes.

### **1.7.1. The city benefit from the investment**

The city will be benefited from investment. These are discussed below.

- Employment opportunity

## PROJECT PROFILE ON SEWARAGE SERVICE- FAECAL SLUDGE DISPOSAL SERVICE

---

Investment is expected to provide direct and indirect employment. These range from unskilled casual workers, semi-skilled and skilled employees.

- Improving growth of the economy

Through the use of locally available materials and exporting products, the investment contributes towards growth of the economy by contributing to the growth of domestic product. These eventually attract taxes including VAT which will be payable to the government hence increasing government revenue while the cost of local materials will be payable directly to the producers. In addition, domestic products save foreign exchange and exports also bring money to the country.



# PROJECT PROFILE ON SEWAGE SERVICE- FAECAL SLUDGE DISPOSAL SERVICE

## 2. Marketing study

As shown in the table below, the amount of sewerage disposal of (including both faecal sludge and sewerage system) increased from 5,392,899 m<sup>3</sup> in 2013/14 to 13,897,328 m<sup>3</sup> in 2017/18. The number of vehicles in charge of sewerage disposal increased from 187 to 322 and the disposal capacity of vehicles has shown an increase from 511,597 m<sup>3</sup> to 1,280,145 m<sup>3</sup> during the same period.

Table 2: Liquid Waste Disposal Capacity (Source: Addis Ababa City Government of Water and Sewerage Authority, 2019)

S.No	Item	Year	
		2014	2018
1	Amount of Sewage Disposed (m <sup>3</sup> )	5,392,899	13,897,328
2	Vehicles in Charge of Sewerage Disposal (No)	187	322
3	Disposing capacity of vehicles (m <sup>3</sup> )	511,597	1,280,145

Assuming the number of vehicles increase by 5% and disposal capacity increase by 10% , in 2022 number of vehicle and disposal capacity is 391 and 1,874,260 m<sup>3</sup>/year respectively; with an average of 4794 m<sup>3</sup>/ vehicle/year.

Moreover, based on study of new Transfer Station and sludge injection and rehabilitation of existing transfer station (2016), it was estimated a total volume of faecal sludge of 3,762 m<sup>3</sup>/d or 1,373,130 m<sup>3</sup>/year. This volume was expected to be generated in the year 2020. Assuming 10% increase, the volume of faecal sludge generation in 2022 is 1,722,454 m<sup>3</sup>/year.

## PROJECT PROFILE ON SEWAGE SERVICE- FAECAL SLUDGE DISPOSAL SERVICE

In order to project sludge disposal capacity, the past trend of the city disposal capacity was considered. As stated above, the sludge disposal capacity was considered to increase by 5%. Assuming that this growth rate will continue in the future and taking 2022 figure (1,874,260 m<sup>3</sup>/year) as a base, sludge disposal capacity was forecasted. Moreover, in order to compute the unsatisfied demand, the faecal sludge production of Addis Ababa city by 2022 as a base year, which was computed to be (1,722,454 m<sup>3</sup>/year) per annum, is taken as the existing production. Assuming this figure will grow by 10% due to population growth, increase in number of hotels, increase in unsewered part of the city, increase in awareness of the people and increase in house construction, the total faecal sludge production was projected for the years 2023-2032 (Table 3).

Table 3: Projected and unsatisfied demand

Year	Projected sludge disposal capacity (m <sup>3</sup> )	Number of vehicles (supply)	Projection of faecal sludge production	Number of vehicles (demand)	Unsatisfied Demand
2023	1,967,973	411	1,929,149	402	
2024	2,066,372	431	2,160,647	451	20
2025	2,169,690	453	2,419,924	505	52
2026	2,278,175	475	2,710,315	565	90
2027	2,392,083	499	3,035,553	633	134
2028	2,511,688	524	3,399,819	709	185
2029	2,637,272	550	3,807,798	794	244
2030	2,769,136	578	4,264,733	890	312
2031	2,907,592	607	4,776,501	996	390
2032	3,052,972	637	5,349,682	1,116	479

Accordingly, based on the market study and other considerations 20 vacuum trucks with the capacity of 4794 m<sup>3</sup>/vehicle/year are recommended.

# PROJECT PROFILE ON SEWARAGE SERVICE- FAECAL SLUDGE DISPOSAL SERVICE

---

## **3. Production Technology and engineering**

### **3.1 Technology**

#### **3.1.1 Environmental and Social Impact Assessment**

Typically, any developmental projects also trigger a set of environmental and social impacts. These environmental and social due to development projects occur in different forms. An Environmental and Social Impact Assessment (ESIA) has to be carried out to study the potential environmental and social impacts of the envisaged sewerage service faecal sludge disposal. Potential environmental and social on attributes like air quality, noise, water quality, soil, flora, socio-economic, etc. have to be assessed as part of the ESIA study. Appropriate mitigation measures to help minimize/avoid impacts from the development have to be recommended in the study. The measures include avoidance measures, mitigation measures and environmental enhancement measures. Social responsibility cost estimated to be 1% of fixed investment costs.

