REPORT N^{O} DRAFT VERSION 2

CHISINAU SOLID WASTE PROJECT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

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AUGUST 2017

WSP | PARSONS BRINCKERHOFF

CHISINAU SOLID WASTE PROJECT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

EBRD

Version 2

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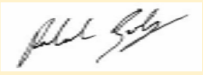
Signature				
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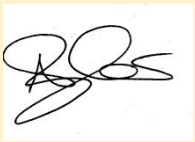
Signature				
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ABBREVIATIONS

Abbreviations	Definition
asl	Above Sea Level
EBRD	European Bank for Reconstruction and Development
EUR	Euro (€)
ESIA	Environmental and Social Impact Assessment
EU	European Union
EIA	Environmental Impact Assessment
PR	Project Requirement
MoH	Ministry of Healthcare
ESAP	Environmental Social Action Plan
ESMP	Environmental Social Management Plan
SEP	Stakeholder Engagement Plan
PM	Project Manager
GPS	Global Positioning System
WHO	World Health Organisation
NRMM	Non-Road Mobile Machinery
LLC	Limited Liability Company
MSW	Municipal Solid Waste
dBA/dB	Decibels
ESP	Environmental and Social Policy
HDPE	High Density Polyethylene

GIS	Geographic Information System
MoE	Ministry of Environment
SHMS	State Hydro-Meteorological Service
SGA	State Geological Agency
SEI	State Ecological Inspectorate
SEE	State Ecological Expertise
AM	“Apele Moldovei”
HDV/HGV	Heavy Duty Vehicle/Heavy Goods Vehicle.
IAQM	Institute of Air Quality Management
NO2	Nitrogen dioxide.
NOx	Nitrogen oxides.
PM10	Particulate matter with an aerodynamic diameter of less than 10 micrometres.
SO2	Sulphur Dioxide
VOC	Volatile Organic Compound
DEFRA	Department for Environment, Food and Rural Affairs.
DMRB	Design Manual for Roads and Bridges
AADT	Annual Average Daily Traffic
TSP	Total Suspended Particulates
IBRD	International Bank of Reconstruction and Development
LGVs	Light Good Vehicles
CO2	Carbon Dioxide
CH4	Methane
H2S	Hydrogen Sulphide
CO	Carbon Monoxide
DMP	Dust Mitigation Plan
EHS	Environmental Health and Safety
ISO	International Standards Organisation
Hz	Hertz
CRTN	Calculation of Road Traffic Noise
IUCN	International Union for Conservation of Nature
UNESCO	United Nations Educational, Scientific and Cultural Organisation
IFC	International Financing Corporation
LVIA	Landscape and Visual Impact Assessment
ZTV	Zone of Theoretical Visibility
AONB	Area of Outstanding Natural Beauty
PRoW	Public Rights of Way
AOD	Above Ordnance Datum
BH	Borehole

UK	United Kingdom
OECD	Organisation for Economic Co-operation and Development
DWS	Drinking Water Standards
SWS	Surface Water Standards
ILO	International Labour Organisation
GDP	Gross Domestic Product
USD	United States Dollar ($)
MDL	Moldovan Leu

1 NON TECHNICAL SUMMARY

1.1 PURPOSE OF THE NON TECHNICAL SUMMARY

1.1.1 This Non-Technical Summary (NTS) provides an easily understandable summary of the information that is provided in the Environment and Social Impact Assessment (ESIA). The purpose of the NTS is to help the public and non-experts to understand the background, project description, the ESIA process, the beneficial and adverse environmental and social impacts and effects, and the mitigation measures proposed for the project.

1.2 INTRODUCTION

1.2.1 WSP | Parsons Brinckerhoff has prepared an ESIA for the European Bank for Reconstruction and Development (EBRD). The ESIA identified and assessed the environmental and social effects of upgrading the Tintareni landfill site in Moldova to EU standards. The ESIA also included a review of the closure plan for the temporary dumpsite in Ciocana District, Chisinau, and recommendations to enhance the environmental and social benefits of closing the temporary dumpsite. A project feasibility study was undertaken by Fichtner Management Consulting in parallel with the ESIA conducted by WSP | Parsons Brinckerhoff. Fichtner Management Consulting also produced the closure plan for the Ciocana temporary dumpsite, and commissioned a Hydrogeological Study for the Tintareni landfill site.

THE LOAN

1.2.2 The ESIA will be considered by the EBRD as part of EBRD's decision to extend a loan of up to EUR 10 million to Regia Autosalubritate (the "Company"), a municipal solid waste management company which is 100 per cent owned by the City of Chisinau (the "City"). The proceeds of the loan will be used to finance priority investments in the Chisinau solid waste disposal system. The loan will be guaranteed by the City. The project is expected to be co-financed by the loan and a capital grant of up to EUR 5 million from an international donor.

PROJECT REQUIREMENTS

1.2.3 The ESIA has assessed the potential for the Project to have significant adverse and beneficial effects on the environment and the community. The assessment has been carried out in accordance with:

- The EBRD's Environmental and Social Policy and Performance Requirements (2014);
- EU environmental legislation, including (but not limited to) the EIA Directive, Industrial Emissions Directive, and the Birds and Habitat Directives, Water Framework Directive;
- EU Landfill Directive;
- Moldovan EIA legislation and Environmental standards;
- International conventions transposed into Moldovan legislation.
- Public consultation and stakeholder engagement has been meaningful, participatory and has informed the ESIA and the Project.

SIGNIFICANT EFFECT

1.2.4 A 'significant effect' is an environmental or social effect that is of such concern that it should influence the decision as to whether or not the project should be funded.

SCOPING

1.2.5 Scoping is considered to be good practice, because it gives relevant organisations the opportunity to comment on what the ESIA will include, before the assessment is carried out. The local community, key stakeholders and regulators were invited to comment on: the environmental topics which were assessed; the methods used; and the environmental and social impacts that have been considered, at the start of the ESIA process, through a formal scoping procedure.

1.3 PROJECT DESCRIPTION

BACKGROUND

1.3.1 Tintareni landfill site is located in Anenii Noi District, 35km south-east of Chisinau, and approximately 5km from the village of Tintareni and 3km from the village of Creţoaia (Figure 1-1). This previously operational landfill and has an area of approximately 25ha.

1.3.2 The Tintareni landfill was designed in 1984 and put into operation in 1990, and operations were put on hold in 2010. It was designed by the Institute IPROCOM in accordance with the Design and Construction Standards and Sanitary Norms adopted by the Soviet Union at that time. This design does not comply with the EU Landfill Directive. The landfill was designed with a capacity of up to 44,000,000m^3, and less that 50 per cent is currently utilised. A biogas plant was constructed at the Tintareni landfill site in 2004 and is operated by a private company.

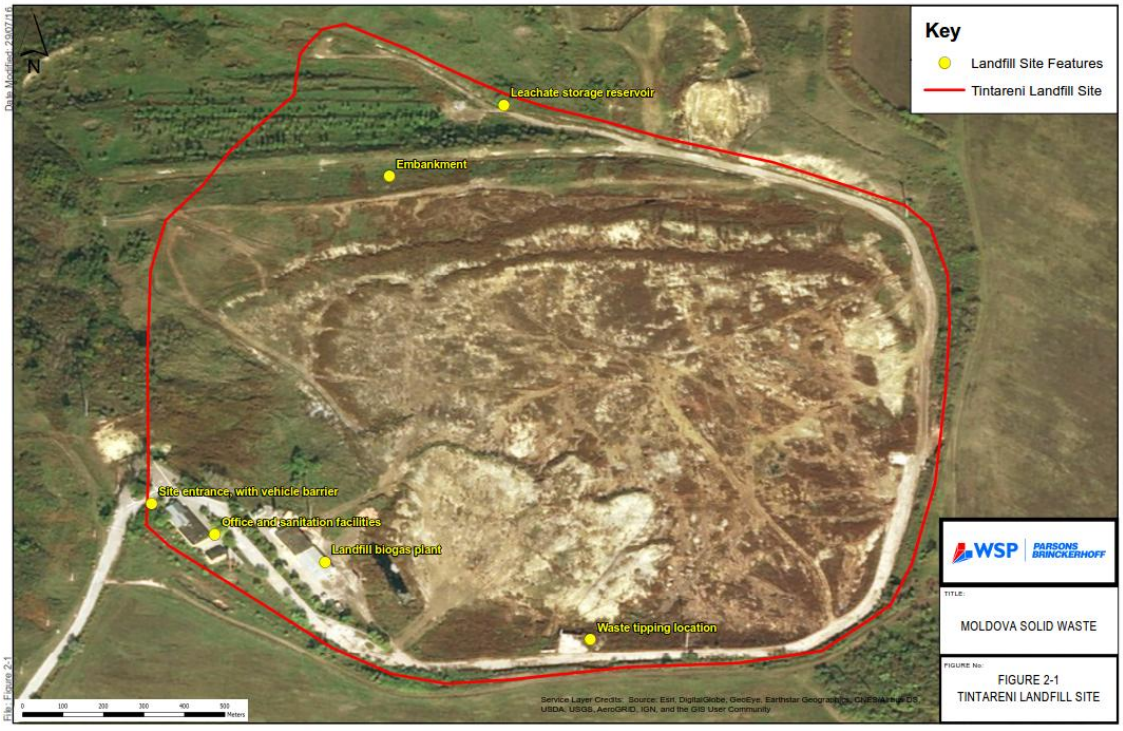


Figure 1-1 Aerial Photograph of Tintareni Landfill

1.4 TINTARENI LANDFILL DESIGN – UPGRADE TO EU COMPLIANCE

1.4.1 In order for the EBRD to invest in the project, the landfill must be designed and operated in compliance with the Bank's Environmental and Social Policy and EU regulations. It must comply with the EU Landfill Directive, and have appropriate systems to manage landfill gas and leachate.

1.4.2 Fichtner Management Consulting (Project Proposal Report, 2016) developed a conceptual design for the project. The detailed design for the project will be developed at a later stage, but will be a refinement of the conceptual design. The proposed measures are required to improve and upgrade the operation of the landfill to the required standards, so it is reasonable to assume that they will be implemented:

- Construction of a Leachate Treatment Plant;
- New trucks to transport the treated leachate to a Water Treatment Plant;
- New geotextile membrane;
- Re-profiling to lay the geotextile membrane on the existing waste, and construction of new drainage systems to the Leachate Treatment Plant;
- Revised sequence of landfill phasing (the order the site is filled in);
- New fencing around the operational area;
- Continued use of associated ancillary infrastructure, including access roads, site compound, surface water management, site offices;
- Strict waste acceptance criteria and procedures for rejecting unsuitable waste;
- New vehicle fleet to transport the waste to the Tintareni Landfill;
- Resurfacing of the vehicle access from the road to the entrance to Tintareni Landfill.
- New waste collection system in the Village of Tintareni; and
- Environmental monitoring systems and procedures, including boreholes / water quality, air quality (including dust), noise and litter containment.

CIOCANA TEMPORARY DUMPSITE

1.4.3 The Company is currently storing waste at a temporary dumpsite located at the old "Purcel" quarry on the Uzinelor Street, Ciocana District, in the City of Chisinau (Figure 1-3). Once Tintareni Landfill is upgraded and re-opened, it will be possible to close the temporary dumpsite site. This site was opened for solid waste disposal as a temporary measure in 2011, following the unexpected closure of the Tintareni Landfill. The capacity of this site is expected to be exhausted around the end of 2016. This site does not have a gas collection system.

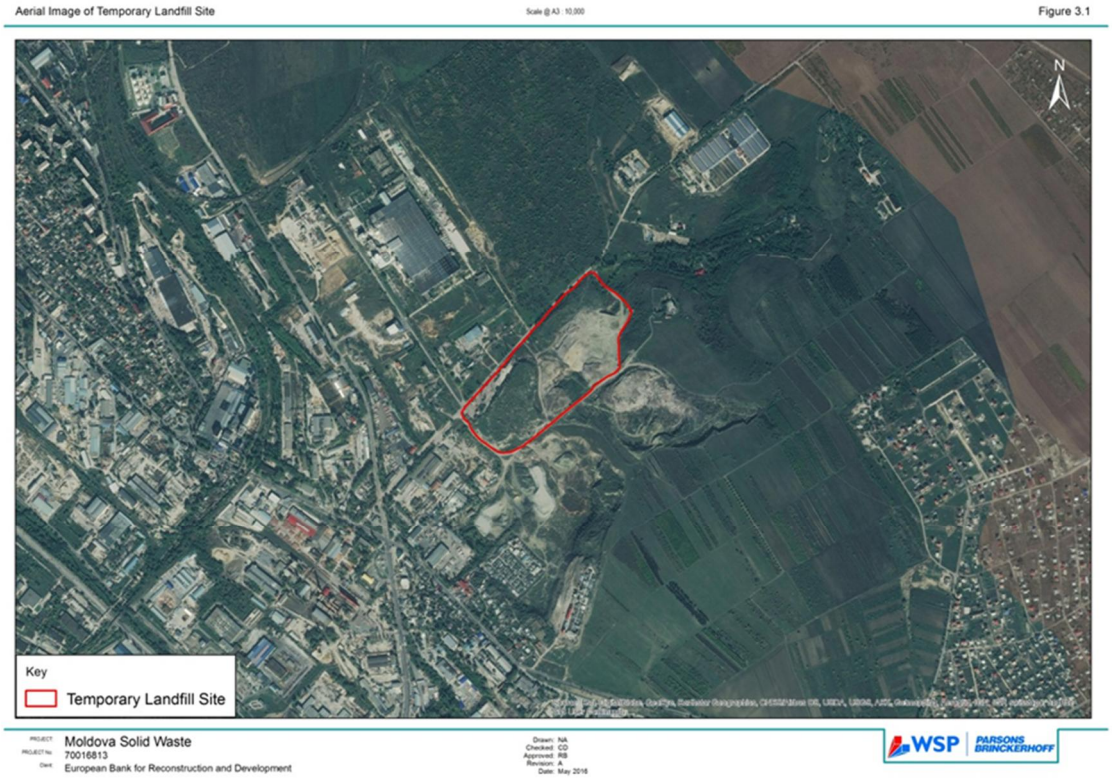


Figure 1-3 Aerial Photograph of the Temporary Landfill in Ciocana District, Chisinau

1.4.4 There are currently informal waste pickers working on the temporary landfill. They are not employed by the Company, but access the site without permission to extract plastic and glass for recycling. A Livelihood Restoration Framework has been developed and will be implemented by the Company, because when the temporary dumpsite is closed, the informal waste pickers will no longer be able to continue collecting waste and will lose their source of livelihoods.

1.4.5 A closure plan for the temporary dumpsite in Ciocana was prepared by Fichtner Management Consulting (2016), it includes the following measures:

- Surface Sealing
- Leachate Drainage System
- Landfill Gas Management System and Flare Station
- Surface Water Management System
- Monitoring Wells
- Access Road and Perimeter Fence
- Topsoil and Landscaping

1.4.6 The ESIA team has reviewed the closure plan, including the potential for economic displacement on the site operators and informal waste pickers, and provided recommendations to supplement the closure plan, with a view to enhancing the environmental and social benefits of closing the temporary dumpsite at Ciocana.

1.5 CONSIDERATION OF ALTERNATIVES

1.5.1 The following alternatives were considered at the project feasibility stage.

- A 'do nothing' scenario was been considered as an alternative to the proposals. The Tintareni landfill would remain closed. The current leachate and gas management systems would remain, and the current problems with these systems would continue potentially resulting in air and water pollution;
- A new landfill near Chisinau - The pre-feasibility report (WEG, 2012) states that there are no alternative sites comparable with the Tintareni landfill site within a 60km radius around Chisinau to construct a new landfill. Upgrading the existing Tintareni Landfill to EU standards would provide investment to finance both improvement to the current design, and the gas and leachate management systems.

1.5.2 Two alternative access routes were considered to reduce the impact of the waste trucks on the village of Tintareni. However, alternative routes were considered unsuitable for the waste trucks, they would introduce disturbance in new locations in close proximity to residents, and one option had complications due to the private land ownership.

1.6 CONSULTATION

1.6.1 The ESIA team undertook two site visits to hold meetings with stakeholders and visit the sites and surrounding area. These visits took place in November 2015 and May 2016.

1.6.2 The purpose of the site visit in May 2016 was to present and seek views on the scope of the proposed ESIA, obtain further information and suggestions from affected parties, and to inform them of how they could gain further information about the project. Three consultation meetings were held in Tintareni, Bubuieci and Chisinau in May 2016.

1.6.3 During the public consultation, the ESIA team gave a presentation on the scope of ESIA and participants were given an opportunity to ask questions, make suggestions and share their views on the ESIA and wider project. Participants were also invited to complete a questionnaire and were given a scoping leaflet, which presented the project, the alternatives, the potential impacts, the ESIA process and where and when they will be able to obtain further information on the ESIA.

1.6.4 Stakeholders consulted during the site visits included:

- Representatives of Autosalubritate;
- Ciocana landfill waste pickers;
- Fichtner Management Consulting;
- Ministry of Environment;
- Mayor of Tintareni;
- District Council Anenii Noi;
  - Department of Culture;
  - Department of Land Relations and Cadastre Service; and
  - Department of Agriculture;
- ABS S.R.L (privately owned company planning to launch a waste sorting facility);
- Ministry of Labour, Social Protection and Family National Employment Agency; and
- Social Workers from the Bubuieci Village.

1.7 SUMMARY OF ENVIRONMENTAL AND SOCIAL EFFECTS

1.7.1 This section summarises the likely environmental and social effects that the construction and operation of the scheme would have on the environment and community. These effects have been assessed in the ESIA and are summarise here under the following topics:

- Air Quality and Climate Change;
- Noise and Vibration;
- Biological and Ecological Resources;
- Cultural Heritage;
- Landscape and Visual;
- Geology, Soils, Material and Waste;
- Water Environment;
- Social, Population and Human Health; and
- Traffic and Transport.

1.8 AIR QUALITY AND CLIMATE CHANGE

1.8.1 Transport is a major contributor to air pollution in Moldova, with mobile NO_x emissions contributing to 92% of total NO_x emissions in 2011. The total number of all vehicles on the road increased by 23.8% from 2006 to 2009. It has also been reported that SO_2 emissions have increased from 2,400 tonnes in 2005 to 5,800 tonnes in 2011. Whilst, SO_2 emissions from industrial uses have remained at constant levels, the change is attributed to transport, which contributes to 77% of total SO_2 emissions, and this is a direct result of poor quality fuel.

1.8.2 WSP | Parsons Brinckerhoff undertook specific monitoring of $SO_2$and NO_2 at the Tintareni landfill, the temporary dumpsite in Ciocana, and sensitive receptors along the National Road and District Way. All measurements were below the WHO and EU guidelines.

1.8.3 The emissions of PM_{10} and bio-aerosols to air from the landfill is likely to be limited, because the existing vegetation on the site will be encapsulating the landfill waste. There is a poor road surface along District Way (L481) and unpaved roads within the site, which is result in slower moving vehicles and dust re-suspension into the air.

1.8.4 There were slightly offensive odours on the lower part of the landfill, which were considered likely to be associated with the leachate extraction point. The intensity and frequency (which is considered to be irregular) of the odour was dependent upon the wind speed and direction.

CONSTRUCTION AIR QUALITY

1.8.5 The on-site construction activities have the potential to generate a large quantity of dust. However, as there are no human receptors within 350m of the site this is not anticipated to result in an adverse effect. There are approximately 40 residential properties within 50m of the potential construction traffic routes, who have the potential to be affected by a minor dust and human health effects during construction. This risk will be reduced through good site practices and appropriate mitigation measures adopted through a site-specific Dust Management Plan and Construction Environmental Management Plan.

OPERATIONAL AIR QUALITY

1.8.6 The traffic- related emissions due to the transport of waste to the upgraded landfill, is not expected to result in a significant air quality effects on people living adjacent to the National Route (R2) and District Way (L481). The projects includes the provision of a new vehicle fleet that meets the Euro III emissions standard, which will therefore release less emissions than the previous fleet of waste vehicles, and further reduce potential for air quality effects.

1.8.7 The landfill gas engine plant and stack is not expected to have an adverse effect on the surrounding population, as there is no one living within 350m of the landfill. The landfill is not expected to have an adverse effect on the surrounding population due to the gases that may migrate in a landfill, which include CO_2, CO, H_2S and CH_4, as there as there is no one living within 350m of the landfill. The improved gas collection system, and the reduced volume of leachate in the landfill, due to the new leachate treatment plant, will further reduce the release of harmful gases into the environment.

1.8.8 The new fleet of vehicles carrying waste to the site will be covered, to prevent spillage of lighter materials and to contain odour emissions. Therefore, they are not expected to have an adverse odour effect on the population living adjacent to the route to the landfill.

1.8.9 Bio-aerosols are airborne microorganisms commonly found within waste due to natural microbiological activity, which can pose a health risk to humans if they are exposed for a prolonged period of time. There are no sensitive receptors located within 350m of the Tintareni Landfill, and therefore there is no anticipated risk of exposure to bio-aerosols from site operations to the surrounding population. There is a moderate risk that bio-aerosols may affect the health of employees that are working on site, so appropriate personal protection equipment will be provided for employees, including breathing apparatus to reduce the risk of inhaling bio-aerosols.

OVERALL

1.8.10 The project will not have an adverse effect on air quality during construction, once the dust management measures have been implemented during construction. No significant air quality effects are anticipated once the landfill is operational, provided the landfill operatives are provided with the appropriate personal protective equipment.

1.9 NOISE AND VIBRATION

1.9.1 The ambient noise climate in and around the Tintareni landfill is predominately quiet, with the main noise impacts resulting from the movement of trucks undertaking the recirculation of leachate. The closest residential receptors are located 350m from the site.

1.9.2 A baseline noise survey was undertaken in accordance with ISO 1996-2 between 17 and 18 May 2016, to establish the existing noise climate on Tintareni landfill site, and at noise sensitive receptors in the surrounding area, including locations representative of residential properties along the district road (L481), within close proximity to the junction with the national road (R2).

CONSTRUCTION PHASE

1.9.3 The on-site construction activities are not expected to have an adverse noise effect on the surrounding population, as the nearest residents live over 350km from the site. The improvements to the road access to the Tintareni landfill site are expected to have moderate short-term noise effect on the surrounding population, and a negligible vibration effect. Best practice techniques will be used to reduce the noise of construction plant and activities.

OPERATIONAL PHASE

1.9.4 The on-site activities during the operation of the landfill are not expected to have a significant effect on the surrounding population. Noise monitoring at the site boundary and noise reduction measures, will ensure that the predicted noise level of 70 $L_{AEQ,1H}$ DB is not exceeded during any one hour period.

1.9.5 The village of Creţoaia would not be significantly affected by the noise effects due to the transport of waste to the site. The internal noise level within properties in Creţoaia will meet the required World Bank standard. The properties adjacent to the district road (L481) are currently likely to be experiencing daytime internal noise levels that exceed those recommended in British Standard BS8233, due to the current local traffic. The operation of the Tintareni landfill site and waste truck movements would not increase the noise levels at these properties. The number of hourly waste truck movements will be monitored and if it exceeds 14 movements, further noise assessment will be undertaken.

OVERALL

1.9.6 The noise assessment concludes that the construction and operation of the project will have no significant effect on receptors, following the implementation of best practice construction techniques, and the management of noise generating activities on site.

1.10 BIOLOGICAL AND ECOLOGICAL RESOURCES

1.10.1 Chisinau is situated within the Central-European biogeographic zone; and is most associated with the steppe landscape zone, which dominates the southern half of the Republic of Moldova. The Project is situated within an area that has been heavily influenced by human activity, most notably the impacts of urbanisation and agriculture.

1.10.2 The existing Tintareni landfill site is dominated by rough grassland, interspersed with pockets of scrub and trees. It is considered likely that species richness across the site is limited and typical of similarly disturbed areas across the region.

1.10.3 The nearest nature conservation sites to the existing Tintareni landfill are:

- Veteran trees are situated in the Hirbovatul Nou village, located 10.5km from the site.
- Landscape Reserves at Hirbovatul Nou village and Hirbovat, 4km from the site.

1.10.4 The project is not expected to have an effect on these protected areas, due to the substantial distance to these locations and the nature of the proposed works to upgrade the landfill.

CONSTRUCTION PHASE

1.10.5 The construction works are likely to result in minimal habitat loss in an already degraded site, with minimal vegetation present in the form of small pockets of trees and shrubs. This will be mitigated through the provision of landscape planting on the perimeter of the site.

1.10.6 The trees on site and built structures which remain from the previous landfill operations may provide the potential for bats which are protected under Annex IV of the Habitats Directive. Should rehabilitation / felling works be required for these buildings and trees then bat surveys would be required prior to the start of any works in order to identify roosts. If roosts are present they should be retained (where possible), or their loss mitigated through the provision of artificial roost sites in close proximity to the site.

1.10.7 Vegetation clearance works will be timed to take place outside of the breeding bird season, to prevent direct impacts to nesting birds. The proposed landscape planting will mitigate the loss of vegetation.

1.10.8 The reptile assemblage on the site may experience a minor adverse effect due to disturbance and loss of vegetation. They are likely to respond by leave the site to use suitable similar habitat in the surrounding area, however, the potential foe adverse effects will be reduced by retaining, rock and debris piles on the site to provide hibernacula for reptiles.

1.10.9 The construction activities have the potential to result in a minor adverse effect on animal welfare, due to the risk of injury or death to animals that access the active construction site. This will be reduced by securing and making safe, all open excavations, hazardous materials, and plant machinery should be secured when not in use. The proposed boundary fence will also help to prevent site access by wildlife.

OPERATIONAL PHASE

1.10.10 The reintroduction of landfill operations is unlikely to result in a significant adverse effect on any wildlife present due to disturbance (noise, vehicle movements). The potential effect on animal welfare will not be significant, as the risk of animals being directly impacted by an active landfill (i.e. open excavations, heavy machinery, dangerous substances, etc.) will be minimised through good on-site operational practices, and the proposed boundary fence.

1.10.11 The project is not expected to result in significant adverse operational effects (from air quality, water quality and noise) on habitats and species adjacent to the access route, associated with the reintroduction of waste transportation to the landfill. This will be monitored during operation and mitigation implemented, if required.

1.10.12 The reinstatement of the Tintareni landfill may result in the closure of the illegal dumpsites in Tintareni, which is likely to have a beneficial effect on the River Bic.

OVERALL

1.10.13 The project will have no significant effects on biological and ecological resources. The proposed planting on the boundary will mitigate the vegetation loss and provide ecological enhancements.

1.11 CULTURAL HERITAGE

1.11.1 There are several cultural heritage assets located in the surrounding area, including built heritage and archaeological assets. The nearest asset is located 3.4km from Tintareni Landfill site. Several cultural heritage assets in the village of Tintareni, are located in close proximity to the national road (R2) that will be used by the waste trucks to transport waste from Chisinau to the landfill site, however this road is already heavily used by HDVs.

CONSTRUCTION PHASE

1.11.2 No cultural heritage assets have been found within the Tintareni site itself and given the nature and depth of excavation that was required to construct the original landfill, there are unlikely to be assets preserved beneath the landfill. A ‘Chance Finds Procedure’ will be set up in advance of the construction phase in accordance with EBRD Performance Requirement 8 and conducted by an approved and qualified archaeologist.

1.11.3 The project has the potential to have a temporary minor adverse effect on the setting of:

- The tumulus located to the south of Cretoaia and directly west of the proposed access route (L481), as a result of the construction activities to resurface the access route to the landfill.

- The tumulus located 4km to the north of Tintareni landfill, may be subject to temporary minor effects on its setting due to the re-profiling of the landfill, removal of the low quality vegetation and construction activities.

1.11.4 These minor effects on setting will be reduced through the implementation of best practice measures during construction.

OPERATIONAL PHASE

1.11.5 There will be a minor adverse effect on the setting of the tumulus located to the south of Cretoaia, due to the waste trucks using the resurfaced access route to the landfill, associated noise and dust. These effects would be for the duration of the operation of the landfill site, and will be reduced through the new covered, waste vehicle fleet and resurfacing.

1.11.6 There will be a minor adverse effect on the setting of the tumulus located 4km to the north of Tintareni landfill, due to the anticipated change in the landscape setting of this asset due to the new proposed facilities, leachate management plant, the removal of vegetation and waste management operations at the site and windborne litter. This effect will be reduced through good operational practices on the site, and landscape planting on the boundary of the site.

OVERALL

1.11.7 The project is not expected to have an adverse effect on historic assets beneath the ground. The project will have a minor adverse effect on the setting of two tumuli during construction and operation of the landfill.

1.12 LANDSCAPE AND VISUAL

1.12.1 The landscape surrounding the Tintareni landfill site consists of is one of undulating hills, with grassland, pasture, some scrub, scattered trees and arable farming predominating. Electricity pylons and wires are distinctive features in the low-rise landscape, whilst concrete roads also stand out against the green and brown colours of the hills and fields.

1.12.2 The Tintareni landfill site itself is largely covered by regenerating grass and scrub, with white concrete / dirt tracks and access roads to and through the site. Rubbish and remnants from the previous landfill operations are clearly visible beneath the grass.

1.12.3 The nearest settlement is the Creţoaia village, located approximately 3km to the west of the Tintareni landfill site. There is a ridge of elevated land between the site and the village which prevents views of the landfill from the village.

1.12.4 Residences within the villages of Tintareni 5km to the north-west of the site have long distance views of the Tintareni landfill site. The landfill is also visible to users or the surrounding agricultural landscapes and the nearby highways. The villages of Geamana (particularly Dzhamany area) and Ciobanovca have views no views of the landfill due to the embankment on the southern perimeter of the landfill.

CONSTRUCTION PHASE

1.12.5 The construction activities, including artificial lighting, are expected to have a minor visual effect on residences within the village of Creţoaia, Tintareni, Geamana (particularly Dzhamany area) and Ciobanovca and users of the surrounding agricultural landscape, following the implementation of the Construction Environmental Management Plan.

1.12.6 The users of the R2 and L481 highway may experience minor adverse visual effects due to transient, glimpsed views of the construction activities.

OPERATIONAL PHASE

1.12.7 The operation of the landfill will have a minor effect on topography, which will be minimised through the waste reprofiling and improved site operational procedures. The loss of existing vegetation will be mitigated through planting on the site boundary and the reinstatement of vegetation on the waste cells once they are full.

1.12.8 The operation of the landfill has the potential to have a medium effect on the landscape character of the area, surrounding residential receptors and users of the agricultural landscape. This will be reduced to minor though improved operational practices on the site, measures to prevent windblown litter, careful sighting of artificial lighting and traffic management.

OVERALL

1.12.9 The project is expected to have a minor adverse effect on visual receptors and the character of the existing landscape, following the implementation of best practice during construction, landscape planting on the site boundary and improved operational procedures.

1.13 GEOLOGY, SOILS, MATERIAL AND WASTE

1.13.1 The Tintareni landfill is located on the Dnestr terrace plain and is included into the Sredne-Dnestr geomorphological sub region. The area is dominated by limestone sedimentary rock, which has elements of gravel, sand, silts and clays. This sedimentary rock reaches a depth of approximately 600m, and is underlain by Proterozoic Archean. The seismic degree of the investigation area is accepted to 7 according to the “Map of seismic zoning of the territory of Republic of Moldova, 2006” (Institute of Geology and Geophysics of the Scientific Academy of Moldova).

1.13.2 The surrounding area is primarily used for agriculture, and the main lithology comprises sedimentary soils, which are relatively young, with alluvial deposits in the river valley. The area is vulnerable to landslides, the frequency of landslides in the area is about 50 per 100 km^2 (MENR, 2009). The western side of the investigation area includes an erosion zone. No carstic processes, collapse of rocks are present at the site. Additionally, active landslides have not been observed at the site. The stability analyses considering different scenarios showed that the dam and the dam slope is unstable.

1.13.3 A geotechnical site investigation comprising six boreholes indicated that the topsoil is primarily underlain be sand and clay.

CONSTRUCTION PHASE

1.13.4 The construction of the project is not expected to have an adverse effect on the geology, soils within the site, or those within the surrounding area, following the implementation of best practice measures in the Construction Environment Management Plan.

OPERATIONAL PHASE

1.13.5 The operation of the project is not expected to adversely affect geology following the implementation of the dam stability improvements, the construction of the leachate treatment plant and the provision of a new waste truck fleet.

OVERALL

1.13.6 The construction and operation of the landfill is not expected to have an adverse effect on geology, soils, material or waste, following the implementation of the proposed mitigation.

1.14 WATER ENVIRONMENT

1.14.1 Tintareni landfill site is located in the Dniester River Basin, the nearest watercourse to the site is the River Bic, located approximately 5km north of the landfill. The River Bic is a tributary of the River Dniester, which flows into the Black Sea. The River Bic is currently heavily polluted with organic and inorganic toxic substances. There are groundwater abstraction bores in Tintareni village, located approximately 4km to the northwest of the landfill.

1.14.2 The Hydrogeological Risk Assessment concluded that while the leachate that is currently being generated in Tintareni landfill, is likely to be having an impact on the quality of the groundwater within 500m of the site (where there are no abstractions), the concentration at the abstraction bore holes 4km from the site were assessed to be within the required drinking water standards. The estimated concentrations currently breaking through the landfill liner are not considered to have an adverse impact on the quality of the water extracted from the abstraction wells in Tintareni Village or water quality within the River Bic. The landfill is therefore not considered to be having a water quality related health effect on the residents of Tintareni.

CONSTRUCTION PHASE

1.14.3 The construction of the landfill is not expected to have an adverse effect on groundwater beneath the landfill, following the implementation of leachate monitoring and recirculation during construction. The Construction Environment Management Plan will prevent the risk of minor adverse effects due to waste migrating outside the landfill.

OPERATIONAL PHASE

1.14.4 The project is expected to have a minor beneficial effect on the quality of groundwater beneath the landfill, due to the new leachate treatment plant and measures to reduce the infiltration of rainfall. This will reduce both the amount of leachate in the landfill, and the concentrations of leachate entering the underlying aquifer. There will be no impact on surface water due to the improved site drainage and operational site practices.

1.15 OVERALL

1.15.1 The project is expected to not have a significant adverse effect on the water environment during construction, and it is expected to have a minor beneficial effect during the operation of the landfill.

1.16 SOCIAL, POPULATION AND HUMAN HEALTH IMPACTS

1.16.1 The Moldovan economy relies heavily on agriculture. Economic reforms have been slow and the economy remains vulnerable to higher fuel prices, poor weather and lack of foreign investment. During 2010 and 2011, the poverty level in the Republic of Moldova was significantly reduced. In 2011 the absolute poverty rate accounted for 17.5%, registering a decrease of 8.8 % as compared to 2009. Since then, the poverty rate has been steadily decreasing, however differences continue to persist between the urban and rural populations, with poverty rates three times higher in rural areas than in urban ones. Tintareni is a rural village which is reliant on agriculture for sale and household consumption.

1.16.2 Tintareni has higher rates of illness than the national average. The residents of Tintareni village,

including local medical staff, expressed health concerns, and their concern that leachate from the landfill was contaminating potable groundwater wells in the village.

1.16.3 A hydrogeological study was commissioned by Fichtner Management Consulting as part of the Feasibility Study. Then a Hydrogeological Risk Assessment was undertaken by WSP I PB to assess the potential for Tintareni landfill to be having adverse effects on groundwater and surface water resources that are hydraulically connected to the landfill. The Hydrogeological Risk Assessment concluded that although the quality of the water in the abstraction wells in Tintareni village and the River Bic are below the adopted quality standard, this is the result of other potential sources of contamination such as local small scale local landfilling and agricultural fertilizers, rather than the Tintareni landfill.

1.16.4 The study indicated that the leakages from the landfill do not represent a significant risk to receptors located more than 500m from the landfill site. Furthermore, the Project includes engineering works and management controls, which are expected to improve the current situation and reduce leakages from the current waste body.

1.16.5 Other health concerns voiced by residents of Tintareni were in relation to noise, vibration, dust, odour nuisances, and liquid leaks, related to the trucks transporting waste to the landfill. The littering which resulted from waste falling out of waste transport vehicles, as well as the lack of information on the waste that was being accepted for disposal at the landfill and potential health risks associated with unsuitable waste.

CONSTRUCTION PHASE

1.16.6 The Project will require a new contract for land lease with Tintareni village, who own the land, providing clarity and resulting in a minor positive effect on land ownership.

1.16.7 The upgrading of the existing Tintareni landfill is expected to have a minor positive effect on employment during construction, due to a small number of short term employment opportunities, primarily for unskilled labour. The workforce will be sourced locally, where possible (e.g. Tintareni, Creţoaia). There will also be a minor positive effect on the regional economy, due to the procurement of goods and services during construction. The creation of construction employment opportunities provide a minor positive opportunity to increase the number of women who will be employed during construction.

1.16.8 The implementation of the Construction Traffic Management Plan is expected to reduce the risk of construction traffic related nuisance and accidents to minor adverse. The residents of Creţoaia village who use the district road (L481) to access their village, may experience a minor adverse effect due to the deterioration in road conditions as a result of construction vehicles using the road to access the Tintareni landfill site. This could further lead to damages to motor vehicles and the increase of costs of road repairs for the district road (L481) and the national road (R2).

1.16.9 The Project will not place any additional demands on community infrastructure during construction, as utility infrastructure will be secured locally on the Project site.

OPERATIONAL PHASE

1.16.10 There remains a risk of moderate negative effects due to increases in waste management tariffs, as a result of this Project. To assess the nature of this impact it would be necessary to know how much they will be increased and for whom, e.g. all households, businesses, etc. The maximum adverse effect is limited to moderate negative, as it is assumed that the analysis that is being undertaken as part of the feasibility study will ensure the tariffs are not increased to the point where they would be unaffordable for the local population.

1.16.11 The operation of the landfill will require an estimated 30 employees. These jobs will primarily be

offered to residents of Tintareni and Creţoaia resulting in a moderate positive employment effect for these communities. This will be used as an opportunity to increase the number of women employed, resulting in a moderate positive longer term gender effect.

1.16.12 The project will include the resumption of waste collection in Tintareni village, and provide an opportunity for Regia Autosalubritate to ensure that women are consulted in how waste collection is organised in the village. Resulting in a minor beneficial effect on gender equality.

1.16.13 The proposed waste collection system for the village of Tintareni; provision of health care services in the village and rehabilitation of the village water supply, is expected to result in a major beneficial health effect. The landfill is expected to continue to have a negligible effect on the health of the local population. The implementation of the proposed community benefits are expected to result in a major beneficial effect on the residents of Tintareni.

1.16.14 The regular inspection of the district road (L481), and proposed measures to clean mud with road sweepers, and collect litter, will reduce the effect on local residents using the road to minor adverse.

1.17 OVERALL

1.17.1 The construction of the landfill is expected to have a minor beneficial effect on land ownership and local employment. The construction and operation of the landfill is expected to result in a minor adverse effect on users of the district road (L481). The operation of the landfill is expected to have a moderate long term gender effects due to employment opportunities for women, and a major beneficial effects on the residents of Tintareni due to the proposed community benefits.

1.18 TRANSPORTATION AND TRAFFIC

1.18.1 The site is accessible as follows:

- Road - The proposed route uses the regional R2 and L418 roads to access the landfill site. This route has been selected following the consideration of alternatives, as the waste vehicles only have to make one set of opposed turns across traffic. The final part of the access route to the existing Tintareni landfill is of a poor standard, with fissures and cracks, pits, partial obstructions, road segmentation and reduced visibility due to uncontrolled vegetation growth.
- Rail - Jemciug station which serves journeys to nearby towns, is located in the town of Botnarestii Noi, approximately 7.5km north of the Tintareni landfill. The station can be accessed from the site via roadways and pathways through the town of Tintareni.
- Walking and cycling - The current pedestrians and cyclists access to the site is limited. As discussed above the current road surface condition to and from the site is poor.
- Buses - There are regular bus services to and from Tintareni travelling to and from central Chisinau and other neighbouring towns. The journey from central Chisinau to Tintareni takes approximately 53 minutes, with services running approximately every 25 minutes.

CONSTRUCTION PHASE

1.18.2 The construction vehicles are not expected to have an adverse effect on district road (L481) or national route (R2). The Company will discuss measures to repair / improve district road (L481) once the construction phase has been completed, in agreement with the relevant Highways Authority, which will be the Anenii Noi Council.

1.18.3 The implementation of the construction traffic management plan will prevent significant effects during the activities to upgrade the access road (2.5km) to Tintareni landfill site.

OPERATIONAL PHASE

1.18.4 The resurfacing of the access road to the site is considered to have Minor beneficial effects on pedestrians and cyclists. The operation of the landfill is not expected to have an effect on access by rail or bus.

1.18.5 The traffic assessment concluded that there will be no significant effects on vehicles using R2 or L481, as there will be no adverse effects on traffic flows or junction delays.

1.19 OVERALL

1.19.1 The construction and operation of the landfill is not expected to have an adverse effect on traffic and transport.

1.20 CONCLUSION

1.20.1 The capacity of the temporary dumpsite in Ciocana will be exhausted around the end of 2016. It has been established that there are no alternative sites comparative to the Tintareni landfill, within a 60km radius of Chisinau, which would be suitable for construction of a landfill. The lack of available landfills has the potential to result in an increase in illegal waste dumps and fly-tipping of waste which could lead to further sources of pollution.

1.20.2 The Tintareni landfill site is not currently compliant with EU regulations and will require infrastructure to be installed and measures and controls introduced to ensure compliance. This will include: the construction and operation of a leachate treatment plant; installation of a sealing membrane; introduction of improved gas management measures; and actions to reduce nuisances and site hazards.

1.20.3 An assessment of the Project has been undertaken and the likely significant environmental and social effects have been identified, in terms of upgrading the Tintareni landfill to operate within EU standards as defined in the EU Landfill Directive.

1.20.4 The Project will bring benefits to the area in terms of local job creation, improved condition of access roads and community benefits.

1.20.5 Overall it has been assessed that the Project, within the parameters of the assumptions made and after the application of proposed mitigation measures, will result in minor significant adverse environmental effects, and moderate beneficial social effects, during either construction or operational phases. Additionally, there will be no cumulative effects with consented developments in the surrounding area.

1.21 FURTHER INFORMATION AND CONTACT DETAILS

1.21.1 Full project preparation documents, including the ESIA (its respective annexes, including the ESMP) and the NTS, LRF, HRA and SEP are available online at the Ministry of Environment website. Electronic versions of these documents will be available for a minimum of 120 days at also the following websites:

- Bubuieci Mayor's office website: http://www.bubuieci.md/
- City of Chisinau website: http://www.chisinau.md
- EBRD website: http://www.ebrd.com

1.21.2 Hard copies will also be available at the Mayors' offices in Tintareni and Bubuieci:

- Village of Tintareni, Rayon Anenii Noi, Primaria; 0-265-33348.
- Village of Bubuieci, Ciocana district, municipality of Chisinau, Primaria: 0-22-414969

1.21.3 The contact details for the relevant person at Regia Autosalubritate for this project are:

Name of the person and title	Contact Information
Mariana Nazarenco Head of Office of the General Director / Cancelaria	Regia Autosalubritate MD-2069, str. 27 Martie 1918, nr. 14, Chisinau

1.22 PUBLIC GRIEVANCE FORM

Reference No:	
Full Name	
Note: *you can remain anonymous if you prefer or request not to disclose your identity to the third parties without your consent*	☐ **I wish to raise my grievance anonymously** ☐ **I request not to disclose my identity without my consent**
Contact Information **Please mark how you wish to be contacted (mail, telephone, e-mail).**	☐ **By Post: Please provide mailing address:** _____ _____ _____ ☐ **By Telephone:** _____ ☐ **By E-mail:** _____
Language Please mark your preferred language for communication	☐ **Romanian** ☐ **Russian**

Description of Incident or Grievance:	What happened? Where did it happen? Who did it happen to? What is the result of the problem?

Date of Incident/Grievance	
	☐ **One time incident/grievance (date _____)** ☐ **Happened more than once (how many times? _____)** ☐ **On-going (currently experiencing problem)**

What would you like to see happen to resolve the problem?

Signature: _____

Date: _____

Please return this form to:
Attention: Mariana Nazarenco
Head of Office of the General Director / Cancelaria
Regia Autosalubritate
Postal Address: MD-2069, str. 27 Martie 1918, nr. 14, Chisinau
Telephone: 022-740919; 022-746842
E-mail address: regia-auto@mail.ru

2 INTRODUCTION

2.1 LOAN FOR PRIORITY INVESTMENTS

2.1.1 The European Bank for Reconstruction and Development (the "EBRD" or the "Bank") is considering extending a loan of up to EUR 10 million to Regia Autosalubritate, a municipal solid waste management company (the "Company") 100 per cent owned by the City of Chisinau (the "City"). The proceeds of the loan will be used to finance priority investments in the Chisinau solid waste disposal system (the "Project"). The loan will be guaranteed by the City of Chisinau; the Project is expected to be co-financed by the loan and a capital grant of up to EUR 5 million from an international donor.

2.2 FEASIBILITY STUDY AND ALTERNATIVES

2.2.1 A feasibility study for the Chisinau Solid Waste Project was undertaken by Fichtner Management Consulting in parallel to the Environmental and Social Impact Assessment (ESIA).

2.2.2 The WSP I Parsons Brinckerhoff terms of reference highlighted the following potential options for priority investments in the Chisinau solid waste disposal system:

- an upgrade of the Tintareni landfill site to EU compliance;
- rehabilitation of an alternative access road to the landfill;
- closure of a temporary dumpsite in Ciocana District, Chisinau;
- refurbishment of the existing transfer station and investment in a waste sorting plant; and
- building of a waste digestion plant for energy and heat production.

2.2.3 The Feasibility Study (Fichtner Management Consulting, 2016) indicated that several of these options were not suitable for finance by the proposed loan. The potential options that were identified as being unsuitable therefore form the Project alternatives as set out in Chapter 4.

2.3 THE PROJECT

2.3.1 The main project component that the EBRD has requested to be assessed in the ESIA is:

- an upgrade of the Tintareni landfill site to EU compliance.

2.3.2 The Project is described in Chapter 3.

2.3.3 The EBRD also requested that the ESIA includes a review of the closure plan for:

- the temporary dumpsite in Ciocana District, Chisinau.

2.3.4 The Ciocana Closure Plan Review, benefits of the closure and proposed recommendations, are provided in Appendix A.

2.3.5 The existing access road to the Tintareni landfill will be used once it has been upgraded and is operational.

2.4 PROJECT CATEGORISATION

This Project involves the upgrade of the existing Tintareni landfill to EU standards. The EBRD has assigned this Project as a Category A as it is a project that '*could result in potentially significant adverse future environmental and/or social impacts which, at which, at the time of categorisation, cannot readily be identified or assessed, and which, therefore, require a formalised and participatory environmental and social impact assessment process*.' This categorisation means that a comprehensive ESIA and review of associated documents must be carried out, followed by their public disclosure for a minimum period of 120 days.

2.5 PROJECT REQUIREMENTS

2.5.1 The EBRD's requirements are as follows:

- The Project will be structured to meet relevant EU substantive environmental standards, including (but not limited to) the pertinent requirements of the Environmental Impact Assessment (EIA) Directive (as updated in 2014), the Industrial Emissions Directive, and the Birds and Habitat Directives. When host country regulations differ from EU substantive environmental standards, the Project will be expected to meet whichever is the more stringent;
- The Project will meet the requirements of Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste (herein referred to as the Landfill Directive);
- It will be in compliance with the EBRD's Environmental and Social Policy (ESP) and Performance Requirements (PRs) 2014;
- The Public consultation and stakeholder engagement will be tailored for the Project, be meaningful, and will allow for the disclosure of information and public participation in decision-making (in accordance with PR10);
- The Project shall include all reasonable measures to avoid, minimise or mitigate any adverse changes in environmental and social conditions, and impacts on public health and safety, especially with respect to any disproportionate impacts on any group of people as a result of their gender, age, ethnicity, disability, socio-economic status and/or other personal characteristics; and
- It will take into account relevant international conventions and protocols relating to environmental and social issues, as transposed into national legislation.

2.5.2 The legislative and policy requirements are discussed in more detail in Chapter 6.

EBRD PERFORMANCE REQUIREMENTS

2.5.3 The Project is required to comply with the following ' Performance Requirements (PRs)':

- PR 1: Environmental and social appraisal and management;
- PR 2: Labour and working conditions;
- PR 3: Pollution prevention and abatement;
- PR 4: Community health, safety and security;
- PR 5: Land acquisition, involuntary resettlement and economic displacement (*no involuntary resettlement foreseen, although land acquisition and economic displacement have been considered*);
- PR 6: Biodiversity conservation and sustainable management of living natural resources;
- PR 8: Cultural heritage; and

- PR 10: Information disclosure and stakeholder engagement.

2.5.4 The following EBRD PRs are not applicable to this investment:

- PR 7: Indigenous people (*none present in the Project location*);
- PR 9: Financial intermediaries (*not applicable on this investment*).

2.6 THE COMPANY

2.6.1 The General Housing Department of the City has responsibility for solid waste collection and transportation in Chisinau. These functions are executed through the Company, which is owned by the City. The Company is responsible for collection, transportation and disposal of municipal waste, as well as for the operation of the Ciocana temporary dumpsite.

2.6.2 The Company collects around 1.5 million tons of waste per year with up to 60 per cent organic and 25 per cent recyclable content. Most of the collection and transportation is carried out by the Company using a fleet of 58 specialised vehicles. The waste is transported in small vehicles to the transfer station in Ciocana District and then reloaded on bigger trucks and transported to the adjacent Ciocana temporary dumpsite. Sorting operations are limited with only plastic and glass separated.

2.6.3 There is currently no waste sorting plant to segregate the waste efficiently, although a private operator (ABS) is in the process of constructing a waste sorting plant in Chisinau.

2.7 TINTARENI LANDFILL

SITE LOCATION

2.7.1 The Company previously operated the landfill in Tintareni (Anenii Noi District), which has an area of approximately 25ha, and is located 30km south-east of Chisinau (see Figure 2-1). The Tintareni landfill is approximately 5km from the village of Tintareni and 3km from the village of Creţoaia (see Figure 2-2).

2.7.2 The geographical position is as follows:

- → Latitude: 46° 51' 04 N
- → Longitude: 29° 10' 00 E.

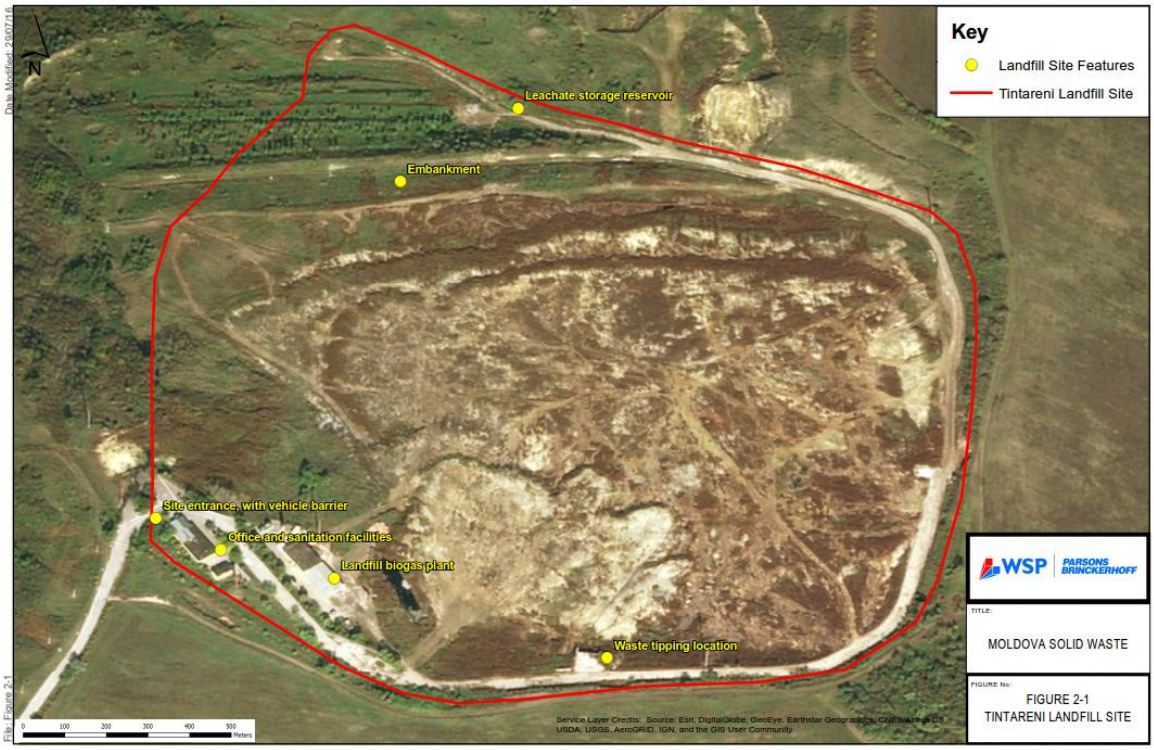


Figure 2-1 Aerial Photograph of the existing Tintareni Landfill

Figure 2-2 Aerial Photograph of the Location of the existing Tintareni Landfill in relation to the villages of Tintareni and Creţoaia

Figure 2-3 Photograph of the Existing Tintareni Landfill

TOPOGRAPHY

2.7.3 The topographical survey undertaken in December 2015. This survey indicated that the highest elevation on the Tintareni landfill site was in the south where the entrance of the site is located, which has an elevation of approximately 196m above sea level (asl). The lowest elevation was in the north where the leachate collection tanks are placed, and it was approximately 115m asl. The site therefore has an average slope of about 1/8 (Vertical leg/ Horizontal leg).

CAPACITY

2.7.4 The design capacity of the landfill is up to 44,000,000m^3. The remaining capacity is calculated to be 2,750,00m^3 (Fichtner Management Consulting, 2017).

TINTARENI LANDFILL DESIGN

2.7.5 The landfill was designed in 1984 by the Institute «IPROCOM» and put into operation in 1990. It was designed in accordance with the Design and Construction Standards and Sanitary Norms adopted in the Soviet Union at that time.

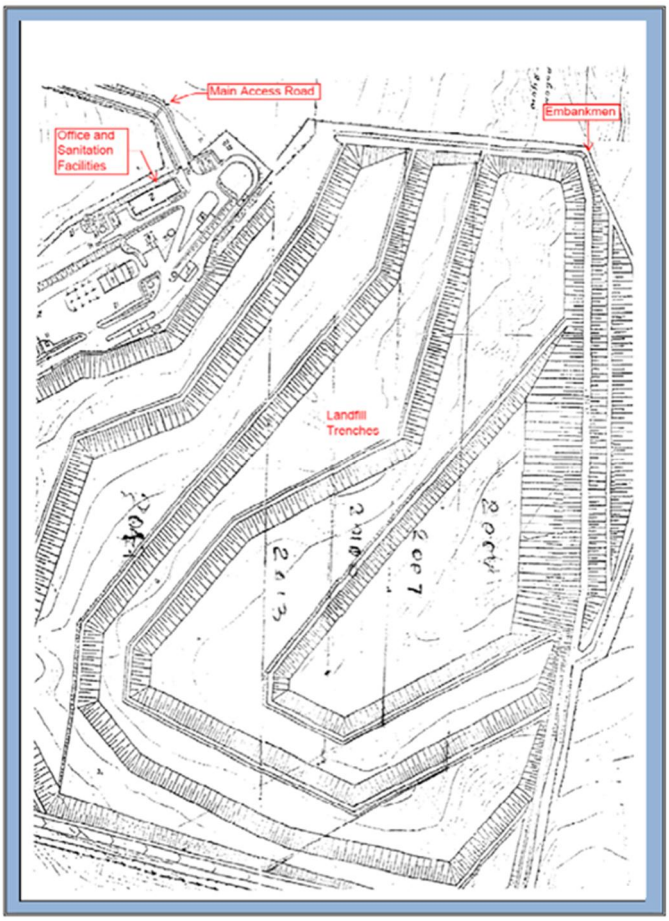


Figure 2-4 Layout Plan of the Landfill at Tintareni (WEG, 2012)

SITE LAYOUT

2.7.6 The site is entrance is controlled by a gate and security guard. There is a fence around parts of the administration area, but the majority of the landfill is not fenced. There are various buildings located just within the entrance to the landfill, including an administration building, water tank, warehouse and garage.

TINTARENI LANDFILL LEACHATE COLLECTION

2.7.7 Leachate from the upper terraces is drained down to the lower terraces through slope drainage ditches. The ditches are closed and covered by sand and gravel. The drained leachate is collected in the drainage channel and retained in the drain. From the drain the collected leachate is directed to the concrete reservoir by means of a cast-iron pipe covered by a concrete casing, which passes through the embankment.

2.7.8 Finally, the drained leachate from the landfill is collected in a series of metal and concrete Reservoirs, with a total capacity of 330m^3. The reservoirs are located on the downhill side of the embankment. A road has been constructed to enable tankers to access the reservoirs. The leachate is pumped from the reservoir into the tanks, then transported by tanker to the upper terraces of the landfill and then discharged to recirculate the leachate. This leachate recycling system is in accordance with the former Soviet and current Moldovan standards, but not EU Landfill Directive standards.

Figure 2-5 Leachate Collection Reservoir

2.7.9 In 2009 «BioGasInter" LLC built a concrete tank with capacity of 80m^3 to collect the leachate, and a 900m long network and pumping station, to collect the leachate from the landfill and then spray it over the landfill. This did not appear to be in operation at the time of the project team site visit, or the visits undertaken for the pre-feasibility study in 2012 (WEG, 2012).

PREVIOUS OPERATIONS AT TINTARENI LANDFILL

2.7.10 When the existing Tintareni landfill site was operational, the daily volume of waste disposed at the landfill was approximately 3,000m^3, five days per week. The volume of waste production in Chisinau is steadily increasing. The Company collects approximately 1,400,000m^3 of Municipal Solid Waste (MSW) annually (2017). If the landfill is upgraded and reopened this would equate to an approximate daily volume of 5500m^3, five days per week.

2.7.11 The project includes the provision of a new fleet of waste trucks, with an increased capacity. It is estimated that there would be 7 two way trips of waste vehicles serving the site per hour between 07:30 and 17:00, five days a week.

2.7.12 The previous operational procedures included covering every 5-6m of waste with a soil layer. However, the waste was not compacted, so the dispersion of waste into the surrounding environment could not be avoided. This was raised as an issue by the surrounding residents and the operational practices will need to be upgraded if the landfill is reopened.

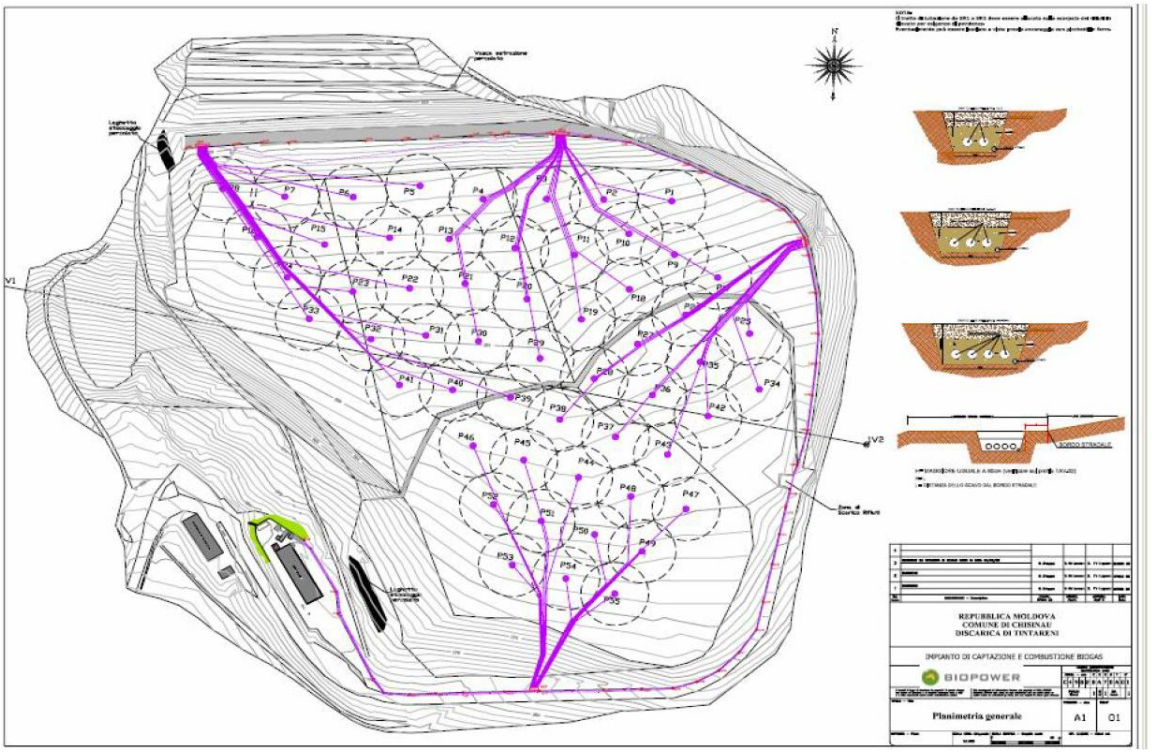


Figure 2-6 Extract from Landfill Gas Recovery and Energy Production at Tintareni Landfill (TEVAS, 2012)

2.7.13 The site is not currently operational, although the Company continues to employ a security guard and a leachate tanker operator at the site.

2.7.1 The operation of the existing Tintareni landfill was put on hold in 2010 due claims by the villagers of Tintareni that the landfill was causing groundwater pollution. These water quality concerns have been considered further in this ESIA. The City of Chisinau assessed the claims together with the relevant environmental authorities. The assessment also took into account other sources of pollution, such as an adjacent river and illegal dumpsites located around the village. The City's conclusion was that some of the more serious alleged impacts of the Tintareni landfill were not justified, while the minor impacts were considered to be manageable. The landfill operations remain on hold and the villagers of Tintareni continue to have severe concerns regarding the landfill, and strongly believe that it is polluting their groundwater, with related health effects. They rely on groundwater for irrigation and drinking water.

TINTARENI LANDFILL BIOGAS PROJECT

2.7.2 In 2004 permission was granted for the construction of a biogas project at Tintareni Landfill. The landfill gas facilities were installed and are operated by a private company JSK BioGasInter. They have no contractual relationship with Regia Autosolubritate, but have a direct agreement with the Chisinau Municipality. The Chisinau Municipality receives the tariff for the operation of the plant.

2.7.3 The Municipal Council of Chisinau under the decision № 16/15 dated 15.12.2004 approved the contract № 538/04 of 16.12.2004 between Chisinau Mayoralty and BioGasInter, which permitted «BioGasInter" LLC and their Italian partners (Unendo Energia" EpA) to implement a project to construct a plant for collection of landfill biogas and the generation of electric power, in order to reduce air emissions from the Tintareni Landfill. The landfill gas collection and combustion system is not currently continually operational, due to the high volume of leachate and a reduced level of gas in the landfill, it now only operates periodically.

Figure 2-7 Biogas Plant at Tintareni Landfill

2.7.4 The project covered the installation of the following equipment:

- Gas collection network, comprising perforated pipes;
- Gas extraction plant;
- Electricity generator, comprising underground connection to the on-site project activities;
- High temperature gas flares;
- Landfill gas monitoring and control equipment.

2.7.5 The permissible noise levels for the Biogass project were established on the basis of sanitary norms SN 2.2.4/2.1.8.562-96 “Noise at Workplaces, in Living Spaces, Public Buildings, and on the Territory of Residential Constructions”. The main noise source from the previous operation of the landfill was project activity, including works on waste discharge and storage. The level of noise at a distance of 10m from the installation was 77 dBA (TEVAS, 2012).

2.8 CIOCANA TEMPORARY DUMPSITE

2.8.1 The Company is currently storing waste on a temporary dumpsite site in Ciocana District in the City of Chisinau. The site was allocated as a short-term measure in 2010 due to the dispute regarding the Tintareni landfill. The Ciocana site is, however, associated with more severe environmental impacts than operation of the Tintareni landfill. It has no gas collection system, and only a basic leachate management system.

2.8.2 The leachate is collected at the northeast of the landfill site in three metal tanks (each with a capacity of 15m^3) and at the southwest of the landfill site in one concrete chamber. The collected leachate is then pumped into tankers, and then transported to the top of the landfill site and emptied onto the waste surface.

Figure 2-8 Tanker for the Collection of Leachate, Ciocana landfill (Fichtner, 2015)

2.8.3 The City of Chisinau is eager to upgrade the Tintareni landfill to compliance with the EU standards, and then close the temporary dumpsite site in Ciocana District.

2.8.4 There are currently informal waste pickers working at the Ciocana landfill. They are not employed by the Company, and access the site without permission. They extract plastic and glass for recycling. This informal waste segregation and collection system is well organised and recycling firms send trucks to collect the extracted recyclables on a daily basis. Initial discussions with waste pickers indicate that they are supplementing other forms of income, such as agriculture or pensions. Informal waste pickers are considered further in Chapter 14.

2.9 ILLEGAL WASTE DUMP SITES AND THE RIVER BIC

2.9.1 There are a number of illegal waste dump sites around the village of Tintareni, these have arising following the closure of the existing Tintareni Landfill. These sites have been located on unsurfaced areas, and it is likely that they are a source of groundwater contamination. The village of Tintareni has arranged for several sites to be cleared up, but illegal dumping of waste (fly-tipping) continues to be a problem.

2.9.2 The River Bic is the nearest watercourse to the existing Tintareni landfill, and it is likely to be hydrologically connected to the aquifer beneath the Tintareni landfill. This river is known to be severely polluted, and farmers who rely on this river for irrigation are now struggling to sell their produce (Resident of Tintareni, pers comm.).

2.9.3 Tintareni residents expressed concerns that the leachate from the Tintareni landfill was contaminating the River Bic. The residents near the temporary dumpsite in Ciocana District, also suggested the temporary dumpsite could be polluting the river. There are industrial activities that discharge to the River Bic that are also likely to be contributing to the pollution.

3 PROJECT DESCRIPTION

3.1 FEASIBILITY STUDY

3.1.1

A feasibility study has been prepared by Fichtner Management Consulting, which considered a broad number of investment options. The culmination of their study was nine proposed investment options which are presented in Table 3-1.

Table 3-1 Fichtner Management Consulting: Proposed Investment Options

	Package	Components
1	Closure of the existing Ciocana landfill site	1. Rehabilitation of the site including installation of the landfill gas and leachate collection systems 2. Vehicles for leachate transportation
2	Leachate treatment plant	1. Leachate ponds 2. Treatment facility 3. Spare parts 4. Management contract and training
3	Re-opening and upgrade of the landfill in Tintareni	1. Gates and a fence 2. Reception area (renovation of the administration building, lab and laboratory equipment, weighbridge and control building, repair workshop, etc.) 3. Compactor, bulldozer, a dumper and renovation of the garage 4. Fuel station (optional) 5. Waste cells area (measures for stability of the embankment, renovation and extension of the ring road, storm water collection system) 6. Monitoring wells (ground water monitoring wells around the landfill, leachate level monitoring wells) 7. Fire fighting and other Health and Safety measures
4	Vehicle fleet	Purchase of the vehicles for waste collection
5	Vehicle fleet	1. Purchase of the larger trucks for waste transportation from the transfer station to the landfill in Tintareni 2. Purchase of the containers for the vehicles
6	Rehabilitation of the transfer station	1. Parking and manoeuvring space for the large trucks (used for waste transportation to the landfill) 2. Gate and a fence (also to block litter) 3. Front loader for the bunker 4. Compaction unit 5. Waste registration unit 6. Rehabilitation of the bunkers 7. Health and Safety measures
7	Road rehabilitation	Repair of the last section of the road to the landfill (2.5 km from the Geamăna junction until the landfill)
8	Landfill gas collection (phase 2)	1. Gas collection system 2. Gas utilisation system
9	Separate collection and sorting	1. Sorting line for the separately collected recyclables at the transfer station 2. Construction of the facilities required for sorting and storage of the recyclables

3.2 COMPLIANCE WITH EU LANDFILL DIRECTIVE

3.2.1 In order for the EBRD to invest in the Project, the landfill must be designed and operated in compliance with the Bank's ESP and EU regulations. It must comply with the EU Landfill Directive, and have appropriate systems to manage landfill gas and leachate.

FICHTNER MANAGEMENT CONSULTING'S ANALYSIS

3.2.2 Fichtner Management Consulting analysed the landfill's compliance with the EU Landfill Directive Design Standards (Fichtner Management Consulting, 2016). The results are summarised in Table 3-2.

Table 3-2 Fichtner Management Consulting: Tintareni landfill's compliance with the EU Landfill Directive Design Standards

No.	EU Requirement	Tintareni landfill	Risk and implications	Implications for further use
1	**Water Control and Leachate Management**			
1.1.	Control to prevent water from precipitation entering into the landfill body	Surface water collection channel along the perimeter is in place	-	-
1.2.	Prevent surface water and/or groundwater entering the landfill	Base sealing is in place	-	-
1.3.	Collect contaminated water and leachate	Leachate collection system is in place	-	-
1.4.	Treatment of contaminated water and leachate from the landfill to required standard for discharge	-	Pollution of soil and water	Construction and operation of leachate treatement plant
2	**Protection of Soil and Water**			
2.1.	Geological barrier (Permeability ≤ 10^{-9} m/s; thickness ≥ 1m)	-	-	-
	Option: Artificial (geological) barrier (Permeability ≤ 10^{-9} m/s; thickness ≥ 0.50m)	Compacted clayer liner of 1meter; minimum assumed permeability ≤ 10^{-8} m/s	-	-
2.2.	Artificial sealing liner	-	Eventual pollution migration (to be verified during the geothechnical survey)	Introduction of the HDPE – geo membrane
2.3.	Drainage layer (thickness ≥ 0.5m)	Gravel drainage layer in place	-	-
2.4.	Drainage and collection pipes	Perforated / non-perforated drainage and collection pipes in place	-	-
2.5	Gas drainage layer	-	Inefficient landfill gas management and surface stabilisation	Introduction of gravel (levelling layer)

2.6.	Impermeable miner layer	-	Percolation of precipitation into waste cell, generation of leachate	Introduction of compacted clayer liner
2.7.	Drainage layer (thickness ≥ 0.5m)	-	Surface water drainage not ensured, damage of sealing system	Introduciton of gravel
2.8.	Top soil cover (thickness > 1m)	-	Erosion of surface sealing, no landscape	Introduction of soil and recultivation layer
3.	**Gas Control**			
3.1.	Collection	Gas extraction wells, piping system, substation are in place	-	-
3.2.	Utilisation (energy production)	Energy generator is in place	-	-
3.3.	Flare	Flare is in place	-	-
4.	**Nuisance and Hazards**			
4.1.	Emission Odours / Dusts	-	Air Pollution when put into operation	Introduction of capping and road dewatering
4.2.	Windblown material	Mobile fences are in place	-	-
4.3.	Noise and traffic	Not applicable since the landfill is not in operation	Noise Pollution when operational	Regulation of operational hours
4.4.	Birds, Vermin and Insects	Daily (frequent) surface cover was applied when the site was operational	-	-
4.5.	Fire	Not applicable as the landfill is not in operation	Air Pollution when operational	Introduction of firefighting system
5.	**Stability**			
5.1.	Settlement of the bottom / bottom sealing	To be verified during the geotechnical survey	-	-
6.	**Site Access (Barriers)**			
6.1.	Prevention of illegal entrance / dumping of waste	-	Site out of control, Health and Safety	Construction of fence and gate

BEST AVAILABLE TECHNIQUE (BAT) ANALYSIS

3.2.3 WSP I Parson Brinckerhoff has undertaken further analysis of compliance with BAT and the EU Landfill Directive Design Standards (Appendix C), and identified some additional measures that will need to be incorporated into the design, as set out in Paragraph 3.3.4.

3.3 DESCRIPTION OF THE PROJECT

CONCEPTUAL DESIGN

3.3.1 Fichtner Management Consulting (Project Proposal Report, 2016) developed a conceptual design for the project. The detailed design for the project will be developed at a later stage, but will be a refinement of the conceptual design. The proposed measures are required to improve and upgrade the operation of the landfill to the required standards, so it is reasonable to assume that they will be implemented.

MEASURES TO UPGRADE TINTARENI LANDFILL

3.3.2 The Project Proposal Report (Fichtner Management Consulting, 2016) proposes the following measures to upgrade Tintareni Landfill:

- Construction of a Leachate Treatment Plant;
- New geotextile membrane;
- Re-profiling to lay the geotextile membrane on the existing waste,
- Construction of new drainage systems to the Leachate Treatment Plant;
- Revised sequence of landfill phasing (the order the site is filled in);
- Strict waste acceptance criteria and procedures for rejecting unsuitable waste;
- New Perimeter Road;
- Improved surface water management;
- New control building, weighbridges, workshop, fuel station, and wheel washing station, and continued use of the existing site offices, and associated infrastructure;
- Resurfacing of the vehicle access from L481 to the entrance to Tintareni Landfill (2.5 km from junction Geamăna, Ruseni to the landfill).
- New vehicle fleet to transport the waste to the Tintareni Landfill;
- Improved Gas Management System;
- Environmental monitoring systems and procedures, including boreholes / water quality, air quality (including dust), noise, and litter containment.

3.3.3 Further details are provided in Sections 3.3.5 to 3.3.25. The waste trucks will use the previous access route, via National Route 2, and District Route 481, to the site entrance to access the upgraded landfill.

ADDITIONAL MEASURES PROPOSED BY WSP I PARSONS BRINCKERHOFF

3.3.4 The following measures have been proposed to comply with the Best Available Technique (BAT), as identified through the WSP I Parsons Brinckerhoff BAT analysis in Appendix C:

- New perimeter fencing around the Tintareni Landfill, and security measures to prevent free access to the site;
- Accident Management Plan;
- Waste acceptance procedures should preclude the acceptance of hot or reactive wastes;
- A firefighting protocol and reporting procedure;
- Full assessment of the stability of the landfill;

- The waste acceptance proposal needs to include procedures for quarantining waste load to undertake additional visual inspections, prior to accepting waste;
- A quarantine area is required for waste that is not suitable, and procedures for notifying the Environmental Regulator
- The waste acceptance proposal needs to include procedures for inspecting waste materials at the point of deposit;
- The proposals require a methodology for identifying and handling difficult wastes on site;
- Trained personnel are required to inspect wastes and identify where waste may require special handling;
- Measures to monitor and control particulate matter (including bioaerosols);
- Water supply and dust suppression measures;
- A site traffic management plan;
- Measures to prevent litter escaping, and collection procedures;
- Warning signs for mud on the public highway, and procedures for deploying road sweepers;
- Regular odour impact assessments and control measures;
- Road Maintenance to reduce traffic noise;
- Requirements to enclose any landfill gas flares;
- Pest Control Measures; and
- An Outline Closure Plan and aftercare procedures.

CONSTRUCTION OF THE LEACHATE TREATMENT PLANT

3.3.5 The leachate treatment plant will be required to meet the maximum allowable concentrations set out in either national standards or EU Standards, whichever is more stringent.

The Leachate Treatment Plant will comprise:

- Biological Treatment Stage: Membrane bio-reactor, with a Denitrification and Nitrification stage; and
- Physical Treatment Stages: Ultrafiltration and Nanofiltration followed by Reverse Osmosis.

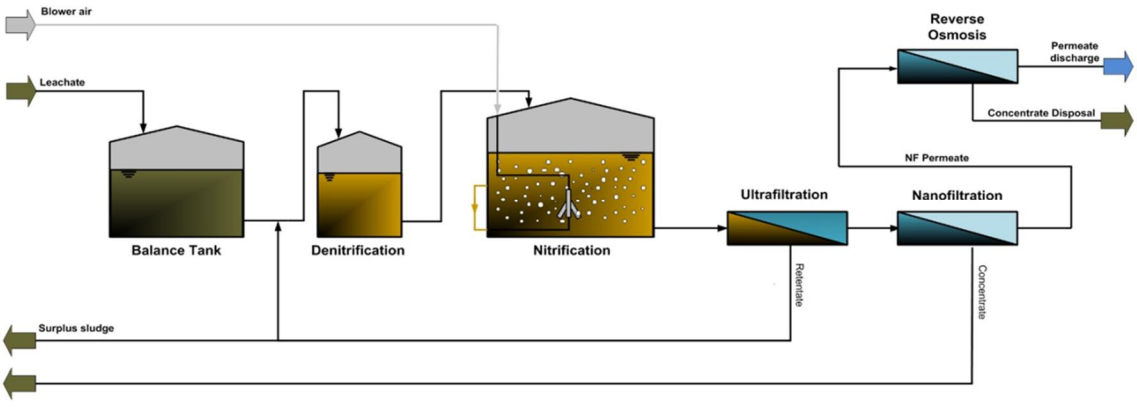


Figure 3-1 Concept for Leachate Treatment Plant
(Source: Fichtner Management Consulting, 2016)

NEW GEOTEXTILE MEMBRANE

3.3.6 A separation geotextile will be laid on the surface of the existing waste cells, before constructing a Compacted Clay Liner. This geotextile will ensure the stability and functionality of two layers, thereby preventing the interaction of two layers with different grain size. The geotextile shall have a mass per unit area of at least 300 g/m^2.

3.3.7 A second separation geotextile should be laid above the clay liner, for the same purpose, and it should have the same specifications.

RE-PROFILING TO LAY THE GEOTEXTILE MEMBRANE ON THE EXISTING WASTE, AND CONSTRUCTION OF NEW DRAINAGE SYSTEMS TO THE LEACHATE TREATMENT PLANT

3.3.8 An embankment will be constructed along the perimeter of the waste cell. The embankment will have a trapezoidal cross section shape. The embankment will be constructed from clayey soil. It will have an average height of 2m to enable it to secure both the interim sealing systems and surface sealing systems.

3.3.9 This lining system will seal the surface of the waste that has already been disposed in the existing landfill (waste cell 1), and provide a base sealing for any future waste that is disposal at the upgraded landfill (waste cell 2). The interim lining system shall not be rigid, but flexible. The flexibility will be required to tolerate different movements within waste cell 1. These movements are likely to occur due to two processes: the extraction of leachate from waste cell phase 1; and the continuing biological degradation. These two processes can create settlement within the waste cell 1 which can result in an uneven surface.

3.3.10 The interim lining system will have the following cross section (from top to bottom):

a) Leachate drainage system;
b) Protection geotextile: to prevent punctures to the Geosynthetic liner;
c) Geosynthetic liner (high density poly ethylene): which is resistant to the aggressive content of the leachate;
d) Geosynthetic clay liner (flexible): with a thickness of between 0.5cm – 1.0cm, and a permeability of $1x10^{-11}$ m/s;
e) Geogrid: made of synthetic material such as, HDPE or PET; and
f) Levelling layer: a layer of gravel, with a thickness of 0.30m, and a minimum permeability of $1x10^{-3}$ m/s.

REVISED LANDFILL PHASING

3.3.11 A Waste Filling Plan will be developed for the landfill, with defined waste cells and waste filling procedures. This will specify the unloading location within the waste cell, and the landfill staff will direct the driver to the location and provide instructions to ensure safe access and unloading.

3.3.12 At the end of each working day, any waste layers that reaching a thickness of 2m, must be covered with a daily cover of soil, which should not be more than 0.20m – 0.25m thick. This daily cover will reduce odour and visual impacts, and prevent light waste being blown by the wind. This daily cover must not result in the creation of an impermeable layer, as this would compromise the effectiveness of the leachate collection system and gas production.

3.3.13 When Tintareni landfill was constructed, all the excavated material (soil, clay etc) was stored in the northern part of the landfill (north-east from the embankment). During operation these materials was used to cover the waste in layers. The same materials can be used in future. No importing of soil is required.

STRICT WASTE ACCEPTANCE CRITERIA

3.3.14 The operator at the control building will be responsible for ensuring that only waste which is acceptable at the landfill is allowed into the site. Waste must be controlled and registered before a waste vehicle enters the site (including information on the waste producer, transportation vehicle). Vehicles carrying waste which is not acceptable will not be allowed to enter the site. The operator will refuse access to vehicles or drivers that are in an unsuitable condition.

NEW PERIMETER ROAD

3.3.15 A new perimeter road will be constructed to access the waste cell (phase 2). This will extend from the reception area to the east and the west, around the perimeter of the site. The perimeter road will enable the waste trucks to access the waste sub-cells to unload the transported waste. Additionally, the heavy landfill compactor will use this road to access the waste sub-cells, garage and workshop. This road will be asphalt coated and have two lanes, the first lane will be 3.5m wide for use by the waste trucks, the second lane will be 4.5m wide for use by the landfill compactor.

IMPROVED SURFACE WATER MANAGEMENT

3.3.16 Surface water management at the proposed Tintareni landfill will include:

a) Surface water collection channel next to the perimeter embankment,
b) Surface water collection channel, at the outer side of the perimeter road, and
c) Surface water collection in waste sub-cells.

NEW CONTROL BUILDING, WEIGHBRIDGES, WORKSHOP, FUEL STATION, AND WHEEL WASHING STATION, AND CONTINUED USE OF THE EXISTING SITE OFFICES, AND ASSOCIATED INFRASTRUCTURE

3.3.17 The following new facilities are proposed at Tintareni Landfill, and the existing buildings and infrastructure will continue to be used:

- Control Building and Weighbridges: The control building will be located at the centre of the incoming-outgoing lanes, to ensure the waste trucks, which should be weighed full and empty, pass the weighbridge during entry and exit. There will be an electronic weighbridge at each side of the control building. The weighbridges will have the capacity to weigh up to 60tons, and will be linked to a computer in the control building, that has appropriate software for efficient database management. The weighbridges will be equipped with vehicle ID-card device, external weight display and traffic lights.
- Workshop: The workshop will be used for repair and maintenance of vehicles. The building will be located at the southern part of the garage-warehouse. It will be single storey, with a floorspace of approximately 10m x 20m.
- Fuel Station: The station will be located near the fire fighting tanks.
- Wheel Washing Station: This will be located next to the administration building, and is required to cleaning the wheels of waste vehicles leaving the site.

RESURFACING OF THE VEHICLE ACCESS FROM L481 TO THE ENTRANCE TO TINTARENI LANDFILL

3.3.18 The existing access road will be resurfaced to provide a stable and safe access road for vehicles to access the site (including the new hook lift trucks):

- Road structure reconstruction – in scope to obtain a road structure resistant to the new waste transfer tracks;
- Rehabilitation of the existing rain water collecting system; and
- Vegetation management – removal of encroaching trees and bushes.

3.3.19 An example design for the proposed road structure is provided in Figure 3-2.

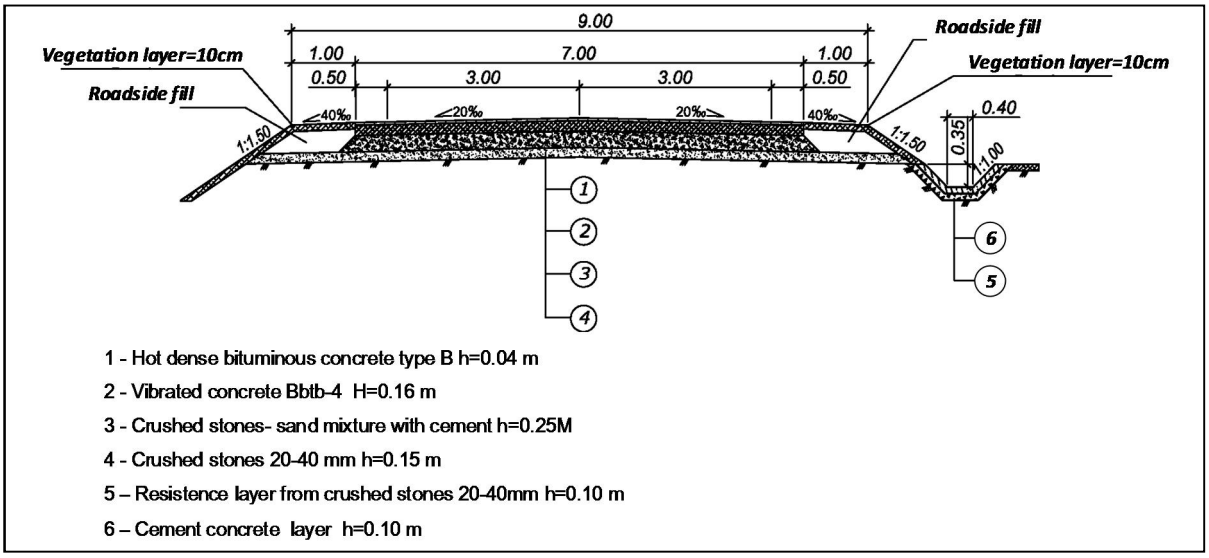


Figure 3-2 Suggested Road Structure Cross-section

NEW VEHICLE FLEET TO TRANSPORT WASTE TO THE TINTARENI LANDFILL

3.3.20 The new fleet of waste transfer vehicles, comprising 22 vehicles and trailers, will have 40m^3 containers that will be loaded and transported by hook-lift trucks. Each trailer truck unit will be able to carry 2 x 40 m^3 containers. They will access Tintareni landfill via the previous access route from Route 2.

