

SKOPJE WASTEWATER TREATMENT PLANT  
FYR MACEDONIA

---



Non-technical Summary  
FINAL

1 November 2018

---

## Table of Contents

<b>1</b>	<b>INTRODUCTION</b> .....	<b>3</b>
<b>2</b>	<b>PROJECT DESCRIPTION</b> .....	<b>3</b>
<b>3</b>	<b>BACKGROUND</b> .....	<b>4</b>
3.1	Rationale of the Project.....	4
3.2	Legal Aspects and Compliance with Relevant Environmental and Social Laws.....	5
3.3	Current Environmental and Social Situation and Considerations.....	6
3.4	History of Project Development and Planning.....	7
<b>4</b>	<b>PROCESS</b> .....	<b>8</b>
<b>5</b>	<b>SUMMARY OF PROJECT BENEFITS, ADVERSE IMPACTS AND MITIGATION MEASURES</b> .....	<b>8</b>
5.1	Environmental and Social Benefits.....	8
5.2	Environmental and Social Adverse Impacts and Mitigation Measures during Construction.....	9
5.3	Environmental and Social Adverse Impacts and Mitigation Measures During Operation.....	14
5.4	Cumulative Impacts.....	18
<b>6</b>	<b>MONITORING</b> .....	<b>20</b>
<b>7</b>	<b>COMMUNICATIONS</b> .....	<b>20</b>

## Abbreviations

CESMP	Construction Environmental and Social Management Plan
CSOP	Construction Site Organisation Plan
E&S	Environmental and Social
EBRD	European Bank for Reconstruction and Development
EBRD ESP	EBRD's Environmental and Social Policy
EIB	European Investment Bank
ESAP	Environmental and Social Action Plan
ESIA	Environmental and Social Impact Assessment
EU	European Union
FYR	Former Yugoslavian Republic
GUP	General Urban Plan
MoEPP	Ministry of Environment and Physical Planning
NTS	Non-Technical Summary
OESMP	Operational Environmental and Social Management Plan
OHS	Occupational Health and Safety
PE	Public Enterprise
PE	Population Equivalent
PR	Performance Requirements
SEP	Stakeholder Engagement Plan
WWTP	Wastewater treatment plant

## 1 INTRODUCTION

The European Bank for Reconstruction and Development (**EBRD**) and the European Investment Bank (**EIB**) (together: the **Lenders**) are considering providing finance to Former Yugoslav Republic (**FYR**) Macedonia to fund the construction of a new wastewater treatment plant (**WWTP**) (**the Project**) in the City of Skopje (**the City**). The Project will serve 9 of the 10 municipalities that make up the City.

A location has been selected that is adjacent to the Vardar River to the east of the City. The investment will be implemented by Public Enterprise (PE) Vodovod i Kanalizacija Skopje (**the Public Enterprise**), fully owned by the City. The final beneficiary of the loan will be the PE. The Project will also require the expansion of the sewage network, which is being implemented separately as an ongoing process by the City of Skopje.

As this Project involves the development of a greenfield WWTP with a capacity exceeding 150,000 PE, it has been categorised as a Category “A” project in line with the Lenders’ requirements.

This Non-technical Summary provides a summary of the expected environmental and social (E&S) impacts and measures needed to structure the Project to meet the Lenders’ requirements. The purpose of this document is to provide information to everyone that may be interested in the Project.

## 2 PROJECT DESCRIPTION

The construction of the WWTP has not commenced yet. Construction activities will be implemented through engagement of contractor(s). The WWTP will be operated by the Public Enterprise.

The location for construction of the WWTP, as defined by the General Urban Plan (GUP) Skopje 2012-2022, is situated in the south-east part of the Skopje Valley, within the Municipality of Gazi Baba. This Municipality is located in the eastern part of the City. The Vardar River is located south from the site, flowing in west to east direction. The current state of the site is modified and semi-modified due to agricultural activities.

The Project has two phases. Wastewater treatment will consist of pre-treatment and biological treatment units that will be constructed in the first phase up to 2030. The upgrade of biological treatment to include removal of nitrogen and phosphorus will be constructed in the second phase of the project (up to 2045). A disinfection unit and separate treatment of the storm water were considered optional facilities to be constructed in the second phase of the project. The treated effluent will be discharged into the Vardar River. The design capacity of the WWTP is 625,000 PE in 2030, and 650,000 PE in 2045.

The overall layout of the WWTP is given in [Figure 1](#).

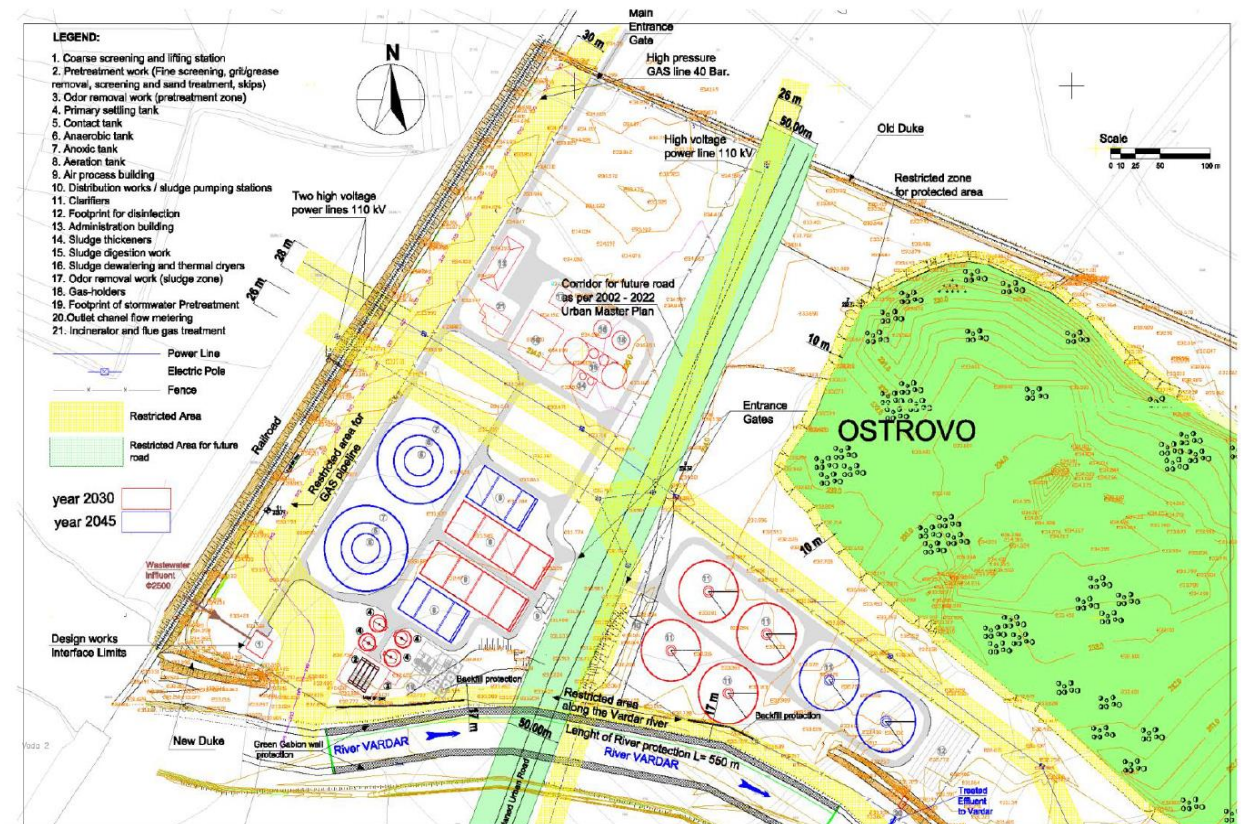


Figure 1: WWTP Layout (source: Study to Finance, Build & Operate a Wastewater Treatment Plant for the Capital City Skopje – Republic of Macedonia, Technical Report, Version 0 (March, 2016))

### 3 BACKGROUND

#### 3.1 Rationale of the Project

FYR Macedonia has adopted a sound strategic and legal framework for water management (including wastewater). However, implementation of the requirements in practice remains an issue. The main issues related to the operation of the sewage system in the City of Skopje are: discharge of untreated wastewater into the Vardar River; frequent overflowing of the combined sewage network in urban areas during rainfall; illegal sewer connections; illegal discharges into surface water; and damaged parts of the sewage network.