#### **3.1.2 Service capacity**

From the market study, it is observed that there is a great demand gap between the demand and supply of international standard hotel service. Therefore, taking in to account the market study and economic scale of service provision the envisaged international standard hotel will have capacities as shown below :

#### **3.1.3 Service program**

At the initial stage of the provision period, the hotel would require some years to penetrate into the market and capture a significant market share. Therefore, in the first year of service the capacity

## PROJECT PROFILE ON SEWARAGE SERVICE- FAECAL SLUDGE DISPOSAL SERVICE

utilization rate will be 70% and progressively increase by 10%. Full service provision shall be attained in the fourth year and then after. The proposed service provision program is shown in Table 4.

Table 4: Service provision program in (m3)

S.No.	Service	Service year			
		1	2	3	4-10
1	Amount of Sewage Disposed (m3)	67,116	76,704	86,292	95,880

### 3.2. Engineering

#### 3.2.1. Land, buildings and civil works

The required area (m<sup>2</sup>) and construction cost for the production facilities essential for the successful operation of the processing plant is shown in Table 5. A total area ready for the processing plant is 1,000m<sup>2</sup> out of which 866m<sup>2</sup> is to be covered by building while uncovered area of 134m<sup>2</sup> is left open green area. In order to estimate the land lease cost of the project profiles it is assumed that all the project will be located in different land level from level 1/1 to level 4/3, their current market lease price is from 39,073.31 birr per M<sup>2</sup> to 2,800.71 birr per M<sup>2</sup> respectively. Therefore, for the profile a land lease rate of birr 3,885 per M<sup>2</sup> have been taken, which is between the ranges.

The cost of construction of building should be appropriate to the size and expected profitability of business, costs of building generally differs by the type of construction materials used, the type of foundation, wall height and location. The current building cost for simple storage and processing room is from 1,800.00 Birr per m<sup>2</sup> to 25,000 Birr per m<sup>2</sup>. The total construction cost of buildings

## PROJECT PROFILE ON SEWAGE SERVICE- FAECAL SLUDGE DISPOSAL SERVICE

---

and civil works, at a rate of Birr 20,000 per m<sup>2</sup> is estimated at Birr 10.95 million. Therefore, the total cost of land lease and construction of buildings and civil works is estimated at Birr 14.84 million.

The proposed plant layout comprises the following buildings and structures.

Table 5 Building costs

S/No	Descriptions	Total area M <sup>2</sup>	Estimated cost per square meter (in Birr)	Total estimated cost ( in Birr)
6	Office and toilet	200	20,000.00	4,000,000.00
7	Canteen	160	20,000.00	3,200,000.00
8	Guard house	6	20,000.00	120,000.00
9	parking	500	2,000	1,000,000.00
10	Green area	134	1,000	134,000.00
11	Fence			2,500,000.00
	TOTAL	1,000		10,954,000.00

## PROJECT PROFILE ON SEWAGE SERVICE- FAECAL SLUDGE DISPOSAL SERVICE

Table 6 Land lease period in Addis Abeba

Sector of development activity	Period of lease	Down payment
Education, health, culture and sports	90	10%
Industry (manufacturing )	70	10%
commerce	60	10%
For urban agriculture	15	10%
For others	60	10%

Sources: - city government of Addis Abeba land development and management bureau

Table 7 Land lease floor price in Addis Abeba

S/No	Land level	Current land lease floor price per M <sup>2</sup>	Current lease price per M <sup>2</sup> (Market price )
1	1/1	2,213.25	39,073.31
2	1/2	2,165.47	36,825.73
3	1/3	1,900.19	34,578.15
4	¼	1,552.93	31,119.21
5	1/5	1,531.91	29,096.45
6	2/1	1327.39	27,073.71
7	2/2	1,221.18	25,050.96
8	2/3	1,191.17	23,028.21
9	2/4	1,074.39	21,005.46
10	2/5	1,027.84	18,982.71
11	3/1	994.71	16,959.96
12	3/2	960.21	14,937.21
13	3/3	927.84	12,914.46
14	¾	904.77	10,891.71
15	3/5	873.74	8,868.96
16	4/1	814.06	6,846.21
17	4/2	786.45	4,823.46
18	4/3	748.80	2,800.71

Sources: - city government of Addis Abeba land development and management bureau

# PROJECT PROFILE ON SEWAGE SERVICE- FAECAL SLUDGE DISPOSAL SERVICE

## 3.2.2. Machinery and equipment

The main plant and machinery is 20 vacuum trucks with the capacity of 4794 m<sup>3</sup>/vehicle/year.