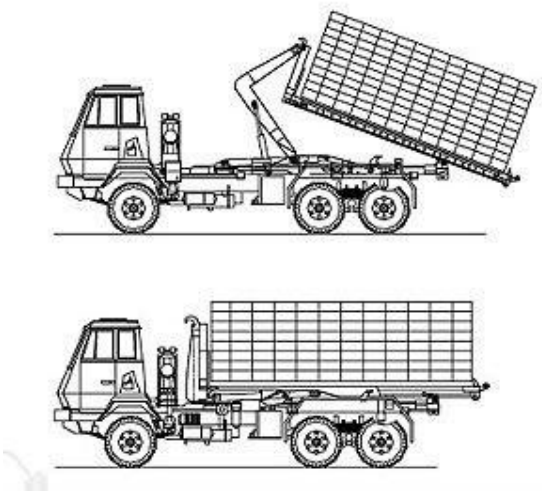


Figure 3-3 Diagram of a hook-lift trucks and trailer

3.3.21 The empty and full containers at the Transfer Station will be moved by a hook-lift truck and parked in a storage area, from where the hook-lift truck will load the full containers for transport to Tintareni landfill. Additional containers will be available at the transfer station for storage of unloaded waste so that in total 50 containers will be required. The new containers will be covered with canvas to ensure the waste is secured in the container during transport to Tintareni landfill.

3.3.22 The waste collection vehicles procured for the Project will meet the Euro III emissions standard as a minimum. It is not possible to procure Euro IV and Euro V vehicles for the Project, as the fuel currently available in the Republic of Moldova is unsuitable for these vehicles. The available fuel is of a much lower quality and contains impurities, which drastically affect the performance and the lifespan of the engine and exhaust system.

IMPROVED GAS MANAGEMENT SYSTEM

3.3.23 A system to collect the landfill gas produced by the landfill operations during phase 2, will be installed. The gas collection system will consists of:

- Gas extraction wells;
- Gas collection and transmission system including pipework, dewatering unit and gas sub-station; and
- Co-generation facility with flare.

ENVIRONMENTAL MONITORING SYSTEMS AND PROCEDURES

3.3.24 Three monitoring (observation) wells for groundwater will be installed, by drilling of boreholes and casing them as monitoring wells. They will be sampled and analysed periodically to check for potential contamination.

3.3.25 Observation wells for probable landfill gas migration will be installed around the entire waste cell at Tintareni landfill, and measurements will be undertaken periodically. The locations of the monitoring and observation wells will be confirmed following the completion of geotechnical investigations.

NEW FENCING AROUND THE TINTARENI LANDFILL

3.3.26 Tintareni landfill will need new fencing around the perimeter to comply with the EU Landfill Directive Design Standards.

NEW WASTE COLLECTION SYSTEM IN THE VILLAGE OF TINTARENI

3.3.27 A system for waste collection in the village of Tintareni will be required to provide benefits to the local community, once the Tintareni landfill is upgraded.

3.4 CLOSURE PLAN FOR THE TEMPORARY DUMPSITE IN CIOCANA

3.4.1 Once the existing Tintareni Landfill is upgraded and re-opened, it will be possible to close the temporary dumpsite site in Ciocana District, Chisinau. The temporary dumpsite site is located at the old “Purcel” quarry located on the Uzinelor Street. This site was opened for solid waste disposal as a temporary measure in 2011, following the unexpected closure of the Tintareni Landfill. The capacity of this site is expected to be exhausted around the end of 2016. This site does not have a gas collection system. The site lies adjacent to a Solid Waste Transfer Station operated by the Company.

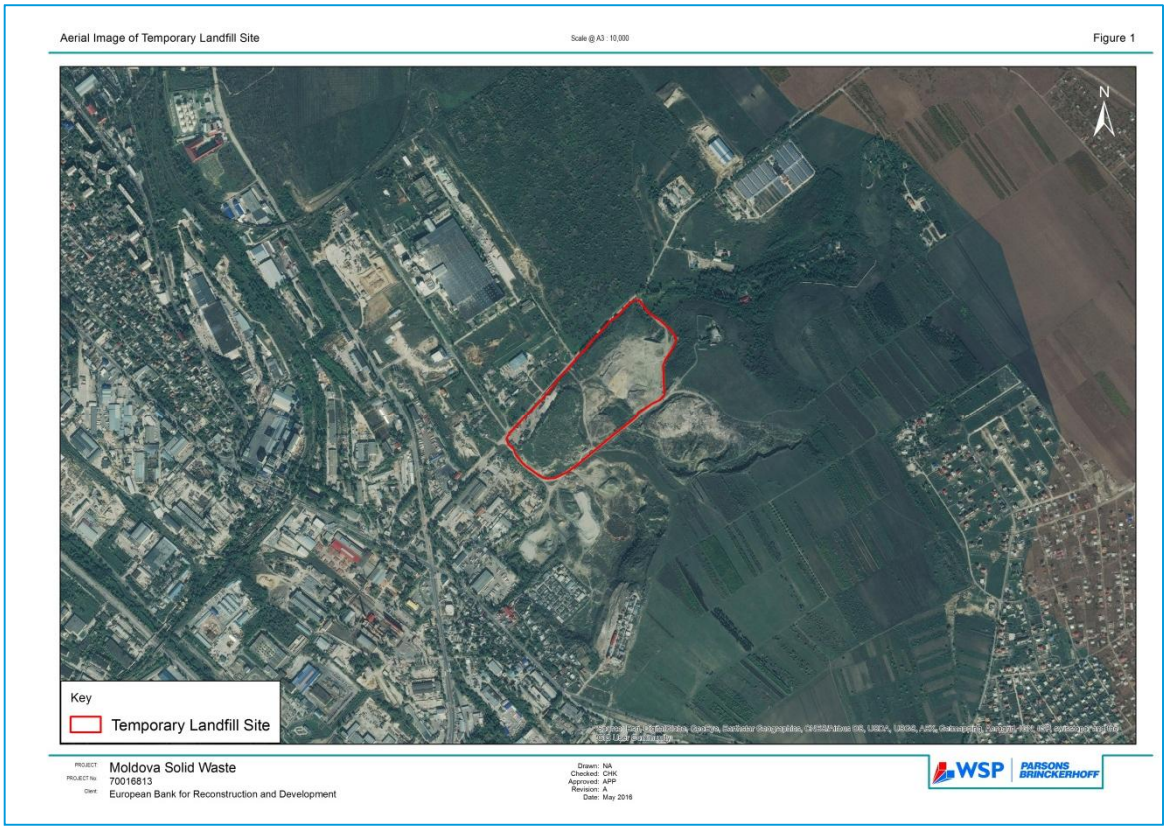


Figure 3-4 Aerial Photograph of the Temporary dumpsite in Ciocana District, Chisinau

3.4.2 The closure plan for the temporary dumpsite in Ciocana was prepared by Fichtner Management Consulting.

3.4.3 The Closure Plan includes the following measures:

- Surface Sealing
- Leachate Drainage System
- Landfill Gas Management System and Flare Station
- Surface Water Management System
- Monitoring Wells
- Access Road and Perimeter Fence
- Topsoil and Landscaping

3.4.4 The ESIA team has reviewed the closure plan, including the potential for economic displacement on the site operators and informal waste pickers. This review is provided in Appendix A and includes recommendations to supplement the closure plan, with a view to enhancing the environmental and social benefits of closing the temporary dumpsite at Ciocana.

3.4.5 A Livelihood Restoration Framework (WSP I PB 2017) has also been prepared, in compliance with Moldovan legislation and the EBRD's Environmental and Social Policy from 2014, particularly Performance Requirement 5 (Land Acquisition, Involuntary Resettlement and Economic Displacement). This is required because when the temporary dumpsite is closed, the informal waste pickers will no longer be able to continue collecting waste and will lose their source of livelihoods. Therefore, appropriate livelihood restoration measures will be developed and implemented. The Livelihood Restoration Framework will be implemented by Regia Autosalubritate.

4 ALTERNATIVES

4.1 INTRODUCTION

4.1.1 The EU EIA Directive 2014, Annex IV, Paragraph 2, requires the inclusion of an outline of the main alternatives and an indication of the main reasons for the choice made, taking into account the environmental effects. This chapter includes an overview of the project alternatives, including alternative investment options.

4.1.2 The main alternatives considered are summarised here (and detailed in Section 4.2 to 4.5):

- Do nothing scenario;
- a new Landfill near Chisinau;
- alternative access road to the Tintareni Landfill;
- refurbishment of the existing waste transfer station in Ciocana and investment in a water sorting plant;
- a new waste digestion plant for energy and heat production.

4.2 DO NOTHING

4.2.1 A ‘do nothing’ scenario has been considered as an alternative to the proposals. The following conditions are likely to remain or occur, if the Project does not proceed:

- The Tintareni landfill would remain closed. The current leachate and gas management systems would continue, the current problems with these systems would continue potentially resulting in air and water pollution;
- The capacity of the Ciocana landfill will be exhausted around the end of 2016, leading to a search for an alternative landfill. It has been identified that there are no alternative sites comparative to the Tintareni landfill within a 60km radius of Chisinau, which would be suitable for construction of a landfill;
- With a lack of available landfills there is a potential for an increase in illegal waste dump sites and fly-tipping of waste, creating further sources of pollution; and
- Without the implementation of an appropriate closure plan for the Ciocana landfill there are highly likely to be adverse effects on the surrounding environment and population, such as the pollution of air, water and soil.

4.3 A NEW LANDFILL NEAR CHISINAU

4.3.1 The pre-feasibility report (WEG, 2012) states that there is a consensus among the environmental and municipal authorities that the operation of the Tintareni landfill should be recommenced as soon as possible, and that there are no alternative sites comparable with the Tintareni landfill site within a 60km radius around Chisinau to construct a new landfill. Upgrading the existing Tintareni Landfill to EU standards would provide investment, which would finance improvements to the current situation, including upgrades to the existing gas and leachate management systems.

4.4 ALTERNATIVE ACCESS ROAD TO THE TINTARENI LANDFILL

4.4.1 Prior to 2010, when the landfill was operational the waste was transported to the landfill by truck through the village of Tintareni. This resulted in air quality and noise impacts on residents along the route, particularly those with properties close to the road. The trucks also leaked liquid onto the road and waste fell from the trucks and littered the sides of the road (resident of Tintareni, personal communication).

4.4.2 Two alternative access routes were considered to reduce the impact of the trucks on the residents of the village of Tintareni (Figure 4-1):

1. The first is a route proposed by the Company, which is an unpaved rural road that follows the perimeter of the village, but is adjacent to a new extension to the village and is close to the residential properties that are currently under construction.
2. The second option is to upgrading a 3km unpaved rural road near the village, proposed in the pre-feasibility study. There are fewer properties near this route, with one farm and one house adjacent to the alignment.

SITE VISIT

4.4.3 The project team visited both the alternative access routes.

OPTION 1

4.4.4 The alternative access route proposed by the Company only bypasses a short section of the village of Tintareni. The route would be immediately adjacent to residential properties that are currently being constructed. The road is currently in disrepair and would require upgrading. It will also require the waste trucks to turn at two additional junctions, so is likely to have traffic safety implications.

4.4.5 This proposed alternative access route is unsurfaced and gravel based and is likely to cause significant dust re-suspension issues unless completely resurfaced (no traffic was witnessed travelling along this route during the site visit). Furthermore, this alternative route is not conducive to use by the waste trucks given the proximity to residential receptors and the existing width of the roads/track.

OPTION 2

4.4.6 The route in the pre-feasibility study is several kilometres in length and follows existing agricultural access tracks. It passes close to residential properties at two locations. This single track dirt road is likely to be expensive to upgrade to a standard that is suitable for the waste trucks, and is very steep in one location. The land is in private ownership which is also likely to preclude this option.

Figure 4-1 Alternative Access Roads to the Tintareni Landfill

PREFERRED OPTION - EXISTING ACCESS ROUTE

4.4.7 The project proposes to use the current access route to Tintareni Landfill, via National Route 2 and the District Route 481 (yellow route – Figure 4-1). The two alternative routes were considered unsuitable for the waste trucks, as they would introduce disturbance in new locations in close proximity to residents. Option 2 would have further complications due to private land ownership.

4.4.8 The Air Quality and Noise assessments have considered the potential traffic related effects on residents adjacent to the existing route. New covered waste trucks will be used to transfer the waste to the site, which will reduce the nuisance associated with waste and liquid falling from the waste trucks.

4.5 REFURBISHMENT OF THE EXISTING WASTE TRANSFER STATION AND INVESTMENT IN A WASTE SORTING PLANT

4.5.1 The Waste Transfer Station is located in Ciocana District, adjacent to the temporary dumpsite site. It comprises of an uncovered area of hard standing. The Feasibility Study (Fichtner Management Consulting, 2016) outlines several investment options, including measures to refurbish the existing waste transfer station in Ciocana District. The proposed refurbishment would not divert a sufficient amount of waste from landfill to enable it to be an effective alternative to the Project. These measures are being considered for inclusion in the loan package, and although they would enhance the package they are not required for the Project to go ahead.

4.5.2 ABS SRL" LTD is currently constructing a waste sorting plant in Chisinau. ABS is a privately owned Company which is planning to launch their sorting facility in a few months. The sorting facility will employ 200 people to work on the sorting lines. As a waste sorting plant is already been provided by a private company, it would not be appropriate to compete with this enterprise by investing in a further waste sorting plant.

4.6 NEW WASTE DIGESTION PLANT FOR ENERGY AND HEAT PRODUCTION

4.6.1 This facility is proposed to be constructed in the village of Bubuieci. Food waste is a major constituent of the waste produced in the country (Fichtner 2015). This would require segregation of food waste and construction of holding tanks for treatment of the waste with bacteria. The digester would then provide a source of energy (through biogas) and heat. In addition, the digestate produced has the potential to be used as a fertiliser, however, this would be dependent on the quality of the feedstock (i.e. the food waste).

4.6.2 This option is proposed as a medium term solution, and is not included in the current loan package, due to the costs involved and waste collection systems required. The current waste collection system does not have an effective system for the separate collection of waste, due to poor uptake of the systems, and high levels of cross-contamination. An anaerobic digester would require a more effective separate waste collection system to be established, because the process is sensitive to contaminants.

5 EBRD Performance Requirements, EU Standards, Legislative and Policy Context

5.1 EBRD PERFORMANCE REQUIREMENTS

5.1.1 The following EBRD requirements are applicable to the Project:

- PR 1: Environmental and social appraisal and management;
- PR 2: Labour and working conditions;
- PR 3: Pollution prevention and abatement;
- PR 4: Community health, safety and security;
- PR 5: Land acquisition, involuntary resettlement and economic displacement (*no involuntary resettlement foreseen, although land acquisition and economic displacement have been considered*);
- PR 6: Biodiversity conservation and sustainable management of living natural resources;
- PR 8: Cultural heritage;
- PR 10: Information disclosure and stakeholder engagement.

5.2 INTERNATIONAL CONVENTIONS

5.2.1 The Republic of Moldova has ratified several international environmental conventions and protocols that are of relevance to the Project, as set out in Table 5-1.

Table 5-1 International Conventions

International Convention	Date of ratification (Rt), accession (Ac), approval (Ap), adoption (At) entry into force (EIF)	Comment
UN Framework Convention on Climate Change (New-York, 1992)	09.06.1995 (Rt)	Climate Change effects are considered in Chapter 7.
Kyoto Protocol (Kyoto, 1997)	22.04.2003 (Rt)	Climate Change effects are considered in Chapter 7.
Convention on Biological Diversity (Rio-de-Janeiro, 1992)	20.10.1995 (Rt)	Ecology effects are considered in Chapter 9.
Convention Concerning the Protection of the World Cultural and Natural Heritage (Paris, 1972)	23.09.2002 (Rt)	Ecology effects are considered in Chapter 9.
Convention on the Conservation of Migratory Species of Wild Animals (Bonn, 1979)	01.04.2001 (EIF)	Ecology effects are considered in Chapter 9.
Agreement on the Conservation of Populations of European Bats	02.02.2001	Ecology effects are considered in Chapter 9.
Global Forest Resources Assessment (FAO)	Participates	Ecology effects are considered in Chapter 9.

Table 5-2 Regional Environmental Conventions

Regional Conventions	Comment
Convention on Environmental Impact Assessment in a Transboundary Context (Espoo, 1991)	Not Applicable as the Project is approximately 30km for the nearest country border, and there will be no effects at this distance from the Tintareni landfill site.
Protocol on the Reduction of the Sulphur Emissions or their transboundary Fluxes by at least 30 per cent, 1985	Air Quality effects are considered in Chapter 7. No transboundary effects are anticipated.
Protocol on Limitation of Emissions of Nitrogen Oxides or their transboundary Fluxes, 1988	Air Quality effects are considered in Chapter 7. No transboundary effects are anticipated.
Protocol on Limitation of Emissions of Volatile Organic Compounds or their Transboundary Fluxes, 1991	Air Quality effects are considered in Chapter 7. No transboundary effects are anticipated.
Protocol on Further Reduction of Sulphur Emissions, 1994	Air Quality effects are considered in Chapter 7. No transboundary effects are anticipated.
Protocol on Heavy Metals, 1998	Contamination effects are considered in Chapter 12.
Protocol to Control Oxidation, Eutrophication and Ground Ozone, 1999	Air Quality effects are considered in Chapter 7.
International Co-operative Programme on Assessment and Monitoring of Air Pollution Effects on Forests (ICP Forests)	Air Quality effects are considered in Chapter 7.
Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Helsinki, 1992)	Water Resource effects are considered in Chapter 13. No transboundary effects are anticipated.
Protocol on Water and Health (London, 1999) - which aims to protect human health and well-being by better water management, including the protection of water ecosystems, and by preventing, controlling and reducing water-related diseases.	Water Resource effects are considered in Chapter 13.
Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (Aarhus, 1998)	The ESIA has been produced with extensive and effective public participation, and access to information.
Convention on the Conservation of European Wildlife and Natural Habitats (Bern, 1979) - which aims to conserve wild flora and fauna and their natural habitats, with particular attention to endangered and vulnerable species.	Ecology effects are considered in Chapter 9.

5.3 EU ENVIRONMENTAL STANDARDS

5.3.1 The Project is required to meet relevant EU substantive environmental standards, including (but not limited to) the pertinent requirements of the EIA Directive (as updated in 2014), Industrial Emissions Directive, Water Framework Directive, EU Landfill Directive and Birds and Habitat Directives. When host country regulations differ from EU substantive environmental standards, the Project will be expected to meet whichever is the more stringent.

EU EIA DIRECTIVE

5.3.2 A review against EU EIA Directive[1] requirements has been undertaken, to assess whether the project activities are listed in Annex I or II of the EIA Directive. EU EIA Annex I projects require a full EIA in the EU. For Annex II projects, EIA is not compulsory but requires assessment on a project by project basis, using national law to undergo a "screening process".

5.3.3 The following are of potential relevance for the Tintareni Landfill site:

- "Annex I, PROJECTS REFERRED TO IN ARTICLE 4(1), Waste disposal installations for the incineration, chemical treatment as defined in Annex I to Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste under heading D9, or landfill of hazardous waste, as defined in point 2 of Article 3 of that Directive"; and
- "Annex II, PROJECTS REFERRED TO IN ARTICLE 4(2), 11.OTHER PROJECTS (b) Installations for the disposal of waste (projects not included in Annex I)".

5.3.4 The upgraded Tintareni Landfill will not be designed to accept hazardous waste. The Project would therefore be captured under Annex II as a waste disposal installation that is not included in Annex I.

EU ENVIRONMENTAL DIRECTIVES

5.3.5 The following EU Directives are of relevance to the Project:

- Birds Directive - this gives provision for the protection of all wild birds, their nests, and eggs, within the European Community;
- Habitats Directive - this provides a framework for the strict protection of animal and plant species listed under Annex IV of the Directive;
- The Water Framework Directive (2000/60/EC) – this establishes a framework for protecting the water environment;
- The Groundwater Directive (2006/118/EC) - this is an environmental protection measure which provides enhanced protection for groundwater;
- Air Quality Directive – this is an environmental protection measure aimed at defining and establishing objectives for ambient air quality designed to avoid, prevent or reduce harmful effects on human health and the environment;
- Environmental Noise Directive - the main EU instrument to identify noise pollution levels and to trigger action at Member State level.

INDUSTRIAL EMISSIONS DIRECTIVE

5.3.6 Industrial Emissions Directive (IED) aims to achieve a high level of protection of human health and the environment taken as a whole by reducing harmful industrial emissions across the EU, in particular through better application of Best Available Techniques (BAT).

1 DIRECTIVE 2011/92/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment (codification) and DIRECTIVE 2014/52/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment

5.3.7 The IED Directive combines seven existing Environmental Directives including, IPPC, Waste Incineration, Solvent Emissions, Titanium Dioxide and Large Combustion Plant Directives. From 2013 onwards, relevant sites were required to apply for a permit under the IED Directive (2010/75/EU). The upgraded Tintareni landfill site would be relevant site under the IED regime as it falls under:

"*Annex I, Section 5 Waste Disposal, 5.4 Landfills, as defined in Article 2(g) of Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste, receiving more than 10 tonnes of waste per day or with a total capacity exceeding 25,000 tonnes, excluding landfills of inert waste*."

5.3.8 The maximum daily amount of waste that will be delivered to the upgraded Tintareni landfill is estimated to be around 1,750 tonnes per day. This correlates well with the proposed number of vehicle trips of around 60 per day with each trailer truck unit able to carry 2 x 40 m^3 containers. This estimated quantity far exceeds the 25,000 tonne total capacity threshold and the 10 tonnes per day threshold specified in the IED Directive. In an EU context, the re-opened Tinterani landfill would be required to be permitted under the IED and as such will be required to comply with BAT. A high level review of BAT requirements is provided in Appendix C.

EU LANDFILL DIRECTIVE

5.3.9 The objective of the Landfill Directive[2] is to prevent, or reduce as far as possible, negative effects on the environment, in particular on surface water, groundwater, soil, air, and on human health from the landfilling of waste by introducing stringent technical requirements for waste and landfills.

5.3.10 The Landfill Directive defines the different categories of waste (municipal waste, hazardous waste, non-hazardous waste and inert waste) and applies to all landfills, defined as waste disposal sites for the deposit of waste onto or into land. Landfills are divided into three classes:

1. Landfills for hazardous waste;
2. Landfills for non-hazardous waste; and
3. Landfills for inert waste.

5.3.11 A standard procedure for the acceptance of waste in a landfill is laid down so as to avoid any risks, including:

- waste must be treated before being landfilled;
- hazardous waste within the meaning of the Directive must be assigned to a hazardous waste landfill;
- landfills for non-hazardous waste must be used for municipal waste and for other non-hazardous waste;
- landfill sites for inert waste must be used only for inert waste; and
- criteria for the acceptance of waste at each landfill class must be adopted by the Commission in accordance with the general principles of Annex II.

2 Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste

5.3.12 The following wastes may not be accepted in a landfill:

- liquid waste;
- flammable waste;
- explosive or oxidising waste;
- hospital and other clinical waste which is infectious;
- used tyres, with certain exceptions; and
- any other type of waste which does not meet the acceptance criteria laid down in Annex II.

5.3.13 The Directive sets up a system of operating permits for landfill sites. Applications for permits must contain the following information:

- the identity of the applicant and, in some cases, of the operator;
- a description of the types and total quantity of waste to be deposited;
- the capacity of the disposal site;
- a description of the site;
- the proposed methods for pollution prevention and abatement;
- the proposed operation, monitoring and control plan;
- the plan for closure and aftercare procedures;
- the applicant's financial security;
- an impact assessment study, where required under Council Directive 85/337/EEC on the assessment of the effects of certain public and private projects on the environment.

5.3.14 EU Member States are required to ensure that existing landfill sites do not continue to operate unless they comply with the provisions of the Directive.

5.3.15 The Tintareni Landfill will be designed to take municipal waste and therefore should only be permitted to accept non-hazardous wastes. To remain compliant with the Landfill Directive, it cannot accept waste that is mixed with waste from another class (i.e. hazardous or clinical waste).

EUROPEAN UNION WASTE LEGISLATION

5.3.16 In addition to the Landfill Directive, the Project will be required to meet the same environmental, health and safety standard of management and control, as prescribed within the European Union legislation relating to waste management:

- → The Waste Framework Directive, 2008/98/EC, which sets basic waste management definitions, such as waste, recovery and disposal systems and when recovered material ceases to be a waste; the waste hierarchy, support for waste prevention, recycling and recovery; producer responsibility, permitting and inspection for non-landfill waste activities. As amended by Decision 2014/955/EU and Commission Regulation (EU) No.1357/2014.
- → Decision 2000/532/EC establishing a list of wastes. This establishes the classification system for wastes, including a distinction between hazardous and non-hazardous wastes. It is closely linked to the list of the main characteristics which render waste hazardous contained in Annex III to the Waste Framework Directive.
- → The Packaging Directive 94/62/EC and subsequent additions, which set a timetable for manufacturers to make packaging capable of recovery and set minimum percentage targets for recycling and recovery of packaging materials.

→ The Industrial Emissions Directive, 2010/75/EU, (incorporating the previous IPPC and Waste Incineration Directive requirements).

The Groundwater Directive 80/68/EEC, which contains provisions to protect groundwater from pollution caused by certain dangerous substances.

5.4 APPROPRIATE ASSESSMENT

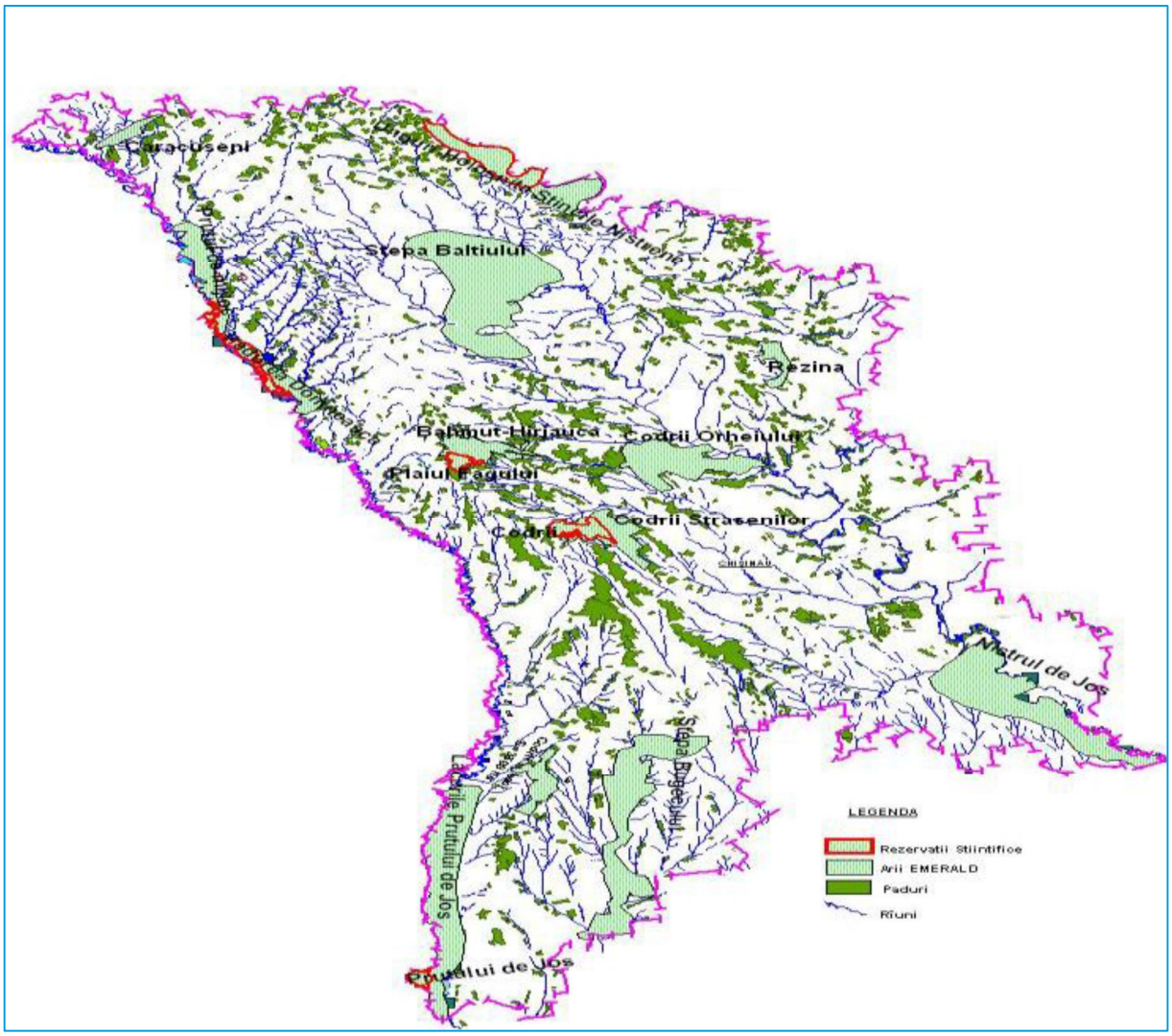


Figure 5-1 GIS Map of Emerald Sites in Moldova[3]

[3] http://pjp-eu.coe.int/documents/1461016/3828642/Moldova_Emerald_Narrative_Report_2013.pdf/7eb210f3-2c47-4496-b08e-f9e8abf16f50

5.4.1 Appropriate Assessment is required by Article 6(3) of Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora, herein referred to as the European Habitats Directive. Appropriate Assessment tests whether a plan or a project is likely to have a significant adverse impact on a European Sites, such as:

- Special Protection Area – a European designation which protects birds;
- Special Area of Conservation – a European designation which protects habitats;
- Ramsar site – a European designation which protects wetlands.

Appropriate Assessment is not considered necessary for the Project, as it not located near any European designated sites. The site is not located close to any equivalent critical habitat sites such as Emerald sites.

5.5 ADMINISTRATIVE BODIES IN THE MOLDOVAN ENVIRONMENT SECTOR

5.5.1 The main administrative bodies which are involved in the environmental sector are:

- The Ministry of the Environment (MoE, former Ministry of the Ecology and Natural Resources) is responsible for the development and promotion of the State policy in the field of environment. MoE initiates drafts environmental laws and regulations and issues relevant instructions and decisions, ensures coordination and control over the implementation of environmental laws and policies, issues permits on natural resources uses and licenses for polluting emissions, elaborates environmental standards and normative documents. MoE is also responsible for environmental monitoring and overseas national environmental institutions, such as the State Ecological Inspectorate; State Hydro-Meteorological Service (SHMS), and the State Geological Agency (SGA).
- The State Ecological Inspectorate (SEI) is an environmental protection regulatory and enforcement agency which controls the implementation of environmental legislation and performs the State control over the rational use and protection / conservation of the natural resources. SEI has a wide network of Territorial Agencies and District (Rayon) Inspections which monitors industrial facilities impacting on environment. It issues permits on the use of natural resources and environmental pollution in admissible limits, enforces the application of ecological norms and requirements on the use of natural resources, hazardous substances and wastes. The SEI is fully involved in the State Ecological Expertise (SEE), and establishes emission limit values and maximum allowable concentrations for pollutants. The SEI performs environmental pollution monitoring. The SEI can levy fines or close down a facility in the case of non-compliance with environmental protection requirements.
- The SHMS performs, through the Monitoring Centre on Environmental Quality, regular monitoring of the air, water and soil quality as well as atmospheric radiation background levels. Among other task the SHMS is responsible for the weather hydrological and agro-meteorological forecasts, monitoring data recording and management.
- The SGA is responsible for the promotion of State policy in the field of management and the monitoring of underground resources, including underground water resources (deep underground water). It is responsible for monitoring (flows and quality), protection and management of underground water resource at the national level.
- State Agency “Apele Moldovei” (AM, Waters of Moldavia) is directly subordinated to the Government of Moldova. AM is the central technical and administrative organisation dealing with surface water resources, and is responsible for management of water resources used for irrigation, domestic and industrial water supply purposes as follows: development of long-term programs concerning river basins and water administration works throughout the country, including centralised water supply facilities, irrigation and drainage, protection against floods or other damage, coordinating of construction, design, and operation activities in the field of water. Design of water resource projects and for land reclamation works such as irrigation,

drainage or soil erosion control is the mission of Acvaproject Design Institute subordinated to "Apelei Moldovei".

- The Ministry of Healthcare (MoH) is the central authority responsible for population health protection, and sanitary and epidemiological supervision. Ministerial sub-division National Scientific and Practical Centre for Preventive Medicine performs regular sampling and analysis of water quality in water bodies and groundwater used for drinking water supply (tap water, artesian and shallow wells), and those used for recreation purposes.

5.6 MOLDOVAN EIA LEGISLATION

5.6.1 The project is required to comply with Moldovan EIA legislation, as set out in:

- → Law on Environmental Impact Assessment, adopted in 2014, which specifies the necessary Environmental Assessment procedures for large and complex projects, as specified in annex 1 and 2. It is fully harmonised with the EU Directive; and
- → The Law on Ecological Expertise and Environmental Impact Assessment, no. 851-XIII dated 29 May, 1996 (Appendix D1).

5.6.2 According to the law, all projects fall under three main categories:

- → First category – projects that require full EIA, and can only be developed (detailed design) only after a positive approval of EIA findings by the State Ecological Expert (SEE);
- → Second category – projects require ecological substantiation of project activities and a special environmental chapter to be included in the project design documentation and respectively positive approval from SEE before commencement of construction; and
- → Third category – all other projects which do not need to be passed through the formal procedures of EIA and SEE.

5.6.3 Moldovan EIA procedures are only applicable to complex and potentially dangerous (to the environment) projects which could lead to significant impacts. Among others, these include:

- → Installations for recycling, with a capacity exceeding 100 tonnes per day; and
- → Waste disposal installations with a capacity of 50 to 100 tonnes per day.

5.6.4 The Ministry of Environment may require EIA for other types and scales of projects on a case-by-case screening, but criteria and procedures for this decision are not specifically stipulated in the Law.

5.6.5 The EIA scoping report (WSP I PB 2016), and the Project Feasibility Study (Fichtner, 2016) have been submitted to the Ministry of the Environment. The confirmation receipt from the Ministry of Environment is provided in Appendix D2. The Ministry of the Environment decision was that the EIA has to be developed in conformity with Law on EIA, No. 86 dated 29 May 2014, Chapter V,I EIA Procedure for the National level (Appendix D3). The submitted EIA Programme is provided in Appendix D4.

5.6.6 The activities that have already been completed to comply with this procedure and the remaining activities that are required are set out in Table 5-3.

The ESIA will be restructured based on the format required by the national authorities and submitted to seek approval of the national authorities to fulfil local legislative requirements.

Table 5-3 Moldovan EIA Procedures

Activities	Responsibility	Status[1]	Proofs/Records
End of Feasibility Study by Fitchner	**F**	**Received**	FS Report (EN version)
Art. 7 Submit application regarding planned activity			
Elaboration of Application for planned activities	**I+C**	**Done**	Application was drawn up twice
Submit application to ME	**I+C**	**Done**	Resubmit Application to ME on 11.10.2016
Place information on web page of ME	**ME**	**Done**	ME placed on web site
Art. 9 Preliminary assessment of planned activity			
Preliminary assessment of application	**ME**	**Done**	ME examined Application and issued Decision no. 03-12/2346 of 16.11.2016
Publication of Decision on ME web site	**ME**	**Done**	Decision from ME regarding perform EIA at the National level ME placed Decision on web site on 16.11.2016 (please see http://www.mediu.gov.md/index.php/activitate/evaluarea-impactului/154-categorii-in-romana/activitate/evaluarea-impactului/2371-registru-evaluarii-prealabile-a-activitatii-planificate-anul-2016)
Art. 19 EIA procedure at the National level			
EIA Program elaboration	**I+C**	**Done**	EIA Program has been developed
Submit EIA Program to Bubuieci |Mayoralty	**I+C**	**Done**	EIA Program was submitted on 30th November 2016
Submit EIA Program to Tintareni Mayoralty	**I+C**	**Done**	EIA Program was submitted on 30th November 2016
Submit EIA Program to City Hall Chisinau	**I+C**	**Done**	EIA Program was submitted on 1st December 2016
Place EIA Program on Bubuieci web site	**I+C**	**Done**	EIA Program has been placed on Bubuieci web site (Please see link http://bubuieci.md/151-gestionarea-deeurilor-solide.html
Place EIA Program on Tintareni web site	**I+C**	**Not done**	Mayor of Tintareni agreed to place EIA Program on web site. This has not been done.
Place EIA Program on City Hall Chisinau web site	**I+C**	**Done**	EIA Program was submitted to the City Hall of Chisinau on 1st December 2016 and published on 22nd March 2017
Publication of EIA Ads in the local & national newspapers	**C**	**Done**	The Advertisement template was sent to Regia on 25.11.2016 and recommended national and local newspapers and sites.
	I	**Done**	IM Regia Autosalubritate has published on Adevarul de Anenii Noi and Moldova Suverana newspapers
Receiving written comments on the EIA Program	**I+C**	**Done**	No comments received
Submit EIA Program to ME	**I+C**	**Done**	
EIA Program coordination by the ME	**ME**	**Done**	A decision from ME for EIA Program has been provided
Art. 20 Elaboration of EIA			
EIA report elaboration	**I+C**	**Started**	
Receive comments from interested public	**I+C**	**Not started**	

Art. 21 EIA Examination and discussion			
Submit EIA to ME	**I+C**	**Not started**	
Place EIA to ME site and mass media	**ME/I+C**	**Not started**	
EIA examination	**ME**	**Not started**	
EIA examination and receive comments	**ME, LPA**	**Not started**	
EIA place on LPA web site	**LPA**	**Not started**	
Place EIA on IM Regia Autosalubritate web site	**I+C**	**Not started**	
Receive EIA comments from interested public	**I+C**	**Not started**	
Send copies of EIA comments to ME	**I+C**	**Not started**	
Draw up a Report of Public Participation and submit to ME	**I+C**	**Not started**	
Art. 22 Public debates procedure			
Place ads regarding public debates	**I, LPA**	**Not started**	
Public debates organisation	**I, LPA**	**Not started**	
Drawn up Minute of public debates	**ME, I**	**Not started**	
Draw up and send answers to authors of questions	**I+C**	**Not started**	
Submit docs to ME	**I+C**	**Not started**	
Art. 23 Environmental Agreement			
Issue of EA	**ME**	**Not started**	

ME – Ministry of Environment, P – Public¸ LPA – Local Public Authority, CPA – Central Public Authority, C – Consultant, I – Initiator

[1]Green – Complete, Yellow - Started but not complete, Red – not started.

5.6.7 The relevant National Laws that relate to the environment are outlined in Table 5-3.

Table 5-4: National Environmental Law

National Law	Implications
Law on environmental impact assessment, No. 86 dated 29 May 2014	This Law sets out a legal basis for the environmental impact assessment (EIA) of public and private projects or proposed economic activities that aims to prevent or to reduce negative environmental impact and to protect public health at the initial stages of a project. The EIA process should be carried out in line with the following key principles: (a) preventive actions; (b) reliability and completeness of information; (c) transparency and accessibility; (d) public participation; (e) risk assessment; and (f) polluter pays.
Resolution No. 248 dated 10 April 2013 on approval of the Waste Management Strategy of the Republic of Moldova (2013-2027)	The Strategy stipulates the major targets to be achieved in the waste management sector in the Republic of Moldova. The Strategy also includes an action plan, which outlines the implementation activities, their timeline, approximate costs, performance indicators and responsibilities.
Law on hazardous products and substances No. 1236-XIII dated 3 July 1997	It sets a legal framework regulating generation, storage, transportation, treatment and disposal of hazardous products and substances including aspects associated with their import and export.
Law on waste from production and consumption No. 1347-XIII dated 9	This law regulates the relationship between waste generation, storage, transportation, recycling and disposal of waste and is based on approach and standards of the Soviet Union. It covers the aspects of national

October 1997. This Law is abrogated and the new Wastes Law no. 209 of 29.07.2016 came into force from 23.12.2017. This law is in conformity with Directive 2008/98/CE	monitoring, supervision and control in the waste management sector and aims to avoid the negative impact on the environment and human health as a result of waste management. The law defines the responsibilities and roles of key stakeholders in the waste management sector. The law defines waste minimization and recycling through the full economic cycle as a priority. However, the generic nature of this law and lack of enforcement mechanisms do not actually prevent environmental pollution. The law on waste does not follow the international standards, e.g. "waste hierarchy" principles and promotion of the extended producer responsibility. Taking into account the current developments in the waste management sector as well as the agreements of the Republic of Moldova towards EU accession, a new draft law on waste has been developed and is to replace the existing law on waste. The provisions of the draft law on waste are described below.
Law on payment for environmental pollution No. 1540-XIII dated dated 25 February 1998	This Law provides for the payment for pollutant air emissions from stationairy and mobile sources,disposal of industrial waste, import duties on products that has a potential to pollute the environment in the process of their use and charges for plastic and tetra-pack packaging.
Law on natural resources No. 1102-XIII dated 6 February 1997	It establishes the legal framework for the settlement of the relations regarding the usage, protection and reproduction of the natural resources in order to ensure the environmental security if the country.
Law on ecological expertise No. 851-XIII dated 29 May 1996	The scope of the state expertise is to examine the compliance of proposed activities and projects with the requirements of national environmental legislation and standards. Should the competent authority (the Ministry of Environment) establish that the activities listed in Appendix 2 of the "Law on environmental impact assessment", No. 86 dated 29 May 2014 do not require the EIA, technical documentation shall be prepared, which shall be the subject of the state ecological expertise.
Law on environmental protection No. 1515-XII dated 16 June 1993	This is a framework environmental law that stipulates national policy and priritises environmental actions based on proven approaches focusing on nature protection and sustainable use of resources. The law defines the regulatory principles and the measures required to ensure a safe and healthy environment. The law sets out activities to monitor environmental compliance.

5.6.8 The environmental and social topic chapters contain further legislation that relates to each individual environmental and social topic.

5.7 NATIONAL WASTE MANAGEMENT STRATEGY FOR MOLDOVA

5.7.1

A National Waste Management Strategy (NWMS) for Moldova (Ministry for Environment Republic of Moldova, 2013) provides a government commitment for development of a legal and institutional framework to support the gradual alignment to EU waste management practices and the development of waste management infrastructure and services. The strategy is for the implementation during the period of 2013-2027 and covers all waste types. The vision is for an economically efficient and integrated waste management system that would assure the protection of human health and the environment.

Figure 5-2 Regional Waste Management Territories

5.7.2 The specific objectives for municipal waste are:

- Promotion and implementation of selective collection systems in all areas, both in the domestic sector and production, as well as sorting, composting and recycling facilities;
- Improvement of waste transportation system and development of transfer stations (4-7 stations per district);
- Development of municipal waste disposal capabilities comprising construction of 7 regional waste storage facilities and 2 mechanical and biological treatment (MBT) plants; and
- Improvement of institutional governance in municipal waste management by creating 8 regional waste management territories, as shown in Figure 5-2.

5.7.3 The Plan for the Chisinau region (Region 4 in Figure 5-2) is to build one mechanical-biological treatment facilities. The plan proposes that the local authorities in Chisinau and Balti municipalities and neighbouring districts, work together to develop attractive and competitive investment projects for waste recovery, which would allow the development of more complex solutions to waste management problems, and the overcome of problems associated with the selection of land areas for the location of the solid household waste storage facilities.

5.7.4 The Project aims go towards meeting the NWMS objectives i.e. reopening an existing landfill as a solid household waste storage facility, and meeting EU standards for these facilities. It is understood that a Chisinau Solid Waste Master Plan shall be developed over the next few years which can also be developed as part of the Region 4 Master Plan.

6 ESIA METHODOLOGY

6.1 INTRODUCTION

6.1.1 The approach to the ESIA is outlined in this section of the report.

6.1.2 Annex IV, Paragraph 4, of the EIA Directive 2014, provides an indication of the topic areas to be considered in the EIA as follows:

"…. a description of the factors in Article 3 (1) likely to be significantly affected by the project: population, human health, biodiversity, land, soil, water, air, climate, material assets, cultural heritage, including the architectural and archaeological aspects, and landscape…..".

6.1.3 Having regard to the above, this Chapter sets out the approach adopted in the ESIA for the following topic areas:

- Air Quality and Climate Change;
- Noise and Vibration;
- Biological and Ecological Resources;
- Cultural Heritage;
- Landscape and Visual;
- Geology, Soils, Material and Waste;
- Water Environment;
- Social, Population and Human Health; and
- Transportation and Traffic.

6.2 TEMPORAL SCOPE

6.2.1 This ESIA has addressed effects that are anticipated to arise during the construction of the Project (the construction phase), and following its completion (commonly referred to as the 'operational phase') and following its closure (decommissioning). These effects can broadly be summarised as follows:

- Any effects during the construction phase that may arise as a direct result of construction activities such as demolition, temporary use of land (e.g. site compounds) and construction of new buildings and facilities; from associated changes in traffic movements (e.g. construction traffic travelling to and from the site); or from temporary closures or diversions such as when resurfacing the access road;
- operational effects relating to those effects which may arise from the introduction of new facilities into the surroundings or from the activities associated with the use of the upgraded landfill; and
- decommissioning effects related to the closure of the landfill.

6.2.2 Consideration has be given to those impacts (i.e. changes to the environment) associated with the Project, compared with the baseline conditions (i.e. those conditions which would exist if the development did not go ahead).

6.2.3 The baseline year for the assessment of construction impacts is the projected start year for construction, which is anticipated to be 2017. Construction impacts have been assessed for the projected period of construction, which is anticipated to be two years commencing in Summer 2017.

6.2.4 Operational impacts will be assessed for the proposed opening year for the Project unless stated otherwise in respect of a particular topic within the subsequent section of the ESIA. This is anticipated to be summer 2019.

6.2.5 The Tintareni landfill has been temporarily decommissioned and the baseline assessments indicate that it is not currently having significant environmental and social effects, with implementation of a Closure Plan at the decommissioning stage, significant adverse effects are considered unlikely and are therefore scoped out of further assessment.

6.2.6 When the upgraded landfill reaches full capacity, it will be decommissioned in accordance with a Closure Plan, to meet the requirements of the EU Landfill Directive. It is anticipated that the Closure Plan will include measures such as:

- Surface Sealing
- Continued Operation of the Leachate Treatment Plant
- Continued Operation of the Landfill Gas Management System
- Continued Operation of the Surface Water Management System
- Monitoring Wells
- Maintenance of the Access Road and Perimeter Fence
- Topsoil and Landscaping

The requirement to prepare a Closure Plan at the detailed design stage, is set out in the ESMP in Appendix B

6.3 SPATIAL SCOPE OF THE ESIA

6.3.1 The Project footprint for the ESIA is defined by the red line boundary shown in Figure 3.1.

6.3.2 The spatial scope for the ESIA varies, according to the specific assessment requirements of each ESIA topic. This is detailed further within each topic chapter, and also takes into account the following:

- the project footprint;
- the nature of the existing baseline environment;
- the pathway for some effects that may extend beyond the boundary of the Project footprint (e.g. effects on watercourses may extend beyond the area defined within the Project footprint);
- the area affected (beneficially, adversely, directly and indirectly) by transport movements; and
- the geographical boundaries of the political and administrative authorities which provide planning and policy context for the Project.

6.3.3 The spatial scale of the effect is defined in the ESIA according to whether it is Local, Authority-wide, Regional, National or International. Definitions of the spatial scales to be used are provided in Table 6-1.

Table 6-1 Definition of Spatial Scales

Spatial extent of effects	Definitions
International	Effects extending beyond Moldova
National (Moldova)	Effects within the Moldova but extending beyond region
Regional	Effects within the District of Anenii Noi
Local	Effects confined to a local area, typically <1km from source

6.4 BASELINE

6.4.1 Environmental effects from the Project are described in this ESIA in relation to the extent of changes to the existing baseline environment. The baseline is the environmental characteristics and conditions of the area likely to be affected that are present at the time of the assessment, or which are predicted to be the case at certain times during the Project's development ('future baseline').

6.4.2 The future baseline for the Project assumes that the Tintareni Landfill will continue to be non-operational; the existing leachate problems will continue; and the current vegetation on the site will continue to grow. The do-nothing scenario is set out in the Chapter 4.

6.4.3 The collection of baseline information has been achieved through desk study, consultation and field surveys where appropriate. Field surveys were undertaken for noise, air quality, traffic, and landscape. A hydrogeological study was commissioned by Fichtner Management Consulting as part of the Feasibility Study, and this was undertaken in parallel to the ESIA. Social data was obtained using a combination of research, interviews, surveys and public consultation.

6.4.4 The baseline environmental condition, including the predicted future baseline, has been assessed through the use of existing available data, additional studies, surveys and modelling.

6.4.5 A receptor is an entity that may be affected by direct or indirect changes to an environmental variable. Together, the receptors and their setting comprise the baseline for each topic. Relevant receptors have been identified for each environmental and social topic and an appropriate baseline has been developed for each of these topics.

6.4.6 This ESIA details the following aspects for the baseline:

- sources of information;
- methodology (including that for modelling or surveys);
- consultation;
- any limitations (data availability, seasonal variation, etc.); and
- the temporal and spatial extent.

6.5 PREDICTION OF IMPACTS AND ASSESSMENT OF EFFECTS

6.5.1 This ESIA report describes the outcome of the ESIA process, i.e. the significant effects of the Project. This has been undertaken in accordance with Annex IV, Paragraph 5 of the EIA Directive 2014. The ESIA details the significant environmental effects (both beneficial and adverse) that are predicted to result from the construction (including any re-commissioning activities) and operation of the Project.

6.5.2 The purpose of determining the significant effects of a project is to inform the decision maker so that it may make a balanced and informed decision regarding the project in respect of the environment.

6.5.3 An impact is a physical or measurable change in the environment, such as the demolition of a structure, the construction of new facilities, or an increase in noise levels. Construction impacts are those generated by construction activities, for example noise, dust, additional lighting from night works, risk of water pollution and traffic/road diversions. Operational impacts are the impacts that result from the project's existence beyond the construction phase. These include changes in the appearance of the site, and traffic movements associated with the waste trucks.

6.5.4 An effect is the interaction of such an impact or change in the environment with an identified receptor (such as a human being), or to the quality of an environmental resource. The significance of an effect is assessed by looking at what the changes will be against the existing, or predicted, baseline as a result of both the construction and operation of the project. The way that the significance of effect is determined for each topic varies, but in principle has been based on the degree of change (i.e. the magnitude of impact), along with the sensitivity of the receptor which is affected. Criteria which define the sensitivity of a receptor are provided in Table 6-2.

Table 6-2: Description of the Sensitivity of an Environmental Receptor

Sensitivity	Typical descriptors
Very High	Very high importance and rarity, international scale and very limited potential for substitution.
High	High importance and rarity, national scale, and limited potential for substitution.
Medium	High or medium importance and rarity, regional (within the District) scale, limited potential for substitution.
Low	Low or medium importance and rarity, local (within town or city) scale.
Negligible	Very low importance and rarity, very local (<1km) scale.

6.5.5 Descriptions of the magnitude of impact are provided in Table 6-3.

Table 6-3: Description of the Magnitude of an Impact

Magnitude of impact	Impact Type	Typical criteria descriptors
Very Large	Adverse	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements
	Beneficial	Large scale or major improvement of resource quality; extensive restoration or enhancement; major improvement of attribute quality
Large	Adverse	Loss of resource, but not negatively affecting the integrity; partial loss of/damage to key characteristics, features or elements
	Beneficial	Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality
Moderate	Adverse	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements
	Beneficial	Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring
Slight	Adverse	Very minor loss or detrimental alteration to one or more characteristics, features or elements
	Beneficial	Very minor benefit to or positive addition of one or more characteristics, features or elements
No change	n/a	No loss or alteration of characteristics, features or elements; not observable in either direction.

6.5.6 Once the sensitivity of receptors and magnitude of impacts have been established, the overall significance of effects has been assessed using the matrix in Table 6-4.

Table 6-4: Arriving at the Significance of Effects

		MAGNITUDE OF IMPACT (DEGREE OF CHANGE)				
		No change	**Slight**	**Moderate**	**Large**	**Very Large**
ENVIRONMENTAL SENSITIVITY	**Very High**	Not Significant	Minor significance	High Significance	Very High Significance	Very High Significance
	High	Not Significant	Minor significance	Medium Significance	High Significance	Very High Significance
	Medium	Not Significant	Minor significance	Minor significance	Medium Significance	High Significance
	Low	Not Significant	Minor significance	Minor significance	Minor significance	Medium Significance
	Negligible	Not Significant	Not Significant	Minor significance	Minor significance	Minor significance

6.5.7 The environmental and social topic chapters outline where this approach to assigning the significance of an effect varies, according to the requirements of that topic. Assessing the likely significant effects of the Project on the environment considers the direct effects and any indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, reversible and irreversible, beneficial and adverse effects of the Project.

6.5.8 Direct effects arise as a direct consequence of a project, for example an increase in construction traffic. Indirect effects are those which are not a direct result of the project, but occur away from the original effect or as a result of a complex pathway. The effect pathway is mediated or transmitted by effects on another receptor. Indirect effects consist of a sequence of at least two effect steps. For example, effects of traffic may indirectly affect air quality, and in turn affect people. There are many such interactions within an ESIA, which have been taken into account in this ESIA for each topic area. A secondary effect is a change to the environmental setting of a receptor, which in turn affects the receptor.

6.5.9 The EIA Directive also requires the assessment of cumulative effects. There are two aspects to cumulative effects:

- → those arising from the project in combination with other proposed developments;
- → additional impacts arising from interrelationships within the same project.

6.5.10 Consideration has been given to any proposals within the vicinity of the project that have the potential to come forward to a similar timescale, and hence where there is the potential for interaction of impacts with those arising from the proposed development to occur, either during construction or operation. Relevant proposals have been outlined at the outset of the ESIA when the site and its surroundings are described. Where relevant, the potential impacts of any or all of these projects, along with any others subsequently identified, have been considered in combination with those of the project, within the relevant topic chapters of this ESIA.

6.5.11 The potential for cumulative effects to arise as a result of several different impacts resulting from the project affecting a single receptor, or group of receptors, has also been considered. Individually, these effects might not be significant, but collectively they could assume a greater level of significance. Such effects could be negative or positive. The potential for such cumulative effects have been assessed within the Chapter 16 of the ESIA.

6.5.12 The ESIA does not use the term combined effects, as these are considered to be included within cumulative effects, nor does it use the term synergistic effects, as these are contained within direct, indirect and cumulative effects.

6.5.13 With regards to the frequency and duration of effects, the ESIA considers whether the effect will be continual or intermittent over the period of time identified. Duration of effect is defined in Table 6-5.

Table 6-5: Determination of Duration of Effect

	Duration of effect			
Classification	Long Term	Medium Term	Short Term	Very Short Term
Guideline	10-15 years	5-10 years	2-5 years	<2 years

6.5.14 Potential effects will be described as either temporary or permanent, according to whether or not the effect is expected to last for an indefinite period of time, and are be detailed within the topic chapters.

6.5.15 Any effects described as reversible or irreversible refer to whether the effect could be removed if deliberate action were taken to do so. This judgement is based on the timescale for a receptor's return to baseline conditions without intervention. If the timescale for a receptor's return to baseline conditions is greater than 15 years then it is considered irreversible and if it is less than it is considered reversible.

6.5.16 A beneficial effect is defined as one that is favourable or otherwise beneficial to the condition of a receptor. An adverse effect is one that is unfavourable or otherwise adverse to the condition of a receptor.

6.6 MITIGATION OF SIGNIFICANT ADVERSE EFFECTS

6.6.1 This ESIA includes details of any measures that can be practicably implemented to prevent or reduce any significant effects on the environment. The identification of any such measures has been undertaken as part of the ESIA process, and in parallel with the design process (taking into account Fichtner's parallel feasibility study), in order to incorporate measures into the project development, wherever feasible.

6.6.2 Effects have been assessed following the inclusion of mitigation measures as outlined above. If any significant effects remain after mitigation of significant adverse effects, these residual effects have been reported in the ESIA. Mitigation measures have also been incorporated in a separate ESMP (see Appendix B).

6.7 CONSULTATION AND STAKEHOLDER ENGAGEMENT

6.7.1 A Stakeholder Engagement Plan (SEP) has been be developed for the Project, as required under PR 1 and PR 10. It will be publicly disclosed and available for questions, comments and suggestions together with this ESIA, after which it will be regularly updated throughout the life of the Project.

CONSULTATION UNDERTAKEN DURING SITE VISITS

6.7.2 During the scoping stage the core environment team undertook two site visits, to refine their understanding of the proposed project and the work being undertaken for the feasibility study; to collect baseline environmental and social information; and to commence the consultation with interested parties.

SITE VISIT NOVEMBER 2015

6.7.3 This site visit was undertaken by Scott Beaton (PM), Rachael Bailey (ESIA lead), Andrew Moore (Hydrogeology lead), with support from local experts Alexandru Josan (Co-ordinator), Eugenia Ganea (Stakeholder Engagement Specialist) and Anatol Burlacu and Ivan Josan (Environment Specialists). The team undertook meetings with stakeholders (Table 3-2) and visited the sites and surrounding area (detailed in 6.7.4 to 6.7.14).

Table 6-1 Meeting with Stakeholders

NAME AND TITLE / ROLE	MEETINGS	DATE
Meeting 1		
Octavian Costas	EBRD office	17.11.2015
Olga Mereuta - M&E Officer		
Piotr Gontea - General Director	EBRD office	
Tudor Maniv - Director Autosalubritate		
Victor Serghienco – Deputy Technical Director		
Talking to waste pickers	Chisinau temporary site	17.11.2015
Meeting 2		
Victor Serghienco	Autosalubritate office	18.11.2015
Ala Rughina		
Tudor Maniv		
Meeting 3		
Fichtner representatives – Maria Belova (Feasibility Study PM), Nadia Boyarkina, Alex Cotr	Fichtner office	18.11.2015
Meeting 4		
Ministry of Environment		18.11.2015
Meeting 5		
Ina Pașcan – Mayor of Tintareni	Tintareni Mayor's office	19.11.2015
Meeting 6 – District Council Anenii Noi		
Department of culture	District Council Anenii Noi	21.11.2015
Department of Land Relations and Cadastre Service	District Council Anenii Noi	21.11.2015
Department of Agriculture	District Council Anenii Noi	21.11.2015

TINTARENI LANDFILL AND SURROUNDING AREA

6.7.4 The team visited the Tintareni Landfill, where Victor Serghienco (Deputy Technical Director Autosalubritate) described the design of the landfill, the surface water and leachate management system; the previous operational procedures at the landfill; and current operations now that the site is not operational. The project team was also shown the biogas facility and pipe network. The team also visited the area surrounding the Tintareni Landfill, including the Village of Tintareni and an illegal dumpsite in the village.

TEMPORARY DUMPSITE IN CIOCANA DISTRICT, CHISINAU

6.7.5 The team visited the Temporary Dumpsite in Ciocana District, Chisinau. The site is located in an industrial zone within the City of Chisinau. The project team were shown the Waste Transfer Station in Ciocana, where some limited segregation of waste (glass and paper) takes place before it is taken to the adjacent landfill. This is an uncovered area of hardstanding with basic equipment to reload the trucks once the waste has been segregated.

6.7.6 The team were able to view the operational procedures at the Temporary Dumpsite. The waste trucks transported the waste to the top of a mound, and then tipped the waste over the edge. There was no compaction of materials. The material was then partially covered with a layer of soil, which was also tipped from the top of the mound.

6.7.7 As the waste was tipped over the edge waste pickers surrounded the vehicle to collect glass and paper materials, which they stored in sacks ready for collection by external waste recycling companies.

6.7.8 The team spoke to two of the waste pickers, who explained that the external waste recycling companies provided the sacks that they collected the glass and paper waste on a daily basis. They paid the waste pickers 150 leu a day. The waste pickers all have other jobs or pensions and pick waste to supplement their income, particularly during the winter when there is less agricultural work available. There are no overnight stays at the landfill, the waste pickers live in the surrounding area.

AUTOSALUBRITATE OFFICES IN CHISINAU

6.7.9 Victor Serghienco provided a tour of the Company's offices in Chisinau. The depot contains the Company's administration offices, and is also used for vehicle storage, washing and maintenance. It also has staff welfare facilities, including a canteen, medical facilities, and dental facilities.

6.7.10 The site has several vehicle maintenance workshops, with a wide variety of equipment to repair the truck engines and bodywork. The majority of the waste trucks are older vehicles, which are likely to be simpler to maintain. There were also a small number of newer waste trucks.

6.7.11 The Company track their waste collection truck using a GPS system. This is to ensure that they visit all the waste collection sites on their route, and take the collected material to the waste transfer station for segregation and transfer to larger vehicles. When the truck drivers are unable to access waste bins on their route, they are required to photograph the obstruction and send it to the offices as evidence. All the drivers have an alcohol test before commencing their shifts, to check that they are fit for work.

ALTERNATIVE ACCESS TO TINTARENI LANDFILL

6.7.12 The project team visited the alternative access route proposed in the pre-feasibility study, and the alternative route identified by Autosalubritate.

6.7.13 The route in the pre-feasibility study is several km in length and follows existing agricultural access tracks. It passes close to residential properties at two locations. This single track dirt road is likely to be expensive to upgrade to a standard that is suitable for the waste trucks, and is very steep in one location. The land is in private ownership which is also likely to preclude this option.

6.7.14 The alternative access route identified by Autosalubritate only partially bypasses the village. The route would be close to some residential properties that are currently being constructed. The road is currently in disrepair and would require upgrading. It will also require the waste trucks to turn at two additional junctions, so is likely to have traffic safety implications.

MEETING WITH FICHTNER MANAGEMENT CONSULTING

6.7.15 The project team met with Fichtner Management Consulting, in Chisinau. They briefed the team on their feasibility study scope, timetable for completing the study, and their anticipated dates for consulting on the feasibility study.

6.7.16 Fichtner provided a copy of their draft commissioning brief for the Hydrological Study at Tintareni landfill. Andrew Moore provided additional advice on the content of the commissioning brief and the scope of work required for the Hydrological Study.

6.7.17 Fichtner also updated the project team on the timetable and scope of the Topographic Survey of Tintareni, which they were commissioning at the time of the visit. It was requested that they extend the spatial scope of this survey to beyond the boundary of the landfill site, to provide additional information for the ESIA and hydrological assessment.

MAYOR OF TINTARENI

6.7.18 The Mayor outlined the villages concerns with the Tintareni Landfill, stating that the people who live in the village believe the landfill is contaminating the underlying aquifer and their groundwater, which they rely on for irrigation and drinking water. The Mayor advised that there are many health problems in the village, which the village residents believe are connected to contaminated water. It was reported that a private water company tested the water quality in a new borehole in the Village of Tintareni and found it unsuitable for drinking. Parts of the village are not connected to the public water supply, so are reliant on wells and groundwater for drinking and household activities.

FURTHER REPORTS

6.7.19 The following reports were obtained during the site visit:

- Pre-Feasibility Study, Moldova Solid Waste Project: Project Identification (World Experience for Georgia,2012)
- Draft Feasibility Study (Fichtner, 2015, final produced in 2016)
- Tintareni Landfill Issues Report (Provided by the Mayor of Tintareni)
- Tintareni Biogas ESIA (TEVAS)

SITE VISIT MAY 2016

6.7.20 This site visit was undertaken by Scott Beaton (PM), Rachael Bailey (ESIA lead), Jelena Oplanić and Branko Radovanovic (Social Experts), Neal Barker (Project Director), Esteban Olmos (Noise Expert), Tom Reade (Air Quality Expert) and Stephanie Tyrrell (Environmental Specialist), with support from local experts Eugenia Ganea (Stakeholder Engagement Specialist) and Anatol Burlacu (Environment Specialist).

6.7.21 During this visit, Ebru Yildiz (EBRD, London) and/or Octavian Costas (EBRD, Moldova) attended the scoping meetings detailed in Section 6.8.

6.8 SCOPING MEETINGS

6.8.1 The purpose of the site visit was to present and seek views on the scope of the proposed ESIA, obtain further information and suggestions from affected parties and let them know how and when they can gain further information on the project. Three scoping meetings were held.

Community consultation events at:

- Tintareni , Tintareni Town Hall - Sunday, 15 May time: 16:00
- Bubuieci, Mayor's office in Bubuieci - Monday, 16 May time 17:00

Key Stakeholder and Regulator event:

- Chisinau, Chisinau Town Hall - Tuesday 17 May time: 09:00

6.8.2 The approach to the public consultation was as follows:

- The ESIA team gave a presentation on the scope of ESIA;
- The participants were then given an opportunity to ask questions, make suggestions and share their views on the ESIA and wider project;
- Participants were invited to complete a questionnaire;
- Participants were given a scoping leaflet - which presented the project, the alternatives, the potential impacts, the ESIA process and where and when they will be able to obtain further information on the ESIA.

6.8.3 The notifications for the meetings were as follows:

- The Tintareni notice was placed in the villages of Tintareni and Creţoaia;
- The Bubuieci notice was placed at the Ciocana temporary dumpsite and the village of Bubuieci;
- The notifications were presented in Russian and Romanian.
- Invitations were sent to the key stakeholders and regulators, for the regulator event in Chisinau.

6.8.4 This information is presented in Appendix D and has been be used to refine the scope of the ESIA and the supporting assessments.

6.9 STAKEHOLDER MEETINGS – 15TH MAY TO 18TH MAY 2016

Table 3-3 Stakeholder meetings summary

NAME AND TITLE / ROLE	MEETING SUMMARY	DATE
Meeting 1		
Ina Pașcan Mayor of Tintareni Civil Society Representative	The Mayor is prepared to consider continuing to rent land for the landfill, under certain conditions: building of a leachate treatment plant, reinforcing the landfill embankment and the sorting of old waste (landfill mining). They would also expect to be paid for the use of land and some more benefits for the village. The first two conditions would be met by the project, while the third (landfill mining) is probably not a feasible idea. EBRD will require from Fichtner to look into this option. Fichtner should meet with the Mayor to present the Project.	17.05.16
Meeting 2		
ABS S.R.L Balica Serghei Owner and Administrator Including visit to the new sorting facility, located in the vicinity of the Ciocana dumpsite	ABS is a privately owned Company which is planning to launch their sorting facility in the near future. The sorting facility will employ 200 people to work on the sorting lines and will employ all waste pickers from the Ciocana waste dump, who are interested. This will bring the benefits of a regular job with social, pension and health insurance. According to the owner of the Company, approximately 70 to 80 people pick waste at the Ciocana dumpsite, some more regularly than others.	18.05.16
Meeting 3		
Ministry of Labour, Social Protection and Family National Employment Agency Stefan Calancea First Deputy Director	The National Employment Agency provides many services which can be tapped into for provision of assistance to waste pickers, mainly free job and vocational training (for over 50 professions) and access to employment. The National Employment Agency has an office in Ciocana which would have the mandate to work with the waste pickers if they wanted to access these services.	18.05.16
Meeting 4		
Social workers from the Bubuieci village	None of the waste pickers are registered with the social protection department at present, however the social workers know some of them from the village. According to the social workers, not all waste pickers from Bubuieci are vulnerable; some are engaged in waste collection as it is more profitable than agriculture, which is their primary source of livelihood. There are approx. 20 residents of Bubuieci engaged in wastepicking at the Ciociana waste dump. The waste pickers are not homeless people, they live in the village in their houses. Most of the beneficiaries of social welfare in the village are elderly people with very low pensions, who cannot survive on them, without additional assistance.	16.05.16
Meeting 5		
Autosalubritate (several meetings)	The landfill in Tintareni is the only option for Chisinau city waste. Many benefits were provided to Tintareni in the past, however the village still does not agree with	18.05.16

NAME AND TITLE / ROLE	MEETING SUMMARY	DATE
Tudor Maniv Director Victor Serghienco Deputy Director	the re-opening of the landfill. Autosalubritate is now prepared to provide new benefits if necessary. A meeting with all the relevant stakeholders is needed urgently, including the village Tintareni, the City Chisinau and the Ministry of Environment, to agree on the land issue. The Company believes that the Ministry of Environment is in the best position to organise this meeting (as a mediator). The Company requested help from EBRD in setting up the meetings.	

FURTHER MEETINGS

6.9.1 During the ESIA development a key meeting took place between representatives of the City of Chisinau, Regia Autosalubritate, and the EBRD, to discuss and agree conditions of use of land for the Tintareni landfill, including potential investments / benefits for the village. This is summarised in Table 6-4.

Table 6-4 Further Meeting to discuss benefits for Tintareni

NAME AND TITLE / ROLE	MEETING SUMMARY	DATE
Meeting 1		
City of Chisinau, Regia Autosalubritate, EBRD and Fichtner	The issues that were discussed included the possible nationalisation of the land, although it was agreed that this would not be possible as the Tintareni residents would be unlikely to support this proposal. An overview of the options for the Tintareni landfill was provided and the associated risk and benefits were discussed. It was agreed that for the project to go ahead there will need to be benefits for the residents of Tintareni. These could include: ■ Waste collection in the locality would be free of charge; ■ A gate fee tax that Regia Autosalubritate will pay to Tintareni Mayor's Office that will be based on - per tonne of waste deposited at the landfill. The fee will be determined by benchmarking and negotiations; ■ Regia Autosalubritate to regularly clean cesspits at the wastewater facilities of Tintareni public institutions (two schools, kindergarten etc.); ■ Payment for land lease; ■ Rehabilitation of the water supply system; ■ Management of the water supply system (contract with Apa - Canal Chisinau); ■ Building a Family Doctors Centre in the village of Tintareni; ■ Hiring local people for the landfill operation. Other issues agreed on included: ■ The EBRD to try to facilitate the dialogue between The City of Chisinau, Autosalubritate and Tintareni Mayor's Office and the EBRD would insist on signing of a contract between Chisinau	12.07.16

NAME AND TITLE / ROLE	MEETING SUMMARY	DATE
	Mayor's Office, Regia Autosalubritate and Tintareni Mayor's Office, which will stipulate the rent conditions, a gate fee, other benefits and obligations of the parties etc.; ■ Based on the results of the studies performed by Fichtner it will be determined what are the next steps in the project. If the test results show that the underground water is polluted, then the project will have to be cancelled in the current format. If the water is not polluted, then negotiations with Tintareni Mayor's Office will be initiated. ■ The next steps in the project development would be: 1. Negotiation between Tintareni Mayor's Office (at premises of the EBRD) and Chisinau Mayor's Office, Regia Autosalubritate and Fichtner. At this meeting Fichtner will present the Project Components and the study results; 2. Organisation of a study visit for Tintareni mayor and locals to the Romania, Iasi dump site, a recent EBRD project; and 3. Fichtner to suggest a benchmarking of gate fees in Romania or other countries that could serve as a basis for negotiations with Tintareni village. ■ Auto Salubritate commission an independent study on public health in Tintareni and Cretoaia. ■ Meetings to be held (by the City and Regia Autosalubritate) with ABS regarding a possible collaboration on waste sorting.	

6.9.2 A further meeting took place on September 20th 2016, following the completion of the Hydrogeological Study. This meeting was held between Fichtner Management Consulting, the Mayor of Chisinau and other representatives of the Mayor's office, Regia Autosalubritate and the EBRD. Although invited, the Major of Tintareni village was not available to attend.

6.9.3 Fichner Management Consulting presented the findings of the Hydrogeological Study. The study concluded that the landfill is not a source of pollution for water wells in Tintareni and other villages. The survey works conducted by Fichtner also identified that the dam at the base of Tintareni landfill would need additional stabilisation measures, to resist earthquakes and prevent the current leakage of leachate into the dam.

6.9.4 The gate-fee tax that Regia Autosalubritate will pay to Tintareni Mayor's Office was also discussed. The amount of the gate fee tax will need to be decided on by the City of Chisinau, based on suggestions from Fichtner. It was agreed that the Mayor of Tintareni and members of the Tintareni Local Council will be invited to the presentation that was to follow (on September 22nd) in the premises of the Chisinau Municipality, and if they did not attend, another meeting would be organised in Tintareni village.

6.9.5 On September 22nd 2016, Fichtner presented the options for waste management in the City of Chisinau, in the Chisinau City Hall. The meeting was attended by representatives of the City and the Ministry of Environment, however representatives of the village Tintareni, including the Mayor, did not attend.

6.9.6 The Communist and Socialist parties declared that the Feasibility Study did not consider all solutions to solve waste in Chisinau. They proposed to: i) close the landfill in Tintareni, ii) invest in the company ABS to collect and sort solid wastes, and iii) invest in a fermentation plant for organic wastes, etc.

6.9.7 On March 17th 2017 at meeting was held at EBRD Offices. At this meeting Fitchner presented the project scenarios to a Councillor of Tintareni Mayor's Office and representatives from Chisinau's Mayor's Office. An approach for establishing a dialogue with Tintareni Mayor's office was developed, the next steps were confirmed.

6.9.8 On completion of the draft ESIA and Stakeholder Engagement Plan, the documents will be presented to local communities, stakeholders and interested parties, for questions, comments, suggestions.

7 AIR QUALITY AND CLIMATE CHANGE

7.1.1 This chapter reports the assessment of likely significant effects of the construction and operational phases of the Project in terms of impacts on local air quality, at locations where the public may be exposed to air quality effects. It also proposes mitigation measures to prevent, minimise or control the likely adverse air quality effects arising from the Project, The anticipated residual effects are also identified.

7.1.2 A glossary of terms can be found in Appendix E.

7.2 LEGISLATION

7.2.1 Details of the relevant legislation, policy and guidance are provided in Appendix F-1.

7.2.2 The applicable legislation, policy and guidance are listed below:

- Air Quality Directive 2008/50/EC;
- The Landfill Directive, 1999/31/EC;
- Industrial Emissions Directive 2010/75/EU;
- World Health Organisation (WHO). Air Quality Guidelines for Particulate Matter, Ozone, Nitrogen Dioxide and Sulphur Dioxide (2005);
- Republic of Moldova. Decision on the Approval of the Environmental Strategy for years 2014-2023 and of the Action Plan for its Implementation (April 2014);
- European Neighbourhood and Partnership Instrument – Shared Environmental Information Systems. Republic of Moldova Country Report (January 2012), Chisinau;
- United Nations Economic Commission for Europe. Republic of Moldova Environmental Performance Reviews, Third Review (2014);
- Institute of Air Quality Management (IAQM): Guidance on the Assessment of Dust from Demolition and Construction (February 2014);
- Design Manual for Roads and Bridges. Air Quality, HA207/07.

7.3 ASSESSMENT METHODOLOGY

SCOPE OF THE ASSESSMENT

7.3.1 This assessment uses the scope, methodology and significance criteria in Chapter 6: ESIA Methodology. The significance of the air quality impacts due to the proposed development has been determined using the distance to the nearest receptors affected and the dust emissions class of the works being undertaken. Receptors may be affected due to impacts on human health, a loss of amenity, or they may include sensitive ecosystems, both of which are affected within set distances of the dust generating activities. The potential for impacts was considered both with, and without, mitigation measures. Appropriate mitigation has been recommended for the Project as a whole, and specifically where effects have been identified due to particular dust-generating activities. The construction traffic impacts were assessed qualitatively due to the small scale of the Project.

7.3.2 Air quality emissions from changes due to operational traffic were assessed following the Regional Emissions methodology set out in the Highways England Design Manual for Roads and Bridges (DMRB), Volume 11, Section 3 (Department for Transport, 2007). This uses appropriate data traffic data from the Transport and Traffic Assessment.

7.3.3 A semi-quantitative assessment of operational traffic impacts was undertaken for nitrogen dioxide (NO_2), particulate matter (PM_{10} and $PM_{2.5}$). The assessment was limited to these pollutants as they are the pollutants of greatest concern in relation to road traffic.

7.3.4 A qualitative assessment of the air quality impacts for the Project operation and decommissioning was undertaken for NO_2, PM_{10}, $PM_{2.5}$, odour and bio-aerosols

LIKELY SIGNIFICANT EFFECTS

CONSTRUCTION PHASE

7.3.5 During the construction phase:

- On-site dust and particulate matter emissions from the activities required to upgrade the existing Tintareni landfill to EU Standards, such as the use of plant and machinery; and
- Changes in ambient concentrations of NO_2 and PM_{10} at existing receptors as a result of exhaust emissions arising from non-road mobile machinery (NRMM) and construction traffic.

OPERATIONAL PHASE

7.3.6 The following air quality effects are expected during the operational phase:

- Road traffic emissions associated with the movement of cars and Heavy Duty Vehicles (HDVs). In particular, changes in NO_2 and PM_{10} emissions from changes in traffic and operational waste delivery, including the reduction in traffic to the Ciocana temporary dumpsite and the increase in traffic to Tintareni landfill;
- Landfill gas emissions from the landfill gas engine plant and stack;
- Landfill gas migration;
- Emissions of odours from the site operations and transportation of waste; and
- Bio-aerosol risk from the site operations.

EXTENT OF THE STUDY AREA

7.3.7 In accordance with guidance published by the Institute of Air Quality Management (IAQM) Guidance on the Assessment of Dust from Demolition and Construction (February 2014), the construction phase assessment assessing the effects of dust and particulate matter considers an area extending to 350m from the construction site boundary, and up to 500m from the site entrance, extending 50m either side along construction traffic access routes. Beyond these distances any impacts are unlikely to give rise to a significant effect and are scoped out.

7.3.8 To understand the potential effects of emissions resulting from development-generated road traffic, traffic data have been provided for the surrounding network (further details are provided in Appendix F-2) by the WSP | Parsons Brinckerhoff, Transport Specialist.

METHOD OF ASSESSMENT

CONSTRUCTION PHASE

7.3.9 An assessment of construction phase effects in terms of deposited dust and ambient PM_{10} concentrations has been undertaken following the relevant methodology published by the IAQM. This assessment considers the risk of effects in relation to:

- Demolition;
- Earthworks;
- General construction activities; and
- Trackout (dust and dirt that can be carried out of the site predominantly on the wheels of construction vehicles).

7.3.10 The IAQM method takes into account the nature and scale of the activities undertaken and the sensitivity of the area to increases in dust and PM_{10} levels in order to assign a level of risk (low, medium or high). Once the level of risk has been established, then site specific mitigation proportionate to the level of risk is identified, and the significance of residual effects determined. A summary of the IAQM assessment methodology is provided in Appendix F-3.

7.3.11 In terms of emissions from NRMM, detail regarding the nature and operations of NRMM do not permit the quantitative assessment of impacts on ambient NO_2 and PM_{10} concentrations. Consequently, only commentary has been provided on this aspect.

7.3.12 Details of construction traffic routes have been provided by WSP | Parsons Brinckerhoff. A qualitative assessment of impacts on ambient NO_2 and PM_{10} concentrations has therefore been carried out.

OPERATIONAL PHASE

7.3.13 Effects of the operational phase relate to potential changes in ambient concentrations of NO_2 and PM_{10} at human receptors (listed in Table 7-1 and shown in Figure 7-1). These are the local air pollutants that that are of most concern in the context of the Project.


Date Modified: 29/07/16
Key
Receptors
Ştefan cel Mare
1
8
2
3
4
5
6
7
9
©2016 Google
Image© 2016 DigitalGlobe
Image© 2016 CNES/ Astrium
WSP | PARSONS BRINCKERHOFF
TITLE:
CHISINAU SOLID WASTE PROJECT
FIGURE No:
FIGURE 7-4
RECEPTORS
File: Figure 7-4

Figure 7-1 Air Quality – Human Receptors

7.3.14 Other aspects that need to be considered are in relation to concentrations of sulphur dioxide (SO_2), migration of gas emissions through the landfill, emissions of odour, and bio-aerosols from the waste site and the associated operations.

TABLE 7-1: HUMAN RECEPTORS

ID	Description	Longitude	Latitude
1	Residential dwelling National Road, Moldova	46°54'5.42"	29° 7'39.89"
2	Residential dwelling National Road, Moldova	46°53'59.77"	29° 8'1.18"
3	Residential dwelling National Road, Moldova	46°53'56.76"	29° 8'10.03"
4	Residential dwelling National Road, Moldova	46°53'53.02"	29° 8'23.16"
5	Residential dwelling District Way, Moldova	46°53'47.92"	29° 8'25.67"
6	Residential dwelling District Way, Moldova	46°53'43.81"	29° 8'27.66"
7	Residential dwelling District Way, Moldova	46°53'40.26"	29° 8'29.95"
8	Residential dwelling National Road, Moldova	46°54'2.48"	29° 7'51.69"
9	Residential dwelling District Way, Moldova	46°53'39.07"	29° 8'24.91"

7.3.15 For the prediction of impacts due to emissions arising from road traffic sources during operation, DMRB has been used. DMRB utilises a spreadsheet screening method where pollutants that are most likely to exceed the WHO guidelines and EU limit values are considered.

7.3.16 This screening tool uses Annual Average Daily Traffic (AADT) flows, vehicle speeds (kph), and the percentage of Heavy Duty Vehicles[4] (HDVs), to predict pollutant concentrations at selected relevant locations. A summary of the traffic data used in the assessment can be found in Appendix F-2.

7.3.17 For the screening assessment, two scenarios have been considered:

- Scenario 1: Baseline; and
- Scenario 2: Baseline with Development – routing of operational traffic via National Road and District Way towards the Tintareni Landfill.

SIGNIFICANCE CRITERIA

CONSTRUCTION PHASE

7.3.18 For the construction phase, IAQM guidance regarding the determination of a significant effect has been followed, where:

- *"IAQM recommends that significance is only assigned to the effect after considering the construction activity with mitigation."*

[4] Trucks, buses and coaches

- *"For almost all construction activity, the aim should be to prevent significant effects on receptors through the use of effective mitigation. Experience shows that this is normally possible. Hence the residual effect will normally be 'not significant'."*

OPERATIONAL PHASE

7.3.19 Effects have been described in accordance with ESIA methodology detailed in Chapter 6. Pollutant concentrations have been compared to EU and WHO limit values. Impact descriptors are given Tables 6-3, 6-4 and 6-5 in Chapter 6. This approach has been followed to determine whether or not local air quality impacts are likely to give rise to a significant effect, which may be adverse or beneficial.

7.3.20 In determining whether or not an effect is significant the following have been considered:

- The magnitude of each change in ambient pollutant concentration at each receptor (i.e. the impact as given by the impact descriptors);
- The existing and future air quality in the absence of Project; and
- The extent of current and future population exposure to the impacts.

7.4 BASELINE CONDITIONS

INSTITUTIONAL AIR QUALITY MONITORING DATA

7.4.1 In the Republic of Moldova, the State Hydrometeorological Service (SHS) manages 19 ambient air quality monitoring stations. These monitoring stations are located in Tiraspol, Ribnita, Bender, Chisinau, Balti, and Mateuti. Six of these air quality monitoring stations are located in Chisinau, all of which are non-automatic monitoring stations. Sampling is undertaken manually and takes place three times per day. The air quality monitoring assesses the monthly maximum concentrations of SO_2, CO, NO_2, PM_{10} and Total Suspended Particulates (TSP) concentrations. The data collected are stored on a database that is not available for public use.

7.4.2 Key air quality trends are presented within the 2014 Republic of Moldova Environmental Performance Reviews, Third Review. The report cites that air quality within urban areas is mainly influenced by emissions from transport, power plants, and larger enterprise heating systems. In relation to transport, the main cause of air pollution is directly associated with ageing vehicles, poor quality fuel, and out-dated technologies.

7.4.3 Transport is a major contributor to air pollution in Moldova, with mobile NO_x emissions contributing to 92% of total NO_x emissions in 2011. The total number of all vehicles on the road increased by 23.8% from 2006 to 2009. It has also been reported that SO_2 emissions have increased from 2,400 tonnes in 2005 to 5,800 tonnes in 2011. Whilst, SO_2 emissions from industrial uses have remained at constant levels, the change is attributed to transport, which contributes to 77% of total SO_2 emissions, and this is a direct result of poor quality fuel.

7.4.4 Baseline concentrations of NO_2 for Chisinau and PM_{10} for Moldova have been obtained from the Government of the Republic of Moldova (2016) and the International Bank for Reconstruction and Development (IBRD, 2016) websites, respectively.

7.4.5 Data for NO_2 concentrations from 2005 to 2014 for Chisinau indicate a slight increasing trend since 2005 (see Figure 7-1). The recorded NO_2 concentration in 2014 was 56.7µg/m^3 which exceeds the WHO guidelines and EU limit value for NO_2 of 40µg/m^3.

