LTD "SOLID WASTE MANAGEMENT COMPANY OF GEORGIA"

# Integrated Solid Waste Management Programme II
# Kakheti and Samegrelo Zemo Svaneti Regions
# Georgia

# SCOPING REPORT

## Closure of Existing Landfill and Construction of New Non-Hazardous Waste Landfill in Samegrelo-Zemo Svaneti Region

**May 2020**

Funding Partner: KFW

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CDM Smith, hereafter referred to as the Consultant, has prepared this report with due care and diligence and under the guidance of the Client (SWMCG) and the Accompanying Measures Consultant (AMC). This report is based on information and data provided to the Consultant by the Client and AMC. The Consultant has not verified the accuracy and completeness of the information and data provided but has assumed it to be correct and complete at the instruction of the Client. The Consultant shall not assume any responsibility or liability for the correctness and completeness of the information and data as well as the results and evaluations arising thereof.

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## LIST OF ACRONYMS

| | |
|---|---|
| AMC | Accompanying Measure Consultant |
| BMW | Biodegradable Municipal Waste |
| E&S | Environmental and Social |
| EAC | Environmental Assessment Code |
| EHS | Environment, Health & Safety |
| EIA | Environmental Impact Assessment |
| ESAP | Environmental and Social Action Plan |
| ESIA | Environmental and Social Impact Assessment |
| ESMP | Environmental and Social Management Plan |
| EPR | Extended Producer Responsibility |
| EU | European Union |
| FC | Financial Cooperation |
| FS | Feasibility Study |
| GIIP | Good International Industry Practice |
| GHG | Greenhouse Gases |
| GoG | Government of Georgia |
| HDPE | High-Density Polyethylene |
| IC | Implementation Consultant |
| IDP | Internally Displaced Persons |
| IFC | International Finance Corporation |
| ISWM | Integrated Solid Waste Management |
| KfW | *Kreditanstalt für Wiederaufbau* – German Bank for Reconstruction |
| MEPA | Ministry of Environmental Protection and Agriculture |
| MP | Monitoring Plan |
| MRF | Material Recovery Facility |
| OP | Operational Policy |
| PS | Performance Standard |
| RDF | Refuse Derived Fuel |
| SEP | Stakeholder Engagement Plan |
| SWM | Solid Waste Management |
| SWMCG | Solid Waste Management Company of Georgia |
| SZS | Samegrelo Zemo Svaneti |
| TS | Transfer Station |

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# 1 INTRODUCTION

## 1.1 Project Introduction

Within the framework of German Financial Cooperation with Georgia, and through support from the German Bank for Reconstruction (KfW – *Kreditanstalt für Wiederaufbau*), a contract for Consulting Services was signed on 03.09.2019 between the Solid Waste Management Company of Georgia (SWMCG) and the Project Implementation Consortium CDM Smith / Saunders Group for the assistance in implementing the "Integrated Solid Waste Management Programme II, Kakheti and Samegrelo Zemo Svaneti Regions (SZS), Georgia". The Project Execution Agency (PEA) is the SWMCG.

The main objective of this Scoping Report is to indicate Environmental and Social Impact Assessment (ESIA) procedures and clear mechanisms to manage the environmental and social impacts and risks of the implementation of the new regional non-hazardous waste landfill of SZS. It shall also ensure a sustainable development of the Integrated Solid Waste Management (ISWM) project across this Region, in line with Georgian regulations and KfW Environmental and Social Sustainability Guidelines.

## 1.2 Project Background

The ISWM Project for the SZS region includes the implementation phase for an ISWM system to improve overall Solid Waste Management (SWM) in the SZS region, including waste collection and transport, first steps towards separate collection of recyclable materials, closure and remediation of existing landfills, as well as final design and construction of a regional non-hazardous waste landfill for the disposal of municipal waste.

A site selection was carried out in 2016 as part of the Feasibility Study (FS), and the site of the current Zugdidi landfill was identified as the most suitable site for the implementation of a new regional non-hazardous waste landfill. In accordance with Georgian regulations, and to fulfil all requirements for financing the Project, an ESIA and the necessary approvals are required for the implementation of the Project.

The preparation of a full ESIA is part of the activities assigned to the IC.

## 1.3 Project Relevance

The majority of existing landfills in Georgia have been constructed decades ago and do not meet modern national and international standards. This applies to all existing landfills in the SZS region.

The construction of new regional non-hazardous waste landfills meeting new national requirements, which in turn are in line with international standards, is clearly defined by the National Waste Management Strategy and National Waste Management Action Plan (2016). In particular, one of the nine objectives of the strategy is: "*Waste disposed in a manner safe for human health and the environment*" (Objective 4). The specific target under this objective is to construct "*New modern landfills with transfer systems, or modification of existing landfills in accordance with EU*

*standards considering separate cells for some specific waste (e.g. asbestos, non-hazardous animal waste, etc.) established by 2025*" (T.4.1). There are a number of specific activities under this target and one of them is the construction of a regional non-hazardous waste landfill in in SZS region (A 1.4.5).

The closure of existing landfills is also given due attention in the mentioned policy documents (T.4.2 *Existing official but unpermitted, with no environmental permit document, landfills closed*).

The construction of new regional non-hazardous waste landfills and the development of relevant infrastructure is defined as one of the priorities by the *Third National Environmental Action Programme of Georgia* (NEAP 3), approved in 2018 by the Government of Georgia (GoG). Target 2, under the waste management section is as follows: "*Development of waste treatment and safe disposal infrastructure*" and „*Closure/ remediation of dumpsites*" and „*Establishment of modern regional landfills and waste transport stations*" are among the activities to be undertaken by 2021 (Activity 2.2 and 2.3).

## 1.4 Legal Basis for the Scoping Report

This scoping report is prepared according to the Law of Georgia on the Environmental Assessment Code (EAC), which defines the process of obtaining environmental decisions in Georgia. The code defines two lists of development projects in Annexes I and II.

Annex I activities are subject to an Environmental Impact Assessment (EIA), and Annex II activities need to undergo a screening procedure first, based on which the need for an EIA is established:

- Annex I includes the following non-hazardous waste management related activities: Disposal, incineration and/or chemical treatment of more than 100 tonnes of non-hazardous waste per day
- Annex II comprises the following activities: Disposal of waste and recovery of waste, except for the pre-treatment of non-hazardous waste.

This means that depending on the amount of disposed non-hazardous waste, municipal solid waste landfill projects require an EIA (if more than 100 tonnes are disposed) and are subject to a screening procedure. However, if a person planning a development project intends to carry out an activity provided for by Annex II and considers that an environmental decision needs to be issued for this activity, the person may submit a scoping application to the Ministry of Environmental Protection and Agriculture (MEPA) without going through the screening stage (Art.7, paragraph 13).

A more detailed description of the scoping procedure by stages is provided in the figure below.

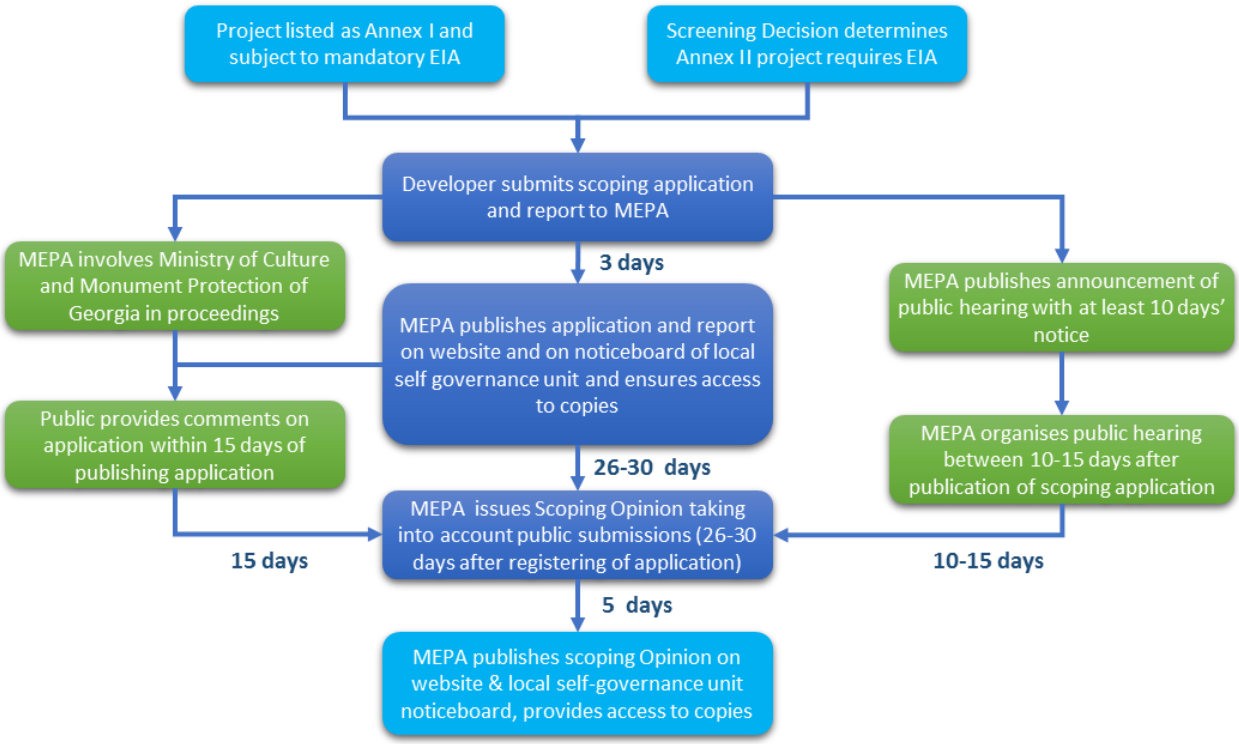



Figure 1-1: Scoping Procedure

Based on the above information, and considering that the non-hazardous waste landfill for the SZS region will require an environmental decision, the process of obtaining an environmental decision starts from the scoping stage. The EAC defines scoping as a procedure to determine the list of information to be obtained and studied for an EIA, and the means to include this information in the EIA report. The scoping procedure is aimed at defining the information to be collected, and studies to be undertaken during the EIA. In line with the EAC, this scoping report includes:

- Brief description of the planned activity, especially general information on:
  - The location of the planned activity, with an indication of Geographical Information System (GIS) coordinates
  - The physical characteristics of the planned activity (capacity, scale, etc.)
  - Any alternatives to the planned activity, and the place of its implementation.
- General information on the potential environmental impact, including:
  - Information on the potential impact on protected areas (if any)
  - Information on the potential impact of the implementation of the planned activity on human health, the social environment, cultural property, and other objects of cultural heritage

- Information on baseline research to be carried out and on the methodology to prepare an EIA report
- General information on the measures which will be considered for preventing, reducing and/or mitigating significant adverse impacts on the environment.

After the scoping opinion is issued by the MEPA, the preparation of the ESIA report will commence, based on comments and suggestions provided by MEPA in the scoping opinion.

# 2 LEGAL FRAMEWORK AND INTERNATIONAL STANDARDS

## 2.1 National Environmental Legal Framework

A number of laws and bylaws are to be considered during the preparation of the scoping and ESIA report. A list of related laws and secondary legislation with the brief overview of their relevance is provided in the table below:

Table 2-1: List of Most Relevant National Environmental Legislation

| Laws and Sub-Legislative Acts | |
|---|---|
| **Name of Legal Act** | **Brief Description** |
| Law of Georgia – EAC | The code regulates matters related to strategic documents and public or private activities which may have significant effects on the environment, human life and/or health. The code defines the procedures for environmental decision, strategic environmental assessment, transboundary EIA, and public participation in decision-making, etc.<br>The code was adopted in 2017 and it replaced two laws (Law on Environmental Impact Permit and Law on Ecological Expertise). The Code introduces EIA procedures harmonized with international standards and European Union (EU) legislation. The code (similarly to EIA Directive), defines two lists of development projects (Annex I and Annex II). Annex I activities are subject to EIA and Annex II activities need to undergo a screening procedure, based on which the need for an EIA will be established. |
| Waste Management Code | The objective of the code, which was adopted in December of 2014, is to protect environment and human health through 1) the prevention or reduction of waste and its adverse impact; 2) the establishment of effective mechanisms for waste management; 3) the reduction of damage caused by the consumption of resources and the more efficient use of resources.<br>The Code provides provisions on landfill categories. Detailed requirements for the construction, operation, closure and aftercare of landfills and special requirements for existing landfills are defined by the Governmental Ordinance #421(see below). |
| Forest Code | The existing Forest Code (1999) is outdated and does not correspond to the principles of sustainable forest management; therefore, forest related aspects are mainly regulated by secondary legislation. Specifically, Governmental Decrees # 242 on rules on forest use (20.08.2010), #241 on maintenance and restoration of forests (13.08.2010) and #179 on forest inventory and monitoring (17.07.2013) are the main bylaws regulating forestry issues. [1] |
| Law of Georgia on Environmental Protection | The law (1996, last amended in 2019) regulates legal relations in the field of environmental protection and the use of natural resources, between state bodies and physical persons/legal entities throughout Georgia, including its territorial waters, airspace, continental shelf and exclusive economic zones. |
| Law of Georgia on Ambient Air Protection | The law (1999, last amended in 2018) regulates protection of ambient air from harmful anthropogenic impacts in the territory of Georgia.<br>The law defines state control on recording and permissible emissions. |

[1] Two parliamentary hearings have already taken place in order to adopt a new Forest code based on the principles of sustainable forest management. Above mentioned bylaws will be updated accordingly.

| Laws and Sub-Legislative Acts | |
|---|---|
| Law of Georgia on Water | The law (1997, last amended in 2018) defines state control on water protection and consumption. Among other issues, state control includes the protection of water discharge standards and norms, as well as established regime of water consumption.[2] |
| Law of Georgia on Soil Protection | The law (1994, last amended in 2017) aims at ensuring the preservation of the integrity and improve the fertility of the soil. It defines obligations and responsibility of land users and the state regarding provision of soil protection conditions and ecologically safe production. The law sets the maximum permissible concentrations of hazardous matter in soil. The law restricts: the use of fertile soil for non-agricultural purposes; execution of any activity without striping and preservation of topsoil; terracing without preliminary survey of the area and approved design, and any activity deteriorating soil quality. |
| Law of Georgia on Wildlife | The law (1996, last amended in 2020) requires that impact on wild animals should be assessed and mitigation measures should be determined through the EIA process. Protection of important habitats for wild animals should be envisaged while designing and constructing enterprises and other activities. |
| Law of Georgia on System of the Protected Areas | The law (1996, last amended in 2018) establishes the legal status of the protected territories and declares the State's exclusive ownership rights on all territories including natural resources (lands, forests, waters, animals, etc.) located within the boundaries of State Nature Reserves, National Parks and Natural Monuments, and Managed Reserves. According to the law, all kinds of economic and entrepreneurship activities are admissible in the support zone provided they do not hamper the functioning of the protected areas. |
| Law of Georgia on Red List and Red Book | The Law (2003, last amended in 2018) prohibits any action which could lead to reduction of endangered species, their habitats and living conditions. Possible negative impacts of the planned activity on the endangered species should be taken into account during the EIA process. |
| Law of Georgia on Cultural Heritage | The Law (2007, last amended in 2019) establishes buffer zones for the protection of cultural heritage. |
| **Legislation on Social and Land Ownership** | |
| Law on Private Ownership of Agricultural lands (2019), Law on Public Registry (2008), Civil Code, and Law on Special Rule for Systematic and Sporadic Registration of Land Rights and Improvement of Cadastral Data.<br>The State has constitutional power to seize any property by means of expropriation for projects of imminent public necessity. Procedures of expropriation are defined by the Law on Rules for Expropriation of Ownership for Necessary Public Needs. According to the Law, the expropriator has to make every reasonable effort to acquire property by negotiation and is required to value the property in accordance with fair market value before negotiations. | |
| Law on Replacement Cost Reimbursement and Compensation for the Use of Agricultural Land for Non-Agricultural Purposes[3] defines the compensation amounts, required at the time of allocation, use or disposal of an agricultural land plot for non-agricultural use, according to municipalities and recreation zones. The law also identifies the payment procedure and the procedure for changing the agricultural land category, including the issues of payment of losses to landowners or land users, as a result of restricting their rights or reducing the quality of their land. | |

[2] A new draft law on water is expected to be submitted to the Parliament this year. The draft law is based on principles of the EU Water Framework Directive and other international requirements
[3] This law will be replaced by a new Law on the definition of a special purpose of land and sustainable management of agricultural land to be enacted from July 2020.

| Laws and Sub-Legislative Acts |
|---|
| **Relevant Secondary Legislation** |
| **Waste** |
| Decree of GoG (#421, 11.08.2015) Technical regulation "*On the construction, operation, closure and after-care of landfills*"; In this ordinance criteria for the siting of new landfills are specified |
| Decree of GoG (#426, 17.08.2015) "on the List of Waste and Classification of Waste, according to its types and properties" |
| Decree of GoG (#159, 01.04.2016) "*Rules on collection and treatment of Municipal Waste*" |
| Decree of Government of Georgia (#143, 29.03.2016) on "*Rules for waste transportation*" |
| **Water** |
| Technical regulation for protection of surface waters from pollution (Resolution #425 of GoG of December 31, 2013) |
| Technical regulation for discharging effluent from industrial and non- industrial facilities into surface water bodies (Resolution #17 of GoG of January 3, 2014 on "*Approval of Environmental technical regulations*") |
| Technical regulation on water protection areas (Resolution #440 of GoG of December 31, 2013) |
| On approval of the environmental quality standards (Order #297/n of the Minister of Labour, Health and Social Affairs, August 16, 2001) |
| Technical regulation for conditions for the discharge and collection of wastewater in the sewer system and limit pollution standards (Resolution of GoG #431, August 8, 2018) |
| Technical regulation on water protection zones (Resolution of the GoG #440, December 31, 2013) |
| Technical regulation for sanitary specification for water sampling (Resolution of GoG #26, January 3, 2014) |
| Technical regulation for the calculation of limit values for emissions of pollutants discharged into the surface water bodies (Resolution of GoG #414, December 31, 2013) |
| Technical regulation on drinking water (Decree of the GoG #58, 15 December 2014) |
| **Air** |
| Technical regulation for atmospheric air pollution activities with hazardous substances (Resolution #17 of GoG of January 3, 2014 |
| Technical regulation for inventory of stationary sources of atmospheric air pollution (Resolution #42 of GoG of January 6, 2014) |
| Technical regulation for self-monitoring and reporting on emissions from stationary sources of pollution (Resolution #413 of GoG of December 31, 2013) |
| Technical regulation on methods for defining emissions from the stationary sources of pollution (Resolution #435 of GoG of December 31, 2013) |
| Technical regulation for calculation of the maximum permissible emission rates of harmful substances in ambient air (Resolution of GoG #408, December 31, 2013) |
| On approval of the environmental quality standards (Order #297/n of the Minister of Labour, Health and Social Affairs, August 16, 2001) |
| **Soil** |
| Technical regulation for removal, storage, utilization and re-cultivation of topsoil (Resolution #424 of GoG of December 31, 2013) |
| Guidelines for assessment of soil pollution with chemicals (Order #38/n of the Minister of Labour, Health and Social Affairs, 24 February, 2003) |

| Laws and Sub-Legislative Acts |
|---|
| **Noise** |
| On approval of the environmental quality standards (Order #297/n of the Minister of Labour, Health and Social Affairs, August 16, 2001) |
| Acoustic noise norms in residential houses and public/state premises and their surrounding territories (Governmental Decree #398 15.08.2017) |
| **Public Hearing** |
| Order of the Minister of Environmental Protection and Agriculture of Georgia on "Rules for public Hearing" (#2-94. 22.02.2018) |

## 2.2 International Standards

KfW provides financing for investments in SWM infrastructure, including related technical assistance, and acts as the donor agency. As per KfW regulations, all projects and programmes funded by KfW, including this SWM Project, are required to align with the provisions of the KfW Sustainability Guideline (*Guideline of KfW Entwicklungsbank for Conducting Business in an Environmentally, Socially and Climate Friendly Manner*[4]).