The urgent need for construction of a WWTP in Skopje is justified due to urbanisation, population growth and rapid industrialisation of the City and surrounding settlements that will result in increasing volumes of untreated domestic and industrial wastewaters being discharged into the Vardar River.

The wastewater to the WWTP will be transported through two wastewater collectors on the left and right bank of the Vardar River. The left bank collector includes a siphon structure under the Vardar River<sup>1</sup>. These collectors will be connected to the planned WWTP in Trubarevo settlement. Their construction is currently ongoing. This project is covered under IPA 2 project "improvement of wastewater collection infrastructure in the City of Skopje". The investment is financed by EU in the amount of over 9 million EUR and the budget of FYR Macedonia.

The implementation of this Project will enable the City of Skopje and Vodovod i Kanalizacija Skopje to meet the legal requirements and strategic objectives. The Project will also significantly improve the environmental and health situation in the City of Skopje and as well as in the downstream areas sharing the same natural resource, respectively the Vardar River.

### 3.2 Legal Aspects and Compliance with Relevant Environmental and Social Laws

During the implementation of this Project, City of Skopje and Vodovod i Kanalizacija Skopje are expected to meet the requirements set down by relevant national, EBRD/EIB and EU environmental, social, health and safety legislation and standards. The most stringent regulations and/or requirements (whether national, EBRD/EIB or EU) will be applied, in order to ensure environmental protection and community health and safety.

#### Compliance with National Requirements

The national requirements for environmental assessment have been met, through the development of the ESIA Study in 2017. Public consultations, as required by national legislation, have also been conducted.

All other national requirements are also expected to be fully complied with, including the development of the WWTP design documents; approval of the ESIA by the Ministry of Environment and Physical Planning; obtaining all the necessary permits; labour, health and safety requirements, etc.

#### Compliance with EU and EBRD Requirements

The Project has been structured to meet the EU Directives relevant to this Project, i.e. the EIA Directive, Water Framework Directive, Urban Wastewater Directive, IED Directive, Waste Framework Directive, Landfill Directive, Directive on the Protection of the Environment, and in Particular of the Soil, when Sewage Sludge is used in Agriculture, Environmental Noise Directive, Birds and Habitat Directives, and Occupational Health and Safety Directives.

The Project has also been structured to meet all EBRD's requirements relevant to this Project, as set out in EBRD's Environmental and Social Policy 2014.

An Environmental and Social Action Plan (ESAP) has been agreed between the Public Enterprise and the Lenders. It includes a set of comprehensive mitigation measures to bring the Project into compliance with the Lenders', EU and national legislation requirements.

---

<sup>1</sup> The Main Design for the siphon was developed in 2015. An EIA Report (in line with national legislation) was prepared for the left bank collector (including the siphon), and was approved in 2016 by the City. However, the City has decided to construct the siphon together with the WWTP. It has also been decided that permits needed for the siphon will be issued by the same authority which will issue the permits for the WWTP (i.e., the Ministry of Transport of Communication) instead of the City of Skopje which issued the permits for the collector.

### 3.3 Current Environmental and Social Situation and Considerations

**Location:** The location for construction of the WWTP, as defined by the spatial planning documentation, is situated in the eastern part of the City of Skopje within the Municipality of Gazi Baba. The land that will be used for the WWTP construction is categorised as agricultural land. On the site and its surroundings, there are: the Vardar River situated south from the site); the protected area “Ostrovo” located approx. 50-100 m east from the site with Arboretum and Ezerce on the north; and the railway located west to the site. Several infrastructure facilities are found at site: a high/medium voltage power line 110 kV and an underground gas pipeline, both passing across the site. The site is accessible by three unpaved access roads.

**Topography:** The terrain of the WWTP is mostly flat. The location of the WWTP is the lowest point of the City of Skopje with an average elevation of 230 m a.s.l., compared to the average elevation of the City which is 350 m a.s.l.

**Climate:** The climate in Skopje is classified as continental sub-Mediterranean or even hot continental climate. The summers are long, hot and humid, while the winters are short and relatively cold. Snowfall is common in the winter period, but heavy snow accumulation is rare and the snow cover lasts only for a few days. Precipitation is highest from October to December and from April to June. Annual precipitation varies from 300 mm to 800 mm. The most frequent wind directions are north-east, east and south-east. Annual average temperatures in the City of Skopje for the period 1990-2017 varied from 12.2 up to 14 degrees.

**Air quality:** The air quality monitoring results from the nearest monitoring station show impaired air quality in the City of Skopje, where exceedances of PM<sub>10</sub>, NO<sub>x</sub> and CO were recorded. The meteorological conditions have a significant contribution to the occurrence of air pollution in Skopje, especially during the winter season. During these periods, there is reduced circulation in the atmosphere due to prolonged period with weak winds, very little rain and occurrence of temperature inversion.

**Noise:** The Project area corresponds to non-residential areas exclusively intended for industrial activities, storage activities and other production facilities. The conducted monitoring of ambient noise showed that at 1 of 4 measuring points, the ambient noise was above permissible values due to truck transport at the nearby road.

**Geological and engineering characteristics:** The project area lies on a Q2a1 alluvium layer consisting of gravel, sand, dirt and clay with a thickness under 5 m. Q2t1,t2 Alluvium terrace layers of gravel, sand, dirt and clay are also present. The alluvium terrace is a river terrace with a slope of 1-4 meters above the average river water level.

**Seismological characteristics and stability:** The WWTP site is found in the Vardar seismic zone. The maximum expected magnitude is 6.5 and seismic intensity of IX (EMS-98).

**Hydrological characteristics:** In the Skopje region, the Vardar River has 5 large tributaries. Three of them flow in from the right side of the Vardar River: the Treska River (138 km), the Markova Reka River (29 km) and the Moranska Reka River (10.5 km), and two from the left side of the Vardar River: the Lepenec River (75 km) and the Serava River (21 km). The Vardar River flows through the Skopje valley to the Taor gorge, with a slow water flow due to deposited material in the river and the curved riverbed. The area of the site is characterised by high ground water level.

**Surface water quality:** According to the surface water categorisation, the Vardar River (from Skopje’s waste water collector discharge point up to the confluence of Vardar and Pcinja rivers) belongs to the class III to IV of water quality.

**Soil:** The Project location is characterised by hydromorphic soil, i.e. alluvial soil fluvisol.

**Flora and fauna and biodiversity:** Based on findings from the site visit, there are no endangered / endemic plant species at the project location or in the near vicinity. The area designated for construction is modified due to agricultural activities with no potential to sustain natural values of flora species. Regarding the fauna species at the project site, several ornithofauna species of conservation concern were identified. The site is assessed as non-critical habitat. Adequate mitigation measures to avoid impacts on these species are suggested in ESAP. Fish species of the conservation concern in the Vardar River were determined based on desk research. One endemic species might be found in the river. The Project will be beneficial for this species.