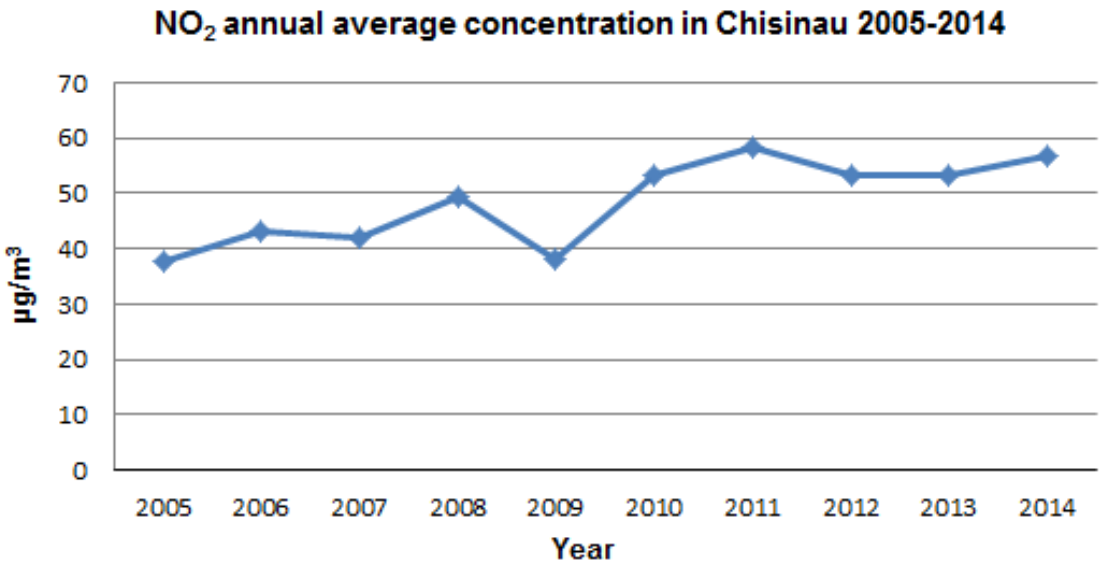


Figure 7-2 NO_2 Annual Average Concentration in Chisinau 2005-2014

7.4.6 Data for PM_{10} concentrations from 1995 to 2011 for the Republic of Moldova indicate a decreasing trend from 1995 to 2003; however beyond 2003 concentrations appear to fluctuate. In 2011 the recorded annual mean PM_{10} concentration was 43.5µg/m^3 which exceeds the WHO guidelines and EU limit value of 40µg/m^3 (see Figure 7-2 below).

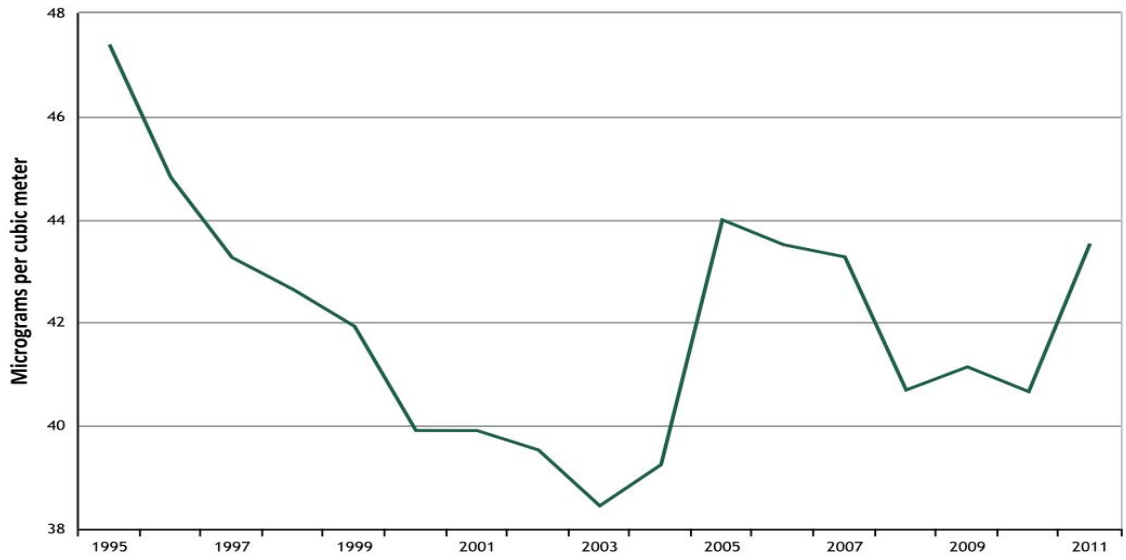


Figure 7-3 Annual Mean PM10 Concentration, Republic of Moldova

AIR QUALITY MONITORING DATA FROM FIELD SURVEY

7.4.7 WSP | Parsons Brinckerhoff undertook a site specific air quality monitoring survey at the Tintareni landfill site, and at sensitive residential receptors along National Road (Route 2) and District Way (L418), monitoring both NO_2 and SO_2. NO_2 was monitored at six locations (DT1 to DT6). SO_2 was monitored at two locations (DT1 and DT5). The locations of diffusion tube monitoring are indicated in Figure 7-3, and 7-4. Given the available timescales, the air quality monitoring survey

was limited to three weeks and the diffusion tubes were changed on a weekly basis.

Figure 7-4 Location of Diffusion Tubes - Tintareni Landfill (DT1) and Cretoaia (DT2)

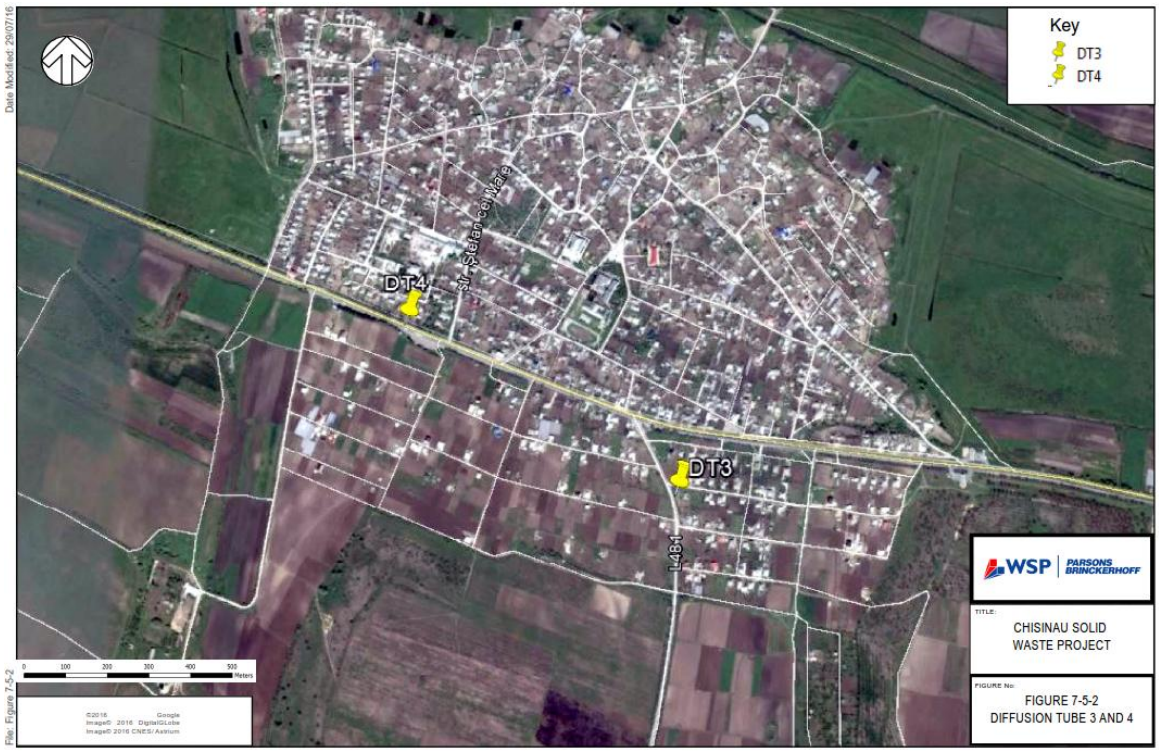


Figure 7-5 Location of Diffusion Tubes - District Road Tintareni (DT3) and National Road (DT4)

7.4.8 Measurements were also taken at the temporary dumpsite in Ciocana, to inform the review of the Closure Plan, the location plan and results are presented in Appendix A

7.4.9 The monitoring results for the diffusion tube survey undertaken by WSP | Parsons Brinckerhoff for NO_2 are presented in Table 7-2 and for SO_2 in Table 7-3**.** Full results can be found in Appendix F-4**.**

Table 7-2 Averages of WSP | Parsons Brinckerhoff NO_2 Diffusion Tube data over the monitoring period

Site ID	Site Description	Site Type (distance from road side)	Northings	Eastings	Date	Average NO_2 concentration ($\mu g/m^3$)
DT1	Tintareni Landfill	Background	46,50,978	29,10,141	17/05/16-07/06/16	3.8
DT2	Cretoaia Location	Roadside (2m)	46,51,799	29,08,511	17/05/16-31/05/16	5.2
DT3	District Road Tintareni	Roadside (2m)	46,53,684	29,08,696	17/05/16-07/06/16	9.5
DT4	National Road	Roadside (3m)	46,53,876	29,08,293	17/05/16-07/06/16	22.8
DT5	Temporary dumpsite	Background	46,59,942	28,55,400	17/05/16-07/06/16	10.9
DT6	Temporary dumpsite Haul Road	Roadside	46,59,807	28,55,171	17/05/16-07/06/16	16.4

7.4.10 The diffusion tube results indicated that concentrations of NO_2 at all monitoring sites do not exceed the WHO guidelines and EU limit values for this pollutant ($40\mu g/m^3$).

Table 7-3: Averages of WSP | Parsons Brinckerhoff SO_2 Diffusion Tube data over the monitoring period

Site ID	Site Description	Site Type (distance from road side)	Northings	Eastings	Date	Average SO_2 concentration ($\mu g/m^3$)
DT1	Tintareni Landfill	Background	46,50,978	29,10,141	17/05/16-07/06/16	<2.89
DT5	Temporary dumpsite	Background	46,59,942	28,55,400	17/05/16-07/06/16	8.38

7.4.11 SO_2 diffusion results indicated that concentrations were relatively low across the monitoring period at both sample sites. These were observed to be below both the SO_2 EU limit value of $125\mu g/m^3$ over a 24hr period and the WHO guideline 24hr mean value of 20 $\mu g/m^3$.

EXISTING TINTARENI LANDFILL

7.4.12 The existing Tintareni landfill site (Figure 3-1) is located in an area where the main influence on local air quality is likely to arise from exhaust emissions from cars and HDVs, emissions from the onsite gas engine, and odour and bio-aerosols.

7.4.13 The results of the diffusion tube monitoring survey show that average NO_2 concentrations at all monitoring sites were below the EU limit and WHO guideline annual mean value of 40µg/m^3 and that SO_2 concentrations for the whole monitoring period were below the 24hr mean EU limit value and WHO guideline value.

7.4.14 A number of further observations are summarised below and photographs associated with each are presented in Appendix F-6:

- The existing Tintareni landfill site is vegetated with little surface evidence that it is a landfill site, therefore due to the encapsulation of landfill waste by overlying vegetation it is considered likely that emissions of PM_{10} and bio-aerosols to air will be limited;
- There is a poor road surface along District Way (L481) and unpaved roads within the site. There was clear evidence of slower moving vehicles as a direct result of poor surfacing and dust re-suspension into the air;
- The Light Goods Vehicles (LGVs) (>10 years on average) and HDVs (>20 years on average) used by the Company are old and out-dated. There was visible evidence of exhaust emissions;
- The onsite gas engine was not currently in use, however, it can be activated at any point. When operational the power generated from the gas engine feeds into the national grid. Currently, there is little to no gas being produced, however any small pockets of gas collected are vented via the various gas extraction points located around the landfill;
- There were visible pools of stagnated water on the surface of the landfill;
- On the lower part of the landfill there were a number of detectable odour issues, which were considered to be slightly offensive and are likely to be associated with the leachate extraction point. The intensity and frequency (which is considered to be irregular) of the odour was dependent upon the wind speed and direction.

OTHER OBSERVATIONS

7.4.15 Below is a summary of other general observations made during the site visit:

- The main roads, National Road (R2) and District Road (L481), were in fairly good condition, however the junction of these two roads itself was only part surfaced, which lead to visible dust re-suspension into the air;
- The National Road and District Road within the study area are both fairly free flowing throughout the day, with minimal evidence of queuing at the junction.

7.5 POTENTIAL IMPACTS

CONSTRUCTION PHASE

INCREASE IN DUST AND PM_{10} GENERATED BY ON-SITE ACTIVITIES ON NEARBY ENVIRONMENT

7.5.1 During the construction phase, there will be a number of activities which are likely to generate and / or re-suspend dust and PM_{10}. These activities have been identified for the construction phase of the Project and their likely effects evaluated using the risk assessment approach published by the IAQM. The following sections present these sources and the risk assessment results.

7.5.2 The main sources of dust and PM_{10} during the construction phase will include:

- Site clearance and preparation;
- Preparation of temporary access / egress to the site and haulage routes;

- Earthworks;
- Materials handling, storage, stockpiling, spillage, and disposal;
- Movement of vehicles and construction traffic within the site (including dumper trucks);
- Exhaust emissions from NRMM, especially when used at the extremes of their capacity and during mechanical breakdown;
- Construction of buildings, roads and areas of hardstanding alongside fabrication processes; and
- Site preparation and restoration after completion.

7.5.3 The majority of the releases are likely to occur during the 'working week'. However, for some potential release sources (e.g. exposed soil produced from significant earthwork activities) in the absence of dust control mitigation measures, dust generation has the potential to occur 24 hours per day over the period during which such activities are to take place.

ASSESSMENT OF POTENTIAL DUST EMISSION MAGNITUDE

7.5.4 The criteria to determine the dust emission magnitude are detailed in Appendix F-3 and results of the assessment are summarised below.

DEMOLITION

7.5.5 It is understood that there will be a small amount of demolition works that will occur at the site as part of the construction phase of the Project. Therefore, the potential dust emission magnitude is considered to be **small** for demolition activities.

EARTHWORKS

7.5.6 The total area of the site is approximately 95,000m^2, which falls into the IAQM category of more than 10,000m^2. The total material that will be moved is estimated to be more than 100,000 tonnes. Therefore, the potential dust emission magnitude is considered to be **large** for earthwork activities.

CONSTRUCTION

7.5.7 The total volume of buildings to be constructed on the site is will be less than 25,000m^3. This includes construction of the control building, workshop, fuel station, and the leachate treatment plant and access road. Therefore, the potential dust emission magnitude is considered to be **small** for construction activities.

TRACKOUT

7.5.8 There is currently no available information on the number of HDV vehicle movements per day during the construction phase. Based on the size of the Project, and as a conservative estimate, it has been considered that there will be between 10 and 50 HDV movements in any one day travelling on moderately dusty surface materials. Therefore, the potential dust emission magnitude is considered to be **medium** for trackout (Displacement of mud/ soil by vehicle wheels off-site onto local road surfaces).

7.5.9 Table 7-4 provides a summary of the potential dust emission magnitude determined for each construction activity considered.

Table 7-4: Potential Dust Emission Magnitude

Activity	Dust Emission Magnitude
Demolition	Small
Earthworks	Large
Construction Activities	Small
Trackout	Medium

ASSESSMENT OF SENSITIVITY OF THE STUDY AREA

7.5.10 Wind direction data has been provided by the SHS for January 2015 to July 2016, this is contained within Appendix F-7**.** The data provided indicates the percentage of wind from each direction and it is evident that the prevailing wind direction is from the north and north-west. Therefore, receptors located to south and south-east of the site are more likely to be affected by dust and particulate matter emitted and re-suspended during the construction phase.

7.5.11 Depending on wind speed and turbulence, it is likely that the majority of dust would be deposited in the area immediately surrounding the source. The IAQM guidance provides advice on how the proximity and number of receptors of different sensitivity within the study area can be used to determine the overall sensitivity of the study area This involves assessing dust impacts upon receptors up to 350m from the emission source and is reproduced in Appendix F-3.

7.5.12 There are no human receptors within 350m of the site. Along potential construction routes, there are approximately 40 residential properties within 50m. The most recent available PM_{10} baseline concentration (2011) was 43.5µg/m^3 and was obtained from IBRD. The 2011 baseline concentration exceeds the WHO guidelines and the EU limit value of 40µg/m^3.

7.5.13 Taking the above into account and following the IAQM assessment methodology, the sensitivity of the area to changes in dust and PM_{10} has been derived for each of the construction activities considered. The results are shown in Table 7-5.

Table 7-5: Sensitivity of the Study Area

Potential Impact	Sensitivity of the Surrounding Area			
	Demolition	**Earthworks**	**Construction**	**Trackout**
Dust Soiling	N/A	N/A	N/A	Medium
Human Health	N/A	N/A	N/A	High

RISK OF IMPACTS

7.5.14 The predicted dust emission magnitude has been combined with the defined sensitivity of the area to determine the risk of impacts during the construction phase, prior to mitigation. Table 7-6 below provides a summary of the risk of dust impacts for the Project. The risk category identified for each construction activity has been used to determine the level of mitigation required.

Table 7-62: Summary Dust Risk Table to Define Site Specific Mitigation

Potential Impact	Risk			
	Demolition	**Earthworks**	**Construction**	**Trackout**
Dust Soiling	N/A	N/A	N/A	Low Risk
Human Health	N/A	N/A	N/A	Medium Risk

7.5.15 Taking into account all of the above, in accordance with the IAQM Guidance the overall risk of the surrounding area in terms of dust soiling and human health is Low to Medium Risk. Therefore overall, there is likely to be a direct, temporary, short term adverse impact on sensitive receptors of minor significance, prior to the implementation of mitigation measures.

INCREASE IN POLLUTANT CONCENTRATIONS (NAMELY NO_2 AND PM_{10}) AS A RESULT OF EXHAUST EMISSIONS ARISING FROM CONSTRUCTION TRAFFIC AND PLANT ON LOCAL AIR QUALITY

7.5.16 The greatest impact on air quality due to emissions from vehicles and plant associated with the construction phase will be in the areas immediately adjacent to the site access and along the likely construction routes. It is considered likely that the construction traffic will be less than 50 HDV movements per day.

7.5.17 Final details of the exact plant and equipment likely to be used on site will be determined by the appointed contractor. The number of plant and their location within the site are likely to be variable over the construction period.

7.5.18 Due to the number and proximity of sensitive receptors to the potential construction routes and the likely numbers of construction vehicles and plant that will be used, the impacts are not considered to be significant**.**

OPERATIONAL PHASE

7.5.19 Full results from the DMRB screening exercise can be found in Appendix F-8, and summary is provided below.

EMISSIONS OF NO_2 AND PM_{10} ASSOCIATED WITH THE OPERATION OF TINTARENI LANDFILL

7.5.20 The changes in NO_2 concentrations as a result of the operation of Tintareni landfill ranges from 0.1-0.4µg/m^3 for Option 1 (routing of operational traffic via National Road and District Way). Taking into account the local diffusion tube monitoring results, which indicated NO_2 concentrations are well below the WHO guidelines and EU limit values, the impact from NO_2 concentrations at existing receptor locations during the operational phase is considered to be long term and permanent, but not significant.

7.5.21 The changes in PM_{10} concentrations as a result of the operation of Tintareni landfill range from 0.03-0.09µg/m^3 for traffic routing Option 1.There is no available PM_{10} data for the local area of Tintareni. However, the change in PM_{10} concentrations as a result of the Project in comparison to the baseline PM_{10} concentrations taken from IBRD is considered very small. Therefore, the impact of the operation of the Tintareni landfill on PM_{10} concentrations is considered to be long term and permanent, but not significant.

LANDFILL EMISSIONS FROM THE LANDFILL GAS ENGINE PLANT AND STACK

7.5.22 The primary gases that may be emitted from the landfill gas engine plant and stack are NO_x and SO_2. As there are no existing human receptors within 350m of the Project, therefore the impact on existing sensitive receptors is not considered to be significant.

LANDFILL GAS MIGRATION

7.5.23 The potential gases that may migrate in a landfill include carbon dioxide (CO_2), carbon monoxide (CO), hydrogen sulphide (H_2S) and methane (CH_4). The leachate ponds and treatment plant would aim to minimise harmful gas releases into the environment, through gas collection and treatment processes. Taking into account that there are no existing sensitive receptors within 350m of the Project, the impact on existing sensitive receptors is not considered to be significant.

GREENHOUSE GAS EMISSIONS

7.5.24 A qualitative assessment of the impact on greenhouse gases (GHG's) was undertaken, as detailed information regarding such gases was not available at the time of writing.

7.5.25 The Project plan includes using the existing landfill gas treatment plant to burn off gas emissions from the landfill, and improve the effectiveness of the existing gas collection system. This will have a beneficial impact on greenhouse gas emissions, as CH_4 has a large greenhouse warming potential, i.e. CH_4 is between 28 to 36 times more effective as a greenhouse gas than CO_2 a 100 year period (US EPA, 2017). When CH_4 is converted to CO_2 during combustion the overall greenhouse warming potential is reduced. Therefore the proposal to burn off any landfill gas in the form of CH_4 will result in the production of CO_2, which is effectively a reduction in the CO_2 equivalent of the landfill emissions. Therefore, the impact on GHG's for the proposed project is considered to be not significant.

ODOUR EMISSIONS FROM SITE OPERATIONS AND TRANSPORTATION OF WASTE

7.5.26 There are residential properties which represent high sensitivity receptors in close proximity to routes used for the transportation of waste, and therefore there is the potential for odour emissions to affect residents along these routes. Vehicles carrying waste will be covered by a canvas to prevent spillage of lighter materials and to contain odour emissions. Therefore, the odour impact on existing sensitive receptors is not considered to be significant.

7.5.27 As the landfill site is greater than 500m from the nearest sensitive receptor, odour emissions from the landfill site are likely to be negligible at the closet sensitive receptor, due to the dispersion and dilution of any odours prior to them reaching sensitive receptors.

BIO-AEROSOL RISK FROM SITE OPERATIONS

7.5.28 Bio-aerosols are airborne microorganisms commonly found within waste due to natural microbiological activity that takes place over time. These can pose a health risk to humans if exposed for a prolonged period of time. There are no existing sensitive receptors located within 350m of the Tintareni Landfill, and therefore the risk of exposure to bio-aerosols from site operations at existing sensitive receptors is not considered to be significant.

7.5.29 There is a risk that bio-aerosols may affect employees that are working on site. Prolonged exposure to waste materials and airborne particulates represents an occupational risk hazard and could potentially have a negative impact on the health of employees. Therefore, the unmitigated risk of exposure to employees is considered to be of moderate significance.

7.6 MITIGATION

CONSTRUCTION PHASE

7.6.1 Based on the assessment results, the mitigation measures which are recommended to be implemented to eliminate the identified risk of dust impacts associated with the various activities of the construction phase of the Project are listed below.

GENERAL COMMUNICATION

- The name and contact details of person(s) accountable for air quality and dust issues should be displayed on the site boundary. This may be the environment manager/engineer or the site manager. The head or regional office contact information should also be displayed.

SITE MANAGEMENT

- All dust and air quality complaints should be recorded and causes identified. Appropriate remedial action should be taken in a timely manner with a record kept of actions taken including of any additional measures put in place to avoid reoccurrence;
- The complaints log should be made available to the local authority on request; and
- Any exceptional incidents that cause dust and/or air emissions, either on- or offsite should be recorded, and the action taken to resolve the situation recorded in the log book.

MONITORING

- Regular site inspections to monitor compliance with the Dust Management Plan (DMP) should be carried out, inspection results recorded, and an inspection log made available to the state regulatory authority when asked; and
- The frequency of site inspections should be increased when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.

PREPARING AND MAINTAINING THE SITE

- The site layout should be planned so that machinery and dust causing activities are located away from receptors, as far as is possible;
- Where practicable, solid screens or barriers should be erected around dusty activities or the site boundary that are at least as high as any stockpiles on site;
- Site runoff of water or mud should be avoided; and
- Site fencing, barriers and scaffolding should be kept clean using wet methods.

OPERATING VEHICLE/MACHINERY AND SUSTAINABLE TRAVEL

- It should be ensured that all vehicle operators switch off engines when stationary with no idling of vehicles; and
- The use of diesel or petrol powered generators should be avoided and mains electricity or battery powered equipment used where practicable.

OPERATIONS

- Cutting, grinding or sawing equipment will be fitted or used in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems;
- It will be ensured that an adequate water supply will be on the site for effective dust / particulate matter suppression / mitigation, using non-potable water where possible and appropriate;

- Enclosed chutes and covered skips will be used;
- Drop heights from loading shovels, hoppers and other handling equipment will be minimised and fine water sprays used on such equipment wherever appropriate; and
- It will be ensured that equipment is readily available on site to clean any dry spillages, and spillages will be cleaned up as soon as reasonably practicable after the event using wet cleaning methods.

WASTE MANAGEMENT

- Bonfires and the burning of waste materials will be avoided in accordance with national laws.

MEASURES SPECIFIC TO DEMOLITION

- It will be ensured that effective water suppression is used during demolition operations. Hand held sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground;
- Explosive blasting will be avoided, and appropriate manual or mechanical alternatives used; and
- Biological debris will be bagged and removed, or dampened down before demolition.

MEASURES SPECIFIC TO EARTHWORKS

- The surface area of stockpiles will be minimised (subject to health and safety and visual constraints regarding slope gradients and visual intrusion) to reduce area of surfaces exposed to wind pick-up;
- Where practicable, windbreak netting / screening will be positioned around material stockpiles and vehicle loading / unloading areas, as well as exposed excavation and material handling operations, to provide a physical barrier between the site and the surroundings;
- Where practicable, stockpiles of soils and materials will be located as far as possible from sensitive properties, taking account of the prevailing wind direction; and
- During dry or windy weather, material stockpiles and exposed surfaces will be dampened down using a water spray to minimise the potential for wind pick-up.

MEASURES SPECIFIC TO CONSTRUCTION

- All construction plant and equipment will be maintained in good working order and not left running when not in use.

MEASURES SPECIFIC TO TRACKOUT

- It will be ensured that vehicles entering and leaving the site are covered to prevent escape of materials during transport; and
- A wheel washing system will be implemented (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).

RESIDUAL EFFECTS

7.6.2 The residual effects of dust and PM_{10} generated by construction activities following the application of the mitigation measures described above and good site practice are not considered to be significant.

7.6.3 The residual effects of emissions to air from construction vehicles and plant on local air quality are not considered to be significant.

OPERATION PHASE

7.6.4 There are a number of mitigation measures proposed for the operational phase of the Project:

- In order to avoid fugitive emissions of odour from waste, a daily soil cover will be placed over the fresh waste;
- A daily soil cover will prevent waste being windblown, reducing fugitive emission of dusts from the landfill site;
- All waste collection vehicles procured for the Project will meet the Euro III emissions standard as a minimum. The fuel currently available in the Republic of Moldova is unsuitable for Euro IV, V and VI vehicles, as it is of a lower quality and contains impurities, which drastically affect the performance and the lifetime of the engine and exhaust system. However, the Euro III compliant trucks will be capable of operating with "low sulphur" fuel if / when it becomes available;
- Vehicles transporting waste between the transfer station and the Tintareni landfill site will be covered by a canvas to prevent spillage of light waste materials on to the public highway, reducing the potential for odour issues, and emissions of PM_{10} and bio-aerosols to air;
- A wheel washing unit will be installed at the Tintareni landfill to reduce the trackout of material on to the public highway;
- Monitoring wells for ground water and leachate levels will be installed at a number of points around the landfill to allow for optional sampling of volatile organic compounds as well as trace gases including CH_4, CO_2 and H_2S ; and
- The appropriate personal protection equipment will be provided for employees, in particular breathing apparatus to reduce the potential of inhaling hazardous airborne particulates.

RESIDUAL EFFECTS

7.6.5 The residual effects of the operational phase of the Tintareni landfill on local air quality are not considered to be significant.

8 NOISE

8.1 INTRODUCTION

8.1.1 This chapter assesses the potential noise and vibration effects upon nearby sensitive receptors as a result of the construction and operation of the Project. The baseline conditions are described and the potential impacts are identified and assessed. Finally, the requirement for mitigation is discussed and options are presented, where necessary, in line with guidance and best practice.

8.1.2 Appendix E presents a glossary of the acoustics terminology used in this chapter.

8.2 LEGISLATION

GUIDANCE

ISO 1996-2, 2007

8.2.1 ISO 1996-2:2007 'Description and Measurement of Environmental Noise' defines and prescribes best practice during recording and reporting of environmental noise. It advises that the information to be reported should include measurement technique (including type of instrumentation, measurement procedure and position of measurements), prevailing conditions during the measurements and any relevant qualitative data such as the nature of the sound source.

WORLDBANK / IFC ENVIRONMENTAL, HEALTH AND SAFETY GUIDELINES, 2007

8.2.2 The Environmental, Health and safety (EHS) Guidelines, Noise Management provides noise level guidelines which are normally used to assess the potential noise impact arising from a noise source of an industrial nature. It states that the noise impact should not exceed the levels presented in Table 8-1, or result in a maximum increase in background levels of 3dB at the nearest receptor.

8.2.3 This assessment uses these criteria to identify any potentially significant noise impacts, due to the operation of the Tintareni Landfill (i.e. daytime). A significant noise impact would occur if any of these criteria are exceeded.

Table 8-1 – World Bank / IFC Noise Level Guidelines

Receptor	Noise Level $L_{Aeq, 1h}$ dB	
	Daytime (07:00 – 22:00 hrs)	Night-time (22:00 – 07:00 hrs)
Residential, institutional, educational	55	45

BS5228, 2009 + A1-2014

8.2.4 BS5228‘ Noise and vibration control on construction and open sites has a methodology for predicting noise levels from construction sites, and assessing its impact on those exposed to it. BS5228 is the industry approved code of practice in the United Kingdom, and it complied with EU requirements for assessing noise from construction sites.

BS8233, 2014

8.2.5 BS8233 ‘Sound insulation and noise reduction from buildings – Code of practice’ gives recommendations for the control of noise in and around buildings, identifying appropriate criteria and limits for different situations. These criteria are intended to assist in the design of new or refurbished buildings.

8.2.6 The standard advises on the design criteria and limits for intrusive external noise. Table 8-2 presents the criteria for intrusive external noise, such as road traffic.

Table 8-2 - Indoor Ambient Noise Level Design Criteria

Typical Situation	Design Range $L_{Aeq,\ T}$ dB	
	Daytime – 16h	Night-time – 8h
Living Rooms	35	-
Bedrooms	35	30

CALCULATION OF ROAD TRAFFIC NOISE (CRTN), 1988

8.2.7 The CRTN provides a methodology for calculating the road traffic noise levels at a given distance from the highway.

8.2.8 The methodology takes into account the intervening ground cover, road configuration and road layout. The calculation assumes typical traffic (i.e. free flowing) and noise propagation conditions. Noise levels are presented in terms of the noise descriptor $L_{10,18h}$ which is the noise level exceeded for just 10% of the time between 06:00 and 24:00 hours. The variables used in the calculation of the traffic noise level are:

- The annual average weekday traffic flow (AAWT) for the 18-hour period from 06:00 to 24:00 hours;
- Mean traffic speed;
- Percentage heavy vehicles;
- Road gradient;
- Type of road surface;
- Distance of the receptor from the road; and
- Nature of the ground cover between the road and the receptor

8.3 BASELINE CONDITIONS

METHODOLOGY

8.3.1 A baseline noise survey was undertaken in accordance with ISO 1996-2 between 17 and 18 May 2016. The purpose of the noise monitoring was to establish the existing noise climate on Tintareni landfill site, and at noise sensitive receptors in the surrounding area.

Tintareni Landfill

8.3.2 A visit was made to the Tintareni landfill site, and representative noise sensitive receptors in the surrounding areas, who may potentially be affected by its upgrade and reopening. Short-term baseline noise measurements were taken at the Tintareni landfill site and also at locations representative of the nearest properties in the village of Cretoaia. The village of Cretoaia is over 3km from the Tintareni landfill site, and has no line-of-sight to the landfill due to the elevated topography of the intervening land. However, the village is approximately 220m from the district road (L418), which will provide access to the Tintareni landfill site for the waste truck and other vehicles.

8.3.3 Noise measurements were also taken at locations representative of residential properties along the district road (L481), within close proximity to the junction with the national road (R2), as these properties may potentially be affected by the additional movements of the waste trucks.

8.3.4 Tables 8-3 present a summary description of the noise measurement locations including the eastern and northern coordinates. Figures 8-1 shows the monitoring locations.

Figure 8-1 Noise Survey Locations – Tintareni Landfill, Cretoaia and Tintareni Village

Table 8-3 – Description of Noise Survey Locations - Tintareni

Location	Description
T1	Site – Leachate collection 46°51'9.03"N; 29°10'10.85"E
T2	Cretoaia Village – nearest property in relation to the site 46°51'53.13"N; 29° 8'17.89"E
T3	District Road L481 - representative of nearest property to local road 46°53'44.26"N; 29° 8'29.35"E
T4	National Road R2 – 10m from the main road 46°53'57.84"N; 29° 8'4.70"E
T5	Representative of properties near alternative access 46°53'52.21"N; 29° 7'43.54"E

Ciocana Temporary Dumpsite

8.3.5 A site visit was made to the Ciocana temporary dumpsite in Chisinau, and a noise survey was undertaken at representative receptors that are potentially affected by its current use. The results of this survey have been used to inform the recommendations for the Ciocana Closure Plan in Appendix A. They have also been used to develop the operational noise model for Tintareni landfill and the measurement locations are described and presented in Table 8-4 and Figure 8-2.

Table 8-4: Description of Noise Survey Locations - Ciocana Temporary Dumpsite

Location	Description
CH1	Dumpsite, Tipping Area 47° 0'4.68"N; 28°55'3.16"E
CH2	Dumpsite, Haul Road, movement of waste trucks, terrain in slope 46°59'55.00"N; 28°54'58.83"E
CH3	Dumpsite, Haul Road, movement of waste trucks, flat terrain 46°59'51.04"N; 28°54'43.92"E
CH4	Nearest properties at 930m away, Bubuieci, general ambient noise, dumpsite not audible 46°59'56.07"N; 28°55'50.56"E

Figure 8-2 Noise Survey Locations – Ciocana Temporary Dumpsite

Noise Measurements

8.3.6 The noise measurements were undertaken using a Class 1 Sound Level Meter, in free-field conditions (i.e. more than 3.5m away from any reflective surface other than the ground). The noise descriptors recorded included L_{Aeq}, L_{A90}, L_{A10} and L_{Amax}. Noise frequency data was recorded in 1/3 octave bands. Calibration checks were performed before and after undertaking the noise measurements with no significant change noted. Table 8-5 presents a summary of the equipment used in the survey. Appendix G-1 contains the associated calibration certificates.

Table 8-5 – Noise Survey Equipment

Sound Level Meter	Pre-Amplifier	Microphone	Calibrator
Rion NL-52 Sn 1021290	Rion NH-25 Sn 21332	Rion UC-59 Sn 04346	Rion NC-74 Sn 34657202

8.3.7 The weather conditions during the noise monitoring were generally overcast, calm and dry.

RESULTS

8.3.8 Tables 8-6 and 8-7 presents a summary of the noise levels recorded during the noise measurements at Tintareni Landfill and Ciocana Dumpsite. Noise monitoring forms in Appendix G-2 present time histories, frequency spectra and description of all measurements.

TABLE 8-6 – DAYTIME NOISE SURVEY RESULTS – TINTARENI LANDFILL

Location	Start Time	L_{Aeq} dB	L_{Amax} dB
T1	11:32	78.5	80.1
T2	13:18	41.4	60.5
T3	13:46	62.3	86.2
T4	14:13	67.6	86.2
T5	14:35	50.6	62.2

TABLE 8-7 – DAYTIME NOISE SURVEY RESULTS – CIOCANA DUMPSITE

Location	Start Time	L_{Aeq} dB	L_{Amax} dB
CH1	10:26	61.3	74.5
CH2	10:55	69.6	87.0
CH3	11:28	63.4	85.2
CH4	12:15	42.5	59.1

8.4 POTENTIAL IMPACTS

CONSTRUCTION PHASE

8.4.1 Construction and demolition activity inevitably leads to some degree of noise disturbance at locations in close proximity to these activities. It is however a temporary source of noise. The noise levels generated by construction and demolition activities would have the potential to impact upon nearby noise sensitive receptors. Noise levels at any one location will vary as different combinations of plant machinery are used and throughout construction and demolition activities and as specific locations of these activities change.

8.4.2 There is no construction planned off-site as part of the Project, other than the road improvements to the access to Tintareni landfill. This is likely to increase temporarily the ambient noise levels at properties within close proximity to the road. At this stage this is considered to be of a short term nature and moderate impact (i.e. 3 – 5dB increase in noise levels). It is also understood that piling methods will not be part of the construction activities, therefore, it is expected that the vibration impact will be negligible.

8.4.3 The nearest property to the site is over 3km from the Tintareni landfill site in Creţoaia, therefore, construction activities on Tintareni landfill, are unlikely to impact upon dwellings.

OPERATIONAL PHASE

8.4.4 A noise model using CadnaA was prepared to determine the potential noise impact arising from the operation of the upgraded Tintareni landfill site. Calculations in the model were undertaken following the methodology in ISO 9613 Part 2 for the site activities, and CRTN for the traffic on the local roads. It should be noted that ISO9613 Part 2 allows propagation from source to receptor in downwind conditions, as a worst case scenario. The prevailing wind direction is north and north-west (i.e. away from the receptor areas).

8.4.5 The noise data collected during the baseline noise survey at the Ciocana Temporary Dumpsite in Chisinau has been used to characterise the noise sources associated with the operation at Tintareni landfill. Table 8.8 presents the noise frequency spectrum used for the movement of waste trucks and the tipping activities.

Table 8-8 – Source Noise Data

Source	31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	16kHz
Waste lorry pass-by $L_{Aeq,15min}$ at 5m	71	76	81	66	64	64	63	60	52	43
Tipping area $L_{Aeq,10min}$ at 40m	69	71	65	61	57	53	53	50	43	29
Leachate collection $L_{Aeq,3min}$ at 5m	68	83	82	73	70	71	73	71	67	55

8.4.6 It has been assumed that the tipping area noise source that was recorded at Ciocana, would be present across approximately 50% of the Tintareni landfill site. It has also been assumed that the noise reading taken at location CH1 is representative of a typical hour during the daytime operation.

8.4.7 The noise associated with the waste truck movements have also been modelled for the Tintareni landfill site. The model includes noise associated with the waste truck movements on the perimeter road within the Tintareni landfill site. It also includes noise associated with the waste truck movements outside the Tintareni landfill site, representing the 2.5km Tintareni landfill site access road, and the section of the district road (L481) between the access road and the national road (R2).

8.4.8 The trip generation for Tintareni landfill site is estimated to be 14 additional HDV movements on the local road network an hours, including the national road (R2) and the district road (L481) (i.e. 7 waste trucks arriving and 7 leaving during a typical hour). Data for the noise source representing the leachate collection has been taken from measurement location T1. It has been assumed, as a worst case, that it is representative of a typical one hour.

8.4.9 The results of the noise measurements at locations T3 and T4 have been used to validate the baseline noise model using CRTN.

8.4.10 The results of the noise model have been used to determine the potential noise impact at the nearest noise-sensitive receptors. Table 8-9 presents the results of the noise modelling as free-field noise levels $L_{Aeq,1h}$ dB showing the baseline noise levels, the noise levels due to the operational activities on the Tintareni landfill site, the combination of the baseline and the operational noise, and the likely change in noise level.

Table 8-9 – Noise Impact at Nearest Receptors and Boundary

Receptor	BASELINE $L_{Aeq,1h}$ dB	SITE NOISE $L_{Aeq,1h}$ dB	TOTAL NOISE $L_{Aeq,1h}$ dB	CHANGE IN NOISE LEVELdB
Properties adjacent to Road L481, Tintareni	59	52	59	0
Properties in Creţoaia	40	34	41	1
Boundary of the Site	Not applicable	70	Not applicable	Not applicable

8.4.11 Table 8-9 demonstrates that the operation of the Tintareni Landfill would increase the current noise levels by 1dB, as a worst case for the nearest properties in Cretoaia. The noise levels arising from the site operations and waste truck movements are predicted to not exceed $L_{Aeq,1h}$ 52 dB at the properties adjacent to the district road (L481), and not exceed $L_{Aeq,1h}$ 34 dB in the village of Creţoaia. Therefore, the Worldbank noise level guidelines for daytime noise levels would be met and the noise impact due to the operation of the landfill would be not significant.

8.4.12 The noise levels due to the operation of the upgraded landfill at Tintareni will result in noise levels that meet the daytime internal noise levels presented in Table 8-2, so the internal noise level within properties in Creţoaia will meet the required standard.

8.4.13 The properties adjacent to the district road (L481) are likely to be experiencing daytime internal noise levels that exceed those recommended in BS8233 at present, due to the current local traffic. If these properties currently have an open window it is estimated that the noise break-in attenuation would be 10 – 15dB. The operation of the Tintareni landfill site and waste truck movements would not result in an increase in noise levels at this location (Table 8-9).

8.5 MITIGATION

CONSTRUCTION PHASE

8.5.1 Best Practice methodologies should be adopted where possible in the construction activities associated with the local access road improvement:

- Location and orientation of plant / equipment away from the nearest properties wherever possible;
- Use of temporary acoustic barriers;
- Selection of inherently quiet plant/equipment to provide a reduction of noise at source (it is noted that reducing the number of plant / equipment items can reduce the intensity of the noise, although this will serve to prolong the period of noise);
- Controlling noise at source by effective silencers on machines, if applicable;
- Avoiding unnecessary running of plant / equipment;
- The use of acoustic covers on construction plant / equipment (wherever practical);
- Regular maintenance of plant/equipment.

OPERATIONAL PHASE

8.5.2 No mitigation measures are required for the operation of the landfill if the assumptions presented in this chapter are followed.

8.5.3 It is however suggested that the following monitoring is undertaken during the operational phase to ensure the impact on at the nearest residential receptors is not significant:

- Noise monitoring at the site boundary to ensure that the predicted noise level of 70 $L_{AEQ,1H}$ DB is not exceeded during any one hour period; and
- Monitor the number of hourly waste truck movements, and is they exceed the assumed 14 movements per hour, undertake further noise assessment.

9 BIOLOGICAL AND ECOLOGICAL RESOURCES

9.1 INTRODUCTION

9.1.1 This chapter considers the effects of the Project on relevant biological and ecological resources. Tintareni is situated within the Central-European biogeographic zone and is most associated with the steppe landscape zone, which dominates the southern half of the Republic of Moldova. The Project is situated within an area that has been heavily influenced by anthropogenic activity, most notably the impacts of urbanisation and agriculture.

9.2 LEGISLATION

9.2.1 Moldovan nature conservation legislation relevant to the Project is as follows:

- The 1993 Law on Environmental Protection; and in particular Chapter 6, section 5, devoted to biodiversity and nature monument protection;
- The 1995 Law on Protection of the Animal Kingdom;
- The 1995 Law on Zones and Strips for Rivers and Water Basins Protection;
- The 1998 Law on Protected Areas;
- The 1993 Law on Cultural and Natural Monument Protection;
- The 2005 Law on the Red Book of the Republic of Moldova;
- The 2007 Law on the National Ecological Network;
- The 2007 Law on the Zoological Gardens.

9.2.2 Further to the above, additional international / European legislation / agreements are also relevant to the Project by virtue of the requirements of EBRD Performance Requirement 6: 'Biodiversity Conservation and Sustainable Management of Living Natural Resources'. These include, but are not limited to, the following:

- The EU Birds Directive - this gives provision for the protection of all wild birds, their nests, and eggs, within the European Community.
- The EU Habitats Directive - this provides a framework for the strict protection of animal and plant species listed under Annex IV of the Directive; and
- Ramsar List of Wetlands of International Importance.

9.3 BASELINE CONDITIONS

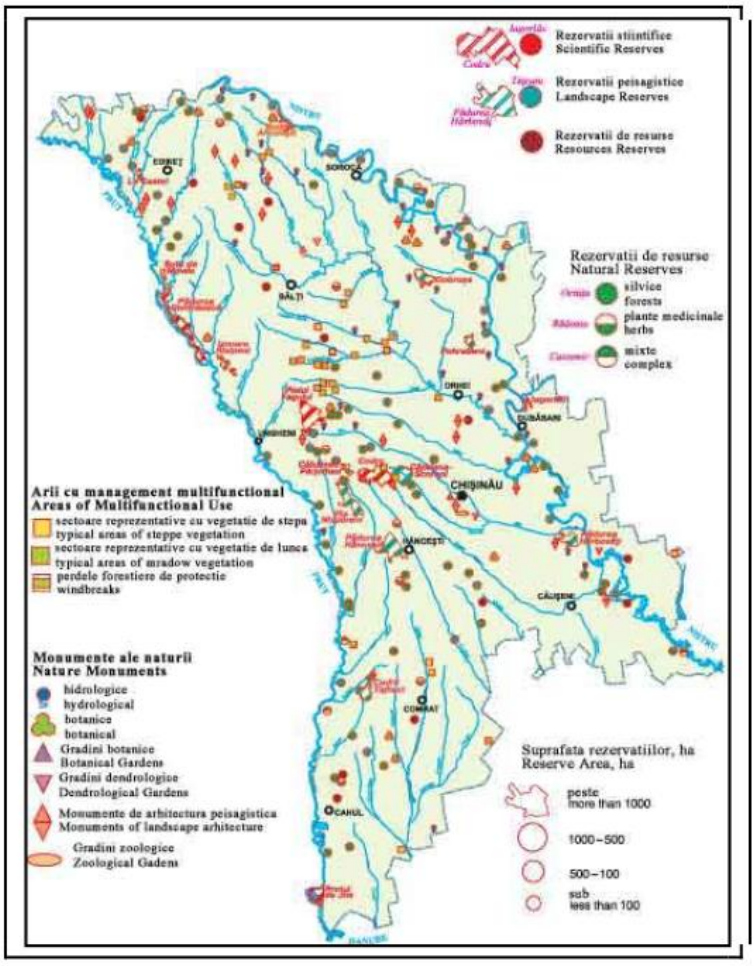
STATUTORY DESIGNATED SITES

9.3.1 Protected areas within Moldova account for 4.65% of the republic and fall under the following categories:

- Scientific reserve (29% of all protected areas);
- National Park;
- National Monument;

- Nature Reserve;
- Landscape Reserve (52% of all protected areas);
- Multifunctional management area;
- Biosphere reserve;
- Botanical Garden ;
- Dendrological garden;
- Landscape architecture monument;
- Zoological Garden; and
- Wetland of International Importance.

Figure 9-1 Nature Conservation Sites



9.3.2 Figure 10-1 identifies nature conservation sites located in Moldova. The nearest secular trees[5] are situated in the Hirbovatul Nou village, located 10.5km from the existing Tintareni landfill site. The nearest Landscape Reserves are situated Hirbovatul Nou village and Hirbovat, and are located 4km from the existing Tintareni landfill. Due to the distance between these protected areas and the Project, and the nature of the proposed works to upgrade the landfill, impacts upon protected areas are unlikely.

Figure 9-2 Nature Conservation Sites near to the Tintareni Landfill

HABITATS

9.3.3 There are no protected areas within the physical extent of the site. The existing Tintareni landfill site is dominated by rough grassland, interspersed with pockets of scrub and trees. From the high-level review of existing information completed, it is considered likely that species richness across the site is limited and typical of similarly disturbed areas across the region.

FLORA AND FAUNA

9.3.4 The Tintareni landfill site was in operation until 2010 and the site remains mainly degraded land with relatively few trees and shrubs present. It is likely that common breeding bird assemblages are present, including both scrub/tree and ground-nesting birds in areas where disturbance levels are not prohibitively high. Furthermore, it is likely that foraging animals (including birds, small to medium-sized mammals, and bats) will use the site for foraging purposes. This faunal assemblage may include representatives from the Red Book, as well as those species protected under the EU Habitats and Birds Directives, however such occurrences are unlikely to be from resident individuals and the site is not considered to be a critical resource in terms of its importance to these species (i.e. similar foraging resources will be common across the wider area).

[5] Secular tree - an old tree with heritage value / veteran tree

9.3.5 A resident population of (likely common) reptiles and small mammals/rodents is present on the site (as evidenced through anecdotal records obtained during a site visit).

9.3.6 The International Union for Conservation of Nature (IUCN) red list includes 33 faunal species native to Moldova as being Vulnerable or above (more threatened), with one species recognised as being extinct. These include resident species such as the spur-thighed tortoise *Testudo graeca* and the European mink *Mustela lutreola*, together with migratory species such as the Egyptian vulture *Neophron percnopterus.*

9.3.7 The National Red Data Book for Moldova (3rd edition, published in 2015) lists 219 faunal species and 208 floral species including the wildcat *Felis sylvestris*, pink pelican *Pelecanus rufescens* and feather grass *Stipa* sp. The Red Data Book recognises that some species of reptiles, in particular snakes, and rodent mammals have become vulnerable and in some cases rare.

LIMITATIONS

9.3.8 The biodiversity baseline information for the Project has been obtained from a review of existing information, and anecdotal information obtained during a site visit. Both of these sources are limited in their extent. Given the level of degradation already present at the site, and the lack of features of increased biodiversity interest, this limitation is not considered to represent a constraint to the overall integrity of this assessment.

BIODIVERSITY VALUE

9.3.9 Despite the potential presence of protected species (e.g. bats), there are not considered to be any priority biodiversity features (as defined within EBRD PR 6); the overall evaluation of biodiversity receptors is considered to be of low sensitivity. This evaluation is a precautionary one and is based upon the relatively ubiquitous nature of the habitat types across the site and the likelihood that such conditions (and indeed more suitable areas for protected species) are mirrored and indeed bettered across the wider area.

9.4 POTENTIAL IMPACTS

9.4.1 This section comprises a precautionary assessment of the impacts upon receptors of ecological importance in relation to the reinstatement of the existing Tintareni landfill and the associated development works; these findings should be corroborated through targeted survey/monitoring completed prior to commencement of construction activities and then throughout the operational phase of the Project.

9.4.2 The objectives for EBRD PR 6 state that the mitigation hierarchy should be adopted, with the aim of achieving at least no net loss of biodiversity and, if possible, a net gain of priority biodiversity features. Application of the mitigation hierarchy to achieve no net loss of biodiversity involves the following steps: avoid, mitigate, restore, and lastly offset.

9.4.3 The structure of this assessment will be to identify the impact during both the construction and operation stages, and then make an assessment both prior to and post-mitigation (where relevant).

CONSTRUCTION

9.4.4 The Project involves the reinstatement and upgrade of the existing Tintareni landfill site, repair of the access road, construction of a leachate treatment plant and operational facilties, including a control building, weighbridge and workshop. The Tintareni landfill site remains a mainly degraded site with minimal vegetation present in the form of small pockets of trees and shrubs. The works are unlikely to involve more than minimal habitat loss in an already degraded site. The magnitude of this impact is therefore considered to be slight adverse. Any losses could be mitigated through landscaping around the perimeter of the site which will reduce the residual impact magnitude, resulting in an impact that is not significant.

9.4.5 The trees on site and built structures which remain from the previous landfill operations may provide the potential for bats which are listed under Annex IV of the Habitats Directive. Depending on the scale of removal / disturbance of these features, this impact has the potential to be Large Adverse (i.e. should all such features be lost). This is a precautionary assessment and assumes a similar limited roosting resource across the wider area. Should rehabilitation / felling works be required for these buildings and trees then bat surveys would be required prior to the start of any works in order to identify roosts which should subsequently be retained (where possible), or their loss mitigated through the provision of artificial roost sites in close proximity. With the incorporation of this mitigation, the residual effect is not considered to be significant.

9.4.6 Vegetation on site may support breeding birds; it is considered likely that such an assemblage will comprise common bird species. All breeding birds are protected under the provision of the EU Birds Directive and removal of vegetation has the potential to impact upon them through the destruction of nests or eggs. Given the inherent mobility of this animal group and the likely presence of suitable similar habitat in the surrounding area, the impact is considered to be Slight Adverse. Vegetation clearance works will be timed to take place outside of the breeding bird season, thus preventing direct impacts to nesting birds. The provision of landscape planting will serve to mitigate the loss of this resource, resulting in an effect that is not significant.

9.4.7 The reptile assemblage on the site will also be affected by the disturbance or loss of vegetation. Given the inherent mobility of this animal group and the likely presence of suitable similar habitat in the surrounding area, the impact is considered to be Slight Adverse. It is recommended that where possible, any rock or debris piles are retained on the site to provide continued hibernacula resources for reptiles. With the inclusion of this measure, the residual effect will likely be one of Minor Significance.

9.4.8 A general animal welfare impact exists during construction activities with the potential for injury or death to mobile fauna as they access the active construction site. This impact is considered to be Slight Adverse. In order to reduce this, all open excavations, hazardous materials, and plant machinery should be secured and made safe when not in use. Furthermore, a fence is proposed for the boundary of the site which will help to prevent site access by wildlife, minimising the potential impacts from the construction activities. The residual effect will therefore not be significant.

9.4.9 In light of the limited nature of the baseline data collection, it will be necessary for a more complete review of existing information (or if this doesn't exist, detailed field survey work) to be undertaken prior to construction in order to corroborate the above assessment.

OPERATION

9.4.10 The landfill was operational until recently (2010). The disturbance (noise, movement) from the renewed operation of the reinstated site is unlikely to cause any significant adverse impact on any wildlife present.

9.4.11 As with the animal welfare consideration during construction, there is the potential of fauna being directly impacted by an active landfill (i.e. open excavations, heavy machinery, dangerous substances, etc.). Measures should be taken to minimise these risks through environmental management during the lifetime of the Project. Furthermore, a fence is proposed for the boundary of the site which will help to prevent site access by wildlife, minimising potential impacts from the operational activities. These measures will result in a residual effect that is not significant.

9.4.12 Potential operational effects (from air quality, water quality and noise) on habitats and species adjacent to the access route, associated with the reintroduction of waste transportation to the landfill, shall be minimised through the monitoring of effects and steps taken to mitigate any impacts.

9.4.13 It is also recognised that the reinstatement of the Tintareni landfill may result in the closure of illegal dumpsites in Tintareni, which are closer to the River Bic. A potential Moderate Beneficial impact therefore exists in the improvement in water quality that will occur as a result in decreased leachate pollution to the River Bic from these illegal dump sites.

9.5 CONCLUSIONS

9.5.1 It is anticipated that biodiversity loss will be minimal during the upgrade of the Tintareni landfill site due to the low-interest habitats currently present across the site. Any potential losses can be avoided, mitigated or restored within the site to ensure no net loss of biodiversity, without the need for biodiversity offsetting. The ecological assessment summarised in Table 9-1.

9.5.2 A potential beneficial impact of the Project will be improvement of the water quality (and thus biodiversity resource) of the River Bic following management/closure of illegal dumpsites in the region.

Table 9-1 – Summary of potential Biodiversity Impacts and Associated Mitigation Measures

POTENTIAL IMPACT	PHASE	MITIGATION/ MANAGEMENT PROPOSED	POSITIVE OR NEGATIVE	IMPACT	MITIGATION MEASURES	RESIDUAL IMPACT
Biodiversity	Construction	Yes	Negative	Low	→ Securing of construction areas and site fencing installed prior to reinstatement and construction works to prevent site access by wildlife species. → Full survey of ecological receptors across the site – focussing primarily on fauna. → Retention of key habitat features where possible (as identified from the field survey work), or compensatory provision thereof (especially with regards roosting bats). → Monitoring of any mitigation to ensure on-going success of such measures. → Vegetation clearance works timed to take place outside of the breeding bird season.	Negligible
	Operation	Yes	Negative	Negligible	→ Landscape planting around the surrounds of the site. → Reducing risks to animal welfare through provision of environmental management across the site, to include but not be limited to: covering open excavations, securing dangerous substances and maintaining maximum speed limits for landfill vehicles.	Negligible

10 CULTURAL HERITAGE

10.1 INTRODUCTION

SCOPE

10.1.1 This chapter addresses the following potential impacts on cultural heritage assets:

- Indirect impacts on the setting and character of cultural heritage assets within a 4km area surrounding the Tintareni Landfill site, due to the reopening of the landfill;
- Indirect impacts on the setting and character of cultural heritage assets adjacent to the national route (R2) in the village of Tintareni due to potential alterations in Heavy Duty Vehicle (HDV) traffic;
- Effects on unknown buried assets during the construction phase of the Project.

10.2 LEGISLATION

10.2.1 The current legislative framework governing the historical and cultural heritage of Moldova is based on the following national legislation:

- *Law of Historical Monument Protection* (1993);
- *Law on Museums* (2002);
- *Law on Culture* (1999);
- *Law on Archaeological Heritage* (2010);
- *Law on Public Forum Monuments* (2011);
- *Law on Protection of the National Mobile Cultural Heritage* (2011);
- *Law on Protection of Intangible Cultural Heritage* (2012); and
- *EIA legislation of Moldova (Law No. 86 of May 29, 2014).*

10.2.2 An updated version of the 1993 *Law of Historical Monument Protection* was released for public review in April 2016. In 2002 Moldova ratified the Convention on Protection of World Cultural Heritage and Natural Heritage (1972) adopted at the 16th Session of UNESCO General Assembly in Paris.

10.2.3 National Agency on Monuments Inspection and Restoration has responsibility for developing effective policies to protect cultural heritage. The State Register of Monuments was published in 2010. The Ministry of Culture has produced a cultural development strategy ‘Culture 2020’.

10.2.4 In addition to the requirements specified in the legislation, the Project must also conform to the following performance requirements:

- International Financing Corporation (IFC) Performance Standard 8 (2012);
- EBRD Performance Standard 8 of Environmental and Social Policy (2014); and
- European Investment Bank Environmental and Social Practices and Standard 5 (ESS 5).

10.3 BASELINE CONDITIONS

10.3.1 Tintareni Landfill is located within a rural area, and the land surrounding the existing landfill is primarily used for agriculture. No cultural heritage assets have been recorded within the site itself and given the nature and depth of excavation that was required to construct the original landfill, there are unlikely to be assets preserved beneath the existing landfill.

10.3.2 There are several cultural heritage assets located in the surrounding area, as listed in Table 10-1Table 10-1 . They include built heritage and archaeological assets. Their location in relation to the landfill is shown in Figure 10-1. The nearest asset is located 3.4km from Tintareni Landfill site.

10.3.3 There are several cultural heritage assets in the village of Tintareni, that are located in close proximity to the national road (R2) that will be used by the waste trucks to transport waste from Chisinau to the landfill site. These include the war memorials and tumulus shown in Figure 10-1 and detailed in Table 10-1. However, this is a National Route that is already heavily used by Heavy Duty Vehicles (HDVs), so additional use by the waste trucks will only result in a minor increase (approximately 10%) in HDVs. This minor increase in HDVs is unlikely to have an additional effect on air quality or noise and vibration, and therefore it is not expected to result in adverse effects on affect heritage assets near to the national road (R2).

Table 10-1 List of Existing Cultural Heritage in the Project Area

NAME OF HERITAGE ASSET	LOCATION OF HERITAGE ASSET	TYPE OF HERITAGE ASSET	IMPORTANCE	AGE
Settlement	Albinita	Archaeological	National	The Bronze Age
Settlement	Albinita	Archaeological	National	Century XIV-XVI
Tumulus	Cretoaia	Archaeological	National	The ancient era
The Church “Sf. Gheorghe”	Geamana	Architectural	National	1804
Monument in memory of the villagers fallen in the World War II (1941-1945)	Geamana	Historical	Local	1967
Tumulus	Geamana	Archaeological	National	The ancient era
Settlement	Todiresti	Archaeological	National	Century II-IV
The old Hospital building of Zemstvo	Todiresti	Architectural	National	1970
Monument in memory of the villagers fallen in the World War II (1941-1945)	Todiresti	Historical	National	1985
Tumulus	Todiresti	Archaeological	National	The ancient era
Settlement	Tintareni	Archaeological	National	Century II-IV
Tumulus	Tintareni	Archaeological	National	-
Monument in memory of the villagers fallen in the World War II (1941-1945)	Tintareni	Historical	National	-
Monument (the common grave) to fascism victims	Tintareni	Historical	Local	1956

10.3.4 Table 10-2 contains a description of the types of the existing cultural heritage assets in the study area and identifies the distance of the nearest cultural heritage asset of each type to the existing Tintareni landfill. The location of the heritage assets described in Table 10-2 are shown in Figure 10-1: Cultural Heritage Sites near Tintareni Landfill.

Table 10-2: Description of each Type of Cultural Heritage Asset

NAME OF HERITAGE	DESCRIPTION	IMPORTANCE	YEAR
Tumulus (Archaeological)	A tumulus is a mound of earth and stones raised over a grave or graves. Tumuli are also known as barrows, burial mounds, or kurgans. Tumuli are often categorised according to their external shape. In this respect, a long barrow is a long tumulus, which contains several burials, such as passage graves. A round barrow is a round tumulus, commonly constructed on top of a grave. The internal structure and architecture of both long and round barrows has a broad range, the categorization only refers to the external apparent shape. The nearest tumulus is situated near Cretoaia village located 3.5km to the west of the existing Tintareni landfill. It is not visible from the landfill site due to the intervening elevated topography.	National	Prehistoric period
Settlement (Archaeological)	A settlement, locality or populated place is a community in which people lived. A settlement can range in size from a small number of dwellings grouped together to the largest of cities with surrounding urbanized areas. Settlements may include hamlets, villages, towns and cities. Often small settlements are found, but the heritage of these is protected by the State. The nearest protected settlements are located in the village of Albinita, 4km from the existing Tintareni landfill, and date from the Bronze Age. The settlements are not visible from the landfill site due to the intervening elevated topography.	National	The Bronze Age; Century II-IV; Century XIV-XVI;
War Monuments (Historical)	A war memorial is a building, monument, statue or other edifice to celebrate a war or victory, or (predominating in modern times) to commemorate those who died or were injured in a war. The war monuments are raised in memory of the soldiers or persons who died in the First and Second World Wars. These monuments are of local and national interest and are protected by the State. The nearest war monuments are situated in the Geamana village, located 3.5 km from the existing Tintareni landfill. This war memorial is not visible from the landfill site due to the intervening elevated topography.	National and/or local	1956/85/67
Church (Architectural)	A church (building), is a building used for religious activities, particularly Orthodox Christian worship service. The term in its architectural sense is most often used by Christians to refer to their religious buildings; in traditional Christian architecture, the church is often arranged in the shape of a Christian cross. When viewed from plan view the longest part of a cross is represented by the aisle and the junction of the cross is located at the altar area. The Churches from Anenii Noi town and Geamana village are the only churches from this area protected at a national level. The first one is situated 4.0km from the existing Tintareni landfill in Geamana village, and the second one is 5.5km from the existing Tintareni landfill in the Anenii Noi town. These churches are not visible from the Tintareni landfill site due to the intervening elevated topography.	National	1804

NAME OF HERITAGE	DESCRIPTION	IMPORTANCE	YEAR
Other Heritage (Architectural, Historical, Archaeological)	This category refers to a type of structure that was explicitly created to commemorate a person or important event, or which has become important to a social group as a part of their remembrance of historic times or cultural heritage, or as an example of historic architecture. The term 'monument' is often applied to buildings or structures that are considered examples of important architectural and/or cultural heritage.	National	1970

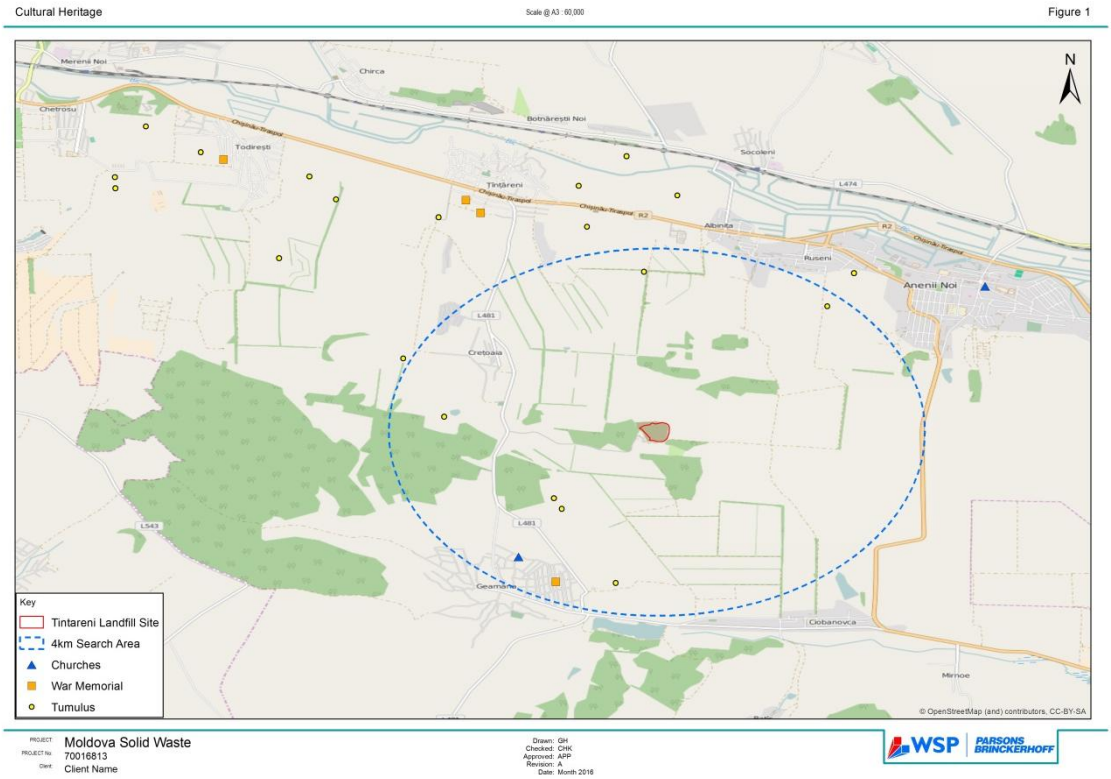


Figure 10-1 Cultural Heritage Sites near Tintareni Landfill (Source: The State Register of Monuments)

10.4 POTENTIAL IMPACTS

10.4.1 The assessments of potential impacts as a result of the Project has taken into account both the construction and operational phases. The significance attributed to each impact has been based on the magnitude of change due to the Project, and the sensitivity of the affected receptor. The methodology used to determine significance is outlined in Chapter 6 of the ESIA.

10.4.2 As indicated in Table 10-2 and Figure 10-1 there are eight cultural heritage assets, and one protected settlement, located within 4km of the existing Tintareni landfill site. The closest heritage assets are two tumuli, situated 3.4km to the south west of the existing Tintareni landfill site.

10.4.3 The heritage assets located to the south of the existing Tintareni landfill site, which comprise three tumuli, a church and a war memorial near Geamane, have no inter-visibility with the landfill site due to the elevated topography between the landfill site and these locations. The Project will therefore have not effects on these heritage assets during construction or operation. The protected settlements in the village of Albinita also have no inter-visibility with the existing Tintareni landfill site, so the Project will have no effect on the settlements during construction or operation

CONSTRUCTION PHASE

10.4.4 There is one tumulus located to the south of Cretoaia and directly west of the proposed access route (L481), which may be subject to temporary indirect effects on its setting that are of minor significance, as a result of the resurfacing of the access route to the landfill. The resurfacing works may affect the setting of the tumuli through the introduction of uncharacteristic elements to the surrounding landscape, such as construction vehicles, noise, and dust. These effects would be temporary and short term.

10.4.5 The tumulus located 4km to the north of Tintareni landfill, identified in Figure 10-1, may be subject to temporary minor significant indirect effects as a result of the construction of the upgraded Tintareni landfill site. The setting of this cultural heritage asset may be affected by the re-profiling of the landfill, removal of the low quality vegetation and the introduction of uncharacteristic elements to the agricultural landscape such as construction vehicles, noise, dust, and artificial lighting. The effect would be temporary and short term.

OPERATIONAL PHASE

10.4.6 During the operational phase of the Project it is envisaged that the tumulus located to the south of Cretoaia will be subject to a small adverse effect, which will be of minor significance. This effect on its setting is due to the anticipated change in the landscape setting of this asset due to the waste trucks using the resurfaced access route to the landfill, associated noise and dust, and windborne litter. These effects would be indirect but experienced for the duration of the operation of the landfill site.

10.4.7 The tumulus located 4km to the north of Tintareni landfill, identified in Figure 10-1, will be subject to a small adverse effect, which will be of minor significance. This effect on its setting is due to the anticipated change in the landscape setting of this asset due to some of the new proposed facilities, such as the leachate management plant, the removal of vegetation and waste management operations at the site and windborne litter. These effects would be indirect but experienced for the duration of the operation of the landfill site.

10.5 MITIGATION

CONSTRUCTION PHASE

10.5.1 The proposed works to upgrade the Tintareni landfill site to EU standards are likely to require excavation works. Although these activities will occur within the footprint of the existing Tintareni landfill site, it should be recognised that there is the possibility of encountering previously undiscovered archaeological assets. It is therefore recommended that a ‘Chance Finds Procedure’ is set up in advance of the construction phase to manage and mitigate the impact during construction on potential archaeological assets. This will be conducted in accordance with EBRD Performance Requirements 8 (9-14) and conducted by an approved and qualified archaeologist.

10.5.2 The following mitigation measures may act to reduce any adverse impacts on the setting of the cultural heritage assets during the construction stage:

- Good construction site management to reduce visual impacts associated with the construction works;
- Minimising the use of artificial lighting, and undertaking construction during daylight hours;
- Where possible, hedgerow and hedgerow trees could be planted around the perimeter of the Project to provide screening;
- Minimising lorry movements, noise and dust during the construction stage through efficient site management, including wheel washing and using covered vehicles.

OPERATIONAL PHASE

10.5.3 The following mitigation measures can reduce adverse impacts on the setting of the cultural heritage assets during the operational stage:

- Good operational site management to reduce the visual impacts associates with the operation of the landfill site;
- Reinstating completed landfill cells with suitable planting of grass/wildflower/shrubs as soon as the cell becomes filled and non-operational;
- Ensure the finished levels of the landfill site replicate the surrounding landscape of rolling hills and does not take on an unnatural contour;
- Ensure suitable establishment and on-going maintenance of any woodland tree planting, hedgerow and hedgerow trees to maintain screening properties;
- Minimise dump truck movement, noise and dust being emitted from landfill operations; and
- Ensure reduced speed limits are enforced on the access road to reduce the effects of noise and dust.

11 LANDSCAPE AND VISUAL

11.1 INTRODUCTION

11.1.1 This chapter assesses the impact of the Project on existing landscape character and visual amenity of the Tintareni landfill site, including the landscape that surrounds it. It considers the potential impacts of the proposals on the visual amenity from receptors in the surrounding landscape, in particular residences within the village of Tintareni and users of the agricultural land surrounding the Tintareni landfill site.

11.1.2 This chapter (and its associated figures and appendices) should be read in conjunction with Chapters 1-7 of this ESIA, which provide further information relating to the Project.

11.2 LEGISLATION AND GUIDANCE

11.2.1 The Project is required to comply with EU and Moldovan EIA legislation, as set out in:

- The Law on Ecological Expertise and Environmental Impact Assessment, no. 851-XIII dated 29 May 1996; and
- Law on Environmental Impact Assessment, adopted in 2014, which specifies the necessary Environmental Assessment procedures for large and complex projects, as specified in Annex 1 and 2. It is fully harmonised with the EU Directive.

11.2.2 These Laws provides the requirements for EIAs, but do not contain specific requirements for Landscape and Visual Impact Assessments (LVIA).

11.2.3 As there is currently no guidance available relating to LVIA in Moldova, this assessment of landscape and visual impacts has been undertaken broadly in accordance with the following good practice guidelines, which are the industry accepted best practice guidance in the UK, and are in accordance with EU requirements:

- '*Guidelines for Landscape and Visual Impact Assessment*' (GLVIA, third edition, 2013), published April 2002 by the Landscape Institute and Institute of Environmental Management and Assessment; and
- '*Landscape Character Assessment, Guidance for England and Scotland*', (Countryside Agency and Scottish Natural Heritage, 2002).

11.3 ASSESSMENT METHODOLOGY

SCOPE OF THE ASSESSMENT

11.3.1 The following elements have been considered within this assessment to identify the potential impact of upgrading and reopening of the Tintareni landfill site:

Construction Stage Effects

- Effect upon the existing character of the Tintareni landfill site and surrounding area due to construction activities;
- Effect upon the setting of any nationally or regionally important buildings, monuments or features of historical importance within 2km of the Tintareni landfill site due to construction activities;

- Effect upon the users of surrounding roads, public paths, tracks or public spaces due to construction activities;
- Effect on the setting of any nationally, regionally, or locally important wildlife or habitat sites within 2km of the site due to construction activities;
- Effect upon existing public views from surrounding visual receptors, in particular those from Tintareni, but also visual receptors within 2km of the site, due to construction activities;
- The visual relationship of the Project to the existing landscape, particularly in terms of height, scale, massing, materials and built form due to construction activities; and
- Changes in night-time views due to new artificial light sources during construction.

Operational Stage Effects

- Effect upon the existing character of the site and surrounding area due to operation of the Tintareni landfill site;
- Effect upon the setting of any nationally or regionally important buildings, monuments or features of historical importance within 2km of the site operations;
- Effect upon the users of surrounding roads, public paths, tracks or public spaces due to operation of the Project;
- Effect on the setting of any nationally, regionally, or locally important wildlife or habitat sites within 2km of the site due to operation of the Project;
- Effect upon existing public views from surrounding visual receptors, in particular from Tintareni but located within 2km of the site due to operation of the Project; and
- The visual relationship of the Project to the existing landscape, particularly in terms of height, scale, massing, materials and built form due to operation of the Project.

11.3.2 The methodology proposed for the LVIA is as follows:

- A desk-based review of the relevant guidance and planning policy context (where possible);
- A description of existing land use within the site and its immediate surroundings;
- Assessment of local landscape character;
- A visual assessment of the existing site and features on the site;
- An assessment of the landscape and visual impacts of the scheme (landfill operations and site traffic) and the significance of the effects.
- Assessment of trends for change in the area; and
- Opportunities for mitigation and enhancement.

EXTENT OF THE STUDY AREA

11.3.3 The study area has been defined as the furthest extent from where elements of the Project are predicted to be visible. This is known as the Zone of Theoretical Visibility (ZTV) or visual envelope (i.e. the approximate area from which the Project will be visible from a height of approximately 1.6m (eye level) above the ground). The extent of the ZTV is influenced by the following:

- The extent of direct effects on the landscape as a result of the Project and the extent of indirect impacts on the landscape (i.e. wider changes in character and setting);
- The extent and sensitivity of distinctive landscape character areas within or adjacent to the site; and
- The effects on people with views of the site.

11.3.4 A review of aerial photographs and site visit photographs identified that inter-relationships within the landscape and views of the site in some instances extend some distance due to the undulating topography, lack of built form, and blocks of open farmland allowing more open views across farmland. The spatial scope for the landscape and visual assessment was a 2km radial study area from the centre of the Tintareni site. This allowed for longer-distance views towards the site from surrounding slightly elevated locations.

METHOD OF BASELINE DATA COLLATION

11.3.5 A desk-based review was undertaken in order to determine existing landscape features, landscape character, and potential visual receptors. This included a desk-based review of existing publically available on-line information including aerial photographs, base maps, site plans and site photographs supplied by others.

RECEPTOR SENSITIVITY, MAGNITUDE OF CHANGE AND RESIDUAL EFFECTS

11.3.6 The methodology for assessment within this chapter is outlined in Chapter 7, including the following:

- The sensitivity of landscape and visual receptors is outlined in Table 7-2
- The magnitude of change in relation to landscape and visual receptors is outlined in Table 7-3
- The resulting residual effect for landscape and visual receptors is outlined in Table 7-4.

11.3.7 In accordance with '*Landscape Character Assessment Guidance for England and Scotland*' (Countryside Agency and Scottish Natural Heritage, 2002), visual receptors are given a different 'value' or 'sensitivity' to identify their relative importance. For clarity in relation to visual receptors, the following table provides further information on sensitivity value:

TABLE 12.1: VISUAL RECEPTOR SENSITIVITY

Receptor/ Resource	Context of View/ Number of Potential Viewers	Visual Susceptibility to change	Value attached to the View
Very High	High concentrations of static receptors such as large residential estates.	Large residential areas; high quality public open space; visitors / users of recreational, historical or cultural sites where landscape is an integral part of its enjoyment (such as users of National Parks, World Heritage Sites). Very high susceptibility to any change in the view.	Typically strong landscape with many features worthy of conservation in the view; infrequent detracting features; strong sense of place. Typically of international recognition such as World Heritage Sites.
High	Many viewers including static viewpoint such as residential property.	Residential areas; public open space; visitors / users of recreational, historical or cultural sites where landscape is a significant factor in its enjoyment (such as users of long distance trails). High susceptibility to changes in the view.	Good quality, high value and often designated landscape in the view. High importance.
Medium	Several viewers, longer transient views such as from public open space and recreational areas.	Retail areas, offices, formal sports facilities where the landscape is secondary to enjoyment of the sport; outdoor workers; users of scenic roads, railways or waterways; users of tourist routes, schools and other institutional buildings and their outdoor areas. Moderate susceptibility to changes in	A reasonably attractive landscape in the view with a mix of attractive features and intrusive elements. Considered pleasant but unremarkable by most people. Moderate

		the view.	importance.
Low	Several viewers, longer transient views such as from public open space and recreational areas.	Indoor workers in medium quality landscape; passengers in public transport on main arterial routes; users of recreational facilities where the purpose of that recreation is not related to the view (e.g. sports facilities). Limited susceptibility to changes in the view.	A typically poor quality landscape in the view of low importance, with detracting features and intrusive features but with occasional attractive features and elements.
Negligible	Very few viewers; fast, transient views such as from vehicles along a national road.	Industrial area, land awaiting development; indoor workers in poor quality landscape; users of large main roads (e.g. motorways and national roads). Very limited susceptibility to changes in the view.	A degraded or disturbed landscape in the view, typically awaiting development. Many unattractive and intrusive features, litter and dirt. Poor quality landscape. Very low importance.

ASSUMPTIONS AND LIMITATIONS

11.3.8 The following assumptions have been made in relation to this chapter:

- The temporal scope is considered to be of short term duration for construction activities (i.e. less than 2 years in duration) and long-term for operational effects of the Project (i.e. greater than 10 years duration); and
- It has been assumed that cumulative effects in relation to landscape and visual receptors are unlikely to occur and therefore they are not currently considered as part of this chapter.

11.3.9 The following limitations have been experienced in relation to this chapter:

- No specific site visit in relation to landscape and visual receptors has been undertaken. Site photographs and some general surrounding photographs have informed the visual assessment, along with a desk-based review of aerial photographs, maps and publically available on-line data;
- There was limited on-line information available in English relating to designations or landscape / visual related legislation, nor relating to public access rights and therefore these sections are limited in extent; and
- No consultation relating specifically to landscape or visual issues was undertaken.

11.4 BASELINE CONDITIONS

11.4.1 A number of features contribute to the creation of landscape character and quality and influence the visibility of the site. Although certain aspects such as the history and geology of the site are not assessed in terms of their sensitivity to change or the impact of the Project upon them, they are identified within this chapter as important landscape features which influence landscape character and visibility.

OVERVIEW OF THE SITE AND IMMEDIATE SURROUNDINGS

11.4.2 The Tintareni landfill site is located near the village of Tintareni within the Anenii Noi district of Moldova. The Tintareni landfill site is 3km form the village of Creţoaia and 5km from the village of Tintareni. The local economy relies heavily on agriculture, and they are vineyards in the area surrounding the site.

11.4.3 The Tintareni landfill site itself is largely covered by regenerating grass and scrub, with white concrete / dirt tracks and access roads to and through the site. The site was originally created as a series of trenches, with an embankment to the north and landfill trenches gradually in-filled from north to south towards the access roads and welfare facilities to the south. The built form within the site, includes the biogas plant, consisting of a series of small work blocks with gas collection stacks and plant (see Figure 2.5 in Chapter 2) located towards the higher end of the landfill site in the south-west. There are administration buildings and associated infrastructure at the entrance to the site in the south. Rubbish and remnants from the previous landfill operations are clearly visible beneath the grass.

Figure 11-1 View looking west across Ţînţăreni landfill site towards the biogas plant

11.4.4 The landscape surrounding the site is one of undulating hills, with grassland, pasture, some scrub, scattered trees and arable farming predominating. Electricity pylons and wires are distinctive features in the low-rise landscape, whilst concrete roads also stand out against the green and brown colours of the hills and fields.

11.4.5 The nearest settlement is the Creţoaia village area of Tintareni, located approximately 3km to the west of the Tintareni landfill site; along with Tintareni village 5km to the north-west of the site; Anenii Noi and Ruseni located 4km and 3.2km respectively to the north-east of the site, Albinita located approximately 3.8km to the north of the site and Geamana (particularly Dzhamany area) and Ciobanovca located approximately 2.7km and 4.3km respectively to the south of the site.

BASELINE CONDITIONS - LANDSCAPE

TOPOGRAPHY

11.4.6 The Tintareni landfill site lies at a level of approximately 150m Above Ordnance Datum (AOD), sitting within a relatively flat plateau extending north to south-east. There is a slight rise in the surrounding landscape from north to south. A small ridge of higher ground is located 200m to the south-west of the site, lying at a level of around 200m AOD.

11.4.7 The site itself is artificial in its contouring, having been re-profiled during its use as a landfill site. It now accommodates approximately five landfill trenches and is typically slightly lower in height than the surrounding rolling landscape.

11.4.8 The sensitivity of the existing topography within the site is therefore considered to be low.

LANDSCAPE FEATURES AND DESIGNATIONS WITHIN AND SURROUNDING THE SITE

Trees and Vegetation

11.4.9 The site itself is largely covered by regenerating grass and scrub, with some scattered trees. This creates a blanket cover of green or brown vegetation (depending on the season) but also allows long-distance views across the following hills towards the surrounding settlements due to the low-level scrubland and limited tree cover.

11.4.10 The sensitivity of the existing vegetation cover within the site is therefore considered to be low.

Setting of Features of Historical and Cultural Importance

11.4.11 There are a number of cultural and historic assets within 4km of the site, which are considered in Chapter 10. The nearest assets are two tumuli located 3.4km to the west of the existing Tintareni landfill. They are not visible from the landfill due to the intervening elevated topography. Given distance and lack of intervisibility, historical and cultural assets are considered with Chapter 10 only and are therefore not considered further within this Chapter.

Connectivity and Access

11.4.12 The site is accessed from Chisinau via the national road (R2) and then via the district road (L481), which passes near to the Creţoaia village area of Tintareni. The L481 connects the R2 highway in the north-west to Geamana in Ciobanovca the south. The R30 highway is located approximately 4km to the east of the site, and also provides a route from the R2 highway in the north to the Ciobanovca in the south.

11.4.13 There are further surfaced and unsurfaced tracks located throughout the surrounding farmland, but there is no public access to the site itself. The site is currently connected to the wider highway infrastructure via a poorly-surfaced access road, which links the site to the district road (L481), just south of Creţoaia village.

11.4.14 The sensitivity of the existing connectivity and access is therefore considered to be low.

LANDSCAPE CHARACTER

Character Area 1: Small scale agricultural farmland

11.4.15 This area is characterised by small-scale fields principally surrounding settlements and containing a wide variety of horticultural production. Small scale fields are often unbounded, separated by grassed tracks but typically rectilinear in shape and lying horizontally to each other. The fields are reminiscent of back gardens of nearby houses, used for crop production. They are gradually being replaced by larger fields, and whilst replaceable, they are becoming less common.

11.4.16 The sensitivity of Character Area 1 is therefore considered to be medium-high.

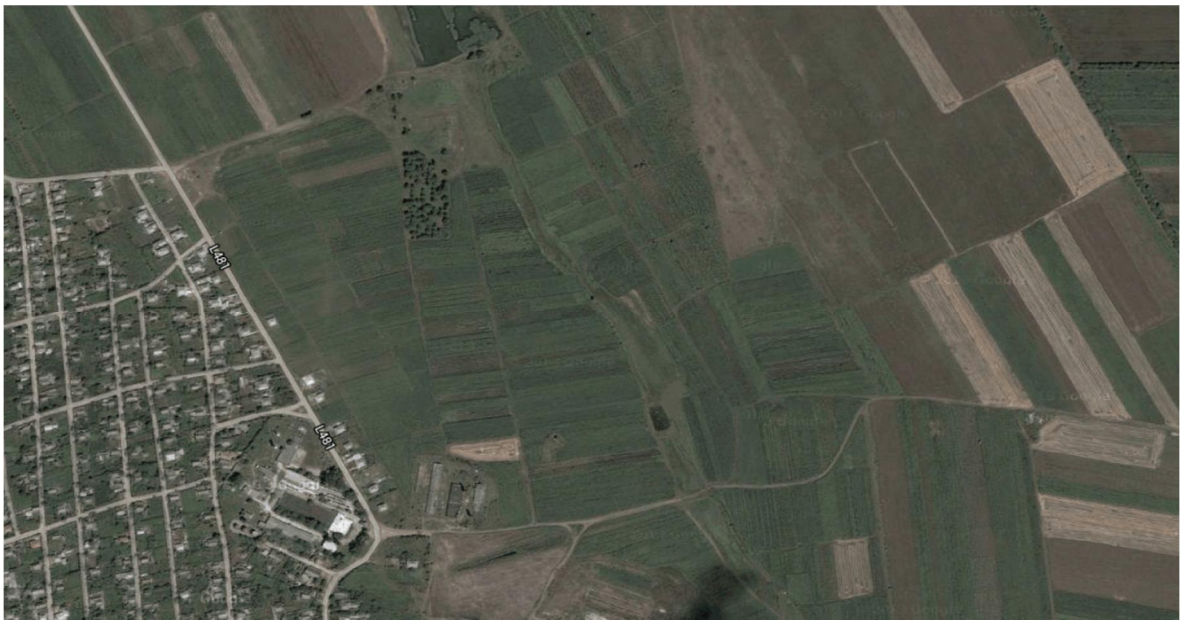


Figure 11-2 Aerial view of smaller scale farmland adjacent to settlements

Character Area 2: Large scale agricultural farmland and woodland blocks

11.4.17 This area is characterised by larger-scale monoculture fields typically rectilinear in shape and lying horizontally to each other. Large areas are often bounded by hedgerows, with un-made boundaries edging many fields. Large blocks of woodland, of similar scale to the fields, are also located within this character area, visually breaking up the smaller fields and providing a green background to some skyline views. The large agricultural fields are substitutable, but the woodland blocks and hedgerows less substitutable.

