Minskvodokanal

Non-Technical Summary

April 2018

MINSK WASTEWATER TREATMENT PLANT
NON-TECHNICAL SUMMARY

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1. INTRODUCTION

1.1 General information

The purpose of this Non-Technical Summary (NTS) is to provide an overview of key findings and conclusions of the environmental and social assessment (ESIA) of the project proposed by UE "Minskvodokanal" (the Company) to upgrade the existing waste water treatment plant and construct sludge treatment facilities at the existing site of Minsk WWTP in Zavodskoy district of Minsk (the Project).

ESIA identified the potential benefits and negative environmental and social impacts of the proposed activities, and respective mitigations have been recommended including measures to strengthen environmental and social opportunities in the Project area.

The NTS is integral part of the Project's disclosure package in line with the Environmental and Social Policy of the European Bank for Reconstruction and Development (EBRD, the Bank) and respective Performance Requirements. The Project disclosure package also comprises the Stakeholder Engagement Plan (SEP) and the Environmental and Social Action Plan (ESAP).

1.2 Introduction to the Project

The EBRD is considering providing a Sovereign guaranteed loan of up to EUR 84 million to Minsk Vodokanal (UE "Minskvodokanal" or "Company"), a municipal enterprise wholly owned by the City of Minsk (the "City"), to finance a Priority Investment Programme ("PIP") for the rehabilitation and reconstruction of the Minsk wastewater facilities. The proposed EBRD loan is expected to have several tranches and would be co-financed in equal amount by the European Investment Bank ("EIB"). The total project costs are estimated at EUR 168 million.

The EBRD loan will be used to co-finance: (i) reconstruction of Minsk WWTP to eliminate odour, optimise use of the existing facilities and enhance wastewater treatment efficiency of the plant in line with national and EU requirements, and (ii) construction of sludge treatment facilities (including digestion, dewatering, drying and incineration) in line with EU BAT on the premises of the WWTP.

The Project has been categorised A in line with the EBRD Environmental and Social Policy 2014.

Once implemented, the Project will lead to: (i) EU-compliant treatment of the entire flow of wastewater, (ii) a reduced level of odour, and (iii) EU-compliant solutions for sludge management and disposal. The Project is expected to substantially contribute to the reduction of pollution in downstream river Svisloch, and subsequently Dnieper River and the Black Sea basin.

2. PROJECT SUMMARY

2.1 Project Company

UE "Minskvodokanal" is a company with a history of 140 years. In 1871 the city authorities decided to build a water supply system which became the starting point for development of water services in Minsk. Two years later a few facilities became operational including the first shaft wells, the first pumping station, 1500 m of water pipelines with the capacity of 500 m^3 of water per day. In December 1873 the system was started for test operation.

At present UE Minskvodokanal is a major modern water company which serves the city with about 2 million residents.

Minsk City consumes almost 500,000 m^3 of water per day. Continuous provision of water and wastewater services in the capital city is ensured by the Company personnel which includes more than 3000 technicians, engineers and workers.

2.2 Minsk Waste Water Treatment Plant: Current Situation

The Company operates Minsk Waste Water Treatment Plant (MWWTP) – the country's largest wastewater treatment facility which processes 95% of sanitary waste water generated in the city and several neighbour communities, as well as industrial effluents from dozens of industries.

The influent wastewater flow to MWWTP of almost 500 thousand cubic metres is distributed between two sites: MWWTP-1 dating back to 1963, and MWWTP-2 with smaller treatment capacity commissioned in 2006-2015. Some of MWWTP-1 main assets and infrastructure facilities are outdated and have to be upgraded or decommissioned.

The existing MWWTP provides two stages of treatment:

1) removal of debris, mineral and organic suspended solids and scum in a series of inlet chambers, step screens, grit basins and primary sedimentation tanks;
2) biological treatment of clarified waste water with activated sludge in a system of aeration tanks, followed by secondary sedimentation tanks for settling of suspended solids.

Treated water is transported by collection channel to River Svisloch.

The above treatment process implies generation of large quantities of primary sludge and excess activated sludge. About 650-700 tons of sludge is transported by road to Volma sludge facilities located downstream along River Svisloch, in Lugovoslobodsky rural community of Minsk district. The sludge disposal facilities comprise 18 barrow pits of former sand and gravel quarries and sludge lagoons occupy the area which is more than three times larger than the site of WWTP. Estimated total volume of disposed sludge is 5 Mm^3. Some sludge lagoons have been recultivated with planting of trees while other lagoons are water logged. Remaining capacity of the existing sludge storage facilities is only sufficient for next 4-5 years and its further extension is not possible.

Operational sites of MWWTP are situated near Shabany industrial area and relatively close by residential areas of Shabany, Novy Dvor agro-town, Podlosje, Maly Trostenets and Korolischevici villages. This situation imposes certain limitations on the Company operations, both in terms of generally high anthropogenic load in the territory, and also due to the need to provide adequate living environment for local communities (local residents complain about odour nuisances).

In addition, 4 houses remained in the vicinity of MWWTP sites after resettlement of former Shabany village (Figure 1), including three houses in the existing sanitary protection zone (SPZ) of the treatment plant.

Thus high significance of the Project is predefined by the need to solve the following pressing problems:

- ensuring reliable, efficient and effective treatment of waste water flows;
- mitigation of impacts of WWTP to air, River Svisloch and its ecosystems;
- identification of waste water sludge treatment scheme in order to reduce its quantity.

Options to reconstruct the waste water treatment facilities have been sought since 2000-s. The Minsk Development Master Plan approved by Presidential Order No.165 of 23.04.2003 inter alia provided for:

- advance construction of Minsk Waste Water Treatment Plant for gradual extension of treatment capacities;
- reduction of industrial effluent discharges to the municipal sewerage system;
- arrangements for disposal of sludge generated by waste water treatment processes at MWWTP;
- reconstruction and upgrading of MWWTP-1.

The above objectives have been incorporated in the Sector-specific Wastewater Disposal Scheme of Minsk for the period until 2030 developed by UP "MinskEngProject" in 2007 which considered construction of wastewater sludge treatment facilities as a central element of MWWTP reconstruction.