**Protected areas:** Near the project location is the Natural Monument Ostrovo, an area protected since 1976. During the site visit, the Consultant determined the species in this area, and adequate mitigation measures have been suggested. In the radius of 5 km, there are no other protected areas, Natura 2000 or National Emerald network sites.

**Landscape:** The area is characterised by lowland relief with the lowest elevation in the Municipality of Gazi Baba. The flat land with varieties of altitude of 0.5-1m will minimise the need for flattening of the ground during construction, which will contribute to less dust and noise emissions.

**Land use:** The land planned for construction of the WWTP is a modified surface that is being used for agriculture. The ecosystem services in the construction area refer to the growing of livestock crops (by the Joint Stock Company Fakultetsko Stopanstvo Trubarevo) and naturally grown plums, black elderberry, blackberries, walnuts.

**Nearest settlements:** The nearest settlements to the WWTP is Vardarishte neighbourhood (the first houses are located at an air distance of 400 m north to the WWTP, whereas the remaining part of the neighbourhood is located at 650 m north). Other settlements in the vicinity of the WWTP are Gorno Lisiche neighbourhood (700 m West) and Ergele neighbourhood (1,100 m).

**Cultural heritage:** There are no material assets or remains of any cultural and historical heritage sites on the location.

### 3.4 History of Project Development and Planning

#### Project Preparation

A set of project documentation for the WWTP has been developed to date: (i) Study on Wastewater Management in Skopje in 2009, (ii) Upgrading/Updating of Existing FS & Evaluation of Wastewater Treatment Options in 2015, (iii) Storm Water Impact on Wastewater Treatment in 2015, (iv) Draft Technical Design Report in 2016, and (v) ESIA Study in 2017.

The project documentation confirms that the chosen location is the most optimal location for the future WWTP.

However, the design documents (Main Design and Preliminary Design) for the WWTP have still not been developed. After their preparation, the Public Enterprise will apply for the necessary permits in line with national legislation.

#### Alternatives Considered

The location of the WWTP was selected based on the Study on Wastewater Management in Skopje (JICA, 2008-2009) which analysed four alternative location options. The criteria used for selection of the most favourable location were that the WWTP should be located: (i) downstream of the sewer network in Skopje to collect all the wastewater; (ii) along the river side to discharge the effluent. The selected alternative was incorporated into the GUP Skopje 2012-2022.

Different alternatives related to technological solutions for operation were considered during the preparation of technical documentation<sup>2</sup> for the WWTP before selecting the optimal solution for wastewater and sludge treatment.

For wastewater treatment, solutions were evaluated against the following criteria: land/space requirement; suitability of the process with respect to the required treatment level for short, medium and long term considerations; impact on environment; raw wastewater influent characteristics; use of a technology for plants of similar treatment capacity; and sludge production. Based on these criteria, the Conventional Activated Sludge process was selected as the best solution for treatment of municipal wastewater in Skopje.

For sludge treatment, solutions were evaluated against the following criteria: ability to generate energy during the sludge treatment process and obtain savings in operational costs; to reduce the quantity of sludge generated in primary and secondary WWTP units; and possibility of development of several solutions for reusing or elimination of treated sludge. Based on these criteria, incineration was selected as the best solution due to low costs, low solid waste quantities for disposal and independence. Furthermore, fluidised bed incineration was adopted as the most modern and efficient technology.

## 4 PROCESS

In line with the national environmental legislation, the draft ESIA Study for the WWTP was prepared and submitted to MoEPP in 2017. It was publicly disclosed on the webpage of MoEPP and was available in hard copy at the premises of MoEPP's Public Relations Office, after which a public hearing was organised in July 2017. In order to meet Lenders' requirements, the disclosure package for this Project will remain disclosed on the website of the Public Enterprise, the City and EBRD during a period of 120 calendar days prior to consideration of the Project by the EBRD's Board of Directors.

In addition, during the adoption of the GUP for the City of Skopje, the public was consulted through several public hearings (in each urban unit which consists of parts of municipalities), in line with the national legislation. The draft GUP was publicised in 2015 on the City website and made available for review in hard copies at the City premises. Additional consultations were organised during the development of the Strategic Impact Assessment for the GUP in 2012.

In addition, a Stakeholder Engagement Plan (SEP) has been developed for this Project in accordance with EBRD's Performance Requirement 10, to ensure that all stakeholders have been identified, to disclose sufficient information about issues and impacts arising from the project and to consult with stakeholders in a meaningful and culturally appropriate manner throughout Project implementation.

## 5 SUMMARY OF PROJECT BENEFITS, ADVERSE IMPACTS AND MITIGATION MEASURES

### 5.1 Environmental and Social Benefits and Risks

The key benefits of the Project are:

---

<sup>2</sup> Study to Finance, Build & Operate a Wastewater Treatment Plant for the Capital City Skopje – Republic of Macedonia, Upgrading/Updating of Existing Feasibility Study & Evaluation of Wastewater Treatment Options (May, 2015); Study to Finance, Build & Operate a Wastewater Treatment Plant for the Capital City Skopje – Republic of Macedonia, Technical Report, Version 0 (March, 2016); and ESIA (January, 2017)



- Discontinuation of the current practice of discharging untreated sewage into the Vardar River.
- Expansion of the sewage collector and installation of a comprehensive system for wastewater treatment in the City of Skopje, which will lead to improvement of the environmental and health situation of the population of the City and downstream areas. More than 500,000 residents of the City (almost 1/3 of the entire population of FYR Macedonia) will benefit from improved wastewater management, as well as all other residents of the downstream settlements of FYR Macedonia and Greece up to the Aegean Sea.
- Fulfilment of strategic objectives defined in the water management strategies and plans at state level and fulfilment of the provisions of the local legislation for ensuring that waterbodies achieve 'good status' and to prevent any further deterioration in the existing status of surface waters and groundwater.
- Increased employment opportunities for local population during the WWTP construction and operation.

The key risks of the Project are:

- Malfunctions and failures of the WWTP may lead to discharge of concentrated sewage from the WWTP into the Vardar River, which may cause fatalities to the aquatic life in the river and overall negative impacts on downstream settlements
- Odour release in case of malfunctions and failures of the system for odour treatment and improper sludge treatment may cause nuisances to the local population living in settlements northwest, southeast and southwest to the WWTP site
- Malfunctioning of filters in the incinerator may cause air emissions above permissible limit values and affect the population living in the nearest settlements to the WWTP site
- Accidental situations such as explosions or occasions of fire may cause disturbances to fauna species in surrounding areas, including the protected area "Ostrovo".

## 5.2 Environmental and Social Adverse Impacts and Mitigation Measures during Construction

For the construction phase, the Public Enterprise will require from its contractors to prepare and implement a **Construction Waste Management Plan (CWMP)** and **Construction Site Organisation Plan (CSOP)**. The **CSOP** will include **Construction E&S Management Plan (CESMP)** which will, at minimum, cover measures for the following aspects: air emissions, noise and vibration management, soil management, hazardous material management, biodiversity protection, spill response management, emergency preparedness and response (including fire and explosion management), grievance management for workers and for external stakeholders, security personnel requirements, information disclosure and stakeholder engagement, chance find procedure, community health and safety management, workers' accommodation and traffic management, occupational health and safety (OHS plan)

A summary of the identified impacts and the planned measures to mitigate such impacts during the construction phase are provided below for each issue.