11.4.18 The sensitivity of Character Area 2 is therefore considered to be medium.

Figure 11-3 Larger scale farmland

Character Area 3: Settlements

11.4.19 Settlements located alongside highways. Houses are typically single or two-storey detached dwellings with pitched roofs and set at the front of large plots to allow for private food production. They are located alongside highways with telephone wires, electricity cables and lighting columns. Settlements typically contain a number of trees and shrubs alongside the highway, typically set within gardens.

11.4.20 The sensitivity of Character Area 3 is therefore considered to be medium-high.

Figure 11-4 View looking south across Creţoaia

Character Area 4: Tintareni Landfill Site

11.4.21 This area is characterised by slightly artificial / unnatural contours, covered with recolonising grass and scrubland. Piles of rubbish are visible within the grassland, detracting from the aesthetic appearance of the local landscape. No trees are present.

Figure 11-5 View across Tintareni landfill site

11.4.22 The sensitivity of Character Area 4 is therefore considered to be low.

ARTIFICIAL LIGHTING

11.4.23 The site has lighting masts but is currently unlit, as it is not currently operational. There is limited lighting within the residential areas of Creţoaia and Tintareni. It is likely, however, that there is minimal light spill into the surrounding area.

11.4.24 There are likely to be sources of artificial lighting during the construction phase, as well as use of illumination masts to allow operations during working hours in winter. Artificial lighting on landscape and visual receptors at both construction and operation will therefore be considered.

LANDSCAPE RECEPTOR SUMMARY

11.4.25 The landscape receptors in Table 11.2 have been considered within the assessment section.

Table 11.2: Landscape Receptor Summary

Receptor/ Resource	Sensitivity (Value)	Justification for value
Existing topography within the site	Low	The site is artificial in its contouring, having been re-profiled during its use as a landfill site. It now accommodates approximately 5 landfill trenches and is typically slightly lower in height than the surrounding rolling landscape.
Existing vegetation cover within the site	Low	The site itself is largely covered by regenerating grass and scrub, with a few scattered trees of limited aesthetic value.
Existing connectivity and access within the site	Low	There is no public access across the site and very limited access and connectivity to the wider transport network. Access is via a single dirt track onto the Ţînţăreni to Geamana highway.
Character Area 1: Small scale agricultural farmland	Medium-high	Small-scale fields principally surrounding settlements and containing a wide variety of horticultural production. Gradually being replaced by larger fields and whilst replaceable are become less common.
Character Area 2: Large scale agricultural farmland and woodland blocks	Medium	Larger-scale monoculture fields typically rectilinear in shape and lying horizontally to each other. Large areas are often bounded by hedgerows. Large blocks of woodland also characterise this area. Partially substitutable.
Character Area 3: Settlements	Medium-high	Typically single or 2-storey detached dwellings with pitched roofs and set at the front of large plots to allow for private food production and vegetated gardens. Trees are also located along the highways the houses front on to.
Character Area 4: Ţînţăreni Landfill Site	Low	Artificial / unnatural contours, covered with recolonizing grass and scrubland. Piles of rubbish are visible within grassland. No trees are present.

BASELINE CONDITIONS – VISUAL AMENITY

11.4.26 The process of landscape appraisal is undertaken not only through a review of the existing site conditions to determine local character but through a visual analysis of the site. This is determined through a site visit to review the visibility of the site within the landscape and to record the result through photographs from potentially sensitive visual receptors. The visual analysis aims to determine from which points the site can be seen in the surrounding landscape, known as the visual envelope or ZTV. Appendix H illustrates key receptor viewpoints.

SUMMARY OF KEY VIEWPOINTS

11.4.27 Receptors are generally short-distance views of the site from residential receptors to the north-west, as well as from users of surrounding access tracks and highways, and users of the surrounding fields.

11.4.28 Longer views of the proposed chimney stacks and plumes are likely to be seen in glimpsed views from a greater distance due to their height.

11.4.29 The landscape surrounding the site is relatively open, allowing views towards the site. There are few receptors identified within the landscape due to the undeveloped nature of the study srea. The primary receptors with views of the site are as follows:

- Users of the surrounding agricultural landscape (including users of un-surfaced tracks and paths);
- Residences within the villages of Creţoaia and Ţînţăreni located to the north-west of the site;

- Residences within the villages of Anenii Noi and Ruseni located to the north-east of the site;
- Residences within the settlement of Geamana (particularly Dzhamany area) and Ciobanovca located to the south of the site; and
- Users of the E581 / R2 highway to the north, R30 highway to the east and access roads to the west.

11.4.30 Given the distance from the site, users of the Mainline Railway Line to the north of the site are unlikely to experience any significant visual impacts as a result of the development and operation of the site.

TABLE 12.3: SENSITIVITY OF VISUAL RECEPTORS

Receptor/ Resource	Sensitivity (Value)	Justification for value
Residences within the village of Creţoaia	High	Views are from a static location in close proximity to the site
Residences within the villages of Ţînţăreni, Albiniţa Anenii Noi and Ruseni to the north-west and north-east	Medium-high	Views are from a static location in relatively close proximity to the site
Residences within the villages of Geamana (particularly Dzhamany area) and Ciobanovca to the south	Medium	Views are from a static location in relatively close proximity to the site
Users of the main R30 and R2 highways	Low	Views are transient and typically from faster moving vehicles and public transport
Users of surrounding access roads (Ţînţăreni to Geamana)	Medium	Views are typically transient and seen within the backdrop of a fairly open landscape
Users of surrounding agricultural land, un-surfaced paths and surfaced tracks	Medium	Views are relatively transient but in close proximity to the site

11.5 POTENTIAL IMPACTS

CONSTRUCTION STAGE OVERVIEW

11.5.1 The following activities will be undertaken during the construction phase of the site which will impact upon landscape character and visual amenity:

- Construction of a Leachate Treatment Plant;
- Re-profiling of the site contours and laying of a new geotextile membrane on the existing waste;
- Construction works for a new drainage system to the Leachate Treatment Plant;
- Installation of new fencing around the operational area;
- Use of associated ancillary infrastructure by construction vehicles and workers, including access roads, site compound, surface water management and site offices during the construction stage;
- Resurfacing of the vehicle access from the road to the entrance to Tintareni Landfill;
- Construction works for a new waste collection system in the village of Tintareni;
- Installation of new environmental monitoring systems and procedures, including boreholes / water quality, air quality (including dust), noise and litter containment systems; and

- Presence of artificial lighting sources during construction works.

11.5.2 The following sections provide a summary of the possible impacts of the site construction works on the existing landscape and visual receptors identified in the baseline section above, which are principally related to the following:

- Presence of visually intrusive construction machinery and plant, particularly during the site re-profiling works, producing associated dust, noise and wind-blown litter;
- Presence of artificial lighting in local views and on the surrounding landscape;
- Visual intrusion from traffic and working machinery across the site and on surrounding access roads; and
- Change in landscape character from an open, inactive, broadly vegetated site, albeit visually interrupted with rubbish, into one of noise, plant, machinery and activity.

EFFECT OF THE CONSTRUCTION STAGE ON LANDSCAPE RECEPTORS

11.5.3 Table 12-4 provides a summary of the possible impacts of the construction phase of the Project on the existing landscape receptors identified above.

TABLE 12-4 CONSTRUCTION IMPACTS ON LANDSCAPE RECEPTORS: SUMMARY TABLE

Landscape Element Considered	Sensitivity to Change	Magnitude of change	Impact prior to mitigation	Commentary
Topography	Low	Slight - moderate adverse	Minor significance	The construction stage effects will include re-profiling of the site in order to lay down a new geotextile membrane. This will result in artificial levels being created prior to operation. This effect will be direct, temporary and short-term.
Existing Vegetation	Low	Slight adverse	Minor significance	The existing vegetation is of generally low quality and easily substitutable but provides a beneficial element to the character of the existing site by creating a vegetated and inactive site that is of similar character to its rural surroundings. This effect will be direct, temporary but long-term (i.e. it could be reinstated over time following closure of the landfill site).
Connectivity and Access	Low	Slight adverse	Minor significance	Access is limited and is not anticipated to alter in terms of number of routes or lighting but the access to the site, between the L481 and the entrance will be resurfaced during the construction works. This effect will be direct, permanent and long-term.
The setting of Character Area 1: Small scale agricultural farmland	Medium to high	Slight adverse	Minor significance	Construction activities will slightly affect the wider setting of this character area, introducing uncharacteristic elements into the agricultural landscape. This effect will be indirect, temporary and short-term.

Landscape Element Considered	Sensitivity to Change	Magnitude of change	Impact prior to mitigation	Commentary
The setting of Character Area 2: Large scale agricultural farmland and woodland blocks	Medium	Slight - moderate adverse	Minor significance	Construction activities will affect the wider setting of this character area, introducing uncharacteristic elements into the surrounding agricultural landscape, including additional noise, dust, wind-blown litter, construction vehicles and plant, and artificial lighting. This effect will be indirect, temporary and short-term.
The setting of Character Area 3: Settlements	Medium to high	Moderate adverse	Minor to medium significance	Construction activities will affect the setting of this character area, introducing uncharacteristic elements into the surrounding agricultural landscape, including additional noise, dust, wind-blown litter, construction vehicles and plant, and artificial lighting. This effect will be indirect, temporary and short-term.
Character Area 4: Tintareni Landfill Site	Low	Large adverse	Minor significance	The site will considerably change from a vegetated site to one of construction activity, creating additional noise, dust, wind-blown litter, activity, artificial lighting, and visual intrusion, both on-site and due to increased traffic on access roads. Resurfacing works to the access road may also cause some limited disruption at the junction with the district road (L481). This effect will be direct, temporary and short-term.

EFFECT OF THE CONSTRUCTION STAGE ON VISUAL RECEPTORS

11.5.4 Table 12-5 provides a summary of the possible impacts of the site construction works on the existing visual receptors identified above.

TABLE 12-5 CONSTRUCTION IMPACTS ON VISUAL RECEPTORS: SUMMARY TABLE

Visual Receptor Considered	Sensitivity to Change	Magnitude of change	Impact prior to mitigation	Commentary
Residences within the village of Creţoaia	High	Slight - moderate adverse	Minor to medium significance	Residents will not be able to directly view the construction activities as the village is set below the ridgeline containing the L481, although noise, dust and wind-blown litter, may be visible above the ridgeline. Construction traffic may also be present on the road adjacent to the village, along with artificial lighting visible at night. This effect will be direct, temporary and short-term.

Visual Receptor Considered	Sensitivity to Change	Magnitude of change	Impact prior to mitigation	Commentary
Residences within the villages of Tintareni, to the north-west	Medium to high	Slight - moderate adverse	Minor to medium significance	Residents may have long distance views of the construction activities across the valley, including the activity of construction plant and machinery, noise, dust and wind-blown litter, as well potential increases in traffic and lorries on access roads. This effect will be direct, temporary and short-term.
Residences within the villages of Geamana (particularly Dzhamany area) and Ciobanovca to the south	Medium	Slight - moderate adverse	Minor significance	There are no views of the landfill from the south of the site, due to the embankment on the southern perimeter of the landfill, but residents may experience, noise, dust and wind-blown litter, as well as the potential increases in traffic and lorries on access roads and sky-glow from artificial lighting sources. This effect will be direct, temporary and short-term.
Users of the R2 highways	Low	Slight adverse	Minor significance	Users of the highways may get transient, glimpsed views of the construction activities, including the activity of plant and machinery, noise, dust and wind-blown litter, as well as the potential increases in traffic and lorries on access roads and artificial lighting. This effect will be direct, temporary and short-term.
Users of surrounding access roads (Tintareni to Geamana L481)	Medium	Slight - moderate adverse	Minor significance	Users will get transient, glimpsed views of the construction activities, including construction plant and machinery, noise, dust and wind-blown rubbish, as well potential increases in traffic and lorries on access roads. This effect will be direct, temporary and short-term.
Users of surrounding agricultural land, un-surfaced paths and surfaced tracks	Medium	Moderate - large adverse	Minor - to medium significance	Users of the surrounding landscape will have clear views of the construction activities on site due to proximity and limited tree cover, although some views will be partially screened by intervening topography and tree blocks. Noise, dust and wind-blown litter may also be readily discernible. This effect will be direct, temporary and short-term.

OPERATIONAL STAGE OVERVIEW

11.5.5 The following activities will be undertaken during the operation of the Project which will impact upon landscape character and visual amenity:

- Operation of a Leachate Treatment Plant;
- New vehicle fleet to transport the waste to the Tintareni Landfill;
- Re-profiled site contours;
- New drainage systems for the Leachate Treatment Plant;
- Revised sequence of landfill phasing (the order the site is filled in);
- New control building, weighbridges, workshop, fuel station, and wheel washing station, and continued use of the existing site offices, and associated infrastructure;
- New waste collection system in the village of Tintareni;
- Environmental monitoring systems and procedures, including boreholes / water quality, air quality (including dust), noise and litter containment.

11.5.6 The following sections provide a summary of the possible impacts of the Project operation on the existing landscape and visual receptors identified in the baseline section above, which are principally related to the following:

- Presence of visually intrusive landfill waste, including associated dust, noise, wind-blown litter, particularly as lorries deposit waste into the landfill cells; Visual intrusion from traffic and working machinery across the site and on surrounding access roads;
- Visual intrusion of artificial lighting from illumination masts; and
- Change in landscape character from a rural vegetated site, albeit visually interrupted with existing rubbish, into a fully functioning landfill site.

11.5.7 The existing site lies within agricultural land, and is generally undeveloped land of rolling hills containing fields and vegetation. The Project will transform the site into one of noise, activity, and visual intrusion.

EFFECT OF THE OPERATION OF THE PROJECT ON LANDSCAPE RECEPTORS

11.5.8 Table 11-6 provides a summary of the possible impacts of the Project operation on the existing landscape receptors identified above.

TABLE 11-6 OPERATIONAL EFFECTS ON LANDSCAPE RECEPTORS: SUMMARY TABLE

Landscape Element Considered	Sensitivity to Change	Magnitude of change	Impact prior to mitigation	Commentary
Topography	Low	Moderate – large adverse	Minor significance	The landfill operations will alter the existing topography of the site by increasing the levels. This effect will be direct, permanent and long-term.

Landscape Element Considered	Sensitivity to Change	Magnitude of change	Impact prior to mitigation	Commentary
Existing Vegetation	Low	Slight adverse	Minor significance	The existing vegetation is of generally low quality and easily substitutable, but provides a beneficial element to the character of the existing site. This effect will be direct, temporary but long-term.
Connectivity and Access	Low	Slight beneficial	Minor significance	Access is limited and is not anticipated to alter in terms of number of routes or lighting but the access road will have been resurfaced at construction to minimise dust and noise of vehicles accessing the site at operation This effect will be direct, permanent and long-term.
The setting of Character Area 1: Small scale agricultural farmland	Medium to high	Slight - moderate adverse	Minor to medium significance	Operation of the Project will slightly affect the wider setting of this character area, introducing an uncharacteristic element into the agricultural landscape. This effect will be indirect, temporary but long-term.
The setting of Character Area 2: Large scale agricultural farmland and woodland blocks	Medium	Moderate adverse	Minor significance	Operation of the site will affect the setting of this character area, introducing an uncharacteristic element into the surrounding agricultural landscape, including additional noise, colour, traffic, artificial lighting and wind-blown litter. This effect will be indirect, temporary but long-term.
The setting of Character Area 3: Settlements	Medium to high	Moderate adverse	Minor to medium significance	Operation of the site will affect the setting of this character area, introducing an uncharacteristic element into the surrounding agricultural landscape, including additional noise, colour, traffic and artificial lighting. This effect will be indirect, temporary but long-term.
Character Area 4: Tintareni Landfill Site	Low	Large adverse	Minor significance	The site will considerably change from a vegetated site to one of noise, colour, activity, artificial lighting and visual intrusion. This effect will be direct, temporary but long-term.

EFFECT OF THE OPERATION OF THE PROJECT ON VISUAL RECEPTORS

11.5.9 Table 12-7 provides a summary of the possible impacts of the Project operation on the existing visual receptors identified above.

TABLE 12-7 OPERATIONAL EFFECTS ON VISUAL RECEPTORS: SUMMARY TABLE

Visual Receptor Considered	Sensitivity to Change	Magnitude of change	Impact prior to mitigation	Commentary
Residences within the village of Creţoaia	High	Moderate - Large adverse	Medium to high significance	Residents will not have a direct view of the site activities due to intervening topography, but they may experience effects of the landfill operations such as dust, increased traffic and lorries on access roads, noise of operations and artificial lighting from illumination masts. This effect will be direct, permanent and long-term.
Residences within the villages of Tintareni, to the north-west	Medium to high	Moderate adverse	Medium significance	Residents may be able to view the activities of the landfill site across the valley, including the activity of machinery, piles of waste with associated colour and dust, as well as the potential increases in traffic and lorries on access roads and artificial lighting from illumination masts in winter. This effect will be direct, permanent and long-term.
Residences within the villages of Geamana (particularly Dzhamany area) and Ciobanovca to the south	Medium	Slight adverse	Minor significance	Residents will not have direct view o the landfill site, but they may experience secondary effects such as dust, noise increases in traffic and lorries on approach roads and artificial lighting from illumination masts in winter. This effect will be direct, permanent and long-term.
Users of the R2 highways	Low	Slight adverse	Minor significance	Users of the highways may get transient, glimpsed views of the activities of the landfill site in between properties, including the activity of machinery, piles of waste with associated colour and dust, as well as the potential increases in traffic and lorries on surrounding roads and artificial lighting from illumination masts in winter. This effect will be direct, permanent and long-term.
Users of surrounding access roads (district road L481 Tintareni to Geamana)	Medium	Moderate adverse	Minor significance	Users will get transient, glimpsed views of the activities of the landfill site, including the activity of machinery, piles of waste with associated colour and dust, as well as the potential increases in traffic and lorries on surrounding roads and artificial lighting from illumination masts in winter. This effect will be direct, permanent and long-term.
Users of surrounding agricultural land, un-surfaced paths and surfaced tracks	Medium	Large adverse	Medium significance	Users will have clear views of the activities of the landfill site due to the proximity to the site and limited tree cover, although some views will be partially screened by intervening topography and tree blocks. This effect will be direct, permanent and long-term.

11.6 MITIGATION

11.6.1 The following mitigation measures may assist in reducing adverse impacts of the Project on surrounding landscape character and visual amenity during the construction phase:

- Good site management will reduce the visual clutter associated with the works;
- Minimise the use of artificial lighting on the site and where needed, use directional lighting;
- Incorporate additional screening around the leachate treatment plan at the base of the landfill, and the administration building at the top of the landfill site. Screening could include hedgerow and hedgerow trees, replicating surrounding small field boundaries and providing further screening of the site;
- New tree and hedge / shrub planting to be planted within a suitable depth of appropriate topsoil to aid establishment; and
- Minimise lorry movements, noise and dust being emitted during the construction phase activities.

11.6.2 The following mitigation measures may assist in reducing adverse impacts of the Project on surrounding landscape character and visual amenity during the operational phase:

- Good site management will reduce the visual clutter associated with the operational works;
- Reinstate completed landfill cells with suitable planting of grass / wildflower / shrubs as soon as the cell becomes filled and non-operational;
- Ensure suitable establishment and on-going maintenance of any woodland tree planting, hedgerow and hedgerow trees to maintain screening properties;
- Ensure finished levels of the site replicate surrounding rolling hills and do not take on an unnatural contour; and
- Minimise lorry movements, noise and dust being emitted from the landfill operations.

12 GEOLOGY, SOILS, MATERIAL AND WASTE

12.1 INTRODUCTION

12.1.1 This Chapter reports the likely significant effects of the Project on the Tintareni landfill site and surrounding area in terms of geology, soils, materials and waste. Where appropriate it also identifies proposed mitigation measures to prevent, minimise or control likely negative effects on the soil and geology arising from the Project. This Chapter should be read in conjunction with the introductory chapters (Chapter 1 to 6).

12.2 LEGISLATION

12.2.1 The assessment has been undertaken in line with international best practice. Where appropriate when considering geology and soils, the following EU legislation has been considered during the completion of this assessment:

- The Landfill Directive (EEC/1999/31/EC).

12.2.2 In addition, where deemed appropriate, UK guidance documents have been considered within this assessment on the basis that UK Landfill Guidance is in accordance with EU Legislation.

12.3 BASELINE CONDITIONS

EXISTING BASELINE

GEOLOGY

12.3.1 The Tintareni landfill is located on the Dnestr terrace plain and is included into the Sredne-Dnestr geomorphological sub region. The area is dominated by limestone sedimentary rock, which has elements of gravel, sand, silts and clays. This sedimentary rock reaches a depth of approximately 600m, and is underlain by Proterozoic Archean. The seismic degree of the investigation area is accepted to 7 according to the “Map of seismic zoning of the territory of Republic of Moldova, 2006” (Institute of Geology and Geophysics of the Scientific Academy of Moldova).

12.3.2 The surrounding area is primarily used for agriculture, and the main lithology comprises sedimentary soils, which are relatively young, with alluvial deposits in the river valley. The area is vulnerable to landslides, the frequency of landslides in the area is about 50 per 100 km^2 (MENR, 2009). The western side of the investigation area includes an erosion zone. No carstic processes, collapse of rocks are present at the site. Additionally, active landslides have not been observed at the site. The stability analyses considering different scenarios showed that the dam and the dam slope is unstable (see Paragraph 12.4.3).

GEOTECHNICAL SITE INVESTIGATION

12.3.3 A geotechnical site investigation comprising the advancement of six boreholes (BH1 to BH6) was conducted at the Tintareni landfill by the appointed consultant (2016). A borehole location layout plan is provided in Figure I-1. The depth of investigation varied between locations given the ground elevation varies across the site; boreholes BH2 and BH3 were drilled to a depth of 33.10 meters below ground level (mbgl) and BH4, BH5 and BH6 were drilled to 14-15mbgl. The final depth of investigation was decided when the groundwater body underlying the landfill was encountered. The final depth of BH1 was significantly greater than the remainder borehole locations (81m), as it is located in the southern portion of the landfill (more elevated).

12.3.4 The information detailed below is based on the borehole logs provided in Romanian language.

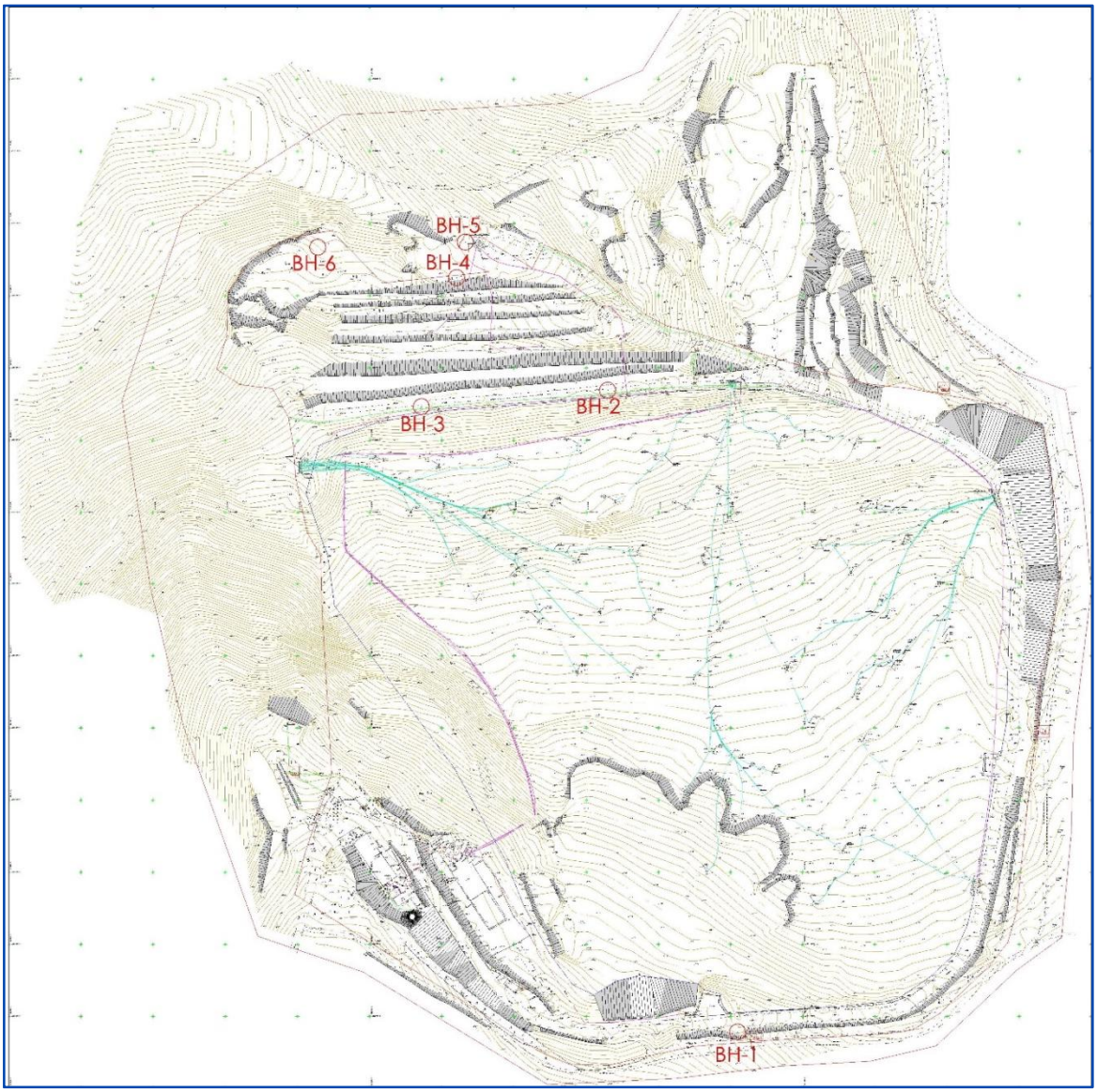


Figure 12-1 Location of Boreholes

12.3.5 The geology encountered at the northern waste cell boundary (based on borelogs BH4, BH5 and BH6) is comprised of topsoil, underlain by sandy clay with humus, underlain by saturated medium grained sand (BH5 and BH6 only), underlain by clay with mottled rust oxides iron with sand to final depth of investigation.

12.3.6 The geology encountered at a ground elevation of approximately 138 meters above sea level (m asl) (based on borehole logs BH2 and BH3) is comprised of clay with layers of humus and sandy pockets, underlain by clay with layers of mottled rust oxides iron with sand and humus, underlain by sandy clay, underlain by saturated medium grained sand, underlain by clay to final depth of investigation.

12.3.7 A summary of the geology encountered is described in Table 12-1.

Table 12-1 Site Geology Summary

APPROXIMATE ELEVATION TOP LAYER (M ASL)	APPROXIMATE ELEVATION BOTTOM LAYER (M ASL)	DESCRIPTION
Elevation of approximately 115m asl - 117 m asl (northern waste cell boundary: BH4, BH5, BH6)		
115 – 117	115.6 – 112.2	Topsoil. Layer thickness greater in BH5 (2.8m)
115.6 – 112.2	114.8 – 111.5	Sandy clay with humus
114. 8 – 111.5	112 – 105.9	Clay with pockets of sand / sandy clay
112 – 105.9	105.75 – 108	Saturated medium grained sand (BH5 and BH6 only)
105.75 – 108	100 – 102	Clay with mottled rust iron oxides with sand Saturated in BH4 between 104 m asl and 102 m asl
Elevation of approximately 138 m asl (BH2 and BH3)		
138	130.7 – 114.1	Clay with sandy clay pockets
130.7	120.5	Clay with mottled rust iron oxides with sand (BH2 only)
120.5	119	Fine grained sand with clay inclusions (BH2 only)
119	111.5	Clay with mottled rust iron oxides (BH2 only)
114.1 - 111.5	109.1 – 107.7	Fine to medium grained sand, saturated at 112 m asl (BH2) and 109 m asl (BH3)
109.1 – 107.7	105	Clay

TOPOGRAPHY

12.3.8 Based on the topographical survey conducted in December 2015, Tintareni landfill size is approximately 25 hectares. The landfill was built in a hillside by the formation of a series of benches with ground levels between 115 m asl (north of the site) and 196 m asl (south of the site), with an average slope of about 1/8 (Vertical/Horizontal) across the site.

FUTURE BASELINE

12.3.9 Tintareni landfill was operative between 1991 and 2010, and the existing waste cell has a size of approximately 161,200 m^2. The landfill leachate is currently collected in five storage reservoirs with a total storage capacity of 330 m^3. It is pumped from these storage reservoirs into tankers and reintroduced to the top of the landfill, as a part of a leachate recirculation strategy. This is a practice which uses leachate to saturate the waste leachate and enhance the rate of degradation of the solid waste. Excess leachate is drained by gravity flow to the base of the landfill and then into the storage reservoirs. The landfill is currently lined by an impermeable base sealing of compacted clay.

12.3.10 The storage capacity of the landfill leachate system could potentially be exceeded following significant snow falls and heavy rainfalls, with the risk of leachate overflowing the storage tank and discharging directly into the ground. The efficiency of the storage tanks is unknown; any potential cracks on the bases could lead to leachate infiltration into the ground.

RECEPTORS

12.3.11 The identified receptors and their assigned sensitivity are detailed below.

- → Soil in the landfill site. Based on the current land use, the sensitivity of the receiving environment is low.
- → Agricultural soil. Based on the surrounding land uses, the sensitivity of the receiving environment is medium.

12.4 POTENTIAL IMPACTS

CONSTRUCTION PHASE

12.4.1 The potential impacts due to construction and operation of the Project are described below. A summary of the identified impacts and description of effects is provided in Table 12-2.

- The construction required to upgrade the landfill will include soil excavation, and creating surplus material that will require management. The excavated material will be temporarily stockpiled, and has the potential to erode and migrate to adjacent agricultural lands. The sensitivity of the receptor is medium and the magnitude of change, prior to mitigation, is moderate. There is likely to be a direct, temporary, short term negative effect on the quality of adjacent soils, which would be of minor significance, without the implementation of the proposed mitigation measures.
- The soil excavation may also potential adversely impact soil, due to the existing landfill material being brought to the surface. The excavated material will be moved to reprofile the landfill, and has the potential to erode and release contaminants to adjacent agricultural lands, impacting on the quality of adjacent land. The sensitivity of the receptor is medium and the magnitude of change, prior to mitigation, is large. There is likely to be a direct, temporary, negative short term effect on the quality of adjacent soils, of medium significance, prior to the implementation of mitigation measures.

- The movement of heavy machinery on the surface of the existing waste cell may lead to the compression of previously deposited wastes, which can lead to increased volumes of leachate reaching the current storage tanks and potential overflow of the tanks. This could impact on the soils and groundwater (see Chapter 13 for the assessment of effects on groundwater) beneath the landfill. The sensitivity of soil in the landfill is medium and the magnitude of change, prior to mitigation, is large. There is likely to be a direct, temporary, very short term negative effect on the quality of soils in the landfill, which is of minor significance, prior to the implementation of mitigation measures.
- There is a risk of oil and/or petroleum leaks / spills from machinery and vehicles used during the construction phase, which could result in soil contamination. The sensitivity of the receptor is low and the magnitude of change is moderate. There is likely to be a direct, temporary, very short term negative effect on the quality of soils in the landfill, which is of minor significance, prior to the implementation of mitigation measures.

OPERATIONAL PHASE

12.4.2 The potential impacts on geology and soils during the operation of the upgraded Tintareni landfill are described as follows (a summary of the identified impacts and description of effects is provided in Table 12-2):

- The proposed upgrade of Tintareni landfill is not expected to require any additional land take, as the footprint of the landfill is not expected to change. Therefore, the effects on land use will not be significant.
- The disposal of new waste into the landfill cell could adversely affect the stability of the dam (embankment) located on the northern boundary of the waste cell. If the dam does not have sufficiently stability it could collapse, releasing leachate into the surrounding area. The dam has already been reinforced, following an accident in 2003. The remediation works allow for an external slope of 1/3.5 (Vertical/Horizontal) instead of the previous slope of 1/1 (Vertical/Horizontal). The dam stability was further assessed in the geotechnical investigation. The sensitivity of the receptor is medium and the magnitude of change, prior to mitigation, is large. Therefore, there is likely to be a direct, temporary, short term, negative effect on the quality of soils in adjacent agricultural land of medium significance, prior to the implementation of mitigation measures.
- The addition of waste on top of the current waste cell in order to reach the maximum capacity of the landfill, may lead to deformation of the subsoil. This will be assessed in the geotechnical investigation that is being carried out at the time of writing this report. The sensitivity of the receptor is low and the magnitude of change, prior to mitigation, is medium. There is likely to be a direct, temporary, short term, negative effect on the stability of the underlying waste, but low impact on soils in adjacent agricultural land, which is of minor significance, prior to the implementation of mitigation measures.
- Geological movement, landslide and erosion, are being assessed as part of the geotechnical investigation being carried out at the time of writing this report. The sensitivity of the receptor is medium and the magnitude of change, prior to mitigation, is large. There is likely to be a direct, permanent, long term negative effect on the quality of soils in adjacent agricultural land, which is of medium significance, prior to the implementation of mitigation measures.
- During operation of the landfill the accumulation of waste will produce leachate that, if not correctly collected and treated, has the potential to impact soil underneath the waste cell. The sensitivity of the receptor is low and the magnitude of change, prior to mitigation, is large. There is likely to be a direct, permanent, negative long term effect on the quality of soils beneath the waste cell, which is of minor significance, prior to the implementation of mitigation measures.
- Waste transportation has previously resulted in leachate leaking into the roads, and has

potentially adversely affected the quality of agricultural soils immediate adjacent to the route, due to contaminated surface water runoff. The sensitivity of the receptor is medium and the magnitude of change, prior to mitigation, is medium. There is likely to be a direct, temporary, negative, short term effect on the quality of adjacent agricultural soils, which is of minor significance, prior to the implementation of mitigation measures.

DAM STABILITY

12.4.3 The base dam (embankment) is located on the northern border of the waste cell. The stability analysis of the dam and dam slope was considered in the geotechnical site investigation. Soil samples taken from the different boreholes were tested for soil mechanics. The results of these tests were considered together with others factors (e.g. seismic conditions etc.), within the stability analysis. Additionally, the following load scenarios were considered:

- Full waste cell; and
- Full waste cell with high leachate content.

12.4.4 Full waste cell scenario means the maximum load onto the dam (and dam slope) from the final waste disposal for Tintareni landfill. In other words it is the load situation of waste cell 1 and waste cell 2 as an entire waste body.

12.4.5 Full waste cell with high leachate content scenario means the high leachate content (in the waste body) in addition to the Full waste cell scenario. This is a worst case scenario because in sanitary landfill operation the leachate should be collected and treated consequently not re-circulated to the landfill.

12.4.6 The analysis results showed that the existing dam and the dam slope are not stable in the case of an earthquake (magnitude 7), and therefore are not in line with the requirements of the national legislation. Therefore, the project will need to include remediation measures.

REMEDIATION MEASURES FOR DAM STABILITY

12.4.7 The purpose of the remediation measure will be to strengthen the dam and dam slope to achieve the required stability levels. At Tintareni landfill a dam is present including a stepwise constructed dam slope (so called berms). The base of the dam slope is immediately adjacent to the site border, which limits the space that is available for remediation. The use of Geogrid is recommended due to the limited available space for remediation measures.

12.4.8 To strengthen the dam and dam slope, some of the present (filled) earth material should be excavated and re-filled (with gravel) in layers with geogrid and compacted accordingly. Different types of geogrids with different specifications are available on market, and they are designed to enable construction or re-construction within limited spaces and/or steep slopes. The length, width, strength and material specification of the geogrid will be determined at the detailed design stage, prior to construction.

DAM SEALING

12.4.9 Borehole number three (BH3) contains several sand bands which are saturated to water. These water saturated sand bands should not be present at the dam, and they indicate a certain level of leakage from the waste cell. The dam should contain compacted clay that is free of water, and even free of humidity. There is a risk that this leakage of leachate could result in the creation of a sliding surface, and a dam failure in long-term.

REMEDIATION MEASURE FOR DAM SEALING

12.4.10 Remediation measures will be required to seal the dam. It will not be possible to install a sealing liner on the inner slope surface of the dam because this section is filled with waste. The alternative is to install a vertical sealing liner at the dam crest. The construction of a vertical sealing system will require the opening of vertical slot and installation of sealing sheets (geosynthetic material) into the slots.

12.4.11 The sealing liner will need to be installed at the location of BH3 and in the surrounding area. Further investigation (e.g. drilling) will be required at the detailed design stage, to determine the extent of the leakage, and the extent of vertical sealing required.

SUMMARY OF IMPACTS

12.4.12 A summary of the identified impacts and effects on the receiving environment are detailed in Table 12-2.

Table 12-2 Assessment of Impacts on Geology, Soils, Material and Waste

Impact	Spatial scale	Receiving environment		Significance of impact		Effect	Significance of effect			Frequency and duration of effect		
		Receptor	Sensitivity	Impact type	Magnitude		Significance	Direct/ Ind.	Positive/ negative	Duration of effect	Temporary/ Permanent	Reversible/ Irreversible
Construction phase												
Generation of soil stockpiles during excavation works	Local	Agricultural soil	Medium	Adverse	Moderate	Soil erosion and surface water runoff to adjacent lands	Minor significance	Direct	Negative	Very short term	Temporary	Reversible
Reprofiling and movement of impacted soil during excavation works	Local	Agricultural soil	Medium	Adverse	Large	Moving impacted soil to the surface and surface water runoff to adjacent lands	Medium significance	Direct	Negative	Short term	Temporary	Reversible
Increase in leachate generation by compression of previously deposited waste (heavy machinery)	Local	Soil in the landfill site	Low	Adverse	Moderate	Contamination of soil due to overflow of leachate storage tanks	Minor significance	Direct	Negative	Very short term	Temporary	Reversible
Accidental oil and/or petroleum leaks from machinery	Local	Soil in landfill site	Low	Adverse	Moderate	Contamination of soil	Minor significance	Direct	Negative	Very short term	Temporary	Reversible

ENVIRONMENT	SIGNIFICANCE OF IMPACT		EFFECT	SIGNIFICANCE OF EFFECT			FREQUENCY AND DURATION OF EFFECT		
SENSITIVITY	IMPACT TYPE	MAGNITUDE		SIGNIFICANCE	DIRECT/ IND.	POSITIVE/ NEGATIVE	DURATION OF EFFECT	TEMPORARY/ PERMANENT	REVERSIBLE/ IRREVERSIBLE
Medium	Adverse	No change	Reduction in agricultural land availability	Not significant	Direct	Positive	Long term	Permanent	Irreversible
Medium	Adverse	Large	Collapse of embankment dam leading to spread of waste / leachate	Medium significance	Direct	Negative	Short term	Temporary	Reversible
Medium	Adverse	No change	Deformation of subsoil	Not significant	Direct	Negative	Long term	Permanent	Irreversible

Impact	Spatial scale	Receiving environment		Significance of impact		Effect	Significance of effect			Frequency and duration of effect		
		Receptor	Sensitivity	Impact type	Magnitude		Significance	Direct/ Ind.	Positive/ negative	Duration of effect	Temporary/ Permanent	Reversible/ Irreversible
Increased waste storage results in geological movement, landslide, erosion	Local	Adjacent agricultural land	Medium	Adverse	Large	Geological movement, landslide, erosion	Medium significance	Direct	Negative	Long term	Temporary	Reversible
Generation of leachate from waste storage activities	Local	Soil in the landfill site	Low	Adverse	Large	Soil impact beneath the landfill	Medium significance[6]	Direct	Negative	Long term	Permanent	Irreversible
Transport of waste – leachate leaks along transport route	Regional	Agricultural land	Medium	Adverse	Medium	Impact on the quality of agricultural soil adjacent to the transport route	Minor significance	Direct	Negative	Short term	Temporary	Reversible

[6] A precautionary approach has been applied to the assessment of the significance of effect due to the generation of leachate, based on the interim information that was provided ahead of the Hydrogeological Study. The assessment will be revised when the on-going Hydrogeological Study is complete.

12.5 MITIGATION

The mitigation measures proposed to be implemented in order to reduce the potential impacts to geology and soils are detailed in Table 12-3.

Table 12-3 Mitigation Measures for Impacts on Soils and Geology

IMPACT / EFFECT	MITIGATION MEASURE
Construction phase	
Generation of soil stockpiles during excavation works – soil erosion and surface water runoff to adjacent land	Implementation of sediment and erosion control measures. Use of clean excavated material for perimeter embankment. Use of clean excavated material during the operation of the landfill (e.g. cover of waste). Use of clean material for the proposed interim lining system.
Surface of potential subsurface impacted soil during excavation works - soil erosion and surface water runoff to adjacent land	Potentially contaminated soil to be stockpiled separately from clean soil. Implementation of sediment and erosion control measures. Program to ensure any potential impacted soil is disposed of to the landfill as waste.
Increase in leachate generation by compression of previously deposited waste (heavy machinery)	Program to inspect the collection tanks frequently. Program to remove leachate from storage tanks regularly during construction works. Examination of the effects of compression of previously deposited wastes to be conducted by visual means during construction works.
Oil and/or petroleum leaks from machinery – impact to soil	Provision of spill kits to contain oil / petroleum leaks or spills. Program to ensure good driver behaviour / maintenance of vehicles.
Operational phase	
Land take / Change in land use	Not applicable – no change compared to baseline conditions

IMPACT / EFFECT	MITIGATION MEASURE
Increase of pressure on embankment dam - collapse leading to spread of waste / leachate	Developed a detailed design including measures to strengthen the stability of the embankment dam using geogrid, prior to commencing the construction works. Undertake further investigation of the leachate leakage in the dam to determine the extent of the vertical sealing required near the location of BH3. Program to review the dam stability during operation phase (e.g. visual inspections). Design the upgraded landfill to improve the management of leachate (i.e. subcells that are independently managed) Improve the surface water drainage to reduce water infiltration into the landfill. Program to inspect the surface water drainage to ensure no accumulation of surface water runoff is occurring. Leachate management system to collect and treat leachate from both the current waste cell and the future waste cell. Construction of perimeter embankment around the waste cell. Program to inspect the stability of the perimeter embankment.
Increased waste storage volume - deformation of subsoil	Conduct an assessment of the potential soil deformation prior to construction works. Construction of perimeter embankment around the waste cell. Program to inspect the stability of the perimeter embankment.
Increased waste storage volume - geological movement, landslide, erosion	Conduct an assessment of the potential geological movement and landslide prior to construction works. Construction of perimeter embankment around the waste cell. Program to inspect the stability of the perimeter embankment. Surface water drainage. Program to inspect the surface water drainage to ensure no accumulation of surface water runoff is occurring.
Generation of leachate - soil impact beneath the landfill	Interim liner to meet EU Landfill Directive design standards, international best practice and state-of-the-art techniques. Leachate collection system and leachate treatment plant. Leak detection system. Daily cover to reduce rainfall infiltration. Improved landfill phasing plan, and cover of waste cells that are not in use.
Transport of waste – leachate leaks along transport route	New vehicle fleet, Euro III standard. Maintenance of fleet. Program to ensure good driver behaviour / maintenance of vehicles. Rehabilitation of access road. Program to inspect the vehicle route.

13 WATER ENVIRONMENT

13.1 INTRODUCTION

13.1.1 This Chapter assesses the likely significant effects of the Project on the Tintareni landfill site and surrounding area, in terms of the receiving water environment. Where appropriate, it also identifies proposed mitigation measures to prevent, minimise or control likely negative effects on the water environment arising from the Project.

13.1.2 The chapter has been informed by a Hydrogeological Risk Assessment (HRA) (WSP I PB December 2016). It was conducted in general accordance with Hydrogeological Risk Assessments for Landfills and the Derivation of Groundwater Control and Trigger Levels (Environment Agency, 2003b). Modelling was undertaken to evaluate the potential for leachate leakage and migration to groundwater.

13.1.3 A quantitative probabilistic risk assessment was undertaken using software LandSim developed for the U.K Environment Agency. LandSim is a customised risk assessment tool that has been produced specifically for assessing risks to groundwater from landfills and uses Monte Carlo (stochastic) techniques. Monte Carlo simulation technique is to select randomly from a pre-defined range of possible input values to create parameters for use in the model calculations. Repeating the process many times gives a range of output values, the distribution of which reflects the uncertainty inherent in the input values.

13.2 LEGISLATION

13.2.1 The national legislative framework for the protection of surface water quality is detailed below.

- Surface Water Quality Regulation in Moldova: Policy Aspects of the Reform, Economic Co-operation and Development (OECD), 2007.

13.2.2 The legislative framework for the protection of drinking water quality is detailed below.

- Guidelines for Drinking-water Quality, Fourth Edition, World Health Organisation (WHO), 2011.

13.2.3 The assessment has been undertaken in line with international best practice. Where appropriate when considering Water Environment, the following EU legislation has also been considered during the completion of this assessment:

- The Landfill Directive (EEC/1999/31/EC.
- The Water Framework Directive (2000/60/EC). These European Regulations establish a framework for protecting the water environment.
- The new Groundwater Directive (2006/118/EC). These European Regulations are an environmental protection measure which provides enhanced protection for groundwater.

13.2.4 In addition, where deemed appropriate, UK guidance documents have been considered within this assessment on the basis that UK Water Environment guidance and UK Landfill Guidance is in line with EU Legislation.

13.3 BASELINE CONDITIONS

EXISTING BASELINE

GROUNDWATER

13.3.1 The Project is located in the Dniester River Basin, the nearest watercourse to the site is the River Bic, located approximately 5km north of the landfill. River Bic is a tributary of the River Dniester, which flows into the Black Sea. Groundwater abstraction bores are known to be located in Tintareni village, located approximately 5km to the northwest of the landfill.

13.3.2 A geotechnical site investigation comprising the implementation of six boreholes (BH1 to BH6) was undertaken between May and July 2016. Geology information is provided in Chapter 12. Groundwater was generally encountered in fine to medium grained sand which lay between more impermeable lithology's, indicating the aquifer located beneath the landfill is likely to be a confined aquifer, with a variable thicknesses across the site.

Table 13-1 Groundwater Elevation on Site

BOREHOLE	APPROXIMATE BOREHOLE ELEVATION (M ASL) (1)	GROUNDWATER DEPTH (MBGL)	GROUNDWATER ELEVATION (M ASL) (1)	LITHOLOGY	OBSERVATIONS
BH1	183	74.0	109.40	Sand with deposits of carbonate rock granules thin substrates of sandstones	
BH2	138	27.0	111.0	Saturated fine grained sand	
BH3	138	29.1	108.9	Saturated medium grained sand	Water was also detected at 10.9m and 14.6 m, in the embankment body (assumed to be leachate)
BH4	116	12.0	104.0	Clay with some sand	
BH5	115	9.2	105.8	Saturated medium grained sand	
BH6	117	5.0	112.0	Saturated medium grained sand	Saturated zone 4m thick

Notes:
(1) No GPS coordinates of the borehole locations were available at the time of writing this report. The borehole elevation was estimated using the topographic survey data. These values shall not be used for any purpose other than to discussion the groundwater encountered on site.

13.3.3 Groundwater elevation ranged between between 104.45 m asl (BH5) and 112.40 m asl (BH6). No boreholes were extended to the limestone aquifer downgradient from the landfill, and therefore the quality of the groundwaterbody used for water supply and the relevant hydrogeological parameters of the extractive water body were not assessed as part of the investigation.

13.3.4 The identified groundwater unit is considered to be in limited continuity with the productive groundwater unit used by the abstraction wells at Tintareni village. Hydraulic connectivity cannot be discarded between the alluvial-talus deposits and the productive underlying mid-Sarmatian limestones, however it is considered to be limited. The regional groundwater flow direction was estimated in a northerly direction.

SURFACE WATER

13.3.5 The River Bîc is the nearest watercourse to the Tintareni landfill, and it is located approximately 5km to the north of the landfill. It is a tributary river of the River Dniester and flows through the capital Chisinau before reaching the Tintareni area, Anenii Noi district. The River Bic is heavily polluted with both organic and inorganic chemical toxic substances. Many surface waters in the Republic of Moldova are contaminated with high levels of nitrites, nitrates and ammonia (MENR, 2007). During the 2016 geotechnical site investigation (Boncom Proiect, 2016), a surface water sample was collected from the River Bic (sampling point location is unknown). A summary of the reported analytical results is included in Table 13-2.

Table 13-2 Groundwater Quality Assessment

		Groundwater concentrations (mg/L)			
	Nitrate (NO_3^-)	Ammoniacal nitrogen (NH_4-N)	Chloride (Cl^-)	Sulphate (SO_4^{2-})	Fluoride (F^-)
Drinking Water Standard (DWS)	50[1]	1.5[2]	250[1]	250[3]	1.5[1]
Surface Water Standard (SWS)	11.3[4]	3.1[5]	500[4]	500[4]	Not available
River Bic	4.69	36.94	95.88	164.45	0.14

Shaded cells indicate exceedance of the adopted SWS

13.3.6 The reported concentration of ammoniacal nitrogen exceeded the adopted SWS by one order of magnitude. It is noted the DWS was also exceeded for ammoniacal nitrogen

13.3.7 The State Hydrometeorological Service operates a surface water monitoring network, which includes 49 observation points on 16 largest rivers, six large water basins and one estuary. The observation points are close to urban areas. Surface water diffuse pollution monitoring is not performed in Moldova. Sampling is performed on a monthly basis for the measurement of at least 42 hydrochemical parameters and at least 6 hydrobiological parameters depending on the observation points. Since 2007, surface water quality monitoring in Moldova has focused on requirements of the Water Framework Directive and the relevant biological and chemical parameters, this included changes to optimise the location of sampling points and the frequency of observation (UNECE, 2010).According to the Water Pollution Index (WPI) the main rivers Dniester and Prut are moderately polluted (category III-IV) while smaller rivers like Reut and Bic are more polluted (category IV-VI), on a scale where I is the least and VI the most polluted (UNECE, 2005).

WATER QUALITY ASSESSMENT

13.3.8 An initial review of the groundwater quality was conducted by WSP I Parsons Brinckerhoff in 2015 based on the groundwater analytical results dated 2014 and 2015. The locations assessed included: a filtration well; a drainage well adjacent to the northern boundary of the landfill; and a number of abstraction bores located at Tintareni village. The groundwater quality analysis from the wells in the Tintareni Village was dated 7 August 2014, and those from the filtration and drainage wells at the landfill were dated 4 February 2015.

13.3.9 Groundwater samples were collected from the six newly installed boreholes BH1 to BH6 as part of the geotechnical site investigation. One groundwater sample was collected from each borehole location (bottom water level) and two additional water samples were collected from BH3 at two different depths; BH3 – 10.9 and BH3 – 14.6 (water associated with the embankment body). A borehole location plan is provided in Figure 12-1.

13.3.10 Few common contaminants were measured for groundwater at the landfill and the wells located at Tintareni village. A summary of the reported analytical results are compared against relevant WHO or European drinking water standards (DWS) and surface water standards (SWS) is provided in Table 13-. The detailed analytical results are provided in Appendix I-2.

Table 13-3 Groundwater Quality Assessment

		Groundwater concentrations (mg/L)			
	Nitrate (NO_3^-)	Ammoniacal nitrogen (NH_4-N)	Chloride (Cl^-)	Sulphate (SO_4^{2-})	Fluoride (F^-)
DWS	50[1]	1.5[2]	250[1]	250[3]	1.5[1]
SWS	11.3[4]	3.1[5]	500[4]	500[4]	Not available
BH1 [6]	5.26	**3.33**	130.98	308.18	0.26
BH2 [6]	0.7	0.77	339.19	125.78	0.66
BH3 [6]	<0.1	0.40	22.84	31.11	1.17
BH3 – 10.9 [6] embankment	-	**3.84**	**6,937.00**	30.66	0.48
BH3 – 14.6 [6] embankment	-	1.42	**5,190.50**	65.41	0.23
BH4 [6]	**519.86**	0.83	**671.41**	212.03	0.43
BH5 [6]	3.32	0.45	230.34	116.59	0.51
BH6 [6]	**425.23**	0.62	**1,607.34**	126.01	0.20
Landfill wells [7]	**30 - 36**	**134.7 – 371.7**	**6,368 – 6,722**	**2,318 – 2,113**	Not available
Morari Alexandru [7]	**128**	Not measured	120	212	0.61
59 [7]	**124**	Not measured	149	333	0.38
Biseruca [7]	**195**	Not measured	128	292	0.56
40 [7]	**137**	Not measured	121	354	0.29
Gradinifa gimnaciu [7]	**27**	Not measured	43	159	1.1
Ciminteri [7]	**24**	Not measured	113	323	1.9
Pogreban Valeriu [7]	**24**	Not measured	163	239	2.9
6 [7]	**21**	Not measured	85	87	2.4
Calder Maria [7]	**21**	Not measured	135	294	1.33

		Groundwater concentrations (mg/L)			
	Nitrate (NO_3^-)	Ammoniacal nitrogen (NH_4-N)	Chloride (Cl^-)	Sulphate (SO_4^{2-})	Fluoride (F^-)
2C (Cretoaia village) (8)	Not measured	Not measured	58	200	Not measured
3C (Cretoaia village) (8)	Not measured	Not measured	145	770	Not measured
4C (Tintareni village) (8)	Not measured	Not measured		85	Not measured
4C1 (Cretoaia village) (8)	Not measured	Not measured	Not measured	Not measured	Not measured
5C (Tintareni village) (8)	Not measured	Not measured	140	400	Not measured
6C (Tintareni village) (8)	Not measured	Not measured	90	405	Not measured
7C (Tintareni village) (8)	Not measured	Not measured	135	320	Not measured
8C (Tintareni village) (8)	Not measured	Not measured	62	256	Not measured

Shaded cells indicate exceedance of the adopted DWS. Cells in bold indicate exceedance of the adopted SWS.
(1) World Health Organisation (WHO) Drinking Water Standard (DWS)
(2) WHO threshold odour level in absence of DWS
(3) European standard in absence of WHO DWS
(4) Maximum allowable concentration (MAC) for Use Class IV (OECD, 2007)
(5) The SWS for ammonium was adopted
(6) Boreholes installed during the geotechnical site investigation in June 2016
(7) Results dated 2014 and 2015 for two landfill wells (drainage and filtration wells) and nine groundwater abstraction wells located at Tintareni village.(8) Results dated 2012 for five wells located at Tintareni village and four wells located at Cretoaia (E. Lindberg, J. Olsson, 2012).

13.3.11 The groundwater analytical results summarised above reported the following.

- Groundwater quality as analysed at the filtration and drainage wells adjacent to the landfill indicate impact of landfill leachate with ammoniacal nitrogen and chloride concentrations up to 371 mg/l and 6,722 mg/l respectively.
- Groundwater quality as analysed at the newly installed boreholes BH2, BH4 and BH6 indicate impact of landfill leachate with chloride concentrations up to 1607.34 mg/l. Reported concentrations of ammoniacal nitrogen, sulphate and fluoride in the newly installed wells exceeded the adopted DWS in BH1 only, located hydraulically upgradient.
- Reported concentrations of chloride in water within the embankment body (BH3 at 10.9 mbgl and 14.6 mbgl) indicate impact of landfill leachate, with concentrations one order of magnitude higher than in the groundwater body. As in the groundwater body, ammoniacal nitrogen, sulphate and fluoride concentrations are considered to be generally relatively low. It is noted a number of contaminants of concern, including dichloro diphenyl trichloroethane (DDT), were only detected in these two samples.
- Nitrate concentrations in the landfill boreholes varied significantly between locations, with values ranging between below the limit of reporting (<0.1 mg/l) to 519.86 mg/l (BH4). The water samples collected from the drainage and filtration wells adjacent to the landfill returned concentrations of 30-36 mg/l. Reported concentrations of nitrate in the abstraction bores were up to three orders of magnitude higher than in a number of the landfill boreholes (BH2 and

BH3). It is noted however nitrate concentrations were higher in BH4 and BH6 than in the abstraction bores.

- Reported concentrations of fluoride were one order of magnitude higher in the abstraction bores than in the landfill boreholes, with concentrations in three abstraction bores exceeding the drinking water standards.
- Chloride concentrations exceeded the adopted DWS in the landfill boreholes and landfill wells only, with reported concentrations in the abstractions bores one order of magnitude lower.
- Sulphate concentrations exceeded the DWS in abstraction bores only.

13.3.12 The available data did not establish any clear correlation between water quality in, or adjacent to, the Tintareni landfill and that in the Tintareni village..

HYDROGEOLOGICAL RISK ASSESSMENT

13.3.13 The Hydrogeological Risk Assessment (HRA) was conducted for the current Tintareni landfill, which is considered to represent the worst case scenario (i.e. no surface sealing, no engineered lining system).

13.3.14 The HRA concluded that the leachate generated in Tintareni landfill is considered likely to impact on the quality of the groundwater in the immediate vicinity of the landfill (i.e. within 500m where there are no abstractions). The estimated concentrations decrease to levels near or below the adopted ecological and drinking water standards at a distance of approximately 500m from the landfill boundary. The estimated concentrations then continue to decrease further beyond 500m from the site boundary.

13.3.15 The estimated concentrations are assessed to be within the required drinking water standards at the abstraction wells at 4km from the source. The estimated concentrations breaking through the landfill liner are not considered to impact on the quality of the water extracted from the abstraction wells in Tintareni Village or water quality within the River Bic. The landfill is therefore not considered to be having a water quality related health effect on the residents of Tintareni.

Table 13-3 HRA Results

RECEPTOR POINT	ANALYTES AT CONCENTRATIONS IN EXCEEDANCE OF:	
	DWS	SWS
Site boundary: 100m	Ammoniacal nitrogen Chloride Sulphate	Ammoniacal nitrogen Chloride Sulphate DDT
Tintareni village abstraction wells: 4km	None	None
Rive Bic (based on concentrations at 4km)	None	None

13.3.16 Based on the HRA undertaken, it is considered that the concentrations detected in both the regional abstraction wells and River Bic are due to potential sources of contamination, such as local small scale local landfilling and agricultural fertilizers, rather than the Tintareni landfill.

FUTURE BASELINE

13.3.17 The current leachate management system at Tintareni landfill, is a leachate recirculation system that complies with Russian and Moldova Standards, as described in Section 2.7.8 to 2.7.10.

13.3.18 If the Project does not go ahead, this leachate recirculation system will continue to be used in the future. The capacity of the leachate storage tanks could eventually be exceeded following significant snow falls and heavy rainfalls, with the risk of leachate overflowing the storage tanks and discharging directly into the ground. The efficiency of the storage tanks is unknown; any potential cracks on the bases could lead to leachate infiltration into the ground.

RECEPTORS

13.3.19 The identified receptors and their assigned sensitivity are detailed below:

- River Bic: based on the poor water quality in the River Bic, the sensitivity of the receiving environment is low.
- Groundwater beneath the landfill: based on the reported groundwater concentrations in the landfill footprint and the vertical extension of the saturated zone encountered during the geotechnical investigation, the sensitivity of the receiving environment is low.
- Wider groundwater environment (downgradient from the landfill): as the nearest groundwater abstraction bores are located 5km to the northwest of the landfill, and the nearest surface water body is located 5km north, the sensitivity of the wider groundwater environment is medium.
- Groundwater abstraction bores: based on the quality of the water collected from the Tintareni wells (i.e. in exceedance of the adopted drinking water standard), the sensitivity of the groundwater abstraction bores is medium.
- Surface water runoff: Based on the surrounding land uses (i.e. agricultural land), the sensitivity of the receptor is medium.

13.4 POTENTIAL IMPACTS

CONSTRUCTION PHASE

13.4.1 The potential impacts identified during the up grading works of the Tintareni landfill are described below. A summary of the identified impacts and description of effects is provided in Table 13-4.

- The impact of heavy machinery moving on the surface of the current waste cell can lead to compression of previously deposited wastes, which can lead to increased volumes of leachate reaching the current storage tanks and potential overflow of the tanks. This could impact on the quality of soils and groundwater beneath the landfill. The sensitivity of groundwater beneath the landfill is low and the magnitude of change, prior to mitigation, is moderate. There is likely to be a direct, temporary, adverse, short term effect on the quality of groundwater beneath the landfill, which is of minor significance, prior to the implementation of mitigation measures.
- The movement of vehicles coming in and out of the landfill can lead to the superficial spread of waste outside the landfill, which can potentially cause contamination of surface water reaching the agricultural land located near the access road. The sensitivity of surface water runoff water is medium and the magnitude of change, prior to mitigation, is slight. There is

likely to be a direct, temporary, adverse, very short term effect on the quality of surface water runoff, which is of minor significance, prior to the implementation of mitigation measures.

OPERATIONAL PHASE

13.4.2 During operation of the landfill the accumulation of waste will produce leachate that, if not correctly collected and treated, has the potential to have an adverse impact on groundwater beneath the landfill. This could also have an adverse impact on wider groundwater environment hydraulically downgradient from the landfill, including groundwater abstraction bores and surface water bodies hydraulically connected with the groundwater body beneath the landfill.

13.4.3 The potential impacts identified during the operational phase are described below. A summary of the identified impacts and description of effects is provided in Table 13-4.

- The leachate generated during the operation of the landfill has the potential to impact on the quality of groundwater beneath the landfill if not correctly managed. The sensitivity of groundwater beneath the landfill is low and the magnitude of change, prior to mitigation, is very large. There is likely to be an adverse, direct, permanent, long term effect on the quality of groundwater beneath the landfill, which is of medium significance, prior to the implementation of mitigation measures.
- The leachate generated during the operation of the landfill has the potential to impact on the quality of downgradient groundwater, and subsequently the quality of water within the groundwater abstraction area in Tintareni village, if not correctly managed. The sensitivity of Tintareni village abstraction bores is medium and the magnitude of change, prior to mitigation, is moderate. There is likely to be an adverse, direct, temporary, long term effect on the quality of water within Tintareni village abstraction bores, which is of minor significance, prior to the implementation of mitigation measures. The upgrade of the landfill will include measures that are expected to reduce the leachate head and ultimately reduce the concentrations of leachate entering the underlying aquifer.
- The leachate generated during the operation of the landfill has the potential to impact on the quality of downgradient groundwater, and subsequently the quality of River Bic, if not correctly managed. The sensitivity of River Bic is medium and the magnitude of change, prior to mitigation, is moderate. There is likely to be an adverse direct, temporary, medium term effect on the quality of River Bic, which is of minor significance, prior to the implementation of mitigation measures.
- The treatment of leachate will generate water that will need to be discharged to the surface. There is potential for surface runoff water to be impacted if the necessary control measures are not put in place. The sensitivity of surface runoff water is medium, and the magnitude of change, prior to mitigation, is large. There is likely to be an adverse, direct, temporary, short term effect on the quality of surface runoff water, which is of medium significance, prior to the implementation of mitigation measures.
- The addition of material above the current waste cell can lead to compression of previously deposited wastes. This can result in potential for squeezing of leachate out of the wastes which may lead to increased leachate volumes that require management in the short term. The examination of these effects is recommended to ensure the efficiency of the leachate treatment plant is not affected. The sensitivity of groundwater beneath the landfill is low and the magnitude of change, prior to mitigation, is large. There is likely to be an adverse direct, temporary, short term effect on the quality of groundwater beneath the landfill, which is of medium significance, prior to the implementation of mitigation measures.
- The movement of vehicles coming in and out of the landfill during the landfill operations have the potential to spread waste outside the landfill, which can potentially cause contamination of surface water runoff reaching the agricultural land located near the access road. The sensitivity of surface water runoff water is medium and the magnitude of change, prior to mitigation, is slight. There is likely to be an adverse, indirect, temporary, very short term effect

on the quality of surface water runoff, which is of minor significance, prior to the implementation of mitigation measures.

SUMMARY OF IMPACTS

13.4.4 A summary of the identified impacts and effects on the receiving environment are detailed in Table 13-4.

Table 13-4 Summary of impacts and description of effects

Impact	Spatial scale	Receiving environment		Significance of impact		Effect	Significance of effect			Frequency and duration of effect		
		Receptor	Sensitivity	Impact type	Magnitude		Significance	Direct/ Ind.	Beneficial/ Adverse	Duration of effect	Temporary/ Permanent	Reversible/ Irreversible
Construction phase												
Increase in leachate generation by compression of previously deposited waste (heavy machinery)	Local	Groundwater beneath the landfill	Low	Adverse	Moderate	Impact on the water quality of groundwater beneath the site	Minor significance	Direct	Adverse	Short term	Temporary	Reversible
Waste spread outside the landfill	Regional	Surface water runoff	Medium	Adverse	Slight	Contamination of surface water, potentially migrating towards agricultural land by runoff	Minor significance	Indirect	Adverse	Very short term	Temporary	Reversible
Operational phase												
Generation of leachate from waste storage activities – groundwater contamination	Local	Groundwater beneath the landfill	Low	Adverse	Very large	Impact on the local groundwater quality, potentially impacting on receptors downgradient	Medium significance	Direct	Negative	Long term	Permanent	Irreversible

Impact	Spatial scale	Receiving environment		Significance of impact		Effect	Significance of effect			Frequency and duration of effect		
		Receptor	Sensitivity	Impact type	Magnitude		Significance	Direct/ Ind.	Beneficial/ Adverse	Duration of effect	Temporary/ Permanent	Reversible/ Irreversible
Generation of leachate from waste storage activities – groundwater contamination	Regional	Tintareni village abstraction bores	Medium	Adverse	Moderate	Impact on the water quality of Tintareni abstraction bores	Minor significance	Direct	Adverse	Long term	Temporary	Irreversible
Generation of leachate from waste storage activities – contamination of River Bic	Regional	River Bic	Medium	Adverse	Moderate	Impact on the quality of River Bic, potential harm to freshwater ecosystems	Minor significance	Direct	Adverse	Medium term	Temporary	Irreversible
Generation of discharged water	Regional	Surface water runoff	Medium	Adverse	Large	Contamination at discharge point and potential for contamination of adjacent agricultural land	Medium significance	Direct	Adverse	Short term	Temporary	Reversible

IMPACT	SPATIAL SCALE	RECEIVING ENVIRONMENT		SIGNIFICANCE OF IMPACT		EFFECT	SIGNIFICANCE OF EFFECT			FREQUENCY AND DURATION OF EFFECT		
		RECEPTOR	SENSITIVITY	IMPACT TYPE	MAGNITUDE		SIGNIFICANCE	DIRECT/ IND.	BENEFICIAL/ ADVERSE	DURATION OF EFFECT	TEMPORARY/ PERMANENT	REVERSIBLE/ IRREVERSIBLE
Increase in leachate generation by compression of previously deposited waste – impact on local groundwater quality	Local	Groundwater beneath the landfill	Low	Adverse	Moderate	Impact on the local groundwater quality, potentially impacting on receptors downgradient	Minor significance	Direct	Negative	Short term	Permanent	Irreversible
Waste spread outside the landfill	Regional	Surface water runoff	Medium	Adverse	Slight	Contamination of surface water runoff, potentially migrating towards agricultural land	Minor significance	Indirect	Negative	Very short term	Temporary	Reversible

13.5 MITIGATION

13.5.1 The mitigation measures proposed to be implemented in order to reduce the potential impacts to the water environment are detailed in Table 13-5.

Table 13-5 Mitigation measures for impacts to water environment

IMPACT / EFFECT	MITIGATION MEASURE
Construction phase	
Increase in leachate generation by compression of previously deposited waste (heavy machinery)	Program to inspect the leachate collection tanks frequently. Program to remove leachate from storage tanks regularly during construction works. Examination of the effects of compression of previously deposited wastes to be conducted by visual means during construction works.
Waste spread outside the landfill – migration towards agricultural land by surface water runoff	Wheel washing before leaving construction works. Inspection to be conducted along the route following construction works, removal of waste found (if any).
Operational phase	
Generation of leachate from waste storage activities –impact on: the quality of groundwater beneath the landfill; the water quality of Tintareni abstraction bores; the water quality of the River Bic	Liner to be designed to address EU Landfill Directive, international best practice and state-of-the-art techniques. Design of upgraded landfill to improve the management of leachate (i.e. subcells that are independently managed). Leachate collection system and leachate treatment plant . Leak detection system. Daily cover to reduce rainfall infiltration. Groundwater monitoring network downgradient from the landfill; a minimum of three groundwater monitoring wells downgradient are recommended, with one located cross gradient in the direction towards Tintareni village. Groundwater monitoring program, including contingency measures in the event there has been a breach in either the control or the trigger levels. Leachate monitoring.

IMPACT / EFFECT	MITIGATION MEASURE
Generation of discharged water - contamination at point of discharge and potential for contamination of adjacent agricultural land	Monitoring at different stages of the treatment process. Program to monitor water at discharge point. Recirculation of water exceeding maximum allowed concentrations. No by-pass allowed. Groundwater monitoring program, including contingency measures in the event there has been a breach in either the control or the trigger levels.
Increase in leachate generation by compression of previously deposited waste – impact on local groundwater quality	Capping of current waste cell. Leachate collection system to extract leachate within the current waste cell. Allowance for additional volume of leachate to be treated with the leachate generated during the operation of the future waste cell.
Waste spread outside the landfill - contamination of surface water, potentially migrating towards agricultural land by runoff	Use of modern fleet (i.e. covered vehicles). Wheel washing before leaving the landfill site. Program to inspect the vehicle route.

14 SOCIAL, POPULATION AND HUMAN HEALTH IMPACTS

14.1 INTRODUCTION

14.1.1 This chapter provides an assessment of impacts of the Project on communities and individuals within the Project's area of influence. It considers the potential socio economic impacts as a result of the Project, associated with the following issues:

- Land tenure and use;
- Employment and procurement opportunities;
- Livelihoods;
- Community health, safety and security;
- Occupational health and safety;
- Infrastructure;
- Increased waste management tariffs;
- Community benefits; and
- Gender.

14.1.2 Impacts and mitigation measures associated with community health, safety and security issues, as well as occupational health and safety issues are also addressed in other chapters of the ESIA.

14.2 LEGISLATION

14.2.1 The Project is required to meet the requirements of both national legislation and EBRD Policy Requirements (PRs) of the EBRD Environmental and Social Policy (2014). The relevant PRs in relation to social issues are:

- PR 1 Environmental and Social Appraisal and Management
- PR 2 Labour and Working Conditions

- PR 4 Community Health, Safety and Security
- PR 5 Land Acquisition, Involuntary Resettlement and Economic Displacement
- PR 10 Information Disclosure and Stakeholder Engagement

14.2.2 One of the key social topics in relation to the Project is access to information and consultation. The EBRD PR 10 requires stakeholder engagement to be an ongoing process which involves:

- the client's public disclosure of appropriate information, so as to enable meaningful consultation with stakeholders;
- meaningful consultation with stakeholders including potentially affected parties; and
- an effective procedure or mechanism by which people can make comments or raise grievances.

14.2.3 Moldovan legislation guarantees that everyone shall have the right to be informed accurately and in a timely manner regarding issues of public importance. These provisions are included in the Constitution of the Republic of Moldova (1994), as well as in the Law No. 982 of 11 May 2000 on Access to Information.

14.2.4 Law No. 86 of 29.05.2014 on EIA of the Republic of Moldova is harmonised with the DIRECTIVE 2011/92/EU on the assessment of the effects of certain public and private projects on the environment, as well as the Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (Aarhus convention). This includes obligations to disclose information and organise public consultations.

14.2.5 EBRD's PR 5 on Land Acquisition, Involuntary Resettlement and Economic Displacement requires the development of appropriate livelihood restoration action plans where displacement is unavoidable. Livelihoods and income earning capacity of affected persons, including those who have no legally recognisable rights or claims to land, have to be improved or, at a minimum, restored to pre-project levels and they must be supported during the transition period.

14.2.6 Issues in relation to provision of support to vulnerable groups are regulated by Moldovan legislation on social welfare and access to employment. Law No. 576 of 25 December 2003 on Social Welfare and Law No. 123 of 18 June 2010 on Social Services, regulate support payments and services that are available to vulnerable individuals and groups, defined as: children and young people living in harmful environments, families who cannot fulfil their basic needs, families with no income or low income, persons and families affected by family violence, single headed and single parent families with no support, families with three or more children, elderly people, persons with disabilities and other persons and families in need. The type of assistance is determined for an individual or family, based on assessments carried out by social workers. Law No. 102-XV of 13 March 2003 on Employment and Social Protection of Persons Seeking Work prescribes the way in which employment can be provided to the unemployed seeking work and what assistance can be offered to them until they find it by various institutions including the National Employment Agency.

14.2.7 The EBRD requires its clients to identify any potential gender-specific and disproportionate, adverse impacts, and undertake to develop mitigation measures to reduce these. Where relevant, clients are requested to enhance the positive gender impact of projects by promoting equality of opportunity and women's socio-economic empowerment, particularly with respect to access to finance, services and employment.

14.2.8 Law No. 5 of 9 February 2006 on Equal Opportunities between Men and Women of the Republic of Moldova, addresses issues of equality between the genders and prescribes measures to ensure this equality, including equal access to employment and services.

14.2.9 To fulfil EBRD standards in relation to labour and working conditions, this Project is required to comply, at a minimum, with (i) national labour and social security laws, and (ii) the fundamental principles and standards embodied in the International Labour Organisation conventions in relation to forced labour, child labour, non discrimination and equal opportunities, worker organisations, conditions of work, etc. The Labour Code of the Republic of Moldova N 154-XV from 28.03.2003. addresses these issues and is largely aligned with ILO conventions and the requirements of PR 2. The Project is also required to ensure that contractors and suppliers are fully compliant with the provisions of national legislation and PR 2.

14.2.10 Standards related to community and occupational health and safety which the Project must comply with are embodied in PR 4. This includes requirements for managing health and safety of workers and communities in relation to equipment, infrastructure and buildings, exposure to hazardous materials, natural hazards, diseases, emergency situations, safety of products, services, traffic and roads. Under national legislation, issues in relation to occupational health and safety are addressed by Law No. 186-XVI of 10 July 2008 on Occupational Health and Safety of the Republic of Moldova.

14.3 BASELINE CONDITIONS

DATA COLLECTION

14.3.1 The data presented in this chapter has been collected in a number of ways including:

- Site visits to the affected areas, including the Tintareni landfill, the Ciocana dump site and the villages Tintareni and Bubuieci;
- Discussions with directly affected waste pickers and a socio economic survey conducted with them in July 2016;
- Meetings with a variety of stakeholders including local authorities from Chisinau, Tintareni and Bubuieci, civil society representatives, private sector representatives, representatives of the National Employment Agency, social workers, Regia Autosalubritate and the EBRD;
- Public meetings in Tintareni and Bubuieci villages; and
- Desk study of official statistical information published by the National Bureau of Statistics of the Republic of Moldova, as well as numerous published studies, reports and plans.

TERRITORIAL AND ADMINISTRATIVE ORGANISATION

14.3.2 Moldova is a democratic republic, with an elected Parliament of 101 deputies, a Government headed by the Prime Minister (designated by the President of Moldova and approved by the Parliament) and the President of the Republic of Moldova, elected by the Parliament.

14.3.3 Moldova is divided into 32 districts, three municipalities (Chisinau, Balti and Bender), one autonomous territorial unit (Gagauzia) and one territorial unit (Trasnistria). Each municipality and district comprises towns and communes, as well as unincorporated villages (which are administratively a part of towns or communes). The capital and largest city is Chisinau, which is divided into five administrative sectors (regions).

14.3.4 There are two levels of local government in Moldova. First level government is found in villages and towns and consists of the mayor and local council. The second level government is found in districts and municipalities (including in the Gagauzian territorial unit) and consists of the Chairman (district) / Mayor (city) and the District Council / Municipal Council.

PROJECT AREA OF INFLUENCE

14.3.5 The primary area of influence encompasses the Project sites – Ciocana dumpsite which is due to be closed and the Tintareni landfill which is to be upgraded and re-opened as part of the Project, as well as the local communities surrounding and closest to these sites.

14.3.6 The Ciocana dumpsite is located in the Ciocana sector of the Chisinau Municipality, approximately 10 km from the centre of Chisinau, in an industrial zone. The village closest to the dumpsite is Bubuieci village (part of the Bubuieci commune), also administratively a part of the Ciocana sector.

14.3.7 The Tintareni landfill is located approximately 35km away from the centre of Chisinau. Villages surrounding and closest to the Tintareni landfill are Tintareni – 5km and Creţoaia – 3km (both comprising the Tintareni commune). These villages are all located within the Anenii Noi district.

DEMOGRAPHY

14.3.8 The total population of Chisinau in 2015 was 809,563 of which 53% were women. The population has been increasing by approximately 0.6% per year in the last four years. Available population data for the relevant villages is provided in Table 14-1.

Table 14-1: Population Data

Administrative unit	Population	Male	%	Female	%
Chisinau Municipality (Fichtner Management Consulting, 2016)	809,563	379,348	46.86%	430,215	53.14%
Bubuieci village (Mayor of Tintareni, pers comm)	11,700	N/A		N/A	
Tintareni village (Census, 2004)	2,867	1,401	48.87%	1,466	51.13%
Creţoaia village (Census, 2004)	458	220	48.03%	238	51.97%

Table 14-2: Population Age Structure

Administrative unit	0 - 14	15 - 64	65 +
Republic of Moldova (National Bureau of Statistics, 2015)	15.7%	74.3%	10%
Chisinau Municipality (Fichtner Management Consulting, 2016)	13%	78-79%	8-9%

14.3.9 At the level of the Republic of Moldova, the birth rate in 2012 was 11.0 per 1,000 inhabitants, while at the level of Chisinau municipality, the birth rate in 2012 was 9.8 per 1,000 inhabitants. The birth rate in Anenii Noi District in 2012 was 11.4 per 1,000 inhabitants. In Tintareni village, the birth rate in 2010 was 7.5 per 1,000 inhabitants (Ecological Movement of Moldova, 2015), which is lower than the birth rate at the national and district level.

14.3.10 The death rate at the level of Moldova in 2012 was 11.4 per 1,000 and in Chisinau municipality in 2012 it was 7.7 per 1,000 inhabitants. The death rate in Anenii Noi District in 2012 was 10.6 per 1,000 inhabitants. In Tintareni during the period 2003 – 2010 the average death rate was 12.3 people per 1,000 inhabitants (Ecological Movement of Moldova, 2015), which is higher than the death rate at the level of the Republic of Moldova and the district.

14.3.11 Moldovans constitute about 67.62% of the population in Chisinau, which is lower compared to the national level where Moldovans make up 75.8% of the population. Both are much lower when compared to the Moldovan community in Tintareni which accounts for 96.41% of the population. Other significant ethnic groups are Ukrainians, Russians and Romanians, see Table 14-3 below.

Table 14-3: POPULATION ETHNIC STRUCTURE

Administrative unit	Moldovan	Russian	Ukrainian	Romanian	Other
Republic of Moldova	75.8%	5.9%	8.4%	2.2%	7.7%
Chisinau Municipality (Census, 2004)	67.62%	13.92%	8.28%	4.49%	5.69%
Tintareni Commune (Census, 2004)	96.41%	0.7%	1.33%	0.56%	1%

14.3.12 The predominant religion in Moldova is Orthodox Christianity (over 90% of the population). The official language in the Republic of Moldova is Romanian, while Russian is also widely spoken.

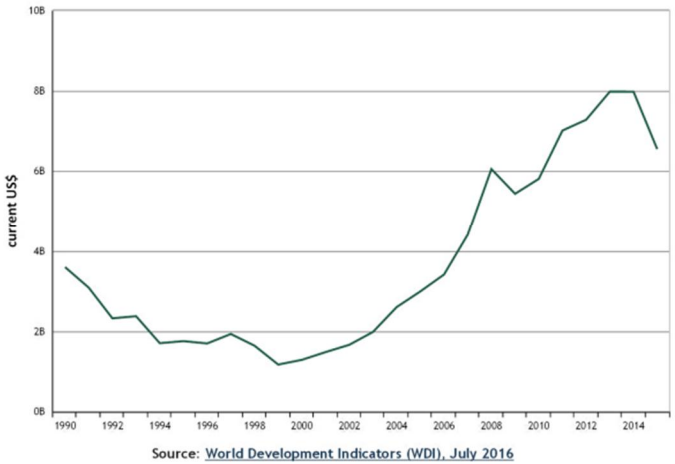
14.3.13 The majority of the population in Moldova is literate – 99.4% (male – 99.7%. female – 99.1%) (Census, 2004).

ECONOMIC ENVIRONMENT

14.3.14 The economy of Moldova depends heavily on agriculture, particularly fruits, vegetables, wine and tobacco. Economic reforms have been slow and the economy remains vulnerable to higher fuel prices, poor weather and lack of foreign investment.

14.3.15 Chisinau is the most economically developed and industrialised city in Moldova. The City's economy relies on industry and services. The main industries include consumer and electrical goods, building materials, machinery, plastics, rubber and textiles, while the main service areas include banking and commerce.

14.3.16 Moldova had been experiencing a relatively steady increase of the GDP since 2000, however in 2013 it began to stagnate, followed by a sharp decline in 2015 (Figure 14-1).



Date	Value	Change, %
2015	6,551,161,404	-17.94 %
2014	7,983,271,111	-0.03 %
2013	7,985,349,731	9.62 %
2012	7,284,686,576	3.84 %
2011	7,015,206,498	20.71 %
2010	5,811,604,052	6.84 %
2009	5,439,422,031	-10.16 %
2008	6,054,806,101	37.57 %
2007	4,401,154,128	29.13 %
2006	3,408,272,498	14.05 %
2005	2,988,338,439	15.01 %
2004	2,598,231,467	

Figure 14-1 GDP in the Republic of Moldova from 1990 to 2015

14.3.17 The unemployment rate at the level of the Republic of Moldova in 2014 was 3.8% (4.6% men, 3.1% women), while in Chisinau it was almost double - 7.6% (Figure 14-2).

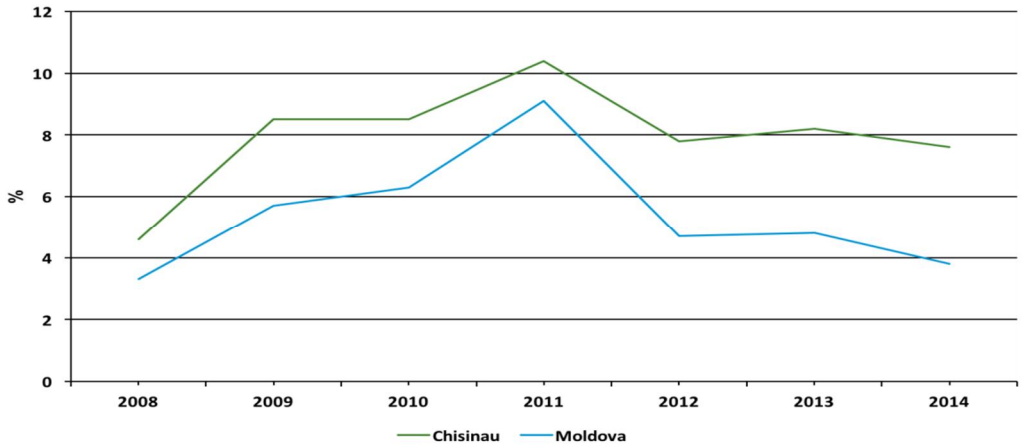


Figure 14-2 Unemployment rate in Moldova and Chisinau from 2008 to 2014

14.3.18 During 2010 and 2011, the poverty level was significantly reduced in the Republic of Moldova. In 2011 the absolute poverty rate accounted for 17.5%, registering a decrease of 8.8 % as compared to 2009. Since then, the poverty rate has been steadily decreasing (see Figure 14-3), however essential differences continue to persist between the urban and rural population living standards, with poverty rates three times higher in rural areas than in urban ones.