This guideline assesses not only environmental and social impacts, but also has a section specific to climate adaptation and protection. In contrast to the local EIA, the product of an Environmental and Social (E&S) assessment is therefore called an ESIA.

Within this guideline, the ESIA and climate change assessments are the core elements of the assessment procedure of KfW Development Bank for its Financial Cooperation (FC) measures. They are, first and foremost, intended as a management tool to steer and shape projects over their entire life cycle (i.e. from planning to completion).

The objective of environmental and social impact and climate change assessments is to anticipate and appraise any foreseeable impacts a project may have on the environment, the climate and/or on social factors (including human rights), and to identify and prevent any negative impact, or limit it to a tolerable level (provided that the negative impact is inevitable but still tolerable) and introduce compensation measures. KfW Guidelines also require that potential negative E&S impacts are minimized, while striving to enhance benefits for local communities and the environment.

The essential steps of the ESIA and climate assessment include:

- A preliminary appraisal, called screening, to determine the environmental, social and climate relevance and environmental, social and climate risks of a FC measure

[4]https://www.kfw-entwicklungsbank.de/PDF/Download-Center/PDF-Dokumente-Richtlinien/Nachhaltigkeitsrichtlinie_EN.pdf

If relevance is affirmed:

- The definition of scope (scoping) to identify and assess the FC measure's environmental, social, and climate-relevant impacts and risks more accurately, including potential to protect the climate and increase the adaptive capacities of the target group in close cooperation with the executing agency, and
- The design and implementation of an ESIA, climate proofing assessment and/or climate protection assessment, in order to examine all or individual aspects of the FC measure, including participatory approaches to involve affected local groups and keep the public in the partner country informed.

The foundation of the assessment of environmental, social and climate impacts of a FC measure are well aligned with the national active legislative framework, as well as internationally recognized environmental and social standards such as:

- Environmental and Social Standards (ESS) of the World Bank (ESS1 to ESS10)
- Federal Ministry for Economic Cooperation and Development (BMZ) Human Rights Guideline
- UN Basic Principles and Guidelines on Development-Based Evictions and Displacement
- General Environment, Health and Safety (EHS) Guideline of the World Bank Group
- Sector specific EHS Guideline of the World Bank Group for “Waste Management”
- International Finance Corporation (IFC) Performance Standard 2 and ILO-norms for occupational health and safety issues.

The standards of the World Bank Group (i.e. for public agencies, the *Environmental and Social Standards (ESS) of the World Bank* and their general and sector-specific *EHS Guidelines,* as well as the *Core Labour Standards of the International Labour Organization* (ILO), are the standards of reference for the assessment of KfW funded projects. The following ESSs on social and environmental sustainability are relevant:

- **ESS1** - Assessment and management of environmental and social risks and impacts
- **ESS2** - Labour and working conditions
- **ESS3** - Resource efficiency and pollution prevention and management
- **ESS4** - Community health and safety
- **ESS5** - Land acquisition, restrictions on land use, and involuntary resettlement
- **ESS6** - Biodiversity conservation and sustainable management of living natural resources
- **ESS8** - Cultural heritage
- **ESS9** - Financial intermediaries
- **ESS10** – Stakeholder engagement and information disclosure

It should be noted that **ESS7**- Indigenous Peoples/Sub-Saharan African Historically Underserved Traditionally Local Communities- is not included above. ESS7 is very specific to ethnic or social groups of people within the national context.

The provisions of the *World Bank General EHS Guidelines*[5], which address waste management in Section 3, and of the *World Bank EHS Guidelines for Waste Management Facilities*[6] also need to be considered when assessing SWM projects.

[5]https://www.ifc.org/wps/wcm/connect/554e8d80488658e4b76af76a6515bb18/Final+-+General+EHS+Guidelines.pdf?MOD=AJPERES

[6]http://www.ifc.org/wps/wcm/connect/1cd72a00488557cfbdf4ff6a6515bb18/Final+-+Waste+Management+Facilities.pdf?MOD=AJPERES

# 3 PROJECT DESCRIPTION

## 3.1 Project Area and Population

The SZS region is located in the western part of Georgia, mainly in the Kolkheti lowland. It is bordered by the Black Sea to the south, on the north-west by the Autonomous Republic of Abkhazia, to the north by the Russian Federation, to the east by Imereti and Racha-Lechkhumi-Kvemo Svaneti regions, and to the southwest by the Guria region.

The total area of the region is about 7,500 km² (10.8% of the country's territory). It includes 9 municipalities – the self-governing city of Poti and the municipalities of Zugdidi, Martvili, Khobi, Tsalenjikha, Chkhorotskhu, Abasha, Senaki and Mestia. The region consists of 531 settlements; 8 cities, 2 towns and 521 villages. The location of municipalities in the region is illustrated in Figure 3-1.

The city of Zugdidi lies in the centre of the region, which is located 325 km from the capital city of Tbilisi.


Figure 3-1: Project Area Samegrelo-Zemo Svaneti[7]

The ISWM project area covers all municipalities of the SZS region, with the exception of Abasha and Martvili Municipalities, as shown in the following Figure 3-2.

The Municipalities of Abasha and Martvili will be connected to the Imereti regional landfill via a Transfer Station (TS) which will be built in Samtredia Municipality (Imereti Region). Furthermore, it has not yet been decided whether the City of Poti shall be part of the catchment area for the envisaged SZS regional landfill, or be connected to the Adjara sanitary landfill.

[7] Source: www.betravel.ge

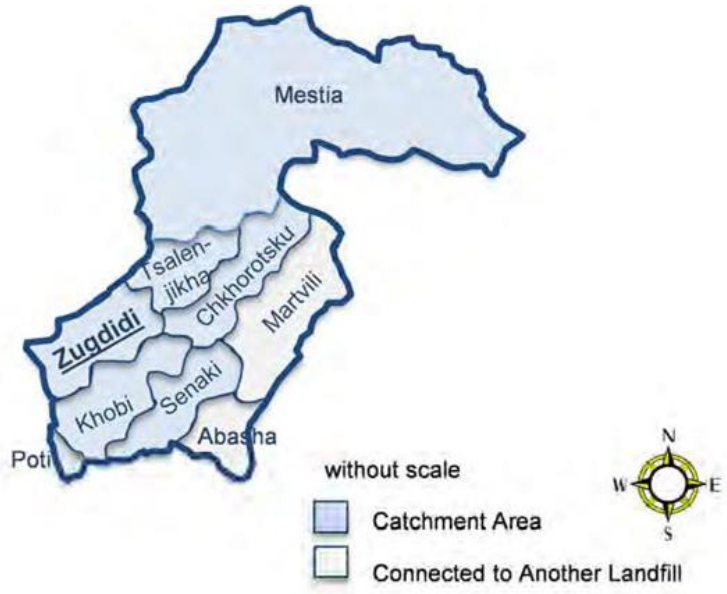



Figure 3-2: Catchment Area of the Regional Non-hazardous Waste Landfill

The total population of the target area (including Internally Displaced Persons [IDPs]) is 316,195[8]. This number is forecasted to decrease to 268,975 by 2038. The overall population decrease is mainly caused by people leaving the economically weak, rural areas. Accordingly, the population in the seaport Poti is forecasted to increase from 50,563 in 2019 to 55,177 in 2038.

Around 40.3% of the population lives in cities and towns, 59.7% in villages. Thereof around 98.6% of the population is ethnically Georgian. The population density of the region is 64 inhabitants per 1 $km^2$.[9]

## 3.2 Current Practice of Waste Management

### 3.2.1 Waste Collection

Municipal waste collection is mainly carried out in cities and towns. In most villages in the region there is no waste collection service. The municipal waste is collected from residents by using two main systems: 1) collection of waste from drop-off points with containers (mainly 1.1 $m^3$ containers), or 2) just-in-time collection of waste (bell system).

Within the first collection system, the residents bring their waste and place it in containers at drop-off points, which are distributed on main streets throughout residential areas. Only the cities/towns in the region are more or less covered with drop-off points/containers. In villages which are connected to SWM service, the containers are only placed along the main roads.

[8] Integrated Solid Waste Management Programme in the Samegrelo-Zemo Svaneti Region, Georgia. Final Feasibility study, 2018.
[9] Strategy for development of Samegrelo – Zemo Svaneti Region (2014-2021). pg. 4 http://szs.gov.ge/res/docs/2014050301151521560.pdf

The collection frequency is once a day or once in two days in different parts of Zugdidi and Poti. In other towns/villages using this system, the collection frequency varies between three times a week and once a week.

Street sweeping in all municipalities of the region is mainly organized in a simple way using brooms. Only Zugdidi city is using a specialized vehicle (Man FAUN Sweeper from 2010) for street sweeping.

Generally, there are waste bins (with a capacity of 25-50 litres) in public areas of cities/towns. These areas are also subject to sweeping services. The waste from public area bins and from sweeping activities is transported to the landfill using the regular waste compactor trucks. The table below shows the coverage of the municipalities in the project catchment area[10]:

Table 3-1: Waste Management Coverage of Municipalities

| # | Municipality | Coverage | |
|---|---|---|---|
| | | Urban areas | Rural Areas |
| 1 | Mestia | 60 % | |
| 2 | Tsalenjikha | 40 % | |
| 3 | Chkhorotsku | 100 % | 100 % |
| 4 | Zugdidi | 100 % | 70 % |
| 5 | Khobi | 40 % | 20 % |
| 6 | Senaki | 50 % | 30 % |
| 7 | Poti | 100 % | N / A |

### 3.2.2 Waste Types, Composition, Quantities and Waste Quantity Forecast

Based on a waste composition analyses conducted in August 2016[11], during which samples from different settlement areas had been analysed, the average composition of household and household-like waste has been calculated (see figure below).

[10] Waste Management Plans of the municipalities
[11] Integrated Solid Waste Management Programme in the Samegrelo-Zemo Svaneti Region, Georgia. Final Feasibility study, 2018.

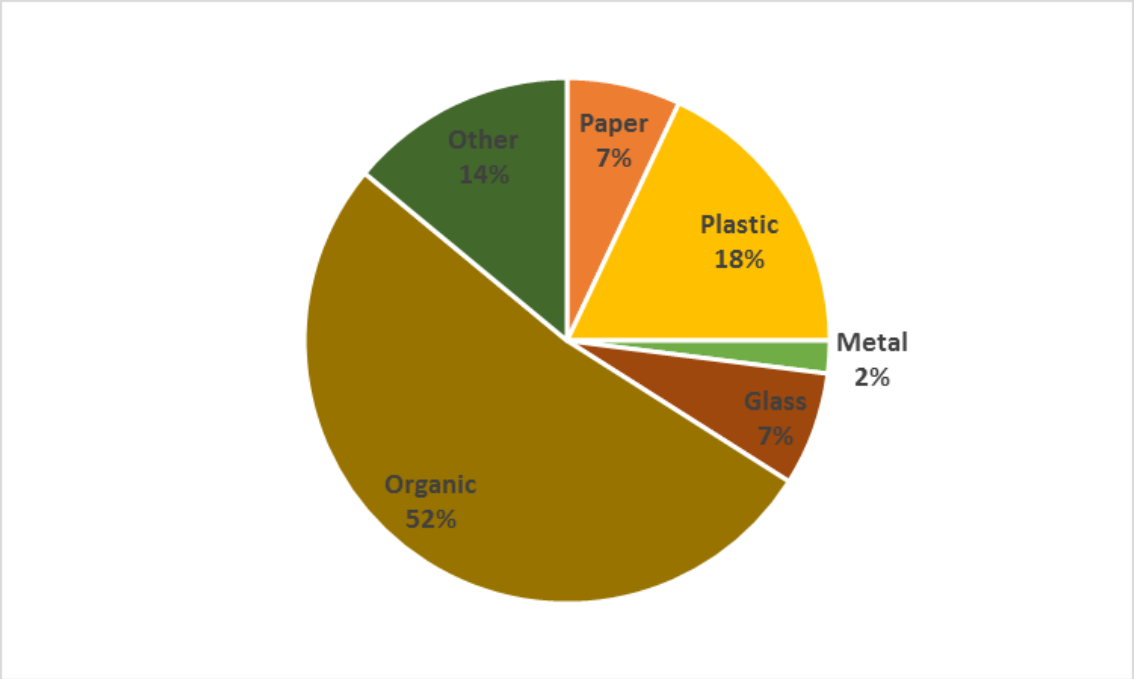
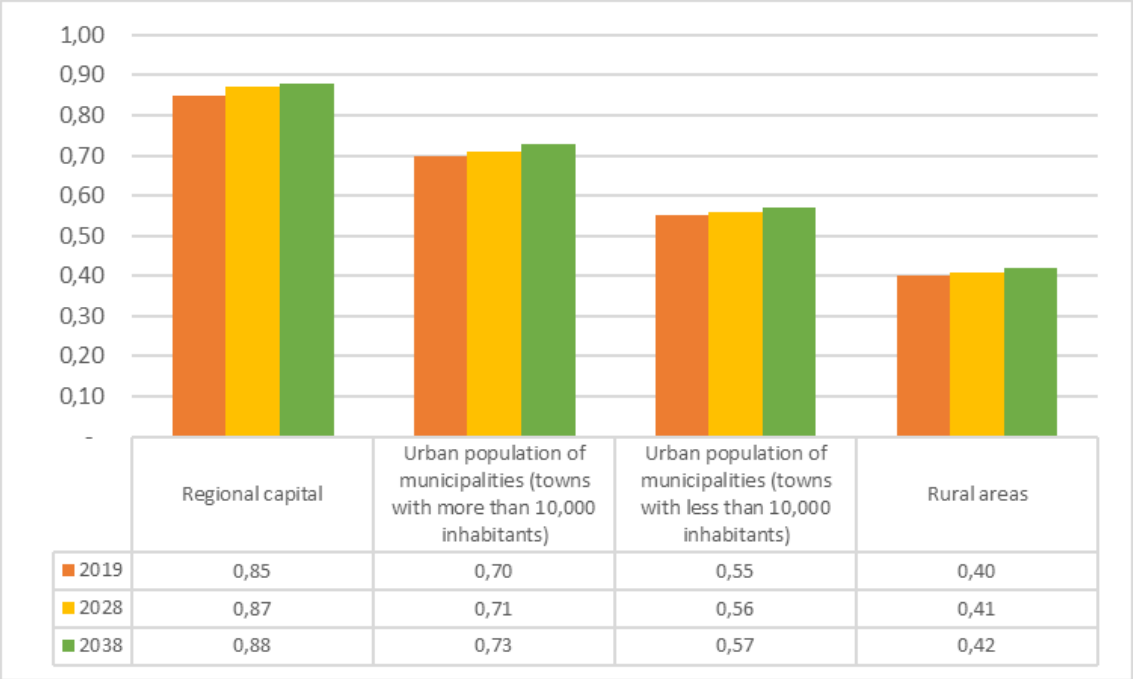



Figure 3-3: Average Composition of Household and Household-like Waste in the SZS Region (%)

Based on the population and tourism forecast, and the assumed specific waste generation quantities for different settlement areas, the waste generation and collection to be expected by the end of 2038 has been calculated. The waste generation rate is estimated to rise by 0.2 % per year, taking into account likely changes in consumption habits of the population, and a respective increase in waste generation (kg/capita/day).

The following figure provides an overview of the assumed generation quantities for some types of waste (paper, plastic, metal, glass, organic waste, and other) for different settlement areas by the end of 2038.




| | Regional capital | Urban population of municipalities (towns with more than 10,000 inhabitants) | Urban population of municipalities (towns with less than 10,000 inhabitants) | Rural areas |
|---|---|---|---|---|
| 2019 | 0,85 | 0,70 | 0,55 | 0,40 |
| 2028 | 0,87 | 0,71 | 0,56 | 0,41 |
| 2038 | 0,88 | 0,73 | 0,57 | 0,42 |

Figure 3-4: Assumed Specific Waste Generation Quantities for Different Settlement Areas by End of 2038 (kg/capita/day)

Furthermore, it is also assumed that a tourist generates 0.7 kg waste per overnight stay (for the complete period until 2038).

For the whole SZS region, the waste generation rate is expected to decrease from 67,151 tons in 2019, to 56,042 tons in 2038, while waste collection is expected to rise from 48,571 tons in 2019 to 56,042 tons in 2038. Decrease in waste generation is attributed to the expected exodus of rural population from the region due to the lack of economic opportunities.

According to the Waste management Code the introduction of the Extended Producer Responsibility (EPR) principle was planned for 1 December 2019. However, given the complexity of the topic, the elaboration of the bylaws and their approval process is not finalised (as of March 2020). It can be assumed that the EPR will be enacted in 2020. Six specific waste streams in the country are subject to this principle (packaging waste, waste oils, batteries and accumulators, tires, end of life vehicles, and waste electric and electronic equipment). Although it is difficult to forecast the success of the system in coming years, it can be assumed that the EPR system will influence waste amount and composition.

Another upcoming document, the implementation of which may affect waste volumes at landfills, is the Strategy on Biodegradable Waste (BW), which is drafted and expected to be submitted for approval to the GoG in the coming months. The draft strategy sets general objectives and specific targets for BW reduction for 2025, 2030, 2040 and 2050. Set targets are provided in Table 3-2 below:

Table 3-2: Georgia's Proposed Targets for BW

| Year | BW Reduction Targets | Tonnes of BW to Reduce | Landfill Targets | Tonnes of BW Allowed on Landfill |
|---|---|---|---|---|
| 2025 | 10% | 52,577 | 90% | 473,197 |
| 2030 | 20% | 107,223 | 80% | 428,891 |
| 2040 | 40% | 224,720 | 60% | 337,079 |
| 2050 | 65% | 386,399 | 35% | 208,061 |

### 3.2.3 Existing Landfills

The strongest negative impact on the environment of the present waste management system results from the disposal of waste. Even if the closing and upgrading measures, which had been carried out by the SWMCG when it took over the existing landfills in the region, have contributed to overall improvements, leachate and landfill gas emissions are still serious problems. The high organic content of household and household-like waste, and its moisture content together with anaerobic conditions in the landfill bodies, lead to the formation of leachate and landfill gas (which consists of methane that contributes to a much larger extent to climate change than $CO_2$). The leachate infiltrates the ground, causing soil, groundwater and surface water pollution[12].

The two landfills in Zugdidi and Poti, which are currently operated by the SWMCG, shall be closed as soon as the regional non-hazardous waste landfill is in operation. The former disposal sites in Chkhorotskhu, Senaki, Khobi and Tsalenjikha have in recent years already been closed by the SWMCG.

## 3.3 Location and Description of the New Regional Non-hazardous Waste Landfill Site

### 3.3.1 Location, Access and Ownership

The location of the new regional non-hazardous waste landfill site for the SZS region is the plot already used partly as the current landfill site in Zugdidi ($42^0$24'25.23''N and $41^0$46'2.03''E). The site is located 18 km in road distance and to the southwest of Zugdidi City Centre.

Access to the landfill site is ensured through Tbilisi-Senaki-Leselidze highway and lies about 2 km from the Anaklia-Khobi intersection. The plot of land is under the ownership of the SWMCG.