Issue	Description of impact	Planned mitigation measures
Climate	<ul style="list-style-type: none"> <li>• Impacts on climate are considered together with impacts on air, and are thus elaborated under 'Air Quality' below.</li> </ul>	<ul style="list-style-type: none"> <li>• Please see below</li> </ul>
Air Quality	<ul style="list-style-type: none"> <li>• Increase in emissions of dust and particulate matter during construction works</li> <li>• Increase in emissions of exhaust gasses (CO<sub>2</sub>, SO<sub>2</sub>, NO<sub>x</sub>) and particulate matter caused by operation of construction machinery and vehicles used for transportation</li> </ul>	<ul style="list-style-type: none"> <li>• Daily cleaning of access roads - in the vicinity of the construction site and working sites (removal of earth and sand to prevent dust)</li> <li>• Mandatory washing of tyres</li> <li>• Implementing procedures for handling of construction materials</li> <li>• Implementing good construction practices</li> <li>• Visual control of working conditions and construction</li> </ul>

Issue	Description of impact	Planned mitigation measures
		<p>practices on the site on a daily basis</p> <ul style="list-style-type: none"> <li>• Measurements of dust and exhausted gases in ambient air on a monthly basis</li> </ul> <p>No specific mitigation measures needed to address climate change since it is assessed that no greenhouse gas emissions will occur.</p>
Noise	<ul style="list-style-type: none"> <li>• Disturbance of the local population and biodiversity as a result of increased noise levels</li> <li>• Local workers will also be exposed to noise</li> </ul>	<ul style="list-style-type: none"> <li>• Preparation and implementation of a Traffic Management Plan and Construction Site Organisation Plan</li> <li>• Limitation of vehicle speeds in settlements</li> <li>• Construction equipment must be compliant with Directive 2000/14/EC for noise emissions generated from outdoor equipment</li> <li>• Construction works must take place only in the period from 7 am to 7 pm with respect to the resting period from 3 pm to 6 pm as well as weekends</li> <li>• Equipment must have devices for noise stifling</li> <li>• Regular maintenance of equipment and mechanisation</li> <li>• Not using equipment with noise levels above 90 dB.</li> <li>• Keeping records on the technical condition of construction machinery and transport vehicles, and excluding any faulty equipment from operation, as well as records on the use of PPE at the construction site.</li> <li>• Undertaking monitoring of noise levels in line with Monitoring Plan</li> </ul>
Surface and Ground Water	<ul style="list-style-type: none"> <li>• Disturbance of groundwater level as a result of excavation works</li> <li>• Modifications of surface water flow through soil wash and rocks displacement into the surface water body, impact on stability of river banks caused by use of construction equipment in the area</li> <li>• Pollution of surface water caused by sediment runoff in case of erosion or landslides; due to discharge of wastewater from washing the equipment and machinery and runoff from the construction site and/or working areas; and caused by rain water runoff from the construction site and/or working area in case of inappropriate storage of construction materials, hazardous substances, fuel, lubricants and waste</li> <li>• Groundwater pollution through infiltration of accidental spills (e.g. fuel and lubricants, hazardous substances) caused by improper storage, refuelling operations or handling operations.</li> <li>• Accidental spills of machine oils</li> <li>• Improper storage and handling of dangerous substances or waste with dangerous/hazardous characteristics</li> <li>• Water pollution as a result of collector pipe breaks, improper maintenance of the syphon (clogging) and in case of WWTP malfunction</li> <li>• Groundwater pollution by leakages caused by damage to civil structures, platforms, pipes etc., located at the WWTP site</li> </ul>	<ul style="list-style-type: none"> <li>• Safe drainage and evacuation of pumped groundwater, to avoid possible suffusion phenomena</li> <li>• Timing of construction activities and avoidance of execution works under heavy weather conditions                         <ul style="list-style-type: none"> <li>○ Construction works for stream and river crossings during low-flow periods</li> <li>○ Use of special construction techniques in areas of steep slopes exposed to erosion as well as areas of stream crossings;</li> </ul> </li> <li>• Avoiding construction works simultaneously on both river banks</li> <li>• Avoiding creating excessive slopes near the river banks</li> <li>• Measures for protection against erosion</li> <li>• Spatial limitation of construction along the river banks should take in consideration the 100-year rainfall period</li> <li>• Developing emergency procedures and contingency plans for accidents, breakdowns, spills, etc.</li> <li>• Application of measures defined in the: soil management plan, waste management plan, plan for management of dangerous substances and control of leakage, and emergency plan</li> <li>• Regular inspection, timely detection of any faults and mistakes and taking appropriate remediation measures</li> <li>• Plan for emergencies and incidental damage to structures, platforms, pipes, etc.</li> <li>• Regular inspections to timely detect any failures, and take remedial action</li> <li>• Developing an emergency plan for accidental pollution events and damage to civil structures, platforms, pipes</li> <li>• Developing and implementing a monitoring programme for groundwater (water table) in the WWTP area; it is recommended to have at least two monitoring wells, placed up and downstream the WWTP site, considering the movement direction of groundwater.</li> </ul> <p>Undertake monitoring of surface and ground water quality:</p>

Issue	Description of impact	Planned mitigation measures
		<ul style="list-style-type: none"> <li>• Measurement of surface water quality, suspended matter, pH, turbidity, dissolved oxygen and other parameters such as PAH, upstream and downstream points of the Vardar River where the main construction activities will be implemented. Sampling and laboratory analysis of physical and chemical water characteristics, once prior to commencement of construction activities, followed by monthly monitoring</li> <li>• Measurement of the quality and ground water levels at the location of the WWTP at different distances from the river. Laboratory analysis of samples collected with a piezometer - once a month.</li> <li>• Report on monitoring results to the competent administrative body</li> </ul>
Ecosystems and Flora & Fauna	<ul style="list-style-type: none"> <li>• Destruction of habitats by removing the humus layer of soil and vegetation removal</li> <li>• Impacts on the process of photosynthesis from emissions of fugitive dust</li> <li>• Impacts on biodiversity caused by increased noise levels and increased presence of people and machinery</li> <li>• Affecting fauna species that have a seasonally variable vulnerability due to breeding, critical feeding times or seasonal migrations</li> <li>• Change of the covert and food places for fauna species in the works area due to construction activities</li> <li>• Aquatic environment alteration due to changes of water characteristics (physical, chemical, and biological), caused by water body pollution</li> </ul>	<ul style="list-style-type: none"> <li>• The contractor, in close cooperation with the Forest Research Unit within the Faculty of Forestry responsible for managing protected areas within the site, should prepare management plans for clearing of vegetation by assessing the quantity and type of timber and other plants that need to be removed from the location, and providing sustainable logging of trees and vegetation</li> <li>• Reuse of the removed top layer of soil for arranging green spaces within the site</li> <li>• Workers' training on legislation regulating biodiversity protection and appropriate mitigation measures</li> <li>• Providing bio-corridors/unhindered passages for fauna species</li> <li>• Conservation of trees and other vegetation as much as possible</li> <li>• Avoiding cutting of trees to the extent possible</li> <li>• After any intervention that may disturb natural sites: ecological restoration through environmental engineering (restorations, rehabilitation), including restoration of top soils and (re-) introduction of genetic species to re-establish natural local ecology</li> <li>• Restriction/control of any fertilisers used during vegetation restoration in affected areas</li> </ul> <p>Undertake monitoring of biodiversity:</p> <ul style="list-style-type: none"> <li>• Monitoring of terrestrial and aquatic flora and fauna habitats near Ostrovo and along the river. Monitoring to be defined in line with the existing valorisation report and in close cooperation with the entity responsible for future management of the protected area. Frequency also to be defined in cooperation with the responsible entity. In case the entity for future management of Ostrovo is not officially designated, frequency of monitoring will need to be determined by MoEPP.</li> <li>• Prior to construction works, require from Contractor to engage a professional biologist/ecologist to inspect the area designated for construction activities at the: <ul style="list-style-type: none"> <li>○ location of the WWTP site, to inspect this area in terms of presence of species, with a focus on on-ground nests of <i>Merops apiaster</i>, and take measures accordingly in line with biodiversity protection practices</li> <li>○ location along the Vardar River required for construction of flood protections, to inspect this area in terms of animals or nests in order to prevent any fatalities to animals that may be</li> </ul> </li> </ul>

