Environmental and Social Assessment for EBRD

GAP ANALYSIS & DISCLOSURE PACK

CATEGORY A PROJECT

SKOPJE WASTEWATER TREATMENT PLANT

FYR MACEDONIA

Supplementary Information to the 2017 ESIA for WWTP Skopje

1 November 2018

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1 CUMULATIVE AND RESIDUAL IMPACTS

1.1 Cumulative Impacts

Cumulative impacts related to the construction and operation of the Wastewater Treatment Plant (WWTP) in Skopje were not assessed in the 2017 Environmental and Social (ESIA) Study. An assessment of cumulative impacts carried out as part of this assignment in line with the *Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions* (European Commission, 1999) is given below.

In order to generally assess cumulative impacts of the Project, the Consultant reviewed the available spatial planning documentation (i.e., the General Urban Plan (GUP) for the City of Skopje, 2012-2022), reports from public consultation meetings held during the development of spatial documentation, and other relevant documentation and information, with the aim of identifying possible impact interactions with other past, existing or planned facilities/projects/activities. Field observations were also utilised during the assessment.

Past, existing and planned infrastructure/ projects/ activities in the Project area	*Possible impacts from past, existing and planned infrastructure/ projects/ activities*
1. Existing railway and noise from railway traffic	1. Noise emissions, water pollution (only in accidental situations)
2. Three existing access roads from SW, W and NW direction	2. Noise emissions, air emissions, water pollution (only in accidental situations)
3. Existing sand extraction facilities at two locations and transport of sand material	3. Noise emissions, air emissions, water pollution (only in accidental situations), reduction in visual values of the areas surrounding the WWTP site
4. Existing / planned small WWTPs in the City of Skopje (Volkovo, Saraj and Dračevo)	4. Increased quantities of sludge to be incinerated compared to the quantities that will be generated at the WWTP Skopje
5. Existing underground gas pipeline at Project area	5. Spatial restrictions, explosion – only in case of malfunction of the gas pipeline in Project area
6. Planned road across the WWTP location in line with GUP 2012-2022	6. Spatial restrictions and difficulties for maintenance of the WWTP
7. Existing high/medium voltage power lines at WWTP site	7. Spatial restrictions and difficulties for maintenance of the WWTP

Note: Spatial restriction impacts have not been further considered since the existing infrastructure such as high/medium voltage power lines or gas pipeline will not be relocated. The existing infrastructure has a maintenance /protective corridor that will be considered during the development of the Main Design for the WWTP.

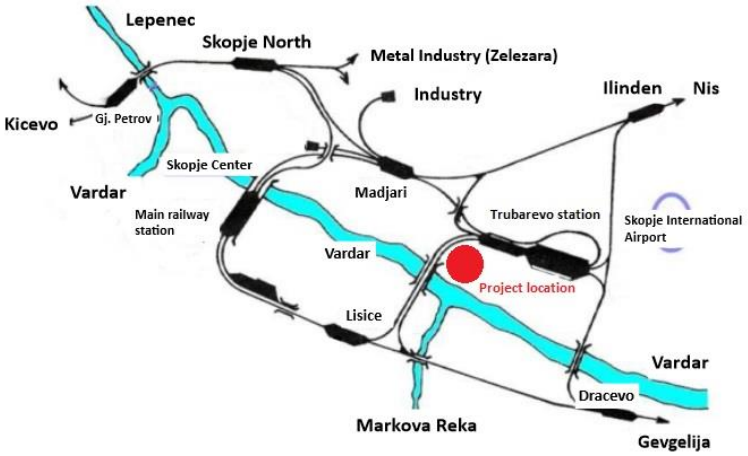


Figure 1: Existing Railway and Railway Station Trubarevo in relation to the Project Location (source: GUP of the City of Skopje - Book 3, 2012)

Figure 2: Position of Sand Separation Facilities (source: field observations and Google Earth)