Assessment of environmental and economic performance of various sludge disposal solutions was conducted in 2011-2015 by UP BelCommunProject, including feasibility studies (FS) for MWWTP reconstruction based on the design capacity of 550 m^3/day. Detailed comparative analysis of technical performance was provided for two sludge treatment options:

1) construction of biogas units at the site MWWTP for digestion of sludge to produce biogas, with subsequent incineration of digested sludge;

2) high-temperature drying of sludge and recommended subsequent utilization of the product for cement production.

2.3 Alternatives Analysis

In 2017-2018 UE "Minskvodokanal" supported by Technical Consultants Sweco Danmark A/S and CJSC "DiArKlass" conducted further technical review of the design solutions (FS 2016) and considered technical alternatives. The WWTP reconstruction solutions were based on EU BAT requirements and best international practice for arrangement of waste water treatment processes.

Main technical alternatives for treatment of sludge

For sludge management, the following options were considered:

1. sludge drying and incineration;
2. anaerobic digestion of sludge to produce biogas, dewatering, drying and incineration;
3. Drying and production of alternative sludge-based fuel in the form of pellets, with partial incineration of pellets for energy recovery;
4. Drying and production of alternative fuel pellets, without incineration.

The first two options are considered typical solutions for sludge disposal, however the options producing alternative fuels would not be robust solutions without a potential market (options 3 and 4), and pellets without application would be considered as waste rather than fuel or secondary resource. Option 2 was recommended by the FS 2015 and, considering the large flows received for treatment, it offers the best performance in terms of utilization of biogas and minimization of wastes.

Project location alternatives

The site of MWWTP is situated within a future development area of the Free Economic Zone "Minsk" – "Shabany industrial area". In 2017 UE Minskgrado developed a plan for extension of Shabany industrial area including inter alia alternative possibility of MWWTP extension in greenfield territories. Minsk City (Zavodskoy District Administration) jointly with UE Minskrado conducted public forum involving various communities after which the City and Minskgrado received official queries and grievances from residents of Minsk City (Shabany neighbourhood) and Minsk District (Novodvorsky rural council).

Construction of sludge treatment facilities beyond the boundary of MWWTP site has been recognized as unsustainable from economic and environmental perspective, for the following reasons:

- Land allocation outside the main sites of MWWTP would entail the need to establish a sanitary protection zone for the new facility and would extend overall area of environmental impacts of MWWTP;
- Sufficient areas are available for the Project implementation at the existing sites of MWWTP;
- This option would require transportation of large quantities of sludge from MWWTP.

It should be noted that the Project location has been finally selected, i.e. the Project will be implemented at the site of MWWTP-1.

2.4 Priority Investment Programme

As a result of technical, environmental and social review, the Project scope has been defined as follows: reconstruction of waste water treatment assets at MWWTP-1 including demolition of unused facilities, and construction of sludge treatment complex comprising digestion, dewatering, drying and incineration of sludge to produce heat and electricity for own needs of MWWTP.

The approved reconstruction programme includes a range of measures designed to improve waste water treatment processes and achieve the required effluent quality taking into account the forecast load on the MWWTP-1 (420 thousand m^3/day based on the corrected population number projections). The main waste water treatment processes are not subject to any substantial changes.

In particular the Project reconstruction activities include:

- Upgrading and reconstruction of selected treatment facilities and auxiliary, utility systems, equipment (sedimentation tanks, grit basins, aeration tanks, pumping stations, etc.) to enhance waste water treatment performance, energy efficiency and MWWTP operational reliability;
- provision of enclosures on mechanical treatment facilities and collection of gas from buildings and facilities of MWWTP-1 (inlet chamber, screening chamber, grit basins, primary sedimentation tanks, waste water transportation channels between facilities) and its removal to the new wet scrubbing facilities, to reduce odour emissions;
- implementation of nitrification and denitrification technology for biological removal of phosphorus and overall improvement of waste water treatment quality, which will help to significantly weaken eutrophication processes in River Svisloch;
- implementation of automatic process monitoring systems to enhance controllability and processes reliability at the treatment plant;
- implementation of effluent UV disinfection system using a gravity-flow unit will help to improve effluent water safety;
- demolition and removal of facilities which are not in use any more (digesters, contact tanks, etc.) or are unsustainable (sludge beds, open channels for transportation of waste water, grit basins, etc.)

The sludge treatment facilities are designed to reduce the original sludge volume to minimum. Based on the adopted Project capacity, it will receive 2300 m^3 of primary sludge and 2100 m^3 of concentrated waste water with sludge per day (i.e. the total of 4400 m^3 per day with dry solids content of 3.5%, or 150 tons of sludge dry solids per day). Anaerobic digestion will decrease sludge quantity to about 88 tons of dry solids per day. Settling at the secondary digestion stage, supernatant recirculation to treatment line, centrifuging and drying will further reduce sludge flow to 67 tons of dry solids per day before incineration. The incineration process will produce a residue of about 27 t of ash per day (10 m^3 of ash).

Biogas (methane and other hydrocarbons) from the enclosed sludge digestion facilities will be collected by gas recovery system and directed to treatment and incineration in gas turbine units to generate electric power for own needs of MWWTP, which is an optimum solution in terms of energy efficiency and minimization of environmental impacts.

2.5 Anticipated Outcomes of the Project

The main outcomes of the Project which are listed in Table 1 indicate that the Project would be beneficial from the environmental and social perspective. The Project is compared to the baseline situation.

Table 1: Main problems to be solved by the Project (information on impacts is provided in section 4).