[12] Final ESIA Report (December 2017). Chapter 3.2 Existing Landfills (pg. 18)

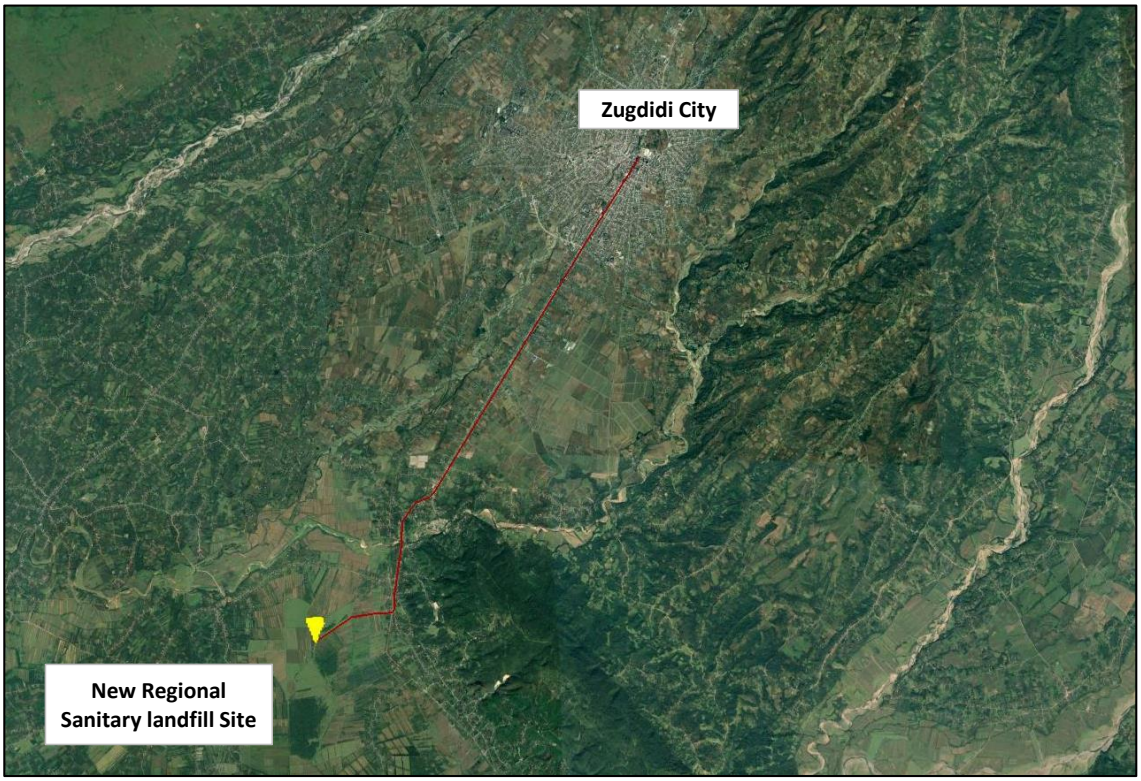



Figure 3-5: Location of a New Regional Non-hazardous Waste Landfill Site (source: Google Earth)

### 3.3.2 Topographical Conditions

A topographical survey is available among the FS outputs. The topography of the site and surrounding areas shows an almost flat surface. The site includes some trenches in different directions, mainly for water drainage. A detailed topographical survey, to be used for the detailed design, will be conducted by the IC.

### 3.3.3 Geological and Hydrogeological Conditions

The geology of the site and the surrounding area consists mainly of a clay series. During the FS, a geological investigation containing some four shallow drillings (7m deep) and two trial pit openings had been carried out. Soil samples have been analysed for certain parameters. Clay drilling cores showed high saturation.

The IC plans to carry out a more comprehensive geotechnical site investigation, analysing among others geo-mechanical properties, such as the bearing capacity of the natural ground in the long term. Soil and groundwater samples will also be taken and tested for the presence of environmental contaminants.

Hydrologically, the site is located in a wetland. The wetland is mainly drained through drainage channels leading towards the river located north of the site. The presence of the wetland and its drainage structure will be investigated further within the scope of the geotechnical site investigation.

The geological study conducted during the FS determined ground water at 0.7m – 1.6m below ground elevation. This unconfined aquifer (sub-surface water), resulting from percolation of surface water, seems to be on top of the clay layers. The groundwater table and flow direction for this aquifer, as well as potentially deeper aquifers, will be investigated as part of the geotechnical site investigation.

### 3.3.4 Seismicity

According to seismic features (Building Norms and Rules II-7-81, Table #1), rocks in the area belong to the II category. Thus, in accordance with the amended scheme of seismic zoning of the territory of Georgia, the examined area belongs to the zone with 8 magnitude activity (Order #1-1/2284 of the Minister of Economic Development of Georgia dated October 7, 2009, Tbilisi, on Approval of Construction Norms and Rules – "Constructions with Seismic Stability" [PN 01.01-09]).

However, the geological study conducted during the FS states that overall the selected disposal site is suitable in terms of geology.

## 3.4 New Regional Non-Hazardous Waste Landfill Design Concept

### 3.4.1 Overview of the Landfill Concept

Over the Project's planning horizon (20 years), the collected waste amounts are estimated to sum up to 1,079,526 tons[13]. In accordance with the project's waste forecast, the daily collected and disposed waste amounts are 133 Mg/d in 2019, and will rise to 160 Mg/d by 2038.

According to the landfill design, a total waste volume of about 1,000,000 m³ is available, resulting in a landfill lifetime of about 18.5 years. It is assumed that with intensified recycling activities in the region (beyond the currently planned pilot projects), the landfill lifetime will actually exceed the duration of 20 years.

Especially to minimize the leachate amount, the landfill will be divided into three cells, respectively construction stages, with a lifetime of 6 to 7 years each. The maximum height of the filled waste will be about 25 m. The maximum length inside the disposal area will be about 300 m, the maximum width about 390 m. For the total landfill an area of about 8.5 ha is needed.

Geological and hydro-geological investigations undertaken in February 2017 revealed that the geological situation does not cause problems for the landfill design, but due to its location in a wetland, the landfill area must be raised by a minimum of 0.5 m. Due to the high amount of rainfall it may also be reasonable to roof the leachate pond. Also, the surrounding drainage channels must be developed in such a way that they can discharge the entire surface water coming from the landfill area.

[13] Final ESIA Report (December 2017). Chapter 3.4.1. General Project Design (pg. 20).

### 3.4.2 Current Site Use and New Layout

Part of the site is used since 2009 as the waste disposal plot for Zugdidi city. The site has a triangular geometry as shown in the figure below. The current waste disposal is concentrated in the northern and upper section of the site. In the lower section waste disposal has taken place in the past. The site is entered through the lowest section in the south.


Figure 3-6: Current Use and Geometry of New Regional Non-hazardous Waste Landfill Site

The layout for the new regional non-hazardous waste landfill foresees the closure of the section currently used for waste disposal. The FS proposes waste cell #1 next to and south of the current disposal section. Waste cells #2 and #3 are consequently planned toward the south. At the southern corner of the site, entrance and auxiliary structures (weighbridge, administrative building etc.) are foreseen. The leachate treatment plant is planned in the north-eastern section, partly on the current waste disposal section, which is topographically the lowest point of the site.

The lower corner of the site cannot be considered for a waste cell. Therefore, the approach to locate the entrance and its related facilities in this section is reasonable from the IC's point of view. The concept layout is presented in Figure 3-7.

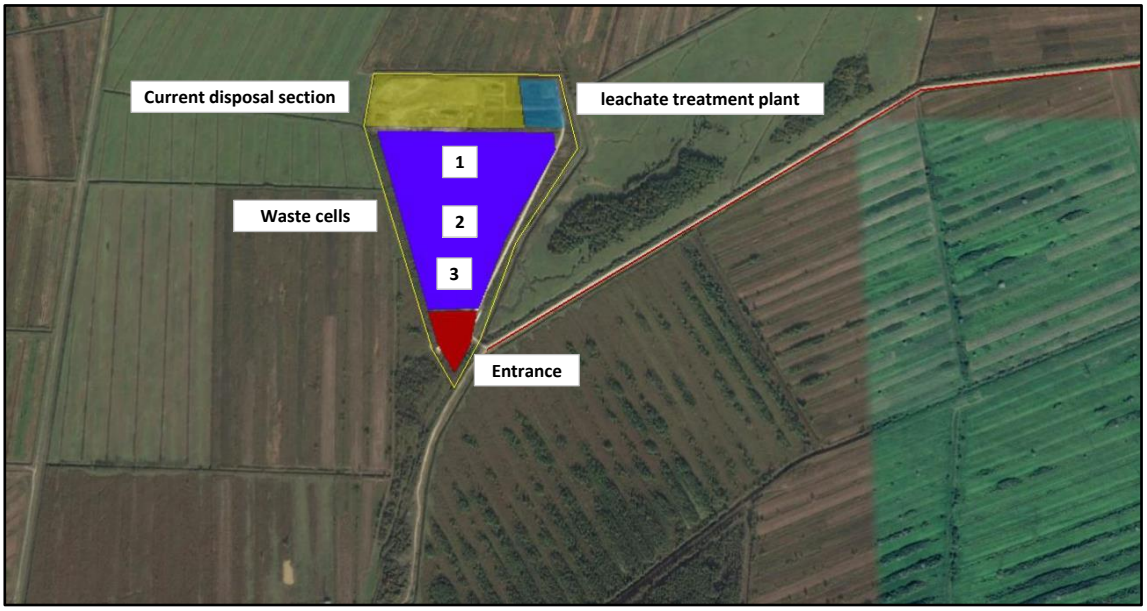



Figure 3-7: Concept Layout for the New Regional Non-hazardous Waste Landfill Site

#### 3.4.2.1 Auxiliary Facilities

The infrastructure for the landfill is divided into an entrance (control) area and an infrastructure area. The entrance area includes the gate with a guard building, the weigh bridge plus an entrance (control) building, and a wheel cleaning unit for trucks leaving the landfill area. The infrastructure area includes an administration building, parking area, maintenance building and waste inspection area, container area, and a public drop-off area. Inside the infrastructure area a septic tank, fuel tank as well as a generator as stand-by unit shall be installed. The infrastructure area of the landfill also includes a control chamber for the collected leachate, a leachate pond and a leachate treatment unit, as well as a gas compression station, flare and sufficient space for various block power stations.

All of these structures are essential for a proper non-hazardous waste landfill operation meeting national and international standards; therefore no changes are foreseen by the IC during the detailed design phase.

#### 3.4.2.2 Roads

The FS foresees all permanent roads in the landfill to be asphalted. As the movement of vehicles within the landfill shall be ensured during all types of weather, it is a reasonable choice to design the roads with asphalt layers.

For detailed drawings of the proposed landfill design kindly refer to Annex 2 and Annex 3.

### 3.4.3 Environmental Planning of the Project

The new disposal area will have a base sealing system. After reaching the highest levels of each construction phase, a final cover will be placed over the waste body. Surface water (i.e. rainwater) will be collected and discharged to the drainage channels that surround the landfill.

Due to bio-chemical reactions in the landfill body leachate will be generated, which has to be collected, transported and treated. Reverse Osmosis (RO) was considered for leachate treatment in the FS. The leachate treatment plant has to be designed for a minimum capacity of 170 m³/ d. Treated leachate will be disposed in the Utora River meeting discharge standards. These standards will be defined with the MEPA during the ESIA phase in accordance with applicable regulations.

Biogas will be collected via a gas collection system and flared. If during operation of the first cell, biogas generation is deemed of sufficient quantities, biogas can be used for electricity generation. This would provide a revenue stream to partially cover landfill O&M costs.

#### 3.4.3.1 Earth Works

To ensure a controlled collection and drainage of leachate by gravity, the deepest point of the leachate collection inside the landfill, and therewith of the plane, must be on one edge (at the north-east) of the landfill.

Due to its location in a wetland, the landfill shall be located a minimum of 0.5 m above ground. The topsoil, which is filled with water, has to be replaced. Therefore, a mass compensation for profiling the landfill plane is not possible.

An overall mass balance based on a 3-dimensional design (x-, y- and z-coordinates) was prepared for the new landfill. The design of the landfill via computer calculation led to the following conclusion with regard to earthworks (fills and cuts):

- Cut of material: 3,000 m³
- Fill of material: 67,000 m³

In addition, the material exchange (volume about 84,000 m³) within the first meter of the existing ground has to be considered. The new filling material should consist of rocky and gritty materials to increase ground stability.

As the ground consists mainly of clay and topsoil, earthworks can be executed with normal machines and efforts. The topsoil will be removed and stored properly according to current legislation (Resolution #424 of GoG of December 31, 2013). The main part of the earthworks will be done as part of the work on cell #1. This requires a fine profiling of the plane for cell #1. A rough profiling (tolerance about +/- 0.25 m) is sufficient for the following construction stages (cells).

For profiling the plane, the earth from the areas where material will be cut has to be transported out of the site (due to the low-quality with regard to stability). This means that all filling material has to be transported on to the site. The plane will already be constructed with the necessary longitudinal and transversal slopes for the base sealing system. A mainly silty and sandy material should be incorporated on top of the rocky/gritty exchange material.

The flat areas of the landfill shall have slopes of 0.3 % (mainly from south-west to north-east). The slopes of the surrounding dike with a height of 1 m will have an inclination of 1:1.5 inside the landfill, and 1:2.5 outside the landfill. This small dike is needed for good leachate collection (i.e. no leachate can flow out of the landfill body). The compaction degree (Dpr) on the plane surface has to be more the 95 %.

Profiling the plane for the leachate pond and the entrance area also requires earthworks. The following earthworks (fills and cuts) have to be done to prepare the plane:

- Cut of material: about 8,000 $m^3$
- Fill of material: about 1,000 $m^3$

All in all, about 152,000 $m^3$ has to be transported to the site.

#### 3.4.3.2 Waste Cells, Base and Surface Sealing System

According to the ToR, the capacity of waste cell #1 should have a minimum life time of 7 years and a capacity of 360,000 tons. The project activities have started during late 2019, and it is assumed that the new landfill will be constructed and handed over for operation after 36 months, and could be accepted at the beginning of 2023. Thus, a seven year life time for waste cell #1 covers the period 2023-2029. The waste quantity for this period sums up to approximately 372,500 tons. The IC will consider this target during the detailed design.

The base sealing layers for the waste cells have been determined in the Final FS Report as following (from bottom to top):

- Mineral sealing layer (clay material), 50 cm thickness
- Geomembrane, 2mm thickness
- Geotextile, 1,200 gr/$m^2$ mass per unit area
- Drainage layer, 50 cm thickness.

This is a common structure for a base sealing of landfill waste cells, and the IC agrees to consider it for the detailed design, which will be conducted according to the Decree of GoG #421 (“On the construction, operation, closure and after-care of landfills”).

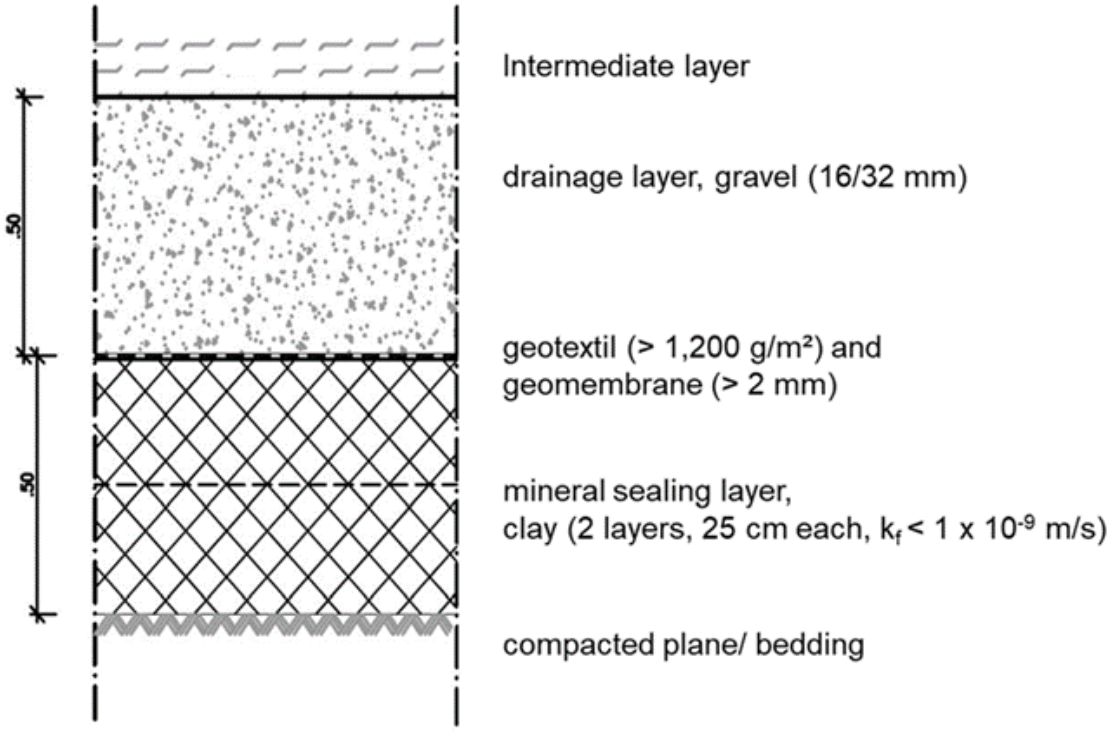



Figure 3-8: Base Sealing System

On the other hand, it has to be kept in mind that the mineral sealing layer comprises of clay material which has to meet certain specifications.

The construction of the surface sealing system might not be a part of the investment. However, the structure and the components may have an impact on the waste cell volume, e.g. sealing thickness and final surface slope. The surface sealing system proposed within the Final FS Report did not contain the geomembrane which has to be placed on top of the impermeable layer. The surface sealing layers which have been revised in accordance to the Decree of GoG #421 ("On the construction, operation, closure and after-care of landfills") are as following (from bottom to top):

- Levelling layer
- Gas drainage layer, 50 cm thickness
- Impermeable layer (clay material), 50 cm thickness
- Geomembrane, 2 mm thickness
- Geotextile
- Surface drainage layer (gravel material), 50 cm thickness
- Re-cultivation layer (soil), 100 cm thickness.

The Decree 421, Article 27 Re-cultivation Layer, does not specify the thickness of the geomembrane layer. However, the EU Landfill Directive as well as other international standards for non-hazardous waste landfills stipulates the minimum thickness of this layer to be 2 mm.

The structure of the surface sealing system is a common one and the IC agrees to consider it for the detailed design for the closure of existing dump sites, which will be conducted according to the Decree of GoG #421 ("On the construction, operation, closure and after-care of landfills").

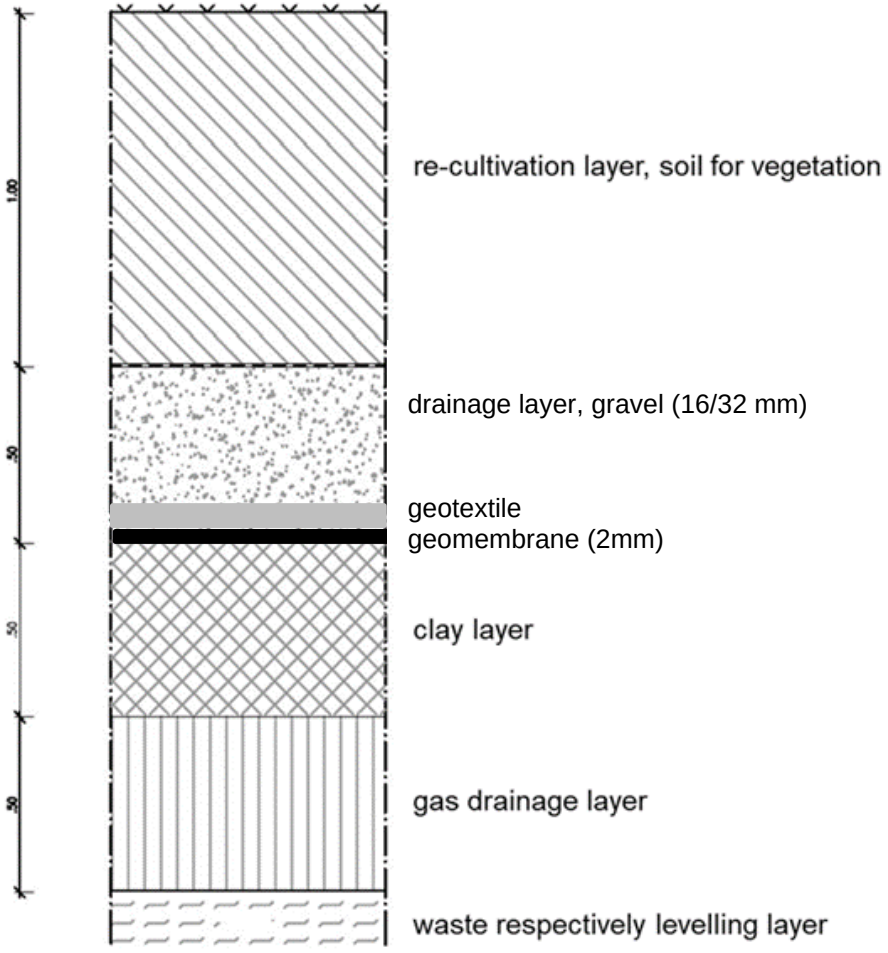



Figure 3-9: Surface Sealing System

In order to achieve a disposal volume of about 1,000,000 m³, waste has to be disposed with a maximum inclination of 1:2.5 up to a height of about 25 m above ground. Next to the sloped area lies a flat plateau with an inclination of 8 % in flow direction. The mentioned inclinations represent the situation before the waste has settled. The inclinations of the landfill surface will likely be about 5 % after settlement. An estimation of the rate of settlement shall be done during the Implementation Phase.