Issue	Description of impact	Planned mitigation measures
		<p>hidden in riparian vegetation. Special attention should be given to species <i>Phalacrocorax pygmaeus</i> (Pygmy cormorant) - Annex I of the Birds Directive; <i>Larus minutus</i> (Little gull) - Annex I of the Birds Directive and <i>Streptopelia turtur</i> (European turtle dove, VU)</p> <ul style="list-style-type: none"> <li>• Require from Contractor to include in CESMP general mitigation measures for biodiversity protection: <ul style="list-style-type: none"> <li>○ fencing of the site to prevent intrusions of fauna species</li> <li>○ avoid any disturbance of areas outside the area required for construction</li> <li>○ reduce the possibility of formation of shelters for small animals during the construction phase by clearing of unused construction material</li> <li>○ avoid any movements of mechanisation in the Vardar River to prevent damage to aquatic life</li> </ul> </li> <li>• Ensure that a buffer area of at least 50 m around Ostrovo is foreseen in the Main Design.</li> </ul>
Soil	<ul style="list-style-type: none"> <li>• Soil degradation as a result of humus layer removal</li> <li>• Soil compaction, and consequently, reduced capacity for infiltration of precipitation</li> <li>• Temporary land use changes</li> <li>• Pollution of soil by infiltration of leachate from uncontrolled waste disposal and construction material <ul style="list-style-type: none"> <li>○ Soil erosion due to: excavation works leading to soil instability and landslides; and removal of vegetation, earthworks and the use of heavy machinery during construction in or near the riverbed.</li> </ul> </li> <li>• Soil pollution at the construction site and working areas in case of accidental spillage of fuels and lubricants on parking areas, fuelling and cleaning of vehicles and equipment used for construction, and by infiltration of leachate from uncontrolled deposits of waste.</li> </ul>	<ul style="list-style-type: none"> <li>• Top soil removal and storage in separate piles and reinstallation after refilling of trenches to enable natural re-vegetation; soil stripping and clearance of vegetation to be done parallel to contour lines, starting from high to low ground; using appropriate machinery for land clearing to minimise disturbances to soil</li> <li>• Performing construction works during low-flow periods; provision of perimeter drains to intercept storm-runoff from outside the working areas; sand/silt traps and sediment basins to be provided; ripping of the soil, re-application of the top soil and establishment of vegetation cover after completion of works</li> <li>• Performing major earthworks as much as possible in the dry season</li> <li>• Constructing a drainage system to accept and conduct storm water from the site</li> <li>• Applying appropriate measures for protection against erosion: sequencing works to avoid areas subject to erosion during severe storms, installing silt screens, in particular in sloping areas and riverbanks</li> <li>• Implementing an active re-vegetation programme at work areas, in particular erosion-prone areas (e.g. hill sides and riverbanks)</li> <li>• Undertake monitoring of soil: <ul style="list-style-type: none"> <li>○ Soil conditioning in regard to engineering and geology processes at locations affected (by erosion, landslide, etc.) as defined through geotechnical and hydro technical investigations and on sites where stored earth is placed on a daily basis.</li> <li>○ Soil pollution - visual control of soil quality at all storage points for chemicals, fuels and waste, on daily basis</li> </ul> </li> <li>• Require from Contractor to include in CESMP and implement: <ul style="list-style-type: none"> <li>○ an Emergency Preparedness and Response Plan (EPRP). The EPRP should be prepared in close cooperation with the Crisis Management Center of the City of Skopje, and should specify the possible risks, assign an emergency response trained team, rapid clean up measures depending on the extent</li> </ul> </li> </ul>

Issue	Description of impact	Planned mitigation measures
		<p>of the spills, flood accidents, earthquake, etc.</p> <ul style="list-style-type: none"> <li>○ A Hazards Management and Spill Prevention Plan (as part of the EPRP), including provisions on monitoring of purchasing, substitution of products with less hazardous ones, labelling and storage conditions, operational controls and everyday handling of hazardous materials and chemicals on the site, checks of containers and tanks, and trainings delivered to avoid leaks and spill of hazardous materials.</li> </ul>
Waste Management	<ul style="list-style-type: none"> <li>• Inadequate waste management during construction is a risk to biodiversity, surface and groundwater quality and soil, human health and landscape.</li> </ul>	<ul style="list-style-type: none"> <li>• Reuse of excavated land and construction waste as much as possible</li> <li>• Reuse of other waste types</li> <li>• Assessment of the value of waste to be used, reused or recycled</li> <li>• Keeping records of the types and quantities of generated waste, and preparation of annual reports of waste quantities handed over to authorised companies</li> <li>• Preparation of a waste management plan in case of incidental spillage of waste with hazardous characteristics</li> <li>• Visual control (as to be defined by the CWMP)</li> </ul>
Visual Landscape	<ul style="list-style-type: none"> <li>• Disruption of the landscape and visual characteristics</li> </ul>	<ul style="list-style-type: none"> <li>• Limitation of the size of the construction site to the cadastre lot</li> <li>• Adequate organisation, maintenance and fencing of the site</li> <li>• Remediation of the site after construction, including cleaning of earth piles, construction material and other construction residues</li> </ul>
Community Health and Safety	<ul style="list-style-type: none"> <li>• Potential security risk to local population in case of unauthorised access to construction areas</li> <li>• Traffic disruptions, resulting in nuisance and interruption of commercial and social activities</li> <li>• Disturbances and nuisances to the public due to noise, air emissions and odour related to construction works</li> </ul>	<ul style="list-style-type: none"> <li>• Preparation of a traffic management plan addressing issues such as rerouting of traffic, informing the local communities of the construction programme, adequate traffic control at critical traffic points, etc.</li> <li>• Fencing and signalling of work sites (especially excavation works)</li> <li>• Restricting unauthorised access to working sites</li> <li>• Restriction of construction activities to day-time; noise mitigation measures; restriction of speed limits and tonnage for heavy vehicles passing through residential areas; proper maintenance of equipment.</li> <li>• Contractor to develop, as part of the CESMP: an OHS Plan (covering OHS measures defined in the ESIA for the construction phase), and a Traffic Management Plan</li> <li>• Monitor Contractor's compliance.</li> </ul>
Accidental Situations	<ul style="list-style-type: none"> <li>• Risk of accidental situations during construction (fire, explosion, etc.), in case of improper handling of machinery, welding activities, spontaneous combustion of stockpiled waste, and incidents/disturbance on the public gas line.</li> </ul>	<ul style="list-style-type: none"> <li>• The contractor should follow the standards and requirements stipulated in the national legislation on protection of workers</li> <li>• High and dry vegetation should be removed from working areas where necessary</li> <li>• Fire extinguishers should be placed and used as necessary</li> <li>• Preventive measures should be applied in case of welding activities</li> <li>• Contractor to develop, as part of the CESMP: an OHS Plan (covering OHS measures defined in the ESIA for the construction phase), and a Traffic Management Plan</li> <li>• Monitor Contractor's compliance.</li> <li>• Ensure that the Main Design includes: <ul style="list-style-type: none"> <li>○ a Plan for Environmental Protection and Protection Against Fires and Explosions is prepared, covering both the construction and operation phase.</li> </ul> </li> </ul>