Table 8 Lists of Equipment Requirements

Description	Unit of measure	Quantity	Total Costs
20 vacuum trucks with the capacity of 4794 m <sup>3</sup> /vehicle/year	PCS	20	100,000,000.00
Total			100,000,000.00

## 4. Organizational structure

The selection of structure of the envisaged project is made based on the existing structure of manufacturing plants operating in the country, the capacity, complexity and technology mix of the plant. Organizational structure principles such as specialization, coordination, and departmentalization are also considered for design of structure that best suits the envisaged project

### 4.1. Manpower Requirement and Estimated Annual manpower costs

Table 9 Annual manpower costs

s/no	Description	Number of persons	Salary in birr	
			monthly	annually
1	General manager	1	45,000.00	540,000.00
2	executive secretary	1	15,000.00	180,000.00
3	Manager- admin. and finance	1	25,000.00	300,000.00
6	cashier	1	10,000.00	120,000.00
8	guards	5	3,000.00	180,000.00
9	driver ii	20	10,000.00	2,400,000.00
	total	29		3,720,000.00

# PROJECT PROFILE ON SEWAGE SERVICE- FAECAL SLUDGE DISPOSAL SERVICE

---

## 5. Financial Analysis

### 5.1. General

The financial analysis evaluation, under consideration has been carried out for sewerage service cost estimates of the envisaged project are mainly consisted of capital investment as well as operating and maintenance costs. The capital investment costs include fixed investment costs (initial fixed investment and replacement costs) and working capital, while operating and maintenance costs comprise current expenses related to material inputs, labour, utility, repair and maintenance costs, spare parts, Overheads, Sales and distribution, interest and depreciation expenses.

The financial analysis and evaluation has been conducted taking assumptions:

1. It is assumed that about 70% of the total capital investment costs including the working capital requirement could be covered through development bank loans of short and long-term credits. The remaining balance 30% will be covered by equity capital contribution of the project owner.
2. Even though the project might secure loans under different term and conditions as well as from different financial sources, for the purpose of calculation of debt service scheduling, the current development bank of Ethiopia credit terms and conditions have been used. Consequently. It is assumed that the project will secure loan facility on the basis of 11.5 % annual interest rate, and 10 years' equal installments.
3. Even though the estimated project production life is more 10 years, the financial analysis has been undertaken for a period interval covering the first 10 years only, during which time



## PROJECT PROFILE ON SEWAGE SERVICE- FAECAL SLUDGE DISPOSAL SERVICE

most of the capital assets are assumed to be depreciated, debts recovered and pay-back period accomplished.

4. It is assumed that the project will be start up production activity at 70 % capacity. During years 2 & year 3 the projects is anticipated to gradually increase capacity utilization to reach 100% in year 4. Therefore, starting from year 4 the project will be operational at full capacity.
5. For the project under reference promotional, sales and distribution expenses have been estimated at 3% of the sales revenue.
6. Maintenance and spare parts costs are 1.5% of the fixed investment costs.

### 5.2. Initial Fixed investment costs

Table 10 Initial Fixed investment costs

S/No	Fixed investment type	Unit of measurement	Quantity	Unit price	Total Amount	Remarks
1	Land	Square meter	1,000	555 birr/year	3,885,000.00	The period of land lease will be 70 years and 10% of the total lease amount will be paid in the first year
2	Buildings and civil works	Square meter	1,000	lump sum	10,954,000.00	
	<b>Sub total</b>				<b>14,839,000.00</b>	
3	20 vacuum trucks	set	2	Lump sum	100,000,000.00	
4	Transformer	set	1	Lump sum	2,000,000.00	
7	Furniture and fixture	Pcs			500,000.00	
	<b>SUB TOTAL</b>				<b>102,500,000.00</b>	
	Fixed capital investment costs				<b>117,339,000.00</b>	
8	pre-operational expenses				2,000,000.00	
	Working capital				6,597,000.00	
	<b>TOTAL INVESTMENT COSTS</b>				<b>125,936,000.00</b>	

## PROJECT PROFILE ON SEWARAGE SERVICE- FAECAL SLUDGE DISPOSAL SERVICE

---

### 5.3. Working capital

Working capital is the financial means required for smooth operation and maintenance of a project mathematically, it is a difference between current assets and current liabilities. In the particular case of the project under consideration, the current assets comprise receivables, inventories (local and imported material inputs, spare parts, work in progress, and products ready for delivery) and cash in hand, while current liabilities comprise accounts payable to creditors.

### 5.4. Project Financing

Fixed capital investment costs and working capital requirements are assumed to be financed by equity capital of the owner and through loans of short and long-term credits.

As stated earlier even though the company obtains loans under different terms and condition as well as from different sources, for the purpose of calculation of debt service scheduling the current development bank of Ethiopia credit terms and conditions have been used. Accordingly, it is assumed that the company will be able to obtain loan 70% of the total investment costs for construction of different buildings, for purchase of machineries, for purchase of truck and vehicles (and for purchase of office furniture and pre operation expense will be covered through bank loans that will have to be repaid back within 10 years, during which time interest will be paid on the loan. The remaining balance (30%) that of the total investment costs will be expected to be covered by equity contribution of the project promoter.

# PROJECT PROFILE ON SEWAGE SERVICE- FAECAL SLUDGE DISPOSAL SERVICE

## 5.5. Production costs

As it is depicted in Annex Table 15 major categories of the total production costs are assembled into the following cost elements.