Reconstruction needs	State and results	
	Baseline	Project
MWWTP-1 treatment capacity	380 thousand m^3 / day	420 thousand m^3 / day
	1 583 000 population equivalent (p.e.)*	1 742 000 p.e.
Total MWWTP treatment capacity	490 thousand m^3 / day	540 thousand m^3 / day.
	1 995 000 p.e.	2 200 000 p.e.
Condition of buildings and structures	Significant proportion of outdated and decommissioned structures and equipment	Demolition of unused facilities, upgrading of facilities and equipment
Waste water treatment quality	During normal operation – compliance with national requirements, however organic removal performance is not high enough (17,2 mg/l N total and 1,1 mg/l P total). Lack of disinfection	Compliance with national and EU requirements (10 mg/l N total and 1,0 mg/l P total) More reliable operation Introduction of UV disinfection of treated wastewater
Impact of River Svisloch	Unsatisfactory condition, due to low water flow rate in the river and historical environmental damage, weak self-purification capacity of the water body	Reduced impact on river ecosystems will support its restoration
Air quality at the boundary of approved SPZ and in surrounding areas	Compliance with local requirements Multiple complaints about odour nuisances	Compliance with national and EU requirements Reduced impact on residential areas Significant reduction of odour emissions
Sludge handling approach and quantity of the main type of waste	Disposal of 650-700 t of sludge per day at the sludge fields Volma, hazard class 3	All sludge is treated on the new complex. Disposal of 27 t of ash per day at the Trostenets landfill, hazard class 3 (volume reduced by 25 times)
Transportation of the main type of wastes to disposal	Transportation distance to take sludge to the disposal facilities is 23 km. Significant load on public roads	Ash transportation distance to Trostenets landfill is 15 km. Load on public roads would be 38 times lower, and the risks on the roads would also decrease
Long-term solution for disposal of the main type of wastes	Lack of sludge disposal capacities in 4-5 years' time	Availability of proven capacity for ash disposal in short and medium term. Ash utilization potential in long term
Land use conditions	Treatment facilities operation at MWWTP sites Degradation of living conditions due to odour emissions	Project would be implemented at the same sites SPZ would be reduced to 500 m, minimum Improvement of living conditions nearby

* 1 p.e. (population equivalent)" means the organic biodegradable load having a five-day biochemical oxygen demand (BOD5) of 60 g of oxygen per day. Source: Council Directive 91/271/EEC of 21 May 1991 concerning urban waste water treatment.

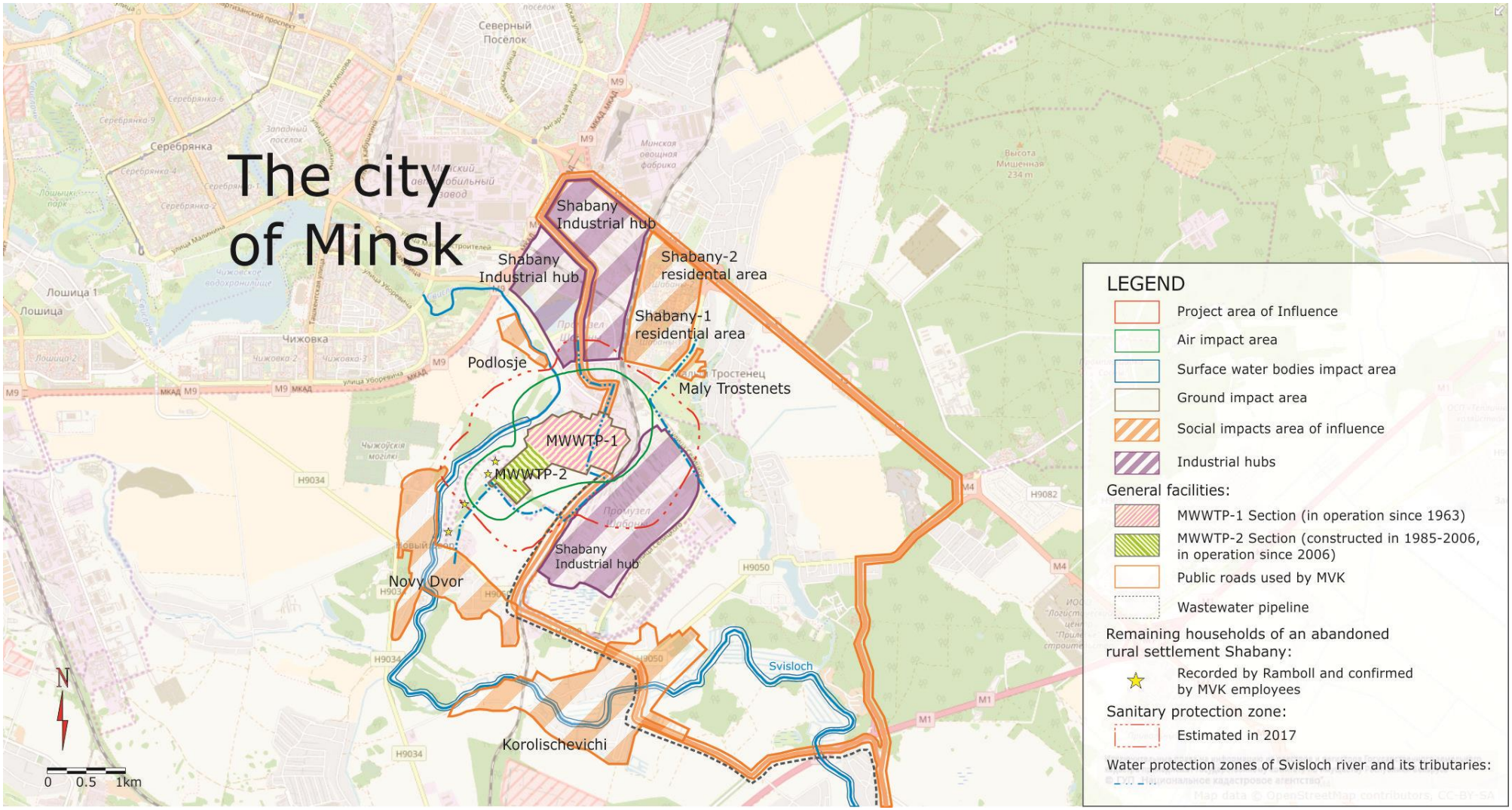

Figure 1. Project location

3. APPLICABLE REQUIREMENTS

3.1 Project finance and applicable requirements

EBRD and the European Investment Bank are considering providing co-financing (by the equivalent loans) for the Project for the total amount of EUR 168 M. The loan funding will be provided on the basis of the cooperation document signed by the two financial institutions – "The Procedural Framework between EIB and EBRD in respect of Mutual Reliance for Procurement in joint co-financed public sector operations outside the European Union". The Project will be also financially supported by the Government of Belarus and the Minsk City.