After reaching the upper surface of the waste body of each cell, a final cover (surface sealing) shall be placed over the waste body. The surface sealing system will be constructed with a maximum slope of 1:2.5.

#### 3.4.3.3 Surface Water Drainage

The following basic setup has been chosen for surface water collection and management:

- A concrete trench will be located along the landfill borders to allow rainwater discharge from the landfill
- Rainwater will flow from the surface sealing to the trench around the landfill to the deepest point of the landfill. The deepest point is located at the north- eastern border of the landfill
- From the deepest point, a culvert channels all collected rainwater underneath the road to the leachate pond towards the east, respectively towards the trench network which surrounds the site. Via this trench, rainwater will flow to Utora River and finally out to the Black Sea
- Rainwater from the paved areas around the leachate pond, and from the road which leads from the entrance area to the pond, also discharges to the above mentioned culvert
- Rainwater from the entrance and infrastructure area south of the landfill is discharged towards the west and therefore also into the surrounding network
- Roads and all other facilities inside the infrastructure area are always positioned as embankment dams with a height difference of about 0.5 m to the surrounding area. Wherever the required roads hinder water drainage, discharge culverts will be constructed at the appropriate location
- Due to the very flat area and the trench network surrounding the site, rainwater from adjacent areas does not have to be taken into consideration.

In summary it can be stated that a surface water drainage system is foreseen to collect surface water from closed waste cell surfaces, road surfaces, and the entrance area. Thus, the entire surface of the new regional landfill can be drained. The IC verifies this concept and intends to extend the trenches towards the river.

#### 3.4.3.4 Leachate Collection and Treatment

Bio-chemical reactions in the landfill body and interaction with rainfall will generate leachate which has to be collected, transported and treated. The following basic setup has been chosen for leachate collection and management:

- The leachate which is generated in the landfill body and the rainwater which percolates through the waste body will accumulate in the drainage layer system, on top of the insulating layer
- The base sealing system has to be constructed with a roof profile for proper leachate collection. The roof will have a length of 20 m, and the inclination of each roof shall be 3 %
- Profile leachate drainpipes are lain at the deepest point of the roof. Leachate runs towards the east via these pipes

- The main leachate pipe (non-perforated pipe) is located at the eastern border of the landfill, outside the waste body
- Leachate drainpipes run at an angle of 75° to the main leachate pipe and will be linked to the main pipe
- The collected leachate will be drained via the drain pipes, and the main pipe via gravity, to the leachate pond outside the landfill body. The leachate pond shall be constructed at the north-eastern border of the site
- All leachate drainpipes are 2/3 perforated and made of High-Density Polyethylene (HDPE)
- The main leachate pipe has a minimum internal diameter of 600 mm and the leachate drainpipes have a minimum internal diameter of 300 mm
- The inclination of the leachate main pipe and the drainpipes is 0.2 %
- At the lowest point of the main leachate pipe, a chamber will be constructed which is also used for performing revision and control works. The main leachate pipe will be led through the sealing system to the leachate pond. A slide valve is included in the chamber as a control measure to avoid overflow of the leachate pond.

As mentioned above, the leachate collection system includes a collection system made of HDPE perforated pipes and lain on the bottom of the waste cells. Furthermore, drained leachate shall be collected through closed pipes to a leachate storage and balancing pond.

RO has been considered and selected as the most feasible option for leachate treatment. The advantage of this treatment is that it is a containerized solution and consumes less space. Treated leachate will be discharged into the Utora River while meeting the admissible discharge levels as required by national legislation (Decree #414) and agreed with MEPA during the ESIA stage. The advantage of the RO system is that it can meet very stringent effluent standards irrespective of the quality of the influent leachate.

Another advantage of the RO system is that investment costs are lower than those of conventional treatment plants. Operational costs may however be higher than other plants, but considering overall factors such as construction space, delivery, installation, investment costs, reliability, and effectiveness in meeting regulatory effluent standards, RO can be considered as the most feasible option.

#### 3.4.3.5 Landfill Gas Collection and Flare

Landfill gas shall be collected via dynamic gas collection wells during landfill operation. The height of the gas well increases in parallel to the rising waste height and is therefore called dynamic gas collection well. The footing and first 2-3 meters of the gas collection well is constructed during the entire landfill construction - during landfill operation, due to the rise of waste, the height of the collection well is raised as well by connecting additional pipes and gravel inside the collection well).

Collected gas will be transported to the flare system and burned accordingly. However, landfill gas may only be generated after a certain period following waste emplacement, e.g. 1-2 years, and might be at a very low level during this period. Landfill gas generation may then increase to expected levels during the third year. As a result, little landfill gas can be collected through this method during the first years of waste cell #1, but increase after that.

Another option might be to drill boreholes and install vertical landfill gas collection wells for waste cell #1 after waste cell #2 is put into operation. This means that no landfill gas collection system is installed and thus no landfill gas is captured during the life cycle of waste cell #1.

In order to reduce methane emissions from the very beginning, the IC verifies the concept proposed within the FS to use dynamic gas collection wells and a flare system, as soon as waste cell #1 will be in operation.

The construction of waste cell #1, includes gas pipelines from each landfill gas collection well towards the gas flare. During operation of waste cell #1, the generated gas will be collected through the wells and transmitted to the flare through the gas pipelines. Thus, the landfill gas collected during operation of waste cell #1 will be burned at the landfill gas flare.

#### 3.4.3.6 Landfill Equipment

The Final FS Report includes the following mobile equipment for daily landfill operation:

- One steel wheeled compactor (28 t)
- One bulldozer (18 t)
- One tipper truck (20 t)
- One wheeled loader (3m$^3$), and
- One pick-up truck (1.5 t).

The listed machinery and trucks are the main required equipment. The selection of a landfill compactor of 28 t is sufficient for the small waste quantities to be managed at Zugdidi. Capacities and quantities are sufficiently from the IC's point of view.

### 3.4.4 Remediation and Closure of Existing Disposal Sites

The Final FS Report differentiates between existing landfills and old landfills and summarizes the closure concepts as follows: Closure will be implemented according to the Decree of GoG #421 "On the construction, operation, closure and after-care of landfills".

#### 3.4.4.1 Existing Landfill Zugdidi

The existing landfill will be closed following the commencement of Zugdidi new regional non-hazardous waste landfill. Proposed measures for the closure and rehabilitation are: reshaping of

the waste body into a stable and smaller footprint, as well as the installation of a surface sealing system, surface water collection system, and landfill gas collection system.

The IC confirms this approach and intends to re-consider the installation of a simple pipeline for the collection of possible leachate to be drained. This recommendation is feasible as the cost is low and the foreseen leachate treatment plant will be located nearby.

#### 3.4.4.2 Existing Landfill Poti

Similar to Zugdidi, the existing landfill in Poti will be closed following the commencement of Zugdidi new regional non-hazardous waste landfill. Proposed measures for the closure and rehabilitation are the same as for the existing landfill in Zugdidi. The IC confirms this approach and intends to re-consider the installation of a simple pipeline for the collection of possible leachate to be drained, which can then be stored in a tank. The IC's approach with regard to the surface sealing system, as mentioned for Zugdidi, will also be considered for Poti existing landfill.

## 3.5 Alternatives of the Planned Activity

### 3.5.1 Zero Alternative or "No Project" Alternative

Zero alternative, or no-project alternative, means that the envisaged regional landfill project would not be implemented. Consequently, the current unsatisfactory situation of disposal sites that do not comply with the current legal framework, and the accompanying high risks for the environment and public health, would not change. The major environmental and health risks caused by the current landfill sites are leachate and landfill gas emissions and thus soil, ground, and surface water pollution in addition to air pollution. These risks would not be alleviated.

The consequences of this alternative would be that the impacts caused by the existing waste disposal practices will continue and even become worse. As the goal of the overall Project is the establishment of an environmentally sound waste management system, the no-project alternative is not considered acceptable.

### 3.5.2 Alternative Location for Landfill Site

Within the scope of the FS, a systematic site selection process for the identification of a new landfill site had been conducted. This selection process followed Georgian and international standards, and included:

- Mapping of exclusion areas, where the construction of a landfill is not allowed / recommended due to legal and/or technical restrictions (negative mapping), as well as mapping of promising areas. The promising areas were further investigated in order to develop a list of candidate sites.
- Assessment of candidate sites in order to identify a preferred site. The preferred site was discussed with various stakeholders involved in order to acquire consensus.

- After preliminary approval of a preferred site, further detailed investigations have been carried out.

A two-staged screening of the promising areas was undertaken. During a first step, the promising areas were inspected together with existing landfills and areas proposed by local stakeholders. The site selection process involved three main stages:

- Selection of alternative sites: Identify potential sites and identify viable alternatives. At this stage, the analysis of available documentation related to the area, the spatial analysis of the area and the dissemination of negative / positive spatial characteristics in the context of the project were carried out. On the basis of the above, areas unfavourable for the project were excluded.
- Preliminary evaluation of selected sites: At this stage of the selection a ranking system (including technical, financial-economic, social and environmental criteria) had been developed. Based on this system, all identified potential candidate areas were evaluated and compared. Conclusions and relevant recommendations were issued.
- Detailed examination of selected sites: At this point, a detailed analysis of availability and area ownership was performed. Topographic, geological, hydrogeological, meteorological, biodiversity (flora and fauna) surveys were conducted. A risk assessment was carried out.

In the initial phase of this process, eleven alternative project site locations were identified. Information on these alternatives is provided below:

Table 3-3: Alternative Project Sites

| Code | Municipality | Location | | Comments |
|---|---|---|---|---|
| | | Longitude | Latitude | |
| CU 01 | Zugdidi | 42$^0$24’25.23’’N | 41$^0$46’2.03’’E | The existing landfill in Zugdidi |
| CU 02 | Zugdidi | 42$^0$26’44.34’’N | 41$^0$51’24.81’’E | Place of waste disposal in Zugdidi (Urta) |
| CU 03 | Poti | 42$^0$11’48.33’’N | 41$^0$39’55.62’’E | Existing landfill in Poti |
| CL 01 | Khobi | 42$^0$18’48.98’’N | 41$^0$50’17.47’’E | Closed landfill in Khobi |
| CL 02 | Senaki | 42$^0$13’57.31’’N | 41$^0$2’12.94’’E | Closed landfill in Senaki |
| PO 01 | Zugdidi | 42$^0$32’43.23’’N | 41$^0$52’24.64’’E | |
| PL 01 | Zugdidi | 42$^0$37’28.83’’N | 41$^0$59’10.69’’E | |
| PL 02 | Zugdidi | 42$^0$35’2.63’’N | 41$^0$56’39.99’’E | |
| PL 03 | Zugdidi | 42$^0$24’45.21’’N | 41$^0$48’309.68’’E | |
| PL 04 | Zugdidi | 42$^0$29’40.36’’N | 41$^0$44’30.87’’E | |
| PL 05 | Senaki | 42$^0$18’56.28’’N | 41$^0$0’58.839’’E | |

As a result of the above mentioned process (screening process), two candidate sites were identified:

- Site 1: Existing Zugdidi Landfill
- Site 2: Former landfill near Urta village

These two sites were investigated in more detail. The assessment of the two sites revealed that the existing Zugdidi landfill[14] was the more suitable option for the implementation of a new regional non-hazardous waste landfill. Advantages of the existing Zugdidi landfill include the following:

- Residential areas as well as other conflicting land uses (except potential clay mining) are located at a sufficient distance (see Figure 3-10 below)
- The surface has a natural geological barrier (clayey soil, even though further investigations are necessary)
- Existing good access road and already existing options for connecting to further technical infrastructure
- The area is under the ownership of the SWMCG.

A third site was also assessed during the preliminary ESIA study conducted in 2017 upon request of the Governor. The Governor suggested to consider an area adjacent to the closed former landfill in Khobi. The site was assessed, however it would have significant social impacts due to the need to convert agricultural land into a landfill site.

Overall, given technical, environmental and social considerations, the Zugdidi site was still ranked as the preferred site.

[14] This landfill has been the official landfill of Zugdidi Municipality since 2010 and has been transferred into the ownership of SWMCG in 2013. It was rehabilitated in 2014 and operates according to the Conditioning plans, approved by MEPA.

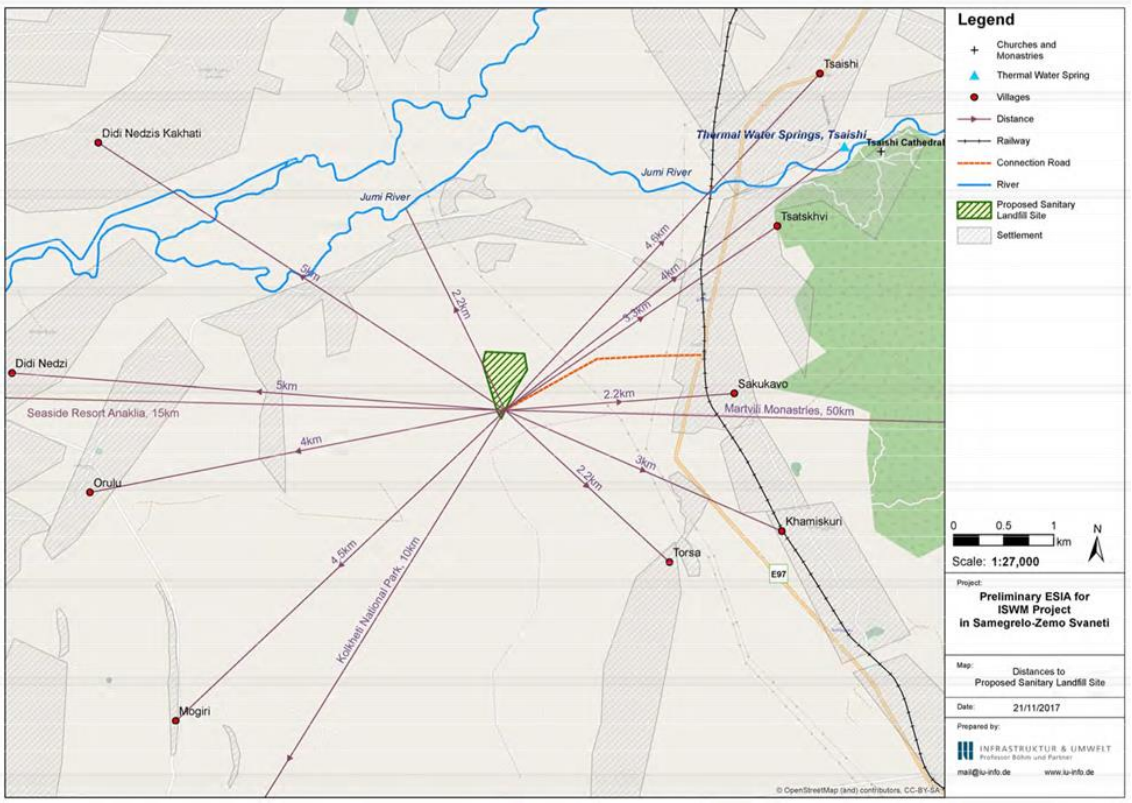



Figure 3-10: Distances from the Selected Landfill Site to Other Land-Uses in the Area

As a result, the location of the existing landfill site in Zugdidi is recommended for implementation of the envisaged regional non-hazardous waste landfill. However, additional efforts will be required to deal with the already disposed waste amounts.

For more details see Annex 1 – Site Selection Report.

### 3.5.3 Alternative Waste Treatment and Disposal Technologies

Different technologies for waste treatment and disposal were discussed in the frame of the Project; from mechanical to biological to thermal treatment options, as well as potential treatment combinations. The table below lists different treatment technologies (for mixed waste or separated waste fractions). The treatment options are compared with each other.