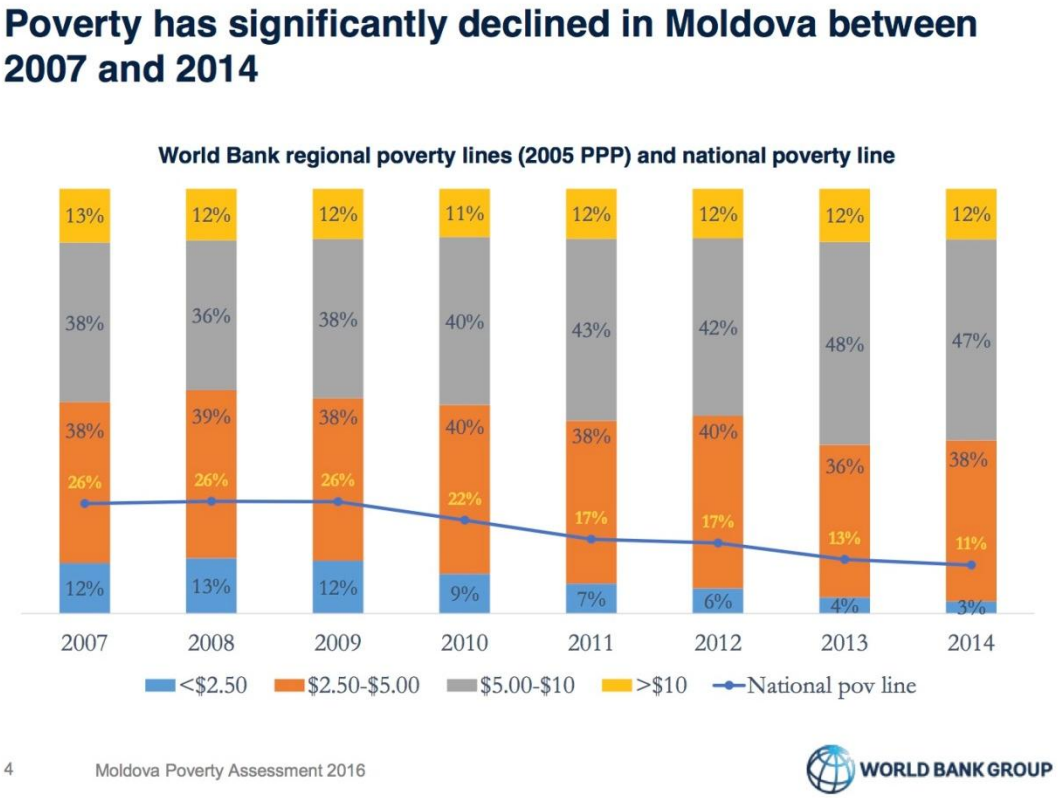


Figure 14-3 Poverty in Moldova according to World Bank and National Standards (World Bank Group, 2016)

14.3.19 In Tintareni village, approximately 30% of the population are manual workers, 12% of the population are working in budget institutions, 6.7% are farmers and agricultural workers, 23.7 are pensioners, 23.7% are unemployed and 3.9% belong to the category 'other' (Census 2004). In Bubuieci, 90% of the working population is employed in the City Chisinau (Secretary of the Bubuieci Mayor, 20 July 2016, pers comm). Residents of both villages are engaged in agriculture, both for sale and household consumption.

INCOMES AND EXPENDITURES

14.3.20 At the level of the Republic of Moldova, the average gross wage in April 2016 was 4,909.6 MDL (approximately 250 USD, where 1 USD = 19.63 MLD), which corresponds to a net wage of 4,026 MDL (approximately 205 USD). The average monthly wages in the period May 2015 to May 2016 are presented in Figure 14-4.

14.3.21 The average monthly wage in Chisinau in 2014 was 4,089.7 MDL, while in that same year the average monthly wage in Anenii Noi district was 3,258 MDL.

14.3.22 The gross minimum wage in Moldova in the private sector as of 1 May 2015 has been 1,900 MDL (approximately 105 USD, where 1 USD = 18.08 MLD), per month, for 169 hours worked per month. In the public sector, in 2015, the minimum monthly wage amounted to 1,000 MDL (approximately 55 USD, where 1 USD = 18.08 MLD).

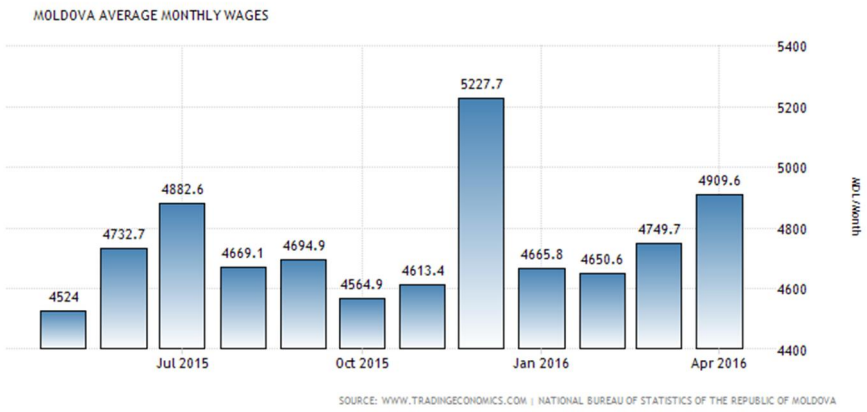


Figure 14-4 Average Monthly Wages in Moldova from May 2015 to April 2016

14.3.23 The average monthly disposable income in 2015 per person in Chisinau was 2,578.3 MDL (approximately 131 USD, where 1 USD = 19.66 MLD). A breakdown by sources of income is provided in Figure 14-5. Social protection payments include: pensions, child allowances, compensations and social support, while other incomes include remittances.

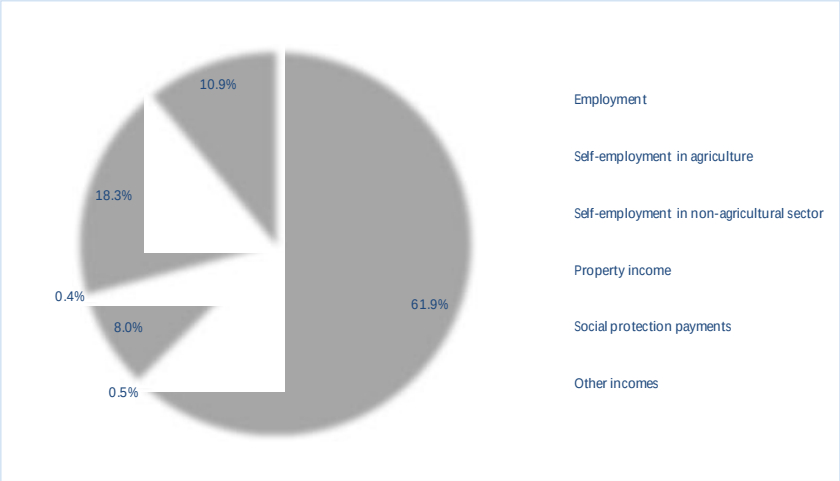


Figure 14-5 Sources of Disposable Income in Chisinau in 2015 (National Bureau of Statistics of the Republic of Moldova, 2016)

14.3.24 The average monthly consumption expenditure in 2015 per person in Chisinau was 2,757.7 MDL (approximately 140 USD, where 1 USD = 19.66 MLD). A breakdown by types of expenditures is provided in Figure 14-6.

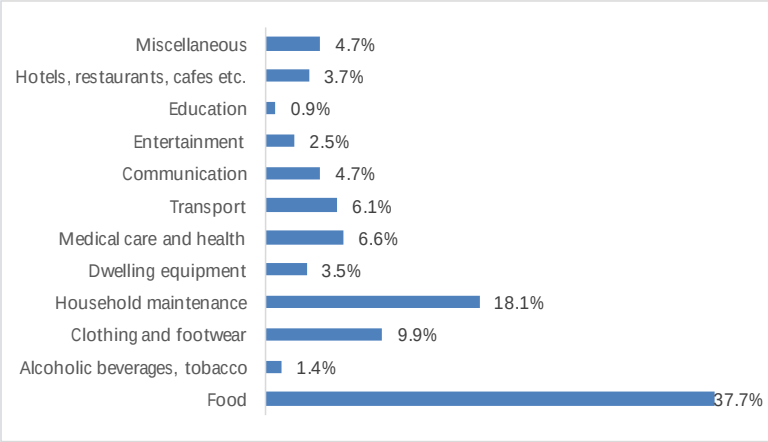


Figure 14-6 Consumption Expenditures of Population in Chisinau in 2015 (Source: National Bureau of Statistics, 2015)

HEALTH AND SAFETY

14.3.25 Life expectancy at birth in the Republic of Moldova in 2014 was 71.48 years (men - 67.52 years, women - 75.39 years). The differences between the urban and rural population is presented in Table 14-4.

Table 14-4: Life Expectancy at Birth (World Bank, 2016)

	Total	Men	Women
Republic of Moldova	71.48	67.52	75.39
Urban population	74.10	70.35	77.51
Rural population	69.81	65.81	74.01

14.3.26 The main causes of death at the level of the Republic are cardiovascular diseases, followed by malignant tumours. Data on the causes of death in 2014 at the level of the Republic, the City Chisinau and Anenii Noi district is provided in Table 14-5.

Table 14-5: Death Rates by Main Causes of Death in 2014 (World Bank, 2016)

	Total deceased (number of deaths per 100,000 inhabitants)	**Diseases of the circulatory system**	**Malignant tumours**	**Diseases of the digestive system**	**Accidents, poisoning and injuries**
Republic of Moldova	1,110.51	642.50	167.11	101.73	85.34
Chisinau	777.18	427.25	156.01	62.33	53.53
Anenii Noi District	1,028.58	562.24	179.82	100.70	91.11

14.3.27 There were health concerns shared at meetings with residents of Tintareni village, which include local medical staff. It is believed that there are higher rates of illness including among children (e.g. hepatitis) and the village residents believe these to be linked to the allegations that there is contamination of potable water in wells by the landfill. At the same time, it is recognised that some of the pollution could be linked with the heavily contaminated River Bic and illegal dumpsites found throughout the village and surrounding areas.

14.3.28 A hydrogeological study was commissioned by Fichtner Management Consulting as part of the Feasibility Study. Further to that, a Hydrogeological Risk Assessment (HRA) was undertaken by WSP I PB to assess the potential effects of Tintareni landfill on hydrogeology and hydraulically connected downgradient groundwater and surface water resources. According to the HRA, although the quality of the water in the abstraction wells in Tintareni village and the River Bic are below the adopted quality standard, this is the result of other potential sources of contamination such as local small scale local landfilling and agricultural fertilizers, rather than the Tintareni landfill. According to the study, the discharges from the landfill do not represent a significant risk to receptors located more than 500m from the site. In addition, as part of the Project, the landfill is to be subject to additional engineering works and management controls, which have the potential to improve the current site and reduce leakages from the current waste body. More details on the HRA are available in Chapter 13.

14.3.29 Other health concerns voiced by residents of Tintareni were in relation to noise, vibration, dust, odour nuisances, and liquid leaks, related to heavy duty vehicles transporting waste to the landfill. The littering which resulted from waste falling out of waste transport vehicles, as well as the lack of information on the waste that was being accepted for disposal at the landfill and potential health risks associated with unsuitable waste.

14.3.30 Very similar health concerns were voiced by residents of Bubuieci village, including contamination of water sources and various nuisances (particularly smell). In Bubuieci commune, the most prevalent diseases are cardiovascular, respiratory and cancer (Secretary of the Bubuieci Mayor, 20 July 2016, pers common).

14.3.31 The most frequent diseases in Tintareni and Cretoaia village for 2014 are shown in the Figure 14-7.

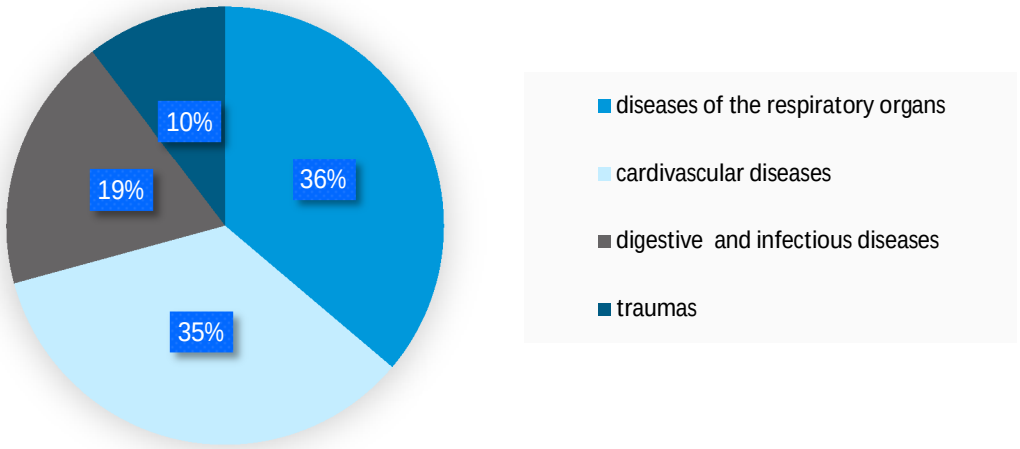


Figure 14-7 The most Frequent Diseases in Tintareni and Creţoaia village for 2014
(Source: Ecologist Movement of Moldova, 2015)

14.3.32 Data on hospitalised patients from Tintareni and Creţoaia, including the number of patients, and the diseases, gender, age and others are shown in Table 14-6 and Table 14-7.

Table 14-6 Number of hospitalised patients in Anenii Noi Rayon Hospital

LOCALITIES	THE TOTAL NUMBER OF PATIENTS (IN A 6 MONTH PERIOD, 2014)	%
Anenii Noi District	4168	100
Tintareni	170	4.08
Cretoaia	13	0.31
Total for Tintareni and Cretoaia	**183**	**4.39**

Table 14-7 Data on hospitalised patients from Tintareni and Creţoaia
(Source: Ecologist Movement of Moldova, 2015)

DESCRIPTION	NO OF PATIENTS	% OF 183 PATIENTS	
Diseases			
Infectious diseases	22	12.02	III place
Malignant tumours	2	1.09	
Diabetes	6	3,28	
Cardiovascular diseases	40	21.86	II place
Respiratory diseases	42	22.95	I place
Digestive diseases	22	12.02	III place
Osteoarticular diseases	6	3.28	
Genitourinary diseases	5	2.73	
Abortion	4	2.19	
Pathology of pregnancy	7	3.83	
Childbirth	11	6.01	
Perinatal diseases	1	0.55	
Traumas	12	6.56	IV place
Others	4	2.19	
Gender			
Men	72	39.34	
Women	111	60.66	I place
Age			
Children	55	30.05	
Able to work	73	39.89	I place
Retirees	55	30.05	

Type of hospitalisation			
Programmed	10	5.46	
Emergencies	173	94.54	I place
Status at discharge			
Improved	97	53.01	I place
Healed	76	41.53	II place
Without changes	2	1.09	
Transfer to other institutions	4	2.19	
Deaths	4	2.19	

14.3.33 Informal waste pickers at the Ciocana dumpsite did not report any diseases, however their working conditions are very poor and they do not use any protective equipment. With no fence around the dump site, access to it is open and the movement of heavy vehicles can be dangerous for the waste pickers.

14.3.34 The Tintareni landfill is located at a distance from the nearest community (approximately 3km) and the site entrance is fenced off and controlled, however, the perimeter fencing only surrounds part of the site.

INFRASTRUCTURE

14.3.35 Some of the data in this section on the Tintareni and Bubuieci communes has been obtained from a report prepared by the NGO National Environmental Centre (The Environmental Situation in the Basin of Bic River, author: Mihail Mustea, Chisinau 2013) and combined with data received through community and other meetings.

14.3.36 In the Bubuieci commune public / social institutions include the following: mayor's office, two kindergartens, a secondary school, a vocational school, a primary school, a medical centre and a church. The greater part of the Bubuieci commune is covered by the public water supply (municipal aqueduct of Chisinau municipality) managed by the JSC "Apa-Canal" Chisinau, while the rest of the population depends on wells. A part of the village is also connected to the sewage system.

14.3.37 In the Tintareni commune public / social institutions include the following: mayor's office, one kindergarten, a secondary school (gymnasium), a primary school, a medical centre and a church. The main source of drinking water in Tintareni commune are village aqueducts, managed by the local company "Tintareni service", however a significant portion of the population also relies on individual wells. Only 3% of the Tintareni population is connected to the sewerage system, while half of the population use septic tanks which are periodically discharged, and the remaining population uses either septic tanks with no discharge or pit latrines. Regia Autosalubritate collected waste in Tintareni village before the closure of the Tintareni landfill, this was discontinued when the Tintareni landfill closed. Household waste is now disposed of at illegal dumpsites around the village.

14.3.38 Access to the Tintareni landfill is provided by an asphalt road (2.5km), which is under the responsibility of Regia Autosalubritate. This road connects to the district road L481, which passes by the village Creţoaia, is under the responsibility of Anenii Noi district, and further to the Regional road R2, which is under the responsibility of the Government of the Republic of Moldova. The access road to the Tintareni landfill (2.5km) is in poor condition, as is the section of the regional road L481 between the landfill and the Creţoaia village access junction (2km). The remaining 3km of the L481 road are in medium condition, while the R2 Regional road is in good condition. Alternative routes to the landfill have been considered (see Section 4.4), however, the previously used route remains the preferred option. Further information on transportation and traffic is available in Chapter 15.

WASTE MANAGEMENT TARIFFS (FICHTNER MANAGEMENT CONSULTING, 2016

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14.3.39 Waste management tariffs in Moldova are developed by service providers based on a prescribed national methodology. In Chisinau, these tariffs are reviewed by the Department on Economics and Reforms of the Mayor's office. Tariffs are set for two types of clients – households and legal entities. Currently valid tariffs have been set on 1 January 2005 (Resolution of the Chisinau Municipality, 2004) and before that in 1999. The current payment collection rate is very high, close to 100%.

14.3.40 At present it is unknown whether the implementation of the Project will require tariffs to be increased. However, the likelihood of this is relatively high, as the current tariffs only cover the cost of basic services, with no provision made for capital investments or mitigation of environmental impacts. According to internationally accepted practice, if the cost per household for the entire waste management system is higher than 2% of the household income, in middle-income countries like the Republic of Moldova, than it is likely not to be affordable. Moldova has been classified as a lower middle income country under the World Bank Classification with a GNI per capita between USD 1,046 and USD 4,125.

14.3.41 An affordability analyses has been carried out by Fichtner Management Consulting and according to current estimates, waste management tariffs in Chisinau will increase two times however they should not be higher than 1% of the household income. The change in tariffs will occur only after construction has been completed. A detailed financial analysis will be carried out, using up to date data including the costs of operating the landfill, after which the final tariffs will be recommended to the Municipal Council, and if approved, established.

PROJECT AFFECTED LAND

14.3.42 The Ciocana temporary dumpsite comprises an area of 8.93 hectares of the "Purcel" quarry on the Uzinelor street in the Ciocana district, which belongs to the City Chisinau, This land was allocated to Regia Autosalubritate by the Decision of the Municipal Council of Chisinau (12 February 2010) for temporary storage of waste.

14.3.43 The Tintareni landfill is located on approximately 25ha of land which belongs to the Tintareni village. In 1986, the land was given for use to the City of Chisinau and allocated for waste disposal (managed by Regia Autosalubritate), after which the landfill was commissioned in 1987 and put into routine operation in 1990. The use period expired in 2010, after which the Tintareni landfill was closed.

WASTE PICKING

14.3.44 During the preparation of the ESIA, numerous site visits were undertaken to the Ciocana temporary dumpsite, to meet with informal waste pickers present at the site. On all occasions, the number of people engaged in this activity at the dumpsite was between 15 and 25 people, of whom two to three were women. Based on information from various sources, it can be estimated that between 15 and 20 people are regularly engaged in this activity, while another 20 to 30 people picked waste occasionally. No children were seen waste picking at the site, except during the last visit in July 2016 when the socio economic survey was being carried out. At that time several children of primary school age were seen on site, however, they were not engaged in the waste picking. It is assumed that they were there to accompanying their parents, due to the summer break from school.

14.3.45 A socio economic survey was carried out on 13th July 2016 by two surveyors, who were accompanied by one employee of Regia Autosalubritate. On that day, the surveyors announced to those who were present that they would also come on July 16th (Saturday) and asked them to spread the word to any other waste pickers to come on that day if they wanted to participate. On the first day of the survey, 20 waste pickers were observed (of whom two were women) at the site, of whom 14 agreed to be interviewed (of whom one was a woman). On the second survey day, 15 waste pickers were observed at the waste dump, five of whom were not present at the site during the first survey visit. None of the new waste pickers agreed to be interviewed.

14.3.46 Only three waste pickers provided their full names, while the rest preferred not to provide this information, or to provide only their given name. Similarly, only one person provided a contact phone number. The interviewed waste pickers were between 18 and 49 years of age (average age 34) and 14 were men, and one was a woman (42 years old). They were all Moldovan and spoke Romanian, four also speak Russian.

14.3.47 All the waste pickers stated that they have personal documents (birth certificates and ID cards and/or passports), and three also reported having a driving license. A total of 11 completed the compulsory primary/basic secondary school (grades 1 to 9), while two also completed secondary school (grades 10 and 11) and two had vocational qualifications (operator of tractors and plastic processing). Table 14-8 provides an overview of the waste pickers formal and informal skills.

Table 14-8: Waste Picker Skills (Source: Survey 2016)

Type of skill	Number of waste pickers
Driving	2
Cooking	2
Cleaning	1
Construction	1
Many skills (not specified)	2
No skills	8

14.3.48 One person reported having a disability (resulting from a broken leg), while all others stated that they have no disability or chronic illness. When asked where they live, 12 of them stated that they live in Chisinau. Despite being asked to specify the exact location (village, sector), only two persons provided this information, one living in Gratiesti (a sector in Chisinau) and one in Bubuieci village. The remaining two waste pickers stated that they live in the village of Geamana, within the Anenii Noi district, which to the south of Tintareni landfill.

14.3.49 All of the interviewed waste pickers had at least one other adult in their household (over 18) and six reported that they have at least one child (under 18) in their household (two reported having two children). The average household size of the waste pickers was 3.43 members. All of the waste pickers stated that they have no other income, and eight of them stated that no one else in their household earns an income. Three of these waste pickers also have one child in their household.

14.3.50 All waste pickers stated that no one else from their household engages in waste picking at the waste dump. It should be noted that in previous discussions with the waste pickers, some stated that they occasionally also engage in agriculture and some work on their own land. One person reported had a pension and using waste picking as a supplementary income. The interviewed social workers from the Bubuieci village stated that none of the beneficiaries of social welfare in their registries are engaged in waste picking, as most of their beneficiaries were elderly people with very small pensions. They also stated that they know some of the villagers who are engaged in waste picking, and that some farm their own land while others engage in seasonal agricultural work. In the social workers' opinion, although waste picking in the way it is carried out at the Ciocana dumpsite is very harmful for people's health, it is also a profitable activity.

14.3.51 In relation to the duration of involvement in waste picking at the Ciocana waste dump, an equal number (6 waste pickers) have been doing it between 6 months and 1 year and between 1 and two years, while two have been doing it for less than 6 months. All of the interviewed waste pickers stated that they are regularly present at the waste dump, 50% of whom are there every day and the other 50%, several times a week, for an average of 6 hours per day.

14.3.52 The male waste pickers reported collecting paper, metal and glass. Five of them also reported collecting plastic. The one female waste picker reported collecting wood.

14.3.53 When asked about total monthly household incomes, eight of the waste pickers reported the amount (Table 14-9), while the rest stated that they did not want to answer the question, or they do not know. When asked about how much they earn from waste picking per month, the majority (9 waste pickers) stated that they earn between 1,001 and 2,000 MDL per month, two waste pickers stated that they earned between 2,001 MDL and 4,000 MDL, while three did not provide an answer.

Table 14-9: Waste Picker Household Incomes (Source: Survey 2016)

Estimated total household income per month (1 USD = 19.83 MLD)	No other income in the household	1 other income in the household	2 other incomes in the household

2000 MDL (101 USD)	4 waste pickers	-	-
3000 MDL (151 USD)	-	1 waste picker	-
4000 MDL (202 USD)	-	2 waste pickers	1 waste picker

14.3.54 When the information on incomes is analysed in conjunction with the estimated household income (and number of incomes in a household), as well as the presence of waste pickers at the waste dump, it can be concluded that the waste pickers earn up to 2,000 MDL per month from spending several days a week at the waste dump (see Table 14-10). This corresponds to information provided to consultants during a site visit in November 2015, when an interviewed waste picker reported earning approx. 150 MDL per day, which would translate to approximately 2,000 MDL if working three to four days per week. A few of those who are present at the Ciocana dumpsite every day reported that they earn between 2,000 MDL and 4,000 MDL, while the majority did not want to share information on incomes (personal and household).

Table 14-10: COMPARISON OF WAGES IN MOLDOVA AND WASTE PICKER EARNINGS

Moldova average net monthly wage (April 2016), full time	Moldova monthly minimum net wage in the private sector (estimated), full time - 2015	Moldova monthly minimum net wage in the public sector (estimated), full time – 2015	Average earning of waste picker engaged several times per week – July 2016	Average earning of waste picker engaged every day – July 2016
4,026 MDL	1,558 MDL	820 MDL	2,000 MDL	Between 2,000 and 4,000 MDL

14.3.55 When asked why they engage in waste picking, most respondents (9) stated that they have no other skills, three stated that they make more money in this way than engaging in formal employment, and two stated that they had lost their regular jobs. One of these was the female waste picker who also stated that she collects food for her animals in this way.

14.3.56 When asked if they would consider being formally employed in a waste sorting facility if the Ciocana waste dump closes, 6 stated that they would, while 8 said they would not. Those that said they would not, confirmed their choice by saying that they do not want the waste dump closed as it is their source of income, while three stated that the formal job would pay very little. One of the waste pickers who stated that he is interested in formal employment, also highlighted that the decision would ultimately depend on how much they would be paid.

ATTITUDES TOWARDS THE PROJECT AND PROPOSED BENEFITS

14.3.57 The Tintareni landfill site was closed as a result of protests from the local community in 2010 and many residents still believe that it should not be re-opened. The primary concern of the villagers is that they believe that pollution from the Tintareni landfill is polluting the groundwater, and affecting their water wells and agricultural land, resulting in adverse effects on their health. They have concerns about the type of waste that has been, and would be deposited at the landfill in the future, and about the littering associated with transport of waste through the village. They believe that unsuitable waste has been accepted at the Tintareni landfill in the past, such as clinical waste.

14.3.58 As part of the ESIA, a Hydrogeological Risk Assessment (HRA) was carried out, which concluded that there was no clear correlation between the quality of water in, or adjacent to, the Tintareni landfill and that in the Tintareni village. More information on the HRA is available in Chapter 13.

14.3.59 Chisinau City authorities and Regia Autosalubritate are considering extending certain benefits to the local community, to generate greater support for the project, and provide benefits for the resident that are concerned about the Project and do not want it to go ahead. These benefits include:

1. Waste collection in the village free of charge;
2. A gate fee (per ton of waste brought to the dump site) paid to the village;
3. Payment for lease of land occupied by the landfill;
4. Regular cleaning of wastewater facilities from local public institutions including the local school, kindergarten, etc;
5. Rehabilitation of the village water supply system;
6. Management of the water supply system (contract with Apa - Canal Chisinau);and
7. Building of a Family Doctors Centre in the village.

14.3.60 The above proposals had not been presented to residents and authorities in Tintareni, at the time of developing this document. The meeting to present this proposal is expected to take place in the near future, following the recent completion of the Hydrogeological Study and the HRA. All measures agreed with the local community in Tintareni will have to be implemented as part of the Environmental and Social Action Plan (ESAP).

14.3.61 The residents of the Bubuieci village, which is the closest village to the Ciocana waste dump are extremely positive about the closure of the Ciocana temporary dumpsite, and support the Project. They also believe that the health of the residents of the village of Bubuieci has deteriorated as a result of pollution from the dumpsite, and that their agricultural land has also been polluted. The residents of the Bubuieci village were primarily interested in how closure will be carried out, how the negative impacts of the waste dump will be mitigated, and how the site will be used in the future.

14.3.62 The disclosure of this ESIA and consultation process has provided people with opportunities to voice their opinions, concerns and suggestions, and they have been used to inform the scope of the assessment in the ESIA.

GENDER ISSUES

14.3.63 Management of solid waste is an issue that affects all members of a household. However, as a result of traditional household divisions of labour which characterise particularly rural communities in many countries in the world, including Moldova, household waste is more often managed by women than by men. Therefore, the disposal and collection of household waste are important issues which must be considered with participation of women and must be designed with their needs in mind.

14.3.64 In both community meetings held during the Project ESIA scoping phase, women were present in significant numbers, as follows: Tintareni: 45 women (45%) and 54 men; Bubuieci: 31 women (61%) and 20 men and were active participants. The meetings were widely publicised and announced, and were held in the late afternoon in response to advice from the Mayors, so that men and women otherwise engaged during the day, could attend.

14.3.65 Women are less often employed in formal jobs dealing with waste collection and management than men. In Regia Autosalubritate, 35 of the 350 employees are women (10%), of whom two are in senior management positions, 16 have specialist functions and the remainder are manual workers. In relation to informal waste picking, only two to three women out of 20 to 25 waste pickers (10 to 12%) were observed at the Ciocana dump site and only one participated in the socio economic survey.

14.4 POTENTIAL IMPACTS

CONSTRUCTION

LAND TENURE AND USE

14.4.1 The Ciocana dumpsite (8.93 ha) and the Tintareni landfill (25 ha) are both located on publicly owned land, the first belonging to the City of Chisinau and the second to the Tintareni community. No additional privately or publicly owned land is needed for construction activities for any of the two Project components. Damages to land surrounding the Ciociana dump site during construction works are also highly unlikely, however if they do occur, they will be compensated at full replacement cost and land fully reinstated.

14.4.2 As the contract by which land for the Tintareni landfill was allocated for use to the City of Chisinau (Regia Autosalubritate) expired in 2010, it will be necessary to sign a new contract for land lease, with Tintareni village who is the owner of the land. As the land is already used for the landfill, there will be no impact on land use. As the tenure of land would be confirmed with a new contract and clear terms and conditions for land lease from Tintareni village, this impact is assessed as a minor positive one.

EMPLOYMENT AND PROCUREMENT OPPORTUNITIES

14.4.3 Activities in relation to the closure of the Ciocana dumpsite and the upgrading and re-opening of the existing Tintareni landfill will create some short term employment opportunities during the construction phase of the Project.

14.4.4 The details of the required workforce for construction are unavailable at present, however it is expected that the scale of such employment opportunities will be limited and that most of them will be for unskilled labour. As the workforce will be sourced locally to the extent possible (e.g. Tintareni, Cretoia, Bubuieci), this impact is assessed as minor positive for these communities.

14.4.5 Similarly to employment details, the procurement opportunities in relation to construction activities are presently unknown. However, as goods and services will also be locally sourced to the extent possible (but are unlikely to be found in the small villages near Project sites), this impact is also assessed as minor positive for the wider region.

LIVELIHOODS OF WASTE PICKERS

14.4.6 The closure of the Ciocana dumpsite will affect the livelihoods of an estimated 50 waste pickers and their households, who will no longer be able to engage in this activity. However, of the estimated 50 waste pickers, only 15 to 20 regularly engage in waste picking while others only occasionally engage in it. The impact on those regularly present at the dumpsite (daily or several times a week) will be greatest.

14.4.7 Although this impact will not affect a large number of numbers of affected people, it will be significant for the individual waste pickers and their households and is therefore characterised as moderate adverse.

COMMUNITY HEALTH, SAFETY AND SECURITY

14.4.8 The impacts on the surrounding community in relation to air quality, noise, water quality, soil quality, transportation and traffic are discussed in the relevant chapters of this ESIA.

14.4.9 Construction traffic can increase the risk of road accidents on the surrounding road network, and result in noise and air quality effects that result in a reduced quality of life. The transport route for the construction vehicles passes through a part of the Tintareni village, and adjacent to the village of Creţoaia. The route uses a part of the same road that residents of Creţoaia use to access their village. These impacts have been assessed as minor negative, although, accidents involving local community members may have serious effects on the individual or his/her household.

14.4.10 The availability of temporary construction employment opportunities is sometimes associated with an increase in vulnerability and susceptibility of local communities to increased crime, alcoholism, etc. However, the project will provide a very limited number of employment opportunities during construction (see 14.4.4) and therefore an influx of workers is not expected. The Tintareni Landifll site and Ciocana temporary dumpsite are relatively far from the nearest villages, and although the presence of workers could cause some disturbances in the nearby villages (Tintareni, Creţoaia and Bubuieci), the likelihood is low. The impact on local communities in relation to social pathologies is assessed as negligible.

INFRASTRUCTURE

14.4.11 Traffic and Transport effects are assessed in Chapter 15. Construction will require the use of the access road to the Tintareni landfill. The residents of Creţoaia village who use the district road (L481) to access their village, may be subject to a deterioration in road conditions as a result of construction vehicles using the road to access the Tintareni landfill site. This could further lead to damages to motor vehicles and the increase of costs of road repairs for the district road (L481) and the national road (R2).

14.4.12 The Project will not place any additional demands on community infrastructure during construction, as utility infrastructure will be secured locally on the Project site.

GENDER ISSUES

14.4.13 The construction phase of the Project is not expected to result in different impacts on men and women. However, with the creation of employment opportunities there is an opportunity to increase the number of women who will be employed on construction phase related jobs. This impact is assessed as minor positive, because the overall number of construction related employment opportunities will be limited.

14.4.14 Most of the regular waste pickers at the Ciocana dumpsite are men, with only two to three women seen on the dumpsite, although there were several visits undertaken to the area. There is a lack of information on the women waste pickers as only one agreed to participate in the socio economic survey. Women waste pickers may be more vulnerable than men, if, for example they are able to collect less waste and earn less money, if they are single mothers or have caregiving responsibilities in their households, if their safety at the dumpsite is jeopardised, etc. This impact is assessed as minor negative due to the number of women affected, however every effort will be made, through cooperation with local social workers, to assist them to identify other income generating activities or to provide them with social welfare or other assistance to overcome their economic displacement.

OPERATION

LAND TENURE AND USE

14.4.15 Once the Ciocana Closure Plan has been implemented, the Ciocana dumpsite will be closed and no longer used for waste disposal. The closure plan proposes that after it has been rehabilitated it will become a green area. The residents of the village Bubuieci will no longer live near an active dumpsite that has poor environmental practices. Therefore, from a perspective of land use, this positive impact is assessed as negligible.

INCREASE IN WASTE MANAGEMENT TARIFFS

14.4.16 It is currently not known whether waste management tariffs will be increased as a result of this Project. To assess the nature of this impact it would be necessary to know how much they will be increased and for whom, e.g. all households, businesses, etc. Depending on these and other factors, the impact could range from minor negative to moderate negative. The maximum adverse effect ould be moderate negative as it is assumed that the analysis that is being undertaken as part of the feasibility study will ensure the tariffs are not increased to the point where they would be unaffordable for the local population.

EMPLOYMENT OPPORTUNITIES

14.4.17 The operation of the landfill will require an estimated 30 employees. Preliminary information suggests that the following staff will be needed as a minimum (Fichtner Management Consulting, 2016):

- Landfill Manager: overall management and operation of the landfill, financial management, daily administration for the staff;
- Clerk: calculation and update of waste disposal fee, collecting of disposal fees from users, overall budgeting of expenses;
- Weighbridge Operator: control person for waste acceptance, operation of weighbridge, instruction to the vehicle drivers;
- Compactor Operator: operation at the landfill cell for emplacement of incoming waste (including spreading, crushing and compacting);
- Operator for Bulldozer and Wheel Loader: operation of the bulldozer and wheel loader for unloading, loading and spreading of daily cover material and for unloaded unacceptable waste loading works;

- Truck Driver: transportation of daily material and for unacceptable waste;
- Site-Traffic Controller: direct the waste vehicle drivers to the exact tipping location, control of unloaded waste prior to emplacement;
- Workers: for daily maintenance at the site;
- Chemist: analyses of samples from leachate, surface water, groundwater;
- Mechanic: maintenance and repair of equipment at the landfill; and
- Landfill Guard: control of the site out of working time.

14.4.18 These jobs will primarily be offered to residents of Tintareni and Creţoaia and the impact is assessed as moderate positive for these communities.

COMMUNITY HEALTH, SAFETY AND SECURITY

14.4.19 The Project is not expected to have any significant operational traffic and transport effects, or traffic safety effects due to the relatively small increase in the number of vehicles on the surrounding roads, and the small percentage increase in HDVs.

14.4.20 The proposed waste collection system for the village of Tintareni; provision of health care services in the village and rehabilitation of the village water supply, can be expected to result in a major beneficial health effect.

14.4.21 The HRA concluded that the discharges from the landfill do not represent a significant risk to receptors located more than 500m from the landfill, and are therefore unlikely to be impacting the health of the local population, as the drinking water abstraction are all over 500m from the site. Nevertheless, as part of the Project, the landfill is to be subject to additional engineering works and management controls which have the potential to improve the current site and reduce leakages from the current waste body. The HRA concludes that the current landfill is not adversely impacting the quality of drinking water used by the residents of Tintareni village. Therefore, the upgrade and operation of the landfill, with the further measures to reduce leakages, is also unlikely to adversely impact the health of the local population. The reduced leakages resulting from the implementation of the Project have been assessed as minor beneficial, and the landfill is expected to continue to have a negligible effect on the health of the local population. A detailed overview of impacts on groundwater and surface water is provided in Chapter 13.

COMMUNITY BENEFITS FOR TINTARENI

14.4.22 At this stage of project development, the City of Chisinau and Regia Autosalubritate are considering providing certain community benefits for Tintareni. However, no agreements or firm commitments have been made yet.

14.4.23 The implementation of the proposed community benefits, as described in section 14.3.58 and required under the ESAP, will result in a major beneficial effect on the residents of Tintareni.

INFRASTRUCTURE

14.4.24 Chapter **Error! Reference source not found.** explains the road requirements during the operation of the Tintareni landfill. Regia Autosalubritate will arrange for the regular inspection of the district road (L481) and any mud will be cleaned with road sweepers, and litter will be collected, if required. This will have a minor adverse impact on local residents using the road, particularly residents of Creţoaia and villagers accessing their agricultural fields in the vicinity of the road due to the small increase in HDV on this road. This will have a minor adverse effect on community infrastructure.

GENDER

14.4.25 Similarly to the construction phase, operation of the Tintareni landfill will also provide employment opportunities, which will be further used as an opportunity to increase the number of women employed. This effect is longer term and therefore is assessed as moderate positive.

14.4.26 One of the proposed benefits for Tintareni village is for Regia Autosalubritate to resume waste collection for local residents. This will provide an opportunity for Regia Autosalubritate to ensure that women are consulted in how waste collection is organised in the village. The consideration of gender specific views in the organisation of waste management is expected to result in a minor beneficial effect on gender equality.

14.5 MITIGATION

CONSTRUCTION

LAND TENURE AND USE

14.5.1 A contract will be negotiated and signed between the City Chisinau (Regia Autosalubritate) and the village Tintareni for lease of land, with clear terms and conditions, including the length of lease and the lease price.

14.5.2 Any damages to land surrounding the Ciociana waste dump will be promptly compensated, at full replacement cost and the land will be fully reinstated.

EMPLOYMENT AND PROCUREMENT OPPORTUNITIES

14.5.3 The project will create some direct employment opportunities and the engagement of all non employee workers will follow international best practice, with the main measures comprising the following:

- Implement transparent and fair recruitment procedures;
- Ensure that all non employee workers are engaged in line with both national legislation and applicable international (ILO) standards and recommendations; and

- Provide a grievance mechanism for workers.

14.5.4 To foster the creation of indirect employment opportunities, the Project will procure goods and services locally whenever possible.

LIVELIHOODS

14.5.5 Economic displacement of waste pickers will be mitigated through the implementation of the Project Livelihood Restoration Framework.

14.5.6 In short, the following measures will be undertaken:

- Provision of timely information to waste pickers on the expected timeline for the closure of the Ciocana dump site;
- Provision of support to interested waste pickers to apply for jobs created by the private company ABS which is planning to launch a waste sorting facility near the Ciocana dumpsite;
- Provision of information and support to interested waste pickers to apply for any other employment opportunities created as part of the Project, including construction phase related opportunities;
- Cooperation with local social workers to provide interested waste pickers with access to social welfare support;
- Cooperation with the local office of the National Employment Agency for the Ciocana sector in Chisinau, to register interested waste pickers and provide them with access to vocational or other available training, as well as any available employment opportunities; and
- Establish and implement a grievance mechanism.

COMMUNITY HEALTH, SAFETY AND SECURITY

14.5.7 Increase in traffic (bringing equipment and materials to the site) could lead to more accidents in the local communities and reduced quality of life. These impacts will be managed with the implementation of the following measures:

- Develop and implement a traffic management plan;
- Enforce workers code of conduct (guidance on safe driving); and
- Cooperate and coordinate with local health, safety and security facilities.

14.5.8 The influx of workers into the Project area causing disturbances for the local population, will be minimised by the implementation of the following measures:

- Encourage contractors to hire local workforce, i.e. give preference to suitably qualified and experienced applicants from the local communities;

- Enforce workers code of conduct; and
- Cooperate and coordinate with local health, safety and security facilities.

INFRASTRUCTURE

14.5.9 Transport of heavy machinery could lead to damages of road surfaces, further causing accidents, vehicle damages, etc. The following measures will be undertaken to mitigate these impacts:

- Preparation of roads for HDVs before construction; and
- Restoration of roads to at least pre-construction condition.

GENDER

14.5.10 Encouraging more women employees during construction will be achieved through the following measures:

- Analyses of all positions where women can be employed during construction;
- Give consideration to flexible working arrangement to encourage woman applicants; and
- Encourage contractors to hire women, i.e. give consideration to suitably qualified and experienced woman applicants.

14.5.11 Women waste pickers may be more vulnerable than men and will require targeted support to overcome economic displacement resulting from the inability to continue with waste picking. The following measures will be undertaken:

- Local social workers will be involved in the process of communicating with women waste pickers, assessing their needs and providing them with appropriate assistance to access available employment opportunities, social welfare, training opportunities, etc.

OPERATION

INCREASE IN WASTE MANAGEMENT TARIFFS

14.5.12 As explained earlier, details on possible increase of waste management tariffs are presently unavailable. However, possible measures which could be implemented to mitigate the consequences of increasing tariffs include:

- Organise a wide consultation process in relation to waste management tariffs and involve clients of waste management services in these discussions;

- Review and apply best practice in the region in relation to tariffs;
- Increase waste management tariffs gradually, at the same time increasing the quality of services, so that customers are more satisfied and less likely to oppose increased tariffs; and
- Introduce subsidies for the most vulnerable households.

EMPLOYMENT OPPORTUNITIES

14.5.13 As with construction related employment, the employment of any individuals for the operation of the landfill will follow principles of international best practice.

COMMUNITY HEALTH, SAFETY AND SECURITY

14.5.14 Additional engineering works and management controls will be implemented at the Tintareni landfill, which have the potential to improve the current site and reduce leakages from the current waste body to areas adjacent to the landfill. The proposed Leachate Treatment Plant will also reduce the volume of leachate within the landfill.

INFRASTRUCTURE

14.5.15 Regular maintenance of the access road will be carried out to benefit local residents using the road.

GENDER

14.5.16 As with construction phase employment opportunities, an analysis will be made of the positions that could be provided to women. When hiring for new positions, consideration will be given to suitably qualified and experienced woman applicants;

14.5.17 To ensure that waste is collected and managed in Tintareni in accordance with men and women's needs, Regia Autosalubritate will seek views, particularly those of women, on issues such as location of community waste bins, (i.e. in well-lit areas, locations at a safe distance from road traffic), timing of waste pickups and any other relevant topics; and

14.5.18 Future customer satisfaction surveys carried out by Regia Autosalubritate will also cover a sufficient number of women users (at least 50%), to provide them with opportunities to voice their suggestions. This will be undertaken not only for Tintareni, but also for the population of Chisinau, to further enhance the positive impact of consideration of gender specific views in the organisation of waste management.

15 TRANSPORTATION AND TRAFFIC

15.1 INTRODUCTION

15.1.1 This chapter assesses the likely significant traffic and transport effects of the Project.

STUDY AREA

15.1.2 The traffic and transport study area focuses on the access route to the Tintareni landfill site, and the closest villages to the Project site, Creţoaia and Tintareni. Three key junctions within Tintareni were surveyed as part of this assessment and these are shown in Figure 15-1.

Figure 15-1 Road Junctions Assessed

15.1.3 The study area and junctions assessed have been chosen based upon a proposed vehicle fleet route to and from the Project site.

ASSESSMENT METHODOLOGY

15.1.4 The three main junctions within Tintareni were analysed through the completion of onsite traffic counts completed on 17 May 2016 approximately between 13:30 and 14:30.

15.1.5 Fifteen minute spot counts were completed on site for each junction. The counts were then were extrapolated to create an hourly flow at each junction. Each junction was then assessed under existing conditions and under proposed conditions with the Tintareni landfill site in full operation.

15.1.6 The following junction has been modelled using PICADY as part of this analysis to understand potential impacts of the proposed traffic:

- Regional Road R2 / District Road L481

15.1.7 This junction has been chosen for modelling as proposed waste vehicles will complete opposed turning movements here and the existing traffic levels are moderate. At this junction additional traffic could have the greatest impact on junction operation.

15.2 LEGISLATION

15.3 BASELINE CONDITIONS

ACCESS TO THE SITE

ACCESS BY RAIL

15.3.1 Jemciug station is located to the north of the town of Tintareni, approximately 7.5km to the north of the existing Tintareni landfill site in the Town of Botnarestii Noi. The station can be accessed from the site Tintareni landfill site, via roadways and pathways through the village of Tintareni.

15.3.2 We were unable to gauge destination or frequency of service information for Jemciug station however it is assumed the station serves journeys to nearby towns and into greater and central Chisinau.

WALKING AND CYCLING

15.3.3 The current pedestrian and cyclist access to the site is limited, due to the poor existing condition of the road surface on the district road (L481), particularly the section between the turn-off to Creţoaia and the turn-off to the Tintareni landfill site, and the poor existing condition of the Tintareni landfill site access road (2.5km).

BUSES

15.3.4 Research conducted using the Moldovan Autogara website (http://www.autogara.md) indicates that there are regular bus services to and from Tintareni travelling to and from central Chisinau and other neighbouring towns

15.3.5 Bus services run from Gara Chisinau Centru to Anenii Noi, stopping in Tintareni. The journey time from Gara Chisinau Centru to Tintareni is approximately 54 minutes and buses run approximately every 25 minutes (http://www.autogara.md/orar/).

ACCIDENT ANALYSIS

15.3.6 No accident analysis was available for the study area.

ROAD ACCESS TO THE SITE

15.3.7 Figure 15-2 Proposed Waste Vehicle Route

15.3.8 2 outlines the previous and proposed access routes for waste vehicles arriving and departing the Tintareni landfill.

15.3.9 The proposed route uses the regional R2 and L418 roads to access the development site. The route to site has been proposed ahead of a route via local roads due to waste vehicles only have to make one set of opposed turns across traffic under this routing.

Figure 15-2 Proposed Waste Vehicle Route

15.3.10 The final part of the access route to the existing Tintareni landfill is of a poor standard. It has been reported that there are a number of issues with the access road including but not limited to, fissures and cracks, pits, partial obstructions, road segmentation and reduced visibility due to uncontrolled vegetation growth.

EXISTING JUNCTION COUNTS

15.3.11 Junction counts have been completed at the three junctions shown within Figure 15-1. Figures 15-3 to 15-5 show hourly existing traffic flows at these junctions for each available movement. Traffic has been broken down in to light (blue), heavy (red) and total (green) vehicles surveyed at each junction.

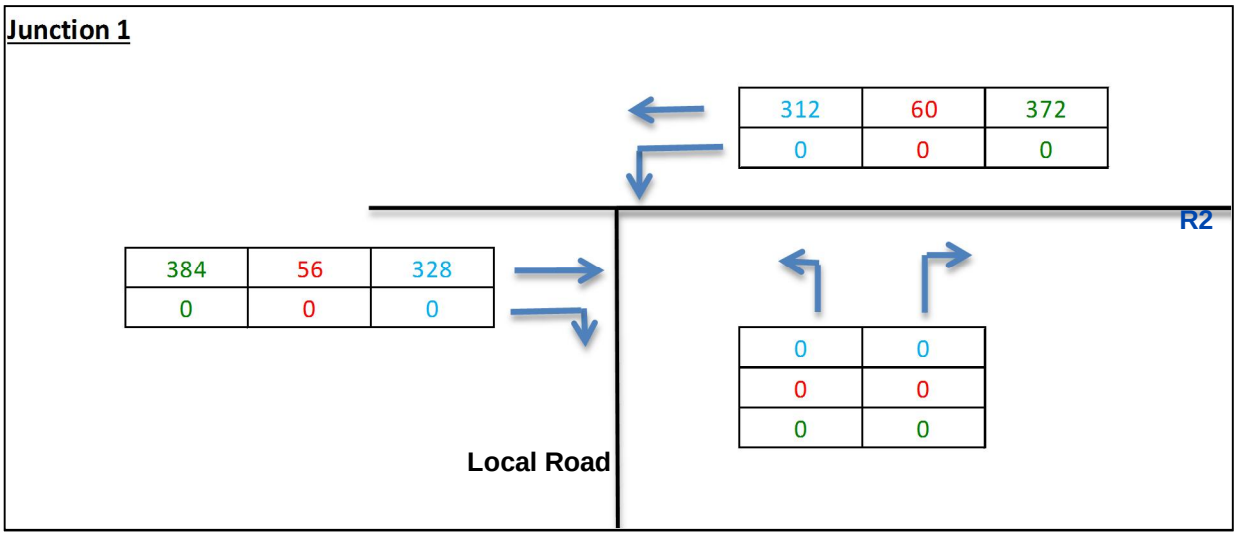

Figure 15-3 Hourly Existing Junction counts – Junction 1

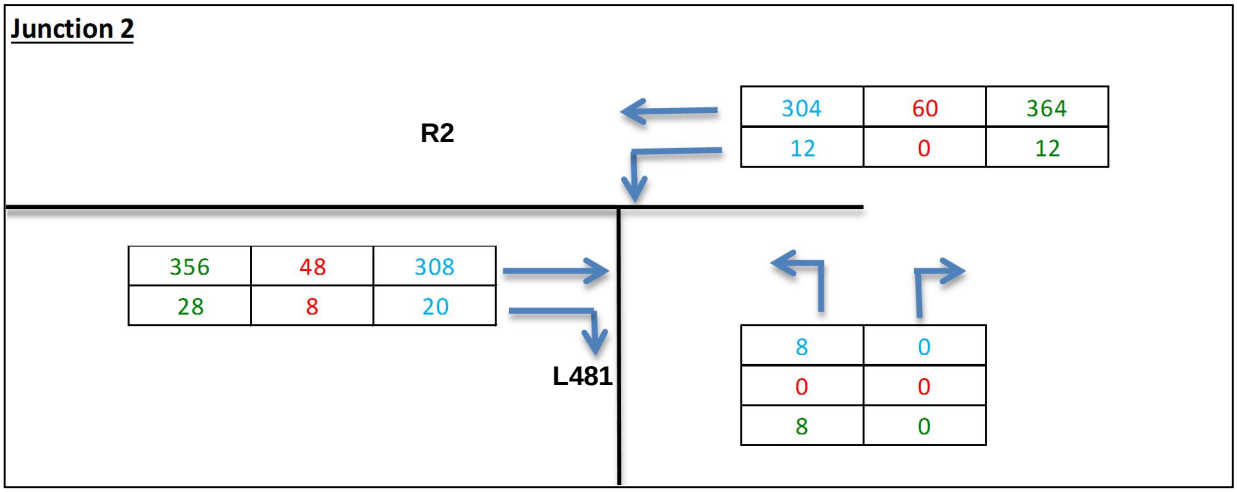

Figure 15-4 Hourly Existing Junction counts – Junction 2

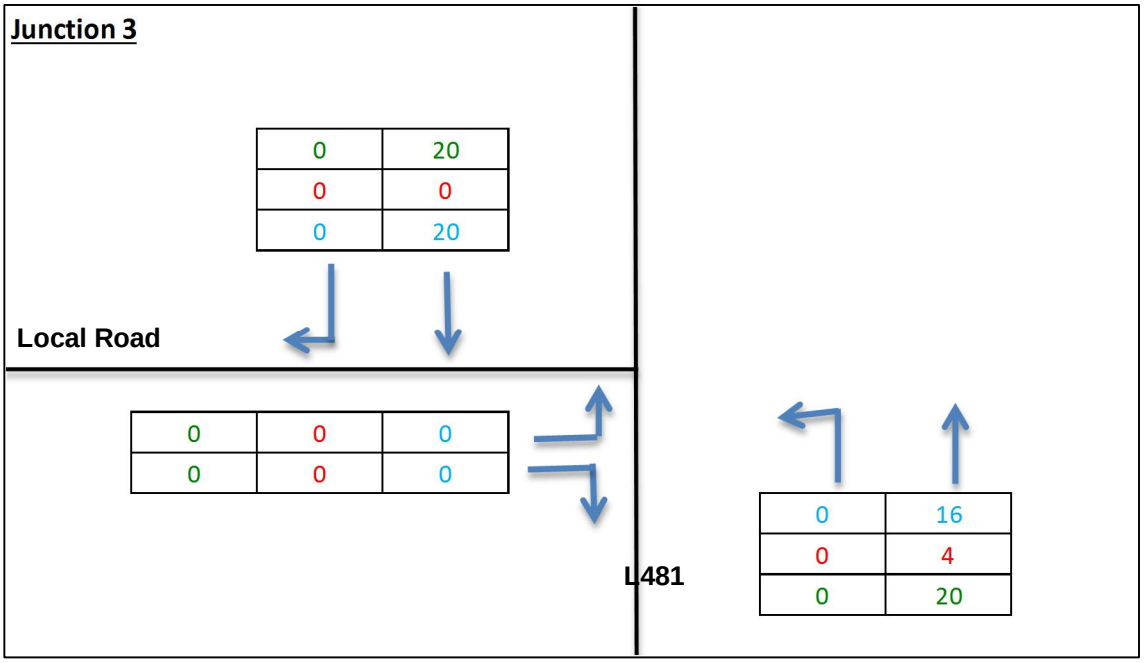

Figure 15-5 Hourly Existing Junction Counts - Junction 3

15.4 POTENTIAL IMPACTS

CONSTRUCTION IMPACTS

15.4.1 The construction vehicles will require the use of district road (L481) to access the Tintareni landfill site. Construction materials will be delivered to Tintareni landfill site via this route, and excess materials will transported from the site. However, the number of construction vehicles using the route is likely to be far lower than the number using the route during operation. As the operational assessment does not predict any significant effects, the construction effects are also unlikely to be significant.

15.4.2 The residents of Creţoaia village who use the district road (L481) to access their village, may be subject to a deterioration in road conditions as a result of construction vehicles using the road to access the Tintareni landfill site. This could further lead to damages to motor vehicles and the increase of costs of road repairs for the district road (L481) and the national road (R2). The Company should discuss measures to repair / improve this road once the construction phase has been completed. This will need to be undertaken in agreement with the relevant Highways Authority, which will be the Anenii Noi Council, as this is a district road.

15.4.3 They may also experience occasional delays during the activities to upgrade the access road (2.5km) to Tintareni landfill site. These should be minimised though the implementation of a construction traffic management plan.

OPERATIONAL IMPACTS

ROAD ACCESS TO THE SITE

15.4.4 The proposed waste vehicle trips per hour to / from the Tintareni landfill site can be found in Table 6. It is proposed that 7 two way trips of waste vehicles will serve the site per hour between 07:30 and 17:00.

Table 65-1 – Proposed Waste Vehicle Trips per hour

Proposed Waste Facility	Waste Vehicles per Hour (Constant throughout the day)	
	Arrivals	Departures
Trip Generation	7	7

15.4.5 Figure 15.6 to Figure 15-8 show the predicted hourly junction counts with the addition of 7 two-way waste vehicle trips per hour. The route used by the waste vehicles matches the proposed route outlined in Figure 15-2.

JUNCTION 1

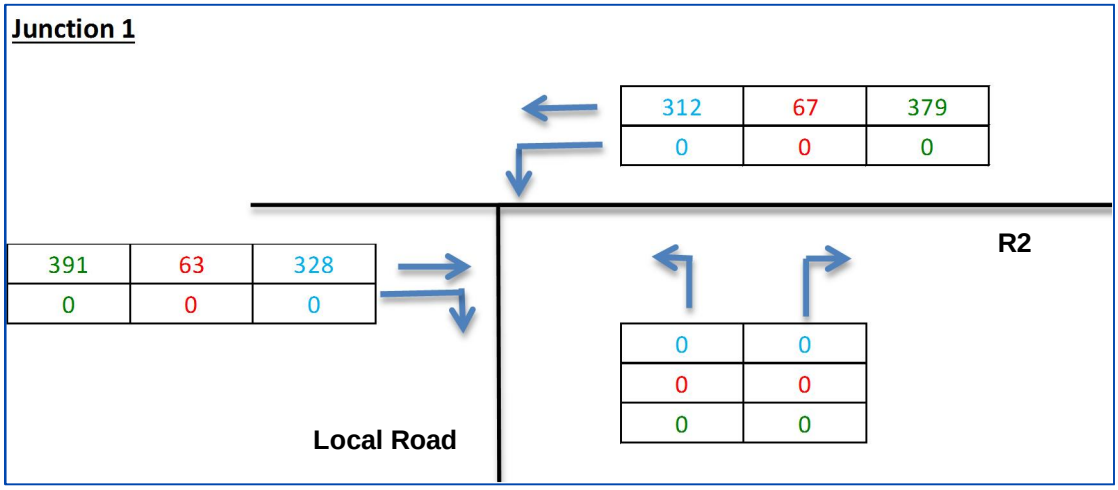

Figure 15.6 - Hourly Proposed Junction Counts - Junction 1

15.4.6 The addition of 7 two-way waste vehicle trips adds to the eastbound and westbound movements at the junction. These additional movements will be completing unopposed movements at this junction and therefore are unlikely to cause any operational issues at the junction.

15.4.7 JUNCTION 2

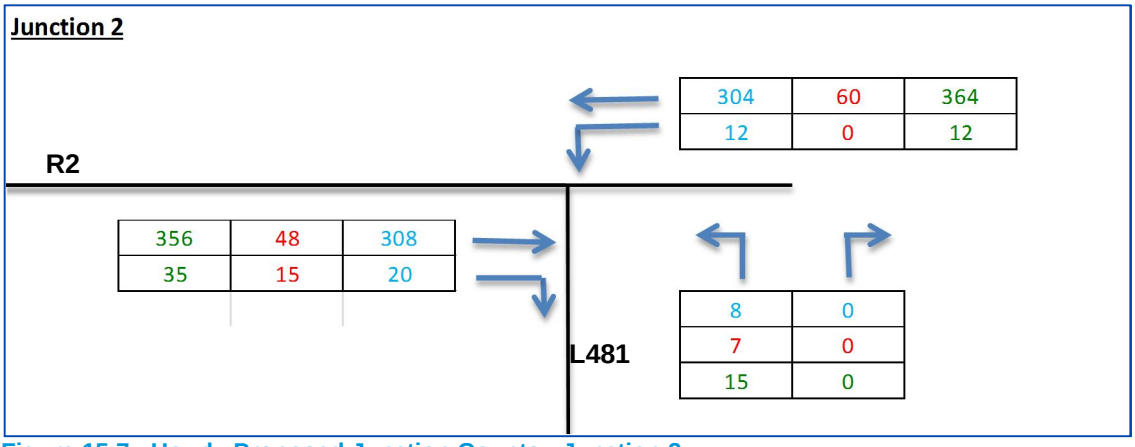

Figure 15-7 - Hourly Proposed Junction Counts - Junction 2

15.4.8 At Junction 2 the addition of 7 two-way waste vehicle trips adds to traffic completing eastbound right turn and northbound left turn movements. These movements will complete opposed turns at the junction which are likely to result in additional delay and queue. As such PICADY modelling has been completed to determine the impact of additional traffic at this junction.

JUNCTION 3

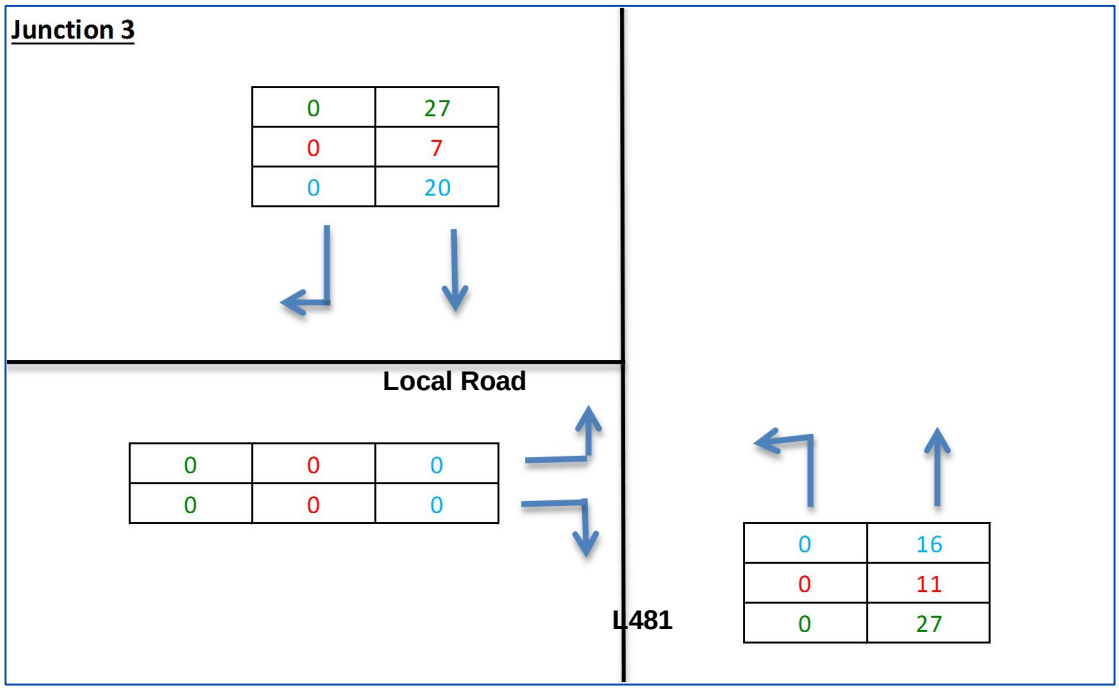

Figure 15-8 - Hourly Proposed Junction Counts - Junction 3

15.4.9 The addition of 7 two-way waste vehicle trips at Junction 3 adds to traffic currently completing northbound and southbound traffic movements. As the existing traffic volumes at this junction have been observed to be very low and the additional traffic is completing unopposed movements it is unlikely the additional traffic addition will result in operational impact.

15.4.10 At the junctions of R2 / Local Road and R2 / L481 the addition of waste vehicles as part of the proposed development constitutes 12% uplift in HGV vehicles. At these junctions the addition of waste vehicles represents a 2% increase in overall traffic at each junction. These figures demonstrate a minor increase in traffic will result due to the proposed development.

15.4.11 At the junction of L481 / Local Road HGV's traversing the junction increase from 4 to 18, however as the traffic flows are currently very low here this increase is unlikely to cause any operational issues.

JUNCTION ASSESSMENTS

15.4.12 In order to ensure the satisfactory operation of the junction of R2 / L481 (Junction 2) with additional waste vehicles PICADY modelling has been completed.

15.4.13 The Ration of Flow to Capacity is a tool that is used by traffic engineer to design highway improvements that will be free or largely free of major queues and delays. A Ration of Flow to Capacity of 0.9 or above indicates that operational issues can arise and the additional traffic may result in delays at the junction.

15.4.14 Table 15-7 shows the increase in Ration of Flow to Capacity as a result of the proposed 7 two-way waste vehicles per hour. Increases are shown to be very slight and the proposed junction results show each arm well below the 0.9 RFC level where operational issues can arise.

Table 15-7 - R2 / L481 Existing and Proposed modelling results – the Ration of Flow to Capacity (RFC)

Movement	Ration of Flow to Capacity	
	Existing Inter Peak	Proposed Inter Peak
L481 to R2 East	0.00	0.00
L481 to R2 West	0.03	0.07
R2 West to L481	0.03	0.03

Table 15-8 - R2 / L481 Existing and proposed modelling results – Queue

Movement	Queue - Passenger Car Unit (PCU)	
	Existing Inter Peak	Proposed Inter Peak
L481 to R2 East	0.00	0.00
L481 to R2 West	0.03	0.13
R2 West to L481	0.04	0.04

15.4.15 Table 15-8 shows the predicted increase in queuing as a result of the proposed addition of 7 two-way waste vehicle movements per hour. Queues are shown to increase slightly in the L481 to R2 West movement from 0.03 per Passenger Car Unit (PCU) to 0.13 PCU. The predicted increase in queue here is very slight and is unlikely to have a material impact on the operation of the junction.

15.4.16 The junction modelling assessment completed suggests that the increase of 7 two way waste vehicle movements per hour is unlikely to cause significant impact on junction operation.

ACCESS BY RAIL

15.4.17 The Project is not expected to have a significant effect on existing rail services and users, due to the distance of the rail services from the Tintareni landfill site. The Project will employ local residents, and requires a relatively low number of workers, so it is unlikely to place much demand on rail services, if any.

WALKING AND CYCLING

15.4.18 The proposed improvement to the access road to Tintareni landfill site, will assist with the ability to walk and cycle to the Tintareni landfill site.

BUSES

15.4.19 Bus services serve Tintareni from Chisinau and surrounding towns, it is unlikely that the additional employment required for either the construction or the operation of the Project, will adversely affect the capacity of the bus services to and from Tintareni.

15.5 MITIGATION

ROAD ACCESS TO THE SITE

15.5.1 At present the existing access road to the Tintareni landfill site is of a poor standard. It is advised that to ensure a stable and safe landfill access road operation the following measures should be applied.

- Road structure reconstruction – in scope to obtain a road structure resistant to the new waste transfer tracks;

- Rehabilitation of the existing rain water collecting system;
- Vegetation management – removal of encroaching trees and bushes.

15.5.2 It is recommended that a vibrated concrete layer be implemented as a road structure reconstruction solution.

15.5.3 In addition to the access road it is also advised that another part of the regional road L481, on approach to the site, close to Cretoaia village requires rehabilitation. The condition of this section of the L481 is similar to that outlined above regarding the condition of the access road, and as such, should be rehabilitated.

15.5.4 Driver delay and congestion have been assessed through the junction modelling and analysis of traffic generation. The analysis completed suggests that an increase in 7 two-way waste vehicle movements per hour is unlikely to cause any significant issue to junction capacity. Therefore no further mitigation is required to offset this requirement.

15.6 SUMMARY AND CONCLUSIONS

15.6.1 This Chapter has considered the traffic and transport effects of an operational landfill site in Tintareni with the site generating 7 two-way waste vehicle trips per hour.

15.6.2 The traffic generation and junction modelling results indicate that no physical mitigation measures would be required at the existing junctions, as a result of the minor operational impacts

15.6.3 Rehabilitation works on the access road to the site and a section of the regional L481 road are required to ensure stable and safe landfill access road operation.

16 CUMULATIVE ASSESSMENT

16.1 INTRODUCTION

16.1.1 Cumulative effect interactions can occur as either interactions between effects associated with just one project or interactions between the effects of a number of projects in an area.

16.1.2 As a result, two types of cumulative effect interaction have been considered within this assessment as follows:

- The combined effect of individual effects arising as a result of the Project, for example effects in relation to noise, airborne dust or traffic impacting on a single receptor; and
- The combined effects of the Project with several other development schemes which may, on an individual basis be insignificant but, together (i.e. cumulatively), have a significant effect.

16.2 LEGISLATION

16.2.1 European Commission (EC) Directive 85/337/EEC requires assessment of "the direct effects and any indirect, secondary, cumulative, short, medium and long term, permanent or temporary, positive and negative effects of the project". EC Directive 97/11/EC requires projects to be assessed in relation to "the cumulation with other projects and the existing land use".

16.2.2 Guidance used for this assessment are included the European Union (EU) (1999) European Directorate XI: Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions.

16.2.3 The Moldovan Law on Environmental Impact Assessment, adopted in 2014, is fully harmonised with the EU Directive, and contains the requirement to undertake cumulative impacts.

16.3 SCOPE OF THE ASSESSMENT

16.3.1 The spatial scope of the cumulative effects taken to be the spatial extent of the Tintareni landfill site and a 1km buffer around it. The temporal scope for the assessment is the construction period for the Project (2 years commencing in summers 2017, with the operational phase commencing in summer 2019. There are no waste projects or other developments known to be coming forward within this study area which have the potential to have cumulative effects with the Project.

16.3.2 This assessment has therefore considered the cumulative effects likely as arising from the combined action of a number of different impacts upon a single resource or receptor identified within this ESIA during the construction phase, and when the Project is complete and operational.

16.3.3 This assessment identifies the specific receptors that would experience a number of different impacts from the construction and operational stages of the Project.

16.3.4 For some environmental aspects, no interactions with other aspects can occur and so no combined cumulative effects could arise. For example, employment opportunities and noise and vibration. Where there is considered to be no potential for effect interactions this is stated.

16.4 CUMULATIVE EFFECTS DURING CONSTRUCTION

16.4.1 Cumulative construction effects are predominately perceived as being adverse, and generally include the following:

- Air Quality;
- Noise and Vibration;
- Landscape and Visual;
- Geology and soils;
- Water resources; and
- Traffic and transport, including road safety.

16.4.2 Cumulative effects are most likely to be experienced by resident who live close to:

- the Tintareni landfill site;
- the resurfacing works on the Tintareni landfill access road; and
- the roads used by the construction vehicles.

RESIDENTIAL RECEPTORS

16.4.3 During the construction phase, there is potential for cumulative effects related to nuisance and disturbance caused by noise, dust, visual impacts and increased traffic movements. As described in Chapter 7, Air Quality, the greatest impact during the construction phase will be due to the emissions from construction vehicles and plant associated with the construction work in the areas immediately adjacent to the site access and along the likely construction haul routes.

16.4.4 Similarly, as described in Chapter 8 Noise and Vibration the construction and demolition activities will lead to temporary noise disturbance close to the location of the works taking place. However, due to the distance between the construction works and the nearest residential receptors (3km), no significant noise or air quality effects are expected, and no cumulative noise and air quality effects are expected.

16.4.5 As described in Chapter 11, Landscape and Visual, there is the potential for visual effects on a number of residencies within nearby villages (of minor to medium significance) where there is potential for views of the construction activities, dust and windblown litter. Residences within the villages of Creţoaia and Tintareni, are expected to experience visual effects or minor to medium significance. However, no cumulative effects with noise and air quality effects are expected, as there will be no significant noise and air quality effects at these locations.

16.4.6 During construction, there is potential for nuisance effects due to construction vehicles utilising local roads to access the site. However, due to the low number of construction vehicles expected (less than 50 per day), and the low number of residential receptors (approximately 40 within 50m of likely access roads), the impacts are not expected to be significant for air quality and noise.

BIOLOGICAL AND ECOLOGICAL EFFECTS

16.4.7 There are no ecologically protected areas within the physical extent of the Tintareni landfill site. The Tintareni landfill site remains a mainly degraded site with minimal vegetation present in the form of small pockets of trees and shrubs. There are built structures on the site which have the potential to support bats, vegetation on site which has the potential to support breeding birds and habitat suitable to support reptiles. The effects due to habitat loss for reptiles and breeding birds, if present on the site, is expected to be slight adverse. Similarly if bats are present on the site, the habitat loss will be Large adverse, without mitigation.

16.4.8 There is potential for cumulative effects on these species resulting from habitat loss, and the potential risk of pollution migration within the landfill itself, and the risk of pollution migration and windblown litter to adversely affect adjacent agricultural land, which has the potential to degrade the habitat outside of the physical extent of the Tintareni landfill site.

16.5 CUMULATIVE EFFECTS DURING OPERATION

RESIDENTIAL RECEPTORS

16.5.1 The operation of the upgraded Tintareni landfill is not expected to result in significant effects on air quality, as the operation of the Tintareni Landfill would increase the current noise levels by 1dB, as a worst case for the nearest properties in Creţoaia (the closest residential receptors), and as this increase will not to be perceptible to the human ear, the effect is not considered to be significant. The residents within the village of Creţoaia are expected to have visual impacts of medium to high adverse significance, however as no significant effects are expected for noise and air quality there is not expected to be an interaction to produce a cumulative effect. In addition the visual effects can be minimised by measures such as good site management and suitable landscaping to provide screening.

16.5.2 The residents of Tintareni may also experience visual effects of medium adverse significance as they may be able to view the activities of the landfill across the valley. However, they are 4-5km from the Tintareni Landfill site, so disturbance effects due to air quality and noise from the site are not expected. An interaction between landscape and visual effects and water quality is not expected.

SOCIAL, POPULATION AND HUMAN HEALTH EFFECTS

16.5.3 There is a proposal from the Company and the City of Chisinau to provide community benefits for the residents of Tintareni, including medical services, rehabilitation of the village water supply system and free waste collection (reducing the problems associated with the current illegal waste dump sites in the village). The Company and the City of Chisinau proposal and the environmental and social improvements at the Tintareni landfill site, due to the Project, are expected to provide major cumulative beneficial social, population and human health effects.

17 MONITORING AND SUPERVISION

17.1.1 This chapter summarises the environmental and social monitoring that will be required to ensure the effective mitigation of adverse effects, and set out how they will be monitored and managed in practice. The construction, operation and decommissioning stages have been considered.

17.2 CONSTRUCTION

17.2.1 During the construction phase of the Project the following monitoring and supervision will need to be in place:

- Employment of a suitably qualified construction environmental manager/supervisor to enforce environmental mitigation measures and undertake environmental monitoring;
- The construction site manager and/or environmental construction manager, should undertake daily site inspections to monitor compliance with the Dust Management Plan, inspection results should be recorded, and an inspection log made available to the state regulatory authority when asked;
- The frequency of site inspections should be increased when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions;
- The construction environmental manager will be responsible for ensuring that a suitably qualified noise expert undertakes noise monitoring at the site boundary to ensure that noise levels stated in the ESIA are not exceeded during any one hour period, additional noise checks should be undertaken when using any new construction machinery that is known to generate high levels of noise e.g. concrete crusher;
- The construction site manager should implement a daily program of inspections, to check the landfill access road and district road for any waste that may have spread to outside of the landfill (particularly on vehicle wheels), and deploy road sweepers, if required, to prevent the potential contamination of surface water runoff from the road;
- The construction environmental manager will be responsible for implementing a groundwater monitoring program to monitor groundwater levels and quality, including contingency measures in the event there has been a breach in either the control or the trigger levels;
- The construction site manager will be responsible for implementing a program to ensure any potential impacted soil is disposed of to the landfill as waste;
- The construction site manager will be responsible for implementing a program to inspect the collection tanks frequently and remove leachate from storage tanks regularly during construction works; and
- The construction site manager will be responsible for implementing a program to ensure good driver behaviour / maintenance of vehicles.

17.3 OPERATION

17.3.1 During the operational phase of the Project the following monitoring and supervision will need to be in place:

- Employment of a suitably qualified environmental manager/supervisor to enforce environmental mitigation measures and undertake environmental monitoring;

- The environmental manager will be responsible for monitoring of particulate matter (including bio-aerosols);
- The environmental manager will be responsible for on-going monitoring of emissions of pollutants (NO2, PM10 and SO2) with respect to HGV's movements, emissions from the onsite gas engine and any gas venting systems to ensure compliance with EU Limit Values;
- The environmental manager will be responsible for implementing noise monitoring at the site boundary to ensure that noise levels stated in the ESIA are not exceeded during any one hour period;
- The environmental manager will be responsible for noise monitoring at the site boundary to ensure that the predicted noise level of 70 $L_{AEQ,1H}$ DB is not exceeded during any one hour period; and
- The site manager will be responsible for monitoring the number of hourly waste truck movements, and if they exceed the assumed 14 movements per hour, the environmental manager will be responsible for arranging further noise assessments.
- The environmental manager will be responsible for implementing a groundwater monitoring network downgradient from the landfill; a minimum of three groundwater monitoring wells downgradient are recommended, with one located cross gradient in the direction towards Tintareni village;
- The environmental manager will be responsible for implementing a groundwater monitoring program, including contingency measures in the event there has been a breach in either the control or the trigger levels;
- The environmental manager will be responsible for monitoring the leachate at different stages in the leachate treatment process;
- The environmental manager will be responsible for implementing a program to monitor effluent water from the leachate treatment plant at the discharge point;
- The site manager will be responsible for implementing a program to inspect the vehicle route for waste spread to outside of the landfill and the potential contamination of surface water; and
- The site manager will be responsible for implementing a program to review the embankment dam stability, e.g. visual inspections, to prevent collapse.

17.4 DECOMMISSIOING

The Closure Plan for Tintareni Landfill (as specified in the ESMP), will set out the requirements and responsibilities for ensuring the aftercare activities, such as landscaping, groundwater monitoring, leachate monitoring, air quality and odour management are undertaken in accordance with the Closure Plan.

18 SUMMARY

18.1 OVERALL CONCLUSIONS

Table 18.1 below summarises the environmental baseline, effects, proposed mitigation and residual impacts of the Project, during the construction works to upgrade the landfill to EU Standards, and the operation of the upgraded landfill.