In view of the intention to attract international finance, the Project, besides meeting the national environmental, social, health and safety requirements of the Republic of Belarus, is also expected to meet the applicable international requirements to the extent defined by EBRD guideline documents. The EBRD will seek to ensure that the projects it finances are designed and operated in compliance with applicable regulatory requirements and good international practice related to sustainable development.

The main document, which determines conceptual requirements for the projects financed by the Bank, is the EBRD Environmental and Social Policy ("ESP") (2014). More detailed requirements covering key areas of environmental and social impacts and issues are established in a set of specific Performance Requirements. Their integral element is the requirement for compliance with the national legislation and good international practice reflected in international standards and agreements and requirements of other international financial institutions.

Consequently, for the success of the EBRD loan application the Project must meet the requirements and standards established in the following documents:

- EBRD Environmental and Social Policy and Performance Requirements[1];
- International Conventions;
- European Union (EU) Environmental and Social Standards;
- International Financial Corporation (IFC) Environmental, Health and Safety Guidelines;
- BAT Reference Documents;
- National laws and regulations;
- Corporate Policies and Standards.

The Company follows legislative and regulatory requirements of the Republic of Belarus in its operations and in general complies with the requirements of the national legislation. Based on the preliminary analysis of the Company documentation, organizational structure and operations, it is concluded that the Company has sufficient capacity to improve its compliance with EBRD ESP Policy and PRs and best international practice by integrating them into corporate policies, procedures and management practices pertaining to the proposed Project, and by ensuring adequate planning and implementation of stakeholder engagement activities.

3.2 Compliance with applicable requirements and supplementary ESIA

UE "Minskvodokanal" has been developing the WWTP reconstruction project since 2007. There are two national EIAs prepared for development of UE "Minskvodokanal" waste water operations:

- EIA for Reconstruction of Minsk Wastewater Treatment Station (2016), including sludge management/treatment by digestion, dewatering, drying and incineration, which is approved by the State Environmental Review;
- outdated EIA for Construction of the Sludge Incineration Plant (2012) which is rejected by the State Environmental Review.

Both national EIA packages have been prepared in line with national requirements of the Republic of Belarus and thus do not fully meet the requirements of EBRD ESP (2014) and the applicable international law, e.g. in terms of collection of comprehensive baseline information, social assessment and stakeholder engagement, analysis of affected communities and impacts on the environment.

[1] http://www.ebrd.com/environmental-and-social-policy.html

To fill the identified gaps, a supplementary Environmental and Social Impact Assessment (ESIA) process was initiated. ESIA has been conducted in compliance with international requirements and is intended to provide a comprehensive and integrated assessment of negative impacts, benefits and potential risks of the Project, and to propose adequate prevention, mitigation and compensation measures to address the identified environmental and social effects.

The main efforts during the supplementary ESIA process were focused on socio-economic assessment, clarification of the range of environmental impacts and their significance, selection of appropriate environmental and social mitigations, assessment of residual impacts and identification of management decisions and procedures which would enable the Project implementation and address the existing limitations and applicable requirements.

The approach adopted in the supplementary ESIA process for identification and assessment of environmental and social impacts of the Project is based on a common procedure used internationally for assessment of project impacts and fully accounts for the environmental and socio-economic circumstances of the Project implementation, its receptors and stakeholders in general.

Based on the EBRD disclosure process requirements (Public Information Policy, 2014) for Category A projects in the public sector, information disclosure and meaningful consultations with stakeholders shall be held during 120 days. The disclosure package shall include the following parts:

- EIA report 2016;
- Supplementary ESIA report;
- Non-technical Summary;
- Environmental and Social Action Plan;
- Stakeholder Engagement Plan.

All documents for the Project Supplementary ESIA disclosure package have been prepared in Russian and English languages and published at the web-sites of EBRD and UE “Minskvodokanal” for stakeholder engagement process.

4. IMPACTS AND MITIGATION MEASURES

4.1 Benefits and opportunities of the Project

Implementation of the Project will provide environmental benefits and improve social conditions in the project area of influence. In particular, the positive effects will include:

- More reliable waste water disposal services and more efficient waste water treatment;
- Improved quality of life across the Project area and near the Volma sludge facilities;
- Significant reduction of impacts on local communities and environment, including air, soil and ground water, River Svisloch and its ecosystems, as well as minimization of odour emissions;
- Reduction of risks to community health and safety related to MWWTP operations, enhanced safety of the Company's operational sites;
- More efficient use of natural resources due to reduction of water losses and enhanced energy saving performance of the processes, utilization of energy content of the wastes;
- Improved working conditions and enhanced OHS performance at the Company's facilities;
- Employment generation at contractor companies for the period of construction;
- Procurement opportunities generated for national and local businesses during the Project implementation;
- Reduction of greenhouse gas emissions in a long term.

In general, implementation of such projects attracts attention both to the City and the Company and can create good history for further investments in water and wastewater projects and thus contribute to development of the City and neighbouring communities.

4.2 Environmental and social impacts of the Project

The review and appraisal of the proposed investment projects have identified a number of potential environment and social impacts. The ESIA and ESAP propose mitigation measures for any of the aforementioned impacts. Special attention shall be paid to stakeholder engagement, managing construction activities, as well as supervision of design and construction works. Recommendations for enhancement of the Project benefits have been developed where possible. Conclusions on specific groups of impacts are summarised below.

Air quality

The odour releases from MWWTP are mainly caused by the large area of open surfaces for evaporation of hydrogen sulphide, amines and other odorous substances. Therefore, the reconstruction design provides for isolation of a large group of mechanical treatment facilities from free gas exchange with atmosphere with special hoods. Gaseous phase from under the hoods will be pumped through a block of scrubbers before emission to air at one central source.