Issue	Description of impact	Planned mitigation measures
		<ul style="list-style-type: none"> <li>○ consideration of all seismic related models and calculations for seismic stability. Seismic design of the facility must fulfil both Eurocodes and national design criteria.</li> </ul>
Cultural Heritage	<ul style="list-style-type: none"> <li>• No impacts on known cultural heritage can occur since there are no archaeological or cultural sites in the Project area.</li> <li>• However, potential destruction and loss of previously unknown archaeological remains is recognised as a risk during construction.</li> </ul>	Develop Chance Find Procedure for managing chance finds, defined as physical cultural heritage encountered unexpectedly during project implementation, share with Contractor to implement during construction works, and ensure relevant staff and Contractor is trained in its requirements.
Material Assets	<ul style="list-style-type: none"> <li>• Possible damage to underground infrastructure</li> <li>• Impact on quality of roads used for transport of construction materials</li> <li>• Temporary interference with private property (e.g. pipeline crossings over private lands)</li> </ul>	<ul style="list-style-type: none"> <li>• Obligation of contractor to collect all necessary data from all institutions responsible for underground infrastructure in order to avoid incidents of disruption of water supply, electricity, and other underground infrastructure</li> <li>• Obligation of contractor to pay for any claims for damage to material assets</li> <li>• Obligation of contractor to repair any damaged roads after completion of construction</li> <li>• Any temporary impacts on private property to be discussed in advance with affected people prior to the start of construction and compensated</li> </ul>
Workers' Health and Safety	<ul style="list-style-type: none"> <li>• Risks from operating heavy equipment and vehicles</li> <li>• Exposure to chemicals</li> <li>• Exposure to diseases</li> <li>• Temporary exposure to exhaust gases</li> <li>• Working in extreme weather conditions</li> <li>• Risks from fires and explosions</li> </ul>	<ul style="list-style-type: none"> <li>• Hiring only qualified and experienced workers</li> <li>• Provision of OHS training by the contractor</li> <li>• Mandatory use of PPE</li> <li>• Regular medical checks for workers</li> <li>• Compliance with the Labour Law and EU Directives 89/654 / EEC , 89/656 / EEC , 89/686 / EEC and 2009/104 / EC</li> <li>• Ensuring the use of safe machines (e.g. and safe operation of machines</li> <li>• Training of operators of industrial vehicles</li> <li>• Mobile equipment with limited visibility must be equipped with audible alarms</li> <li>• Contractor to develop, as part of the CESMP: an OHS Plan (covering OHS measures defined in the ESIA for the construction phase), and a Traffic Management Plan</li> <li>• Monitor Contractor's compliance.</li> </ul>

### 5.3 Environmental and Social Adverse Impacts and Mitigation Measures During Operation

Prior to commencement of WWTP operation, the Public Enterprise will develop an **Operation Environmental and Social Management Plan (OESMP)**. At a minimum, the OESMP will cover:

- mitigation measures for the following aspects: waste management, soil management, air emissions management, noise management, spill response management, hazardous material management, biodiversity protection emergency preparedness and response (covering management of the malfunctions of the WWTP, fire and explosion), traffic management, security personnel requirements, grievance management for workers and for external stakeholders, information disclosure and stakeholder engagement, and health and safety management
- Monitoring Plan for the following aspects: air emissions, emissions to water, noise levels, influent quality, effluent quality and sludge analysis

A summary of the identified impacts and the planned measures to mitigate such impacts during the operation phase are provided below for each issue.

Issue	Description of impact	Planned mitigation measures
Climate	<ul style="list-style-type: none"> <li>Impacts on climate are considered together with impacts on air, and are thus elaborated under 'Air Quality' below.</li> </ul>	<ul style="list-style-type: none"> <li>Please see below</li> </ul>
Air Quality	<ul style="list-style-type: none"> <li>Discharge of flue gasses and odour caused by sludge treatment and incineration</li> <li>Emission from electric generators</li> <li>Emission of NOx in flue gases at the stack of the incinerator</li> <li>H<sub>2</sub>S releases from the sludge digester</li> <li>Odour generated during the wastewater treatment process</li> </ul>	<ul style="list-style-type: none"> <li>Maintenance of the degassing system</li> <li>Diesel engines must comply with the EU regulation regarding diesel engines</li> <li>Regular monitoring of WWTP operations</li> <li>Minimising the settling time of sludge in the primary settler</li> <li>Control of the sludge treatment process</li> <li>Regular monitoring of parameters in the sludge treatment process</li> <li>Control of wastewater flow and aeration process</li> <li>Planting of vegetation (trees and plants of varying heights forming a windbreaker) at the borders of the WWTP site</li> <li>Defining alternative transport routes for sludge</li> <li>Covering the vehicles during transport</li> <li>Preparation of a sludge management plan</li> <li>Monitoring of odour from the water and sludge treatment processes (with appropriate laboratory analyses and monitoring tests to define sensitivity to odour)</li> <li>Implement a monitoring plan for flue gas treatment and odour treatment facilities in line with national legislation and the IED Directive.</li> </ul>
Noise	<ul style="list-style-type: none"> <li>Vibration generated by the cogeneration unit equipment</li> <li>Noise generated by engines/alternators</li> <li>Noise generated by centrifuges used in dehydration of digested sludge</li> <li>Noise generated from WWTP equipment (generator, pumps, ventilation)</li> <li>Noise generated from the STF (incinerator)</li> </ul>	<ul style="list-style-type: none"> <li>Proper installation and operation of equipment with the application of soundproofing and vibration prevention infrastructure/measures</li> <li>Planting vegetation within the boundaries and around the site</li> <li>Measurement of noise and vibration level at the location and in the surroundings. According to national legislation, if such levels are found to be below limit values, monitoring is done once a year.</li> <li>Include in OESMP a Monitoring plan regarding noise measurement (with specified type of monitoring, sampling/measurement locations, and emission limits values or references, measurement and supervision frequency, responsible persons, timeline, etc.)</li> </ul>
Soil	<ul style="list-style-type: none"> <li>Discharge of wastewater generated by washing the concrete plateau</li> <li>Soil erosion and landslides in sloping areas, caused by run-off to surface waters and/or by removal of vegetation</li> <li>Soil pollution at the WWTP location, through leakages because of damage to certain pipes, basins, structures</li> </ul>	<ul style="list-style-type: none"> <li>Internal sewage network will be constructed conveying on-site waters to the inlet structures for treatment</li> <li>Implementation of an active re-vegetation programme on work area, in particular erosion-prone areas</li> <li>Application of appropriate for protection against erosion</li> <li>Regular inspections to timely detect any failures, and take remedial action</li> <li>An emergency plan for accidental pollution events and damage to civil structures, platforms, pipes</li> <li>Compliance with good construction practices for sludge storage location and impermeable concrete pavings</li> <li>Visual control of all points for storage of chemicals, fuel, waste and sludge</li> </ul>
Surface and Ground Water	<ul style="list-style-type: none"> <li>Malfunctioning of the WWTP</li> <li>Wastewater discharge from wet cleaning of flue gases from the incineration process (wet scrubbers)</li> <li>Groundwater pollution caused by damage of civil structures, platforms, pipes etc.</li> </ul>	<ul style="list-style-type: none"> <li>Full inventory of the quantity and quality of technological and storm effluents from industrial sites, taking into consideration the relevant data on waste water pollution incidences, supported with sampling and analyses</li> <li>If the above-mentioned effluent inventory indicates a risk that limit values of wastewater parameters cannot be met (or met at all times), special conditions have to be imposed</li> </ul>