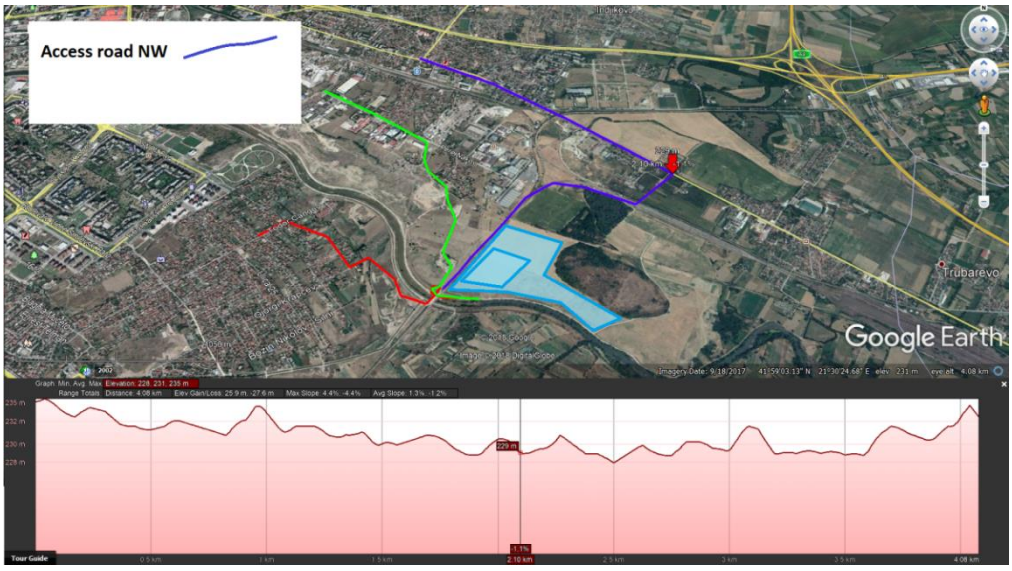


Figure 3: Position of Access Roads - from SW (red), W (green) and NW (purple) (source: Google Earth)

Construction phase:

- *Quarries and borrow pits:* The locations of disposal sites and borrow sites that will be used to source construction materials are not known at this stage of the Project since the Preliminary or Main Design have not been developed yet. 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 (the maximum noise levels measured by the Consultant during August 2018 were in the range 42-76 dB). 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 measures proposed by the Consultant 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[1], and pollution is visible. Cumulative impacts on the river during construction activities 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. This issue 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_{10} particles and SO_2 exceed the limit values (especially during the winter season). Earth works will generate dust including PM10 particles, and combustion of fuel in mechanisation will cause emission of the SO_2. This issue will be mitigated with good construction practices and good organisation of construction site.

Operation phase:

- *Noise:* The operation of WWTPs involves the operation of mechanical equipment (hydraulic pumps, generators, gensets, noisy pipes, and exhaust fans) that creates high noise levels. Therefore, noise levels will be increased compared to the present state due operation of the aforementioned equipment at the WWTP site; and together with the existing noise generated by railway transport, movement of vehicles on the local access road and noise generated by sand separation activities 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.

- *Air emissions:* The current air quality of the City of Skopje is impaired, mostly since PM_{10} particles and SO_2 exceed the limit values (especially during the winter season). It is possible to expect that current air emissions and air quality may act cumulatively with emission from sludge treatment (H_2S and NH_3) and incineration of sludge (SO_2, NOx, volatile Hg and volatile As) in case of failures of the odour treatment and flue gas treatment. Good maintenance of the facilities will be suggested. The ESIA foresees adequate mitigation measures to reduce emissions to air, such as wet electrostatic precipitators to remove dust and particulate matters. After de-dusting, flue gases will be treated by means of a special cleaning system, consisting of a reactor and followed by a bag filter. Inside the reactor, sodium bicarbonate and activated carbon are injected into the flue gas to remove the harmful components.

[1] For definition of water classes, please refer to Chapter 2: Updated Baseline Characteristics.

- *Water pollution:* As stated above, the present state of the River Vardar is classified as class III and IV, and visible pollution such as floating waste is evident. Cumulative water pollution of the river during operation is possible only in major accidental situations, such as failure or malfunction of the WWTP. Adequate mitigation measures are included in the Environmental and Social Action Plan (ESAP) such as:
    - daily monitoring of proper functioning of the WWTP
    - influent /effluent water analysis and sludge analysis
    - periodical monitoring of the 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 will also be operated by the Public Enterprise "Vodovod i kanalizacija" together with the central WWTP to be financed by the Lenders. It is possible that sludge from other small WWTPs (Volkovo, Saraj and Dračevo) will be incinerated at the central WWTP instead of the current practice of landfilling at the Drisla landfill, causing cumulative waste quantities at location of the sludge treatment facilities at the WWTP site. 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 in ESAP), 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. Several sensitive receptors (protected Vertebrate species are found at the WWTP site or in surrounding areas such as near the Vardar River or at the location of "Ostrovo"); therefore specific mitigation measures have been suggested by the Consultant in the ESAP. 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. The Consultant has suggested in ESAP that specific mitigation measures should be included during the development of the Main Design to avoid/mitigate this issue.

1.2 Residual Impacts

Residual impacts refer to those impacts that remain following the implementation of the proposed mitigation measures. Residual impacts of the Project are related to the sludge production and treatment process, during which significant amounts of waste ash from the incinerator will be generated. The ESIA suggests landfilling of such waste at the Drisla landfill. However, this aspect needs further consideration taking into account the fact that the quality of the ash and its (non-)hazardous properties are not know at this stage. This is addressed in ESAP. In addition, permanent changes to the landscape to occur after construction of facilities are considered to be a residual impact. These aspects are addressed through mitigation measures in the ESIA as well as additional measures in ESAP.

2 UPDATED BASELINE INFORMATION

This Chapter provides an understanding of the site setting in terms of E&S issues, to augment the understanding as provided in the background data based on the site visits and consultation undertaken by the Consultant in July and August 2018.

The information presented below supplements the baseline information provided in the 2017 ESIA, with additional details on the baseline setting of the Project area, especially having in mind that the 2017 ESIA does not provide site-specific information to a sufficient extent and that it was prepared based on data from previous years.