Other elements of the Project will act as new sources of emissions: construction of preliminary digestion system which will be also equipped with biogas collection and removal system, as well as sludge incineration complex. Composition of emissions will change after reconstruction: reduced methane, ammonia and hydrogen sulphide content and increase in carbon oxide, nitrogen oxides and other combustion products of sludge. In order to determine the effect on air quality and community health, Ramboll prepared pollution dispersion model using Ekolog software. The software and model selection was dictated by the need to obtain results which would be comparable with outputs from previous dispersion analyses. The simulations were conducted for the existing situation ("No Project") and the selected reconstruction option. Changes in pollution emissions as a result of Project implementation are shown in Table 2.

Table 2. Key pollution emissions from MWWTP, baseline and after Project

No.	Pollutant		Baseline emissions		Emissions after Project implementation	
	Code	Description	g/s	t/a	g/s	t/a*
1	410	Methane	12.932	444.941	20.6137	199.6
2	301	Nitrogen dioxide	0.04849	0.109	9.4286	152.0
3	337	Carbon oxide	0.4937	0.818	7.8221	103.9
4	303	Ammonia	0.2959	9.7842	0.2529	4.41
5	333	Hydrogen sulphide	0.147	10.174	0.1277	4.195
6	140	Copper sulphate (as Cu)	0.002	0.008	0.0164	0.228
7	143	Manganese and its compounds	0.00311	0.0065	0.01751	0.227
8	203	Chromium (VI)	0.000066	0.000046	0.01447	0.224
9	123	Iron oxide	0.071	0.221	0.071	0.119
10	616	Dimethylbenzene (xylene)	0.075	0.18	0.075	0.10

Comparison of the baseline situation with the Project implementation outcomes in respect to the emission changes:

Emission increase
Emission decrease

Conclusions for the simulations and dispersion modelling results indicate that despite the inevitable increase of pollution emissions to air from the proposed sludge incineration and biogas facilities and elevated concentrations of common combustion products of organic matter (carbon oxide, oxides of nitrogen and sulphur), the resultant estimated pollution concentrations will still remain within the permissible limits in the area of existing SPZ, but also at a distance of 500 m from the boundary MWWTP site, thus SPZ can be reduced to 500 m, i.e. by almost two times.

The findings are illustrated by a series of schematic maps with isometric lines of pollution concentrations before and after the reconstruction which are included in the supplementary ESIA package. A fragment of schematic map which is provided below in Figure 2 illustrates dispersion of hydrogen sulphide, the most problematic component of emissions at MWWTP-1. The figure shows that after implementation of the selected option of reconstruction of MWWTP-1 the dispersion area of hydrogen sulphide will shrink (red contour with hatched filling inside the contour with dotted filling that depicts the baseline area of dispersion) and split in two parts.

Thus the Project will significantly reduce impacts on health of residents of the nearby settlements. Emissions from the new sludge treatment complex will not contribute much to the baseline impacts on air, however reduction of sludge volumes and cessation of use of the sludge lagoons (and sludge transportation) will improve air quality not only in the area of the treatment plant, but also in the settlements of Lugovoslobodsky rural council.

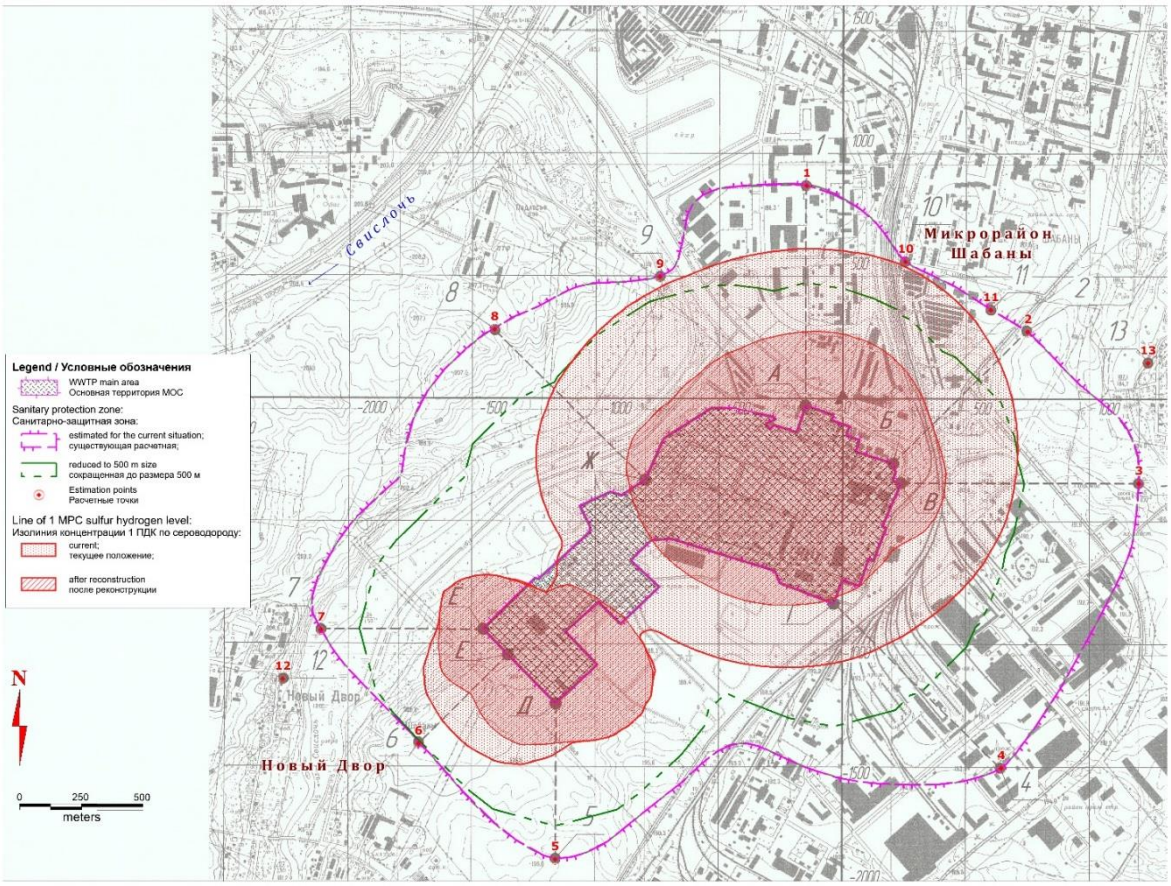

Figure 2: Reduction of areas affected by pollution after reconstruction of MWWTP, hydrogen sulphide sample

The air treatment performance will be regularly monitored. Monitoring results will be integral part of environmental and social reporting to EBRD.