Table 3-4: Waste Treatment Options

| Technology | Description - Targets / Outputs | Framework Conditions / Restrictions | Average Costs |
|---|---|---|---|
| Dirty Material Recovery Facility (MRF) | Components of a mixed waste stream are separated by means of manual picking and/ or mechanical separation techniques. Screening and sorting techniques are used to split the waste stream into recyclables and non-recyclable residual waste for disposal or further processing.<br>Targets / Outputs:<br>▪ Reduction of the volume of residual waste for disposal<br>▪ Separation of recyclables and residual waste for disposal<br>▪ Refuse Derived Fuel (RDF) separation/ conditioning for use in energy recovery facilities. | Input: Residual waste (high recovery rate)<br>Mechanical equipment: Magnetic and eddy current separators, trommels, inclined tables, air classifiers, ballistic separators and advanced optical recognition equipment. Lower quality and marketing potential due to pollution or damage of recyclables (compared to Clean MRF) | Higher effort/costs compared to clean MRF<br>Capital costs: 3-6 Mio. EUR (considering an input of 45,000 t/a)<br>Operating costs: > 360,000 EUR/a (~ 8-12 EUR/t/a) |
| Clean MRF | Components of source separated collected mixed recyclables (clean MRFs) are segregated by means of manual picking and/or mechanical separation techniques. Screening and sorting techniques are used to split the waste stream (see above). Less challenging operation for sorting and (theoretically) higher recovery rates compared to Dirty MRF.<br>Targets / Outputs:<br>▪ Reduction of the volume of residual waste for disposal<br>▪ Separation of recyclables (higher quality compared to Dirty MRF) and residual waste<br>▪ RDF separation/conditioning for reuse | Input: Source separated collected mixed recyclables<br>Mechanical equipment: See above<br>Requirement: Full participation of the population and well- functioning separate collection services<br>Integration of informal recycling sector is recommended | Considering an input of 15,000 t/a:<br>Initial investment costs: ~1-3 Mio. EUR,<br>Operating costs: > 150,000 EUR/a (~ 10-15 EUR/t/a)<br>Additional costs for separate collection |

| Technology | Description - Targets / Outputs | Framework Conditions / Restrictions | Average Costs |
|---|---|---|---|
| Composting:<br><br>Open windrow composting passively aerated<br><br>Composting with forced aeration or with turning by skid loader<br><br>Fully automate in-house plants | Aerobic stabilization of organic waste. Material conditioning: screening, sorting, selection of contraries. Composting process (~ 60 d), including regulation of the water content (~ 50 %) and aeration (passive aeration, windrow turner or forced aeration systems). Sieving of the composting product before curing for a period of about 10-70d<br>Material conditioning: screening and selection.<br>Targets / Outputs:<br>▪ Reduction of the amount of biodegradable waste (stabilization)<br>▪ Reduction of the overall waste amount landfilled<br>▪ Reduction of emissions from the disposed waste<br>▪ Produce (and sell) high-quality compost, fertilizer and soil conditioner | Input: Organic household waste, market/garden waste, waste from restaurants and public green areas.<br>Mechanical treatment equipment: Screening machine, shredder, water tank, pump, skid loader, sieve.<br>Stabilisation conditions:<br>Suitable C/N rate (about 35:1)<br>Water content of about 50 % (25-70 %). Aeration by a regularly turning of waste or forced aeration systems. Drying-out roofs, semipermeable cover or in- house plants.<br>Requirement: Market for compost, marketing activities. | Separate collection: Increase of the total collection costs by at least 50 %<br>Investment costs: ~2-5 Mio. EUR (facility: 20,000 t/a)<br>Unit costs: ~ 30 EUR/t (in a range of 10-75 EUR/t) |
| Digestion:<br><br>Fully mixed<br><br>Plug flow<br><br>Batch system | Anaerobic stabilization of organic waste:<br>Biochemical process that takes place in a vessel under anaerobic conditions (biogas production). Potential combination with an aerobic second stage composting or co-treatment in a WWTP.<br>Targets / Outputs:<br>▪ Reduction of the amount of biodegradable waste (stabilization) and of the overall waste amount landfilled<br>▪ Production of renewable energy<br>▪ Use of digestate (liquid fertilizer/ soil conditioner). | Input: Organic household waste, market/ garden waste, waste from restaurants and public green areas.<br>Stabilisation conditions: Closed digester, continuous mixing and constant temperature (37- 55°C). Further parameters: pH, digestion time, content of nutrients and inhibitors. | Investment costs: ~ 8 Mio. EUR (facility: 45,000 t/a)<br>Unit costs: > 50 EUR/t<br>Revenues from biogas utilization via combined heat and power plant |

| Technology | Description - Targets / Outputs | Framework Conditions / Restrictions | Average Costs |
|---|---|---|---|
| Biological drying | Aerobic degradation process with a computer controlled forced aeration in order to reduce moisture content in a short time by generating bio-thermal energy. Separation of combustible waste (such as plastics, wood, textiles and organics [RDF]) from inert waste (such as sand, stones, glass and ceramics) via screening and wind shifting steps.<br>Targets / Outputs:<br>▪ Enhance the sorting capabilities for an efficient separation of (high quality) RDF (energy production) and recyclables (e.g. high-purity ferrous)<br>▪ Produce biologically stable and storable output. | Input: Residual waste (pre shredded). Drying box with an airtight lid system. Short-term drying process (~ 7 d) via produced heat (evaporation of the waste humidity). Separation of high-quality metal via magnets and eddy current separators. | Higher investment costs compared to composting: ~ 8 Mio. EUR (facility: 45,000 t/a)<br>Unit costs: > 50 EUR/t |
| Mechanical Biological Treatment (MBT) | Integration of different waste management processes.<br>Mechanical treatment: Dirty MRF, screening, sorting, shredding, homogenization, pasteurising.<br>Biological treatment: Composting (aerobic stabilization), digestion (anaerobic stabilisation) or biological drying.<br>Targets / Outputs:<br>▪ Conditioning of waste for further biological treatment<br>▪ Residual waste: Reduction of volume, reduction/degradation of biodegradable amount (disposal of stabilized waste), increase compaction density<br>▪ Reduction of leachate generation due to higher compaction and total organic carbon reduction (degradation)<br>▪ Material recovery: Separating out valuable recyclable materials, use of compost<br>▪ Energy recovery: Use of RDF, biogas production | Input: Residual waste<br>Technical conditions: See respective mechanical and biological treatment technology above. | Depending on the respective technologies integrated within the MBT<br>Investment costs: ~9-14 million EUR<br>Unit costs: 30-120 EUR/t |

| Technology | Description - Targets / Outputs | Framework Conditions / Restrictions | Average Costs |
|---|---|---|---|
| Thermal Waste Treatment – Incineration | Waste combustion in municipal waste incineration plant (comprising grate, furnace and heat recovery stages) is a common and effective method of waste treatment in Europe. Due to high investment costs, high input quantities are necessary to operate these facilities economically.<br>Targets / Outputs:<br>▪ Significant reduction of the overall amount of waste disposed on landfills (app. 95 % reduction)<br>▪ Production of inert incinerator ash<br>▪ Generation of energy in form of electricity and heat | Input: Municipal Solid Waste (MSW), commercial and industrial non-hazardous waste, sewage sludge and certain clinical waste. Securing the availability (via maintenance and control system). Residues of the combustion air cleaning (to be disposed of in hazardous waste landfills). Input quantities from the region not sufficient to operate these facilities economically | High capital and operation cost: 100-200 Mio. EUR (investments), 70-250 EUR/t (specific costs) |
| Mechanical Heat Treatment (MHT) (Waste to Energy)<br><br>Pyrolysis<br><br>Gasification<br><br>Plasma treatment<br><br>Waste to Diesel<br><br>Technology | Separation of the components of the reactions that occur in conventional waste incineration plants by controlling process temperatures and pressures in specially designed reactors. Both pyrolysis and gasification differ from incineration in that they may be used for recovering the chemical value from the waste (rather than its energetic value). The chemical products derived may in some cases then be used as feedstock for other processes.<br>Targets / Outputs:<br>▪ Targets of waste incineration (see above)<br>▪ Convert certain fractions of the waste into process gas (syngas)<br>▪ Reduce gas cleaning requirements by reduction of flue-gas volumes. | Input: MSW, RDF. Gasification, pyrolysis, plasma treatment and waste to diesel are not long-term proven technologies for municipal waste (limited experience with respect to the treatment of waste or waste derived fuels). | High costs (similar to MSW incineration) |

Under consideration of the given framework conditions in the project area, it was decided to postpone the implementation of waste treatment at the landfill to a later stage; i.e. sorting and further treatment of the recyclable waste fraction shall be done by private companies that buy/receive separately collected recyclables from the municipalities.

Incineration was considered not feasible due to the high investment and operation costs involved, as well as the low calorific value of the waste.

### 3.5.4 Technical Alternatives of Leachate Treatment

Several technologies are available for the treatment of leachate generated from landfills. The table below shows different technical alternatives used.

Table 3-5: Methods of Leachate Treatment

| Method | Short Description of Method | Suitable Substances | Unsuited Substances | Products/ Residues of Method |
|---|---|---|---|---|
| Biological treatment aerobic/ anaerobic | Biological reaction of dismantling compounds in storage basins, aeration basins, closed aerated reactors, closed non-aerated reactors | Biodegradable compounds | Toxic substances, salts (salt compounds) | Sludge surplus disposal/ landfill thermal treatment |
| Flocculation and coagulation | Dissolved substances will be transformed and separated into undissolved substances by reactive agent | Heavy metals and suspended matters | Water containing complex forming compounds | Sludge disposal through thermal treatment |
| Oxidation method | Organic substances will be dismantled with oxidising agents | Organic compounds | Inorganic compounds | Carbon dioxide, respectively organic products / residues of decomposition |
| Membrane filter method | Concentrate of pollutants and cleaned water will be produced by means of pressure and semi-permeable (diaphragm) membrane | Molecular (well dissolved) solutions | Special organic compounds (e. g. acids, alcohol) | Concentrate, further treatment, evaporation |
| Adsorption on activated carbon or adsorbing resins | Pollutants will be adsorbed in tanks | Organic compounds | Salts, metals, ammonium | Contaminated activated carbon or adsorbing resins, regeneration thermal treatment, disposal/ landfill |
| Evaporation/ concentration | Evaporation of water and generation of salts | Basically for all | Volatile chlorinated hydrocarbons | Salts disposal/ landfill, exhaust air incineration |
| Incineration | Incineration of water and generation of cinders or dusts | Basically for all | Cadmium and mercury | Cinders and dusts disposal/ landfill |

Almost all treatment technologies listed above require a combination of different alternatives to reach a sufficient purification of the leachate. These combinations mainly require high technical efforts leading to high investment and operation costs.

Among all chemical and physical treatment processes, RO has recently drawn increased attention in developed countries. Due to its good cleaning performance, even very strict effluent discharge requirements can be met.

Therefore, RO as the preferred method for leachate treatment was assumed for Zugdidi landfill during the feasibility stage. The main reasons for this decision were:

- RO is an established leachate treatment process which comes in prefabricated container systems
- It is in accordance with Georgian and EU standards
- It can be operated independently of the incoming pollutant
- RO provides the best feasible purification values.

A final decision on the preferred leachate treatment technology will be made by the IC in close cooperation with the SWMCG, and included in the final landfill design.

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# 4 ENVIRONMENTAL & SOCIAL CHARACTERISTICS OF CATCHMENT AREA AND SITE

Sources of information in this section are the 2017 Feasibility and preliminary ESIA studies, unless otherwise specified. Baseline information will be updated during the ESIA study to reflect more recent published data, if and when available. The purpose of this section is to identify major gaps in environmental and social baseline data that should be filled by primary data collection during the ESIA phase.

## 4.1 Topography

### 4.1.1 Catchment

The catchment area is located in Western Georgia, on Colchis Lowland. The area includes the historical Georgian provinces of SZS. The landscape of the area ranges from low-land marsh forests, swamps, and temperate rainforest to eternal snows and glaciers. Marshlands can be found along the coastal areas. During the Soviet period, the river lowlands in the area were turned into prime subtropical agricultural land by embanking and straightening many stretches of rivers, and by building an extensive system of canals. The mountainous part of the area (mostly in the historical Svaneti province) is dominated by mountains that are separated by deep gorges and surrounded in some places by 3,000-5,000 m high peaks.

### 4.1.2 Site

As presented earlier, topography of the site is generally flat and does not pose major constraints to the development of the project.

## 4.2 Climate

### 4.2.1 Catchment

The major part of the area's territory is characterized by a subtropical climate, while in the northern, mountainous part of the area the climate is subalpine and alpine. The area includes the Kolkheti Lowlands, characterized by an excessively humid subtropical climate significantly influenced by the Black Sea.

Climatic zones are determined by their distance from the Black Sea and by altitude. Along the Black Sea and in the Kolkheti Lowlands, the predominant subtropical climate features are high humidity and heavy precipitation (1,000-2,000 mm/year). The average temperature in winter is $5^0$C, and the average temperature in summer is $22^0$C. The precipitation tends to be uniformly distributed throughout the year, although rainfall can be particularly heavy during the autumn months.

The climate varies significantly with elevation. The subtropical climate is found below 650 m above sea level. Above that altitude (also to the north and further inland to the east) moist and moderately warm weather dominates, which turns cool and wet. Alpine conditions begin at about 2,100 m, and snow and ice are present year-round above 3,600 m.

### 4.2.2 Site

Zugdidi Municipality is located in the subtropical moist sea climate zone with mild winters and hot summers. The average annual temperature is +13 – 14 $^0$C, average temperatures of the coldest and hottest months (January and August, respectively) are 4-5 $^0$C and 22-23$^0$C.

The site is characterized by a relatively high level of precipitation with an average annual precipitation ranging between 1500 – 2000 mm with maximum precipitation in August-September.

The area is also characterized by the sea winds of the Black Sea with reverse winds (onshore after sunrise and offshore after sunset). Monsoon winds are also common in the area. Prevalent winds appear to be from the East (36% of windy hours) and West (27% of the windy hours). No winds (still period) are prevalent 53% of the year.

## 4.3 Air Quality and Noise

### 4.3.1 Catchment

Main sources of air emissions in the region are food industry, oil terminals, the Poti Sea Port, and asphalt plants. Largest emissions in the area are Total Suspended Particulates (30%) and hydrocarbons (38%)[15]. Sources of noise are mainly from transport and industrial sectors.

### 4.3.2 Site

Measurements of air pollution in Zugdidi City collected by passive sampling method in 2016 at three different locations (Sokhumi street, Tbilisi-Senaki highway, and Rustaveli street) indicated ambient concentrations of Nitrogen Dioxide ($NO_2$) between 16.16 and 36.40 μg/m$^3$, ground level ozone ($O_3$) between 44.15 and 62.21 μg/m$^3$, and Sulphur Dioxide of 2.41 μg/m$^3$ at Tbilisi-Senaki highway (only measurement available).

The main sources of air and noise emissions at the proposed site are the existing landfill and movement of waste collection trucks.

If there is local available capacity and equipment, ambient air quality levels surrounding the proposed landfill site will be established at up to 4 locations by measuring the ambient concentrations of $NO_2$, $SO_2$, $O_3$ and $H_2S$.

[15] MEPA, Ambient Air Protection Service: Emissions from Stationary Objects, 2015

Noise measurements will be made at three (3) locations around the site to establish baseline noise levels during a normal week-day and a non-working day.

## 4.4 Geology and Soil

### 4.4.1 Catchment

According to the tectonic zoning of Georgia, the area is located within the Kolkheti subzone of the western intermountain zone of the South Caucasus. The Kolkheti subzone forms its lowest part and represents the Kolkheti intermountain plain.

### 4.4.2 Site

The area where the proposed landfill is located is formed of quaternary deposits. Based on consultations with the Geological Department of Georgian National Environmental Agency (NEA) in 2016 by the FS Consultants, NEA informed that no exploitable clay deposits are officially registered on the proposed landfill area, but on adjacent land. Therefore the project should not affect exploitation of these clay deposits.

As described in Section 3.3.3, the proposed site is covered by a thin soil layer (about 50 cm) followed by a clay layer of at least 3 to 6 m thick with a permeability of 1.4 x 10-7 m/s. The clay's permeability does not meet the national standards as a geological barrier which should be at least 1x10-9 m/s. Based on the investigations conducted to date, no stability problems are expected on-site.

Additional geotechnical investigations will be conducted by the IC. Soil samples will be taken and analysed in a laboratory for environmental components as per regulatory requirements.

## 4.5 Hydrology

### 4.5.1 Catchment

The project catchment area is characterized by an abundance of water. The area's longest rivers include: Enguri (213 km), Khobistskali (150 km), Tekhuri (101 km) and Abashistskali (66 km), and the main river of the western part of Georgia – Rioni. The Rioni originates in the Greater Caucasus Mountains, in the Racha-Lechkhumi and Kvemo Svaneti Region, and flows west to the Black Sea, entering it north of the City of Poti. The area is also crossed by the river Tskhenistskali.

The area is rich in lakes and mineral and thermal waters, including Jvari Water Reservoir with a surface area of 13.5 $m^2$.

### 4.5.2 Site

The area where the proposed landfill is to be located, is covered by a river system which consists of short rivers that carry only small amounts of water. The landfill site itself is drained by drainage channels that are currently not well-maintained and require rehabilitation to function properly.

The Utora River flows past the proposed site along its eastern border. It originates in the territory of the village Tsatskhvi and flows into the Munchia River. Near the landfill site, the river is up to 3.5 m deep. The water level of the Utora River changes throughout the year, but according to the local residents, the river seldom reaches the asphalted road or the landfill, even at high levels.

In terms of groundwater, and according to the geomorphological zoning of Georgia[16], the proposed landfill site and its surroundings are located within the Kolkheti plain and lowland, which can be characterized as wetlands/swamp area. The hydrogeological zoning of Georgia[17] indicates that the subsoil of the proposed landfill site and its surrounding is characterized by porous, cleft and cleft-karst waters.

During site investigations conducted in February 2017, groundwater could not be identified in all drillings and pits (up to a depth of 20 m), but surface water was registered till a depth of 1.6 m (at the border between filing material and clay).

During the ESIA study, groundwater samples will be collected form sub-surface water and if possible, from aquifers under the clay layer to establish a groundwater quality baseline. Groundwater levels in three (3) locations will be measured to determine groundwater flow direction. Water wells used within a radius of 1 km around the site will be surveyed to determine their depth, aquifer tapped, and use.

Furthermore, up to five (5) samples will be taken from the Utora River and measured for regulatory parameters to assess its existing quality. Estimates for the river flow will also be made. One (1) sediment sample will also be collected and analysed in the laboratory.

If possible, up to two (2) leachate samples from the existing landfill will be collected and analysed in the laboratory.

## 4.6 Biodiversity / Natural Habitats

### 4.6.1 Catchment

Much of the natural habitat in the low-lying areas of western Georgia has disappeared in the past 100 years due to urbanization and agricultural development of the land. Most of the forests that covered the lowlands are now virtually non-existent, with the exception of the regions that are included in national parks and reserves. Yet the catchment area still has abundant forest re-

[16] Q.v. Maruashvilli L.: Geomorphology of Georgia, "Metsniereba", Tbilisi, 1971.
[17] Q.v. Buachidze, I: Hydrogeology of the USSR, volume X (Georgian SSR), Moscow "Nedra", 1970.

sources. So called “intact forests” are located within this area, which, together with the other forested areas, create a deposit of biodiversity.

Existing forests mainly consist of deciduous trees below 600 m above sea level. Slopes are covered by temperate rain forests. Between 600 – 1,000 m above sea level the deciduous forest is mixed with both broad-leaf and coniferous species. From 1,500 – 1,800 m the forest is largely coniferous. The tree line generally ends at around 1,800 m and the alpine zone takes over, which in most areas extends up to an elevation of 3,000 meters above sea level, and is characterized by alpine meadows and grassland. Eternal snows and glaciers cover areas above 3,000 m above sea level.

### 4.6.2 Site

Flora and fauna surveys were conducted as part of the preliminary ESIA study in 2017 within the site and a 1,000 m radius surrounding it. The study area consists of fragments of natural and semi-natural habitats as well as agricultural lands. Most parts of the study area are used by local population as pastures and cultivable lands and are protected by fences. Cultivable lands are mainly used as corn fields. Pastures are used for cattle grazing and represent strongly degraded grassland by systemic overgrazing.

Natural and semi-natural habitats are represented by forest fragments, secondary grassland, and semi-natural fresh water habitats.

Species of high conservation value such as Red List or endemic species were not found in the habitat during the field investigations conducted in March 2017 in the woodland habitat.

Kolkheti lowland secondary grassland vegetation covers most of the study area surrounding the landfill. The habitat is heavily transformed and degraded by the anthropogenic impact, as it is used for pasture and cultivable land by the local population. The major part of the flora of the surveyed area comprises of legume and grass species, which have a high economic importance (including grazing). Plants of medicinal value are also encountered. The habitat is highly overgrazed.

A major part of the semi-natural fresh water habitats are artificial, consisting of drainage channels. No species of high conservation value were found in these habitats during the survey. It should be noted that the channels were found to be polluted by wastes from the existing landfill.

In terms of fauna, the study is located close to the Black Sea coast where the bird migratory route passes. Consequently, bird species diversity is high in the study area. In different seasons of the year, including seasonal migrants, about 215 bird species could occur in the area, out of which 14 are listed in the Georgian Red List (GRL) and 4 in the International Union for Conservation of Nature (IUCN) Red List.

Based on literature review and field findings, 38 mammal species (2 in GRL and 1 in IUCN Red List), 7 reptile (one endemic to the Caucasus), and 4 amphibian species could be present in the study area. A confirmatory ecological survey will be conducted as part of the ESIA study.

## 4.7 Protected Areas

### 4.7.1 Catchment

There are two types of protected areas in the project catchment area, namely a National Park as well as several Natural Monuments (see figure below).


Figure 4-1: Protected Areas of Samegrelo-Zemo Svaneti Region[18]

[18] Integrated Solid Waste Management Programme in the Samegrelo-Zemo Svaneti Region, Georgia, Feasibility Study

Kolkheti National Park includes the coastline of the Black Sea and the Lake Paliastomi basin. The National Park was created in order to protect and maintain Kolkheti wetland ecosystems, protected under the Ramsar Convention, which are of international importance. It is located both in the Samegrelo-Zemo Svaneti and in the Guria region.