### 5.5.1. Utilities

In estimating costs of utility expenses for operation and maintenance of the project, Costs of fuel, oil and lubricant, electricity and water consumptions have been taken in to consideration, the rates of which have been estimated on the basis of the proposed capacity utilization program of the project and at the current official charging rates. At full capacity operation the project will have the following utility expense per annum which amounts to Birr 7.5 million.

Table 11 Utilities of the factory'000''Birr

<b>Utility'000''Birr</b>		Start-up			Full Capacity
		70 %	80 %	90 %	100 %
Capacity utilization		70 %	80 %	90 %	100 %
Project year		1	2	3	4
Item description	Unit of measurement				
<b>Fuel</b>					
Gasoline for transport truck	(100km*300days* 47Birr/LIT*5km/Li)*20	3,948	4,512	5,076	5,640
Change of oil and lubricant	10% of the fuel consumption	395	451	508	564
<b>Sub-Total</b>		<b>4,343</b>	<b>4,963</b>	<b>5,584</b>	<b>6,204</b>
Electricity	260days*24 hr.*150kwh* 0.69Birr/kwh	907	907	907	907
<b>Sub- Total</b>		<b>907</b>	<b>907</b>	<b>907</b>	<b>907</b>
Water	365days*100m <sup>3</sup> /day*10 Birr/m <sup>3</sup>	255.50	292.00	328.50	365.00
<b>Sub -Total</b>		<b>255.50</b>	<b>292.00</b>	<b>328.50</b>	<b>365.00</b>
<b>Telecommunication</b>					
Telephone	5 lines* 500Birr/month/line+18Birr/line/mon	31.08	31.08	31.08	31.08
Mobile	5 lines*500 Birr/month/line	30.00	30.00	30.00	30.00
Fax	2line*1,000Birr/month + 17 Birr/line/month	24.40	24.40	24.40	24.40
Internet	2,500 Birr/month	30.00	30.00	30.00	30.00
<b>Sub-Total</b>		<b>115.48</b>	<b>115.48</b>	<b>115.48</b>	<b>115.48</b>
<b>TOTAL</b>		<b>5,621</b>	<b>6,278</b>	<b>6,935</b>	<b>7,592</b>

## PROJECT PROFILE ON SEWAGE SERVICE- FAECAL SLUDGE DISPOSAL SERVICE

---

### 5.5.2. Repair and maintenance

In the expenses under this title have been considered cost estimates required for annual repair and maintenance works including spare parts expenses. These costs include the annual repair expenses of structures and civil works as well as repair and maintenance expenses of machinery and equipment including accessory and general service facilities. The repair and maintenance and spare parts costs have been assumed to be (1.5% of fixed costs and spare part costs).

### 5.5.3. Salaries and wages

The costs of salaries have been calculated in accordance with the manning list proposed under the “organization and Management” section of this study. In the estimation of salaries and wages, the official minimum wage has been taken in to account. At full capacity operation the costs of salaries and wages will amount to Birr 3.72 Million.

### 5.5.4. Over heads

In the expenses under this title have been included land and building taxes, buildings, vehicles as well as machinery and equipment insurance, vehicles annual inspection; postage, telephone and e. mail, stationery and office supplies; printing and copying; audit fee; cash indemnity etc. The overhead costs and divided in to direct overheads and administration overheads.

## PROJECT PROFILE ON SEWAGE SERVICE- FAECAL SLUDGE DISPOSAL SERVICE

Table 12 Overhead costs

<b>Direct Overhead"000" Birr</b>		Year 1	Year 2	Year 3	Year 4
Annual land lease Payment		3,885	3,885	3,885	3,885
<b>Insurance</b>					
Building and Civil works	0.10%	11.00	11.00	11.00	11.00
Motor vehicle and Truck	1%	1,000	1,000	1,000	1,000
Vehicles annual inspection and registration	25,000 Birr per annum per vehicle	500.00	500.00	500.00	500.00
Work cloth	Two times per annum per workers at 1,500 Birr	30.00	30.00	30.00	30.00
Cleaning and sanitation	Lump sum	100.00	100.00	100.00	100.00
Sub Total		5,526	5,526	5,526	5,526
<b>Administration Overhead "000' Birr</b>					
Audit fee	40,000 Birr per annum	40.00	40.00	40.00	40.00
Office cleaning and sanitation	2,000 Birr per month	24.00	24.00	24.00	24.00
Stationery and office supplies	2,000 Birr per month	20.00	20.00	20.00	20.00
Printing and Copy	2,000 Birr per month	24.00	24.00	24.00	24.00
Sub Total		<b>108.00</b>	<b>108.00</b>	<b>108.00</b>	<b>108.00</b>
<b>GRAND TOTAL</b>		<b>5,634</b>	<b>5,634</b>	<b>5,634</b>	<b>5,634</b>

### 5.5.5. Financial costs

As it has been outlined earlier under " project Financing" the current Development Bank of Ethiopia credit terms and conditions for newly establishing projects have been used to compute the financial costs, estimated to be incurred in connection with that of the total investment costs assumed to be covered through loan financing. The amount of the loan capital to be obtained and the financial costs to be incurred thereof have been determined depending on the amount of fixed investment cost and pre-production expenses.