Reduction of Greenhouse Gas Emissions and increase in energy efficiency

The main input of MWWTP-1 to the greenhouse gas (GHG) emissions is defined by the composition of wastewater (significant methane emission) for the baseline situation The Project implementation will lead to a major reduction of methane emissions due to coverage of evaporation surfaces on primary treatment equipment and constructions but also to an increase in the actual CO_2 emissions as the sludge and biogas combustion product, as well as an overall decrease of external electricity consumption (decrease of indirect emission).

External electricity consumption of MWWTP will drop from the current 45,088,766 kWh /a (2017 data) to 28,804,329 kWh/a (a forecast for 2024 after the Project implementation). The specific energy consumption per 1 m^3 of wastewater treatment decreases from 0.34 to 0.20 kWh.

In total, the current GHG emissions will reduce by estimated 1,857 t/a from 5,140 to 3,283 t/a (calculated based on IFC Carbon Emissions Tool average emission factor for the Republic of Belarus for CO_2 is 0.114 kg CO_2/kWh).

After the Project implementation, the MWWTP emissions will change significantly including the GHG emissions with lower GHG potential value (first of all, CO_2), that will lead to significant improvement in MWWTP carbon footprint.

Noise and vibration

In 2017 UE "Minskvodokanal" commissioned the private company Environmental Centre PYLEGAZOOCHISTKA to assess adverse physical impacts of MWWTP on the adjoining area, for estimation of the minimum size of the SPZ and assessment of possibility of its reduction from 700 to 500 m. The assessment was based on the noise sources data and results of field measurements of acoustic impacts. Both calculations and measurements demonstrated that acoustic impacts of MWWTP are well within the permissible limits.

Site studies conducted by Ramboll did not identify any areas with substantial acoustic load. An exception is indoor space of buildings and structures where pumps or other noisy equipment are installed.

The nearest residential areas in the Zavodskoy district of Minsk (Shabany-1) and Novodvorsky rural council (Novy Dvor, Podlosje and Yelnitsa) are situated at a distance of 700-1000 m and are separated from the MWWTP noise sources by motorways and railroads, as well as by other industrial sites with local sources of operational noise. The dominating external noise exposure in residential areas is largely related to railroad and automobile traffic; whereas acoustic impact from local construction and repair works, transformers, ventilation systems and other equipment is less essential.

In the context of the proposed reconstruction, a short-term increase of level of noise may be expected during construction phase near the areas where demolition, foundation construction, materials and waste handling activities will be conducted, as well as along the access roads. It is also expected that the Project will decrease the acoustic impacts at the operation phase, as the reconstruction programme provides for replacement of old equipment with new units (with better noise performance) and provision of enclosures and emissions prevention facilities which will also contribute to reduction of noise levels.

Surface water. Water resources of River Svisloch catchment area

MWWTP operations affect River Svisloch mainly through the controlled discharge of treated effluents with the flow comparable to the natural river flow at the place of discharge. The second less significant source of impact is uncontrolled discharge of drainage water and ground water from the site.

The Project in general is intended to improve treated effluent quality to meet the requirements of the Republic of Belarus and the European Union, and to decrease the failure rate of the treatment facilities. Thus the Project is expected to produce benefits for aquatic ecosystem of River Svisloch.

Earth works and other activities at the construction phase may potentially cause short-time increases of pollution flows to River Svisloch with drainage water and ground water. Disturbance of soil and vegetation cover in the areas of demolition and construction may result entrainment of ground particles by surface runoff.

However, if the activities are implemented in strict compliance with the applicable requirements, the risk of river contamination is negligible. Implementation of the proposed water protection measures will ensure the appropriate level of safety of River Svisloch water resource. Sufficiency and efficiency of the adopted measures will be assessed through the existing hydrochemical monitoring system of UE "Minskvodokanal" which will be extended to include a range of monitoring activities in the water protection zone.

Waste management practice

Positive effect of the Project is manifested in implementation of efficient sludge management system which helps to reduce the amount of the main type of waste of hazard class 3 by 25 times, from 650-700 t/day of sludge to 27 t/day of ash. The negative environmental impacts will be related to the disposal of ash from sludge incineration and decontamination of coal absorber containing mercury. Considering the significant volumes of the waste and its hazard classes (III and I), the overall impact of WWTP on the environment from waste management activities during the operation phase is initially estimated as high. Subject to implementation of the proposed solutions and waste management procedures and taking into account the general requirements for collection, temporary storage, transportation and disposal of waste, the residual impact is assessed as moderate to low and as

localized. Subject to implementation of the set of measures for recycling of ash in production of materials for construction industry, the impact can be mitigated to minor.

Sludge and ash management plans should be developed, as well as procedures to monitor the movement of waste streams and records of the waste streams by types and hazard classes should be kept, both at the accumulation and temporary storage facilities and outside these facilities. Impacts of wastes generation will be controlled through regular monitoring of atmospheric air quality (locally – dispersed ash).

With regard to the Volma sludge lagoons, a recommended strategy would be the development of a decommissioning plan, including the following activities:

- Ensuring safety of the local people (by restricting access to the site)
- Monitoring the composition of surface water bodies and the conditions of the geological environment and groundwater in the affected area
- Collection and treatment of surface runoff, as required until closing-down or reclamation of the site, and
- Development of measures for closing-down or reclamation of the site.

Land resource and land use conditions

Alongside the positive effect on land use conditions in the location area of MWWTP-1, the Project will also have negative consequences during the construction phase:

- short-time increase of load in the area during demolition, reconstruction and construction of MWWTP-1 facilities: pollution emissions, vibration and noise from the activities at MWWTP-1, and also from the vehicles using the public roads beyond the site territory;
- short-time increase of surface runoff pollution at the site of MWWTP caused by construction works and associated activities, with consequential risk of contamination of ground water and River Svisloch.