Natural Monuments in the region are:

- The Nazodealo Cave Natural Monument is a canyon of 600 m length and 7 – 8 m depth. The main corridor at the bottom of the canyon was cut by underground river flows. The cave provides an important shelter for bats
- The Motena Cave Natural Monument is a two-story stalactite cave with a high variety of different stalactites, stalagmites, cascades, curtains as well as large sized boulders. Furthermore, the cave is inhabited by spiders and other insects.

### 4.7.2 Site

The closest protected area to the regional non-hazardous waste landfill site is Kolkheti National Park. The distance between them is more than 12 kilometres.

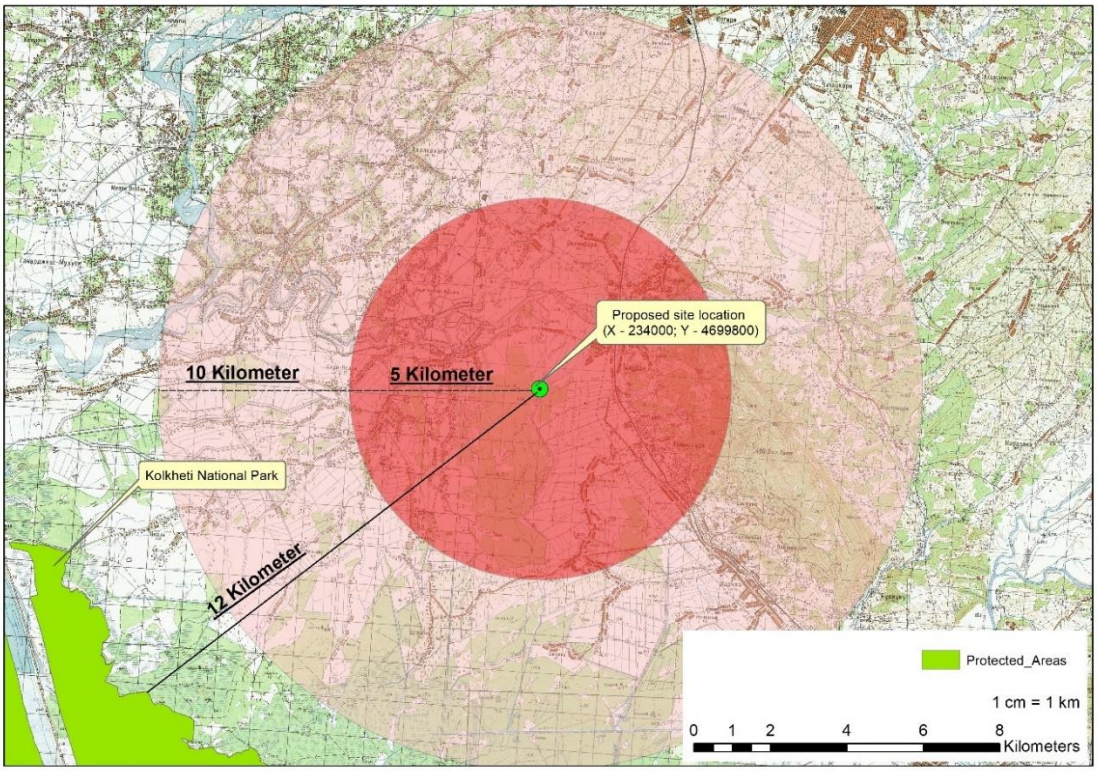


Figure 4-2: Distance from Project Site to Kolkheti National Park

## 4.8 Traffic

### 4.8.1 Catchment

According to the National Statistics Office of Georgia, the total length of transport ways was 3,685.6 km in 2015, of which 122.7 km were international roads and 790.9 km were secondary roads.

### 4.8.2 Site

The existing access road to the proposed landfill site diverges from the European road E60 and has a total length of about 2.5 km. The junction is large enough with a good visibility and would not require any structural changes or improvements to support the project. The road is currently used by waste trucks to deliver wastes to the existing landfill. Other users of the road are farmers who use the agricultural land in the area, and the military. There are no residential or commercial buildings along the access road.

Although there is no traffic data on the E60, junction or access roads, these should be able to cope with the future truck traffic associated with the project without need for further improvements. Further coordination with the Georgian Ministry of Regional Development and Infrastructure, Roads Department, will be sought during the ESIA to confirm this assumption based on anticipated traffic volumes.

## 4.9 Cultural Heritage

### 4.9.1 Catchment

Among the medieval monuments of the region, the most noteworthy are the structures belonging to the Georgian Christian Architecture such as the ensemble of Martvili Monasteries, the Khobi Monastery, the churches of Tsaishi, Kortskheli, Gulevli and others.

### 4.9.2 Site

The proposed site is neither a cultural heritage, nor is it significant for tourism development in the region.

## 4.10 Social and Economic Environment

Due to its location near the Black Sea, the project catchment area is an important trade centre, especially through the Port of Poti (landfill site itself is 15km from the sea). Through this port, Georgia is connected to European and Asian markets.

The development of the area's business sector is based on its strategic location and the resulting advantages. In the area, business sector development is further supported by the existence of the Poti Free Industrial Zone, which was created in 2010. With respect to business development

and increase of cargo turnover, additional opportunities for further growth may arise in case a high capacity port in Anaklia is constructed.

These positive framework conditions are limited by the area's closeness to the occupied territory of the Autonomous Republic of Abkhazia and, inter alia, a weak basic infrastructure.

The area's industrial sector is weakly developed; the majority of the industrial enterprises are small to medium sized. Key products include processed hazelnuts and timber, but also tea, wine, meat, and dairy products as well as fish. The general lack of a modern processing industry for agricultural products is regarded as one of the key problems in the industrial/production sector.

In the past, poor conditions in the transport and communication sectors significantly hindered the development of business and economy. However, in recent years several infrastructure projects of great significance were implemented: One of two most significant Georgian ports, the Port of Poti, is a commercial centre and plays a particular role on the Europe-Caucasus-Asia transport corridor. Because of the Port of Poti, the transport and telecommunication sectors are now the second most important economy sectors in the area.

The agricultural sector (including hunting and forestry as well as fishing) is the most important economic sector. Most of the working population is active in this sector, for the most part self-employed, working on family farms, and primarily focused on subsistence farming. Only the hazelnut production is a major exception, as it is almost entirely intended for export. As a consequence, more than three quarters of the area's total agricultural products, and steadily increasing, are from hazelnut processing enterprises which export to European, Asian and American markets. However, in general it can be stated that the agricultural sector lacks modernization and is mostly based on subsistence farming.

The following figures provide an overview of the distribution of economic sectors in the SZS region in 2017[19]. The distribution is according to the regional value added by types of economic activities.

[19]The project catchment area does not include Abasha and Martvili Municipalities of the SZS Region. But still, the figure provides a general understanding of the importance of the sectors within the target area.

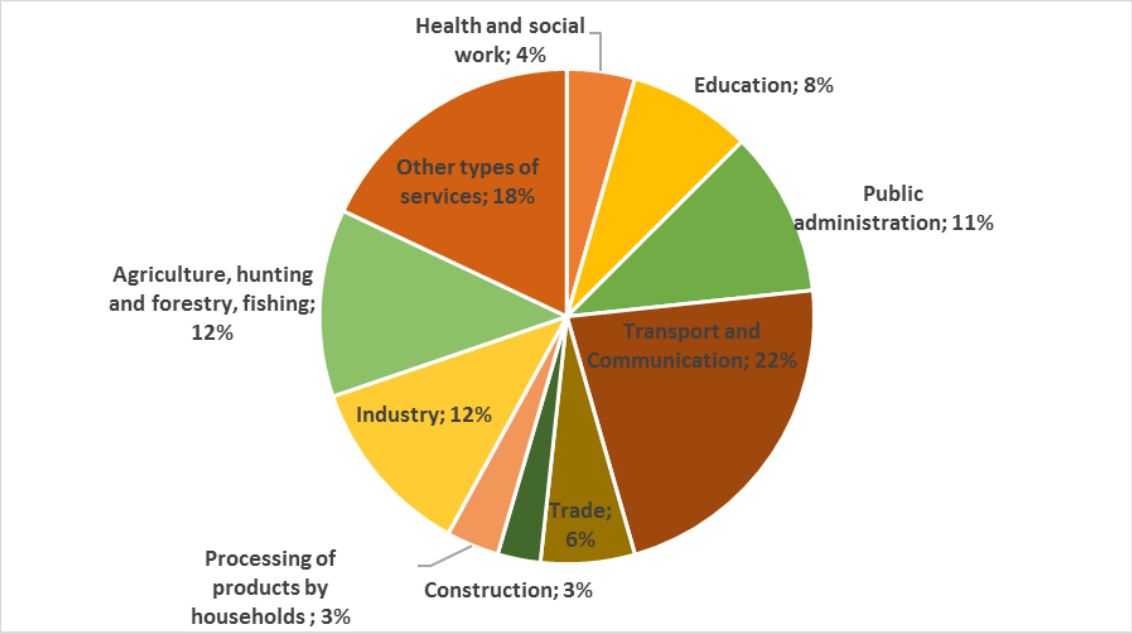


Figure 4-3: Distribution Sectors of Economy in the SZS Region (2017)

The area has a high potential for the future development of tourism as a significant economic sector. This is due to a set of factors such as the ancient culture of Colchis and Svaneti, unique cultural and historical monuments, museums, caves, places for horse-racing and picnics, the humid Kolkheti Lowlands and its rare natural environment, geographical characteristics of the region, mosaic landscapes and biological diversity, the glaciers of Zemo Svaneti, the Black Sea, and developed resorts.

The Thermal Water Springs in Tsaishi village also have a good touristic potential, but require rehabilitation and upgrading to fulfil their potential.

All of the above provide unique conditions for the development of various types of tourism (motor, horse, walks and eco-tourism; marine navigation, river navigation, hunting, fishing, birdwatching, agri-tourism, learning tourism, pilgrimage, extreme tourism, health tourism, etc.). In recent years high class hotels have already been constructed in Anaklia (at the Black Sea Coast in Samegrelo) and in Mestia (in Zemo Svaneti). Also, in 1996, the Ushguli community of Zemo Svaneti was recognized as a world heritage site.

## 4.11 Income and Poverty

Data from the SZS region was used to assess income and poverty in the catchment area. The employment status in the region is detailed in the following table.

Table 4-1: Distribution of Population & Age by Economic Status in the SZS Region for 2018 (Thousand)

| | |
|---|---|
| **Population (15 +)** | **274.2** |
| **Active Population (Labour force), Total** | **179.3** |
| Employed | 158.0 |
| Hired | 58.6 |
| Self-employed | 99.4 |
| Non-identified worker | 0 |
| Unemployed | 21.3 |
| **Population Outside Labour Force** | **94.9** |
| Unemployment rate (%) | 11.9 |
| Economic activity rate (%) | 65.4 |
| Employment rate (%) | 57.6 |

The regional unemployment rate was 11.9% in 2018. However, it has to be pointed out that the majority of the economically active population (55%) is self-employed with unstable incomes, largely depending on seasonality. The population's income level is slightly less than the country's average rate. In the SZS region the average monthly income was 948.5 GEL per household or 275.2 GEL per capita (total cash and non-cash inflows) in 2018.

Rates of poverty and extreme poverty are very high in the region. In 2018, 34,751 families were registered in the Unified Database of Targeted Social Programmes, and 14,597 families were receiving subsistence allowance. The percentage of families registered in the database is close to the country's average. At the same time 97,826 person are registered as recipients of pension and social packages, and make up 30.9% of the region's population.

A major challenge for the region is the large number of IDPs from occupied territories living there. A total of 87,220 IDPs are registered in SZS region (26,620 families), making up 27.7% of the total region's population. With regard to this indicator, SZS region is first among all Georgian regions.

## 4.12 Land Ownership and Land Use

### 4.12.1 Land Ownership

The preliminary ESIA prepared in 2017 had established that farmers surrounding the project site can be categorized as follows:

- Land owners who have registered their lands with exact borders (GPS coordinates)
- Land owners who have registered their lands based on conventional survey and who need to correct borders by using GPS coordinates
- Land owners who have not registered their land but have documents that confirm their property

- Leaseholders who lease land from legal persons or public institutions, and
- Land users who do not have any documents confirming their land ownership or land use rights.

According to the Georgian National Public Registry, the site of the proposed landfill is owned by the SWMCG. The land plot on the East of this plot is registered as municipal property (cadastral code 43.20.44.089). Local people use this area as pasture land.

Most of the remaining land adjacent to the landfill site is private land. There is also an unregistered plot to the South of the landfill site.

During the ESIA, engagement with owners of surrounding plots will be undertaken to ensure they are not negatively affected by the project. Their current socio-economic status and condition (sources of income, etc.) will be established through surveys.

### 4.12.2 Land Use

According to the agricultural census of 2014, out of the total number of 17,373 agricultural farms in the Municipality of Zugdidi, subsistence farming made up 99.6%. Lands around of the planned landfill site are used for the cultivation of maize and as pastures. Updated information will be collected during the ESIA phase.

During the ESIA, land users will be engaged to ensure their livelihoods are not negatively affected by the project. Their current socio-economic status and conditions (sources of income, etc.) will be established through surveys. It is to be noted that the proposed project will improve the current situation of the existing landfill and provide state-of-the-art landfilling practices according to international and national standards, and is expected to significantly reduce negative impacts from the existing situation.

# 5 STAKEHOLDER ENGAGEMENT

## 5.1 Methodology

A stakeholder survey was conducted as part of the scoping process to better understand the current environmental and social impacts due to the existing landfill, as well as possible community concerns towards the proposed rehabilitation project.

The research methodology was based on a qualitative research method, in particular the approach of in-depth interviews. Guiding questions were prepared at the initial stage of the study.

Fieldwork was carried out between March 13 and 15, 2020 in the villages of Didi Nedzi and Orulo (which are the closest villages to the landfill site). A total of 12 interviews were conducted. Due to the prevalent COVID-19 situation, some of the interviews were conducted face-to-face (7 interviews), and some by phone (5 interviews).

Respondents were selected based on the snowball principle - the first respondent indicated the second, and so on. Interviews were conducted with "community leaders", the main feature of which being their authority in the village, including school principals, a village church architect and builder, farmers engaged in cattle breeding (>30 cows), and a local head of an enterprise (hazelnut processor).

In addition, in-depth interviews were conducted with representatives of the mayor office of the village of Didi Nedzi and Orulo, as well as with the employees of the existing landfill.

## 5.2 Stakeholders Concerns

Various concerns were raised by the interviewed stakeholders, particularly with respect to environmental impacts from the existing landfill. In general, the overall attitude of the surveyed stakeholders was positive towards the new project since it is seen as a solution to improve the current situation. Impacts from the existing situation, as explained by the stakeholders, include:

- Impacts on pasture: Despite the fact that the landfill is fenced and the SWMCG takes action to clean nearby territory from the escaped polyethylene bags, the pasture and its surrounding area are still littered with polyethylene bags transferred from the landfill by the wind.
- Health impacts: Almost every year 2-3 cases of brucellosis are registered in the villages; however a scientific correlation between the presence of the landfill and these cases has not been established.
- Odour: The unpleasant smell coming from the landfill, especially in summer, is noticed by almost every family in Didi Nedzi and about 30-40 families in the village of Orulo.
- Insects: Insect abundance is another area of concern for locals, and in their opinion their abundance is linked to the landfill. This problem is greatest for the residents of the village of Didi Nedzi and about 10 families living in the village of Tsatskhviti. There is however

no currently established scientific correlation between the presence of the landfill and insects abundance in these villages.

- Feral dogs: In recent years, a new habit of abandoning pets has emerged – some people in the region release dogs they no longer want in the vicinity of the landfill. Consequently, a relatively large number of stray dogs gather in the area. There have been reported cases where dogs have attacked cattle on the pasture and in some cases even killed and ate them. According to the population, solving this problem is critical to ensure their safety and that of their cattle.
- Road safety: Two residents of the village of Tsatskhviti live near the local road leading to the landfill. Garbage trucks are moving at high speeds, which, on the one hand, causes noise and on the other hand, causes a feeling of insecurity among the residents. Accordingly, the request of these two families is to install a speed-limiting obstacle on the road, which will ensure a reduction in the speed of the vehicles.
- Employment: Two residents of Didi Nedzi are currently employed by the solid waste company in Zugdidi regional unit. In future, the employment of several locals can become a significant factor in increasing the positive attitude towards landfills among the rural population.

When asked about the landfill rehabilitation project, the stakeholders' views can be summarized as follows:

- General attitude towards the new project is positive; it is seen as a solution to improve the current situation and eliminate the impacts associated with the existing landfill
- The local population is used to the current situation and tired of hearing about it; the existing landfill has been there for many years and local communities have been waiting for a long time for the improvement of the current situation
- Local communities should be informed about the details of the project to build trust and avoid creating an information vacuum, which could be used by some to create negative and wrong publicity about the project
- Local communities should be informed how landfill rehabilitation and the establishment of a modern landfill will solve the current environmental impacts of the existing landfill. It is expected that with the closure of the existing landfill and the establishment of a modern landfill operated according to international standards, these impacts will be eliminated and the environmental situation will be significantly improved
- Investments by the SWMCG and/or other state agencies in the nearby communities would be welcome and contribute to further increasing project acceptability. These investments could target priority needs of the local communities
- Members of the local communities nearest to the landfill sites should be given priority during hiring.

## 5.3 Next Steps in Stakeholder Engagement

In line with the Environmental Assessment Code, MEPA will provide the opportunity to the public and stakeholders to review the scoping report and provide their comments. Given the current COVID-19 situation, public review of the Scoping Report will be done in line with new procedures set by MEPA.

A Stakeholder Engagement Plan (SEP) is also being prepared to inform on additional engagements to be conducted during the ESIA phase. Once the ESIA report has been finalized, it will be submitted to MEPA, and a public hearing will be organized to discuss the findings with communities and stakeholders.

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# 6 PURPOSE OF ESIA AND DEVELOPED METHODOLOGY FOR IMPLEMENTATION OF SZS REGIONAL NON-HAZARDOUS WASTE LANDFILL PROJECT

## 6.1 Purpose and Steps of Development of an ESIA

The purpose of the ESIA Report is to help make the project reliable and sustainable from an environmental point of view, and ensure conformity with Georgian Legislation and KfW requirements. The ESIA will also focus on social issues associated with the project.

The overall approach to ESIA is in compliance with national laws and will be performed in line with the requirements of the EU Directive and applicable international standards, as embodied in the KfW Sustainability Guidelines.

ESIA activities and their cross-connection to the present scoping phase are briefly described in the table below.

Table 6-1: ESIA Process - Summary

| Step | Description |
|---|---|
| **Scoping** | This report identified the key issues to be addressed in the ESIA. It will ensure that the process is focused on the potentially significant environmental and social impacts which may arise from the project. |
| **Baseline Studies** | For the key issues identified during scoping, further available information on the existing environmental and social conditions (also referred to as baseline conditions) will be gathered. This will be supplemented by field studies and surveys where necessary. |
| **Impact Assessment and Mitigation Measures** | This stage is focused on predicting environmental and social changes from the baseline (including their expected evolution without the project) as a result of the project's activities (considering the entire lifecycle of the project). Each impact will then be evaluated to determine its significance for the environment and society. Where necessary, measures will be proposed to mitigate significant impacts. |
| **Environmental and Social Management Plan (ESMP)**<br>**&**<br>**Environmental and Social Action Plan (ESAP).** | The various mitigation measures will be presented in an ESMP, describing how measures will be implemented throughout the different project phases. The ESMP will detail the resources and responsibilities for implementation, timing and monitoring, and audit plans to ensure all the prevention and mitigation commitments are met. It will also identify any requirements for training and capacity building. The ESMP will include an appropriate plan detailing how expropriation will be managed, if necessary, in the frame of this project.<br>Considering the findings of the environmental and social appraisal, and the result of consultation with affected stakeholders, the client will develop and implement a programme of mitigation and performance improvement measures and actions that address the identified social and environmental issues, impacts and opportunities in the form of an ESAP. |
| **Monitoring and Risk Assessment Plan** | A monitoring plan and risk assessment plan will have to be prepared in order to present in detail all environmental and social monitoring actions that have to take place during the implementation and operation of the new ISWM system, based on international best available techniques, international and Georgian quality standards tools, and current legislative framework. |

| Step | Description |
|---|---|
| | Immediate actions will be clearly defined in case emergency situations occur, in order for the system to efficiently react, minimizing the negative results of possibly unsafe conditions (environmental hazard situations, physical catastrophes etc.). |
| **Stakeholder Engagement and Consultation** | The views of interested parties will be sought so they can be taken into account during the assessment, and reflected in the proposals for mitigation. During the ESIA process public consultation, as well as supporting the active participation of all stakeholders is encouraged, and all outcomes and comments will be considered in the development of the ESIA Report and ESMP. |

Further environmental and social baseline conditions will be identified by collecting additional information on recipients and biophysical/social resources within the sites and the surrounding areas, which might be affected by the design proposals. Having outlined the baseline conditions, potential impacts will be identified and their acceptability in terms of environmental and social effects will be assessed.