## PROJECT PROFILE ON SEWAGE SERVICE- FAECAL SLUDGE DISPOSAL SERVICE

---

### 5.5.6. Depreciation

Depreciation charges should be taken in to account as part of the total production costs in order to calculate the total production costs, the net working capital and the gross or net-profit. For the given project under reference, the fixed assets and the pre-production capital expenditures have been depreciated and amortized respectively on “a straight line” depreciation method basis using the following rates of the original acquisition costs of the assets:

The rationale uses for the estimation of the depreciation and the amortization rates is based on the expected service life of the assets and repayment capacity of the project under consideration. Based on the above charging rates and consideration of the above facts, the total annual depreciation cost at full capacity operation have been estimated at Birr 21.37 million.

Table 13 Depreciation in Birr"000"

Period			Start-up			
			70 %	80 %	90 %	100 %
Capacity utilization			70 %	80 %	90 %	100 %
Project year			1	2	3	4
Item description	Original Value					
Structure and civil works	10,954,000.00	5% of original value	5,477.00	5,477.00	5,477.00	5,477.00
Transformer	2,000,000.00	15 % of original value	300.00	300.00	300.00	300.00
Motor vehicles and trucks	100,000,000.00	15 % of original value	15,000.00	15,000.00	15,000.00	15,000.00
Office equipment and furniture	500,000.00	20% of original value	100.00	100.00	100.00	100.00
Pre-operation expense	2,000,000.00	25% of original value	500.00	500.00	500.00	500.00
<b>Total</b>			<b>21,377.00</b>	<b>21,377.00</b>	<b>21,377.00</b>	<b>21,377.00</b>

# PROJECT PROFILE ON SEWAGE SERVICE- FAECAL SLUDGE DISPOSAL SERVICE

---

## 5.6. Break Even point and ROI

### 5.6.1. Break Even point (BEP)

Three kinds of break-even point

- A. BEP Sales Revenue(BR)
- B. BEP production (Volume)
- C. BEP Percentage (%)

#### A. Break-even point(BEP) Sales

To determine BEP Annual Sales, multiply annual sales found in income statement by the annual fixed cost, and divided by Annual sales less Annual variable cost.

$$\text{BEP (sales)} = \frac{\text{Annual sales} \times \text{Annual fixed costs}}{\text{Annual sales} - \text{Annual variables costs}}$$

Annual sales = 50,337,000 Birr

Unit selling price = 750 Birr/M<sup>3</sup>

$$\text{BEP (sales)} = \frac{\text{Annual sales} \times \text{Annual fixed costs}}{\text{Annual sales} - \text{Annual variables costs}} = \frac{50,337,000 \times 35,343,000}{50,337,000 - 8,833,000}$$

BEP (Sales) = 42,864,798 Birr

#### B. BEP production

To determine BEP production volume, divided BEP sales by the unit selling price (USP)

BEP production = 42,864,798/750 = 57,153

$$\begin{aligned} \text{c. BEP percentage} &= \frac{\text{Annual fixed costs} \times 100\%}{\text{Annual sales} - \text{Annual variables costs}} \\ &= \frac{35,343,000 \times 100\%}{50,337,000 - 8,833,000} \\ &= 85\% \end{aligned}$$

# PROJECT PROFILE ON SEWARAGE SERVICE- FAECAL SLUDGE DISPOSAL SERVICE

---

## 5.6.2. Return on investment

Return on investment = Net profit /Total capital requirement

$$= 14,026,000/125,936,000$$

$$= 11\%$$

The return on owners' investment (ROOI)

= Annual net profit /owners' investment

$$= 14,026,000/37,780,800$$

$$= 37\%$$

## 5.7. Project costs

Project capital investment costs are the sum of fixed capital investment (fixed investment plus pre-production capital expenses) and net working capital at full capacity, with fixed capital constituting the resources required for constructions and civil works, importation vacuum truck and general service facilities, whereas, the working capital corresponding to the resources needed for operation of the project totally and partially.

As it has been revealed in Annex Table 15 the total annual operating costs excluding depreciation and interest are estimated to range from 18.18 million Birr in year 1 to 20.80 million Birr in year 4 and then after remain constant for the rest of the project life.

The total annual production costs including depreciation and interest increase from 49.70 million Birr in year 1 to 50.33 million Birr in year 4 then starts declining until it reaches 27.85 million Birr in year 10.



## PROJECT PROFILE ON SEWAGE SERVICE- FAECAL SLUDGE DISPOSAL SERVICE

### 5.8. Project benefits

For financial analysis and evaluation of the given project, the current service delivery price at the project gate has been taken as a basis. As it has been stated earlier the project is envisaged to reach full capacity operation four years after commencement of production activities which are assumed to begin with 70% of the estimated total capacity.

At full capacity operation the project is envisaged to have the following revenue components.