Table 18.1 Summary of Potential Impacts and Mitigation

POTENTIAL IMPACT	BASELINE	PHASE	IMPACT	EFFECT (WITHOUT MITIGATION)	MITIGATION MEASURES	RESIDUAL EFFECT (AFTER MITIGATION)
Air Quality	All measurements for Sulphur Dioxide (SO_2) and Nitrogen Dioxide (NO_2) at the Tintareni landfill site; the Ciocana temporary dumpsite; and sensitive receptors located adjacent to the R2 and L481 roads were within WHO and EU safe limits for health. In 2011 the annual mean PM10 concentration in Moldova exceeded WHO and the EU safe limits. Current PM10 and bio-aerosol concentrations at the Tintareni landfill site are likely to be low, due to the encapsulation of	Construction	Dust and PM_{10} generation through demolition, earthworks, construction and trackout. NO_2 and SO_2 exhaust emissions from construction vehicles and non-road mobile machinery.	Minor adverse	→ Best practice measures in Construction Environment Management Plan including: → Maintenance and best practice operation of construction vehicles and non-road mobile machinery in order to reduce NO_2 and SO_2 concentrations. → Construction vehicles and non-road mobile machinery should adhere to euro III standards → Dust Management Plan and regular monitoring. → Grievance process and actions log.	Non-significant
		Operation	NO_2, PM_{10} and SO_2 emissions from HDV movements; onsite gas engine; and any gas venting systems. Bio-aerosol risk from site	Moderate adverse	→ Regular environmental monitoring of emissions of pollutants (NO_2, PM_{10} and SO_2) due to HDV's movements; emissions from the onsite gas engine; and any gas venting systems to ensure compliance with EU Limit Values. → Improved Gas Management System;	Non-significant

POTENTIAL IMPACT	BASELINE	PHASE	IMPACT	EFFECT (WITHOUT MITIGATION)	MITIGATION MEASURES	RESIDUAL EFFECT (AFTER MITIGATION)
	landfill waste by overlying vegetation.		operations may have a negative impact on the health of employees. Odour impacts from the waste trucks, on residents adjacent to the route to the Tintareni landfill site.		→ A new waste truck fleet will be purchased, and will adhere to Euro III standards. → On-going environmental monitoring of bio-aerosols from the Tintareni Landfill to protect human receptors both onsite and offsite. → Personal protection equipment will be provided for employees, in particular apparatus to reduce the potential of inhaling hazardous airborne particulates. → Vehicles carrying waste will be covered by a canvas to contain odour emissions.	
Noise and Vibration	The area surrounding the Tintareni landfill site is predominately quiet, with the main noise impacts resulting from the movement of trucks undertaking the recirculation of leachate. The closest residential receptors are located in the village of Creţoaia, which is approximately 3km from the Tintareni landfill site with no line-of-sight due to elevated topography.	Construction	Re-paving the site access between the entrance and the L481 is likely to temporarily increase the ambient noise levels at properties within close proximity to the access road.	Moderate Adverse	→ Best Practicable Means (BPM) should be followed to undertake any demolition or construction related to the project. Such as temporary acoustic barriers, quiet plant and equipment, acoustic covers and silences and regular maintenance of equipment. → Permissible noise levels stated in the 'Noise emissions for outdoor equipment', supporting EU Noise Directive 2000/14/EC should be applied, and specified in the Construction Environment Management Plan.	Non-significant
			Noise associated with construction and demolition activities. The impact will vary depending upon the combination of plant and machinery.	Minor Adverse		Non-significant

POTENTIAL IMPACT	BASELINE	PHASE	IMPACT	EFFECT (WITHOUT MITIGATION)	MITIGATION MEASURES	RESIDUAL EFFECT (AFTER MITIGATION)
	Creţoaia village is 220m from the L481 road, which provides access to the Tintareni Landfill site for waste trucks and other vehicles.	Operation	No impact on sensitive noise receptors	N/A	→ Regular noise monitoring at the site boundary to ensure that the predicted noise levels at the site boundary (70 $L_{AEQ,1H}$ DB) are not exceeded during any one hour period. → Monitoring the number of hourly waste truck movements, and if they exceed the assumed 14 movements per hour, arranging further noise assessments.	N/A
Biological and Ecological Resources	The existing Tinterani landfill site is dominated by rough grassland, interspersed with pockets of scrub and trees. From the high-level review of existing information completed, it is considered likely that species richness across the site is limited and typical of similarly disturbed areas across the region.	Construction	Removal of vegetation	Minor Adverse	→ Construction site fencing installed prior to reinstatement and construction works to prevent site access by wildlife species. → Full survey of ecological receptors across the site prior to construction – focussing primarily on fauna. → Retention of key habitat features where possible (as identified from the field survey work), or compensatory provision thereof (especially with regards roosting bats). → Monitoring of mitigation to ensure on-going success of measures. → Vegetation clearance works timed to take place outside of the breeding bird season.	Non-significant
			Removal of existing trees and built structures which may serve as bat habitats.	Large Adverse		Non-significant
			General animal welfare impact with the potential for construction activities to injure or kill mobile fauna as they access the construction site.	Minor Adverse		Non-significant
			Removal of reptile assemblages as a result of loss of vegetation.	Minor Adverse		Minor adverse
			Destruction of nests and eggs as a result of vegetation removal.	Minor Adverse		Non-Significant

POTENTIAL IMPACT	BASELINE	PHASE	IMPACT	EFFECT (WITHOUT MITIGATION)	MITIGATION MEASURES	RESIDUAL EFFECT (AFTER MITIGATION)
		Operation	General animal welfare impact with the potential for construction activities to injure or kill mobile fauna as they access the construction site.	Minor Adverse	→ Landscape planting around the surrounds of the site. → Reducing risks to animal welfare through provision of environmental management across the site, to include but not be limited to: covering open excavations, securing dangerous substances and maintaining maximum speed limits for landfill vehicles.	Non-Significant
Cultural Heritage	No cultural heritage assets have been found within the site itself and given the nature and depth of excavation that was required to construct the original landfill, there are unlikely to be assets preserved beneath the landfill. There are several cultural heritage assets located in the surrounding area, including built heritage and archaeological	Construction	The resurfacing of the access road and upgrading of the Tintareni landfill may temporarily impact on the setting of nearby cultural heritage assets.	Minor Adverse	→ Chance Finds Procedure – conducted by an approved and qualified archaeologist. → Good construction site management to reduce visual impacts associated with the construction works. → Minimising the use of artificial lighting, and undertaking construction during daylight hours. → Where possible, hedgerow and hedgerow trees could be planted around the perimeter of the Project to provide screening; → Minimising lorry movements, noise and dust during the construction stage through efficient site management, including wheel washing and using covered vehicles.	Non-significant

POTENTIAL IMPACT	BASELINE	PHASE	IMPACT	EFFECT (WITHOUT MITIGATION)	MITIGATION MEASURES	RESIDUAL EFFECT (AFTER MITIGATION)
	assets. The nearest asset is located 3.4km from Tintareni Landfill site. Several cultural heritage assets in the village of Tintareni, are located in close proximity to the national road (R2) that will be used by the waste trucks to transport waste from Chisinau to the landfill site, however this road is already heavily used by HDVs.	Operation	An indirect impact on the landscape setting of cultural heritage assets as a result of the construction of new proposed facilities, such as the leachate management plant, the removal of vegetation, waste management operations and waste trucks using the resurfaced access route to the landfill with the associated noise and dust, and windborne litter.	Minor adverse	→ Good operational site management to reduce the visual impacts associates with the operation of the landfill; → Reinstating completed landfill cells with suitable planting of grass/wildflower/shrubs as soon as the cell becomes filled and non-operational; → Ensure the finished levels of the landfill site replicate the surrounding landscape of rolling hills and does not take on an unnatural contour; → Ensure suitable establishment and on-going maintenance of any woodland tree planting, hedgerow and hedgerow trees to maintain screening properties; → Minimise dump truck movement, noise and dust being emitted from landfill operations; and → Ensure reduced speed limits are enforced on the access road to reduce the effects of noise and dust.	Non-significant
Landscape and Visual	The landscape surrounding the Tintareni landfill site consists of small and large scale agricultural farmland with blocks of woodland and residential settlements which typically comprise of single or two-storey detached dwellings which are screened by trees	Construction	Adverse impacts due to changes in the topography (due to re-profiling of the landfill); removal of existing vegetation; road resurfacing work.	Minor Adverse	→ Good site management will reduce the visual clutter associated with the works; → Minimise the use of artificial lighting on the site and where needed, use directional lighting; → Incorporate additional screening around the leachate treatment plan at the base of the landfill, and the administration building at the top of the landfill site. Screening could include hedgerow and hedgerow trees, replicating surrounding small field boundaries and	Non Significant
			Adverse impacts on the setting of the following Character Areas: Tintareni landfill site; small scale farmland; and large scale agricultural farmland and	Minor Adverse		Non Significant

POTENTIAL IMPACT	BASELINE	PHASE	IMPACT	EFFECT (WITHOUT MITIGATION)	MITIGATION MEASURES	RESIDUAL EFFECT (AFTER MITIGATION)
	from the nearby highways. Residences within the villages of Tintareni have long distance views of the Tintareni landfill site. The landfill is also visible to users or the surrounding agricultural landscapes and the nearby highways. The villages of Geamana (particularly Dzhamany area) and Ciobanovca have views no views of the landfill due to the embankment on the southern perimeter of the landfill.		woodland blocks.		providing further screening of the site; → New tree and hedge / shrub planting to be planted within a suitable depth of appropriate topsoil to aid establishment; and → Implement a CEMP to minimise lorry movements, noise and dust being emitted during the construction phase activities. Cover trucks carrying materials and waste.	
			Adverse impacts on the setting of the following Character Area: setting of settlements located alongside highways.	Minor to Medium Adverse		
			Residents in the villages of Tintareni and Creţoaia; and the users of the agricultural land, un-surfaced paths and tracks surrounding the Tintareni landfill site, are expected to experience adverse visual impacts due to on-site construction activities (including dust, windblown litter etc.) and construction traffic.	Minor Adverse		Non Significant
			Residents in the villages of the village of Geamana and Ciobanovca; may experience, noise, dust and wind-blown litter. Users of the R2 and L481 highway, may experience transient, glimpsed views of the construction activities.	Minor to Medium Adverse		Non Significant
		Operation	Adverse impacts due to changes in the topography (due to re-profiling of the	Minor Adverse	→ Implement good site management to reduce the visual clutter associated with the	Non Significant

POTENTIAL IMPACT	BASELINE	PHASE	IMPACT	EFFECT (WITHOUT MITIGATION)	MITIGATION MEASURES	RESIDUAL EFFECT (AFTER MITIGATION)
			landfill); removal of existing vegetation; road resurfacing work.		operational works; → Implement good operational procedures, compact litter and cover with soil at regular intervals, to minimise windblown litter; → Reinstate completed landfill cells with suitable planting of grass / wildflower / shrubs as soon as the cell becomes filled and non-operational; → Ensure suitable establishment and on-going maintenance of any woodland tree planting, hedgerow and hedgerow trees to maintain screening properties; → Ensure finished levels of the site replicate surrounding rolling hills and do not take on an unnatural contour; and → Minimise lorry movements, noise and dust being emitted from the landfill operations.	
			Adverse impacts on the setting of the following Character Areas; Tintareni landfill site, and large scale agricultural farmland and woodland blocks.	Minor Adverse		Non Significant
			Residents in the villages of the village of Geamana and Ciobanovca, may experience secondary visual effects such as dust, windblown litter, increases in traffic and lorries on approach roads and artificial lighting from illumination masts in winter Users of the R2 and L481 highway may get transient, glimpsed views of the activities of the landfill site in between properties.	Minor Adverse		Non Significant
			Adverse impacts on the setting of the following Character Areas: small scale agricultural farmland and Settlements.	Minor to Medium Adverse		Non Significant
			Residences within Tintareni and the users of the surrounding agricultural land un-surfaced paths and tracks may experience adverse	Medium Adverse		Non Significant

POTENTIAL IMPACT	BASELINE	PHASE	IMPACT	EFFECT (WITHOUT MITIGATION)	MITIGATION MEASURES	RESIDUAL EFFECT (AFTER MITIGATION)
			visual effects due to direct views of the landfill activities.			
			Views from residences within Creţoaia	Medium to High Adverse		Non-Significant
Geology, soils, material and waste	The main lithology comprises sedimentary soils, which are relatively young, with alluvial deposits in the river valley. The area is vulnerable to landslides. The landfill uses leachate recirculation to saturate the waste and enhance the rate of degradation of the solid waste. Leachate is drained to the base of the landfill and then into the storage reservoirs. The landfill is currently lined by an impermeable base sealing of compacted clay. The leachate storage reservoirs have a finite capacity, and there are currently concerns that this could be exceeded following significant snow falls and heavy rainfalls. The main receptors are	Construction	Soil erosion due to surface water run-off from soil stockpiles. Increase in leachate generation by compression of previously deposited waste by heavy machinery.	Minor Adverse	→ Vehicles and machinery shall be inspected regularly → Vehicles and machinery shall be provided with an oil spill kit → Soil excavations shall be supervised by experienced personnel to ensure no contaminated soil is reused → Sediment and erosion control measures shall be implemented to reduce the transport of stockpiled soil by surface runoff → The leachate storage tanks shall be inspected regularly throughout the construction phase. → Construction of engineered lining systems will be in accordance with a Construction Quality Assurance Plan. → Monitoring of groundwater levels and quality shall be maintained from existing boreholes throughout the construction period. → Design detailed measures to ensure dam stability prior to the commencement of construction. → Undertake further investigation and develop detailed design measures to design the vertical barrier required to prevent leachate leaking into the dam, prior to commencing construction.	Non-Significant
			Movement of polluted soil to the surface during the re-profiling and excavation works. Accidental oil and petroleum leaks from machinery.	Medium Adverse		Non-Significant

POTENTIAL IMPACT	BASELINE	PHASE	IMPACT	EFFECT (WITHOUT MITIGATION)	MITIGATION MEASURES	RESIDUAL EFFECT (AFTER MITIGATION)
	the soil in the Tintareni landfill site, and the surrounding agricultural soil.	Operation	Ineffective management of leachate and leachate leaks along transport route.	Minor Adverse	→ Regular inspections of the dam stability, including the additional stability measures to be constructed prior to operation, shall be undertaken. → Regular inspections of the surface water drainage to ensure surface water runoff is not accumulating on the site. → Regular inspections of the embankment around the perimeter of the landfill cell. → Provision of new covered waste trucks. → A program to ensure good driver behaviour and good maintenance of vehicles. → Spill kits shall be used when oil / petrol leaks or spills occur.	Non-Significant
			Increased pressure on embankment dam, increased geological movement and increased number of landslides and erosion caused by increased waste storage.	Medium Adverse		Non-Significant
Water Environment	Tintareni landfill site is located in the Dniester River Basin, the nearest watercourse to the site is the River Bic, located approximately 5km north of the landfill. The River Bic is a tributary of the River Dniester, which flows into the Black Sea. The River Bic is currently heavily polluted with organic and inorganic toxic substances.	Construction	Erosion of soil stockpiles due to surface water runoff. Increase in leachate generation due to compression of previously deposited waste by heavy machinery. The spread of waste to outside of the landfill reaching agricultural land. Contaminated surface water runoff from the access route, as a result of vehicles with mud on their wheels leaving the site.	Minor Adverse	→ The leachate storage tanks shall be inspected regularly. → Wheel washing of vehicles and machinery shall be undertaken before leaving the site. → Sediment and erosion control measures shall be implemented to reduce the transport of stockpiled soil by surface runoff.	Non-significant

POTENTIAL IMPACT	BASELINE	PHASE	IMPACT	EFFECT (WITHOUT MITIGATION)	MITIGATION MEASURES	RESIDUAL EFFECT (AFTER MITIGATION)
	According to the Water Pollution Index (WPI) the main rivers Dniester is moderately polluted (category III-IV) while smaller rivers like the Bic is more polluted (category IV-VI), on a scale where I is the least and VI the most polluted. Groundwater elevation ranges between 104m above sea level to 112m above sea level flowing in a north-easterly direction. Few common contaminants were measured for groundwater at the landfill and the wells located at Tintareni village however, based on the available data, there seems to be no clear correlation between water quality in, or adjacent to, the landfill and that in the Tintareni village.	Operation	Poor management of leachate resulting in contamination of groundwater and/ or contamination of surface water runoff. The addition of new waste leads to compression of previously deposited waste resulting in squeezing out excess leachate, which may contaminate groundwater if the leachate treatment plant does not have sufficient capacity.	Medium Adverse	→ New Leachate Treatment Plant. → Areas of waste open to rainfall/snow will be minimised to prevent the formation of leachate. → Wheel washing of all vehicles leaving the site. → Regular road inspections and deployment of a surface sweeper to clean mud, when required. → A groundwater monitoring network shall be installed downgradient from the landfill. → The preparation of a groundwater monitoring program , including control and trigger levels.. → The preparation of a monitoring program for the leachate treatment plant effluent.	Non-significant
			Leachate contamination of downstream groundwater, and subsequently the quality of the water in the River Bic and groundwater abstraction bores in Tintareni village. The spread of waste outside of the landfill, reaching agricultural land and polluted surface water runoff, as a result of vehicles with mud on their wheels leaving the site.	Minor Adverse		Non-Significant

POTENTIAL IMPACT	BASELINE	PHASE	IMPACT	EFFECT (WITHOUT MITIGATION)	MITIGATION MEASURES	RESIDUAL EFFECT (AFTER MITIGATION)
Social, population and human health impacts	Tintareni village has higher rates of illness than the national average. The Moldovan economy relies heavily on agriculture. Chisinau is the most economically developed city in Moldova, reliant on industry and services. However it is experiencing high unemployment and a lower average wage than the national average. The Tintareni commune is resident to several public an social institutions including the mayor's office, a kindergarten, a primary and secondary school, a medical centre and a church. Aqueducts provide the main source of drinking water. Only 3% of the population are connected to the sewerage system. Waste collection in the village has been suspended since the closure of the landfill.	Construction	Implementation of a new land lease contract from Tintareni village with clear terms and conditions; sourcing of local labour, goods and services; creation of employment opportunities, particularly those for women.	Minor Beneficial	→ A contract will be negotiated and signed between the City Chisinau (Regia Autosalubritate) and the village Tintareni for lease of land, with clear terms and conditions, including the length of lease and the lease price; → The engagement of all non-employee workers will follow international best practice as follows: Implementation of transparent and fair recruitment procedures; Engaging all non-employee workers in line with both national legislation and applicable international (ILO) standards and recommendations; and implementation of a grievance mechanism for workers; → Employment of women will be encouraged with implementation of the following measures: Identification of all positions where women can be employed; providing flexibility in work hours/ arrangements to encourage woman to apply; and giving consideration to suitably qualified and experienced woman applicants → Local workforce will be hired and goods and services will be procured locally whenever possible. → A Livelihood Restoration Framework will be implemented to address impacts on waste pickers at the Ciocana waste dump. → Women waste pickers will be approached and assisted in cooperation with local social workers.	Minor Beneficial
			Increased traffic during construction leading to the potential for more road accidents; Displacement of waste pickers, resulting in loss of income, including women who may be more vulnerable than men.	Minor Adverse		Non-significant
			Closure of the Ciocana temporary dumpsite affecting the livelihood of waste pickers and their households.	Moderate Adverse		Non-significant

POTENTIAL IMPACT	BASELINE	PHASE	IMPACT	EFFECT (WITHOUT MITIGATION)	MITIGATION MEASURES	RESIDUAL EFFECT (AFTER MITIGATION)
	It is estimated that there are 50 informal waste pickers, 15-20 who work regularly, separating waste at the temporary Ciocana temporary dumpsite. Women are less often employed in formal jobs dealing with waste collection and management than men. However, household waste is often managed by women.				→ A workers Code of Conduct will be developed and implemented → All activities will be planned and coordinated with local health, safety and security facilities.	
		Operation	The potential for increased tariffs for waste management. It is assumed that the tariffs cannot be increased beyond a certain amount which would make them unaffordable for the local population.	Minor to Moderate Adverse	→ Measures to prepare for and increase waste management tariffs include; Organisation of a wide consultation process in relation to waste management tariffs and involvement of clients of waste management services in the discussions; Review and application of best practice in the region in relation to tariffs; and increasing of waste management tariffs gradually, at the same time increasing the quality of services; and introduction of subsidies for the most vulnerable households; → Recruitment and employment will be implemented following international best practice; → Employment of women will be encouraged with implementation of the following measures: Analyses of all positions where women can be	Non-Significant
			Creation of job opportunities which will be offered to residents of Tintareni and Creţoaia; provision of employment opportunities to increase the number of women employed.	Moderate Beneficial		Moderate Beneficial

POTENTIAL IMPACT	BASELINE	PHASE	IMPACT	EFFECT (WITHOUT MITIGATION)	MITIGATION MEASURES	RESIDUAL EFFECT (AFTER MITIGATION)
			Improved access road will aid villagers accessing their agricultural fields; resumption of waste collection and consideration of gender specific views in the organization of waste management.	Minor Beneficial	employed; providing flexibility in work hours/ arrangements to encourage woman to apply; and giving consideration to suitably qualified and experienced woman applicants → Waste collection and management in Tintareni village will take into consideration residents need, particularly women's needs. → Customer satisfaction surveys, covering at least 50% women users will be implemented	Minor Beneficial
			Agreements and commitments from the Company and the City of Chisinau to provide community benefits to the residents of Tintareni.	Major Beneficial		Major Beneficial
Transportation and Traffic	The proposed route uses the regional R2 and L418 roads to access the landfill site. The final part of the access route to the existing Tintareni landfill is of a poor standard. There are a number of issues with the access road including but not limited to, fissures and	Construction	Potential for damage to the road surface of the L841 due to heavy construction traffic.	Minor Adverse	→ Traffic Management Plan to limit disruption on the L481.	Non-Significant
		Operation	There will be no significant effects on vehicles using the R2 or L481. There will be no adverse effects on traffic flows or junction delays.	N/A	→ Reconstruction of the Tintareni landfill site access road; → Rehabilitation of the existing rain water collecting system; → Vegetation management – removal of encroaching trees and bushes; → Part of the district road L481 (between the turn-	N/A
			Resurfacing of the access road easing access for walking and cycling to the site.	Minor Beneficial		Minor Beneficial

POTENTIAL IMPACT	BASELINE	PHASE	IMPACT	EFFECT (WITHOUT MITIGATION)	MITIGATION MEASURES	RESIDUAL EFFECT (AFTER MITIGATION)
	cracks, pits, partial obstructions, road segmentation and reduced visibility due to uncontrolled vegetation growth.		The operation of the landfill will not have a significant effect on access by rail, buses.	N/A	off to Creţoaia village and the turn-off to the access Tintareni access) also requires rehabilitation. The relevant highways authority should be consulted regarding its rehabilitation.	N/A

BIBLIOGRAPHY

Agency for Land Relations and Cadastre (ALRC).(2015). Available at: http://geoportal.md/en/mobile/map. Accessed on 21st December 2015.

BSI (British Standards Institution) (2008) BS 5228-1:2009+A1: 2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites. Noise.

BSI (British Standards Institution) (2014) BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings. [Online] URL: http://magento1.wwwsr10.supercp.com/media/pagefile/file/b/s/bs8233-2014_guidance_on_sound_insulation_and_noise_reduction_for_buildings.pdf [Accessed on 04/08/16].

BSI (British Standards Institution) (2014) BS4142: 2014 Methods for Rating and Assessing Industrial and Commercial Sound.

Census (2004) URL: http://primarii.casata.md/index.php?action=viewprimarie&id=1050 [Accessed on 01/08/16]

CIA Factbook (2016), The World Factbook, Moldova URL: https://www.cia.gov/library/publications/the-world-factbook/geos/md.html [Accessed on 01/08/16]

Countryside Agency and Scottish Natural Heritage (2002) *Landscape Character Assessment, Guidance for England and Scotland'*

Department for Transport (2007) Design Manual for Roads and Bridges, Vol. 11, Section 3, Part 1: HA 207/07 Air Quality. [Online] URL: http://www.standardsforhighways.co.uk/dmrb/vol11/section3/ha20707.pdf [Accessed on 31/05/16]

Ecological Movement of Moldova (2015) Report on environment and social study result of Cretoaia dumpsite activity

European Bank for Reconstruction and Development (2014) Chisinau Solid Waste Project – Environmental and Social Assessment for EBRD Brownfield Category A Project Terms of Reference.

European Bank for Reconstruction and Development (2014) Environmental and Social Policy (ESP). [Online] URL: http://www.ebrd.com/news/publications/policies/environmental-and-social-policy-esp.html [Accessed 31/05/16]

European Bank for Reconstruction and Development (2014) Performance Requirements (PRs) 1-10. [Online] URL: http://www.ebrd.com/who-we-are/our-values/environmental-and-social-policy/performance-requirements.html%20 [Accessed on 31/05/16]

European Bank for Reconstruction and Development (2016) Baseline PM10 Concentrations. Taken from the International Bank of Reconstruction and Development. Available at: http://data.worldbank.org/data-catalog/world-development-indicators [Accessed: 18th July 2016]

European Commission (2014) The Environmental Impact Assessment Directive (85/37EEC). [Online] URL: http://ec.europa.eu/environment/eia/eia-legalcontext.htm [Accessed 13/06/16]

European Commission (1992) The Habitats Directive (92/43/EEC). [Online] URL: http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:31992L0043 [Accessed on 31/05/16]

European Commission (1994) The Packaging Directive (94/62/EC). [Online] URL: http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:01994L0062-20150526 [Accessed on 31/05/16]

European Commission (1999) The Landfill Directive (1999/31/EC). [Online] URL: http://www.central2013.eu/fileadmin/user_upload/Downloads/Document_Centre/OP_Resources/Landfill_Directive_1999_31_EC.pdf [Accessed on 31/05/16]

European Commission (2000) The European List of Waste. [Online] URL: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CONSLEG:2000D0532:20020101:EN:PDF [Accessed on 31/05/16]

European Commission (2006) The Groundwater Directive (2006/118/EC). [Online] URL: http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32006L0118 [Accessed on 31/05/16]

European Commission (2008) Air Quality Directive (2008/50/EC) [Online] URL: http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32008L0050 [Accessed on 31/05/16]

European Commission (2008) The Waste Framework Directive (2008/98/EC). [Online] URL: http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32008L0098 [Accessed on 31/05/16]

European Commission (2009) The Birds Directive (2009/147/EC). [Online] URL: http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32009L0147 [Accessed on 31/05/16]

European Commission (2010) The Industrial Emissions Directive (2010/75/EU). [Online] URL: http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32010L0075 [Accessed: 31/05/16]

European Neighbourhood and Partnership Instrument – Shared Environmental Information Systems. Republic of Moldova Country Report (January 2012), Chisinau

The Federation of International Employers (2016) Review of minimum wage rates. URL: http://www.fedee.com/pay-job-evaluation/minimum-wage-rates/ [Accessed on 01/08/16]

Fichtner Management Consulting (2015).Baseline Study Report, Moldova: Chisinau Solid Waste Project, Feasibility Study, Stuttgart, Germany.

Fichtner Management Consulting (2016) Project Proposal Report, Moldova: Chisinau Solid Waste Project Feasibility Study, Stuttgart, Germany.

GVLIA (2013) '*Guidelines for Landscape and Visual Impact Assessment'* published April 2002 by the Landscape Institute and Institute of Environmental Management and Assessment

IAQM (2012) Guidance on the Assessment of the Impacts of Construction on Air Quality and the Determination of their Significance December 2011. [Online] URL: http://iaqm.co.uk/text/guidance/construction_guidance_2011.pdf [Accessed on 31/05/16]

Institute of Air Quality Management (IAQM): Guidance on the Assessment of Dust from Demolition and Construction (February 2014)

International Household Survey Network (2015) National Bureau of Statistics of the Republic of Moldova, Household Budget Survey [Accessed on 01/08/16]

ISO (1996) ISO 9613-2:1996 Acoustics – Attenuation of Sound During Propagation Outdoors – Part 2: General Method of Calculation. [Online] URL: http://www.iso.org/iso/catalogue_detail.htm?csnumber=20649 [Accessed on 31/05/16]

ISO (1996) ISO 1996-2:2007 Acoustics – Description, measurement and assessment of environmental noise – Part 2: Determination of Environmental Noise. [Online] URL: http://www.iso.org/iso/home/store/catalogue_tc/catalogue_detail.htm?csnumber=41860 [Accessed on 31/05/16]

Mayor of Tintareni, pers comm (2016) Personal communications with the Mayor of the Village of Tintareni.

Ministry of Environment and Natural Resources (2003) Environmental Protection in the Republic of Moldova

Ministry of Environment and Natural Resources. (2007).Environmental Protection in the Republic of Moldova.

Ministry of Environment and Natural Resources (2003) Historic Ambient Air Pollution at selected Moldovan monitoring stations between 2004 to 2006

Ministry of Environment of the Republic of Moldova, Chisinau, (2013) National Waste Management Strategy of the Republic of Moldova (2013-2027),

Moldova adopted law on the protection of atmospheric air in 1997, it was last amended in 2008. [Online] URL: http://www.unep.org/transport/airquality/Moldova.pdf

National Bureau of Statistics of the Republic of Moldova (2016) URL: https://knoema.com/atlas/Republic-of-Moldova [Accessed: 1st August 2016]

Republic of Moldova. Decision on the Approval of the Environmental Strategy for years 2014-2023 and of the Action Plan for its Implementation (April 2014)

Republic of Moldova (2016), Baseline NO2 Concentrations. Taken from Government of Republic of Moldova. Available at: http://date.gov.md/ckan/dataset/14786-ambient-air-quality-in-urban-areas [Accessed on 18/07/16]

Resolution of the Chisinau Municipality (2004) No. 16/10 dated 15.12.2004

Survey (2016) Wastepicker socio economic survey, 13th July 2016

TEVAS (2012) Project Design Document.

The Moldovan framework law on environmental protection of 1993, as amended in 2011. [Online] URL: http://www.iso.org/iso/catalogue_detail?csnumber=28633 [Accessed on 31/05/16]

Tintareni Mayor's Office (2013) Tintareni Landfill Issues Report (unpublished report prepared on behalf of the Tintareni Mayor's Office).

United Nations Economic Commission for Europe (2010) Country Profiles: Republic of Moldova. United Nations.

United Nations (1994) Framework Convention on Climate Change. [Online] URL: http://unfccc.int/essential_background/convention/status_of_ratification/items/2631.php [Accessed on 31/05/16]

United Nations (1998) Kyoto Protocol to the United Nations Framework Convention on Climate Change. [Online] URL: http://unfccc.int/resource/docs/convkp/kpeng.pdf [Accessed on 31/05/16]

United Nations Economic Commission for Europe. Republic of Moldova Environmental Performance Reviews, Third Review (2014)

WEG (2012) Chisinau Solid Waste Project, Georgia.

WHO (1999) Guidelines for Community Noise. [Online] URL: http://www.persona.uk.com/bexhill/Core_docs/CD-09/CD-09-41.pdf [Accessed on 31/05/16]

WHO (2006) Air Quality Guidelines for Particulate Matter, Ozone, Nitrogen Dioxide and Sulfur Dioxide, Global Update 2005. [Online] URL: http://apps.who.int/iris/bitstream/10665/69477/1/WHO_SDE_PHE_OEH_06.02_eng.pdf [Accessed on 31/05/16]

World Bank Group (2016) Poverty and Shared Prosperity in Moldova: Progress and Prospects (June 16, 2016).

World Bank Group (2016) World Development Indicators. URL: http://data.worldbank.org/data-catalog/world-development-indicators [Accessed on 01/08/2016]

APPENDIX A: REVIEW OF CIOCANA TEMPORARY DUMPSITE CLOSURE PLAN

1 INTRODUCTION

1.1.1 This report presents a review of the closure plan, produced by Fichtner Management Consulting (2016), for the temporary Ciocana dumpsite situated close to the centre of Chisinau. A review of the closure plan has been undertaken by each environmental discipline, and recommendations have been made to improve and reduce the impact of the closure plan on the surrounding environment and communities.

1.1.2 The Ciocana dumpsite is located about 10 km (travelling distance) to the southeast of Chisinau, close to Bubuieci village. The dump site has been used since 2011 for disposal of municipal solid waste. Approximated 7,5 million m^3 of waste has been emplaced at the dump site during this period.

1.1.3 The closure plan includes measures to secure the waste mass at Ciocana and enable in long term minimum adverse effects. These measures explained here, are as listed below, but not limited to:

- Re-Profiling of the waste body
- Leachate drainage system
- Surface sealing system
- Landfill gas collection system
- Rainwater collection system
- Control road
- Monitoring and After-Care

2 AIR QUALITY AND CLIMATE CHANGE

2.1 INTRODUCTION

2.1.1 This section considers how the proposed closure plan will effect air quality and climate change, and offer recommendations where appropriate.

2.1.2 Air quality monitoring was undertaken at the site and has been used to inform the review.

2.2 AIR QUALITY MONITORING DATA, CIOCANA DUMPSITE

2.2.1 WSP | Parsons Brinckerhoff undertook a site specific air quality monitoring survey at Ciocana, monitoring both Nitorigen Dioxide ($NO_{2)}$ and Sulphur Dioxide ($SO_{2)}$. NO_2 was monitored at two locations (DT5 and DT6). SO_2 was monitored at one location (DT6). The locations of diffusion tube monitoring are indicated in Figure 2-1. Given the available timescales, the air quality monitoring survey was limited to three weeks and the diffusion tubes were changed on a weekly basis.

Figure 2-1 Location of Diffusion Tubes – Ciocana Dumpsite (DT5) and Ciocana Dumpsite Haul Road (DT6)

2.2.2 The monitoring results for the diffusion tube survey undertaken by WSP | Parsons Brinckerhoff for NO_2 are presented in Table 2-1 and for SO_2 in Table 2-2**.** Full results can be found in Appendix F-4**.**

Table 2-1 Averages of WSP | Parsons Brinckerhoff NO_2 Diffusion Tube data over the monitoring period

Site ID	Site Description	Site Type (distance from road side)	Northings	Eastings	Date	Average NO_2 concentration ($\mu g/m^3$)
DT5	Temporary dumpsite	Background	46,59,942	28,55,400	17/05/16-07/06/16	10.9
DT6	Temporary dumpsite Haul Road	Roadside	46,59,807	28,55,171	17/05/16-07/06/16	16.4

2.2.3 The diffusion tube results indicated that concentrations of NO_2 at both monitoring sites do not exceed the World Heath Organisation (WHO) guidelines and European Union (EU) limit values for this pollutant ($40\mu g/m^3$).

Table 2-2: Averages of WSP | Parsons Brinckerhoff SO_2 Diffusion Tube data over the monitoring period

Site ID	Site Description	Site Type (distance from road side)	Northings	Eastings	Date	Average SO_2 concentration ($\mu g/m^3$)
DT5	Temporary dumpsite	Background	46,59,942	28,55,400	17/05/16-07/06/16	8.38

2.2.4 SO_2 diffusion results indicated that concentrations were relatively low across the monitoring period. These were observed to be below both the SO_2 EU limit value of $125\mu g/m^3$ over a 24hr period and the WHO guideline 24hr mean value of 20 $\mu g/m^3$.

BACKGROUND

2.2.5 The temporary dumpsite in Ciocana is located in a predominately industrial area (refer to **Figure 4-1**). The local air quality issues are likely to arise from exhaust emissions from cars and Heavy Duty Vehicles (HDVs), and the odour and bio-aerosols associated with the temporary dumpsite.

2.2.6 The results of the diffusion tube monitoring survey show that annual average NO_2 concentrations at all monitoring sites are below $40\mu g/m^3$ and that SO_2 concentrations for the whole monitoring period were below the 24hr mean EU limit value and WHO guideline value

2.2.7 A number of further observations are summarised below and photographs associated with each are presented in **Appendix F-6**:

- The temporary dumpsite is not covered and does not have a protective outer wall to prevent the movement of waste material downhill. There appeared to be no measures in place to limit the re-suspension of materials to the air, therefore it is considered likely that there is a high risk of exposure to PM_{10} and bio-aerosols;
- There is a poor road surface (predominately gravel based and unsurfaced) along the site access road and the roads within the site. There was clear evidence of slower moving vehicles as a direct result and severe PM_{10} and dust re-suspension into the air;
- Vehicles (LGVs (>10 years on average) and HDVs (>20 years on average)) used were old and out-dated. There was visible evidence of exhaust emissions;
- HDVs carrying waste were regularly uncovered, therefore there is the potential for spillage

onto the public highway and potential odour, PM_{10} and bio-aerosol issues along the traffic routes;

- There is currently no onsite gas engine, therefore any gas produced is not collected in specifically designed gas wells. There is a risk of the gas migrating through the landfill and venting to the air in undesirable locations;
- There were visible pools of stagnated water on the surface of the temporary dumpsite. In addition there was visible evidence of leachate runoff in the lower parts of the landfill;
- A highly offensive odour was detected during the site visit. The intensity of the odour was high, and the frequency is considered regular, if not constant, regardless of wind speed and direction;
- There is a vast amount of unauthorised dumping (access to the dumpsite is available 24 hours per day, 7 days per week);
- Dumping of waste is unmanaged, therefore leading to unlimited amounts of waste being delivered. In addition, the waste is often unsegregated and contains potentially hazardous waste (asbestos was visible);
- Burning of vegetation is common practice at the dumpsite, and visible plumes of black smoke were noted; and
- The closest residential receptors are located in the town of Bubuieci approximately 1.5km to the south west. There were no visible signs of the temporary dumpsite, and no odour was detected at this location.

2.2.8 In a regional context, in Chisinau, the baseline NO_2 and PM_{10} concentrations exceed the WHO guidelines and EU limit values of 40 $\mu g/m^3$; therefore, there is a risk that in more urban locations within the city of Chisinau further exacerbation of already elevated NO_2 and PM_{10} concentrations may occur.

2.2.9 It should be noted that the closure of the temporary dumpsite in Ciocana is likely to offer some localised improvements in air quality. It is widely expected that there will be a significant reduction in HDV movements and the dumping of waste, therefore offering beneficial impacts in relation to NO_2, PM_{10}, odour and the emission of bio-aerosols.

2.3 REVIEW OF CLOSURE PLAN IN THE CONTEXT OF AIR QUALITY AND CLIMATE CHANGE

RE-PROFILING OF THE WASTE BODY

2.3.1 Overall the proposed re-profiling of the waste body is unlikely to have any implications on air quality, however, consideration should be given to the following:

- The plant and vehicles used during the re-profiling process should comply, where practicably possible with euro standards; and
- Protective equipment should be issued to all onsite workers for protection against the inhalation of bioaersols and other airbourne contaminants emitted from the dumpsite whilst the re-profiling is being undertaken.

INSTALLATION OF A LEACHATE DRAINAGE SYSTEM

2.3.2 The installation of a leachate drainage system is a necessary requirement to manage any leachate generated post closure of the dumpsite. There are no specific air quality issues in relation to the installation of this system, however thought should be given to the collection zones. It is recommended that the collection zones are sealed and are not open air tanks, this will reduce any potential odour and bioaersol issues.

2.3.3 Furthermore, it is recommended that the leachate collected at the Ciocana dump site should be transported to the leachate treatment plant at the Tintareni landfill using trucks which are sealed to avoid spillages onto the public highway and comply with euro emission standards.

INSTALLATION OF A SURFACE SEALING SYSTEM

2.3.4 No comments or recommendations in relation to air quality and climate change.

LANDFILL GAS COLLECTION SYSTEM

2.3.5 The installation of a gas collection system forms an important part of the closure plan. The build up of landfill gas is likely to occur for some time into the future and it is important to monitor the amount of gas produced and the pollutants generated. The key pollutants from landfill gas are methane and carbon dioxide, however there is a small proportion of volatile organic compounds (VOC's) that are generated.

2.3.6 It is recommended that ongoing environmental monitoring is undertaken to monitor the level of landfill gas produced and the concentrations of each pollutant. It is recommended that this is undertaken on a 6 monthly basis. This data should be submitted to the Ministry of Environment alongside an annual report. Furthermore, gas collection wells should be drilled so that the migration of gas through the landfill can also be considered.

RAINWATER COLLECTION SYSTEM

2.3.7 No comments or recommendations in relation to air quality and climate change.

CONTROL ROAD

2.3.8 It is recommended that a solid pavement and road surface i.e. tarmac should be laid as oppose a crushed gravel. This will limit the re-suspension of dust to the air when vehicles are travelling along it.

MONITORING & AFTER-CARE PROGRAMME

2.3.9 The proposed monitoring and after-care programme is comprehensive. However, it is recommended that wind speed and direction should be collected in addition to the other meteorological parameters stated. Wind speed and direction is important meteorological information when considering the potential impacts of the landfill and other sources on local and regional air quality at existing or future receptor locations.

3 NOISE

3.1 INTRODUCTION

3.1.1 This section of Appendix A will reflect on how the proposed closure plan will effect noise, and offer recommendations where appropriate.

3.1.2 A noise survey was undertaken at the site and in the surrounding area, and has been used to inform the review.

3.2 CIOCANA TEMPORARY DUMPSITE

3.2.1 A site visit was made to the Ciocana temporary dumpsite in Chisinau and representative receptor areas potentially affected by its current use. Short-term noise measurements were taken at the temporary dumpsite in order to characterise the current operations; these included movements of heavy recycling vehicles along the haul road and tipping operations (i.e. off loading and compaction of waste using a bulldozer).

3.2.2 In addition, indicative noise readings were taken at the nearest noise-sensitive receptors at the locality of Bubuieci, which is located approximately 930m from the Ciocana temporary dumpsite. The survey team did not identify any line-of-sight between the residential area and the Ciocana temporary dumpsite.

Table 3-1 – Description of Noise Survey Locations – Ciocana Temporary Dumpsite

Location	Description
CH1	Dumpsite, Tipping Area 47° 0'4.68"N; 28°55'3.16"E
CH2	Dumpsite, Haul Road, movement of waste trucks, terrain in slope 46°59'55.00"N; 28°54'58.83"E
CH3	Dumpsite, Haul Road, movement of waste trucks, flat terrain 46°59'51.04"N; 28°54'43.92"E
CH4	Nearest properties at 930m away, Bubuieci, general ambient noise, dumpsite not audible 46°59'56.07"N; 28°55'50.56"E

Figure 3-1 Noise Survey Locations - Ciocana Temporary Dumpsite

TABLE 9-7 – DAYTIME NOISE SURVEY RESULTS – CIOCANCA DUMPSITE

Location	Start Time	L_{Aeq} dB	L_{Amax} dB
CH1	10:26	61.3	74.5
CH2	10:55	69.6	87.0
CH3	11:28	63.4	85.2
CH4	12:15	42.5	59.1

3.2.3 It is expected that, due to the noise measurement results obtained at location CH4, noise-sensitive areas surrounding the temporary dumpsite at Ciocana would not experience a change in noise levels when the site is closed and the upgraded Tintareni landfill is opened.

3.3 REVIEW OF CLOSURE PLAN IN THE CONTEXT OF NOISE

RE-PROFILING OF THE WASTE BODY

3.3.1 It is considered that given the distance to the nearest residential property in Bubuieci (i.e. over 930m) it is unlikely that re-profiling will have an effect upon the closest sensitive receptors. However, it is recommended that permissible noise levels stated in the 'Noise emissions for outdoor equipment, a database intended for use by manufacturers, authorised representatives, EU authorities and notified bodies, should be followed.

3.3.2 It is is also recommended that Brest Practice is followed, as described in British Standard BS5228:

- → Location and orientation of plant / equipment away from the nearest properties wherever possible;
- → Use of temporary acoustic barriers;
- → Selection of inherently quiet plant/equipment to provide a reduction of noise at source (it is noted that reducing the number of plant / equipment items can reduce the intensity of the noise, although this will serve to prolong the period of noise);

- Controlling noise at source by effective silencers on machines, if applicable;
- Avoiding unnecessary running of plant / equipment;
- The use of acoustic covers on construction plant / equipment (wherever practical);
- Regular maintenance of plant/equipment.

3.3.3 Best Practice as described in British Standard BS5228 as detailed above, should be applied to the following activites:

- Installation of a Leachate Drainage System
- Installation of a surface sealing system
- Landfill Gas collection System
- Rainwater Collection System
- Control Road

MONITORING & AFTER-CARE PROGRAMME

3.3.4 It is recommended that inspections are undertaken to ascertain the Best Practice is followed, where possible. Investigation of noise complaints should be followed with noise measurements both on site and at the receptor location.

5 BIOLOGICAL AND ECOLOGICAL RESOURCES

5.1 REVIEW OF CLOSURE PLAN IN THE CONTEXT OF BIOLOGICAL AND ECOLOGICAL RESOURCES

5.1.1 There is no detail on any proposed planting of the topsoil to be placed over the re-profiled site. The site provides a good opportunity to enhance biodiversity in the area through wildflower seeding to attract more invertebrate species. The surrounds of the site could be planted with native trees/shrubs increasing available habitat for local species, including birds.

5.1.2 Planting should be focussed upon providing habitats for species known to be either vulnerable and above on the IUCN red list for Moldova, or species which are listed in the newly published 3rd edition of the National Red Data Book for Moldova.

5.1.3 Planting regime should take into account neighbouring habitats and be in keeping with the local area. It should aim to increase the connectivity of wildlife corridors/green networks.

5.1.4 Providing habitat for rare species is a good news story for all involved in a project, as well as a benefit for biodiversity.

5.1.5 There may be opportunity for community/school involvement in planting trees around the perimeter of the site (provided this is not precluded on health & safety grounds).

7 CULTURAL HERITAGE

7.1 REVIEW OF CLOSURE PLAN IN THE CONTEXT OF CULTURAL HERITAGE

7.1.1 The closure of the temporary dumpsite in Chisinau is expected to have a beneficial effect on the setting of any heritage assets in the surrounding area. The landfill closure would not require any further land-take and so no effect on undiscovered buried archaeology is anticiapted.

8 LANDSCAPE AND VISUAL

8.1 REVIEW OF CLOSURE PLAN IN THE CONTEXT OF GEOLOGY, SOILS, MATERIAL AND WASTE

RE-PROFILING OF THE WASTE BODY

8.1.1 There is no detail on either potential planting of the topsoil layer to be placed over the re-profiled site or the appearance of the re-profiled area. There is the opportunity to create a natural looking profile with natural-flowing contours across the site (as opposed to an engineered profile) as well the opportunity to plant the topsoil layer with native grass seeding/ wildflowers and/or shrubs. The boundaries of the site could be planted with native trees/shrubs, increasing available habitat for local species and replicating natural vegetation and landscape. The contours (profiling)and vegetation selection should be in keeping with the local area.

8.1.2 There may be the opportunity for community/school involvement in planting trees around the perimeter of the site (subject to appropriate health & safety checks) so the community can be involved with the restoration of the site and its future.

LANDFILL GAS COLLECTION SYSTEM

8.1.3 Should a gas collection flare be required, it should be sensitively located, and potentially the inclusion of some screening from sensitive visual receptors may be needed in the form of a tree belt to limit visual impacts.

RAINWATER COLLECTION SYSTEM

8.1.4 The surface water collection channel around the perimeter of the site should be located inside a boundary planting of vegetation (of trees or shrubs) to maintain a natural visual appearance from the surrounding landscape.

CONTROL ROAD

8.1.5 The control road around the perimeter of the site should be located inside a boundary planting of vegetation (of trees or shrubs) to maintain a natural visual appearance from the surrounding landscape.

9 GEOLOGY, SOILS, MATERIAL AND WASTE

9.1 REVIEW OF CLOSURE PLAN IN THE CONTEXT OF GEOLOGY, SOILS, MATERIAL AND WASTE

RE-PROFILING OF THE WASTE BODY

9.1.1 Based on the information available, the waste slope gradients at the temporary dumpsite are considered to vary between 1/1 and 1/2 (vertical/horizontal). Steep caps can lead to erosion problems and are more difficult to maintain than flatter caps. Best-practice guidelines indicate the waste body shall have a slope gradient of 1/3 (V/H). The most elevated surface of the waste body shall have a minimum gradient to reduce the risk of water ponding in areas of differential settlement. Gradients of about five per cent are considered to adequately shed water.

9.1.2 A landfill is subject to long-term settlement, as waste decomposes and consolidates. This settlement has significant impacts on the final surface profile, the landfill cap and potential afteruses for the site. Most of the settlement occurs within the first few years of the cell closure, the result of waste compressing under its own weight and the weight of the cap. After this initial compression, settlement will continue for many years, as a result of consolidation and biodegradation processes within the waste. The monitoring of landfill settlement shall be conducted during the after care program.

9.1.3 Until the waste within the landfill has sufficiently decomposed or stabilised such that it no longer presents a risk to the environment, the landfill must be managed to prevent any environmental impact. The landfill aftercare program must include inspections of the cap, checking for differential settlement and indicators that the integrity of the low-permeability cap has not been compromised. The frequency of the inspection program will be determined from the observed rate of settlement.

INSTALLATION OF A SURFACE SEALING SYSTEM

9.1.4 The landfill cap design is governed by limiting water infiltration into the landfill and gas migration through the cap; these are a function of the materials used in the cap and its shape. The gradient for a completed cap should be sufficient to prevent water ponding on the cap to minimise infiltration through the cap. Gradients of about five per cent will adequately shed water.

9.1.5 The landfill cap will have a significant importance in ensuring the stability of the dumpsite, to minimise the risk of landslide and soil movement. It is noted the waste was deposited in the dumpsite without any treatment and no engineering measures appropriate to a landfill had been put in place before the use of the temporary dumpsite. The following recommendations shall be considered in the design of the surface sealing for the Ciocana dumpsite.

9.1.6 The landfill cap (i.e. surface sealing) design must prevent leachate levels rising to the point where they could cause a leachate outbreak. Leachate collection systems are expected to either fail or no longer be operated following the completion monitoring. Given the generation of leachate can continue in the long term, this potential issue requires management during the early stages of the closure program. International guidelines recommend the design seepage rate of the cap does not exceed 75 per cent of the design seepage rate of the landfill liner. It is understood a layer of clay was laid at the bottom of the dumpsite prior to the commencement of waste disposal. The engineering details of the liner (e.g. thickness of the clay layer, existence of geomambrane) are unknown. The efficiency of the landfill cap is therefore of significant importance.

9.1.7 The purpose of the drainage layer immediately over the engineered cap is to remove excessive moisture that has permeated through the soil layer and will not be removed by evapotranspiration. Care must be taken to ensure that the drainage layer is able to drain water from the landfill, as an accumulation of water at the toe of the cap may cause instability in the cap.

9.1.8 The final surface should be vegetated as quickly as possible to further control erosion. Until the vegetation becomes established, this revegetation program should be augmented with measures such as mulch or erosion mats to control erosion.

9.1.9 The plant species used for the revegetation of the surface sealing shall be selected to ensure that roots do not penetrate the cap. The use of plants on the landfill caps must consider the particular requirements of the cap design, and vegetation used must be compatible with the cap design. Conventional caps require plant roots not to penetrate the barrier layer underlying the topsoil layer.

LANDFILL GAS COLLECTION SYSTEM

9.1.10 Landfill gas is generated by the biodegradation of waste materials due to the actions of micro-organisms and is produced at varying rates during the decomposition cycle.The nature of landfill sites means that large quantities of degradable waste are present, resulting in high gas generation rates over long periods of time. Typically methane will be generated at a constant rate for approximately 20 years, but gas will continue to be emitted for approximately 50 years. However these time frames can vary significantly depending upon site specific conditions. Landfill gas impacts, including the risk of explosion and/or asphyxiation shall be managed and considered during the closure of the dumpsite.

9.1.11 Landfill gas potential risk remain post closure and for at least 20 years post-closure. The risk of explosion can lead to soil deformation and geological movement. Post-closure buffers shall be set to manage landfill gas impacts. It is noted the immediate surrounding land use is industrial, with the nearest industrial facilities within an approximate distance of 100m from the dumpsite boundary. The nearest residential area is located at approximately 750m to the south and east from the dumpsite. A post closure landfill gas monitoring program shall be prepared to protect the stability of the nearby infrastructures.

9.1.12 The proposed landfill gas collection system shall account for build up of gases following the capping of waste material, with on going ground gas monitoring required following the site closure.

10 WATER ENVIRONMENT

10.1 REVIEW OF CLOSURE PLAN IN THE CONTEXT OF THE WATER ENVIRONMENT

INSTALLATION OF A LEACHATE DRAINAGE SYSTEM

10.1.1 The leachate drainage system shall include monitoring points to allow for the monitoring of leachate during the after care programme. The collection of leachate shall be conducted in such a manner that no leaks / spills occur and the capacity of the storage tanks is sufficient. The collection system shall be designed in such a manner that rainfall does not enter the system in order to reduce the risk of overflow and potential impacts to the immediate environment.

10.1.2 An assessment of the feasibility of leachate being drained through gravity shall be undertaken prior to the dumpsite closure. The provision of pumps to drain the leachate out of the dumpsite shall be taken into account if gravity is not considered to be sufficient. Given no engineering liner was laid at the bottom of the dumpsite, the closure plan shall ensure the accumulation of leachate within the waste mass is reduced to a minimum..

INSTALLATION OF A SURFACE SEALING SYSTEM

10.1.3 Recommendations as per Section 7 of Appendix A.

MONITORING & AFTER-CARE PROGRAMME

10.1.4 The closure plan shall include a groundwater monitoring programme, to demonstrate the landfill is no longer capable of harming human health or the environment. Completion monitoring requires that a trend of improving leachate quality has been established by ongoing monitoring programmes. Consequently, all monitoring data collected form an essential part of the detail needed to demonstrate completion conditions. It is noted however, that the dumpsite lacks a groundwater, leachate and surface water monitoring network and no historical data is available for Ciocana dumpsite. A completion report shall be prepared to demonstrate that waste stabilisation has been achieved.

10.1.5 A geotechnical site investigation is scheduled to be carried out at the dumpsite by the appointed consultant, comprising the advancement of four boreholes to collect data and assess the geological, hydrogeological and hydrological conditions. The hydrogeological investigation will aim to assess the up-gradient groundwater depth and quality as well as intercepting the down-gradient groundwater in order to assess potential impacts to the receiving environment located hydraulically downgradient from the dumpsite.

10.1.6 In the event surface water bodies are identified as being potential receptors, the completion monitoring programme shall include the monitoring of surface water at designated points (upstream and downstream).

11 SOCIAL, POPULATION AND HUMAN HEALTH IMPACTS

11.1 REVIEW OF CLOSURE PLAN IN THE CONTEXT OF SOCIAL, POPULATION AND HUMAN HEALTH IMPACTS

INSTALLATION OF A LEACHATE DRAINAGE SYSTEM

11.1.1 This approach is supported as leachate management is anticpated to be beneficial in terms of population and human health.

INSTALLATION OF A SURFACE SEALING SYSTEM

11.1.2 This approach is supported as sealing the waste from potential receptors is anticpated to be beneficial in terms of population and human health.

LANDFILL GAS COLLECTION SYSTEM

11.1.3 This approach is supported as gas collection may result in air quality improvements, and is anticpated to be beneficial in terms of population and human health.

MONITORING & AFTER-CARE PROGRAMME

11.1.4 During the ESIA scoping public consultation meetings, residents of the Bubuieci community closest to the Ciociana waste dump requested to see the details of the closure plan.

11.1.5 Among the residents of the Bubuieci village, there is an expectation that the existing waste from the Ciociana waste dump will be moved to the Tintareni landfill once it is re-opened. There are also expectations that the location can be used for new housing or recreational activities after closure. Most of the residents are interested in how the existing health hazards (pollution of water, air, soil, etc.) will be addressed during and after closure.

11.1.6 It is therefore important to organise a public consultation meeting in Bubuieci and present the closure plan once it has been finalised. The presentation should use non technical language and all issues should be discussed openly with the residents. Examples of best practice used in other countries in the region should also be presented, as well as images of what the dump site will look like after the implementation of all measures. Participants should be provided with an opportunity to ask any follow up questions and provide comments and suggestions, which should be considered in the final closure plan to the extent possible.

11.1.7 Results of all future monitoring activities have to be transparent and available to the local community and as well as to the population of Chisinau. An information campaign at the level of the City should be launched to present the benefits of the closure of the dumpsite and how impacts are being managed.

11.1.8 To contribute to the mitigation of economic displacement of waste pickers once the waste dump is closed, any potential employment opportunities in relation to the closure of the Ciociana waste dump should be offered to them. Skill training and/or training on health and safety should also be implemented with them to enhance their performance and capacity for any potential future work.

APPENDIX B – ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

1.1 SCOPE

1.1.1 The aims of this Environmental and Social Monitoring Plan (ESMP) are to:

- Identify the key environmental and social issues or sensitivities related to the Project;
- Describe the mitigation measures and show how the effectiveness of the mitigation will be monitored;
- Ensure that the program will be developed and operated according to requirements EBRD and the EU;
- Ensure that the programme will comply with relevant Moldovian environmental legislation and other corporate and Lender requirements throughout its construction and operational phases;
- Identify roles and responsibilities; and
- Propose mechanisms for monitoring compliance.

This document represents a commitment by the Company and the local municipalities to environmental and social sustainability, and applies to the Project's entire life cycle.

The potential impacts and associated mitigation measures and management procedures in this ESMP are based on the baseline information and assessments provided in the ESIA documents and Environmental Social Action Plan (ESAP) prepared for the Project by WSP I PB (2017).

In addition, for this project a Stakeholder Engagement Plan (SEP) and a Livelihood Restoration Framework (LRF) have been prepared by WSP I PB (2017) with management and monitoring elements captured in this ESMP.

1.2 INTENDED USERS

- → The aim of this document is to communicate to the Project Team (including contractors and sub-contractors); the potential environmental and social issues associated with the proposed scheme and the procedures and mitigation measures that are required to be implemented.
- → The Project Team will utilise this ESMP during project execution to achieve appropriate and effective environmental and social management.

1.3 ROLES AND RESPONSIBILITIES

The broad role of each party involved in the Project in relation to the ESMP is identified below.

EBRD: is financing but not directly developing the project. Responsibility is therefore passed to the Project Owner, although reports will be required to be submitted to the EBRD on the status of the ESAP, resolution of grievances and EHSS performance of the project.

Regia Autosalubritate and Local Municipalities: have overall responsibility for planning, implementation, monitoring and enforcement of activities associated with this ESMP and environmental, social, health and safety performance.

PIU: the Project Implementation Unit (PIU) has not been formed yet. The role of the PIU will be the project implementation, financial management and overall delivery of the investment project.

Regia Autosalubritate: takes the responsibility for the ESMP and ensuring that all parties understand, implement and comply with the measures identified during construction and operation. Regia Autosalubritate is responsible for all local and community liaison and all social aspects related to the Project.

Designer: responsible for implementing the design control process, to ensure the measures identified in the ESMP are implemented during the development of the detailed design.

Contractor: responsible for the implementation of appropriate mitigation measures identified in the ESMP and Construction Environmental Management Plan (CEMP) during the construction phase to minimise the environmental and social impacts that may occur during construction and to record all public complaints via a well-defined complaint logging procedure and take the necessary action to manage the issues. All contractors and sub-contractors shall comply with and apply the ESMP and CEMP requirements as applicable to the tasks they are instructed to complete.

Site Manager: responsible for implementation of the Operational Environmental Management Plan (OEMP) during the operation phase to minimise environmental and social impact that may occur during operation and decommissioning.

1.4 DELIVERY MECHANISMS

DESIGN CONTROL PROCESS

The application of a formal process during the development of the design to ensure the ESMP activities are undertaken and inform the design as it is refined.

CONSTRUCTION ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

The CEMP will elaborate the measures for implementing the activities specified in the ESMP, and will contain the following plans:

- Occupational Health and Safety Plan;
- Recruitment Plan;
- Accident Management Plan,
- Emergency Preparedness and Response Plan
- Environmental Monitoring Plans;
- Complaints register;
- Noise Monitoring Plan;
- Air Emissions (Dust) Plan
- Water Quality Management and Monitoring Plan (Runoff, Wastewater);
- Waste Checking and Acceptance Plan;
- Traffic Management Plan; and
- Security Management Plan.

OPERATIONAL ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

The OEMP will elaborate the measures for implementing the activities specified in the ESMP during the operation of the landfill.

CLOSURE PLAN

When the upgraded landfill reaches full capacity, it will be decommissioned in accordance with a Closure Plan, to meet the requirements of the EU Landfill Directive.

The Closure Plan will include measures such as:

- Surface Sealing;
- Continued Operation of the Leachate Treatment Plant;
- Continued Operation of the Landfill Gas Management System;
- Continued Operation of the Surface Water Management System;
- Monitoring Wells;
- Maintenance of the Access Road and Perimeter Fence; and
- Topsoil and Landscaping.

STAKEHOLDER ENGAGEMENT PLAN AND LIVELIHOOD RESTORATION FRAMEWORK

A Stakeholder Engagement Plan (SEP) and Livelihood Restoration Framework (LRF) have been prepared by WSP I PB and will be implemented as part of this Project. These plans will remain live documents and will be updated throughout the construction phase, operation and decommissioning phase.

PROJECT STAGE Topic Action	Responsibilities	Timing	Indicator of Delivery	Monitoring of Delivery	Delivery Mechanism
DESIGN					
Air Quality and Climate Change					
The design shall incorporate measures to improve the efficiency of the operation of the gas collection system, which will improve the operation of the biogas plant.	Landfill designer	Before the completion of the detailed design	Final design which includes stated measure	Audit of final design documents	Design Control Process
Measures to reduce the volume of leachate in the landfill, by constructing an onsite leachate treatment plant. Where possible, the leachate treatment plant/storage tanks should be covered. Leachate should not be stored in open air tanks.					
The provision of new waste trucks (specifically to Euro Standards), to reduce the potential effect of vehicle emissions in particular nitrogen dioxide (NO_2) and particulate matter (PM_{10}).	EBRD	Before the opening of the landfill	Documents to confirm receipt of the vehicles	Audit of documents indicating the emission values of the vehicles.	Design Control Process
Noise and Vibration					
The design should allow the preparation of a Construction Environmental Management Plan (CEMP) to minimise the impact upon residential receptors near the access road	EBRD	Before construction	CEMP section on noise and vibration indicating mitigation measures	Audit of CEMP	CEMP
Biological and Ecological Resource's					

PROJECT STAGE Topic Action	Responsibilities	Timing	Indicator of Delivery	Monitoring of Delivery	Delivery Mechanism
The design shall minimise landtake on the perimeter of the existing landfill.	Landfill designer	Before the completion of the detailed design	Final design which indicates development extent.	Audit of final design documents	Design Control Process
The design shall minimise habitat loss and key habitat features within the site and apply the mitigation hierarchy to account for any losses, ensuring no net loss of biodiversity and if possible, a net gain in line with EBRD PR6.	Landfill designer	Before the completion of the detailed design	Final design which provides evidence of no net loss in biodiversity	Audit of evidence within final design documents	Design Control Process
A landscape plan shall be produced detailing the planting in and around the site to account for no net loss and potentially a net gain of biodiversity.	Landfill designer	Before the completion of the detailed design	Final design which includes a drawing of landscaping plan and the detail.	Audit of final design documents	Landscape Management Plan and Design Control Process
Cultural Heritage					
Design will minimise potential impact on heritage assets, during both construction and operation	Landfill designer	Before completion of detailed design	Final design which provides evidence of limiting impact on heritage assets.	Audit of final design documents	Design Control Process
Landscape and Visual					

PROJECT STAGE Topic Action	Responsibilities	Timing	Indicator of Delivery	Monitoring of Delivery	Delivery Mechanism
Design will minimise any potential landscape or visual impact during both construction and operation.	Landscape designer	Before completion of detailed design	Final design which provides evidence of limiting landscape and visual impacts	Audit of final design documents.	Landscape Management Plan and Design Control Process
Geology, Soils, Material and Waste					
The design shall provide for reinstatement of use of all land temporarily used during construction, and for enhancement where possible.	Landfill designer	Before the completion of the detailed design	Final design which includes stated measure	Audit of final design documents	Design Control Process
The design shall provide indication on the areas where excavated material is to be stockpiled and what erosion and control measures are to be implemented	Landfill designer	Before the completion of the detailed design	Final design which includes stated measure	Audit of final design documents	Design Control Process
The design shall provide a program for the reuse of excavated material where possible to reduce the volume of soil to be imported to site	Landfill designer	Before the completion of the detailed design	Final design which includes stated measure	Audit of final design documents	Design Control Process
The design shall provide for the contingency measures to adopt in the event impacted soil is excavated and brought to the surface	Landfill designer	Before the completion of the detailed design	Final design which includes stated measure	Audit of final design documents	Design Control Process
The design shall provide an assessment of the stability of the current waste mass and account for the potential effects of the compression after additional waste deposition.	Landfill designer	Before the completion of the detailed design	Final design which includes stated measure	Audit of final design documents	Design Control Process
The design shall account for the increased generation of leachate in the assessment of the dam stability	Landfill designer	Before the completion of the detailed design	Final design which includes stated measure	Audit of final design documents	Design Control Process

PROJECT STAGE Topic Action	Responsibilities	Timing	Indicator of Delivery	Monitoring of Delivery	Delivery Mechanism
The design shall include the provision of a perimeter embankment in order to provide a fixing structure and reduce the risk of landslide and deformation of subsoil.	Landfill designer	Before the completion of the detailed design	Final design which includes stated measure	Audit of final design documents	Design Control Process
The design shall incorporate measures to improve the efficiency of the landfill gas collection system.	Landfill designer	Before the completion of the detailed design	Final design which includes stated measure	Audit of final design documents	Design Control Process
The detailed design must include measures to strengthen the stability of the embankment dam, and further investigation to inform the design of the vertical sealing required to prevent leachate leakage in dam.	Landfill designer	Before the completion of the detailed design	Final design which includes stated measures	Audit of final design documents.	Design Control Process
Water Environment					
The design shall include a lining system to act as surface sealing of the current waste cell and as a base sealing for the future waste cell, in order to protect the soil and groundwater beneath the landfill	Landfill designer	Before the completion of the detailed design	Final design which includes stated measure	Audit of final design documents	Design Control Process
The design shall include a leachate extraction system for the current waste cell to reduce the impact on the quality and functionality of the base sealing and reduce the risk of instability of the dam	Landfill designer	Before the completion of the detailed design	Final design which includes stated measure	Audit of final design documents	Design Control Process
The design shall include a leachate collection system to extract the leachate from the current waste cell and collect leachate from the future waste cell to reduce the risk of leachate building up and subsequent contamination of receiving environment	Landfill designer	Before the completion of the detailed design	Final design which includes stated measure	Audit of final design documents	Design Control Process
The design shall include a leachate treatment plan to reduce the risk of leachate building up in the landfill and exceeding the capacity of the storage tanks and/or dam.	Landfill designer	Before the completion of the detailed design	Final design which includes stated measure	Audit of final design documents	Design Control Process

PROJECT STAGE Topic Action	Responsibilities	Timing	Indicator of Delivery	Monitoring of Delivery	Delivery Mechanism
The design shall include detail on the emergency contingency actions to be undertaken in the event there is an incident in the leachate collection system or treatment plant (i.e. leakage from a leachate distribution pipeline)	Landfill designer	Before the completion of the detailed design	Final design which includes stated measure	Audit of final design documents	Design Control Process
The design shall provide measures to manage the leachate efficiently (e.g. designed in such a manner that the infiltration of rainfall is minimised, surface cover)	Landfill designer	Before the completion of the detailed design	Final design which includes stated measure	Audit of final design documents	Design Control Process
The design shall include a leak detection system in order to act promptly in the event of a failure in the leachate collection system or treatment plant	Landfill designer	Before the completion of the detailed design	Final design which includes stated measure	Audit of final design documents	Design Control Process
The design shall include a wheel washing facility to minimise the waste leaving the landfill that could impact on adjacent agricultural land by surface water runoff	Landfill designer	Before the completion of the detailed design	Final design which includes stated measure	Audit of final design documents	Design Control Process
The design shall include a surface water drainage strategy, diverting surface water from the waste body and preventing it from becoming contaminated.	Landfill designer	Before the completion of the detailed design	Final design which includes stated measure	Audit of final design documents	Design Control Process
The design shall include a detailed Construction Quality Assurance plan detailing required materials and methods for installation and verification on completion.	Landfill designer	Before the completion of the detailed design	Final design which includes stated measure	Audit of final design documents	Design Control Process
Social, Population and Human Health					
Clear terms and conditions have been agreed for the lease of land for the Tintareni landfill between the City Chisinau (Regia Autosalubritate) and Tintareni village	City Chisinau Regia Autosalubritate	Prior to Construction Period	Signed contract for land lease	Review of contract	Contract for land lease
Transportation and Traffic					

PROJECT STAGE Topic Action	Responsibilities	Timing	Indicator of Delivery	Monitoring of Delivery	Delivery Mechanism
The scheme and its associated works will incorporate design elements to limit the impact of transportation and traffic.	Landfill/scheme designers	Before the completion of detailed design	Final design with include mitigation measures	Audit of final design documents.	Design Control Process
CONSTRUCTION					
Air Quality and Climate Change					
Demolition and construction will be undertaken in line with best practice measures as detailed in the IAQM 2014 guidance document to control any potential impact of demolition/construction dust.	Demolition & Construction Contractor, including a Construction Environmental Manager	During Demolition & Construction Period	Monthly reporting from onsite Environmental Manager. Emission values of construction vehicles and NRMM	Review of monthly reports submitted. Review of documentation of emission limits for construction vehicles and NRMM. Regular site inspections.	CEMP
Best practice measures will be followed in terms of demolition and construction vehicles and non- road mobile machinery (NRMM) in order to reduce any potential exacerbation of NO_2 concentrations. Both construction vehicles and NRMM should adhere to euro standards.					
All dust and air quality complaints should be recorded and causes identified. Appropriate remedial action should be taken in a timely manner with a record kept of actions taken including of any additional measures put in place to avoid reoccurrence.	Construction Environmental Manager	Throughout Demolition & Construction Period	Monthly reporting from onsite Environmental Manager.	Review of monthly reports submitted	Complaints register
Noise and Vibration					
Best Practicable Means (BPM) should be followed to undertake any demolition or construction related to the project. ESIA presents examples based on British Standard 5228. Special consideration should be given in areas close to existing residential properties, adjacent to the L481. Permissible noise levels stated in the 'Noise emissions for outdoor equipment', supporting EU Noise Directive 2000/14/EC should be followed.	Contractor and Construction Environmental Manager	Construction Phase	Monthly reporting from onsite Environmental Manager.	Review of monthly reports submitted.	CEMP

PROJECT STAGE Topic Action	Responsibilities	Timing	Indicator of Delivery	Monitoring of Delivery	Delivery Mechanism
Biological and Ecological Resource's					
Vegetation clearance shall not be undertaken during the breeding bird season.	Demolition & Construction Contractor, including an Construction Environmental Manager	During Construction Period	Vegetation Clearance programmes outside this period	Regular inspection of landfill during upgrade / construction period	CEMP
Walkover survey of key ecological receptors across the site – focussing primarily on fauna (especially roosting bats).	Demolition & Construction Contractor, including an Construction Environmental Manager	Prior to any construction works	Production of ecological survey reports	Ecological survey reports available	CEMP
Where possible, retention of ecological features of interest identified from the walkover survey above (e.g. mature trees, dense scrub, rock piles, etc.).	Demolition & Construction Contractor, including an Construction Environmental Manager	During Construction Period	Ecological features retained	Protection plan for identified ecological features incorporated into CEMP. Regular inspection of landfill during upgrade / construction period.	CEMP

PROJECT STAGE Topic Action	Responsibilities	Timing	Indicator of Delivery	Monitoring of Delivery	Delivery Mechanism
Site fencing installed prior to reinstatement and construction works to prevent site access by wildlife species; all exposed excavations, hazardous materials and plant machinery to be secured when not in use.	Demolition & Construction Contractor, including an Construction Environmental Manager	Prior to any construction works	Fencing visible around site	Visual checks of fence integrity around the site	CEMP
Monitoring of any mitigation to ensure ongoing success of such measures.	Demolition & Construction Contractor, including an Construction Environmental Manager	During Construction Period	Mitigation measures visible on site	Visual checks of mitigation measures on site	CEMP
Landscape planting shall be undertaken around the surrounds of the site.	Demolition & Construction Contractor, including an Construction Environmental Manager	At the end of the construction period	Landscape planting is visible and meets with designs	Landscape planting is in place and growing well	CEMP
Cultural Heritage					
Set up a 'Chance Finds Procedure' to manage and mitigate the impact during construction on potential archaeological assets, this should be conducted in accordance with EBRD Performance Requirements 8 (9-14)	Contractor, Construction Environmental Manager, qualified Archaeologist.	Prior to and during construction	Producing a defined procedure	Check that recognised procedure is being conducted.	CEMP

PROJECT STAGE Topic Action	Responsibilities	Timing	Indicator of Delivery	Monitoring of Delivery	Delivery Mechanism
Good construction site management to reduce visual impacts associated with the construction works;	Contractor, Construction Environmental Manager	During construction	Mitigation measures visible on site	Visual checks of mitigation measures on site	CEMP
Minimising the use of artificial lighting, and undertaking construction during daylight hours	Contractor, Construction Environmental Manager	During construction	Mitigation measures visible on site	Visual checks of mitigation measures on site	CEMP
Where possible, hedgerow and hedgerow trees could be planted around the perimeter of the Project to provide screening.	Contractor, Construction Environmental Manager	During construction	Mitigation measures visible on site	Visual checks of mitigation measures on site	CEMP
Minimising lorry movements, noise and dust during the construction stage through efficient site management, including wheel washing and using covered vehicles.	Contractor, Construction Environmental Manager	During construction	Mitigation measures visible on site	Monitoring number of lorry movements.	CEMP
Landscape and Visual					
Good site management will reduce the visual clutter associated with the works	Contractor, Construction Environmental Manager	During construction	Mitigation measures visible on site	Visual checks of mitigation measures on site	CEMP
Minimise the use of artificial lighting on the site and where needed, use directional lighting	Contractor, Construction Environmental Manager	During construction	Mitigation measures visible on site	Visual checks of mitigation measures on site	CEMP

PROJECT STAGE Topic Action	Responsibilities	Timing	Indicator of Delivery	Monitoring of Delivery	Delivery Mechanism
Incorporate additional screening around the leachate treatment plan at the base of the landfill, and the administration building at the top of the landfill site. Screening could include hedgerow and hedgerow trees, replicating surrounding small field boundaries and providing further screening of the site;	Contractor, Construction Environmental Manager	During construction	Mitigation measures visible on site	Visual checks of mitigation measures on site	CEMP
New tree and hedge / shrub planting to be planted within a suitable depth of appropriate topsoil to aid establishment	Contractor, Construction Environmental Manager	During construction	Mitigation measures visible on site	Mitigation planting is in place and growing well	CEMP
Minimise lorry movements, noise and dust being emitted during the construction phase activities	Contractor, Construction Environmental Manager	During construction	Mitigation measures visible on site	Monitoring number of lorry movements.	CEMP
Geology, Soils, Material and Waste					
Vehicles and machinery shall be inspected regularly	Contractor and Construction Environmental Manager	During construction works	Records of inspection	Audit of records of inspection	CEMP
Vehicles and machinery shall be provided with an oil spill kit	Contractor and Construction Environmental Manager	During construction works	Item to be included in the vehicle inspection checklist	Audit of vehicle inspection checklist	CEMP
Soil excavations shall be supervised by experienced personnel to ensure no contaminated soil is reused	Contractor and Construction Environmental Manager	During construction works	Tracking of excavated material	Audit of tracking documents	CEMP

PROJECT STAGE Topic Action	Responsibilities	Timing	Indicator of Delivery	Monitoring of Delivery	Delivery Mechanism
Sediment and erosion control measures shall be implemented to reduce the transport of stockpiled soil by surface runoff	Contractor and Construction Environmental Manager	During construction works	Photographs	Audit of photographs	CEMP
The leachate storage tanks shall be inspected regularly	Contractor and Construction Environmental Manager	During construction works	Records of inspection	Audit of records of inspection	CEMP
Construction of engineered lining systems will be in accordance with a Construction Quality Assurance Plan.	Contractor and Construction Environmental Manager	During construction works	Records in accordance with plan	Audit of records	CEMP and Construction Quality Assurance Plan
Monitoring of groundwater levels and quality shall be maintained from existing boreholes throughout the construction period.	Autosalubitate and Construction Environmental Manager	During Construction Period	Groundwater monitoring program report	Regular review of results by the designer	CEMP and Groundwater monitoring program report
Water Environment					
The leachate storage tanks shall be inspected regularly	Contractor and Construction Environmental Manager	During construction works	Records of inspection	Audit of records of inspection	CEMP
Wheel washing of vehicles and machinery shall be undertaken before leaving the site	Contractor and Construction Environmental Manager	During construction works	Item to be included in the vehicle inspection checklist	Audit of vehicle inspection checklist	CEMP

PROJECT STAGE Topic Action	Responsibilities	Timing	Indicator of Delivery	Monitoring of Delivery	Delivery Mechanism
Sediment and erosion control measures shall be implemented to reduce the transport of stockpiled soil by surface runoff	Contractor and Construction Environmental Manager	During construction works	Photographs	Audit of photographs	CEMP
Social, Population and Human Health					
The engagement of all non-employee workers will follow international best practice as follows: • Implementation of transparent and fair recruitment procedures • Engaging all non-employee workers in line with both national legislation and applicable international (ILO) standards and recommendations • Implementation of a grievance mechanism for workers	Regia Autosalubritate Contractors	Prior to and during Construction Period	Recruitment is carried out based on international best practice and in compliance with local legislation Worker grievances are registered and addressed	Audit of recruitment procedures, including grievance management	Recruitment Policy and Grievance register
Employment of women will be encouraged with implementation of the following measures: • Analysis of all positions where women can be employed • Giving equal consideration to suitably qualified and experienced woman applicants	Regia Autosalubritate Contractors	Prior to and during Construction Period	Recruitment of women for at least 15% of construction related jobs	Audit of recruitment procedures and outcomes	Recruitment Policy and Procedures

PROJECT STAGE Topic Action	Responsibilities	Timing	Indicator of Delivery	Monitoring of Delivery	Delivery Mechanism
Local workforce will be hired and goods and services will be procured locally whenever possible	Regia Autosalubritate Contractors	During Construction Period	Recruitment of local workers (from villages near the Project locations) for at least 50 % of construction related jobs	Audit of recruitment procedures and outcomes	Recruitment Policy and Procurement Policy
A Livelihood Restoration Framework will be implemented to address impacts on wastepickers at the Ciocana waste dump Women waste pickers will be approached and assisted in cooperation with local social workers	Regia Autosalubritate	Prior to and during Construction Period	Waste pickers assisted with measures foreseen in the LRF	Regular monitoring of livelihood restoration activities and outcomes and Final Audit of the LRF implementation	Livelihood Restoration Framework Implementation Report
A workers Code of Conduct will be developed and implemented	Regia Autosalubritate Contractors	Prior to and during Construction Period	Code of Conduct developed, shared with the workforce and adequately enforced.	Regular monitoring and audit of health, safety and security performance.	CEMP and Workers Code of Conduct

PROJECT STAGE Topic Action	Responsibilities	Timing	Indicator of Delivery	Monitoring of Delivery	Delivery Mechanism
All activities will be planned and coordinated with local health, safety and security facilities	Regia Autosalubritate Contractors	Prior to and during Construction Period	Meeting minutes and cooperation documents available.	Regular monitoring and audit of health, safety and security performance.	CEMP and Health, Safety and Security Plan
Damages to land surrounding the Ciocana dump site during construction works are unlikely, however if they do occur, they will be compensated at full replacement cost and land fully reinstated	Regia Autosalubritate Contractors	Prior to the end of the Construction Period	Land reinstated	Review by the Moldovan Ministry of Environment & where relevant other governmental bodies.	CEMP
Transportation and Traffic					
Road structure reconstruction	Contractor and Environmental Manager.	Prior to and during Construction Period	Mitigation measures visible on site	Monitoring delivery of mitigation	CEMP
Rehabilitation of the existing rain water collecting system	Contractor and Environmental Manager.	Prior to and during Construction Period	Mitigation measures visible on site	Monitoring delivery of mitigation	CEMP
Vegetation management – removal of encroaching trees and bushes	Contractor and Environmental Manager.	Prior to and during Construction Period	Mitigation measures visible on site	Monitoring delivery of mitigation	CEMP

PROJECT STAGE Topic Action	Responsibilities	Timing	Indicator of Delivery	Monitoring of Delivery	Delivery Mechanism
OPERATION					
Air Quality and Climate Change					
Ongoing environmental monitoring of emissions of pollutants (NO_2, PM_{10} and SO_2) with respect to HGV's movements, emissions from the onsite landfill gas treatment plant ,and any gas venting systems to ensure compliance with EU Limit Values.	Landfill Site Operator and Operation Environmental Manager	For the duration of operation	Six monthly reporting.	Review reports by the Moldovan Ministry of Environment & where relevant other governmental bodies.	OEMP
Ongoing environmental monitoring of bioaersols from the Tintareni Landfill to protect human receptors both onsite and offsite. Provision of personal protection equipment will be provided for employees, in particular breathing apparatus to reduce the potential of inhaling hazardous airborne particulates.					
Monitor and manage odour from the surface of Tintareni Landfill, and the onsite leachate treatment plant.	Landfill Site Operator and Operation Environmental Manager	For the duration of operation	Record log of odour complaints to be submitted 3 monthly.	Review of odour complaint log. Regular site inspections to ensure site protocols are followed.	OEMP
Noise and Vibration					
Ongoing noise monitoring at the site boundary to ensure that noise levels stated in the ESIA are not exceeded during any one hour period. The assessment presented in the ESIA was based on a maximum trip generation of 14 waste truck movements per hour on the district road L481. This should be monitored and if the number of waste trucks exceeds 20 vehicles per hours further noise assessment should be undertaken. Monitoring of vibration levels is not deemed necessary.	Landfill Site Operator and Operation Environmental Manager	For the duration of operation	Monitoring reports every 3 or 6 months	Audit of noise monitoring reports.	OEMP

PROJECT STAGE Topic Action	Responsibilities	Timing	Indicator of Delivery	Monitoring of Delivery	Delivery Mechanism
Biological and Ecological Resource's					
Reducing risks to animal welfare through provision of environmental management across the site, to include but not be limited to: covering open excavations, securing dangerous substances and maintaining maximum speed limits for landfill vehicles.	Landfill Site Operator and Operation Environmental Manager	During operational activities	Measures visible on site	Ongoing checks of measures taken	OEMP
Cultural Heritage					
Good operational site management to reduce the visual impacts associated with the operation of the landfill site	Landfill operator and Operation Environmental Manager	During operational activities	Measures visible on site	Ongoing checks of measures taken	OEMP
Reinstating completed landfill cells with suitable planting of grass/wildflower/shrubs as soon as the cell becomes filled and non-operational;	Landfill operator and Operation Environmental Manager	During operational activities	Measures visible on site	Ongoing checks of measures taken	OEMP
Ensure the finished levels of the landfill site replicate the surrounding landscape of rolling hills and does not take on an unnatural contour;	Landfill operator and Operation Environmental Manager	During operational activities	Measures visible on site	Ongoing checks of measures taken	OEMP
Ensure suitable establishment and on-going maintenance of any woodland tree planting, hedgerow and hedgerow trees to maintain screening properties;	Landfill operator and Operation Environmental Manager	During operational activities	Measures visible on site	Ongoing checks of measures taken	OEMP

PROJECT STAGE Topic Action	Responsibilities	Timing	Indicator of Delivery	Monitoring of Delivery	Delivery Mechanism
Minimise dump truck movement, noise and dust being emitted from landfill operations	Landfill operator and Operation Environmental Manager	During operational activities	Measures visible on site	Ongoing checks of measures taken	OEMP
Ensure reduced speed limits are enforced on the access road to reduce the effects of noise and dust	Landfill operator and Operation Environmental Manager	During operational activities	Lower average speeds	Ongoing checks of measures taken	OEMP
Landscape and Visual					
Good site management will reduce the visual clutter associated with the operational works	Landfill operator and Operation Environmental Manager	During operation	Measures visible on site	Ongoing checks of measures taken	OEMP
Reinstate completed landfill cells with suitable planting of grass / wildflower / shrubs as soon as the cell becomes filled and non-operational	Landfill operator and Operation Environmental Manager	During operation	Measures visible on site	Ongoing checks of measures taken	OEMP
Ensure suitable establishment and on-going maintenance of any woodland tree planting, hedgerow and hedgerow trees to maintain screening properties	Landfill operator and Operation Environmental Manager	During operation	Measures visible on site	Ongoing checks of measures taken	OEMP
Ensure finished levels of the site replicate surrounding rolling hills and do not take on an unnatural contour;	Landfill operator and Operation Environmental Manager	During operation	Measures visible on site	Ongoing checks of measures taken	OEMP

PROJECT STAGE Topic Action	Responsibilities	Timing	Indicator of Delivery	Monitoring of Delivery	Delivery Mechanism
Minimise lorry movements, noise and dust being emitted from the landfill operations	Landfill operator and Operation Environmental Manager	During operation	Lower number of lorry movements on average	Ongoing checks of measures taken	OEMP
Geology, Soils, Material and Waste					
Regular inspections of the dam stability shall be undertaken	Landfill operator and Operation Environmental Manager	During landfill operation	Inspection records	Audit of inspection records	OEMP
Regular inspections of the surface water drainage to ensure no accumulation of surface water runoff is occurring shall be undertaken	Landfill operator and Operation Environmental Manager	During landfill operation	Inspection records	Audit of inspection records	OEMP
Regular inspections of the perimeter embankment shall be undertaken	Landfill operator and Operation Environmental Manager	During landfill operation	Inspection records	Audit of inspection records	OEMP
A program to ensure good driver behaviour and good maintenance of vehicles shall be prepared	Landfill operator and Operation Environmental Manager	Before the re-opening of the landfill	Training records	Audit of training records	OEMP
Spill kits shall be used when oil / petrol leaks or spills occur	Vehicle drivers	During landfill operation	Records of incidents	Audit of records of incidents	OEMP
Water Environment					

PROJECT STAGE Topic Action	Responsibilities	Timing	Indicator of Delivery	Monitoring of Delivery	Delivery Mechanism
Areas of waste open to rainfall/snow will be minimised to prevent formation of leachate.	Landfill Operator and Operation Environmental Manager	During landfill operation	Records of daily works.	Audit of records of works	OEMP
A groundwater monitoring network shall be installed downgradient from the landfill	Landfill operator and Operation Environmental Manager	Before the re-opening of the landfill	Geotechnical site investigation report including details on works undertaken	Audit of geotechnical investigation report	OEMP
A groundwater monitoring program , including control and trigger levels, shall be prepared	Landfill operator and Operation Environmental Manager	Before the re-opening of the landfill	Groundwater monitoring program report	Audit of groundwater monitoring program report	OEMP
Periodic groundwater monitoring shall be undertaken	Landfill operator and Operation Environmental Manager	During landfill operation	Groundwater analytical reports	Audit of groundwater analytical reports	OEMP
A monitoring program for the leachate treatment plant effluent shall be prepared	Landfill operator and Operation Environmental Manager	Before the re-opening of the landfill	Leachate treatment plant monitoring program report	Audit of leachate treatment plant monitoring program report	OEMP
Periodic monitoring of leachate treatment plant effluent shall be undertaken	Landfill operator and Operation Environmental Manager	During landfill operation	Effluent analytical reports	Audit of effluent analytical reports	OEMP

PROJECT STAGE Topic Action	Responsibilities	Timing	Indicator of Delivery	Monitoring of Delivery	Delivery Mechanism
Monitor leachate concentrations generated by the landfill and on potential hydrologically connected receptors (wells in Tintareni Village) will be conducted.	Landfill operator and Operation Environmental Manager	During landfill operation	Regular reporting	Audit of regular monitoring reports.	OEMP
Social, Population and Human Health					
Measures to prepare for and increase waste management tariffs include: • Organisation of a wide consultation process in relation to waste management tariffs and involvement of clients of waste management services in the discussions • Review and application of best practice in the region in relation to tariffs • Increasing of waste management tariffs gradually, at the same time increasing the quality of services • Introduction of subsidies for the most vulnerable households	City Chisinau Regia Autosalubritate	Preparation during the Construction Period Implementation after the opening of the landfill	Report on the process of determining new tariffs Decision on tariff increase	Audit of the report and decision on tariff increase	Report on the process of determining new tariffs
Recruitment and employment will be implemented following international best practice.	Regia Autosalubritate	Prior to Operation Period	Employment is implemented in accordance with international best practice and in compliance with local legislation Worker grievances are registered and addressed	Audit of recruitment procedures, employment and grievance management	Recruitment Procedure and Grievance Register

PROJECT STAGE Topic Action	Responsibilities	Timing	Indicator of Delivery	Monitoring of Delivery	Delivery Mechanism
Employment of women will be encouraged with implementation of the following measures: • Analysis of all positions where women can be employed • Giving consideration to suitably qualified and experienced woman applicants	Regia Autosalubritate	Prior to Operation Period	Recruitment of women for at least 30% of new jobs	Audit of recruitment procedures and outcomes	Recruitment Procedure
Waste collection and management in Tintareni village will be organised in accordance with households, including women's, needs	Regia Autosalubritate	Before the opening of the landfill	Report on consultation process with women residents	Review of consultation report and interviews with women residents	OEMP
Customer satisfaction surveys, covering at least 50% women users will be implemented	Regia Autosalubritate	During Operation Period	Report on customer surveys	Review of customer survey report	OEMP and Report on customer surveys
Regular maintenance of the access road will be carried out to benefit local residents using the road.	Regia Autosalubritate	During Operation Period	Report on customer surveys	Review of customer survey report	OEMP

PROJECT STAGE Topic Action	Responsibilities	Timing	Indicator of Delivery	Monitoring of Delivery	Delivery Mechanism
Benefits to the local community: Waste collection in the village free of charge; A gate fee (per ton of waste brought to the dump site) paid to the village; Payment for lease of land occupied by the landfill; Regular cleaning of wastewater facilities from local public institutions including the local school, kindergarten, etc.; Rehabilitation of the village water supply system; Management of the water supply system (contract with Apa - Canal Chisinau);and Building of a Family Doctors Centre in the village.	Regia Autosalubritate	During Operation Period	Report on customer surveys	Review of customer survey report	OEMP
Transportation and Traffic					
Maintenance of newly rehabilitated access road	Landfill operator	During operation period	Increase in quality of road network and limited traffic impact of the scheme.	Regular inspection of the quality of the rehabilitated road.	OEMP

APPENDIX C - WSP I PARSONS BRINCKERHOFF ANALYSIS OF COMPLIANCE WITH EU LANDFILL DIRECTIVE

BAT REQUIREMENTS	PROJECT PROPOSED DESIGN AND EHS ARRANGEMENTS	BAT
Security Recommendations		
1. You should provide perimeter fencing and gates to prevent unauthorised access as far as practicable (including preventing free access to animals and wildlife, as required by the Animal By-products Regulations).	Site entrance is currently controlled with a gate in the form of a barrier which is opened or closed manually. A fence was previously installed around the landfill during construction works, however only a small part of this fence remains. The proposed investment includes perimeter fencing and gated access at the sites..	Yes
2. Security fencing may be appropriate for vulnerable locations. The suggested minimum height for security fencing is 2m with cranked top and barbed wire strands.		
3. You should ensure perimeter fencing is inspected regularly by a nominated person.	No details for inspection of perimeter fencing provided.	No (ESAP Recommendation)
4. You should maintain perimeter fencing in good repair at all times.	Daily maintenance to be undertaken. No specific details for maintenance of perimeter fencing provided.	No (ESAP Recommendation)
5.You should consider using the following measures to prevent free access to the site: • security cameras • security guard • intruder alarms, lighting, shutters and bars on accommodation.	A landfill security guard is planned. No further details for security measures provided.	No (ESAP Recommendation)
Recommendations for Accident Management Plan		

BAT REQUIREMENTS	PROJECT PROPOSED DESIGN AND EHS ARRANGEMENTS	BAT
1. Particular areas of accidents you should consider at landfills may include, but should not be limited to, the following: • uncontrolled migration of landfill gas • explosion • waste slippage • failure of a basal or side wall liner • incompatible wastes coming into contact • release of leachate to an uncontained area • overfilling of tanks/lagoons • emission of a treated leachate before adequately checking its composition • vandalism.	No specific Accident Management Plan is provided and specific consideration should be given to those listed in terms of BAT as a minimum.	No (ESAP Recommendation)
Recommendations for Preventing Fires		
1.You should take the following measures to minimise the risk of fires: • site security to prevent unauthorised access • prompt emplacement, compaction and covering of wastes in well-defined cells • prompt capping of completed areas • prevention of air ingress in to the waste and gas extraction and collection systems.	See comments on site security above. Other elements of fire prevention are provided.	Yes
2.Your waste acceptance procedures should preclude the acceptance of hot or reactive wastes.	A waste acceptance procedure is provided but does not specifically address the identification and exclusion of hot or reactive wastes.	No (ESAP Recommendation)
3.You should extinguish fires as soon as possible and report fires to us.	Firefighting and other HSE measures are planned for the landfill.	Yes
Recommendations for Stability		
1.You should assess the stability of your landfill. Your assessment should include: • settlement or slippage within the foundation (subgrade) beneath the landfill base or sides • slippage within the liner system • slippage at the waste/liner interface • rotational failure within the waste, or through the whole cross-section • slippage failure of the cap or of its components • effects of settlement on the landfill cap and restoration • effects of settlement on environmental management infrastructure. Your assessment should take account of the presence and movement of waste and leachate.	A dam embankment stability analysis at the landfill has been undertaken and measures for stability are part of the proposed investment. Although a full stability risk assessment should be undertaken for the parameters identified in terms of BAT.	No (ESAP Recommendation)
2. You should not analyse waste stability by ascribing to it conventional geotechnical parameters, unless the waste is homogeneous and its geotechnical properties known. This is because waste is generally a heterogeneous material subject to decomposition, consolidation, and considerable variation, both spatially and with time. You should justify any assumptions and should undertake sensitivity analysis.	Waste is not homogenous and geotechnical properties not know therefore a full stability risk assessment is required.	Yes
3. For household waste and similar industrial and commercial waste, convenient rules of thumb you may	It is identified that slopes of 1 in 3 to 1	Yes