Key impacts will be identified, and the likely scale of each potential impact will be determined as a predicted change from the baseline condition. The impacts will be assessed in the long-term and short-term to see potential changes at different stages of the Project.

The assessment of the significance of impacts will be based on the assessment of their duration, their extent, and value of the natural component which is acting as the recipient of the impact. The planned success of the proposed mitigation measures will also be considered, to provide the final assessment of the impact.

The overall impact will be assessed by means of an analysis of the interaction of different impacts. Construction effects in general will tend to be temporary in nature. Operational effects of the new landfill might be either permanent (visual impacts), or temporary (e.g., transient odorous loads, etc.).

Mitigation measures will be developed for all impacts which will be considered significant. Mitigation measures can be implemented at the following stages of the Project:

- During the design stage of the entire project life cycle to avoid or minimize the magnitude of adverse impacts at source, and promote positive effects where possible
- During construction (mitigation and environmental enhancement measures)
- During operation of the landfill or other SW-infrastructure by applying best operational practices, and
- During the closure and after care phases of a landfill.

All mitigation measures described or proposed will be supported by the SWMCG, so that the significance of residual effects can be predicted, and necessary monitoring / management strat-

egies identified. Mitigation measures will be identified for every project stage using the “avoid/prevent - minimize - compensate” hierarchy.

For certain criteria, where significant environmental impacts are either certain or else likely, it is important to ensure that the effectiveness of mitigation measures is monitored. For this purpose, a Monitoring Plan (MP) will be developed.

Measures will be proposed to monitor each aspect of the natural environment (air, water, soil, etc.) that may be affected.

## 6.2 Impact Assessment Methodology

### 6.2.1 Overview

The assessment of impacts is an iterative process that considers four questions:

- **Prediction:** What will be the potential impacts of the project on the environment and people?
- **Evaluation:** Does this impact matter? How important or significant is it?
- **Mitigation:** If the impact is significant, can anything be done to alleviate it?
- **Residual Impact/Risk**: Is it still significant after implementation of the mitigation measures?

Where significant residual impacts remain, further options for mitigation may be considered and impacts can be re-assessed until they are as low as technically and financially feasible for the Project and within acceptable levels.

The following topics will be considered as part of the ESIA:

- **Physical Environment**
  - Geology, soils
  - Water resources, hydrogeology
  - Landscape and visual amenity
  - Noise and vibrations
  - Ambient air quality and climatic factors
- **Biological Environment**
  - Ecology - habitats
  - Ecology - species
- **Socioeconomic Environment,** and
- **Cultural Heritage.**

### 6.2.2 Impact Prediction

The ESIA will describe what will happen by predicting the magnitude of impacts (both positive and negative) and quantifying these to the extent practicable, which varies depending on the topic being assessed. The term 'magnitude' is used to encompass all dimensions of the predicted impact, including:

- The nature of the change (what is affected and how)
- Its size, scale, or intensity
- Its geographical extent and distribution
- Its duration, frequency, and reversibility
- Where relevant, the probability of the impact occurring as a result of accidental or unplanned events.

The magnitude of the impacts will be graded taking into account all the relevant variables noted above to determine whether an impact is of negligible, low, medium or high magnitude. For readily quantifiable impacts (e.g. noise), numerical values will be used, whereas for other topics (e.g. ecology) a more qualitative classification is necessary.

### 6.2.3 Evaluation of Significance

Based on information on the magnitude of impacts, it will be explained what this means in terms of its importance to the natural, social and cultural society and the environment, so that decision-makers and stakeholders understand how much weight should be given to the particular issue.

The evaluation of impacts will be based on the judgement of the ESIA team, supported by reference to legal standards, EU and national policy, KfW requirements, current international best practice, and the views of stakeholders. The magnitude of the impact, and quality/importance or sensitivity of the receptor will also be looked at in combination, to evaluate whether an impact is significant and if so its degree of significance.

The Project's positive and negative impacts are assessed with reference to baseline socio-economic conditions and take the following into consideration:

- The type of the impact, including whether the impact is direct or indirect, and/or reversible and irreversible
- The duration (i.e. temporal dimension) of the impact, including whether the impact is short, medium, or long-term, and/or temporary or permanent
- The extent (i.e. spatial dimension) of the impact to reflect the expected change that may take place at a national, regional, or local (affected community or household) level
- The magnitude of the impact which reflects the extent of change that is predicted from baseline conditions

- The sensitivity of the receptor, taking into consideration stakeholder value that reflects the importance of changing a receptor's current status
- Gender and vulnerability considerations that are relevant to the impact being assessed, and
- The likelihood or probability of the impact occurring during the project to the receptor, based upon the project's aspects and professional experienced from similar projects.

Impact magnitude is defined as below in 5-2.

Table 6-2: Definitions for Impact Magnitude

| Definitions for Impact Magnitude | |
|---|---|
| **Impact Magnitude** | **Definition** |
| High | Very significant, permanent / irreversible change to key characteristics, livelihoods or features of the receptor's character or distinctiveness. |
| Medium | Significant, potentially permanent change, over the majority of the Project's site and potentially beyond, to key characteristics or features of the receptor's status, character or distinctiveness. |
| Low | Noticeable, temporary (during the project duration) change, over a part of the Project's site, to key characteristics or features of the receptor's character or distinctiveness. |
| Negligible | Noticeable, temporary (for part of the project duration) change, or barely discernible change for any length of time, over a small part of the Project's site, to key characteristics or features of the receptor's character or distinctiveness. |

Receptor sensitivity is defined as below in Table 5-3.

Table 6-3: Definitions for Receptor Sensitivity and Value

| Definitions for Receptor Sensitivity and Value | |
|---|---|
| **Receptor Sensitivity and Value** | **Definition** |
| High | Sensitivity: Receptor has a very low capacity to accommodate the impact.<br>Value: Receptor has key characteristics which contribute significantly to the distinctiveness, and character of the socio-economic receptor (e.g. community health, physical security, social cohesion, living standards, livelihood condition, mental well-being, etc.). |
| Medium | Sensitivity: Receptor has a low capacity to accommodate the impact.<br>Value: Receptor has key characteristics which contribute significantly to the distinctiveness and character of the receptor (e.g. very important to some households in an affected community, but not all). |
| Low | Sensitivity: Receptor has some tolerance to accommodate the impact.<br>Value: Receptor only has characteristics which are important to few people or households. |
| Negligible | Sensitivity: Receptor is generally tolerant and can accommodate the impact.<br>Value: Receptor characteristics do not make a significant contribution to local socio-economic conditions, living standards or mental well-being. |

Impact significance has been calculated based upon the impact magnitude and the receptor sensitivity as illustrated in Table 5-4.

Table 6-4: Impact Assessment Matrix

| Impact Assessment Matrix | | | | |
|---|---|---|---|---|
| **Impact Magnitude** | **Receptor Sensitivity / Value** | | | |
| | High | Medium | Low | Negligible |
| High | Major | Major | Moderate | Minor |
| Medium | Major | Moderate | Minor | Minor |
| Low | Moderate | Moderate | Minor | Negligible |
| Negligible | Moderate | Minor | Negligible | Negligible |

### 6.2.4 Assessing Residual Impacts

The ESIA experts will re-assess the impacts considering further mitigation commitments integrated into the design and operation of the Project. This iterative process will continue until an impact will be deemed acceptable within the confines of what is regarded to be technically and financially feasible and cost-effective.

The degree of significance attributed to residual impacts is related to the “level of weighting” (major, moderate, minor). Also, cumulative positive or negative impacts will be considered and their combined effect on a receptor will be defined.

## 6.3 Area of Influence

The assessment will focus on the anticipated areas of influence (AoI) of the project which include the project footprint and the area around the landfill site including access road, surrounding plots, surrounding villages and the receiving water course for treated leachate.

The areas of influence are defined as follows for the various environmental and social components:

- Vegetation and land cover: The area of the construction site
- Wildlife: Area of the construction site and the receiving water course for treated leachate
- Water: Receiving water course for the treated leachate and groundwater wells within 1 km radius from the centre of the site
- Landscape: Views from the surrounding villages and the main road
- Noise and air: Surrounding land users and nearest villages
- Social issues: Nearest villages
- Land use issues: Landowners and land-users of landfill construction area and surrounding plots.

## 6.4 Existing and Potential Impacts of SWM System and Planned Landfill

### 6.4.1 Potential Impacts of the Existing SWM System

There are several occasions on which the existing waste management systems lead to negative environmental and social impacts, some of which are summarized in a general manner in the table below.

Table 6-5: General Impacts Caused by Existing Waste Management Systems

| Aspect | Impact |
|---|---|
| **Waste Collection and Transport** | |
| Littering and clandestine dumping | The unavailability of garbage bins and proper disposal areas leads to littering and dumping, which is also due to incomplete coverage of waste collection and lack of public awareness. Waste collection companies face the challenge of proposing appropriate methods of waste collection that will be culturally viable and sustainable in the long run. |
| Dust, bioaerosols and odours | The accumulation of waste and dust may have a direct impact on the health of waste collectors and street sweepers. Bio-aerosols are of a concern due to their effect on those employed in the near area and increase the risk of respiratory disease. |
| Vehicle emissions | The increased movement of waste transport vehicles, outdated equipment and irregular maintenance may cause an increase in emissions of solid particles and gases. |
| Impact on livelihood of informal waste collectors | The establishment of waste collection companies/services may have negative effects on the livelihood of the workers in the informal waste collection sector, if they cannot be integrated into the formal sector. |
| **Waste Reception, Unloading, Processing, and Storage** | |
| Contaminated run-off | The organic fraction of the waste and the rain water in them causes a rash, which can contaminate soil, surface water, and groundwater. It may also cause impacts such as eutrophication and acidification of surface water and contamination of water supplies. |
| Litter | In addition to the impacts of littering mentioned above, the lack of storage facilities for waste awaiting processing may cause littering. |
| Air Emissions | Air emissions during the waste reception and processing phase usually originate from transport vehicles exhaust, as well as the emissions of dust, Of gases and odours. |
| Noise and Vibration | Equipment used during transporting, sorting and processing of waste, such as loaders, compactors, grinders, and cranes may all cause significant noise and vibration. |
| **Landfilling** | |
| Impact on landfill surroundings | The location of landfills may cause significant impact on residential, recreation and agricultural areas, natural protected areas, and wildlife habitat, as well as areas prone to scavenging wildlife. |
| Leachate generation | The lack of a collection and disposal system for leachate in landfills may contaminate soil, groundwater, and surface water. |
| Landfill gas emissions | If no gas collection and treatment systems exist, methane and $CO_2$ migrate out of landfills, which may cause an explosion. |

### 6.4.2 Potential Impacts of the New ISWM System

The identified major impact categories for the construction, operation, and closure phases of the Project will be assessed in depth during the ESIA stage.

An overview of the main potential impacts of the Project are provided in the following table:

Table 6-6: Main Scoped Potential Impacts of all Project Cycle Stages

| № | Environmental and Social Aspects | Description of Potential Impact |
|---|---|---|
| 1 | Air pollution (dust, gaseous emissions, odour) | *Gaseous Emissions:* Vehicles and construction equipment exhaust emissions during the construction and operation phase which have the potential to cause deterioration in local ambient air quality. Gaseous emissions from equipment movement in and around the ISWM facilities sites will, inevitably, have some impact on the ambient air quality at the sites, although such impacts will be rather small and unlikely to be detectable, except locally on the site, access and internal site roads.<br><br>*Odours* at ISWM facilities (landfill, waste treatment facilities, etc.) are generated from transferring, placement and decomposition of waste. There are two main sources of odour at the site: Odour from the degradation of organic waste ($H_2S$, landfill gas) and odour from the leachate ponds. Odour may also be caused by smoke from fires at the landfill. It is important to note that odours from landfills will only be generated in case of mismanagement, and are not considered as routine impacts in properly operated landfill sites.<br><br>*Dust* is generated during the landfills rehabilitation stage as well as during construction and operation phases of new ISWM facilities. Main sources of dust are excavation work, bulldozers and trucks movements over unpaved roads and waste cover, and cell/ landfill closure activities. The highest impacts occur during the rehabilitation/construction phase and will be associated with the movement of large construction dozers/ trucks into and out of the sites. |
| 2 | Greenhouse Gas (GHG) emissions and climate impacts | Disposal of mixed waste to the former landfill causes degradation of the organic fraction of waste and as a result produces landfill gas, consisting mainly of methane and carbon dioxide. If not collected and burnt, the gas can cause odour problems in the neighbourhood and globally contribute to the increased level of greenhouse gases in the atmosphere. Landfills generate landfill gas starting some few months after disposal and during the whole active lifetime, as well as during a long period after landfilling has ended.<br><br>Accumulated landfill gases and uncontrolled dispersal and migration can represent a potential hazardous situation, due to several characteristics of the landfill gases. These characteristics include flammability, asphyxiating properties and trace organic concentrations. The slightly positive gas pressure, usually existing within a landfill, permits gases to flow uncontrolled from the fill to areas of lower gas pressure by connective gas transport. Furthermore, gases with higher concentrations of $CO_2$ and $CH_4$ can diffuse into regions containing gases with lower concentrations of these two gases. Finally, if landfill gas accumulates in the fill, the growth of plants rooted in the cover can be inhibited, unless appropriate precautions are taken.<br><br>On the other side, the implementation of the new ISWM system will reduce GHG emissions considerably due to the modern waste management methods to be applied and the standardization of all ISWM system aspects |

| № | Environmental and Social Aspects | Description of Potential Impact |
|---|---|---|
| | | according to international and national standards. It is expected to have a significant positive impact due to the reduction of GHG emissions and consequently, the reduction of factors contributing to climate change. |
| 3 | Noise and vibration impacts | During construction works noise from excavators, wheel loaders and all other vehicles will occur. During operation, the noise from the sites mainly comes from the vehicles operating at the site and the vehicles transporting waste to the sites. |
| 4 | Surface and ground water (wastewater, leachate, rainwater) | The design of the landfill for the SZS region foresees that collected leachate is directed to a RO plant for treatment. The leachate treatment plant must be designed for a minimum capacity of 170 $m^3$/ d. The treated effluent will be discharged to the Utora River (located to the East of the site) in accordance with maximum admissible effluent levels defined by the national legislation and in agreement with MEPA.<br>Pollution from landfill leachate can be avoided by considering the construction of the landfill in accordance with technical regulation # 421. Atmospheric precipitation will be collected through the drainage system, which will also be fully complied with the relevant legal requirements. |
| 5 | Waste generation | During the construction stage, household, construction and hazardous (oil, fuel, iron scrap, contaminated soil, oiled clothes, etc.) wastes will be generated. Separate waste collection, classification, temporary storage and disposal in labelled containers shall be carried out by the construction company on the basis of a waste management plan. Waste recycling should be handled by relevant environmental decision-makers in accordance with waste management legislation. |
| 6 | Litter and clandestine dumping | Illegal waste disposal is caused by problems in the waste management system and low public awareness. Waste collection companies or units face the challenge of proposing appropriate methods of waste collection that will be culturally viable and sustainable in the long run. |
| 7 | Soil contamination | Engineering works in the area require materials. However, material excavated during the earthworks should be used as much as possible during the construction and operation of the landfill. The fertile soil layer should be preserved for future use. However, additional materials (gravel, sand, etc.) may be required for construction purposes.<br>There is a risk of soil contamination by leakages of oil from mobile equipment (bulldozers, compactors, etc.) and other chemicals during their transportation and usage on the construction site. |

| № | Environmental and Social Aspects | Description of Potential Impact |
|---|---|---|
| | | In the unlikely event of a leakage in the landfill leachate system, and in case of inadequate closure measures of landfills, soil (and water receptors) could be polluted during the operation and post closure phases. |
| 8 | Visual amenity | Aesthetic impacts will take place due to the alteration of the natural environment during the construction and operation of the new ISWM facilities. Change of landscape should be considered as adverse impact and should be mitigated (cultivation of a green line at the perimeter of the landfill, etc.). |
| 9 | Protected areas | The nearest Protected Areas have already been identified and are at a distance of >12 km to the landfill site.<br>Nevertheless, the proximity of new ISWM facilities to such areas will be taken into account in order to identify appropriate mitigations measures and minimize any potential impacts. |
| 10 | Ecosystems/ biodiversity (Flora and Fauna) | Waste management operations could have impacts on terrestrial wildlife, ranging from temporary noise disturbances to disturbance of breeding habitat.<br>Rehabilitation/construction activities will be limited in nature and duration and are confined to the disposal sites. However, a list of potential impacts arising from the construction activities will be presented in the ESIA Report such as:<br>• Direct Impacts on Vegetation<br>• Loss of Habitat<br>• Displacement of Fauna During the Operation Phase<br>• Increase of Pest Species<br>• Impacts of Leachate Treatment Facilities on Biodiversity<br>• Creation of New Habitats<br>• Closure Phase Activities / Residual Impacts |
| 11 | Traffic and roads | The main concern of the anticipated increase in truck traffic volumes on the access road of the ISWM facilities is in connection with road safety and the potential danger of road accidents. The anticipated volume of traffic may increase only during works phases, but it will significantly affect the existing traffic volume on the access road to the ISWM facilities. Impact on transportation infrastructure and traffic on E60, junction and access road will be assessed in the ESIA. |

| № | Environmental and Social Aspects | Description of Potential Impact |
|---|---|---|
| 12 | Cultural heritage | Neither a cultural heritage site, nor an archaeological site is situated within or near to the selected landfill site. The nearest cultural heritage site is located at a distance of > 4 km from the landfill site. An impact is not expected.<br>Nevertheless, any potential impacts to cultural heritage sites due to the implementation of the ISWM facilities will have to be identified and considered in order to identify appropriate mitigations measures and minimize any potential impacts. |
| 13 | Work environment - accidents | An improper working environment for workers can cause accidents related to construction works. A distribution of necessary tools, proper uniforms, helmets and glasses to the construction workers, and proper work shift management of the labourers is essential to minimize the occurrence of accidents. Working condition, such as work hours per day, shall be based on regulations in Georgia.<br>Improper handling of equipment during the construction and operation stage of the new ISWM facilities may be the cause of accidents. Additionally, there is the possibility of a traffic accident due to the increase of traffic volumes. The significance of this risk must be carefully identified, and proper mitigation measures must be suggested in order to minimize, if not eliminate, the risk of such an impact. |
| 14 | Public health impacts | The implementation of the new ISWM system and the closure of landfills is generally expected to have a positive impact on public health due to modern waste management methods and the standardization of all ISWM system aspects according to international and Georgian quality monitoring tools (best available techniques, international quality standards and legislation, etc.). The current site is a dump, without leachate collection and treatment, landfill gas collection and treatment. This consequently pollutes the ground, soil and air, and has a negative impact on the health of the people living in the area. Consequently, the closure of existing landfills would eliminate the negative impacts on human health. The project will ensure waste management in accordance with the legislation in force in Georgia and minimize the above mentioned negative impacts. |
| 15 | Hazards (risk), spread of Infectious diseases | Health risks at dumpsites, landfills or other SW-facilities are normally associated with exposure to sharp, infected or toxic material at the site, contact with leachate and emissions of hazardous smoke from fires. Diseases can be transferred from these sites to the local community through animal vectors, water, and air.<br>Other risks include explosions and fires caused by improper management of the landfill gas.<br>The significance of this risk must be carefully identified and proper mitigation measures to be suggested to minimize, if not eliminate, the risk of such an impact. These risks are generally avoided / minimized through |

| № | Environmental and Social Aspects | Description of Potential Impact |
|---|---|---|
| | | the development and implementation of Occupational Health and Safety (OHS) management plans as well as labour force management plans. |
| 16 | Resettlement | In case the new ISWM facilities are not constructed on public land, or if they affect nearby settlements (during their construction or operation) there may be the need for involuntary resettlement of affected inhabitants.<br>The significance of this risk will be carefully identified and proper mitigation measures shall be suggested to minimize, if not eliminate, the risk of such an impact. This impact is not expected in the frame of this programme. |
| 17 | Land acquisition/ land ownership and land use, loss of grazing land | The new ISWM landfill is constructed on publicly owned land, so no land acquisition process will be needed. On the other hand, the site is surrounded by private lands and land users. These land owners and users will be engaged during the ESIA stage to ensure they are adequately informed about the project, its impacts and mitigation measures, and that their livelihoods are not affected. |
| 18 | Low level income/ informal waste collection system (waste pickers) | There are generally two types of people working in the existing SWM system: The public staff working for the responsible public SWM entity, as well as people engaged in informal waste separation (so called waste pick-ers/scavengers). The extent of the informal sector will be further confirmed in the ESIA, but the overall strategy is to integrate those who benefit from scavenging activities (if any) into the new ISWM system to avoid the risks of economic displacement and loss of livelihood. |
| 19 | Impacts on local economy and lo-cal employment | Impacts on the local economy are expected to be positive, as the new ISWM facilities will have to be manned with adequate operational staff of different specializations (i.e. management staff, workers, technicians, etc.). Additionally, new entrepreneurships will emerge especially in the recyclables sector.<br>On the other hand, the income of the informal sector will be lowered significantly. But with appropriate mitigation measures, this sector could be transformed into a formal one, offering a more dignified work life, which may qualify as a significant positive impact.<br>The project could also provide a renewable source of electricity should biogas quantities prove to be sufficient. |

## 6.5 Potential Mitigation Measures for Scoped Impacts

The identification of measures that will be taken to mitigate the Project's impacts is a significant step. In some instances, mitigation will be inherent in the design (e.g. leachate management system), and in other cases mitigation measures will need to be identified during the ESIA process.