Table 14 Source of revenue in Birr"000"

	Period			Start-up			Full Capacity	
				70%	80%	90%	100%	100%
	Capacity utilization							
	Project year			1	2	3	4	5
	Product type		Unit price					
1	Sewerage waste	M <sup>3</sup>	750	50,337	57,528	64,719	71,910	71,910
	Total			50,337	57,528	64,719	71,910	71,910

Thus, according to the computation in Annex Table 17 and Annex Table 19, the net income and cash flow statements analysis revealed that at full capacity operation the project will generate a total income (gross revenue) amounting to 71.91 million Birr per annum. The corresponding Annex Table 17 of "Net Income Statement" shows a steady growth of gross profit starting from 0.635 million Birr in year 1 reaching the peak of 44 million Birr in year 10. In its 10 years of manufacturing activities, the project is expected to generate a total net profit of 161.96 million Birr and contribute 87.2 million Birr to the government treasury in form of 35% income tax.

## PROJECT PROFILE ON SEWARAGE SERVICE- FAECAL SLUDGE DISPOSAL SERVICE

---

According to the current investment Law, machinery and equipment are anticipated to be imported duty- free. The liquidity position of the project is very strong. The corresponding Annex Table 19 of “Cash Flow Statement” shows the positive cumulative cash balance of Birr 233 million and the project will not face any cash shortage throughout its production life.

The computation of the pay-back period as depicted in Annex table 24 indicates that the project will be able to reimburse itself from its net cash-income within five years after commencement of production activities, the period which is considered to be very good for the project of this nature.

In Annex Table 25 of the Benefit-cost ratio and Net present value (NPV) have been calculated at 17% discount factor (D.F) for 10 years of the project activity. Accordingly, the project has NPV of 100 million Birr at 17%D.F. and the benefit-cost ratio of 1.50 at 17% D.F. These results are most appreciable, especially, when related to the external capital borrowing interest rate which ranges from 8.50% to 18.5 % for newly establishing projects.

The project under study when implemented will have BEP at about 85% operation of the estimated full capacity. In addition to this, finally, summary of financial efficiency tests have been conducted in Annex table 23, Accordingly, all efficiency ratios indicated positive trends and consequently, it can be inferred that the project can operate in the frame work of free market mechanism on commercially and financially viable basis and is remunerative.

# ANNEXES

# PROJECT PROFILE ON SEWAGE SERVICE- FAECAL SLUDGE DISPOSAL SERVICE

## ANNEX II

### CALCULATION OF ANNUAL PRODUCTION COSTS

Table 15 Annual total production costs''000''

Period	Start-up			Full capacity						
	70 %	80 %	90 %	100 %	100 %					
Project Year	1	2	3	4	5	6	7	8	9	10
Cost category										
I. Material inputs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
II. Labor	3,720	3,720	3,720	3,720	3,720	3,720	3,720	3,720	3,720	3,720
III. Utility	5,621	6,278	6,935	7,592	7,592	7,592	7,592	7,592	7,592	7,592
IV. Repair and Maintenance and spare parts (1.5 % of fixed costs)	1,702	1,702	1,702	1,702	1,702	1,702	1,702	1,702	1,702	1,702
VI Direct overheads	5,526	5,526	5,526	5,526	5,526	5,526	5,526	5,526	5,526	5,526
<b>A. Direct Production costs</b>	<b>16,569</b>	<b>17,226</b>	<b>17,883</b>	<b>18,540</b>	<b>18,540</b>	<b>18,540</b>	<b>18,540</b>	<b>18,540</b>	<b>18,540</b>	<b>18,540</b>
VII. Administration over head	108	108	108	108	108	108	108	108	108	108
VIII. Marketing and Promotional expense 3 % of sales revenue	1,510	1,726	1,942	2,157	2,157	2,157	2,157	2,157	2,157	2,157
<b>B. Operating costs</b>	<b>18,187</b>	<b>19,060</b>	<b>19,933</b>	<b>20,805</b>	<b>20,805</b>	<b>20,805</b>	<b>20,805</b>	<b>20,805</b>	<b>20,805</b>	<b>20,805</b>
Interest	10,138	9,546	8,886	8,150	7,330	6,415	5,395	4,258	2,990	1,576
Depreciation	21,377.00	21,377.00	21,377.00	21,377.00	20,877	20,777	15,682	5,477	5,477	5,477
<b>C. Total production costs</b>	<b>49,702</b>	<b>49,983</b>	<b>50,196</b>	<b>50,332</b>	<b>49,012</b>	<b>47,997</b>	<b>41,882</b>	<b>30,540</b>	<b>29,272</b>	<b>27,858</b>

# PROJECT PROFILE ON SEWAGE SERVICE- FAECAL SLUDGE DISPOSAL SERVICE

## ANNEX IV CALCULATION OF WORKING CAPITAL REQUIREMENTS

### I. Minimum requirement of current assets and liabilities

- A. Accounts receivable: 30 days at total production costs minus depreciation and interest
- B. Inventory
  - 1. Material inputs: 30days
  - 2. Spare parts : 90 days
  - 3. Work under process: two days at direct costs
  - 4. Product ready for delivery: 8 days at direct costs plus administration overheads
- C. Cash on hand : 90 days
- D. Accounts payable 52 days for material inputs and utilities