BAT REQUIREMENTS	PROJECT PROPOSED DESIGN AND EHS ARRANGEMENTS	BAT
consider are: • a maximum finished slope of 1 in 4 will generally provide an acceptable factor of safety • for temporary slopes between phases of a landfill, 1 in 2 to 1 in 3 has been found to be satisfactory. However, as the biodegradable component of landfilled municipal solid waste declines and pre-treatment of waste increases in response to the Landfill Directive, such rules of thumb will require re-evaluation.	in 4 will be achieved and therefore this should provide an acceptable factor of safety in terms of stability. Stability Risk Assessment should however be undertaken in support of this.	
4. You should monitor stability and settlement in the construction, operational and aftercare phases.	Stability and settlement monitoring are provided and appear satisfactory.	Yes
5. Stability can be a problem at the interfaces between geosynthetics and mineral layers. When building liner systems it is necessary to construct layers of different materials, either for separate or synergistic purposes. You should consider all potential interactions between layers, both in use and under construction. You should assess the interface friction between each layer under all conditions of use, both static and dynamic, temporary or permanent.	The lining system has been developed in accordance with the requirements of the Landfill Directive and different materials have been applied to each layer. Further consideration of material interfaces on landfill slopes should be considered as part of the Stability Risk Assessment.	Yes
Recommendations for Waste Inspection		
1.You must undertake a visual inspection at the landfill entrance unless it is not practicable to see the waste due to the vehicle or container in which the waste is delivered. Visual inspection is not usually practicable where the waste is delivered in: • a front end loader • a rear end loader • compaction container • road sweeper collector • a sheeted container • any other enclosed vehicle where there is no access for inspecting the waste without unloading the vehicle. In these circumstances you should check the delivery vehicle is consistent with vehicle type normally used for the waste described in the documentation. If for whatever reason you are concerned or suspicious about the nature of the waste, you should make a particular effort to complete a visual inspection at the landfill entrance. Where the waste is not consistent with the description provided, you should quarantine the load while you carry out further checks, or alternatively refuse the load.	A waste acceptance procedure is planned that would identify that waste will be inspected and any waste which is not acceptable for disposal at the landfill will not be allowed to enter site. Waste acceptance proposals are limited and should be expanded upon.	Yes
2.You should visually inspect all waste at the point of deposit using staff who are: • aware of the waste description for each load they are inspecting • familiar with the wastes permitted for disposal at the landfill. You should have procedures in place to allow the staff inspecting the loads to make detailed queries about the wastes that are permitted at the landfill including information on basic characterisation and compliance testing. Where the visual inspection of the waste identifies the waste is not consistent with the description provided for	Waste acceptance proposals do not extend to inspecting waste materials at the point of deposit and this should be included in updated waste acceptance procedures.	No (ESAP Recommendation)

BAT REQUIREMENTS	PROJECT PROPOSED DESIGN AND EHS ARRANGEMENTS	BAT
the waste or is otherwise not permitted at the landfill, you should ensure the load of waste is: • reloaded on to the delivery vehicle • removed to a designated quarantine area. The waste should not be accepted for disposal at your landfill.		
3.Where you refuse wastes for disposal at you landfill, they should be removed by the delivery vehicle and you should make a record of this. Where it is not possible for the waste to be removed by the delivery vehicle, you should store the wastes in a quarantine area and remove them as soon as possible.	Waste acceptance proposals do not extend to inspecting waste materials at the point of deposit and no consideration is made of vehicle/waste rejection. This should also be included in updated waste acceptance procedures together with provision of a Quarantine Area and notification to the Environmental Regulator.	No (ESAP Recommendation)
Recommendations for Waste Handling		
1. Ensure every load is visually inspected by personnel trained to recognise waste that requires special handling (see point 5 below).	No details of the use of trained personnel to inspect wastes are provided and to identify where waste may require special handling.	No (ESAP Recommendation)
2.You should design the size of the working area to minimise the potential for fugitive releases.	Cell sizing has been considered in terms of water balance/leachate generation and this should therefore be adequate to minimise potential for fugitive releases.	Yes
3.You should level and compact waste as soon as it is discharged at the working area.	Placement and compaction of wastes is identified to take place on discharge from waste delivery vehicle and it is proposed that daily cover will be applied in a timely manner.	Yes
4.You should ensure waste is covered as soon as practicable. Guidance on using daily cover is given in separate Environment Agency guidance (reference 29). Any cover materials you use should meet the objectives of landfill cover set out in the guidance.		
5.Difficult wastes - Your risk assessment should identify any wastes with characteristics requiring a particular method of handling at the site which is not part of normal day to day procedures. Typical examples are: • finely particulate material • empty containers • very large objects • sludges • very light materials, for example, expanded polystyrene • odorous wastes. You should consider a pre-treatment method to reduce the handling difficulties posed by such wastes.	No methodology for identifying and handling difficult wastes on site is provided.	No (ESAP Recommendation)

BAT REQUIREMENTS	PROJECT PROPOSED DESIGN AND EHS ARRANGEMENTS	BAT
Recommendations for Particulate Matter Control – Dust and Aerosols		
1.You should have procedures in place to deal with particulate matter arising from: • the placement of wastes • traffic on site roads during periods of dry weather • site preparation and restoration activities • surface emissions • carriage of dust/mud onto the highway.	No specific control of particulate matter from identified activities is provided.	No (ESAP Recommendation)
2.Your abatement procedures should take into account the following issues: • abatement of particulate matter at the source of generation is likely to be more effective than suppression of particulate matter once they have become airborne • particle size is very important - coarse particles have much greater settling rates than finer particles: coarse particles will settle out as deposited dust quite close to the source; whereas fine particulate matter may remain airborne for longer periods and travel much greater distances. These are implicated more in health exposure impacts. There is no sharp dividing line between the sizes of suspended particulate matter and deposited particulate matter, although particles with diameters >50 mm tend to be deposited quickly and particles of diameter <10 mm have an extremely low deposition rate in comparison • many dust-suppression techniques are ineffective for the finer particles biological activity - Much particulate matter (solid or liquid droplets) from some landfills is biologically active. Biological aerosols (bioaerosols) consist of finely divided biological organisms suspended in air. These aerosols can vary in size from 0.5 to >100 µm and can occur as aggregates, as droplets or attached to inert dust particles. Bioaerosols are complex in nature, and may include: viruses, bacteria, actinomycetes, fungi, enzymes, endotoxins, mycotoxins and glucans. They can affect organisms by infection, allergy, toxicity, pharmacological and other processes. Bioaerosols are most likely to be formed when degrading waste is disturbed.	No specific control of particulate matter from identified activities is provided.	No (ESAP Recommendation)
3. Your site design should minimise the area left unrestored. Restoration should take place as soon as possible following the end of waste disposal in a cell or phase.	No details for restoration of the Tintareni Landfill, although cross reference is made to capping proposals for the Ciocana Dump site. Cell sizing is considered in terms of water balance/leachate generation and this infers that cell sizing will be limited and capping carried out on completion of cell infill.	No (ESAP Recommendation)
4.You should extend surfaced site roads as far as possible to the tipping face and should make them available for as long as possible. You should maintain surfaced site roads and keep them in a clean condition.	Surfaced site road proposed between reception area and waste cell.	Yes
5.You should control the movements of site traffic including restrictions on routes and speeds.	No details of traffic management are provided.	No (ESAP Recommendation)
6.You should locate wheel washers far enough from the site entrance to allow any residual debris to be	Wheel washing station proposed to be	Yes

BAT REQUIREMENTS	PROJECT PROPOSED DESIGN AND EHS ARRANGEMENTS	BAT
deposited within the site.	located within the site adjacent to the Administration Building.	
7.You should provide dust suppression including the availability of 'bowsers' and water supplies. You should not use leachate for dust suppression.	Details of dust suppression are not provided.	No (ESAP Recommendation)
8.You should develop particulate monitoring programmes for the categories of particulate matter identified in M17 (reference 11). The waste streams and substances identified in the selection of appropriate Environmental Assessment Levels (EALs) (see M17 and H1 references 11 and 7) would form the basis for the monitoring of hazardous substances. The monitoring programmes should be reviewed until the appropriate frequencies and parameters can been determined on a site specific basis.	No specific control of particulate matter from identified activities is provided.	No (ESAP Recommendation)
Recommendations for Litter control		
1. You should manage accumulations of litter within the site and prevent litter escaping from the site.	No specific control of litter within the site or prevention of litter escaping from the site is provided.	No (ESAP Recommendation)
2.You should manage litter generation through the following measures: • instructions to ensure incoming waste remains sheeted for as long as possible prior to emplacement • provision of an emergency tipping area to allow discharge of light waste within a secure litter enclosure during adverse weather; this may be a permanent fixture or mobile • adequate compaction during waste emplacement • adequate covering of wastes following emplacement • minimising the extent of the active tipping area • adequate plant on active phase for placement, compaction and covering of waste • ensuring the adequate supply of daily and intermediate cover material • daily meteorological monitoring, as part of the daily and weekly operations • instructions to ensure the full discharge of a vehicle discharging waste at the site, to prevent any waste retained in the vehicle after tipping being subsequently released • closure of the site to specific or all waste types during adverse weather conditions, for example high winds.	Details of many of the suggested measures are provided but not specifically in the context of litter management.	Yes
3.You should prevent litter escaping the site through the following measures: • considering prevailing wind direction and strength and the proximity of receptors when designing the filling development and sequence, this may require a risk assessment approach • installing permanent and mobile litter fences around the active area • installing temporary bunds immediately adjacent to the tipping area • regular inspections and collection of litter around the site boundary and beyond; specifically, ditches, haul roads, water courses • deploying additional temporary personnel to collect litter, as deemed necessary from inspections and monitoring.	No specific control of litter within the site or prevention of litter escaping from the site is provided.	No (ESAP Recommendation)
Recommendations for Preventing Mud on the Road		
1.Your management system should include the following measures to prevent mud escaping from the site, to	Details of vehicles using wheelwash	Yes

BAT REQUIREMENTS	PROJECT PROPOSED DESIGN AND EHS ARRANGEMENTS	BAT
prevent potential accident hazards, dust and other amenity issues. • effective wheel and body cleaners to remove mud and debris from vehicles prior to them leaving the site • maintenance (for example, regular water changes for wet systems) of wheelwash equipment • supervision of the use of wheelwash to ensure that vehicles use the equipment correctly • main site roads maintained in a mud free condition by employing a mechanical sweeper/washer • sufficient distance on surfaced site roads between haul roads and any wheel wash facilities • monitoring of site road between final wheel wash and public highway • monitoring of public highway.	facility prior to leaving site are provided which could be developed further to cover all suggested measures.	
2.In the event that mud or other debris is carried onto the public highway, you should erect warning signs on the highway to inform users of the potential hazard following approval by the highway authority.	No use of warning signs on the highway where mud has been deposited is provided.	No (ESAP Recommendation)
3.You should employ road sweepers immediately to clean the affected area.	No use of road sweeper on the highway where mud has been deposited is provided.	No (ESAP Recommendation)
Recommendations for Odour Control		
1.You should have procedures to deal with: • waste materials, such as wastes from transfer stations, which have started to decompose prior to landfilling • old waste disturbed by digging • malodorous wastes • agricultural and sewage treatment residues • leachate and leachate treatment systems • landfill gas	No details of odour control measures provided. Daily cover is identified as being a measure which reduces odour impacts from deposited wastes.	No (ESAP Recommendation)
2.You should have procedures in place to maintain a description of the types of odorous substances deposited and generated (intentional and unintentional). This should include: • the treatment applied before landfill, which should limit wastes which are inherently odorous • the distinction between wastes which are inherently odorous where the impact is likely to be more immediate and those wastes which may give rise to odour because of microbiological action in the landfill (organic or inorganic).	No details of odour control measures provided.	No (ESAP Recommendation)
3.You should undertake a regular odour impact assessment. The impact assessment should cover a range of reasonably foreseeable odour generation and receptor exposure scenarios and the effect of different mitigation options. Your assessment should include point sources (such as flares) as well as linear or area sources (tipping faces, cracks in the cap).	No details of regular odour impact assessment provided. This should be considered as part of any routine monitoring that may be required.	No
4.You should ensure: • sulphate wastes are disposed of in cells in which biodegradable waste is not accepted (reference 12) • there is co-ordination between the gatehouse staff and staff at the tipping face where known odorous wastes are being accepted • the potential for odours during the excavation of waste or removal of cover, (for example, during the	No detailed odour control measures provided.	No (ESAP Recommendation)

BAT REQUIREMENTS	PROJECT PROPOSED DESIGN AND EHS ARRANGEMENTS	BAT
installation of gas wells, or for other operational needs) is assessed.		
5.You should: • keep tipping areas as small as possible • cover waste as soon as possible • design, construct and maintain intermediate capping to prevent the possible release of odours	Measures to minimise operational areas, apply daily cover in a timely manner and to design, construct and maintain capping on cell completion are provided.	Yes
6.You should: • implement an effective landfill gas management plan in conjunction with good operational practice (such as not leaving odorous waste uncovered) to prevent such releases • ensure full containment of the waste, including temporary and/or phased capping of the site • ensure landfill gas control systems are well constructed, operated and maintained. • consider point source emissions such as those from landfill gas flares in selecting and assessing the control system • install active landfill gas extraction as soon as possible to minimise the release of uncontrolled landfill gas emissions.	Details of landfill gas and leachate control measures provided. This includes landfill gas extraction and leachate containment systems. However further consideration to point source emissions and operation and maintenance of control systems could be made.	Yes
7.You should: • use an enclosed leachate treatment operation where the proximity of the operation to a receptor is likely to cause an odour problem • provide enclosed leachate storage where the proximity of the storage to a receptor is likely to cause an odour problem • effectively seal leachate sumps/wells/side wall drainage systems (retaining any necessary access for monitoring and maintenance).	Enclosed leachate storage and treatment proposed. No details provided in relation to effective sealing of leachate sumps.	Yes
Recommendations for Noise and Vibration Control		
1.You should ensure regular maintenance of the access roads to repair 'pot-holes'; this serves to significantly reduce noise generated by empty vehicles.	No details of road maintenance provided.	No (ESAP Recommendation)
2.Your design criteria of enclosed landfill gas flares should include noise reduction.	Landfill gas extraction/flare/utilisation equipment is proposed to be installed but no reference is made to noise reduction in proposals.	No (ESAP Recommendation)
Recommendations for Pest Control		
1.You should have procedures to deal with the presence of scavenging birds which should consider: • the deposit of excrement and scraps of food on mobile plant and vehicles on-site, reducing driver's visibility and damaging nearby property • bird-strike damage to aircraft • the introduction of pathogens to nearby water bodies, crops and animals • the introduction of alien species to sensitive local habitats.	No details of Pest Control Measures provided and these should be developed to cover those listed in terms of BAT.	No (ESAP Recommendation)
2.The measures you use to mitigate bird nuisance should include the employment of good landfill practice,	As above	-

BAT REQUIREMENTS	PROJECT PROPOSED DESIGN AND EHS ARRANGEMENTS	BAT
with prompt disposal and compaction, working in small active areas with progressive covering of waste, and netting, together with the use of bird scaring techniques. These measures include: • flying birds of prey over the site • bird kites mimicking birds of prey • shell crackers - containing flare and bangers • rope bangers • gas cannons • scarecrows - fixed or mobile • amplified recordings of bird distress calls (species specific) • electronic sounds imitating calls of distress • bird corpses or dummies. Note: Measures involving explosions or distress calls may have an adverse environmental impact in terms of noise and may scare desirable species living in the vicinity of the site.		
3. You should maintain a log of techniques employed to demonstrate compliance with requirements and as part of your performance monitoring system. The log will also assist you in assessing the effectiveness of the different methods.	As above	-
4.There are advantages and disadvantages to all of the methods and the degree of effectiveness of any method may deteriorate with time and may need to be changed regularly. You should periodically review the measures you use.	As above	-
5. You should take into account the aviation safety standards introduced by the International Civil Aviation Organisation in 20037. One of these standards relates to bird hazard reduction at, or in the vicinity of aerodromes, particularly large numbers of flocking birds feeding at landfill sites	As above	-
6.You should use the following measures to deal with pest infestation: • effective site management involving prompt emplacement, compaction and covering of wastes in well-defined cells, intermediate capping and prompt capping of completed areas • ensuring previously employed waste is not disturbed, exposed or moved • regular visits by pest control contractors or fully trained operatives • inspection and treatment of areas where rats live, for example sewers, culverts and drains.	As above	-
7.Fly infestations commonly arise from waste which has been awaiting collection for some time. You should have procedures in place to prevent or limit the acceptance of such wastes. You should reduce the risk of infestation by prompt burial of such wastes in order to interrupt the reproductive cycle of the fly. You should consider the potential for fly infestation to develop if engineering works require waste to be excavated.	As above	-

APPENDIX D: EIA PROCEDURES AND SCOPING

MINISTRY OF ENVIRONMENT OF THE REPUBLIC OF MOLDOVA

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At no. 01-8/2182 from 11.10.2016

Î.M. Regia "Autosalubritate"

27 Martie 1918 14 street,

Chisinau mun., MD-2069

The preliminary evaluation result of the environmental impact of the planned activity (preliminary evaluation decision)

Following the request made by the municipal enterprise Regia "Autosalubritate", registered under No. 2951 of October 11, 2016 on determining the need to conduct an environmental impact assessment of the planned activity *"Improvement of solid waste management service in Chisinau municipality by construction and modernization of the Tintareni village polygon, Anenii Noi district, as well as rehabilitation of transfer station and closure of the dump site in Ciocana sector, Chisinau municipality"*, The Ministry of Environment communicates the following.

During the preliminary analysis of the environmental impact of works resulted in case of carrying out such activities, at the meeting No. 08.2016 of November 4, 2016, the Committee of preliminary assessment of planned activity

applying selection criteria to determine the need for conducting environmental impact assessment, stipulated in Annex 4 of the Law No.86 of 29.05.2014 on environmental impact assessment.

taking into account the information presented in request and supporting documents.

examining the main and secondary objectives and project concept solutions, the complexity of the planned works (demolition, earthmoving, building, consolidation, renovation and modernization, etc.) specific technical parameters to engineering constructions planned for modernization and / or building (the existing dam, the plant for collection and treatment of leachate, the system for collecting and management of derived gases, drainage system, maintenance, monitoring and control buildings, etc), as well waste volume planned for recycling and disposal,

determined that the initiator plans to achieve, in aggregate, two activities covered by the Law on environmental impact assessment and include them in the list of planned activities necessarily subjected to environmental impact assessment, as follows:

- Annex 1, paragraph 9, "Devices for removal of hazardous waste by incineration, chemical treatment or burial" and Annex 2 paragraph 11, subparagraph b), "Installations for waste disposal (included in Annex 1 with a capacity from 50 to

100 tonnes per day) for the modernization of the polygon from Tintareni village, Anenii Noi district and,

- Annex 1, paragraph 17 “Devices for recycling of hazardous waste with a capacity exceeding 100 tonnes per day" for closing the dump site from Ciocana sector, Chisinau municipality and rehabilitation of transfer station, creation of sorting line and baling of recyclable materials on its territory.
- The impact that could be caused as a result of development of this activity requires determination and proper assessment of its direct and indirect effects on environmental factors and population, including prevention and reduction measures of the potential estimated impact.
- Accordingly, taking into account the fact that the planned activity “Improving solid waste management service in Tintareni village, Anenii noi district, as well as rehabilitation of transfer station and closure of the dump site in Ciocana sector, Chisinau municipality, covered by the Law No. 86 of 29 may 2014 on Environmental Impact Assessment and that such activity is necessarily subject to environmental impact assessment, and **environmental impact assessment at national level is decided to be conducted.**

Thus, in the process of developing the project’s Programme for development of the Environmental Impact Assessment, it is mandatory to comply with the principles for conducting the environmental impact assessment and the stipulations on the procedure for carrying out the environmental impact assessment nationwide, in accordance with Chapter VI of Law No. 86 of May 29, 2014, on environmental impact assessment.

In this context, I. M. Regia “Autosalubritate” will coordinate with the Ministry of Environment the project’s Programme for development of environmental impact assessment, elaborated according to the structure established by art. 19, par. (5) of Law No. 86, accompanied by the materials certifying public information (the copy of publication, announcement).

Also, in accordance with the Law on environmental assessment, the development of environmental impact assessment documentation is made according to the coordinated Program for achieving impact assessment, taking into account the comments expressed publicly in the primary consultation process of the project’s Programme for development of environmental impact assessment.

It is important to note that according to article 19, par. (6) of Law No. 86, the deadline for drafting and presenting the environmental impact assessment documentation of the project from the moment of coordination of the project’s Programme for development of environmental impact assessment, is 3 (three) years. This time period is estimated to be sufficient for the preparation of documentation, which must be based on existing technical and scientific information in the environmental and natural resources field, indicating the measures to reduce or prevent potential environmental impacts during project implementation stages, as well for carrying out environmental impact assessment works, taking into account the peculiarities of planned activity and difficulties of natural, social and technological conditions. If at the expiry of the aforementioned deadline, the initiator has not submitted environmental impact assessment documentation, specified in art. 20 of Law No. 86, he/she is obliged to repeatedly develop and approve the implementation Programme.

It should be mentioned that according to the requirements of art. 8. par. (1) and Annex 3 of the Law on Environmental Impact Assessment, yet at the stage of preliminary examination, the initiator must specify the site alternatives for the planned activity.

Proceeding from what was said, and considering that the information presented does not contain the site alternatives, their description for the development of environmental impact assessment documentation structure becomes imperatively necessary, as well for development of the implementation Programme's project.

We reiterate that for preventing and mitigating potential impacts of project planning stage, when examining technological alternatives, site and strategy of achieving of planned activity, the most optimal choice will be made, in terms of environmental and health protection.

Thus, the contents of environmental impact assessment documentation, must describe the main alternatives proposed and the reasons underlying the choice of one or another alternative, taking into account the environmental effects which must include, in the description, the following aspects: site alternatives, other technical and technological solutions, other start-up periods of the project indicating the reasons that led to the choice, impact size analysis, duration, reversibility, viability and effectiveness of improvement measures for each project alternative and for each environmental component.

Also, for ensuring compliance with the precautionary principle of environmental impact assessment, environmental impact assessment documentation must be developed in compliance with minimum rules for developing and editing of documentation, study, etc, as well its presentation to national legislation requirements, otherwise than indicated in the preliminary assessment request, in section 12.1.2 "based on performance requirements, legislation, and political context of EBRD".

In this regard, it is noted that, in accordance with the applicable Law, art. 20, paragraph (3) of Law No. 86 of May 29, 2014 on impact assessment, the right of conducting/developing documentation is assigned exclusively to legal persons who prove to practice this kind of activity (eg. representation in relations with the central authority and development of environmental and drafting of documentation to obtain environmental agreement, etc.).

Therefore, the review terms stipulated in the Law on environmental impact assessment can be extended in some cases, to clarify, discuss the documentation at each stage separately.

Conformable and qualitative elaboration of documentation, and taking into account other risk factors, can essentially reduce the terms of obtaining Environmental Agreement on environmental impact assessment documentation.

Deputy Minister

Committee President **Victor MORGOCI**

APPENDIX D-1: MOLDOVAN LAW ON EIA NO.86 MAY 2014

LPC86/2014
Single internal ID: 353608 Legal act fiche
Russian version

Republic of Moldova

THE PARLIAMENT

LAW No. 86
of May 29, 2014

on Environmental Impact Assessment

Published on July 4, 2014 in *Monitorul Official*, Issue 174-177, Article 393
Effective date: January 4, 2015

The Parliament passes this organic law.

This Law transposes partly Directive 2011/92/EU of the European Parliament and of the Council of December 13, 2011 on the assessment of the effects of certain public and private projects on the environment (codification) published in the Official Journal of the European Union, Issue L 26, of January 1, 2012.

Chapter I
GENERAL PROVISIONS

Article 1. Purpose and Subject-Matter

(1) The purpose of this Law is to create a legal framework for operation of a mechanism for environmental impact assessment of certain public and private projects or planned activities to ensure prevention or reduction of adverse impact on the environment or human health at their earliest stages.

(2) The subject-matter of this Law are: procedures and manner applied in the process of assessing the impact on environment of certain public and private projects or planned activities which might have a major impact on the environment in the Republic of Moldova or other states.

Article 2. Key Terms

The following key terms shall be used for the purposes of this Law:

Environmental permit means a permit issued by a central environmental public authority which lays down conditions and, if necessary, environmental protection measures subject to be

complied with should a project be implemented;

Planned activities mean a public or private project or type of planned activity which consists in the construction of a new facility, expansion, rehabilitation, modernization, conversion, or planning new activity types, extraction or use of natural resources, impacting an area or a landscape not affected or modified to a small extent by human activities, or other actions implementation or final outcome of which might have a significant environmental impact;

Competent authority means a central environmental public authority;

Environmental impact assessment means a procedure carried out as per this Law with a view to assessing possible environmental impact of planned activities or formulating proposals to prevent or reduce adverse impact or, should the requirements laid down herein be violated, banning the launch of planned activities;

Environmental impact means direct or indirect changes in the environment caused by the implementation of planned activities which have or might have an impact either on human health or on biodiversity, soil, subsoils, water, air, climate, landscape, material assets, cultural heritage, or the interaction between the above factors;

Developer means a natural or legal person, including public and territorial administrative units, which applies for a right to implement planned activities;

Affected party means a contracting party(-ies) to the Convention on Environmental Impact Assessment in a Transboundary Context which might be affected by the impact of planned activities in the territory of the party of origin;

Party of origin means a contracting party(-ies) to the Convention on Environmental Impact Assessment in a Transboundary Context within the jurisdiction of which planned activities are to be implemented;

Public means one or more natural or legal persons and, in accordance with national legislation or practice, their associations, organizations, or groups;

Public concerned means the public interests of which are or could be affected or which is interested in environmental decision-making.

Article 3. Environmental Impact Assessment Principles

(1) Environmental impact assessment shall be carried out based on the following principles:

a) Preventive action principle;
b) Reliable and complete information principle;
c) Transparency and availability principle;
d) Participation principle;
e) Precautionary principle; and
f) “Polluter pays” principle.

(2) Preventive action principle envisages that environmental impact assessment shall be carried out at an early stage of planning, design, and decision-making regarding planned activities based on technical and research information available as of respective moment,

specifying measures to reduce or prevent potential environmental impact with due account taken of the need for sustainable development of the country.

(3) Reliable and complete information principle envisages that environmental impact assessment shall be carried out based on the information provided by a developer about planned activities, current state of environment and natural resources and the information obtained from specialized public authorities and local governments in the territory of which the planned activities are to be carried out with due account taken of the proposals voiced during public debates.

(4) Transparency and availability principle envisages that the public is entitled, as required by this Law and the legislation on decision-making transparency, in due course and before planned activities are launched to obtain information about the planned activities and to participate in public debates held in the course of environmental impact assessment.

(5) Participation principle envisages that a developer shall ensure access by all the participants concerned to the environmental impact assessment documentation and public consultations on the assessment of impact of planned activities in a publicly-available venue at available time.

(6) Precautionary principle envisages that addressing issues related to adverse environmental impact should start before scientific evidence is obtained in full about adverse environmental impact of the planned activities. Should adverse environmental impact of the planned activities be reasonably suspected, precautionary measures shall be taken, and in the event of significant or irreversible impact, the activities shall be subject to ban.

(7) "Polluter pays" principle envisages that a developer of the planned activities shall incur expenses related to environmental impact assessment and minimization of adverse environmental impact of the planned activities.

Article 4. Scope of Environmental Impact Assessment

(1) The environmental impact assessment shall identify, describe, and assess in an appropriate manner, in the light of each individual case, the direct and indirect effects of a planned activity on the following factors:

a) Human beings, fauna, and flora;
b) Soil, subsoils, water, air, climate, and the landscape;
c) Material assets and the cultural heritage;
d) The interaction between the factors referred to in points a)-c) and long-term and cumulative effect thereof.

(2) The environmental impact assessment shall be conducted in a transboundary context by type of activities referred to in points 1-16 of Appendix 1 and at the national level by type of activities referred to in points 17-24 of the same Appendix.

(3) The environmental impact assessment by type of activities referred to in Appendix 2 shall be conducted based on an opinion issued by a competent authority as per Articles 9 and

10.

(4) Types of activities referred to in Appendix 2 for which the need for environmental impact assessment is not provided for shall not fall under this Law.

(5) Planned activities carried out for the purposes of national defence shall not be subject to environmental impact assessment.

(6) Provisions hereof shall not affect the duties of a competent authority to observe restrictions, as imposed by national legislation, with regard to the official, commercial, or industrial secrets, including intellectual property.

(7) Provisions hereof shall not extend to the implementation of activities referred to in point g) of paragraph 10 of Appendix 2 in the event of threat of flood caused by a natural calamity or an accident.

Article 5. Powers of Competent Authority

In the area of the environmental impact assessment, competent authority shall have the following powers:

a) Coordinate the environmental impact assessment procedures, including in a transboundary context;
b) Approve the Environmental Impact Assessment Program;
c) Review the environmental impact assessment documentation;
d) Issue environmental permits.

Article 6. Financing the Environmental Impact Assessment Activities

(1) Developer shall incur expenses related to the drafting and submitting the environmental impact assessment documentation, as well as those related to awareness-raising, public consultations, and translation of the environmental impact assessment documentation in the event of transboundary impact.

(2) Competent authority shall issue environmental permits free of charge.

Chapter II
APPLICATION REGARDING PLANNED ACTIVITIES

Article 7. Applying for Planned Activities

(1) Developer planning an activity referred to in Appendices 1 or 2 shall file with a competent authority a written application for planned activities. The application shall be filed following feasibility study of the planned activities.

(2) The competent authority shall post information to that effect on its official web-page within five days following the day an application has been filed with the competent

authority.

Article 8. Content of the Application for Planned Activities

(1) The application shall contain information about the planned activities and at least two (alternative) solutions as to the venue and employed technologies, specifying possible environmental impact and social and economic aspects of such impact. Appendix 3 provides for the content of the application for planned activities.

(2) Application filed shall serve mostly as grounds for the competent authority to conduct a preliminary assessment.

Chapter III
PRELIMINARY ASSESSMENT OF THE PLANNED ACTIVITIES

Article 9. Preliminary Assessment

(1) The environmental impact assessment shall be preceded by a preliminary assessment of the planned activities conducted by competent authority.

(2) Preliminary assessment of the activities referred to in Appendix 1 shall be conducted based on the application filed by developer, using the criteria set in Appendix 4, with a view to identifying the need for the environmental impact assessment in a transboundary context or at the national level.

(3) Preliminary assessment of the activities referred to in Appendix 2 shall be conducted based on the application filed by developer, using the criteria set in Appendix 4, with a view to identifying the need for the environmental impact assessment. Should the need for the environmental impact assessment be established, the assessment shall be conducted at the national level.

(4) Preliminary assessment shall be conducted within ten business days.

Article 10. Preliminary Assessment Findings

(1) Following a preliminary assessment, competent authority shall make one of the following decisions:

a) Planned activities are subject to the environmental impact assessment in a transboundary context;
b) Planned activities are subject to the environmental impact assessment at the national level;
c) No environmental impact assessment is necessary.

(2) Decision of the preliminary assessment shall be brought to the attention of developer/tier-two local government in the territory of which planned activities are to be carried out and shall be posted on the official web-page of the competent authority within five business days following its date.

(3) Should the competent authority establish that the activities referred to in Appendix 1 are subject to the impact assessment in a transboundary context, the assessment shall be conducted as per Articles 11-15 with due account taken of the affected party.

(4) Should the competent authority establish that the activities referred to in Appendix 1 or 2 are subject to the impact assessment at the national level, the assessment shall be conducted as per Articles 19-23.

(5) Should the competent authority establish that the activities referred to in Appendix 2 do not require the environmental impact assessment, technical documentation subject to the state environmental expert examination shall be prepared.

Chapter IV
PROCEDURE FOR THE ENVIRONMENTAL IMPACT ASSESSMENT IN A TRANSBOUNDARY CONTEXT FOR PARTY OF ORIGIN

Article 11. Initiating the Environmental Impact Assessment in a Transboundary Context

(1) Should the implementation of the planned activities which have transboundary impact be expected in the territory of the Republic of Moldova or if any planned activities of other states might have major impact on the environment in the Republic of Moldova, the environmental impact assessment shall be conducted as required by the Convention on Environmental Impact Assessment in a Transboundary Context (hereinafter "the Espoo Convention") and this law.

(2) If the procedure for the environmental impact assessment in a transboundary context applies, the information provided to other states shall be subject to restrictions imposed by the legislation of the Republic of Moldova.

(3) Decision on the participation of the Republic of Moldova as an affected party in the environmental impact assessment procedures shall be made by its competent authority based on the notice of the planned activities sent by the party of origin.

(4) In the event where the Republic of Moldova deems that it will be affected by significant adverse impact from the planned activities of the party of origin, but failed to receive any notice from the party of origin, its competent authority shall initiate consultations with the party of origin regarding the transboundary impact. If the parties have failed to agree on settlement of the issue, the competent authority of the Republic of Moldova may put up the issue for review by a commission upon request as per Appendix IV to the Espoo Convention.

(5) In the event where joint activities (construction of a thoroughfare, pipelines, etc.) are planned to be implemented, the parties shall agree on the environmental impact assessment procedures and on preparing the environmental impact assessment documentation (uniform documentation shall be prepared, or each party shall prepare its own environmental impact assessment documentation).

Article 12. Notifying the Affected Party

(1) Should the competent authority of the party of origin establish at the preliminary assessment stage that it is necessary to review the planned activities in a transboundary context, developer shall prepare a notice for the affected party and send it to the competent authority of the party of origin.

(2) Five business days following the receipt of the notice from the developer, the competent authority of the party of origin shall submit the notice of the planned activities to the competent authority of the affected party through the diplomatic channels and post it on its official web-page. The competent authority of the affected party shall respond within thirty days following the day of receipt of the notice whether the affected party will/will not participate in the environmental impact assessment procedure.

(3) The notice shall contain information based on which the affected party could determine the extent of its interest and involvement in the environmental impact assessment process. The notice shall be submitted to the affected party in the state language or one of the official languages of the Espoo Convention (hereinafter "accessible language") determined in coordination with the affected party.

(4) The notice template is provided for in Appendix 5.

(5) At the notification stage, the party of origin may request from the affected party publicly available information necessary to prepare the environmental impact assessment documentation and information about national environmental impact assessment procedures. Requested information shall be made available within 45 days following the request date.

(6) Should the affected party inform the competent authority of the party of origin it will not participate in the environmental impact assessment procedure or should it fail to reply within the deadline set in paragraph (2), the environmental impact assessment procedure shall be carried at the national level without the affected party's participation.

(7) Should the affected party express its intent to participate in the environmental impact assessment procedure and inform the competent authority of the party of origin about its decision within the set deadline, the environmental impact assessment procedure shall be carried out with the affected party's participation.

Article 13. Preparing and Submitting the Environmental Impact Assessment Documentation

(1) Should the affected party express its intent to participate in the environmental impact assessment procedure, the competent authority of the party of origin shall submit to the competent authority of the affected party through the diplomatic channels the Environmental Impact Assessment Programme developer presented, based on which the environmental impact assessment documentation shall be prepared. The competent authority of the affected party shall issue to the competent authority of the party of origin its opinion regarding the Program within thirty days.

(2) Once necessary information has been collected at the national level, information from the affected party obtained, and the Environmental Impact Assessment Programme agreed with the competent authority of the party of origin and with due account taken of the

affected party's opinions, the developer shall proceed with preparing the environmental impact assessment documentation.

(3) The competent authority of the party of origin, within five business days following the receipt of the environmental impact assessment documentation from developer or authority which prepared the documentation (hereinafter "the environmental impact assessment documentation preparer"), shall submit it through diplomatic channels in the accessible language to the competent authority of the affected party for review and comments. The environmental impact assessment documentation shall be prepared in hard copies and in an electronic format.

(4) The affected party shall disseminate the environmental impact assessment documentation as per established national procedure, in particular to the public, prepare and present its opinion, and hold consultations with the party of origin.

(5) The timeframe for review, consultations with the public, and release of opinion regarding the environmental impact assessment documentation for the affected party shall not exceed fifty days. At the request of the affected party, the competent authority of the party of origin may with developer's consent extend the timeframe for review of the environmental impact assessment documentation by no more than thirty days.

(6) The developer shall duly take into account in the environmental impact assessment documentation comments and proposals set out in the opinion of the competent authority of the affected party.

(7) Preparation and approval of the environmental impact assessment documentation at the national level shall be carried out as per Articles 19-23.

Article 14. Carrying Out Consultations

(1) Competent authorities of the parties shall conduct, as agreed, consultations at various stages of the environmental impact assessment. Competent authority of the party of origin shall initiate in a mandatory manner consultations with the competent authority of the affected party following the preparation of, and submitting to the affected party, the environmental impact assessment documentation.

(2) Consultations shall be held with regard to the potential transboundary impact of the planned activities and envisaged measures to reduce or eliminate the adverse impact of the activities, methods to inform the public, and public debates. The competent authorities of the parties shall also review, as agreed, other issues relevant to the planned activities and the environmental impact assessment procedure. The competent authorities of the parties shall agree on membership of the consultations, timeframe, venue, and form of the consultations.

(3) The consultations shall be held in the following forms:
   a) Joint committees;
   b) Expert meetings;
   c) Videoconferences, information exchange by e-mail or formal letters;
   d) Meetings of middle and/or senior officials.

(4) Public debates shall be held in the territory of the party of origin within territorial administrative boundaries of a settlement/settlements where it is planned to carry out activities with participation of the affected party as per bilateral agreements or joint decision of the parties to conduct public debates on a case-by-case basis. Affected party shall participate in the consultations and public debates at its own expense.

(5) Outcomes of the consultations and public debates, including the list of participants, shall be entered in the minutes signed by the meeting chairperson and secretary.

(6) Consultations and public debates shall be held before a decision is made as per point a) or c) of paragraph (1) of Article 23.

Article 15. Decision-Making

(1) Following the implementation of the procedure for internal coordination of the environmental impact assessment documentation, including public debates and consultation findings, as well as with due account taken of the affected party's opinion, the competent authority of the party of origin shall make a decision regarding issuance of an environmental permit as per Article 23.

(2) The competent authority of the party of origin shall inform the competent authority of the affected party through diplomatic channels within fifteen days about issuance of an environmental permit.

(3) The competent authority of the party of origin shall inform the competent authority of the affected party through diplomatic channels about approval of the planned activities within fifteen days following the receipt of the information from the competent authority as per Article 24.

Chapter V

PROCEDURE FOR THE ENVIRONMENTAL IMPACT ASSESSMENT IN A TRANSBOUNDARY CONTEXT FOR THE AFFECTED PARTY

Article 16. Preparing a Reply to Notice

(1) The Republic of Moldova shall be deemed to be an affected party should it receive from another state a notice of planned activities which might have significant impact on the environment of the Republic of Moldova. Preparing a reply to the notice and further coordination of work related to the impact assessment procedure shall be incumbent on the competent authority of the affected party.

(2) The competent authority of the affected party shall make a decision within the timeframe set in the notice not exceeding thirty days regarding participation or non-participation in the environmental impact assessment procedure with due account taken of the opinion of the central public authorities or local governments concerned territory of which might be exposed to the transboundary impact and that of the public. To that end, within five

business days the competent authority shall:

a) Post a notice on its official web-page, specifying the timeframe for release of opinion regarding the planned activities;
b) Send the invoice to the specialized public authorities and local governments within the territory of potential impact and to the public, specifying the deadline for comments.

(3) Should a decision be made to participate in the environmental impact assessment procedure, the competent authority of the affected party shall notify to that effect in writing through diplomatic channels the competent authority of the party of origin. A reply may also contain brief description of potentially affected environmental media (for instance, vulnerable ecosystems, rare and endangered species of flora and fauna, natural and cultural landmarks, and other sites which might be affected as a result of implementation of the planned activities). The template for the reply to notice is laid down in Appendix 6. The competent authority shall post information about the decision made on its official web-page within five days.

(4) If the competent authority of the affected party made a decision to not participate in the environmental impact assessment procedure, it shall inform in writing about the decision made the competent authority of the party of origin and post the information to that effect on its official web-page within five days.

(5) At the request of the competent authority of the party of origin, the competent authority of the affected party shall provide to the party of origin available information about the state of environment necessary to prepare the environmental impact assessment documentation and information about the national the environmental impact assessment procedure.

(6) No response from the competent authority of the affected party means its consent to carrying out the planned activities.

Article 17. Filing the Environmental Impact Assessment Documentation

(1) In the event where the competent authority of the party of origin submitted to the competent authority of the affected party for coordination the Environmental Impact Assessment Program, the competent authority of the affected party shall issue its opinion within the set deadline and as per set procedures. The competent authority of the affected party shall post the Program on its official web-page, specifying the timeframe for comments thereto.

(2) The environmental impact assessment documentation shall be submitted to the competent authority of the affected party in the accessible language as a hard copy and in an electronic format, specifying the timeframe for its review which shall not be more than fifty days. Where appropriate, as agreed by the parties, the timeframe for review of the

environmental impact assessment documentation may be extended by no more than thirty days.

(3) Within five business days, the competent authority shall post the environmental impact assessment documentation on its official web-page and submit it to tier-one local governments in the territory of potential impact and to the specialized central public authorities, specifying the timeframe for comments. Local governments shall post the information about the environmental impact assessment as hard copies in a publicly-available place and inform to that effect the public and the competent authority of the affected party.

(4) Public and other institutions involved in the environmental impact assessment documentation review process, as well as the public concerned shall submit their comments within the set timeframe to the competent authority which shall prepare its opinion.

(5) The competent authority of the affected party shall send through diplomatic channels to the competent authority of the party of origin its opinion about the environmental impact assessment documentation and concurrently post it on its official web-page.

(6) Developer shall take account of the opinion of the competent authority of the affected party about the environmental impact assessment documentation and inform within the set timeframe the competent authority of the affected party about whether it has accepted or turned down the comments and proposals set out in the opinion.

Article 18. Consultations and Informing about Decision Made

(1) As it reviews the environmental impact assessment documentation, the competent authority of the affected party shall conduct, as necessary, consultations with the institutions and the public concerned and shall initiate consultations with the competent authority of the party of origin.

(2) The competent authorities shall conduct consultations in coordination; that said, the parties shall agree on participants thereof and issues to be discussed. Consultations shall be held before an environmental permit is issued.

(3) As agreed by the competent authorities of the parties, the affected party may participate in the public debates in the territory of the party of origin. The affected party shall participate in the public debates at its own expense. The competent authority of the affected party shall post the information about the public debates to be held on its official web-page, inform to that effect local governments in the territory potentially affected by transboundary impact, and inform the public through mass media and internet about the date of, and venue for, the public debates.

(4) Outcomes of the consultations and public debates shall be duly taken account of by the party of origin in the process of decision-making regarding the planned activities.

(5) Once it will have received from the competent authority of the party of origin information about the decision made regarding the planned activities along with the reasoning it builds on, within five business days the competent authority of the affected party shall post them on its official web-page and send them to the respective local government.

Chapter VI

PROCEDURE FOR THE ENVIRONMENTAL IMPACT ASSESSMENT AT THE NATIONAL LEVEL

Article 19. Environmental Impact Assessment Program

(1) If the competent authority made a decision as per paragraph (1) of Article 10 to conduct the environmental impact assessment of the planned activities at the national level, developer is obliged to carry out all the procedures in compliance with this Chapter.

(2) In order to conduct the impact assessment of the planned activities, developer shall prepare the Environmental Impact Assessment Program which shall be subject to coordination with the competent authority. The developer shall also ensure informing the public and make it possible for the public and the public authorities concerned to submit written comments to the Program.

(3) The developer shall have published in at least one national and one local newspaper brief information about the planned activities, specifying in a mandatory manner its official web-page and/or another address where one could get conversant with the application and the Environmental Impact Assessment Program, as well as the deadline for comments. Comments shall be submitted to the developer and copies thereof, to the competent authority.

(4) The developer shall submit to the competent authority for coordination draft Environmental Impact Assessment Program along with the materials confirming the public have been informed (copy of publication, announcement). The competent authority shall review the program and issue its opinion within thirty days since the day of its receipt. The Program shall be deemed coordinated if the competent authority issued a clear opinion. If an adverse opinion has been issued, the draft Program shall be returned to the developer for finalization. Following its finalization, the Program may be submitted to the competent authority for review repeatedly.

(5) The Environmental Impact Assessment Program shall set the environmental impact assessment timetable, including consultations and public debates, list of public authorities the environmental impact assessment documentation shall be filed with, structure of the environmental impact assessment documentation, detailed list of the environmental impact assessment works based on the specificities of the planned activities and complexity of natural, social, and man-made conditions.

(6) The Environmental Impact Assessment Program shall be valid for three years since its approval date. If following the expiry of the set timeframe the developer failed to submit the environmental impact assessment documentation as described in Article 20, it shall prepare and coordinate the Program repeatedly.

Article 20. Preparing the Environmental Impact Assessment Documentation

(1) The environmental impact assessment documentation shall be prepared based on the regulations in force as per coordinated Environmental Impact Assessment Program and with due account taken of the comments the public submitted following primary awareness-raising about the planned activities.

(2) The environmental impact assessment documentation shall contain at least the following information:
   a) Description of the planned activities, including description of physical features of, and requirements to, land use during construction and operation stages; description of key features of production processes, assessment by type and amount of expected waste and emissions (water, air, soil, and subsoils pollution, noise, vibration, thermal and radioactive radiation, etc.) generated as a result of the planned activities, as well as the information about the venue for the implementation of the planned activities and scale thereof;
   b) Comparison of the key considered alternative options (including that of turning down the planned activities) and specifying the main reasons for choosing an alternative with due account taken of the environmental impact;
   c) Description of the current state of those environmental media which might be affected significantly by the planned activities, including more specifically human beings, flora, fauna, soil, subsoils, water, air, climatic factors, material assets, including architectural and archaeological heritage, landscape and interaction among the above factors with the level of details necessary to establish the baseline (initial) state of environment in the area of the planned activities;
   d) Description of possible types and consequences of the environmental impact of the planned activities and assessment of the scale thereof. The description shall cover direct impact and any indirect, secondary, cumulative, short-term, medium-term, and long-term permanent and temporary, positive and adverse impact of the planned activities;
   e) Description of the used environmental impact assessment methods;
   f) Description of the envisaged activities to prevent, reduce, and, if possible, eliminate significant adverse environmental impact;
   g) Description of measures to prevent and eliminate the consequences of probable emergencies and accidents;
   h) Rationale for the need to conduct or not conduct post-project analysis and, should it be necessary to conduct it, its indicators and timeframe;
   i) Summary of information, without any technical features, referred to in points a)-h);

j) Identification of any challenged (technical difficulties or knowledge gaps) the drafter faced when compiling the necessary information;
k) Report on public participation;
l) Conclusions.

(3) The environmental impact assessment documentation can be prepared by legal persons authorized to engage in such kind of activity, either by domestic or foreign ones.

(4) Developer shall be authorized to request from the competent authority, public institutions, or local governments information necessary to prepare the environmental impact assessment documentation as per procedure and within the timeframe set by the legislation in force.

(5) If the developer decides to turn down the planned activities as the environmental impact assessment documentation is prepared, it shall inform about its decision the competent authority. The refusal information submitted shall be posted on the official web-page of the competent authority.

(6) The environmental impact assessment documentation shall serve as grounds for drafting the *Environmental Protection* section of design documentation.

Article 21. Review and Discussion of the Environmental Impact Assessment Documentation

(1) Developer shall submit the environmental impact assessment documentation for review to the competent authority which shall post it on its official web-page and review it within sixty days after its submission date.

(2) As instructed by the competent authority, the developer shall submit the environmental impact assessment documentation for review to the specialized central public authorities and tier-one local government in the territory of which the planned activities will be carried out. The above bodies shall submit written comments to the environmental impact assessment documentation to the developer within fifty days, and copies thereof shall be submitted concurrently to the competent authority.

(3) Within five days following receipt of the environmental impact assessment documentation, the local government shall post it in a publicly available venue, inform thereof the developer, the competent authority, and the public, and provide information about the person helping the developer to organize public debates.

(4) The developer shall post the environmental impact assessment documentation on its official web-page or ensure public access to it by other means. Once the environmental impact assessment documentation has been filed, the developer shall have an announcement published in at least one national and one local newspaper about it being possible for the public to get conversant with the environmental impact assessment

documentation, submit written comments thereto, and attend public debates regarding the above documentation. Comments from the public shall be submitted to the developer within thirty days after public access to it has been ensured, and copies thereof shall be made available concurrently to the competent authority.

(5) The developer is obliged to review public opinion by means of public consultations. Following the public debates and written comments received, the developer shall prepare a public participation report which shall be an integral part of the environmental impact assessment documentation. The developer shall submit the report to the competent authority within fifty days after the environmental impact assessment documentation will have been submitted. The substance of the public participation report is described in Appendix 7.

(6) The competent authority shall take part in all public debates regarding the impact of the planned activity, which shall be carried out as per this law.

(7) Until the issuance of the environmental permit, the competent authority shall conduct consultations with the developer with regard to the environmental impact assessment documentation. Consultations may be attended, as the case might be, by the authorities potentially interested in the planned activity, by nature of their specific responsibilities in the sector of environment.

Article 22. Procedure for the conduct of public debates

(1) Public debates regarding the environmental impact assessment documentation shall be conducted in order to:

a) ensure the exercise of the public's right to participate in debates and in important environmental decision-making;

b) take into account the public's objections and proposals with regard to the environmental impact assessment documentation and decision-making related to the implementation of the planned activity;

c) find mutually acceptable solutions for the developer and the public to prevent and minimise the adverse environmental impact resulted from the implementation of the planned activity.

(2) Public debates shall be conducted in the territory of the local public authority where the planned activity is to be implemented. Once the environmental impact assessment documentation has been filed, the developer, together with the local public authority shall set the venue, the date and the time for the conduct of the public debates.

(3) The developer shall inform the public about the conduct of public debates by putting out adverts in the mass-media or posting them on its official web-page. The local government shall also post the advert regarding the conduct of public debates on its web-page, at its office and in other public places. The advert shall be put out no sooner than 10 days before launching the public debates.

(4) The findings of the public debates shall be entered in a minute, with the indication of the total number of participants, of the list of questions and of the objections and proposals put forth during the public debates related to the environmental impact assessment documentation. The minute shall be drawn up within 3 days following the date of the conduct of the public debates and shall be signed by the chairperson of the meeting on the public debates.

(5) Should no answers be provided to the questions put forth during the conduct of the public debates on the environmental impact assessment documentation, the developer (the

environmental impact assessment documentation preparer) shall deliver the answers, within 15 days following the date of the conduct of the public debates, to the authors on the postal or email addresses indicated during registration.

Article 23. The environmental permit

(1) Based on the outcomes of the review of the environmental impact assessment documentation, of the opinions issued by the central and local public authorities, and by other institutions concerned, taking into account as well the written comments submitted by the public and the findings of the public consultations, the competent authority shall approve one of the following decisions:

a) to issue the environmental permit;

b) to return to the developer of the planned activity the environmental impact assessment documentation for finalisation;

c) to decline the issuance of the environmental permit.

(2) The competent authority shall issue the environmental permit if the environmental impact assessment documentation has been drafted as per requirements hereof and the adverse environmental impact has been minimised. The environmental permit shall comprise at least:

a) the reasoning of the decision;

b) mandatory measures envisaged to prevent and reduce the adverse environmental impact;

c) information regarding the process of public participation.

(3) Should the environmental impact assessment documentation have been drafted in breach of the regulations hereof or should no measures to prevent and reduce the adverse environmental impact be provided for, the competent authority shall return the environmental impact assessment documentation to the developer for finalisation, indicating the shortcomings that are to be removed. In that event, the developer shall file, within 30 days, the environmental impact assessment documentation for repeated review, and the competent authority shall adopt one of the decisions laid down in paragraph (1) within 15 business days.

(4) In the event where, by means of the environmental impact assessment documentation, it has been established that, after the implementation of the planned activity, the environment will be exposed to an irreversible damage, the competent authority shall decline the issuance of the environmental permit. In that event, the developer shall turn down the planned activity.

(5) The timeframe for adopting the decision provided for in paragraph (1) and informing the developer with regard to the adoption thereof is 60 days since the date of the receipt of the environmental impact assessment documentation by the competent authority.

(6) Until the expiry of the timeframe laid down in paragraph (5), the competent authority, may decide, with the consent of the developer, to extend this deadline with no more than 30 days.

(7) The environmental permit shall be valid for 4 years. If upon expiry of the above mentioned timeframe the developer has not obtained the permit for the implementation of the planned activity, it shall recommence the entire process of environmental impact assessment, starting with filing the application.

(8) The conditions set in the environmental permit shall be taken into account, in a mandatory manner, by the competent authorities, upon issuance of the permits.

(9) The information regarding the environmental permits issued shall be entered in the data basis of the competent authority.

(10) The competent authority ensures the keeping and maintenance of the archives of the environmental impact assessment documentation and of the copies of the environmental permits issued.

Chapter VII
APPROVAL OF THE PLANNED ACTIVITIES. RESPONSIBILITY AND CHALLENGE OF THE DECISIONS

Article 24. Informing about the approval of the planned activity

(1) The local or public authority that has issued a permit for the implementation of a planned activity with regard to which an environmental permit has been issued shall inform in written form the competent authority about the issuance of the permit, within 10 days since its issuance.

(2) The competent authority shall post on its official web-page the copy of the permit for the implementation of the planned activity. The developer shall inform the public, within 10 days, about the receipt of the permit by putting out adverts in the mass-media and posting them on its official web-page.

Article 25. Responsibility of the developer and of the the environmental impact assessment documentation preparer

(1) The developer shall be responsible for:

a) completeness and reliability of the information submitted;

b) carrying out the assessment of the environmental impact of the planned activity as per this law and other regulations;

c) organising public debates;

d) enforcing the provisions and respecting the conditions laid down in the environmental permit.

(2) The environmental impact assessment documentation preparer shall be responsible to the developer as per contractual provisions and this law.

(3) Non-compliance with the provisions in paragraph (1) by the developer shall be sanctioned as per Contraventional Code of the Republic of Moldova.

Article 26. Challenge of the decision

Any person, including associations of persons or organisations, is entitled to challenge, as per Law no 793-XIV of 10 February 2000 on contentious administrative matters, any decision provided for herein, also in the event where, by this means, the public's rights to information or participation in the process of environmental impact assessment are violated or disregarded.

Chapter VIII
FINAL AND TRANSITIONAL PROVISIONS

Article 27. Entering into force

This law shall enter into force 6 months after the date of publication.

Article 28. Abrogation of contrary regulations

Upon the entering into force of this law, Law no 851-XIII of 29 May 1996 on environmental expert examination and the environmental impact assessment (Official Gazette of the Republic of Moldova, 1996, no 52–53, art. 494), with subsequent amendments, shall be amended as follows:

1. In the title of the law, the words „and the environmental impact assessment" shall be excluded.

2. In the recitals, the words „ and the environmental impact assessment" shall be excluded,

and the word „their" shall be replaced by „its".

3. In article 1, the notion „ environmental impact assessment" shall be excluded.

4. In article 11 letter a), the text „and the environmental impact assessment documentation (hereinafter– EIA)" shall be excluded.

5. Chapter IV shall be abrogated.

6. In article 18, paragraph (6) shall be abrogated.

7. The appendix shall be abrogated.

Article 29. Organising the enforcement

(1) Within 6 months after the publication of this law, the Government, shall bring all its regulations in compliance therewith.

(2) The Government shall put forth to the Parliament proposals for bringing the active legislation in compliance therewith.

(3) Within 6 months after the publication of this law, the Ministry of Environment, shall draft and approve, in the set order, the Guidelines on the enforcement of the environmental impact assessment.

CHAIRMAN OF THE PARLIAMENT Igor CORMAN

No 86. Chisinau, 29 May 2014.

Appendix no 1

List
of planned activities subject in a mandatory manner to the environmental impact assessment

1. Crude oil refineries (excluding undertakings manufacturing only lubricants from crude oil) and installations for the gasification and liquefaction of 500 tons or more of coal or bituminous shale per day

2. Thermal power stations and other combustion installations with a heat output of 300 megawatts or more; Nuclear power stations and other nuclear reactors, including the dismantling or decommissioning of such power stations or reactors[1] (except research installations for the production and conversion of fissionable and fertile materials, whose maximum power does not exceed 1 kilowatt continuous thermal load)

[1] Nuclear power stations and other nuclear reactors cease to be such an installation when all nuclear fuel and other radioactively contaminated elements have been removed permanently from the installation site.

3. a) Installations for the reprocessing of irradiated nuclear fuel

b) Installations designed:

– For the production or enrichment of nuclear fuel;

– For the processing of irradiated nuclear fuel or high-level radioactive waste;

– For the final disposal of irradiated nuclear fuel;

– Solely for the final disposal of radioactive waste;

– Solely for the storage (planned for more than 10 years) of irradiated nuclear fuels or radioactive waste in a different site than the production site

4. a) Integrated installations for the initial smelting of cast iron and steel

b) Installations designed for the production of rough non-ferrous metals from ores, ore concentrates or secondary raw materials through metallurgic, chemical and electrolytic processes

5. Installations for the extraction of asbestos and for the processing and transformation of asbestos and products containing asbestos: for asbestos-cement products, with an annual production of more than 20,000 tons finished product, for friction material, with an annual production of more than 50 tons finished product; and for other asbestos utilization of more than 200 tons per year

6. Integrated chemical installations, that is installations for the industrial-scale manufacturing of substances using chemical conversion methods, in which several units are grouped and linked functionally, being designed for:

– manufacturing basic organic chemicals;

– manufacturing basic inorganic chemicals;

– manufacturing fertilisers based on phosphorus, nitrogen and potassium (simple or compound fertilisers);

– manufacturing basic plant protection products and biocidal substances;

– manufacturing basic pharmaceutic products using chemical or biological methods;

– manufacturing explosives

7. a) Construction of lines for long-distance railway traffic and of airports 3/ with a basic runway length of 2,100 metres or more

[2] "Airport" means an airport which complies with the definition in the 1944 Chicago Convention setting up the International Civil Aviation Organization (annex nr. 14).

b) Construction of motorways and express roads[3]

[3] The term „express road" corresponds to the definition „special motorway" set in the European Agreement of 15 November 1975 on Main International Traffic Arteries.

c) Construction of a new road of four or more lanes, or realignment and/or widening of an existing road of two lanes or less so as to provide four or more lanes, where such new road, or realigned and/or widened section of road, would be 10 km or more in a continuous length

8. a) Inland waterways and ports for inland-waterway traffic which would allow the passage of vessels of over 1,350 tons

b) Trading ports, sea and river ports quays for loading and unloading (except those designed for ferries) that allow the passage of vessels of over 1350 tons

9. Waste-disposal installations for the incineration, chemical treatment or landfill of dangerous wastes

10. Groundwater abstraction activities or artificial groundwater recharge schemes where the annual volume of water to be abstracted or recharged amounts to 10 million cubic metres or more

11. a) Works for the transfer of water resources between river basins, in the event where this transfer is related to preventing potential water shortages and the annually transferred volume of water exceeds 100 million cubic metres

b) In all the other cases, Works for the transfer of water resources between river basins, provided that the average annual flow of the abstraction basin, calculated for several years, exceeds 2 milliard cubic metres and the transferred volume of water exceeds 5% of this flow

In both cases network supplied drinking water shall be excluded

12. Extraction of petroleum and natural gas for commercial purposes, where the amount extracted exceeds 500 tons/day in the case of petroleum and 500 000 cubic metres/day in the case of gas

13. Dams and other installations designed for permanent retention and storage of water, provided that the new amount of water or the additional amount of water retained or stored exceeds 10 million cubic metres

14. Pipelines with diameters exceeding 800 mm and lengths of at least 40 km:

– for the transportation of gas, petroleum and chemical substances

– for the transportation of Carbon Dioxide (CO_2) for geological storage, including auxiliary connected plants

15. Industrial installations designed for the manufacturing of:

– cellulose from wood or other fibrous materials;

–paper and board, with a capacity 200 tons or more per day

16. Storage facilities for petroleum, petrochemical and chemical products, with a capacity of 200000 tons or more

17. Non-hazardous waste disposal installations, with a capacity exceeding 100 tons per day

18. Waste-water treatment plants with a capacity exceeding the 150 000 population equivalent

19. Installations for the intensive rearing of poultry or pigs with capacities exceeding

– 85000 broilers, respectively 60000 hens;

– 3000 production pigs (over 30 kg) or

– 900 sows

20. Quarries and surface mining pits, provided that the surface of the site exceeds 25 hectares or, in the case of turbaries, 150 hectares

21. Construction of overhead electrical power cables with a voltage of 220 kV or more and a length of more than 15 km

22. Carbon dioxide geological storage space (CO_2) in accordance with Directive 2009/31/CE of the European Parliament and of the Council of 23 April 2009 on the geological storage of Carbon dioxide

23. Installations for the capture of Carbon dioxide flows for the purpose of geological storage in accordance with Directive 2009/31/EC, flows originating from installations mentioned in this appendix or which capture an overall annual amount of CO_2 of at least 1,5 megatons

24. Any modification or extension of the activities listed in this appendix, provided that such modification of extension meets the restrictions set, as the case may be, in this appendix

Appendix no 2

List
of the planned activities requiring the identification of the need for the conduct of the environmental impact assessment

1. Agriculture and aquaculture

a) Management of water resources for agriculture, including irrigation and land drainage (100 hectares and more)

b) Installations for the intensive raising of livestock (not included in Appendix no 1, with a capacity of 500 and more for swine, 100 and more for cows, 10000 and more in the case of poultry)

c) Intensive fish farming designed for fishing (10 hectares and more)

2. Extractive industry

a) Quarries, open-pit mining and turbaries (not included in Appendix no 1)

a) Underground mines

c) Deep drilling, except drilling aimed at investigating soil stability, especially:

– geothermal drilling;
– nuclear waste storage drilling;
– water supply drilling (5000 cubic metres per day and more)

d) Surface industrial installations for the extraction of coal, petroleum, natural gas and ores and of the bituminous shale as well (up to500 tons of petroleum per day or 500000 cubic metres of gas per day)

3. Energy industry

a) Industrial installations for the production of electricity, steam and hot water (not included in Appendix no 1, with a power ranging from 100 to 300 megawatts)

b) Industrial installations for the transportation of gas, steam and hot water; conveyance of electric energy through overhead cables (not included in Appendix no 1, but situated on the territory of state-protected areas)

c) Surface storage of natural gas (10000 cubic metres and more)

d) Storage of combustible gases in underground tanks (10000 cubic metres and more)

e) Surface storage of fossil fuels (10000 tons and more)

f) Industrial briquetting of coal and lignite

g) Installations for the collection and treatment of radioactive waste (not included in Appendix no 1)

h) Installations for the production of hydroelectric power

i) Installations for converting wind power into electrical energy (wind parks) with a height exceeding 20 m

j) Installations for the capture of CO_2 flows for the purpose of geological storage in accordance with Directive 2009/31/EC, flows originating from installations not mentioned in Appendix no 1 hereto.

4. Producing and processing metals

a) Installations for producing cast iron or steel (primary or secondary fusion), including continuous casting equipment (2,5 tons per day and more)

b) Installations for processing ferrous metals (2,5 tons per day and more):
– hot rolling mill;
– smitheries with hammers;
– application of protective fused metal coats

c) Ferrous metal foundries (2,5 tons per day and more)

d) Installations for the melting, including alloyage, of non-ferrous metals, excluding precious metals, including recovered products (refining, foundry casting etc.) (2,5 tons per day and more)

e) Installations for the surface treatment of metals and plastic materials through electrolytic or chemical processes

f) Manufacturing and assembling motor vehicles, including tractors and manufacturing motor vehicle engines, including tractor engines

g) Shipyards

h) Installations for the construction and repair of aircrafts

i) Manufacturing railway equipment

j) Swaging by explosives

k) Installations for the roasting and sintering of metal ores

5. Mineral Industry

a) Coke ovens (dry coal distillation)

b) Installations for the manufacture of cement

c) Installations for the production of asbestos and the manufacture of asbestos-products (not included in Appendix I)

d) Installations for the manufacture of glass including glass fibre

e) Installations for smelting mineral substances including the production of mineral fibres

f) Manufacture of ceramic products by burning, in particular roofing tiles, bricks, refractory

bricks, tiles, stoneware or porcelain (5 tons per day and more)

6. Chemical industry (not included in Appendix 1)

a) Treatment of intermediate products and production of chemicals (5 tons per day and more)

b) Production of pesticides and pharmaceutical products, paint and varnishes, elastomers and peroxides (5 tons per day and more)

c) Storage facilities for petroleum, petrochemical and chemical products (10000 tons and more)

7. Food industry

a) Manufacture of vegetable and animal oils and fats (1000 tons per day and more)

b) Packing and canning of animal products (20 tons per day and more) and vegetable products (15 tons per day and more)

c) Manufacture of dairy products (5 tons per day and more)

d) Brewing and malting (5 decalitres per year and more)

e) Confectionery and syrup manufacture (5 tons per day and more)

f) Installations for the slaughter of animals (15 tons per day and more)

g) Industrial starch manufacturing installations (5 tons per day and more)

h) Fish-meal and fish-oil factories (5 tons per day and more)

i) Sugar factories

8. Textile, leather, wood and paper industries

a) Industrial plants for the production of paper and board (not included in Appendix no 1, with a capacity ranging between 50 and 200 tons per day)

b) Plants for the pretreatment (operations such as washing, bleaching, mercerization) or dyeing of fibres or textiles (1 ton per day and more)

c) Plants for the tanning of hides and skins (1 ton per day and more)

c) Cellulose-processing and production installations

9. Rubber industry

Manufacture and treatment of elastomer-based products (1 ton per day and more)

10. Infrastructure

a) Industrial estate development

b) Urban development, including the construction of shopping centres (with independent water supply and heating systems) and car parks (with independent water supply and heating systems) and also public car parks (with a capacity of 300 places and more)

c) Construction of railways and intermodal transshipment facilities, and of intermodal terminals (not included in Appendix no 1)

d) Construction of airfields (not included in Appendix no 1)

e) Construction of roads (thoroughfares), harbours and port installations (not included in Appendix no 1)

f) Inland-waterway construction not included in Appendix no 1, canalization and flood-relief works

g) Dams and other installations designed to hold water or store it on a long-term basis (not included in Appendix no 1, with a capacity ranging from 1 million to 10 million cubic metres)

h) Tramways, elevated and underground railways, suspended lines or similar lines of a particular type, used exclusively or mainly for passenger transport

i) Oil and gas pipeline installations and pipelines for the transportation of Carbon dioxide for the purpose of geological storage (not included in Appendix no 1)

j) Installations of long-distance aqueducts (thoroughfares 5 km long and more)

k) Work to combat river bank erosion

l) Groundwater abstraction and artificial groundwater recharge schemes (not included in Appendix no 1, with an abstraction or recharge capacity of 1 million cubic metres per year and more)

m) Works for the transfer of water resources between river basins (not included in Appendix

no 1)

11. Other activities

a) Permanent racing and test tracks for motorized vehicles

b) Installations for the disposal of waste (not included in Appendix no 1, with a capacity ranging from 50 to 100 tons per day)

c) Waste-water treatment plants (not included in Appendix no 1, with a capacity exceeding the population equivalent ranging from 50000 to 150000 inhabitants)

d) Sludge-deposition sites

e) Storage of scrap iron, including scrap vehicles (300 vehicles and more)

f) Test benches for engines, turbines or reactors

g) Installations for the manufacture of artificial mineral fibres

h) Installations for the recovery or destruction of explosive substances

i) Knackers' yards

j) Construction of hydrotechnical assets on inland waterways and harnessing navigable channels

12. Tourism and leisure

a) Ski-runs, ski-lifts and cable-cars and associated developments

b) Marinas

c) Holiday villages and hotel complexes outside urban areas and associated developments (with independent water supply, heating and sewage systems)

d) Permanent camp sites and caravan sites (with a capacity of 300 motor vehicles and more)

e) Theme parks (on a surface exceeding 10 hectares)

13. Any modification or extension of the activities listed in this appendix, provided that such modification of extension meets the restrictions set, as the case may be, in this appendix

Appendix no 3

Content of the application regarding planned activities

The application regarding planned activities consists of the official letter and, at least, the following information:

1. Planned activity (name, type)

2. Developer of the planned activity (name, postal or electronic legal address, telephone and fax numbers)

3. Contact person (position, e-mail, telephone and fax numbers)

4. Whether the planned activity is specified in Appendix 1 or 2 to the Law on Environmental Impact Assessment; objectives of the planned activity

5. Rationale of the planned activity, including alternatives (location, employed technologies and the zero option)

6. Description of the planned activity (nature, scale, technologies)

7. The location of the planned activity (description and explanation of the choice of location, copies of the papers attesting land ownership)

8. Timeframes for the implementation of the planned activity (beginning, duration of the construction and use)

9. Timeframe estimated for the decision making on the planned activity

10. Description of the environmental media that could be affected by the planned activity

11. Description of the possible effects on the environment and the assessment of their scale

12. Description of the measures for the protection of environment to minimise adverse impact

13. Should the planned activity be specified in Appendix no 1 to the Law on the Environmental Impact Assessment, the application shall contain additional information

regarding:

a) deadlines for the conduct of the environmental impact assessment

b) deadlines for drawing up the environmental impact assessment documentation

c) author of the environmental impact assessment documentation (name, postal or electronic legal address, telephone and fax numbers)

d) deadline estimated for the conduct of public debates and consultations.

Appendix no 4

Selection criteria to identify the need for the conduct of the environmental impact assessment

1. The initial assessment of the planned activity shall be carried out in accordance with the following criteria:

1) Characteristics of the planned activity:

a) the size (capacity/volume);

b) the interaction of the planned activity with other activities;

c) the use of natural resources;

d) the production of waste;

e) pollution and nuisances;

f) the risk of accidents, having regard in particular to substances or technologies used;

2) Characteristics of the location of the planned activity and geographical and urbanistic peculiarities thereof:

a) the existing land use;

b) the relative abundance, quality and regenerative capacity of natural resources in the area;

c) the absorption capacity of the natural environment, paying particular attention to forest areas, wetlands, costal zones, nature reserves and parks;

d) areas where the pollution level exceeds the environmental quality norms;

e) population density in the area;

f) landscapes of historical, cultural or archaeological significance;

3) impact of the planned activity on:

a) state-protected natural areas, protection areas surrounding groundwater abstraction sites, as well as protected areas surrounding surface water facilities;

b) protected species, their habitats and protected biotopes.

2. The potential significant effects of projects must be considered as per criteria set out under point 1, taking into account:

1) the extent of the impact (geographical area and size of the affected population);

2) transboundary nature of the impact;

3) the magnitude and complexity of the impact;

4) the probability of the impact;

5) the duration, frequency and reversibility of the impact.

Appendix 5

Template of the notice regarding the planned activity as per art. 3 of the Espoo Convention

1. INFORMATION ON THE PLANNED ACTIVITY

1) Information on the nature of the planned activity

Type of the planned activity

Whether the planned activity falls under Appendix I to the Espoo Convention

Sector of the planned activity (for instance, main activity and any/all related activities requiring assessment)

The scale of the planned activity (e.g., size, production capacity etc.)

Description of the planned activity (e.g., technologies used)

Description of the purpose of the planned activity

Rationale of the planned activity (e.g., social and economic, physical and geographical conditions)

Additional information /comments

2) Information on the extension of the timeframe and site of the planned activity

Location

Description of the location (social and economic, physical and geographical conditions)

Explanation of the choice of location for the planned activity (e.g., social and economic, physical and geographical grounds)

Timeframe of the implementation of the planned activity (e.g., beginning and duration of the construction and operation)

Maps and other documents on the planned activity

Additional information/comments

3) Information on the estimated environmental impact and the amelioration of measures proposed

The scope of the environmental impact assessment (EIA) (e.g., taking into account the cumulative impact, the issues related to sustainable development, the impact of marginal activities etc.)

The estimated environmental impact of the planned activity (e.g., types, locations, extent)

Use of resources (e.g., raw materials, energy sources etc.)

Consequences (e.g., amounts and types of emissions in the air, in the waters, solid wastes)

Transboundary impact (e.g., type, location, extent)

Amelioration measures proposed (e.g., whether there are amelioration measures for preventing, eliminating, minimising and compensating adverse environmental effects)

Additional information /comments

4) Developer/preparer of the EIA documentation

Name, address, telephone and fax numbers

5) EIA documentation

Availability of the EIA documentation (e.g., documentation is filed together with the notice)

Should the documentation not be submitted or should it be partially submitted, the description of the additional documentation that is to be submitted together with the estimated date of its availability

2. CONTACT POINTS

1) Contact points for the affected party:

Authorities responsible for the coordination of the EIA-related activities (name, address, telephone and fax numbers)

List of the affected parties to which the notice is to be sent

2) Contact points for the party of origin

Authorities responsible for the coordination of the EIA-related activities (name, address,

telephone and fax numbers)

Authorities responsible for decision making, should they be others than the authorities responsible for the coordination of the EIA-related activities (name, address, telephone and fax numbers)

3. INFORMATION ON THE EIA PROCEDURE IN THE COUNTRY WHERE THE PLANNED ACTIVITY IS TO BE CONDUCTED

Information of the EIA procedure to which the planned activity is to be subject

Estimated period (timeframes)

Possibility of the affected party's involvement in the EIA procedure

The affected party's opportunities to review and comment the notice and the EIA documentation

Nature of and deadline for the adoption of a potential decision

Procedure for the approval of the planned activity

Additional information/comments

4. INFORMATION ON THE PUBLIC'S PARTICIPATION IN THE COUNTRY OF ORIGIN

Procedures for the public's participation

Estimation of the beginning and duration of the public consultations

Additional information /comments

5. DEADLINE FOR THE REPLY

Date

Appendix no 6

Template of the reply to the notice regarding the planned activity as per art. 3 of the Espoo Convention

1. INFORMATION ON THE POTENTIAL AFFECTED ENVIRONMENT

a) Information on the potential affected environment

Protected areas

Geographical characteristics

Archaeologically significant region

Regional ecology

Additional information /comments

b) Information on the activities in the potential affected area

Activities that could influence the ecological (environmental) consequences determined by the planned activity in a transboundary context

Additional information /comments

c) Contact points

Contact points where the above mentioned information can be received (name, address, telephone and fax numbers)

2. REPLY TO THE REQUEST FOR PROPOSAL FOR THE PARTICIPATION OF THE PUBLIC

a) Language employed

Language/languages employed in the environmental impact assessment documentation (EIA);

Publication language/languages;

b) Responsible parties

The party responsible for notifying the public and/or disseminating the EIA documentation;

The party responsible for the enforcement of the public's participation and for the receipt of

the public's comments;

c) Notification by means of mass-media

Names, addresses, telephone and fax numbers of the newspapers and other mass-media where the adverts for the public will be put out;

The details that must be included in the notice (e.g., brief description of the planned activity; where can objections/suggestions be included?; timetable for the enforcement of the public's participation; where can one consult the EIA documentation?; language of the EIA documentation etc.)

d) Dissemination of the EIA documentation

Potential targets for the EIA documentation dissemination (e.g., libraries), including the number of copies required in each location

Institutions (public authorities, scientific centres etc.) requiring the submission of the EIA documentation

e) Additional information referring to the proposal of public participation

Additional information/comments/suggestions

Appendix no 7

Content of the report on the public's participation

The report on the public's participation shall comprise, at least, the following information:

1. Planned activity (name, type)
2. Developer of the planned activity (name, legal postal and email address, telephone and fax numbers)
3. The EIA documentation preparer (name, legal postal and email address, telephone and fax numbers)
4. Authority responsible for the notification of the public and/or EIA documentation dissemination
5. Authority responsible for the enforcement of the public's participation and the receipt of the public's comments (objections), in the event where the authority is not the same as the one mentioned above
6. Methods for informing the public, venue, time and manner of conduct of the public debates
7. List of the information sent out to the public at all the stages of the EIA
8. Minute of the public consultation, including the list of participants, the name of the organisation (should there be representatives of the organisations) and the issues addressed by the debate participants
9. List of objections and proposals regarding the EIA documentation submitted in written form
10. The public's objections and proposals, with the indication of the proposals that will be taken into account and of those that will not be taken into account, explaining the decline.

APPENDIX D-2: MINISTRY OF ENVIRONMENT CONFIRMATION RECEIPT FOR SCOPING REPORT

REPUBLICA MOLDOVA
Întreprinderea municipală Regia "AUTOSALUBRITATE"

C/f 1004600028447, c/d 2224710SV80657137100 în BC Mobiasbanca Groupe Societe Generale, BIC MOBBMD22

РЕСПУБЛИКА МОЛДОВА
Муниципальное предприятие Режия "АУТОСАЛУБРИТАТЕ"

Ф/К 1004600028447, р/с 2224710SV80657137100 в Mobiasbanca Groupe Societe Generale, BIC MOBBMD22

Nr. 01.8/1776 din "11" 08 2016

La nr. _____ din "____" _____ 2016

MINISTERUL MEDIULUI AL REPUBLICII MOLDOVA

Prin prezenta, IM Regia Autosalubritate solicită concursul Ministerului Mediului al Republicii Moldova pentru determinarea necesității de efectuare a impactului asupra mediului (conform Legii nr. 86 din 29.05.2014 privind evaluarea impactului asupra mediului) pentru Deșeuri solide din municipiul Chisinau.

Anexă:

1. Informația necesară pentru efectuarea evaluării preafabile a activității planificate (19 file)
2. Chisinau Solid Waste Project (engl.) – a se considera originalul (78 file) (șaptezeci și opt)
3. Proiectul deșeuri solide Chisinau - (79 file) (șaptezeci și nouă)

VICEDIRECTOR **VICTOR SERGHIENCO**

MINISTERUL MEDIULUI AL REPUBLICII MOLDOVA

APPENDIX D-3: EIA DECISION MINISTRY OF ENVIRONMENT

MINISTRY OF ENVIRONMENT OF THE REPUBLIC OF MOLDOVA

Constantin Tanase 9 street, MD-2005 Chisinau·Tel: (+373 22) 204 507·Fax: (373 22) 226 858·www.mediu.gov.md

16.XI.2016 No. 03-12/2346

At no. 01-8/2182 from 11.10.2016

Î.M. Regia "Autosalubritate"

27 Martie 1918 14 street,

Chisinau mun., MD-2069

The preliminary evaluation result of the environmental impact of the planned activity (preliminary evaluation decision)

Following the request made by the municipal enterprise Regia "Autosalubritate", registered under No. 2951 of October 11, 2016 on determining the need to conduct an environmental impact assessment of the planned activity *"Improvement of solid waste management service in Chisinau municipality by construction and modernization of the Tintareni village polygon, Anenii Noi district, as well as rehabilitation of transfer station and closure of the dump site in Ciocana sector, Chisinau municipality"*, The Ministry of Environment communicates the following.

During the preliminary analysis of the environmental impact of works resulted in case of carrying out such activities, at the meeting No. 08.2016 of November 4, 2016, the Committee of preliminary assessment of planned activity

applying selection criteria to determine the need for conducting environmental impact assessment, stipulated in Annex 4 of the Law No.86 of 29.05.2014 on environmental impact assessment.

taking into account the information presented in request and supporting documents.

examining the main and secondary objectives and project concept solutions, the complexity of the planned works (demolition, earthmoving, building, consolidation, renovation and modernization, etc.) specific technical parameters to engineering constructions planned for modernization and / or building (the existing dam, the plant for collection and treatment of leachate, the system for collecting and management of derived gases, drainage system, maintenance, monitoring and control buildings, etc), as well waste volume planned for recycling and disposal,

determined that the initiator plans to achieve, in aggregate, two activities covered by the Law on environmental impact assessment and include them in the list of planned activities necessarily subjected to environmental impact assessment, as follows:

- Annex 1, paragraph 9, "Devices for removal of hazardous waste by incineration, chemical treatment or burial" and Annex 2 paragraph 11, subparagraph b), "Installations for waste disposal (included in Annex 1 with a capacity from 50 to

100 tonnes per day) for the modernization of the polygon from Tintareni village, Anenii Noi district and,

- Annex 1, paragraph 17 “Devices for recycling of hazardous waste with a capacity exceeding 100 tonnes per day" for closing the dump site from Ciocana sector, Chisinau municipality and rehabilitation of transfer station, creation of sorting line and baling of recyclable materials on its territory.
- The impact that could be caused as a result of development of this activity requires determination and proper assessment of its direct and indirect effects on environmental factors and population, including prevention and reduction measures of the potential estimated impact.
- Accordingly, taking into account the fact that the planned activity “Improving solid waste management service in Tintareni village, Anenii noi district, as well as rehabilitation of transfer station and closure of the dump site in Ciocana sector, Chisinau municipality, covered by the Law No. 86 of 29 may 2014 on Environmental Impact Assessment and that such activity is necessarily subject to environmental impact assessment, and **environmental impact assessment at national level is decided to be conducted.**

Thus, in the process of developing the project’s Programme for development of the Environmental Impact Assessment, it is mandatory to comply with the principles for conducting the environmental impact assessment and the stipulations on the procedure for carrying out the environmental impact assessment nationwide, in accordance with Chapter VI of Law No. 86 of May 29, 2014, on environmental impact assessment.

In this context, I. M. Regia “Autosalubritate” will coordinate with the Ministry of Environment the project’s Programme for development of environmental impact assessment, elaborated according to the structure established by art. 19, par. (5) of Law No. 86, accompanied by the materials certifying public information (the copy of publication, announcement).

Also, in accordance with the Law on environmental assessment, the development of environmental impact assessment documentation is made according to the coordinated Program for achieving impact assessment, taking into account the comments expressed publicly in the primary consultation process of the project’s Programme for development of environmental impact assessment.

It is important to note that according to article 19, par. (6) of Law No. 86, the deadline for drafting and presenting the environmental impact assessment documentation of the project from the moment of coordination of the project’s Programme for development of environmental impact assessment, is 3 (three) years. This time period is estimated to be sufficient for the preparation of documentation, which must be based on existing technical and scientific information in the environmental and natural resources field, indicating the measures to reduce or prevent potential environmental impacts during project implementation stages, as well for carrying out environmental impact assessment works, taking into account the peculiarities of planned activity and difficulties of natural, social and technological conditions. If at the expiry of the aforementioned deadline, the initiator has not submitted environmental impact assessment documentation, specified in art. 20 of Law No. 86, he/she is obliged to repeatedly develop and approve the implementation Programme.

It should be mentioned that according to the requirements of art. 8. par. (1) and Annex 3 of the Law on Environmental Impact Assessment, yet at the stage of preliminary examination, the initiator must specify the site alternatives for the planned activity.

Proceeding from what was said, and considering that the information presented does not contain the site alternatives, their description for the development of environmental impact assessment documentation structure becomes imperatively necessary, as well for development of the implementation Programme's project.

We reiterate that for preventing and mitigating potential impacts of project planning stage, when examining technological alternatives, site and strategy of achieving of planned activity, the most optimal choice will be made, in terms of environmental and health protection.

Thus, the contents of environmental impact assessment documentation, must describe the main alternatives proposed and the reasons underlying the choice of one or another alternative, taking into account the environmental effects which must include, in the description, the following aspects: site alternatives, other technical and technological solutions, other start-up periods of the project indicating the reasons that led to the choice, impact size analysis, duration, reversibility, viability and effectiveness of improvement measures for each project alternative and for each environmental component.

Also, for ensuring compliance with the precautionary principle of environmental impact assessment, environmental impact assessment documentation must be developed in compliance with minimum rules for developing and editing of documentation, study, etc, as well its presentation to national legislation requirements, otherwise than indicated in the preliminary assessment request, in section 12.1.2 "based on performance requirements, legislation, and political context of EBRD".

In this regard, it is noted that, in accordance with the applicable Law, art. 20, paragraph (3) of Law No. 86 of May 29, 2014 on impact assessment, the right of conducting/developing documentation is assigned exclusively to legal persons who prove to practice this kind of activity (eg. representation in relations with the central authority and development of environmental and drafting of documentation to obtain environmental agreement, etc.).

Therefore, the review terms stipulated in the Law on environmental impact assessment can be extended in some cases, to clarify, discuss the documentation at each stage separately.

Conformable and qualitative elaboration of documentation, and taking into account other risk factors, can essentially reduce the terms of obtaining Environmental Agreement on environmental impact assessment documentation.