Issue	Description of impact	Planned mitigation measures
		<p>by WWTP operator on industrial companies (compliance with discharge limit values in the sewerage system)</p> <ul style="list-style-type: none"> <li>• Developing and implementing an emergency response programme for WWTP operation</li> <li>• Regular inspections in order to timely detect any failures, and take appropriate remedial action</li> <li>• An emergency plan for accidental pollution events and damage to civil structures, platforms, pipes, etc.</li> <li>• Compliance with good construction practices for sludge storage location and impermeable concrete pavings</li> <li>• Developing a monitoring programme for groundwater (water table) in the WWTP area; it is recommended to have at least two monitoring wells, placed up and downstream the WWTP location</li> <li>• Monitoring of wastewater influent in line with national requirements (twice a month) for the following parameters: quantity and quality of the inlet wastewater BOD, COD, SS, pH, NH4- N, NO2-N, NO3-N, N-total, P-total, heavy metals, organic matters turbidity etc.</li> <li>• Monitoring of WWTP effluent at the discharge point, in line with national requirements (once a month or more frequently upon request) for the following parameters: quantity and quality of the inlet wastewater BOD, COD, SS, pH, NH4- N, NO2-N, NO3-N, N-total, P - total, heavy metals, organic matters turbidity etc.</li> <li>• The above listed parameters should be monitored during the operation phase both for influent and effluent</li> </ul>
<p>Flora &amp; Fauna</p>	<ul style="list-style-type: none"> <li>• Alteration of habitats or species, modification or destruction of migration routes for terrestrial and aquatic fauna due to land use changes</li> </ul>	<ul style="list-style-type: none"> <li>• Compensatory planting or restocking of indigenous species</li> <li>• Efficient elimination of any dangerous invasive species</li> <li>• Creating opportunities for fauna migration or provision of new habitats</li> <li>• Monitoring the affected protected areas for a certain period (e.g. 2-3 years) recommended at the beginning and at the end of the vegetation period</li> <li>• Monitoring of terrestrial species</li> <li>• Good maintenance practices to avoid malfunction incidences at the WWTP to preserve aquatic life</li> <li>• Quality analysis of the effluent to be performed by an authorised laboratory for water quality testing</li> <li>• Include in OESMP the following measures for biodiversity protection: <ul style="list-style-type: none"> <li>○ undertake good maintenance practices to prevent fires and/or explosion that could disturb the species at Ostrovo</li> <li>○ periodically check outdoor areas for presence of fauna species as defined in the ESIA</li> <li>○ undertake trainings of WWTP workers on species that could be found in Ostrovo to avoid unintentional disturbances of species</li> <li>○ prohibit any construction / operation / maintenance activities in order to preserve the edge area of Ostrovo for possible terrestrial fauna species such as birds, reptiles and small mammals.</li> <li>○ During first 5 years of operation phase, compensate for cleared vegetation along both river banks and undertake re-plantation of the same / larger area, in cooperation with relevant authorities</li> </ul> </li> </ul>
<p>Waste Management</p>	<ul style="list-style-type: none"> <li>• Inadequate waste management is a potential risk to contamination of surface</li> </ul>	<ul style="list-style-type: none"> <li>• Use of electrostatic filters to remove flue ashes and their discharge into a storage silo for direct loading on</li> </ul>



Issue	Description of impact	Planned mitigation measures
	<p>and groundwater, as well as flora and fauna</p> <p>Waste to be generated includes:</p> <ul style="list-style-type: none"> <li>• Solid waste removed by the coarse screen</li> <li>• Solid waste removed by the fine screen</li> <li>• Solid waste generation by settling of sand</li> <li>• Oils and grease</li> <li>• Emission of ash residues</li> <li>• Solid waste from the incineration process</li> </ul>	<p>transportation trucks. Silo should be equipped with a mechanical discharge back up and all necessary facilities for safe silo ventilation, product discharge, control and maintenance works.</p> <ul style="list-style-type: none"> <li>• The flue gas treatment residues are collected at the bottom of the bag filter and then stored in separated large-bags.</li> <li>• Ash dispersal should be prevented by water spraying and tarpaulin cover.</li> <li>• Ash should be disposed of at the Drisla landfill site as well as in abandoned quarries in the vicinity or reused in public works. The addition of some reagents can convert ash into granular shape solids which are considered as more adapted for carrying out some specific field works (filling, foundation materials, etc.).</li> <li>• Ash should be transported either by a tank truck or a dumper truck.</li> <li>• Implementation of activities stipulated in the waste management plan for the operational phase.</li> <li>• Signing contracts with authorised companies for collection, transport and treatment of different types of wastes.</li> <li>• At least once a year, undertake laboratory testing of sludge, ash residues from the incineration process, and sand from the fluidized bed cover to determine the category of waste and provide instructions for safe disposal or re-use. In case hazardous waste fractions are identified, engage an authorised company for management of hazardous waste to undertake final disposal.</li> <li>• Undertake first analysis during the test period of WWTP operation, i.e. during the first 6 months</li> <li>• Undertake laboratory analysis of heavy metals (Hg, As, Ni, Cr, Pb, Cd, Fe, Zn)</li> </ul>
Visual Landscape	<ul style="list-style-type: none"> <li>• Impacts on landscape and visual aspects are associated with the presence of facilities and equipment for waste water treatment</li> <li>• Permanent alteration of landscape</li> </ul>	<ul style="list-style-type: none"> <li>• Adequate design of civil structures (WWTP, WPS, WWPS) to ensure that they fit into the surrounding environment;</li> <li>• Planting of native trees and other vegetation on the location</li> <li>• Aesthetic design of incinerator facade, stack and associated structures to fit into the surrounding setting</li> <li>• Shrub and climbing planting to soften structures</li> <li>• Tree planting to screen the STF</li> </ul>
Community Health and Safety	<ul style="list-style-type: none"> <li>• Pollution of land in the event of incidents such as overflow of wastewater</li> <li>• Risks related to inadequate transport, handling and storage of chemicals</li> <li>• Disturbances and nuisances to the public, through the offensive odour generated by the operation of the WWTP</li> <li>• increased presence of mosquitoes at the WWTP site, thus increased risk of diseases</li> </ul>	<ul style="list-style-type: none"> <li>• For the operation phase, include in OESMP: <ul style="list-style-type: none"> <li>○ health and safety measures as defined in the ESIA for the operation phase</li> <li>○ an Emergency Preparedness and Response Plan (with a Hazards Management and Spill Prevention Plan)</li> </ul> </li> </ul>
Accidental Situations	<ul style="list-style-type: none"> <li>• Risk of occurring of the accidental situations (fire, explosion, defects in the degassing system, etc.) during WWTP operation</li> </ul>	<ul style="list-style-type: none"> <li>• Proper placement and storage of fuel, materials and chemicals; regular control of equipment,</li> <li>• Prevention of contact between equipment and storm water;</li> <li>• Protection measures related to flooding, etc.</li> <li>• Due to the low flash point of biogas, the biogas circuit and buildings have to be analysed in an ATEX study to define the necessary precautions to be taken in order to limit fire risks in case of biogas leaks or releases</li> <li>• A fire detection and alarm system within WWTP facilities to be installed</li> <li>• Electrical installations to be anti-explosive</li> </ul>