### ii. Working capital requirement

Table 16 Calculation of working capital

Cost category	Minimum Days of coverage	Coeff-icent of turnover	Project year									
			Start up			Full capacity						
			1	2	3	4	5	6	7	8	9	10
I. Current asset												
A. A/R	26	10	1,819	1,906	1,993	2,081	2,081	2,081	2,081	2,081	2,081	2,081
B. Inventory												
1. Material inputs	26	10	0	0	0	0	0	0	0	0	0	0
2. Spare parts	90	4	426	426	426	426	426	426	426	426	426	426
3. Work under process	2	130	127	133	138	143	143	143	143	143	143	143
4. Product ready for delivery	8	32.5	618	638	658	678	678	678	678	678	678	678
C. Cash on hand			4,169	4,334	4,498	4,662	4,662	4,662	4,662	4,662	4,662	4,662
D. Current assets			7,159	7,436	7,712	7,989	7,989	7,989	7,989	7,989	7,989	7,989
II. Current liabilities												
A. A/p	26	10	562	628	694	759	759	759	759	759	759	759
III. Working capital												
A. Net working capital			6,597	6,808	7,019	7,230	7,230	7,230	7,230	7,230	7,230	7,230
B. Increasing in working capital			6,597	211	211	211	0	0	0	0	0	0

# PROJECT PROFILE ON SEWAGE SERVICE- FAECAL SLUDGE DISPOSAL SERVICE

## ANNEX VI

### PROJECTED NET INCOME STATEMENT

Table 17 Projected Net income statement "000"

Period	Start up			Full capacity						
	70 %	80 %	90 %	100 %						
Project year	1	2	3	4	5	6	7	8	9	10
Item description										
Product sales revenue	50,337	57,528	64,719	71,910	71,910	71,910	71,910	71,910	71,910	71,910
Less total production costs	49,702	49,983	50,196	50,332	49,012	47,997	41,882	30,540	29,272	27,858
Gross profit	635	7,545	14,523	21,578	22,898	23,913	30,028	41,370	42,638	44,052
Tax	222	2,641	5,083	7,552	8,014	8,370	10,510	14,480	14,923	15,418
Net profit	413	4,904	9,440	14,026	14,884	15,543	19,518	26,891	27,715	28,634
Accumulated undistributed profit	413	5,317	14,757	28,783	43,666	59,210	78,728	105,619	133,333	161,967

# PROJECT PROFILE ON SEWAGE SERVICE- FAECAL SLUDGE DISPOSAL SERVICE

## ANNEX VII DEBT SERVICE SCHEDULE AND COMPUTATION PAYMENT OF EQUAL ANNUAL INSTALLMENTS

Table 18 Debt services schedule and computation

Item description	Project year									
	1	2	3	4	5	6	7	8	9	10
A. Investment and working capital										
1. Investment										
2. Increment working capital										
Total										
B. Loan receipts and balances										
1. Loan receipts	88,155									
2. Outstanding balance at end of year										
a. First year loan	88,155	83,009	77,271	70,873	63,739	55,785	46,916	37,028	26,002	13,707
Total										
A. Debt service										
1. First year Loan										
a. Interest	10,138	9,546	8,886	8,150	7,330	6,415	5,395	4,258	2,990	1,576
b. Repayment of principal	5,146	5,538	6,397	7,133	7,954	8,869	9,889	11,026	12,294	13,707

# PROJECT PROFILE ON SEWAGE SERVICE- FAECAL SLUDGE DISPOSAL SERVICE

## ANNEX VIII CASH-FLOW STATEMENT FOR FINANCIAL PLANING

Table 19 Projected Cash flow statement

Period	Start up				Full capacity					
	70%	80%	90%	100%						
Project year	1	2	3	4	5	6	7	8	9	10
Item description										
A. Cash - inflow	<b>176,835</b>	<b>57,804</b>	<b>64,995</b>	<b>72,186</b>	<b>71,910</b>	<b>71,910</b>	<b>71,910</b>	<b>71,910</b>	<b>71,910</b>	<b>71,910</b>
1. Financial resource (total)	126,498	276	276	276						
2. Sales revenue	50,337	57,528	64,719	71,910	71,910	71,910	71,910	71,910	71,910	71,910
B. Cash – outflow	<b>160,191</b>	<b>37,061</b>	<b>40,575</b>	<b>43,916</b>	<b>44,103</b>	<b>44,459</b>	<b>46,599</b>	<b>50,569</b>	<b>51,012</b>	<b>51,506</b>
1. Total assets schedule including replacement	126,498	276	276	276						
2. Operating costs	<b>18,187</b>	<b>19,060</b>	<b>19,933</b>	<b>20,805</b>	<b>20,805</b>	<b>20,805</b>	<b>20,805</b>	<b>20,805</b>	<b>20,805</b>	<b>20,805</b>
3. Debt service (total)										
a. Interest	10,138	9,546	8,886	8,150	7,330	6,415	5,395	4,258	2,990	1,576
b. Repayment	5,146	5,538	6,397	7,133	7,954	8,869	9,889	11,026	12,294	13,707
4. Tax	222	2,641	5,083	7,552	8,014	8,370	10,510	14,480	14,923	15,418
C. Surplus (Deficit)	<b>16,644</b>	<b>20,743</b>	<b>24,420</b>	<b>28,270</b>	<b>27,807</b>	<b>27,451</b>	<b>25,311</b>	<b>21,341</b>	<b>20,898</b>	<b>20,404</b>
D. Cumulative cash balance	<b>16,644</b>	<b>37,387</b>	<b>61,807</b>	<b>90,077</b>	<b>117,884</b>	<b>145,335</b>	<b>170,646</b>	<b>191,987</b>	<b>212,885</b>	<b>233,289</b>