Deputy Minister

Committee President **Victor MORGOCI**

APPENDIX D-4: EIA PROGRAMME

Appendix D4: The schedule of EIA procedure for ĚSolid Waste in Fklvlqdx Š

Activities	Responsibilities	Number of days as per EIA law 86	September 2016				Octomber-16				Nov.16				December 2016				January 2017				February 2017				March 2017				April 2017				May 2017				June 2017				July 2017					
			37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
End of Feasibility Study by Fitchner	F																																													
Art. 7 Submit application regarding planned activity																																														
Elaboration of Application for planned activities	I+C																																													
Submit application to ME	I+C																																													
Place information on web page of ME	ME	5																																												
Art. 9 Preliminary assessment of planned activity																																														
Preliminary assessment of application	ME	10																																												
Publication of Decision on ME web site	ME	5																																												
Art. 19 EIA procedure at the National level																																														
EIA Program elaboration	I+C																																													
Publication the EIA Program in the local and national newspapers	I+C																																													
Receiving written comments on the EIA Program	I+C																																													
EIA Program coordination	ME	30																																												
Art. 20 Elaboration of EIA																																														
EIA report elaboration + public comments	I+C																																													
Art. 21 EIA Examination and discussion																																														
Submit EIA to ME	I+C																																													
Place EIA to ME site and mass media	ME/I+C																																													
EIA examination	ME	60																																												
EIA examination and receive comments	ME, LPA	50																																												
EIA place on LPA web site	LPA	5																																												
Place EIA on IM Regia Autosalubritate web site	I+C	5																																												
Receive EIA comments from interested public	I+C																																													
Send copies of EIA comments to ME	I+C																																													
Draw up a Report of Public Participation and submit to ME	I+C	50																																												
Art. 22 Public debates procedure																																														
Place ads regarding public debates	I, LPA																																													
Public debates organisation	I, LPA																																													
Drawn up Minute of PB	P, ME, I	3																																												
Draw up and send answers to authors of questions	I+C	15																																												
Submit docs to ME	I+C	30																																												
Art. 23 Environmental Agreement																																														
a) Issue of EA	ME	15 working days																																												

NOTE: ME µ Ministry of Environment, P µ Public, LPA µ Local Public Authority, CPA µ Central Public Authority, C µ Consultant, I - Initiator

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APPENDIX D-5: SUMMARY OF SCOPING MEETINGS

APPENDIX E – GLOSSARY OF TERMS

Term	Definition
AADT **Annual Average Daily Traffic**	A daily total traffic flow (24 hrs), expressed as a mean daily flow across all 365 days of the year.
Adjustment	Application of a correction factor to modelled results to account for uncertainties in the model
A-Weighting	The human ear can detect a wide range of frequencies, from 20Hz to 20kHz, but it is more sensitive to some frequencies than others. Generally, the ear is most sensitive to frequencies in the range 1 to 4 kHz. The A-weighting is a filter that can be applied to measured results at varying frequencies, to mimic the frequency response of the human ear, and therefore better represent the likely perceived loudness of the sound. SPL readings with the A-weighting applied are represented in dB(A).
WHO & EU Limit Value	Policy target generally expressed as a maximum ambient concentration to be achieved, either without exception or with a permitted number of exceedences within a specific timescale (see also air quality standard).
Ambient air	Outdoor air in the troposphere, excluding workplace air.
Annual mean	The average (mean) of the concentrations measured for each pollutant for one year. Usually this is for a calendar year, but some species are reported for the period April to March, known as a pollution year. This period avoids splitting winter season between 2 years, which is useful for pollutants that have higher concentrations during the winter months.
Conservative	Tending to over-predict the impact rather than under-predict.
DEFRA	Department for Environment, Food and Rural Affairs.
Decibel (dB)	The decibel scale is used in relation to sound because it is a logarithmic rather than a linear scale. The decibel scale compares the level of a sound relative to another. The human ear can detect a wide range of sound pressures, typically between 2x10-5 and 200 Pa, so the logarithmic scale is used to quantify these levels using a more manageable range of values.
ESIA	Environmental Social Impact Assessment.
Emission rate	The quantity of a pollutant released from a source over a given period of time.
Exceedence	A period of time where the concentrations of a pollutant is greater than, or equal to, the appropriate air quality standard.
HDV/HGV	Heavy Duty Vehicle/Heavy Goods Vehicle.
IAQM	Institute of Air Quality Management
L10 or LA10 **And other percentile measures.**	This represents the SPL which is exceeded 10% of the time, expressed in dB or dB(A). LA10 is used to quantify road noise levels. Other percentiles exist and are used for various types of noise assessment. These include L01, L50, L90, L99.
NO_2	Nitrogen dioxide.
NO_x	Nitrogen oxides.
Noise	A noise can be described as an unwanted sound. Noise can cause nuisance.
Noise Sensitive Receptors (NSR's)	Any identified receptor likely to be affected by noise. These are generally human receptors, which may include residential dwellings, work places, schools, hospitals, and recreational spaces.
PM_{10}	Particulate matter with an aerodynamic diameter of less than 10 micrometres.
SO_2	Sulphur Dioxide
Sound Pressure Level (SPL)	The Sound Pressure Level has units of decibels, and compares the level of a sound to the smallest sound pressure generally perceptible by the human ear, or the reference pressure. It is defined as follows:

Term	Definition
	SPL (dB) = 20 Log10(P/Pref) where P = Sound Pressure (in Pa) Pref = Reference Pressure 2x10-5 Pa An SPL of 0dB suggests the Sound Pressure is equal to the reference pressure. This is known as the threshold of hearing. An SPL of 140dB represents the threshold of pain.
VOC	Volatile Organic Compound
Road link	A length of road which is considered to have the same flow of traffic along it. Usually, a link is the road from one junction to the next.
µg/m^3 microgrammes per cubic metre	A measure of concentration in terms of mass per unit volume. A concentration of 1ug/m^3 means that one cubic metre of air contains one microgram (millionth of a gram) of pollutant.

APPENDIX F-1 – AIR QUALITY LEGISLATION, POLICY AND GUIDANCE

LEGISLATION, POLICY AND GUIDANCE

AIR QUALITY DIRECTIVE 2008/50/EC

The *Air Quality Directive 2008/50/EC* came into force on the 11th June 2008. This Directive merged three existing Directives and one Council Decision into a single Directive on air quality. It sets air quality limit values, target values, and critical levels for a number of air pollutants (established by the European Parliament and Council) for the protection of human health, vegetation and ecosystems. These are sulphur dioxide (SO_2), nitrogen dioxide (NO_2), oxides of nitrogen (NO_X) particulate matter smaller than 10µm in aerodynamic diameter (PM_{10} and $PM_{2.5}$), lead (Pb), benzene (C_6H_6), carbon monoxide (CO) and ozone (O_3). These have been transposed into UK legislation by the *Air Quality Standards Regulations 2010*.

It also sets new standards and target dates for reducing concentrations of fine particles. Under the Directive, Member States are required to reduce exposure to $PM_{2.5}$ in urban areas by an average of 20% by 2020 based on 2010 levels. The magnitude of the required reduction depends on national average concentrations between 2009 and 2011. For the UK, from the 47 $PM_{2.5}$ stations used in a study by Defra in 2011, it is likely that average $PM_{2.5}$ concentrations for 2009-2011 will be between 13-14 µg/m^3. This would require the UK to comply with a 15% reduction target for 2020, equating to a required reduction in average concentrations of around 2.0µg/m^3. The directive also obliges Member States to meet a Limit Value of 25µg/m^3 by 2015 and a Limit Value of 20µg/m^3 by 2020.

THE LANDFILL DIRECTIVE 1999/31/EC

The objective of the *Landfill Directive 1999/31/EC* is to prevent or reduce as far as possible negative effects on the environment, in particular on surface water, groundwater, soil, air, and on human health from the landfilling of waste by introducing stringent technical requirements for waste and landfills.

It includes a standard procedure for acceptance of waste in a landfill to avoid any risks, wastes that may not be accepted in a landfill, and a system of operating permits for landfill sites.

INDUSTRIAL EMISSIONS DIRECTIVE 2010/75/EU

The Industrial Emissions Directive is the main tool adopted in 2010 used by the EU regulating pollutant emissions from industrial installations.

The Directive achieves a high level of protection of human health and the environment taken as a whole by reducing harmful industrial emissions across the EU, in particular through better application of Best Available Techniques (BAT).

For certain activities, i.e. large combustion plants, waste incineration and co-incineration plants, solvent using activities and titanium dioxide production, the Directive also sets EU wide emission limit values for selected pollutants.

WORLD HEALTH ORGANISATION (WHO). AIR QUALITY GUIDELINES FOR PARTICULATE MATTER, OZONE, NITROGEN DIOXIDE AND SULPHUR DIOXIDE (2005)

The WHO air quality guidelines are designed to offer guidance in reducing the health impacts of air pollution, and to inform policy-makers and provide appropriate targets for a broad range of policy options for air quality management in different parts of the world. The guidelines are based on expert evaluation of currently scientific evidence, and the latest update of the Air quality guidelines relate to four common air pollutants: particulate matter (PM), ozone (O3), nitrogen dioxide (NO2) and sulfur dioxide (SO2).

REPUBLIC OF MOLDOVA. DECISION ON THE APPROVAL OF THE ENVIRONMENTAL STRATEGY FOR YEARS 2014-2023 AND OF THE ACTION PLAN FOR ITS

IMPLEMENTATION (APRIL 2014)

The Environmental Strategy for the years 2014 – 2023 covers challenges in the environmental sector and aspires to be the key strategic planning document for the actions to be taken in the following decade.

The vision of the Strategy is oriented towards an implemented environmental protection sector reform, so as an institutional, administrative and environmental management system, adjusted to the EU requirements will be functioning and ensuring environmental sustainability and increase the quality of the environment.

The goal of the Strategy is to guarantee the right of the population of the Republic of Moldova for a sustainable, unpolluted and healthy environment in harmony with economic development and social welfare.

EUROPEAN NEIGHBOURHOOD AND PARTNERSHIP INSTRUMENT – SHARED ENVIRONMENTAL INFORMATION SYSTEMS. REPUBLIC OF MOLDOVA COUNTRY REPORT (JANUARY 2012), CHISINAU

The purpose of this document was to consider the requirements for introducing the Environmental Neighborhood Policy Instrument – Shared Environmental Information System (ENPI-SEIS) in the Republic of Moldova. The main goal of the ENPI-SEIS project is to promote environmental protection in the ENPI countries

In the Republic of Moldova environmental monitoring is a basic element of any environmental management system. The Republic of Moldova has an environmental monitoring system covering ambient environmental quality, state of natural resources like soils, forests and wildlife, and pollution emissions and discharges. The main network of environmental quality monitoring stations is maintained by the State Hydrometeorological Service (SHS).

UNITED NATIONS ECONOMIC COMMISSION FOR EUROPE. REPUBLIC OF MOLDOVA ENVIRONMENTAL PERFORMANCE REVIEWS, THIRD REVIEW (2014)

The United Nations Economic Commission for Europe (ECE) Environmental Performance Review Programme assesses progress made by individual countries in reconciling their economic and social development with environmental protection, as well as in meeting international commitments on environment and sustainable development. It assists countries to improve their environmental policies by making concrete recommendations for better policy design and implementation.

GUIDANCE ON THE ASSESSMENT OF DUST FROM DEMOLITION AND CONSTRUCTION

The *Guidance on the Assessment of Dust from Demolition and Construction* (Ref. 8.19) was produced by the Institute of Air Quality Management (IAQM) to provide guidance to developers, consultants and environmental health practitioners on how to undertake a construction impact assessment. The emphasis of the guidance is on classifying the risk of dust impacts from a site, which then allow mitigation measures commensurate with that risk to be identified.

DESIGN MANUAL FOR ROADS AND BRIDGES

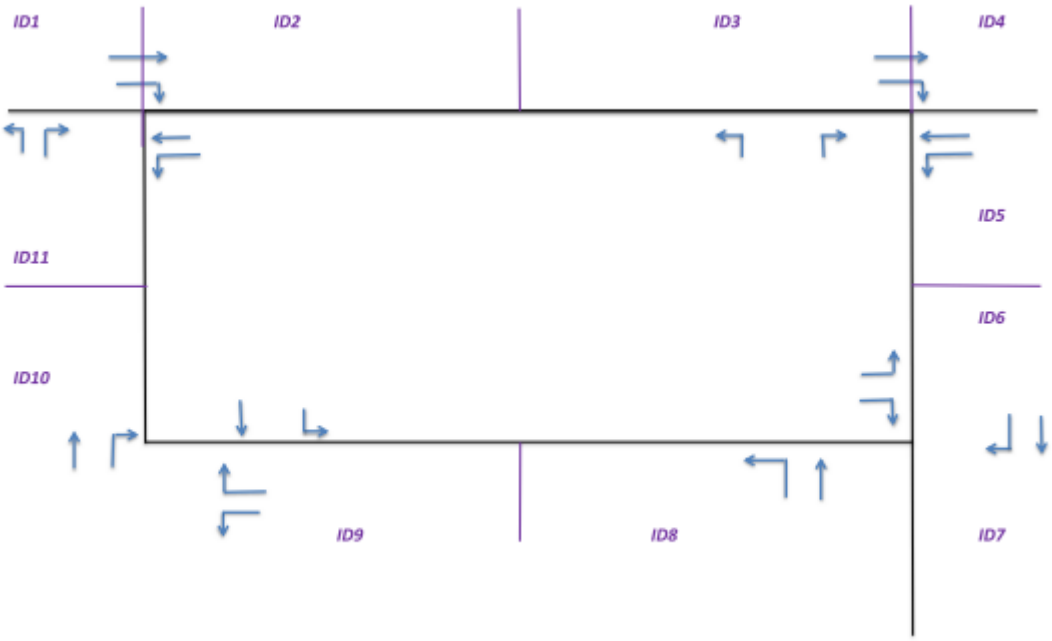
Volume 11, Section 3, Part 1 of the Highways England (formerly the Highways Agency) Design Manual for Roads and Bridges (DMRB)1, provides a methodology for determining the effect of traffic emissions on areas with potentially sensitive ecosystems, which have statutory protection status under national and international law. These are known as ‘Designated Sites’ and include Sites of Special Scientific Interest (SSSIs), Special Areas of Conservation (SACs), Special Protection Area (SPAs), potential Special Protection Area (pSPAs) and ‘Ramsar’ sites.

Table 8-2A:Summary of the current WHO and EU limit values for the pollutants of concern in the current assessment

Pollutant	Applies to	Standard		Objective		2008/50/E
		Concentration	Measured as	Annual exceedences allowed	Target date	
Nitrogen dioxide (NO_2)	All UK	200µg/m^3	1 hour mean	18	31.12.2005	01.01.2010
	All UK	40µg/m^3	annual mean	-	31.12.2005	
Particulate Matter (PM_{10}) (gravimetric)[1]	All UK	40µg/m^3	annual mean	-	31.12.2004	01.01.2005
	All UK	50µg/m^3	24 hour mean	35	31.12.2004	01.01.2005
Sulphur Dioxide (SO_2)	All UK	350µg/m^3	1 hour mean	24	31.12.2005	01.01.2010
	All UK	125µg/m^3	24 hour mean	3	31.12.2005	

EXPLANATION
µg/m^3 = microgram per cubic metre; [1] Measured using the European gravimetric transfer sampler or equivalent.

APPENDIX F-2 – TRAFFIC DATA FOR THE SURROUNDING NETWORK



Scenario 1: Baseline

Link No.	Annual Average Daily Traffic Flow	HDVs (%)	Speed (kph)
1	9072	15.3	48
2	9072	15.3	48
3	9072	15.3	48
4	8784	14.8	48
5	576	16. 7	48
6	480	10.0	48
7	480	10.0	48
8	0	0.0	48
9	0	0.0	48
10	0	0.0	48
11	0	0.0	48

Scenario 2: Baseline With Development Option 1

Link No.	Annual Average Daily Traffic Flow	HDVs (%)	Speed (kph)
1	9240	16.9	48
2	9240	16.9	48
3	9240	16.9	48
4	8784	14.8	48
5	744	35.5	48
6	648	33.3	48

Link No.	Annual Average Daily Traffic Flow	HDVs (%)	Speed (kph)
7	648	33.3	48
8	0	0.0	48
9	0	0.0	48
10	0	0.0	48
11	0	0.0	48

Scenario 1: Baseline with Development Option 2

Link No.	Annual Average Daily Traffic Flow	HDVs (%)	Speed (kph)
1	9240	16.9	48
2	9072	15.3	48
3	9072	15.3	48
4	8784	14.8	48
5	576	16.7	48
6	480	10.0	48
7	648	33.3	48
8	168	100.0	48
9	168	100.0	48
10	168	100.0	48
11	168	100.0	48

APPENDIX F-3 – SUMMARY OF IAQM ASSESSMENT METHODOLOGY

STEP 1 – SCREENING THE NEED FOR A DETAILED ASSESSMENT

An assessment will normally be required where there is:

- A 'human receptor' within:
  - 350m of the boundary of the site; or
  - 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s).
- An 'ecological receptor' within:
  - 50m of the boundary of the site; or
  - 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s).

Where the need for a more detailed assessment is screened out, it can be concluded that the level of risk is "negligible" and any effect will not be significant.

STEP 2 – ASSESS THE RISK OF DUST IMPACTS ARISING

The risk of dust arising in sufficient quantities to cause annoyance and/or health and/or ecological impacts should be determined using four risk categories: negligible, low, medium and high risk. A site is allocated to a risk category based on two factors:

- The scale and nature of the works, which determines the potential dust e mission magnitude as small, medium or large (**Step 2A**); and
- The sensitivity of the area to dust impacts (**Step 2B**), which is defined as low medium or high sensitivity.

These two factors are combined in **Step 2C** to determine the risk of dust impacts with no mitigation applied. The risk category assigned to the site can be different for each of the four potential activities (demolition, earthworks, construction and trackout).

STEP 2A – DEFINE THE POTENTIAL DUST EMISSION MAGNITUDE

The dust emission magnitude is based on the scale of the anticipated works and should be classified as Small, Medium or Large. The following are examples of how the potential dust emission magnitude for different activities can be defined. Note that in each case, not all the criteria need to be met, and that other criteria may be used if justified in the assessment.

1. Demolition

Example definitions for demolition are:

- Large: Total building volume >50,000 m^3 potentially dusty construction material (e.g. concrete), on-site crushing and screening, demolition activities >20m above ground level;
- Medium: Total building volume 20,000m^3 – 50,000m^3, potentially dusty construction material, demolition activities 10-20 m above ground level; and
- Small: Total building volume <20,000m^3, construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <10m above ground, demolition during wetter months.

2. Earthworks

Earthworks will primarily involve excavating material, haulage, tipping and stockpiling. This may also involve levelling the site and landscaping. Example definitions for earthworks are:

- Large: Total site area >10,000m^2, potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size), >10 heavy earth moving vehicles active at any one time, formation of bunds >8 m in height, total material moved >100,000 tonnes;
- Medium: Total site area 2,500 m^2 – 10,000 m^2, moderately dusty soil type (e.g. silt), 5-10 heavy earth moving vehicles active at any one time, formation of bunds 4 m - 8 m in height, total material moved 20,000 tonnes – 100,000 tonnes; and,
- Small: Total site area <2,500 m^2, soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <4 m in height, total material moved <10,000 tonnes, earthworks during wetter months.

3. Construction

The key issues when determining the potential dust emission magnitude during the construction phase include the size of the building(s)/infrastructure, method of construction, construction materials and duration of build. Example definitions for construction are:

- Large: Total building volume >100,000 m^3, piling, on site concrete batching, sandblasting
- Medium: Total building volume 25,000 m^3 – 100,000 m^3, potentially dusty construction material (e.g. concrete), piling, on site concrete batching; and
- Small: Total building volume <25,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber).

4. Trackout

Factors which determine the magnitude class are vehicle size, vehicle speed, vehicle numbers, geology and duration. As with all other potential sources, professional judgement must be applied when classifying trackout into one of the magnitude categories. Example definitions of trackout are:

- Large: >50 HDV (>3.5t) outward vehicle movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100m;
- Medium: 10-50 HDV (>3.5t) outward vehicle movements in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50m – 100m; and
- Small / Medium: <10 HDV (>3.5t) outward vehicle movements in any one day, surface material with low potential for dust release, unpaved road length <50m.

These numbers are for vehicles that leave the site after moving over unpaved ground, where they will accumulate mud and dirt that can be tracked out onto the public highway.

STEP 2B – DEFINE THE SENSITIVITY OF THE AREA

The guidance to identify the sensitivity of different types of receptor to Dust Soiling, Health Effects and Ecological Effects are listed **Tables 8-4A** to **8-4C** below:

Table 8-4A: Sensitivity of People to Dust Soiling Effects

High Sensitivity Receptor
→ users can reasonably expect enjoyment of a high level of amenity; or → the appearance, aesthetics or value of their property would be diminished by soiling; and the people or property would reasonably be expected to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land. → indicative examples include dwellings, museums and other culturally important collections, medium and long term car parks and car showrooms.
Medium Sensitivity Receptor
→ users would expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home; or → the appearance, aesthetics or value of their property could be diminished by soiling; or → the people or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land. → indicative examples include parks and places of work.
Low Sensitivity Receptor
→ the enjoyment of amenity would not reasonably be expected; or → property would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling; or → there is transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land. → indicative examples include playing fields, farmland (unless commercially-sensitive horticultural), footpaths, short term car parks and roads.

Table 8-4B: Sensitivity of People to Health Effects of PM_{10}

High Sensitivity Receptor
→ locations where members of the public are exposed over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day). → Indicative examples include residential properties. Hospitals, schools and residential care homes should also be considered as having equal sensitivity to residential areas for the purposes of this assessment.
Medium Sensitivity Receptor
→ locations where the people exposed are workers, and exposure is over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day). → indicative examples include office and shop workers, but will generally not include workers occupationally exposed to PM_{10}, as protection is covered by Health and Safety at Work legislation.
Low Sensitivity Receptor
→ locations where human exposure is transient. → indicative examples include public footpaths, playing fields, parks and shopping streets.

Table 8-4C: Sensitivity of Ecological Effects

High Sensitivity Receptor
→ locations with an international or national designation and the designated features may be affected by dust soiling; or → locations where there is a community of a particularly dust sensitive species such as vascular species included in the Red Data List For Great Britain. → indicative examples include a Special Area of Conservation (SAC) designated for acid heathlands or a local site designated for lichens adjacent to the demolition of a large site containing concrete (alkali) buildings.
Medium Sensitivity Receptor
→ locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown; or → locations with a national designation where the features may be affected by dust deposition. → indicative example is a Site of Special Scientific Interest (SSSI) with dust sensitive features.
Low Sensitivity Receptor
→ locations with a local designation where the features may be affected by dust deposition. → indicative example is a local Nature Reserve with dust sensitive features.

Tables 8.4D to **8.4F** below present the how the sensitivity of the area can be determined for dust soiling, human health and ecological impacts respectively. The sensitivity of the area should be determined for each of the four activities: demolition, construction, earthworks and trackout. Only the *highest level* of area sensitivity from the tables need to be considered; it is not necessary to work through the whole of each table once it is clear that the highest level of sensitivity has been determined.

Whilst these tables are necessarily prescriptive, professional judgement may be used to determine alternative sensitivity categories – see full IAQM Construction Dust Guidance (2014) for further details.

Table 8-4D: Sensitivity of the Area to Dust Soiling Effects

Receptor Sensitivity	**Number of Receptors**	**Distance from the Source (m)**			
		<20	**<50**	**<100**	**<350**
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

Table 8-4E: Sensitivity of the Area to Human Health Impacts

Receptor Sensitivity	**Annual Mean PM_{10} Concentration, $\mu g/m^3$**	**Number of Receptors**	**Distance from the Source (m)**				
			<20	**<50**	**<100**	**<200**	**<350**
High	>32	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	28-32	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low

Receptor Sensitivity	Annual Mean PM_{10} Concentration, $\mu g/m^3$	Number of Receptors	Distance from the Source (m)				
			<20	<50	<100	<200	<350
		1-10	High	Medium	Low	Low	Low
	24-28	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<24	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	-	>10	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
Low	-	>10	Low	Low	Low	Low	Low
	-	1-10	Low	Low	Low	Low	Low

Table 8-4F: Sensitivity of the Area to Ecological Impacts

Receptor Sensitivity	Distance from the Sources (m)	
	<20	<50
High	High	Medium
Medium	Medium	Low
Low	Low	Low

STEP 2C – DEFINE THE RISK OF IMPACTS

The potential dust emission class determined above in Step 2A should be combined with the sensitivity of the area determined in Step 2B to determine the risk of impacts. **Tables 8.4G** to **8.4I** provide matrices to determine the risk of impacts.

Table 8-4G: Risk Category from Demolition Activities

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible

Table 8-4H: Risk Category from Earthworks & Construction Activities

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Table 8-4I: Risk Category from Trackout

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

There is an extra dimension to the assessment of trackout, as the distance over which it might occur depends on the site. As general guidance, significant trackout may occur up to 500m from large sites, 200m from medium sites and 50m from small sites, as measured from the site exit. These distances assume no site-specific mitigation.

STEP 3 – IDENTIFY THE NEED FOR SITE SPECIFIC MITIGATION

Having determined the risk categories for each of the four activities it is possible to determine the site-specific measures to be adopted. These measures will be related to whether the site is a low, medium or high risk site. The general mitigation measures and those required for high, medium and low risk for each of the four activities can be seen below.

MITIGATION MEASURES APPROPRIATE FOR THE PROPOSED DEVELOPMENT

GENERAL COMMUNICATION

- A stakeholder communications plan that includes community engagement before work commences on-site should be developed and implemented; and
- The name and contact details of person(s) accountable for air quality and dust issues needs to be displayed on the site boundary. This may be the environment manager / engineer or the site manager. The head or regional office contact information should also be displayed.

GENERAL DUST MANAGEMENT

- A Dust Management Plan (DMP), which may include measures to control other emissions in addition to the dust and PM_{10} mitigation measures given in this report, should be developed and implemented, and approved by the Local Authority. In London, additional measures may be required to ensure compliance with the Mayor of London's guidance. The DMP may include a requirement for monitoring of dust deposition, dust flux, real time PM_{10} continuous monitoring and/or visual inspections.

SITE MANAGEMENT

- Record all dust and air quality complaints and identify the cause(s). Take appropriate measures to reduce emissions in a timely manner, and record the measures taken;
- Make the complaints log available to the local authority when asked;
- Any exceptional incidents that cause dust and / or air emissions, either on- or offsite need to be recorded, and the action taken to resolve the situation recorded in the log book; and

- Regular liaison meetings with other high risk construction sites within 500m of the Site boundary need to be held, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport / deliveries which might be using the same strategic road network routes.

MONITORING

- Daily on-site and off-site inspections should be undertaken, where receptors (including roads) are nearby to monitor dust. The inspection results should be recorded and made available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100m of Site boundary, with cleaning to be provided if necessary;
- Regular site inspections to monitor compliance with the DMP should be carried out, inspection results recorded, and an inspection log made available to the local authority when asked; and
- Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.

PREPARING AND MAINTAINING THE SITE

- Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible;
- Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on-site;
- Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period;
- Avoid site runoff of water or mud;
- Keep site fencing, barriers and scaffolding clean using wet methods;
- Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on-Site. If they are being re-used on-site cover appropriately; and
- Cover, seed or fence stockpiles to prevent wind whipping.

OPERATING VEHICLE / MACHINERY AND SUSTAINABLE TRAVEL

- Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable; and
- Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on unsurfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).

OPERATIONS

- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems;
- Ensure an adequate water supply on the Site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate;
- Use enclosed chutes and conveyors and covered skips;
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate; and

- Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.

WASTE MANAGEMENT

- Avoid bonfires and burning of waste materials.

MEASURES SPECIFIC TO DEMOLITION

- Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust).
- Ensure effective water suppression is used during demolition operations. Hand held sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground.
- Avoid explosive blasting, using appropriate manual or mechanical alternatives.
- Bag and remove any biological debris or damp down such material before demolition.

MEASURES SPECIFIC TO EARTHWORKS

- Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.
- Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.
- Only remove the cover in small areas during work and not all at once.
- Stockpile surface areas to be minimised (subject to health and safety and visual constraints regarding slope gradients and visual intrusion) to reduce area of surfaces exposed to wind pick-up.
- Where appropriate, windbreak netting / screening can be positioned around material stockpiles and vehicle loading/unloading areas, as well as exposed excavation and material handling operations, to provide a physical barrier between the Site and the surroundings.
- Where practicable, stockpiles of soils and materials should be located as far as possible from sensitive properties, taking account of the prevailing wind direction.
- During dry or windy weather, material stockpiles and exposed surfaces could be dampened down using a water spray to minimise the potential for wind pick-up.

MEASURES SPECIFIC TO CONSTRUCTION

- Avoid scabbling (roughening of concrete surfaces) if possible.
- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place;
- Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery;
- For smaller supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust; and
- All construction plant and equipment should be maintained in good working order and not left running when not in use.

MEASURES SPECIFIC TO TRACKOUT

- Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the Site. This may require the sweeper being continuously in use;

- Avoid dry sweeping of large areas;
- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport;
- Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable;
- Record all inspections of haul routes and any subsequent action in a site log book;
- Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned;
- Where practicable, implement a wheel washing system (preferably with rumble grids) to dislodge accumulated dust and mud prior to leaving the Site;
- Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits; and
- Access gates to be located at least 10m from receptors where possible.

STEP 4 – DETERMINE SIGNIFICANT IMPACTS

The significance is best determined using professional judgement, taking account of the factors that define the sensitivity of the surrounding area and the overall pattern of potential risks. The sensitivity of the area needs to be defined.

The sensitivity of the area surrounding the construction / demolition site is combined with the risk of the site giving rise to dust impacts (from Step 2) to define the significance of the impacts for each of the four activities (demolition, earthworks, construction and trackout).

The preference in the IAQM Guidance is to only assign significance to the impact with mitigation. The residual impacts for most sites will be negligible as shown in **Table 8-4J** below.

Table 5.4J: Significance of Impacts of Each Activity with Mitigation

Sensitivity of surrounding area	**Risk of site giving rise of dust impacts**		
	High	**Medium**	**Low**
Very High	Slight adverse	Slight adverse	Negligible
High	Negligible	Negligible	Negligible
Medium	Negligible	Negligible	Negligible
Low	Negligible	Negligible	Negligible

When assessment of the significance of the impacts without mitigation is required, the recommended significance criteria in **Table 8-4K** should be used.

Table 5.4K: Significance of Impacts of Each Activity without Mitigation

Sensitivity of surrounding area	**Risk of site giving rise of dust impacts**		
	High	**Medium**	**Low**
Very High	Substantial adverse	Moderate adverse	Moderate adverse
High	Moderate adverse	Moderate adverse	Slight adverse
Medium	Moderate adverse	Slight adverse	Negligible
Low	Slight adverse	Negligible	Negligible

The final step is to determine the overall significance of the impacts arising from the construction phase of a proposed development. This will be based on professional judgement but should take account of the significance of the impacts for each of the four activities.

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ilac-MRA UKAS TESTING 2187

LABORATORY ANALYSIS REPORT

NITROGEN DIOXIDE IN DIFFUSION TUBES BY U.V.SPECTROPHOTOMETRY

REPORT NUMBER K03594R

BOOKING IN REFERENCE K03594
DESPATCH NOTE 30441
CUSTOMER WSP Environmental Ltd Attn: Tom Reade
The Victoria
150-182 The Quays
Salford
Greater Manchester
M50 3SP

DATE SAMPLES RECEIVED 13/06/2016

Location	Sample Number	Exposure Data Date On	Date Off	Time (hr.)	µg/m^3 *	ppb *	TOTAL µg NO_2
Tanterini Landfill	723950	17/05/2016	24/05/2016	167.17	4.07	2.13	0.05
Cretoaia Location	723951	17/05/2016	24/05/2016	166.42	5.17	2.70	0.06
District Road Location	723952	17/05/2016	24/05/2016	166.33	10.97	5.72	0.13
National Road Location	723953	17/05/2016	24/05/2016	165.92	27.76	14.49	0.33
Temporary Landfill	723954	18/05/2016	24/05/2016	146.67	15.50	8.09	0.17
Temp Landfill Haul Road	723955	18/05/2016	24/05/2016	146.58	22.65	11.82	0.24
Tantareni Landfill	723956	24/05/2016	31/05/2016	167.58	4.18	2.18	0.05
Cretoaia Location	723957	24/05/2016	31/05/2016	166.75	5.25	2.74	0.06
District Road Tantareni	723958	24/05/2016	31/05/2016	167.30	9.42	4.91	0.11
National Road Location	723959	24/05/2016	31/05/2016	167.33	23.38	12.21	0.28
Temporary Landfild	723960	24/05/2016	31/05/2016	167.03	8.99	4.69	0.11
Temp Landfill Haul Road	723961	24/05/2016	31/05/2016	168.08	13.81	7.21	0.17
Tantareni Landfield	723963	31/05/2016	07/06/2016	170.43	3.25	1.70	0.04
District Road Tantareni	723964	31/05/2016	07/06/2016	169.72	8.14	4.25	0.10
National Road Location	723965	31/05/2016	07/06/2016	170.57	17.22	8.99	0.21
Temporary Landfill	723966	31/05/2016	07/06/2016	170.58	8.34	4.35	0.10
Temp Landfill Haul Road	723967	31/05/2016	07/06/2016	170.53	12.69	6.62	0.16
Travel Blank	723968			170.43	0.61	0.32	0.01
Laboratory Blank				170.58	0.24	0.13	0.003

Comment: Results are not blank subtracted

Tube 723957 contained a spider and a web. Results may be compromised.

Tube 723963 contained a web. Results may be compromised.

Results have been corrected to a temperature of 293 K (20°)

Overall M.U. 5.2% +/- **Limit of Detection** 0.010µgNO_2

REPORT OFFICIALLY CHECKED

Gradko International Ltd
This signature confirms the authenticity of these results
Signed.....
L. Gates, Laboratory Manager

(A division of Gradko International Ltd.)
St. Martins House, 77 Wales Street Winchester, Hampshire SO23 0RH
tel.: 01962 860331 fax: 01962 841339 e-mail:diffusion@gradko.co.uk

2187

LABORATORY ANALYSIS REPORT

Tube Preparation : 20% TEA / Water

Analysed on UV05 Camspec M550

		Analyst Name	Chris Fraser
Date of Analysis	28/06/2016	**Date of Report**	28/06/2016

Analysis carried out in accordance with documented in-house Laboratory Method GLM7

REPORT OFFICIALLY CHECKED

Gradko International Ltd
This signature confirms the authenticity of these results
Signed.....
L. Gates, Laboratory Manager

gradko environmental
(A division of Gradko International Ltd.)
St. Martins House, 77 Wales Street Winchester, Hampshire SO23 0RH
tel.: 01962 860331 fax: 01962 841339 e-mail:diffusion@gradko.co.uk

2187

LABORATORY ANALYSIS REPORT

DETERMINATION OF SULPHUR DIOXIDE IN DIFFUSION TUBES BY ION CHROMATOGRAPHY

REPORT NUMBER K03570R
BOOKING IN REFERENCE No K03570
DESPATCH NOTE No 30441
CUSTOMER WSP Environmental Ltd Attn: Tom Reade

6 Devonshire Square,
4th Floor,
London,
EC2M 4YE

DATE SAMPLES RECEIVED 13/06/2016

Location	Sample Number	Date Exposed	Date Finished	Exposure Hours	µg S Total	µg S - Blank	SO_2 µg/m^3*	SO_2 ppb*
Tantareni Landfill	723977	17/05/2016	24/05/2016	162.25	<0.03	<0.01	<2.97	<1.11
Temporary Landfill	723978	18/05/2016	24/05/2016	146.75	0.05	0.04	9.34	3.50
Tantareni Landfill	723979	24/05/2016	31/05/2016	167.58	<0.03	<0.01	<2.88	<1.08
Temporary Landfill	723980	24/05/2016	31/05/2016	167.08	0.06	0.05	10.67	4.00
Tantareni Landfield	723981	31/05/2016	07/06/2016	170.38	<0.03	<0.01	<2.83	<1.06
Temporary Landfill	723982	31/05/2016	07/06/2016	170.57	0.04	0.02	5.13	1.93
Travel Blank	723983				0.02			
Laboratory Blank					0.01			

Comment: Results are blank subtracted
Results reported as <0.03µg S are below the reporting limit.

Overall M.U. ±6.9%
Analysed on Dionex ICS1100 ICU11

Reporting Limit 0.03µg S

Analyst Name Katya Paldamova

Date of Analysis 17/06/2016

Date of Report 21/06/2016

Analysis has been carried out in accordance with in-house method GLM1

REPORT OFFICIALLY CHECKED

Gradko International Ltd
This signature confirms the authenticity of these results
Signed.....
L. Gates, Laboratory Manager

APPENDIX F-6 – SITE PHOTOS

TINTARENI LANDFILL

Tintareni landfill vegetated surface

Poor road surface within the site

Onsite gas engine

Visible pools of stagnated water

TEMPORARY DUMP SITE- CIOCANA

Unprotected/uncovered waste collection

Poor road surface within the site, significant dust re-suspension

Stagnated surface water

Evidence of onsite waste burning

APPENDIX F-7 – AIR QUALITY SCREENING RESULTS

NO_2 Concentrations ($\mu g/m^3$)

Receptor Number	Baseline	Baseline with Development Option 1	Change due to Development Option 1
1	60.4	60.6	0.3
2	60.4	60.7	0.3
3	60.8	61.1	0.3
4	63.4	63.8	0.4
5	57.0	57.2	0.3
6	57.0	57.4	0.4
7	57.0	57.4	0.4
8	60.4	60.7	0.3
9	56.7	56.8	0.1
10	56.7	56.7	0.0
11	56.7	56.7	0.0
12	56.7	56.7	0.0

PM_{10} Concentrations ($\mu g/m^3$)

Receptor Number	Baseline	Baseline with Development Option 1	Change due to Development Option 1
1	44.2	44.3	0.05
2	44.3	44.3	0.05
3	44.4	44.4	0.06
4	45.1	45.2	0.09
5	43.5	43.6	0.03
6	43.5	43.6	0.04
7	43.5	43.6	0.04
8	44.3	44.3	0.05
9	43.5	43.5	0.00
10	43.5	43.5	0.00
11	43.5	43.5	0.00
12	43.5	43.5	0.00

Number of PM_{10} Exceedances of 50µg/m^3

Receptor Number	Baseline	Baseline with Development Option 1	Change due to Development Option 1
1	112	112	0
2	112	112	0
3	113	113	0
4	119	120	1
5	106	106	0
6	106	106	0
7	106	106	0
8	112	112	0
9	106	106	0
10	106	106	0
11	106	106	0
12	106	106	0

APPENDIX F-8 – WIND DIRECTION INFORMATION

MINISTERUL
MEDIULUI
AL REPUBLICII MOLDOVA

**SERVICIUL
HIDROMETEOROLOGIC
DE STAT**

2072, or. Chişinău, str. Grenoble, 134
tel: 022 77-35-00, fax: 022 77-36-36
e-mail: hidrometeo@meteo.gov.md
www.meteo.md

MINISTRY OF ENVIRONMENT
OF THE
REPUBLIC OF MOLDOVA

**STATE
HYDROMETEOROLOGICAL
SERVICE**

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www.meteo.md

Nr. 08/658 din 13.07.16

La nr. 01/07 din 07.07.16

Dlui Gheorghe BURDILA,
Director al "Tehno Consulting&Design" SRL

Prin prezenta, cu referire la scrisoarea Dumneavoastră nr.01/07 din 07.07.2016, Serviciul Hidrometeorologic de Stat Vă comunică informaţia solicitată privind frecvenţa a vîntului pe direcţii şi a calmurilor pentru perioada ianuarie 2015 – iunie 2016, conform datelor celei mai apropiate staţii meteorologice Chişinău de s.Ţînţăreni (r-nul Anenii Noi):

Luna	Frecvenţa (%) a vîntului pe direcţii şi a calmurilor								
	N	NE	E	SE	S	SV	V	NV	Calm
I.2015	11	4	13	6	17	15	11	23	10
II.2015	28	11	15	13	7	6	3	17	8
III.2015	25	14	12	9	15	6	4	15	10
IV.2015	18	5	5	7	9	7	15	34	5
V.2015	21	3	9	10	12	8	7	30	15
VI.2015	36	12	10	6	5	4	2	25	13
VII.2015	19	4	4	1	10	13	15	34	14
VIII.2015	39	19	17	1	1	4	3	16	16
IX.2015	26	9	10	15	14	9	3	14	9
X.2015	20	14	22	17	2	3	3	19	15
XI.2015	10	13	8	1	7	14	18	29	10
XII.2015	11	3	4	2	6	18	22	34	15
I.2016	15	7	12	10	5	12	15	24	8
II.2016	10	2	14	24	18	14	8	10	5
III.2016	17	11	14	12	6	8	12	20	6
IV.2016	10	4	13	15	11	14	14	19	9
V.2016	28	7	16	7	3	4	11	24	10
VI.2016	22	12	17	8	11	8	6	16	7

Nota: în raionul Anenii Noi observaţii asupra vitezei şi direcţiei vîntului nu se efectuează.

Director Mihail ROIBU

MINISTERUL MEDIULUI AL REPUBLICII MOLDOVA SERVICIUL HIDROMETEOROLOGIC DE STAT IDNO 1006601003950

Ex. Lidia Treşcilo
022 773644
E-mail: lidia.trescilo@meteo.gov.md

APPENDIX G: NOISE

APPENDIX G-1: CERTIFICATE OF CALIBRATION

CERTIFICATE OF CALIBRATION

MEASUREMENT SYSTEMS

Date of Issue: 15 June 2015
Issued by:
ANV Measurement Systems
Beaufort Court
17 Roebuck Way
Milton Keynes MK5 8HL
Telephone 01908 642846 Fax 01908 642814
E-Mail: info@noise-and-vibration.co.uk
Web: www.noise-and-vibration.co.uk
Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Certificate Number: TCRT15/1165

Approved Signatory

M. Breslin [ ] K. Mistry [ ] J. Harriman [ ]

Customer	Parsons Brinckerhoff Ltd Queen Victoria House Redland Hill Bristol BS6 6US
Order No.	Warranty Repair
Description	Sound Level Meter / Pre-amp / Microphone / Associated Calibrator

Identification

Manufacturer	*Instrument*	*Type*	*Serial No. / Version*
Rion	Sound Level Meter	NL-52	01021290
Rion	Firmware		1.3
Rion	Pre Amplifier	NH-25	21332
Rion	Microphone	UC-59	04346
Rion	Calibrator	NC-74	34536109
	Calibrator adaptor type if applicable		NC-74-002

Performance Class 1
Test Procedure TP 2.SLM 61672-3 TPS-49
Procedures from IEC 61672-3:2006 were used to perform the periodic tests.
Type Approved to IEC 61672-1:2002 YES Approval Number 21.21 / 13.02
If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2003
Date Received 10 June 2015 ANV Job No. TRAC15/06084
Date Calibrated 15 June 2015

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2006, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2003, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2002, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2002.

Previous Certificate	*Dated*	*Certificate No.*	*Laboratory*
	16 January 2015	17777	Campbell Associates

CERTIFICATE OF CALIBRATION

Certificate Number
TCRT15/1165

Sound Level Meter Instruction manual and data used to adjust the sound levels indicated.

SLM instruction manual title	Sound Level Meter	NL-42 / NL-52
SLM instruction manual ref / issue		11-03
SLM instruction manual source		Manufacturer
Internet download date if applicable		N/A
Case corrections available		Yes
Uncertainties of case corrections		Yes
Source of case data		Manufacturer
Wind screen corrections available		Yes
Uncertainties of wind screen corrections		Yes
Source of wind screen data		Manufacturer
Mic pressure to free field corrections		Yes
Uncertainties of Mic to F.F. corrections		Yes
Source of Mic to F.F. corrections		Manufacturer
Total expanded uncertainties within the requirements of IEC 61672-1:2002		Yes
Specified or equivalent Calibrator		Specified
Customer or Lab Calibrator		Lab Calibrator
Calibrator adaptor type if applicable		NC-74-002
Calibrator cal. date		02 June 2015
Calibrator cert. number		UCRT15/1155
Calibrator cal cert issued by		ANV Measurement Systems
Calibrator SPL @ STP	94.07 dB	Calibration reference sound pressure level
Calibrator frequency	1001.88 Hz	Calibration check frequency
Reference level range	25 - 130 dB	

Accessories used or corrected for during calibration - Wind Shield WS-10
Note - if a pre-amp extension cable is listed then it was used between the SLM and the pre-amp.

Environmental conditions during tests	Start	End	
Temperature	22.97	22.94	± 0.20 °C
Humidity	35.1	35.4	± 3.00 %RH
Ambient Pressure	101.26	101.25	± 0.03 kPa

Response to associated Calibrator at the environmental conditions above.

Initial indicated level	94.1	dB	Adjusted indicated level	94.1	dB
The uncertainty of the associated calibrator supplied with the sound level meter ±				0.10	dB

Self Generated Noise — This test is currently not performed by this Lab.

Microphone installed (if requested by customer) = Less Than	N/A	dB	A Weighting
Uncertainty of the microphone installed self generated noise ±	N/A	dB	

Microphone replaced with electrical input device - UR = Under Range indicated

Weighting	A			C			Z		
	11.7	dB	UR	16.4	dB	UR	22.1	dB	UR
Uncertainty of the electrical self generated noise ±							0.12	dB	

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

For the test of the frequency weightings as per paragraph 12. of IEC 61672-3:2006 the actual microphone free field response was used.

The acoustical frequency tests of a frequency weighting as per paragraph 11 of IEC 61672-3:2006 were carried out using an electrostatic actuator.

..... END .....

Calibrated by: A Patel R 1

Additional Comments
None

CERTIFICATE OF CALIBRATION

Date of Issue: 14 October 2015

Certificate Number: TCRT15/1270

Issued by:
ANV Measurement Systems
Beaufort Court
17 Roebuck Way
Milton Keynes MK5 8HL
Telephone 01908 642846 Fax 01908 642814
E-Mail: info@noise-and-vibration.co.uk
Web: www.noise-and-vibration.co.uk
Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Approved Signatory

M. Breslin [ ] K. Mistry [ ] J. Harriman [✓]

Customer	Parsons Brinckerhoff Ltd Amber Court William Armstrong Drive Newcastle Business Park Newcastle upon Tyne NE4 7YQ
Order No.	86841
Test Procedure	Procedure TP 1 Calibration of Sound Calibrators
Description	Acoustic Calibrator

Identification

Manufacturer	*Instrument*	*Model*	*Serial No.*
Rion	Calibrator	NC-74	34657202

The calibrator has been tested as specified in Annex B of IEC 60942:2003. As public evidence was available from a testing organisation (PTB) responsible for approving the results of pattern evaluation tests, to demonstrate that the model of sound calibrator fully conformed to the requirements for pattern evaluation described in Annex A of IEC 60942:2003, the sound calibrator tested is considered to conform to all the class 1 requirements of IEC 60942:2003.

ANV Job No.	TRAC15/10146
Date Received	13 October 2015
Date Calibrated	14 October 2015
Previous Certificate	*Dated* Initial Calibration *Certificate No.* *Laboratory*

CERTIFICATE OF CALIBRATION

Measurements

The sound pressure level generated by the calibrator in its WS2 configuration was measured five times by the Insert Voltage Method using a microphone as detailed below. The mean of the results obtained is shown below. It is corrected to the standard atmospheric pressure of 101.3 kPa (1013 mBar) using original manufacturers information.

Test Microphone	*Manufacturer*	*Type*
	Brüel & Kjær	4134

Results

The level of the calibrator output under the conditions outlined above was

93.98 ± 0.10 dB rel 20 µPa

Functional Tests and Observations

The frequency of the sound produced was	1002.54 Hz	±	0.13 Hz
The total distortion was	0.87 %	±	7.1 % of Reading

During the measurements environmental conditions were

Temperature	22	to	23	°C
Relative Humidity	38	to	46	%
Barometric Pressure	101.4	to	101.5	kPa

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

The uncertainties refer to the measured values only with no account being taken of the ability of the instrument to maintain its calibration.

A small correction factor may need to be applied to the sound pressure level quoted above if the device is used to calibrate a sound level meter which is fitted with a free-field response microphone. See manufacturers handbook for details.

..... END .....

Note:

Calibrator adjusted prior to calibration?	NO	
Initial Level	N/A	dB
Initial Frequency	N/A	Hz

Additional Comments
None

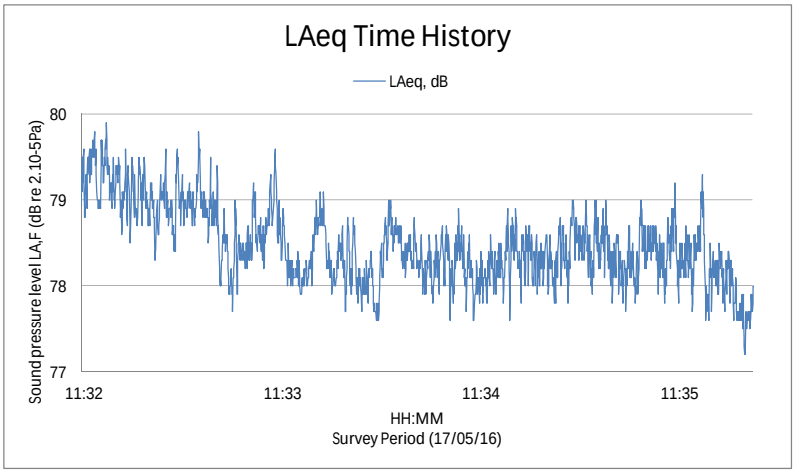
Calibrated by: J Harriman

APPENDIX G-2: NOISE MONITORING FORMS

Noise Monitoring Form

Project:	Moldova Solid Waste ESIA	**Job Number:**	70016813
Location:	T1		
Equipment:	NL-52 - Serial 01021290	**Engineer:**	Esteban Olmos
Pre-Calibration Level:	94.0	**General Weather Description:**	Calm and dry
Post-Calibration Level:	94.0		Wind speed: 3m/s
Additional Comments:	Site – leachate collection, 46°51'9.03"N; 29°10'10.85"E		

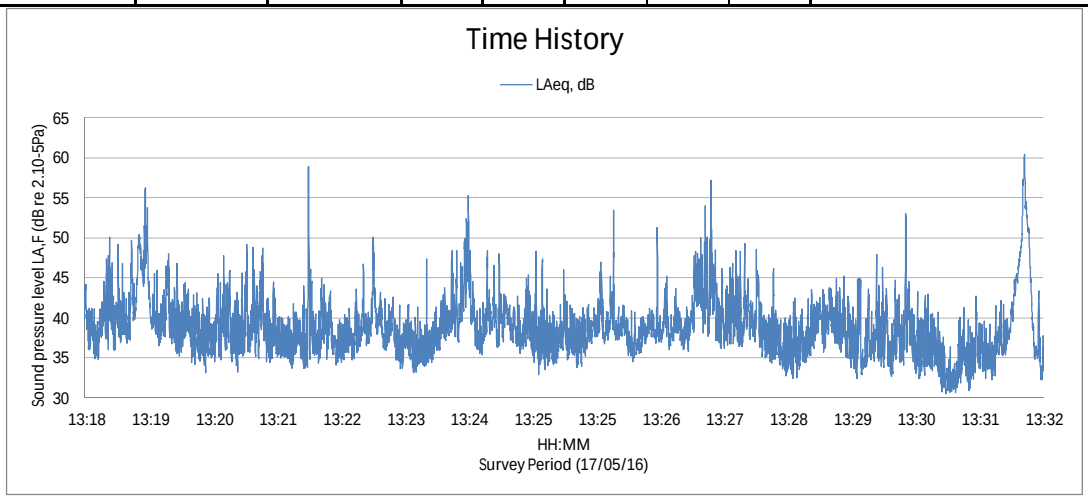
Measurement Period			Statistical Noise Levels / dB					Description of Audible Noise
Date	Start / Stop Time	Measurement Periods	L_{Aeq}	L_{Amax}	L_{Amin}	L_{A10}	L_{A90}	One trcuk filling at app. 5m distance
17/05/2016	11:32	3 min	78.5	80.1	77.0	79.1	78.0	



Noise Monitoring Form

Project:	Moldova Solid Waste ESIA	**Job Number:**	70016813
Location:	T2		
Equipment:	NL-52 - Serial 01021290	**Engineer:**	Esteban Olmos
Pre-Calibration Level:	94.0	**General Weather Description:**	Calm and dry
Post-Calibration Level:	94.0		Wind speed: 3m/s
Additional Comments:	Cretoaia Village – nearest property in relation to the site, 46°51'53.13"N; 29° 8'17.89"E		

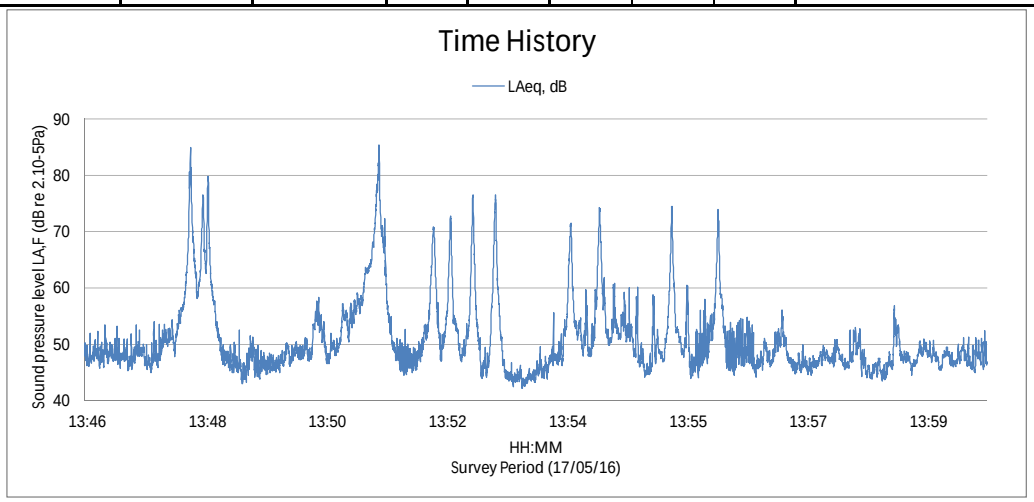
Measurement Period			Statistical Noise Levels / dB					Description of Audible Noise
Date	**Start / Stop Time**	**Measurement Periods**	**L_{Aeq}**	**L_{Amax}**	**L_{Amin}**	**L_{A10}**	**L_{A90}**	
17/05/2016	13:18	15 min	41.4	60.5	30.3	43.1	34.9	Sporadic distant road traffic noise. 2 cars on local road, widn blowing towards the site



Noise Monitoring Form

Project:	Moldova Solid Waste ESIA	**Job Number:**	70016813
Location:	T3		
Equipment:	NL-52 - Serial 01021290	**Engineer:**	Esteban Olmos
Pre-Calibration Level:	94.0	**General Weather Description:**	Calm and dry
Post-Calibration Level:	94.0		Wind speed: 4.1m/s
Additional Comments:	Local Road L481 - representative of nearest property to local road, m46°53'44.26"N; 29° 8'29.35"E		

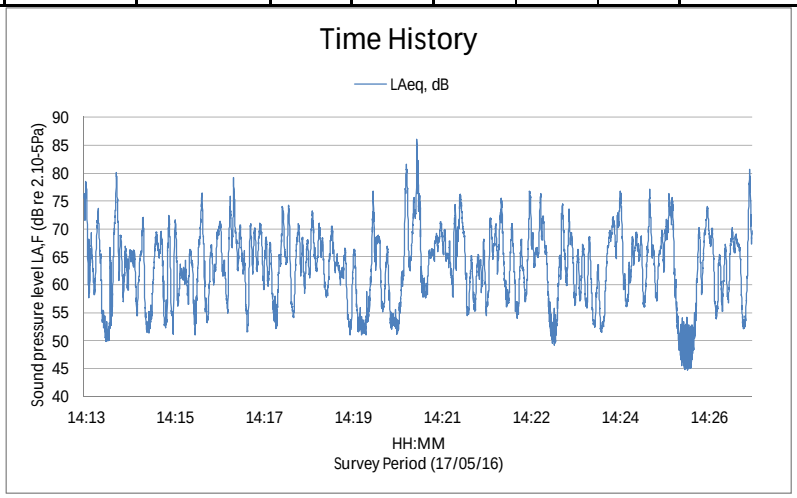
Measurement Period			Statistical Noise Levels / dB					Description of Audible Noise
Date	**Start / Stop Time**	**Measurement Periods**	L_{Aeq}	L_{Amax}	L_{Amin}	L_{A10}	L_{A90}	
17/05/2016	13:46	15 min	62.3	86.2	41.9	59.4	45.5	1 lorry, 8 cars, 1 tractor. Lorries on National Road audible and visible. Wind blowing from national road



Noise Monitoring Form

Project:	Moldova Solid Waste ESIA	**Job Number:**	70016813
Location:	T4		
Equipment:	NL-52 - Serial 01021290	**Engineer:**	Esteban Olmos
Pre-Calibration Level:	94.0	**General Weather Description:**	Calm and dry
Post-Calibration Level:	94.0		Wind speed: 2-3m/s
Additional Comments:	National Road R2 – 5m from the main road, 46°53'57.84"N; 29° 8'4.70"E		

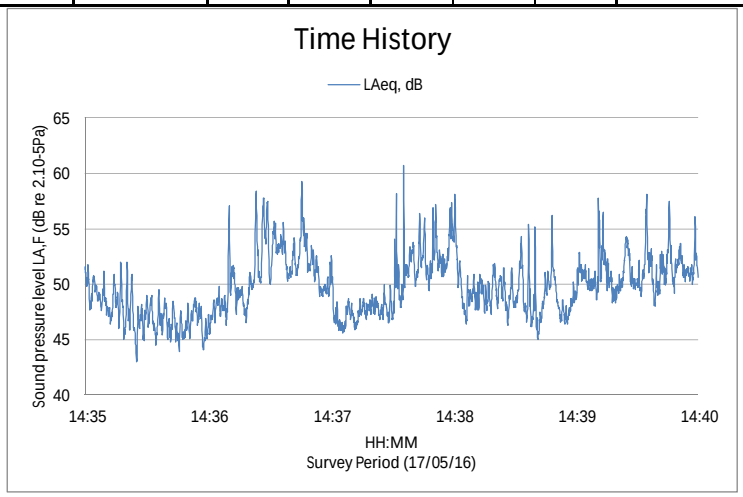
Measurement Period			Statistical Noise Levels / dB					Description of Audible Noise
Date	**Start / Stop Time**	**Measurement Periods**	**L_{Aeq}**	**L_{Amax}**	**L_{Amin}**	**L_{A10}**	**L_{A90}**	
17/05/2016	14:13	15 min	67.6	86.2	44.4	71.1	53.6	10m from road, 30m from nearest property, constant heavy traffic. App. 25 Heavy vehicles



Noise Monitoring Form

Project:	Moldova Solid Waste ESIA	**Job Number:**	70016813
Location:	T5		
Equipment:	NL-52 - Serial 01021290	**Engineer:**	Esteban Olmos
Pre-Calibration Level:	94.0	**General Weather Description:**	Calm and dry
Post-Calibration Level:	94.0		Wind speed: 2-3m/s
Additional Comments:	Representative of properties near alternative access, 46°53'52.21"N; 29° 7'43.54"E		

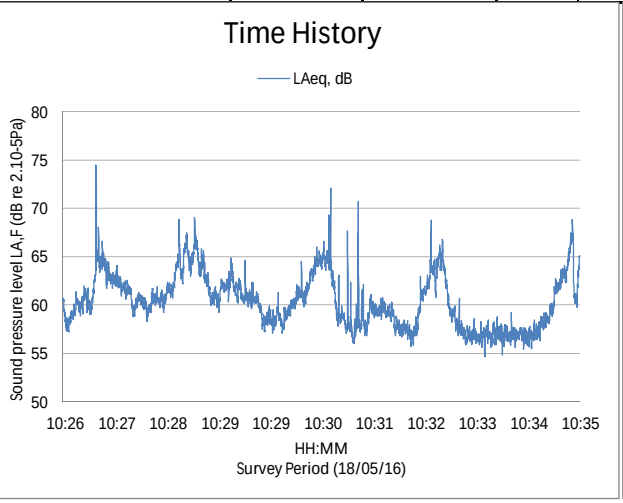
Measurement Period			Statistical Noise Levels / dB					Description of Audible Noise
Date	**Start / Stop Time**	**Measurement Periods**	**L_{Aeq}**	**L_{Amax}**	**L_{Amin}**	**L_{A10}**	**L_{A90}**	
17/05/2016	14:35	5min	50.6	62.2	42.6	53.2	46.6	Distant traffic from main road, houses under construction, wind blowing from the main road

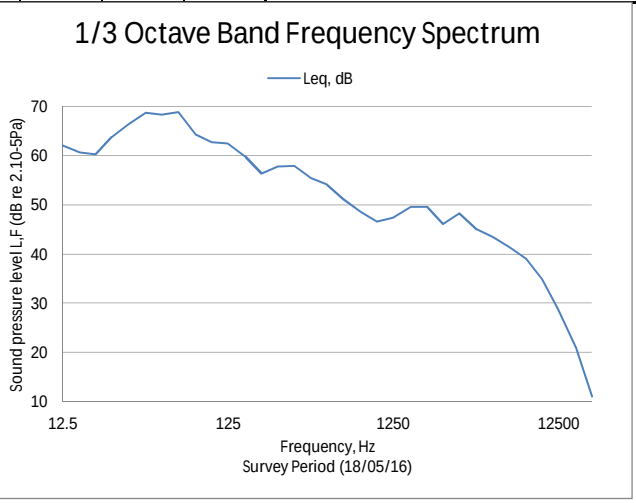


Noise Monitoring Form

Project:	Moldova Solid Waste ESIA	**Job Number:**	70016813
Location:	CH1		
Equipment:	NL-52 - Serial 01021290	**Engineer:**	Esteban Olmos
Pre-Calibration Level:	94.0	**General Weather Description:**	Calm and dry
Post-Calibration Level:	94.0		Wind speed: 3.5m/s
Additional Comments:	Site, waste tipping point, 47° 0'4.68"N; 28°55'3.16"E		

Measurement Period			Statistical Noise Levels / dB					Description of Audible Noise
Date	**Start / Stop Time**	**Measurement Periods**	L_{Aeq}	L_{Amax}	L_{Amin}	L_{A10}	L_{A90}	
18/05/2016	10:26	10 mins	61.3	74.5	54.4	64.2	57.7	Distance to source app. 30-40m. 2 waste lorries tippping and 2 bulldozers compacting soil

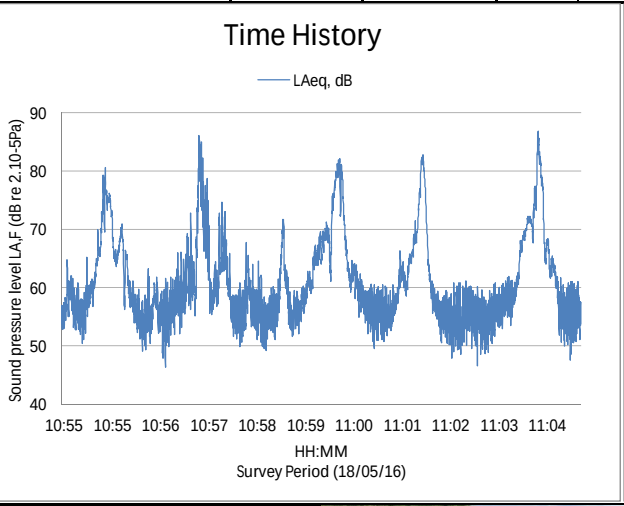


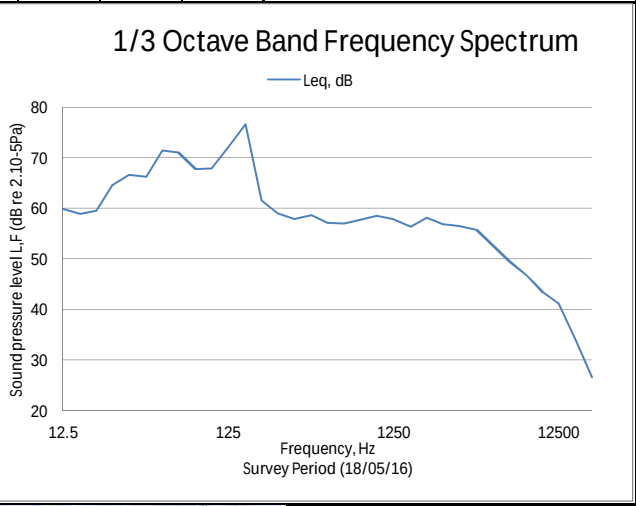


Noise Monitoring Form

Project:	Moldova Solid Waste ESIA	**Job Number:**	70016813
Location:	CH2		
Equipment:	NL-52 - Serial 01021290	**Engineer:**	Esteban Olmos
Pre-Calibration Level:	94.0	**General Weather Description:**	Calm and dry
Post-Calibration Level:	94.0		Wind speed: 3.5m/s
Additional Comments:	Site, Haul Road, 46°59'55.00"N; 28°54'58.83"E		

Measurement Period			Statistical Noise Levels / dB					Description of Audible Noise
Date	**Start / Stop Time**	**Measurement Periods**	L_{Aeq}	L_{Amax}	L_{Amin}	L_{A10}	L_{A90}	
18/05/2016	10:55	10 min	69.6	87.0	46.0	71.9	53.7	Movement of waste lorries, terrain in slope. 5 waste lorries going up, 8 going down.

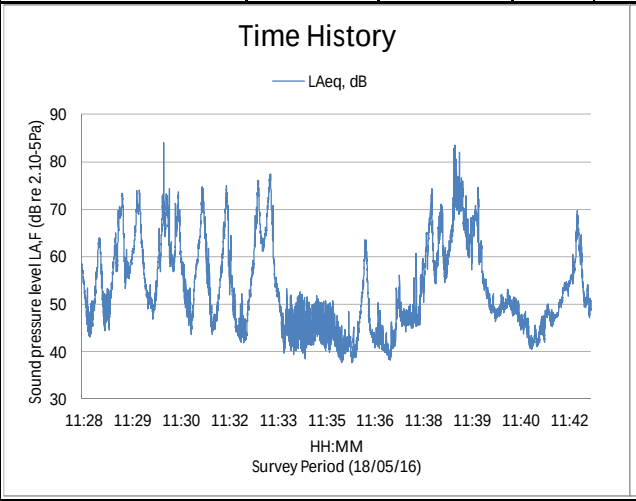


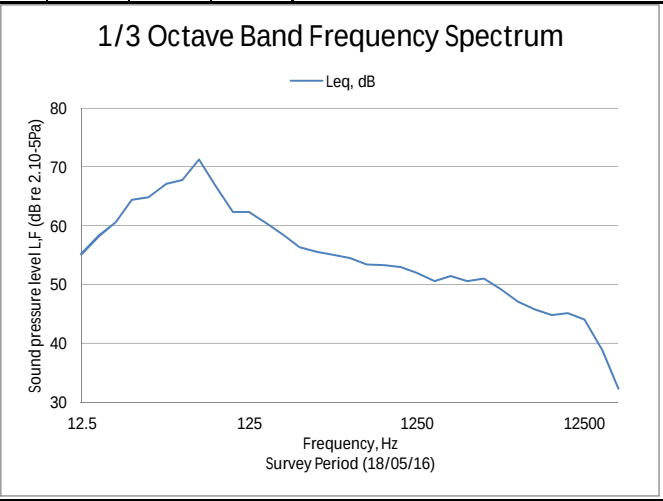


Noise Monitoring Form

Project:	Moldova Solid Waste ESIA	**Job Number:**	70016813
Location:	CH3		
Equipment:	NL-52 - Serial 01021290	**Engineer:**	Esteban Olmos
Pre-Calibration Level:	94.0	**General Weather Description:**	Calm and dry
Post-Calibration Level:	94.0		Wind speed: 3.5m/s
Additional Comments:	Site, Haul Road, 46°59'51.04"N; 28°54'43.92"E		

Measurement Period			Statistical Noise Levels / dB					Description of Audible Noise
Date	**Start / Stop Time**	**Measurement Periods**	**L_{Aeq}**	**L_{Amax}**	**L_{Amin}**	**L_{A10}**	**L_{A90}**	
18/05/2016	11:28	15 mins	63.4	85.2	37.6	66.7	43.7	Movements of waste lorries. 16 waste lorries during the measuring period



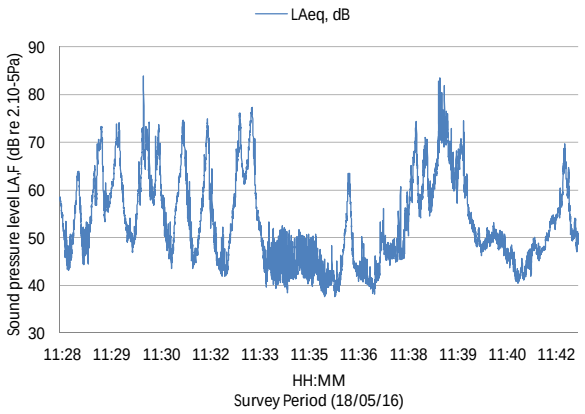


Noise Monitoring Form

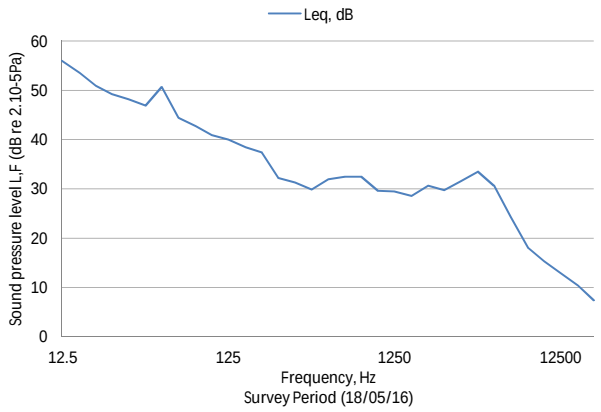
Project:	Moldova Solid Waste ESIA	**Job Number:**	70016813
Location:	CH4		
Equipment:	NL-52 - Serial 01021290	**Engineer:**	Esteban Olmos
Pre-Calibration Level:	94.0	**General Weather Description:**	Calm and dry
Post-Calibration Level:	94.0		Wind speed: 3.5m/s
Additional Comments:	Bubuieci, 46°59'56.07"N; 28°55'50.56"E		

Measurement Period			Statistical Noise Levels / dB					Description of Audible Noise
Date	**Start / Stop Time**	**Measurement Periods**	**L_{Aeq}**	**L_{Amax}**	**L_{Amin}**	**L_{A10}**	**L_{A90}**	
18/05/2016	12:15	10 min	42.5	59.1	30.8	42.9	36.0	Next to local cemetery, distant construction noise, site not audible. Nearest properties at 930m away, general ambient noise.

Time History



1/3 Octave Band Frequency Spectrum



APPENDIX H: LANDSCAPE PHOTOGRAPHS

Figure H-1 Photograph Location Points and Direction Plan

Figure H-2 Location Point 1

Figure H-3 Location Point 2

Figure H-4 Location Point 3

Figure H-5 Location Point 4

Figure H-6 Location Point 5

APPENDIX I GROUNDWATER ANALYSIS RESULTS

INSTITUTUL DE CHIMIE AL AŞM
LABORATORUL DE ÎNCERCĂRI «GEOLAB»
MD-2028, m. Chişinău, str.Academiei, 3, t. 73-99-38, 73-71-44, fax 73-99-54, e-mail - bogdevicholeg@yahoo.com

	Raport de încercări Nr 36 «» iulie 2016	Cod: Fr-5.10/02 Redactia: 6 Data: 01.04.2016

Certificatul de acreditare Nr. LÎ-104, valabil până la 13.03.2020

BENEFICIAR, ADRESA	Bancom Proiect SRL
DENUMIREA PROBELOR	apă din sonde
NUMĂRUL CERERII	11
CANTITATEA PROBELOR	5
PREAMBALAREA	recipient din polietilena
LOCUL PRELEVĂRII	Ţînţăreni, Anenii Noi
NUMĂR ŞI DATA ACTULUI DE PRELEVARE	18 din 20.06.2016
DATA PRIMIRII PROBEI	20.06.2016
COD DE LABORATOR	59/16, 60/16, 61/16, 62/16, 63/16
DATA ÎNCEPUTULUI ÎNCERCĂRILOR	20.06.2016
DATA TERMINĂRII ÎNCERCĂRILOR	05.07.2016
SCOPUL ÎNCERCĂRII	determinarea compoziţiei chimice a apelor
ECHIPAMENT UTILIZAT	spectrofotometru KFK-2, ionometru Consort C6030, Spectrofotometru AAnalyst 800 cu atomizare termică (THGA)

INSTITUTUL DE CHIMIE AL AŞM
LABORATORUL DE ÎNCERCĂRI «GEOLAB»
MD-2028, m. Chişinău, str.Academiei, 3, t. 73-99-38, 73-71-44, fax 73-99-54, e-mail - bogdevicholeg@yahoo.com

Rezultatele obţinute: substanţe unorganice

Nr.	Indicele	Concentraţii depistate						
		37/16 (Sonda BH-3, 10,9)	38/16 (Sonda BH-3, 14,6)	59/16 (Sonda BH-4)	60/16 Sonda BH-3	61/16 Sonda BH-2	62/16 Sonda BH-5	63/16 Sonda BH-6
1	pH, unit pH	6,48	6,68	7,13	7,30	7,17	7,34	6,70
2	Conductivitatea, µS/cm	14580,0	11090,0	3780,0	485,0	2160,0	1685,0	6120,0
3	TDS, mg/L	7760,00	6020,00	1990,00	260,00	1140,00	904,00	3270,00
4	Calciu, Ca^{+2}, mg/L	918,43	918,43	215,63	40,87	127,78	125,78	334,43
5	Magneziu Mg^{+2}, mg/L	3004,72	3037,42	136,03	25,04	137,97	97,49	454,15
6	Sodiu+potasiu, $Na^{+}+K^{+}$, mg/L	2627,5	1136,2	486,51	28,11	156,28	124,30	469,89
	Duritatea (Ca+Mg) mg-eq/L	104,61	105,61	21,95	5,39	17,73	14,3	54,05
7	Duritatea (Ca+Mg), German grad	292,91	295,70	61,47	15,08	49,66	40,03	151,34
8	Cloruri, Cl^{-}, mg/l	6937,00	5190,50	671,41	22,84	339,19	230,34	1607,34
9	Sulfaţi, SO_4^{-2} mg/l	30,66	65,41	212,03	31,11	125,78	116,59	126,01
10	Hidrogenocarbonaţi, HCO_3^{-}mg/l	1207,80	362,95	689,30	244,00	750,30	652,70	1207,80
11	Nitraţi, NO_3^{-}, mg/l			519,86	< 0,1	0,70	3,32	425,23
12	Nitriţi, $N0_2^{-}$, mg/l	0,14	0,13	7,92	0,28	0,01	3,05	2,30
13	Amoniac (total), NH_4^{+}, mg/l	4,66	1,72	1,07	0,51	0,99	0,58	0,80
14	Nitrogen total, mg/l			120,63	0,71	0,93	2,13	97,34
15	Nitrogen amoniacal, mg/l	3,84	1,42	0,83	0,40	0,77	0,45	0,62
16	Mineralizarea, g/l	14908,0	10823,9	2930,80	392,97	1638,00	1350,40	4624,85
17	Reziduul sec, mg/l	11602,30	7776,33	2468,00	292,00	1313,50	1074,50	4259,50
18	Plumb, Pb, µg/l	2,39	334,65	<2	<2	<2	2,98	1,85
19	Cadmiu, Cd, µg/l	1,30	0,79	0,36	<0,2	<0,2	<0,2	0,633
20	Crom (total), Cr, µg/l	41,61	26,96	<0,9	<0,9	<0,9	<0,9	<0,9
21	Mangan, Mn, µg/l	**2181,0**	**4430,0**	**708,0**	**370,9**	**2808**	**383,05**	**454,6**
22	Nichel, Ni, µg/l	**1155,9**	287,2	42,0	13,06	65,2	7,3	36,86
23	Cupru, µg/l	110,1	86,5	56,3	68,1	6,4	51,3	105,1
24	Arsen, As, µg/l	29,2	26,3	5,44	1,83	4,99	6,19	2,46
25	Fluoruri, (F^{-}), mg/l	0,48	0,23	0,43	1,17	0,66	0,51	0,20
26	Fier total (Fe), mg/l	0,15	0,12	< 0,05	< 0,05	< 0,05	< 0,05	< 0,05
27	Oxidabilitatea permanganată, mgO/l	302,20	90,40					
27	Mercur, µg/l	< 0,5	< 0,5	< 0,5	< 0,5	< 0,5	< 0,5	< 0,5

Rezultatele analizei se referă la mostra analizată.
Multiplicarea protocolului de încercareeste strict interzisă fără aprobarea Laboratorului de Încercare.
Fără ştampila laboratorului raportul nu este valabil. La cererea beneficiarului se indică incertitudinea de măsurare.

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Rezultatele obţinute: substanţe unorganice

Nr.	Indicele	Concentraţii depistate						
		37/16 (Sonda BH-3, 10,9)	38/16 (Sonda BH-3, 14,6)	59/16 (Sonda BH-4)	60/16 Sonda BH-3	61/16 Sonda BH-2	62/16 Sonda BH-5	63/16 Sonda BH-6
28	Bor, mg/l	< 0,1	< 0,1	< 0,1	< 0,1	0,15	< 0,1	< 0,1
29	Cianuri, mg/l	< 0,15	< 0,15	< 0,15	< 0,15	< 0,15	< 0,15	< 0,15
30	Consumul chimic de oxigen CCO			204,70	157,60	315,10	110,40	409,40
31	Consumul biochimic de oxigen CBO	16,0	11,1	21,0	11,0	8,0	25,0	39,0
32	Produse petroliere + grăsimi, mg/l	3,8	2,8	0,4	2,4	2,0	0,2	0,8

Rezultatele obţinute: substanţe organice volatile

Nr.	Indicele	Numărul CAS	Concentraţii depistate						
			37/16 (Sonda BH-3, 10,9)	38/16 (Sonda BH-3, 14,6)	59/16 (Sonda BH-4)	60/16 Sonda BH-3	61/16 Sonda BH-2	62/16 Sonda BH-5	63/16 Sonda BH-6
1	Cloroform, µg/l	67-66-3	1,0	0,90	0,72	0,74	1,04	1,14	0,53
2	1-2-Dichloroethane, µg/l	107-06-2.	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1
3	Carbon tetrachloride, µg/l	56-23-5	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1
4	Trichloroethylene, µg/l	79-01-6	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1
5	BDCM, µg/l	75-27-4	0,27	0,60	0,38	0,38	0,56	0,42	0,32
6	Tetrachloroethylene, µg/l	127-18-4	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1
7	DBCM, µg/l	124-48-1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	17,08
8	Bromoform, µg/l	75-25-2	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1
9	Benzene, µg/l	71-43-2	2,76	9,68	<0,1	<0,1	3,17	<0,1	<0,1
10	Toluene, µg/l	108-88-3	6,08	9	<0,1	<0,1	4,71	<0,1	<0,1
11	m-xylene, µg/l	108-38-3	54,32	124,22	<0,1	<0,1	75,40	<0,1	<0,1
12	p-xylene, µg/l	106-42-3	<0,1	5,08	<0,1	<0,1	19,28	<0,1	<0,1
13	styrene, µg/l	100-42-5	<0,1	<0,1	<0,1	<0,1	32,15	<0,1	<0,1
14	o-xylene, µg/l	95-47-6	7,9	7,1	<0,1	<0,1	19,37	<0,1	<0,1

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Rezultatele obţinute: Hidrocarburi poliaromatice, µg/l

Nr.	Indicele	Numărul CAS	Concentraţii depistate						
			37/16 (Sonda BH-3, 10,9)	38/16 (Sonda BH-3, 14,6)	59/16 (Sonda BH-4)	60/16 Sonda BH-3	61/16 Sonda BH-2	62/16 Sonda BH-5	63/16 Sonda BH-6
1	Naphtalene	91-20-3	0.31	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
2	1-Methylnaphtalene	90-12-0	0.06	< 0.01	< 0.01	< 0.01	0.034	< 0.01	< 0.01
3	2-Methylnaphtalene	1575-96-8	< 0.01	< 0.01	< 0.01	< 0.01	0.059	< 0.01	< 0.01
4	Acenaphtylene	83-32-9	0.35	0.05	< 0.01	< 0.01	0.012	< 0.01	< 0.01
5	Acenaphtene	208-96-8	0.17	0.04	< 0.01	< 0.01	0.039	< 0.01	< 0.01
6	Fluorene	86-73-7	< 0.01	< 0.01	< 0.01	< 0.01	0.218	< 0.01	0.02
7	Phenanthrene	85-01-8	< 0.01	< 0.01	< 0.01	0.01	0.426	< 0.01	0.01
8	Anthracene	120-12-7	0.25	0.02	< 0.01	0.01	< 0.01	< 0.01	< 0.01
9	Fluoranthene	206-44-0	< 0.01	< 0.01	< 0.01	< 0.01	0.010	< 0.01	< 0.01
10	Pyrene	129-00-0	< 0.01	< 0.01	< 0.01	0.02	0.011	0.013	0.01
11	Chrysene	218-01-9	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
12	Benz[a]anthracene	56-55-3	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
13	Benz[k]fluoranthene	207-08-9	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
14	Benz[a]pyrene	50-32-8	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
15	Benz[b]fluoranthene	205-99-2	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
16	Indeno[1,2,3-cdi]pyrene	193-39-5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
17	Dibenz[a,h]anthracene	53-70-3	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
18	Benzo[g,h,I]perylene	191-24-2	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01

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Rezultatele obţinute: Poluanţi Organici Persistenţi, µg/l

Nr.	Indicele	Numărul CAS	Concentraţii depistate						
			37/16 (Sonda BH-3, 10,9)	38/16 (Sonda BH-3, 14,6)	59/16 (Sonda BH-4)	60/16 Sonda BH-3	61/16 Sonda BH-2	62/16 Sonda BH-5	63/16 Sonda BH-6
1	a-BHC	319-84-6	0.104	0.065	< 0.005	< 0.005	< 0.005	0.005	0.014
2	b-BHC	319-85-7	0.038	0.023	< 0.010	< 0.010	< 0.010	< 0.010	0.023
3	g-BHC	58-89-9	0.078	0.048	< 0.005	< 0.005	< 0.005	< 0.005	0.015
4	PCB18	37680-65-2	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
5	PCB28	7012-37-5	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.077
6	PCB31	16606-02-3	0.460	0.285	< 0.010	0.012	< 0.010	< 0.010	0.053
7	Heptachlor	76-44-8	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
8	PCB52	35693-99-3	0.572	0.355	< 0.010	< 0.010	0.027	< 0.010	0.018
9	Aldrin-R	309-00-2	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
10	PCB44	41464-39-5	0.264	0.164	< 0.010	0.015	< 0.010	0.018	0.017
11	Heptaclor epoxide	1024-57-3	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
12	PCB101	37680-73-2	0.024	0.015	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
13	p,p-DDE	72-55-9	0.013	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
14	Dieldrin	60-57-1	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
15	o,p-DDD	53-19-0	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
16	Endrine	72-20-8	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
17	PCB118	31508-00-6	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
18	PCB149	38380-04-0	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
19	p,p-DDD	72-54-8	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
20	o,p-DDT	789-02-6	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
21	PCB154	60145-22-4	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
22	p,p-DDT	50-29-3	0.116	0.072	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
23	PCB138	35065-28-2	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
24	PCB180	35065-29-3	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
25	PCB194	35694-08-7	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020

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Rezultatele obţinute: Triazine, µg/l

Nr.	Indicele	Numărul CAS	Concentraţii depistate						
			37/16 (Sonda BH-3, 10,9)	38/16 (Sonda BH-3, 14,6)	59/16 (Sonda BH-4)	60/16 Sonda BH-3	61/16 Sonda BH-2	62/16 Sonda BH-5	63/16 Sonda BH-6
1	Simazine	122-34-9	0,47	0,12	0,04	0,17	0,12	0,59	0,02
2	Prometon	1610-18-0	1,53	0,68	< 0,01	< 0,01	< 0,01	< 0,01	< 0,01
3	Atrazine	1912-24-9	0,24	0,07	< 0,01	0,03	0,08	< 0,01	0,01
4	Propazine	139-40-2	0,04	0,05	< 0,01	0,01	0,02	< 0,01	< 0,01
5	Ametryn	834-12-8	0,09	0,10	< 0,01	< 0,01	< 0,01	< 0,01	< 0,01
6	Prometryne	7287-19-6	0,01	0,15	< 0,01	< 0,01	< 0,01	< 0,01	< 0,01
7	Terbytrin	886-50-0	0,46	0,14	< 0,01	0,01	< 0,01	< 0,01	< 0,01

Condiţii de efectuare a încercărilor

Temperatura, ^{0}C	Umiditatea, %

Şeful Laboratorului, doctor în geologie_____ O. Bogdevici

Executori
Cercetător ştiinţific coordonator _____ D. Izmailova
Cercetător ştiinţific _____ M. Grigoraş
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