Where a significant negative impact is identified, a hierarchy of options for mitigation will be explored as follows:

- Avoid at source – remove the source of the impact
- Abate at source – reduce the source of the impact
- Attenuate – reduce the impact between the source and the receptor
- Abate at the receptor – reduce the impact at the receptor
- Remedy – repair the damage after it has occurred
- Compensate/Offset – replace in kind or with a different resource of equal value.

Compensation/ offset is typically seen as a last resort, but may be required. Providing compensation or offsetting does not, however, automatically make an impact 'acceptable' or excuse the need to consider other forms of mitigation as discussed in the hierarchy. KfW requirements highlight the need to explore alternatives to avoid or reduce impacts.

The following table presents general mitigation measures based on the different types of landfill projects. The proposed mitigation measures were derived from the internationally recognized environmental and social standards on waste management facilities. This is not an exhaustive list – some mitigation measures may be missing, or irrelevant, or non-applicable to this project.

Table 6-7: Potential Mitigation Measures for Scoped Environmental and Social Impacts

| № | Environmental and Social Aspects / Impacts | Description of Potential Mitigation Measures |
|---|---|---|
| 1 | **Air pollution (dust, gaseous emissions, odour, landfill gas emissions)** | **Waste Collection and Transport:**<br>*Dust, bioaerosols and odour:*<br>• Implement a washing program for waste collection vehicles and for company-owned transfer containers<br>*Vehicle emissions:*<br>• Implement Transfer Stations (TS) for small vehicles to consolidate waste into large vehicles for transportation to a treatment facility or landfill<br>• Transport vehicle owners and operators should implement the equipment manufacturers' recommended engine maintenance, along with the mechanical maintenance for the safe operation of the vehicle, including proper tire pressure<br>• Drivers should be instructed on the benefits of driving practices and trained to reduce both the risk of accidents and fuel consumption, including measured acceleration and driving within safe speed limits. Optimize transfer routes to minimize distance travelled and overall fuel use and emissions<br><br>**Waste Reception, Unloading, Processing and Storage:**<br>• Select vehicles and containers that minimize air emissions during waste loading and unloading;<br>• Design drop-off points to minimize queuing of vehicles<br>• Sweep waste management areas and roads frequently and use water spray for dust control where needed;<br>• Pre-treat wastes as needed (e.g., solidification, encapsulation, or wetting enough to reduce dust but without forming leachate)<br>• Use extraction system to remove dust from working areas, buildings, and storage vessels, and treat as needed to control particulate emissions (e.g., bag filter)<br>• Remove, treat, or dispose of all biological/malodorous wastes in an expeditious manner<br>• Use odour-neutralizing sprays where necessary<br>• Use negative pressure in processing buildings and appropriate air filtration (e.g., biofilter) to remove odour.<br><br>**Landfilling:**<br>• Include landfill gas collection system designed and operated in accordance with applicable national requirements and recognized international standards including recovery and pre-use processing or thermal destruction through an efficient flaring facility. Prevent Flare design depends on the type of flare system which may include open flares or enclosed flares. Retention time and temperature necessary to achieve condensation |

| № | Environmental and Social Aspects / Impacts | Description of Potential Mitigation Measures |
|---|---|---|
| | | from accumulating in extraction systems by arranging the pipe work to fall to a removal point such as a knock-out-pot<br>• Use landfill gas as fuel if practical, or treat before discharge (e.g., by using enclosed flare or thermal oxidation if methane content is less than about 3 percent by volume)<br>• Use gas blowers (boosters) of sufficient capacity for the predicted gas yield and constructed of materials appropriate for landfill gas duty; blowers should be protected by flame arrestors at both gas inlet and outlet.<br>• Install and regularly sample boreholes surrounding the landfill to monitor for migration of landfill gas. |
| **2** | **Noise and vibration impacts** | • Construct a buffer zone between the facility and the external environment or locate facilities away from sensitive receptors<br>• Include noise and vibration considerations during design, including use of models to predict noise levels at specified noise-sensitive locations, using standardized sound power levels for construction plant<br>• Maintain site roads in good condition to reduce noise and vibration from vehicle movements<br>• Use acoustic screens around fixed/mobile plant and equipment<br>• Select equipment that has low noise emission levels<br>• Fit silencing equipment to plant, e.g. baffles/ mufflers<br>• Use buildings to contain inherently noisy fixed plant equipment (e.g., locate waste shredder in the tipping hall, and enclose tipping hall on all sides) and consider use of sound-insulating materials in construction |
| **3** | **Surface and ground water (wastewater, leachate, rain-water)** | • When selecting a site, the proximity of waste treatment and storage areas to human and animal water supply wells, irrigation canals and surface water bodies should be taken into account.<br>• Use impermeable materials for roads, waste processing and storage areas, and vehicle washing areas, and install curbs to prevent runoff to permeable areas<br>• Collect runoff and leachate from areas used for waste storage, and treat runoff to meet applicable environmental standards before discharge to surface water or the municipal sewage system (e.g., screen to remove large material, install silt traps to remove particulates, and remove separate-phase liquids with an oil/water separator).Discharge to the municipal sewage system (via pipe or tanker truck), where available, is preferred for runoff from waste storage and handling areas<br>• Re-use collected water in on-site disposal processes to the extent practical or store with collected leachate awaiting treatment<br><br>**Landfilling:**<br>• Site landfills in areas with stable geology and avoid siting near particularly vulnerable or sensitive ecosystems and groundwater and surface water resources |

| № | Environmental and Social Aspects / Impacts | Description of Potential Mitigation Measures |
|---|---|---|
| | | • Design and operate the landfill in accordance with applicable national requirements and internationally recognized standards to minimize leachate generation, including the use of low-permeability landfill liners to prevent migration of leachate as well as landfill gas, a leachate drainage and collection system, and landfill cover (daily, intermediate, and final) to minimize infiltration<br>• Treat leachate onsite and/or discharge to municipal wastewater system. Potential treatment methods include aerated lagoons, activated sludge, anaerobic digestion, artificial wetlands, re-circulation, membrane filtration (RO), ozone treatment, peat beds, sand filters, and methane stripping<br>• Conduct regular monitoring of treated leachate effluent and receiving bodies and ensure treatment plant is regularly maintained and spare parts are available for immediate use in case needed<br>• Provide adequate training to operators on the operation and maintenance of the leachate treatment plant<br>• Minimize the daily exposed working face and use perimeter drains and landfill cell compaction, slopes and daily cover materials to reduce infiltration of rainfall into the deposited waste<br>• Prevent run-on of precipitation into the active area of the landfill (e.g., by use of berms or other diversions); systems should be designed to handle the peak discharge from a 25-year storm<br>• Collect and control run-off from the active area of the landfill; the system should be designed to handle the discharge from a 24-hour, 25-year storm.<br>• Monitor groundwater at 3 locations (one upgradient and 2 downgradient) to check whether groundwater is affected and take immediate corrective actions when needed |
| **4** | **Soil contamination** | • Storing materials extracted from the site for utilization during the construction stage<br>• The topsoil will be removed and stored properly according to the current legislation (Resolution #424 of GoG of December 31, 2013)<br>• Assessment of suitability of sites before sourcing construction materials and compliance with permitting procedure<br>• Exploitation of modern and well-maintained equipment<br>• Water spray in and around entrances of construction sites<br>• Ensuring that the wheels and chassis of all vehicles are cleaned prior to departure from the site<br>• Refuelling of vehicles does not take place anywhere except designated areas<br>• Organization of appropriate trainings for involved personnel and drivers<br>• Implementation of contaminated soils management procedure<br>• All fuels or chemicals stored on site are placed on a paved surface and surrounded by a berm of appropriate height to capture fuel that may be released in case of tank failure |

| № | Environmental and Social Aspects / Impacts | Description of Potential Mitigation Measures |
|---|---|---|
| 5 | **Litter and clandestine dumping** | • Provide adequate storage for waste not immediately treated or disposed of<br>• Waste / cover zones should be used for waste shredding, compaction and other procedures<br>• Install catch fences and netting to trap windblown litter |
| 6 | **Visual amenity and impact on landfill surroundings** | • Residential development should be typically further than 500 meters from the perimeter of the proposed landfill cell development to minimize the potential impact.<br>• Visual impacts should be minimized by evaluating locational alternatives<br>• Siting should be further than 13 km of an airport or as permitted by the aviation authority fully considering potential threats to air safety due to attraction and presence of birds<br>• Private or public drinking, irrigation, or livestock water supply wells located downgradient of the landfill boundaries should be further than 500 meters[20] from the site perimeter, unless alternative water supply sources are readily and economically available and their development is acceptable to regulatory authorities and local communities or others is required by national legislation.<br>• Areas within the landfill boundaries should be located outside of the 10-year groundwater recharge area for existing or pending water supply development<br>• Perennial stream should not be located within 300 meters downgradient of the proposed landfill cell development, unless diversion, culverting or channelling is economically and environmentally feasible to protect the stream from potential contamination. Landfills should be located in gently sloped topography, amenable to development using the cell (bund method), with slopes which minimize the need for earthmoving to obtain the correct leachate drainage slope of about 2%<br>• Groundwater's seasonally high table level (i.e., 10 year high) should be at least 1.5 meters below the proposed base of any excavation or site preparation to enable landfill cell development<br>• Suitable soil cover material should be available on-site to meet the needs for intermediate (minimum of 30 cm depth) and final cover (minimum of 60 cm depth), as well as bund construction (for the cell method of landfill operation). Preferably, the site would have adequate soil to also meet required cover needs (usually a minimum of 15 cm depth of soil)<br>• There should be no underlying limestone, carbonate, fissured or other porous rock formations which would be incompetent as barriers to leachate and gas migration, where the formations are more than 1.5 meter in thickness and present as the uppermost geologic unit above sensitive groundwater |

[20] This is the distance which is applied internationally (WB and IFS requirements) and should be used as a reference.

| № | Environmental and Social Aspects / Impacts | Description of Potential Mitigation Measures |
|---|---|---|
| 7 | **Ecosystems/ biodiversity (flora and fauna)** | • Proper management and control over closure/construction activities, implementation of the measures, envisaged for mitigation of air pollution and noise impacts (e.g. utilize modern machinery and vehicles, install exhaust silencers, etc.)<br>• Limit the impact to planted areas and replant afterwards<br>• Fencing of the new landfill site during construction<br>• Preservation of potential habitats places for fauna species, such as old gardens, etc.<br>• Closed existing landfills have to be re-vegetated/recovered with site specific species |
| 8 | **Public health impacts** | • Prior to commencement of construction, the public should be informed of planned construction activities in the surrounding area in accordance with the legislation<br>• Adequate safety precautions must be taken to prevent accidents and injuries (e.g. speeding on roads, grounding objects).<br>• Secure the actual construction site area sufficiently at night<br>• Provide adequate security to prevent public access to the construction site<br>• Maintain vehicles regularly and use manufacturer approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure<br>• Cover truck beds with tarps during material transport<br>• Store and handle material appropriately to limit dust<br>• Provide clear and adequate signage to identify remediated area, hazardous equipment and other facilities, especially at night<br>• Conduct periodical monitoring of environmental parameters according to law. |
| 9 | **Low level income/ Informal waste collection system (waste pickers)** | • A survey should be conducted to determine the number of affected people<br>• Training in technology transfer and capacity building should be conducted<br>• Provide training for affected people and create new opportunities for them (formalization)<br>• Promote collaboration with government authorities to improve the living conditions of affected people (e.g. access to health and education) |

| № | Environmental and Social Aspects / Impacts | Description of Potential Mitigation Measures |
|---|---|---|
| 10 | **Impacts on local social structure** | • Permanent and transparent information to population about project objectives and activities to avoid misunderstandings and doubts that might be used by different political organizations to encourage confrontations and to obtain followers<br>• Clear educational and awareness-raising campaigns should be conducted<br>• Prior to commencement of the project, the requirements for project employment and the terms of employment should be known |
| 11 | **Impacts on local economy and local employment** | • Subscription of cooperation agreements with educational institutions to offer training in new technologies for new economic activities and consequently new jobs<br>• Workforce should be hired mainly from the region and attention should be paid to rights; Subcontractors' labour policies should be controlled |
| 12 | **Closure of landfill and post-closure issues** | • A closure plan shall be developed which specifies the necessary environmental objectives and control measures (including technical specifications), future land-use (as defined in consultation with local communities and government agencies), closure schedule, financial resources, and monitoring arrangements<br>• Closure methods shall be evaluated, selected and applied, which should include the placement of a final cover to prevent further impacts to human health and the environment<br>• Apply final cover components that are consistent with post closure use and local climatic conditions. The final cover should provide long term environmental protection by preventing direct or indirect contact of living organisms with the waste materials and their constituents; minimize infiltration of precipitation into the waste and the subsequent generation of leachate; control landfill gas migration; and minimize long term maintenance needs<br>• Develop financial instruments to cover the costs of closure and post closure care and monitoring |

## 6.6 Further Steps

Based on the results of the environmental and social scoping exercise, the Consultant will conduct an ESIA for the Project, including the development of an ESMP. The ESIA process shall run in parallel to other tasks.

The ESIA will include a detailed description of the project, an analysis of alternatives, and an environmental / legal framework and international standards. The document will be developed in line with national legislation and conforming to international standards as required by KfW.

In addition to the existing information, appropriate and recent baseline information will be acquired during the ESIA process on:

- Air quality: If local capacity and equipment is available, ambient air quality measurements will be made at up to four (4) locations to establish baseline levels of $NO_2$, $SO_2$, $O_3$ and $H_2S$.

- Noise: Noise measurements will be made at three (3) locations around the site and to establish baseline noise levels during a normal week-day and a non-working day.

- Soil: soil samples will be taken from various locations during the geotechnical survey and analysed for environmental contaminants as per the regulatory requirements. Five (5) samples per ha will be taken covering the four (4) corners and the centre of the area, mixed and analysed for the presence of heavy metals. Soil samples will also be taken in the areas under the existing landfill to establish possible levels of contamination.

- Groundwater: groundwater samples will be collected from sub-surface water and, if possible, from aquifers under the clay layer to establish a groundwater quality baseline according to the parameters set in national regulation #416 and drinking water regulation #58. Groundwater levels in three (3) locations will be measured to determine groundwater flow direction. Water wells used within a radius of 1 km around the site will be surveyed to determine their depth, aquifer tapped, and use.

- Surface water: Up to five (5) samples will be taken from the Utora River and measured for regulatory parameters to assess its existing quality according to national regulation #416. Estimates for the river flow will also be made. One (1) sediment sample will also be collected and analysed in the laboratory. If possible, up to two (2) leachate samples from the existing landfill will be collected and analysed in the laboratory. Based on the collected information, the maximum permissible discharge of pollutants into the Utora River will be calculated according to the relevant technical regulation.

- Biodiversity: A confirmatory ecological survey will be conducted in a study area around 1 km from the site to further document the possible presence of species of high conservation value. Detailed information on migratory bird routes, species and their use of the landfill site will be documented.

- Traffic: Further coordination with the Georgian Ministry of Regional Development and Infrastructure - Roads Department, will be sought during the ESIA to confirm this assumption based on anticipated traffic volumes.

- Land ownership and land use: Socio-economic surveys of landowners and land users in plots adjacent to the site will be conducted to assess their socio-economic status, sources of income and livelihood.

- Land use: Present and planned land use within a 1 km radius from the landfill site will be documented (including land classification and land tenure).

- Issues related to Waste Pickers (if applicable). e.g. a) number of people who carry out waste picking activities; b) how many people earn a portion of their livelihood from waste picking; and c) the opportunities for alternative livelihoods and any social assistance available.

- Public health: More details on the population's health profile will be collected based on available data from healthcare facilities.

- Gender issues: Any differences in attitudes towards waste, responsibilities for waste, labour market participation/livelihood opportunities will be documented in the ESIA study.

- Vulnerable groups: Presence and condition of vulnerable groups within a radius of 1 km around the site, if any, will be documented.

Scoped impacts listed in Table 6-6 will be assessed using the methodology to determine their significance as described in section 6.2.3. Impacts will be assessed in a qualitative manner using professional judgement and knowledge of effectiveness of various mitigation measures. For each impact the Consultant shall apply the mitigation hierarchy and develop appropriate mitigation options to ensure residual impacts are as low as reasonably practicable. These will be clearly described in the ESIA and the ESMP. The ESMP includes the monitoring plan, which specifically indicates monitoring measures.

The ESIA will covers all phases of the project including construction, Landfill Operation, Monitoring & Controlling Plan, and the Landfill Closure & After-Care Plan, in line with Georgian legislation (bylaw #421). Landfill category and waste codes will be documented according to the classification approved by GoG. Waste and acceptance and verification procedures will be in line with prevalent legislation.

To ensure compliance with KfW requirements, a SEP shall be developed, drawing on the outcomes of the scoping process and the social baseline information. The SEP will be in line with international standards and include provisions for the disclosure of the ESIA, as well as a grievance mechanisms.