After completion of the construction activities, negative impacts of the Project may be associated with disposal of residual wastes from sludge incineration processes. This refers to the waste disposal landfill and public roads used for transportation of wastes from MWWTP site. The least beneficial scenario from the perspective of land resource quality is continuation of the current practices which would require extension of the sludge lagoons and acquisition of additional land plots for the purpose.

Soil and geology

Geomorphological, geological and hydrogeological conditions at MWWTP site are stable and fair and are not exposed to any negative impacts except for some local areas affected by historical operations.

Current impacts of MWWTP operations on soil are associated with precipitation of pollutants emitted by existing sources in the treatment plant area. This impact is mostly present in the SPZ where pollution levels in air contacting the soil cover may exceed the safety standards for residential areas which are applicable in the Republic of Belarus. However, dispersion analysis has demonstrated that MPC levels in air will not be exceeded in case of Project implementation, i.e. the impact will notably decrease.

The existing and future reduced SPZ mainly consist of land intended for industrial and transport operations (industrial zone, motor and rail roads to the north and east of MWWTP), agricultural land (Zhdanovichi Agricultural Enterprise to the south of MWWTP, and farm land on the right bank of River Svisloch). Other types of land use including individual houses with auxiliary plots (gardens) are located outside the SPZ however close by it. In general impact on soil outside SPZ is deemed to be minor for any of the reconstruction options.

A more significant impact on soil cover, terrain and geology will be caused by the construction activities, however this impact will hardly affect any territories outside the boundary of MWWTP site:

- immediate mechanical disturbance of soil and ground caused by preparatory activities, excavations, piling and auxiliary operations, as well as movements of construction machinery;

- littering of soil surface with solid wastes;
- local contamination of top soil and geological environment with substances that degrade their biological, physical and chemical properties – waste water, fuel and lubricants, paints.

Based on the available information on the nature of proposed construction and operation activities, it is anticipated that changes in soil and geology will remain within the acceptable limits where they do not affect the status of local soil and ground water. The Project construction activities are not expected to produce any notable additional impact on nearby soil and land. To minimize the respective environmental risks, the method statement should provide for adequate monitoring of compliance with construction standards and regulations, hazardous materials and wastes storage rules, as well as response measures in case of pollution accidents or encountered historical contamination.

Ecosystems and biodiversity

Potential area of the negative biodiversity impacts of the Project is described as follows:

- Mechanical damage of soil and plants, and nuisance to animal life in the adjacent areas during the construction activities;
- Noise and light impact on neighbor animals (at night);
- Impacts of pollution emissions on ground surface ecosystems
- Impacts of treated effluent discharges on aquatic ecosystems (taking into account the cumulative impacts of other water users) – at the operation phase.

The construction phase biodiversity impact in the location area of MWWTP is assessed as negative, however temporary, short-time and local by nature, as it will be present only at the work sites and immediately adjacent areas, and will not result in loss of natural ecosystems and habitats of rare and protected species.

In view of the potential slight increase of waste water discharges - by 10% by 2030, and the improvement of treatment quality, the anticipated impact of WWTP on flow patterns and ecosystems of River Svisloch is assessed as permanent and long-term, however local by nature. There is a high chance that beneficial environmental effect will be produced by reduction of pollution discharges to the river. However, due to low flows in River Svisloch, significant historical contamination and poor self-purification capacity of the water body, the impact significance at the operation phase is assessed as medium. It is recommended to monitor status of the river.

In view of the above, the mitigations for loss of biodiversity may, if needed, include further compensation measures, e.g. reclamation of disturbed land using natural seed materials, trees and shrubs that are typical for the natural ecosystems. As the construction stage will not result in loss or fragmentation of natural ecosystems, the above system of measures will support resilience of the existing ecosystems and help to reduce significance of the residual impacts.

Local socio-economic conditions

The Project in general is designed to improve reliability of sewerage services and waste water treatment quality, to reduce the impact on air, soil and ground water, on River Svisloch and its ecosystems, and to minimize odour emissions. The above translates to improved quality of life for local communities in the Project area and near the associated facilities (Volma sludge facilities).

Probability of impact on social infrastructure at the construction phase is assessed as minor, provided that adequate mitigations are implemented including provision of accommodation for Project workforce (if temporary accommodation is to be provided) in compliance with EBRD/IFC Guidance "Workers' Accommodation: Processes and Standards", provision of equipped on-site medical facility and experienced paramedic, implementation of measures in the sphere of traffic safety, etc.

The potential impacts may affect utilities and social infrastructure of Novodvorsky rural council and Zavodskoy district. To prevent the negative effects on transport infrastructure, UE "Minskvodokanal" will implement specific mitigations including adequate planning of construction traffic routes, compliance with the applicable transportation requirements.

The Project has a potential to increase of employment of local residents for the Project construction activities, local procurement opportunities, elimination of use of heavy load vehicles for transportation of WWTP-produced sludge to the lagoons, and a slightly increased demand for skilled professionals during the operation phase.

The Project may potentially affect recreation anglers who regularly visit the bank of River Svisloch, and auxiliary farming activities of the residents of the former Shabany village. The mitigation measures to be implemented by the Project include regular consultations with residents of the former Shabany village to ensure their feedback on current Project activities, development of a project-specific Code of Conduct for the Project personnel, prohibition of fishing by the Project personnel, and prevention of use of the gravel road approaching the former Shabany village by the Project vehicles.

Potential economic displacement

The assessment of social impacts of the Project considered potential relocation of occupants of the four houses located near UE "Minskvodokanal" facilities. Consultations with stakeholders demonstrated that such relocation will not be needed, provided that the proposed corrective measures are implemented. Such conclusion takes into account the overall beneficial effect of the Project on air quality in the former Shabany village at the operation phase, and the established practices of the four households. At the construction phase UE "Minskvodokanal" should apply their best efforts to implement the proposed mitigations and minimize disturbance and impacts on communities in the above houses.