Issue	Description of impact	Planned mitigation measures
		<ul style="list-style-type: none"> <li>• Providing regular trainings related to: fire protection, management of the biogas system</li> <li>• Preparation and implementation of the standard set of working procedures</li> <li>• Use of fire protection systems.</li> <li>• Include in OESMP: health and safety measures as defined in the ESIA for the operation phase, and an Emergency Preparedness and Response Plan (with a Hazards Management and Spill Prevention Plan)</li> </ul>
Workers' Health and Safety	<ul style="list-style-type: none"> <li>• Risks for workers e.g. exposure to emissions of exhaust gases, and biological and chemical hazards during wastewater and sludge treatment</li> </ul>	<ul style="list-style-type: none"> <li>• The mitigation measures are the same as for the construction phase.</li> <li>• Include in OESMP: health and safety measures as defined in the ESIA for the operation phase, and an Emergency Preparedness and Response Plan (with a Hazards Management and Spill Prevention Plan)</li> </ul>

## 5.4 Cumulative Impacts

### Construction phase:

- *Quarries and borrow pits:* The locations that will be used to source construction materials are not known at this stage of the Project. Therefore, this impact cannot be assessed at the moment.
- *Noise:* Considering the existing noise generated by railway transport, movement of vehicles on the local access road and noise generated by sand separation activities, it can be expected that ambient noise levels will be increased compared to the present state. However, having in mind that no settlements are located in the vicinity of the future construction site, such noise will not affect the local population. Moreover, good construction practices and planned measures will mitigate noise impacts from WWTP construction.
- *Water pollution:* The present state of water quality of the Vardar River is classified as class III and IV in line with national legislation. Cumulative impacts on the river are possible only in case of major accidents, such as leakage of oil from mechanisation at the construction site. During earth works for construction of flood protection, blurring of water is possible. These issues will be mitigated through good construction practices, good organisation of construction site and adequate waste management.
- *Air emissions:* The current air quality of the City of Skopje is impaired, mostly since PM<sub>10</sub> particles and SO<sub>2</sub> exceed the limit values. Earth works will generate dust including PM<sub>10</sub>, and combustion of fuel in mechanisation will cause SO<sub>2</sub> emission. This issue will be mitigated with good construction practices and good organisation of construction site.

### Operation phase:

- *Noise:* WWTP operation will involve the operation of mechanical equipment that will generate high noise levels. Together with the existing noise generated by railway transport, movement of vehicles on the local access road and sand separation activities, such noise levels have the potential to cause noise disturbance to workers at the WWTP site. These impacts will be mitigated through periodical monitoring of ambient noise and OHS measures, such as the use of personal protective equipment by workers.
- *Air emissions:* It is possible to expect that current air emissions may act cumulatively with emission from sludge treatment and incineration of sludge in case of failures of the odour treatment and flue gas treatment facilities. However, this issue will be mitigated through adequate mitigation measures to reduce emissions to air and proper maintenance of the facilities.

- *Water pollution:* Cumulative water pollution of the river during operation is possible only in major accidental situations, such as WWTP malfunctions. Planned mitigation measures include daily monitoring of proper functioning of the WWTP, influent /effluent water analysis and sludge analysis, and periodical monitoring of river water quality.
- *Visual impacts:* Visual cumulative impacts are possible for viewers from the nearest settlement or for passengers travelling by rail or nearby roads, since the location is already intersected with existing infrastructure. There are no low cost applicable mitigation measures.
- *Waste generation:* Three other existing/planned small WWTPs (Volkovo, Saraj and Dračevo) in the City will also be operated by the Public Enterprise. It is possible that sludge from these WWTPs will be incinerated at the central WWTP (but a final decision has not been made yet). Incineration of sludge will lead to additional air emissions caused by incineration, and increased quantities of residual ash to be finally disposed together with the ash from the WWTP. The additional quantities of sludge to be received at the WWTP incinerator need to be analysed in the Main Design for the WWTP (as defined under ESAP section 3.1), together with the additional implications associated with this action (dimensioning of the incinerator and odour treatment line to reduce the additional pollution and residual ash generation).
- *Biodiversity:* Cumulative impacts on biodiversity are possible due to the existing disturbance of species and edge effect caused by existing infrastructure such as roads, railway and high power lines. Cumulative impacts on ichthyofauna of river are possible only in cases of WWTP malfunction or failure, during which concentrated sewage is likely to be discharged. Specific mitigation measures are planned to protect biodiversity.

## 6 MONITORING

Environmental and social monitoring will be implemented both during construction and operation of the Project.

The Public Enterprise will require its construction contractors to monitor relevant environmental issues of their operation (e.g. dust emission, noise levels, prevention of spills and leakages, proper traffic management and to monitor the quality of surface water and groundwater). During operation, the Public Enterprise will regularly monitor, for e.g. influent and effluent quality and laboratory testing of sludge, ash residues from the incineration process, and sand from the fluidized bed cover to determine the category of waste and provide instructions for safe disposal or re-use etc.

It is expected that the WWTP will have real-time continuous monitoring of its operations, as well as early warning and communication systems in place.

The Environmental and Social Action Plan prepared for this Project sets out additional monitoring requirements, particularly in relation to the engagement with stakeholders. Key monitoring results of the Project will be made publicly available.

## 7 COMMUNICATIONS

The Public Enterprise intends to disclose the following Project disclosure package:

- This **Non-technical Summary**;
- **Stakeholder Engagement Plan**;
- **Project Grievance Form** and **Public Grievance Leaflet**;
- **ESIA Study** developed in 2017;
- **Environmental and Social Action Plan**.

The disclosure package will be publicly available in Macedonian (as well as English where available) immediately upon its availability, on the websites of the Public Enterprise, the City and the Ministry of Environment and Physical Planning, as follows:

- [www.skopje-vodovod.com.mk](http://www.skopje-vodovod.com.mk)
- [www.skopje.gov.mk](http://www.skopje.gov.mk)
- [www.moepp.gov.mk](http://www.moepp.gov.mk)

The documents will remain disclosed on the website of the Public Enterprise, the City and EBRD during a period of 120 calendar days prior to consideration of the Project by the EBRD's Board of Directors, and will remain publicly available throughout the life of the Project.

In addition, hard copies of the documents will be available at the following locations:

1. Public Enterprise Vodovod i Kanalizacija (address: Str. Lazar Lichenoski 9, Skopje)
2. City of Skopje (address: Bul. Ilinden 82, Skopje)
3. Municipality of Gazi Baba (address: Str. Arhimedova 2, Skopje)
4. Municipality of Aerodrom (address: Bul. Jane Sandanski 109B, Skopje)
5. Ministry of Environment and Physical Planning (address: Ploshtad Preseveta Bogorodica 3, Skopje)
6. EBRD Resident Office in Skopje (address: Soravia Centre Skopje, 7th floor, Filip II Makedonski no. 3, 1000 Skopje)
7. EBRD Headquarters in London (address: One Exchange Square London EC2A 2JN United Kingdom).

Public consultations as defined in more detail in the Stakeholder Engagement Plan are also planned.

*Contact information for enquiries and grievances:*

Attention: Mr. Kiril Zernovski

Public Enterprise "Vodovod i Kanalizacija"

Address: Str. Lazar Lichenoski, 9 Skopje

Tel: + 389 2 3240 320, E-mail: kiril.zernovski@vodovod-skopje.com.mk