## PROJECT PROFILE ON SEWORAGE SERVICE- FAECAL SLUDGE DISPOSAL SERVICE

### ANNEX XII TOTAL INVESTMENT COSTS

Table 20 Total investment costs”000”

Period	Start up			Full capacity								
	1	2	3	4	5	6	7	8	9	10	11	
Project year												
Investment Category												
1. Fixed investment costs												
a. Initial fixed investment costs	117,339											
b. Replacement												
2. Pre-operational capital expenditure	2,000											
3. Working capital increase	6,597	211	211	211								
Total investment costs	125,936	211	211	211								

### ANNEX XIII TOTAL ASSETS

Table 21 Total Assets

Period	Start up			Full capacity								
	1	2	3	4	5	6	7	8	9	10	11	12
Investment Category												
1. Fixed investment costs												
c. Initial fixed investment costs	117,339											
❖ Cost of land												
d. Replacement												
2. Pre-operational capital expenditure	2,000											
3. Current assets increase	7,159	277	276	277								
Total assets	126,498	277	276	277								

## PROJECT PROFILE ON SEWAGE SERVICE- FAECAL SLUDGE DISPOSAL SERVICE

### ANNEX XIV SOURCES OF FINANCE

Table 22 Sources of finance

Period	Start up			Full capacity							
	1	2	3	4	5	6	7	8	9	10	Total
Sources of finance											
1. Equity capital	37,781	211	211	211							
2. Loan capital	88,155										
3. Current liabilities	562	66	66	66							
Total finance	126,498	276	276	276							

### ANNEX XI SUMMARY OF FINANCIAL EFFICIENCY TESTS

Table 23 Summary of financial efficiency tests

Project year	Project year									
	1	2	3	4	5	6	7	8	9	10
Capacity utilization	70%	80%	90%	100%						
Financial ratio in %										
1. Gross profit : Revenue	1%	13%	22%	30%	32%	33%	42%	58%	59%	61%
2. Net profit : Revenue	1%	9%	15%	20%	21%	22%	27%	37%	39%	40%
3. Net profit : initial investment	0%	4%	7%	11%	12%	12%	15%	21%	22%	23%
4. Net profit : Equity	1%	13%	25%	37%	39%	40%	51%	70%	72%	75%
5. Gross profit : Initial investment	1%	6%	11%	17%	18%	19%	24%	33%	34%	35%
6. Operating costs : Revenue	36%	33%	31%	29%	29%	29%	29%	29%	29%	29%

## PROJECT PROFILE ON SEWAGE SERVICE- FAECAL SLUDGE DISPOSAL SERVICE

---

### ANNEX XV CALCULATIONS OF PAYBACK PERIOD

Table 24 Calculation of payback period”000”

Year	Amount Paid Back			Total investment	End of year
	Net Profit	Depreciation	Total		
1	413	21,377	21,790	125,936	-104,146
2	4,904	21,377	26,281	211	-78,076
3	9,440	21,377	30,817	211	-47,470
4	14,026	21,377	35,403	211	-12,278
5	14,884	20,877	35,761		+23,483

## PROJECT PROFILE ON SEWAGE SERVICE- FAECAL SLUDGE DISPOSAL SERVICE

### ANNEX XVI

#### CALCULATIONS OF NET PRESENT VALUE AT 17% D.F.

Table 25 Calculation of NPV at 17% D.F.

Project year	Gross Revenue	1/(1+i) <sup>n</sup> At 17%	Present value at 17%	Project costs			
				Total investment	Operating costs	Total	Present value at 17%
1	50,337	0.854701	43,023	125,936	18,187	144,123	123,182
2	57,528	0.730514	42,025	211	19,060	19,271	14,078
3	64,719	0.624371	40,409	211	19,933	20,144	12,577
4	71,910	0.53365	38,375	211	20,805	21,016	11,215
5	71,910	0.456111	32,799		20,805	20,805	9,489
6	71,910	0.389839	28,033		20,805	20,805	8,111
7	71,910	0.333195	23,960		20,805	20,805	6,932
8	71,910	0.284782	20,479		20,805	20,805	5,925
9	71,910	0.243404	17,503		20,805	20,805	5,064
10	71,910	0.208037	14,960		20,805	20,805	4,328
Total			301,566				200,902

A. Benefit- cost ratio At 17% D.F. = 1.5

B. NPV At 17% D.F. = 100,664,000 Birr