Labour relations and occupational health and safety

To mitigate potential impact on labour relations and associated risks, a range of measures has been agreed for ensuring compliance with the law of the Republic of Belarus and requirements of EBRD by all parties of the Project including contractors and subcontractors.

Community health and safety

The Project will help to reduce negative impacts on air and improve life quality in the adjacent residential areas compared to the current level. This in turn will have a positive effect on health and wellbeing of local communities in the Project's area of influence.

Reduction of road transportation of sludge will support minimization of community health impacts on the roads.

Other potential impacts on community safety may include emergency and unplanned events in the Project area, and security arrangements at the Project sites, potential conflicts between various groups engaged in the Project and with local communities. The Company will implement the necessary measures to prevent such impacts, including emergency response planning, provision of MWWTP sites security and other actions.

Cultural heritage

Trostenets Memorial which commemorates the former extermination camp is the only object of cultural heritage located relatively close by the Project site. The memorial is separated from the Project area by blocks of industrial buildings and a railway line. The Company will make sure that Project traffic will not affect the access road to the memorial.

All potential negative impacts of the Project in the environmental and social sphere are in general controllable and can well be prevented or reduced as required by the proposed mitigations and through implementation of the Environmental and Social Action Plan and Stakeholder Engagement Plan.

4.3 Environmental and Social Action Plan

Environmental and Social Action Plan has been developed in order to ensure compliance with the applicable requirements. The Plan is a sort of management plan which is intended to improve the Company's environmental and social performance, its overall performance, as well as operational

monitoring and control functions. ESAP provides a sound basis for management of environmental and social aspects throughout the Project life cycle.

The Project ESMP provides for the following activities:

- updating corporate management systems procedures in the sphere of environment, health and safety;
- managing contractors and subcontractors in terms of compliance with international health, safety and social standards;
- management and mitigation of environmental and social impacts at the Project construction phase through development and implementation of Environmental and Social Management Plan;
- for efficient sludge management system, develop and implement:
  - Strategic Complex Sludge Management Plan;
  - Ash Management Plan;
  - Decommissioning of Volma sludge facilities
- Monitoring and management of impacts and status of the environment;
- Development and implementation of Stakeholder Engagement Plan, improvement of internal and public grievance mechanism;
- Stakeholder engagement and the Project information disclosure.

5. STAKEHOLDER ENGAGEMENT

5.1 Information disclosure and consultations with stakeholders

Public consultation and ongoing stakeholder engagement will be arranged throughout the Project preparation and implementation.

The Stakeholders Engagement Plan (SEP) has been developed to support this process which identifies key stakeholders and defines measures to communicate to the communities the nature of the Project, including information on its potential impacts. The SEP will be regularly reviewed and updated during the Project implementation. If any new projects are included in the Project or previously proposed projects need to be amended, the SEP will be updated and stakeholders advised accordingly.

The SEP is organised to provide:

- Summary of the Project and proposed investments;
- Summary of national and international requirements for consultation and disclosure;
- Summary of previous stakeholder engagement;
- Stakeholders Identification and analysis;
- Details of the Project disclosure and stakeholder engagement programme, including methods and approaches, resources and planned activities;
- Description of the Project grievance mechanism;
- Description of SEP monitoring and reporting.

Information on the purpose, nature and impacts, including the whole disclosure package, i.e. SEP, ESAP, NTS, EIA and supplementary ESIA – to be disclosed via the website of UE Minskvodokanal (https://minskvodokanal.by/) and EBRD's website (http://www.ebrd.com) throughout the 120-days consultation period, and will be made available at the following venues:

- office and website of administration of Zavodskoy district;
- office of administration Novodvorsky rural council;
- information repository in Shabany neighbourhood which may be frequently visited by UE "Minskvodokanal" customers;
- venues of ESIA package public consultation meetings to be held in late spring or early summer 2018.

Detailed description of the Project disclosure and stakeholder engagement activities is provided in SEP. All Project press releases will be disclosed on UE "Minskvodokanal" website (in addition to being communicated to media). Similarly, Project employment vacancies will be disclosed on the Project website.

The Company has appointed a dedicated Community Liaison Officer (CLO) who will be responsible for dialogue interested stakeholders during the lifetime of the PIP. The CLO will organise meetings with local stakeholders to inform them of the PIP progress, performance, benefits and impacts. Any questions, comments, grievances and suggestions related to the PIP can be communicated directly to the CLO by post, e-mail, fax or telephone via contact details as specified below.

Information	CLO contact details
Name	Zaitseva Olga Mihailovna
Position	Head of Department of Environment and Development
Address	15 Pulikhova Street, 220088 Minsk, Belarus
Tel./fax	+375 17 389 40 20
E-mail	info@minskvodokanal.by

5.2 Grievances and comments

The Company has developed and implemented an Public Grievance Mechanism which can be specifically used for reception and processing of queries, comments, grievances and opinions from the affected communities and other stakeholders of the Project.

Grievance management and performance monitoring as well as investigations of grievances (if any) related to the Project are the responsibility of the CLO.

To file a grievance, one should fill the grievance form and communicate it to the CLO by any convenient method (by post / e-mail, etc.) using the contact details provided in section 5.1. The grievance form is available at the office of CLO and at the Company's website https://minskvodokanal.by/appeals/make-appeal/, in ESAP annex and in the Project leaflet.

The Company will also provide grievance boxes where the filled grievance forms may be placeds. Any aggrieved individual is free to write a complaint in any format and retain anonymity if so requested. It is however important to specify an address that can be used by the Company to send a reply to. The external grievance boxes will be installed at the venues where the Project leaflets and NTS. The grievances received via the grievance boxes will be treated in line with the Company's public grievance mechanism.

Additionally the Company has a "hot line" telephone service for reception of public grievances and registration of emergencies in water and sewerage systems. The service telephone number is +7 (7152) 34-24-04. The "hot line" service will record grievances relating to the Project and communicate them to the Community Liaison Officer.

The query review period typically takes up to 15 days. This period may be prolonged under certain circumstances. If the query is not relevant to UE "Minskvodokanal" responsibilities, it is forwarded to the responsible agency within 5 days from receipt or is left without answer with necessary notification of the query initiator.