Updated E&S baseline information is provided in Table 1 below.

Table 1: *Updated Baseline Information*

Issue	*Updated baseline information*
Location, accessibility and land use	The WWTP site is categorised as agricultural land. On the site and its surroundings, there are: the Vardar River (flows south from the site); the protected area "Ostrovo" (Monument of Nature from 1976) located approx. 50-100 m east from the site with Arboretum and Ezerce on the north); the railway located west to the site, connecting the settlement Dolno Lisice with Trubarevo, after which it divides into two directions (continues either to Thessaloniki or to Belgrade); a high/medium voltage power line 110 kV passing across the site; and an underground gas pipeline across the site. The site is accessible by three unpaved access roads. The south west road enables approach to the site from the northeast, directly connected to the regional road R1102 (the old road Skopje-Veles). It passes through the settlement Ergele (part of the rural settlement Trubarevo), and then beneath the existing railway (underpass with dimensions: 2.5m x 4m) reaches the site from the north. The north east access road (the one from the south) starts from the last bus station in settlement Novo Lisiche and then passes along the bicycle path on the right side of the Vardar River (parallel to the settlement Gorno Lisiche). Further, the road goes through the bridge on the river, then turns left and continues under the bridge, from the left side of the river to the site. There is another possibility for access to the site – through the densely populated settlement Gorno Lisiche, over the sewage collector (right side) and the bridge. At present, this access road is not intended for vehicle transport, since the road is a bike track along the river flow. The third access road is from the northwest direction, starting at the end of the settlement Vardarishte, over the left sewage collector and local fields, next to the river embankment and under the bridge to the site. The Main Design will determine the main future access road to the WWTP. The site is not used for any industrial activities. The only identified user of the land planned for WWWP construction is the company *Fakultetsko Zemjodelsko Stopanstvo Trubarevo AD*. Based on information provided during an interview conducted in August 2018 with the company's general manager, the company is a joint stock company privatised during the 90s. The company is a tenant on state owned land within the WWTP footprint, based on a contract with the Ministry for Agriculture and Water Management. The company grows corn, wheat and alfalfa (Medicago sativa) on the land, used to feed livestock. Along the Vardar River basin, there are several private sand separation companies. Some of the ongoing activities (corn planting and sand extraction) are shown in Figure 4.  *Figure 4: Photos of Activities at Project Location*

Issue	*Updated baseline information*

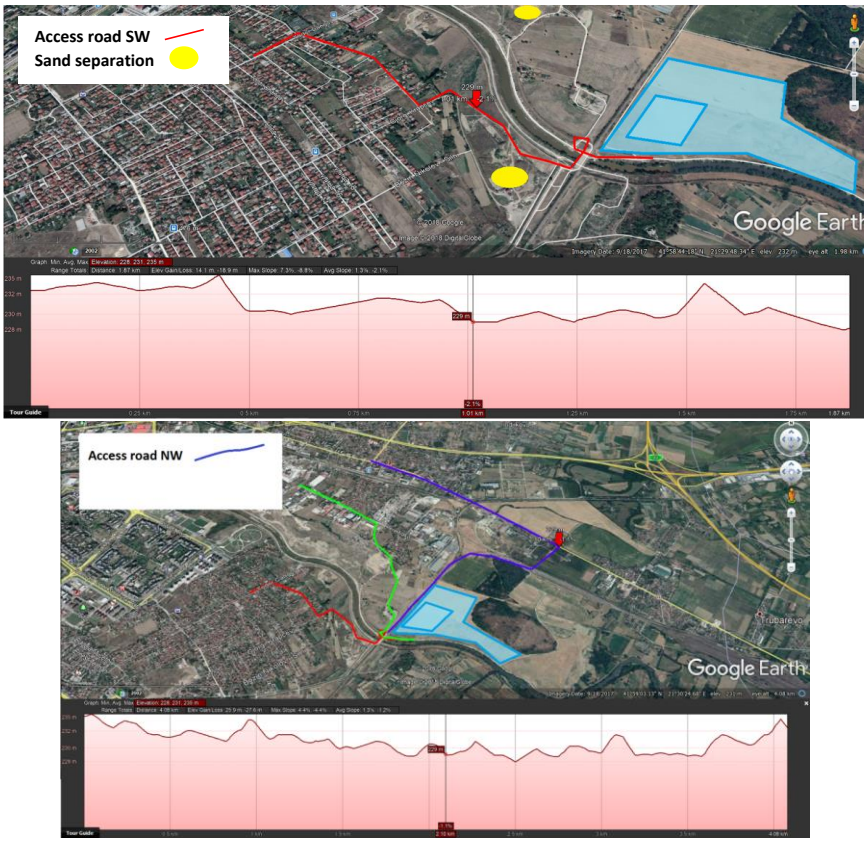


Figure 5: Locations of Access Roads[2]

Topography	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. Annual average temperatures in the City of Skopje for the period 1990-2017 varied from 12.2 up to 14 degrees (Figure 6).

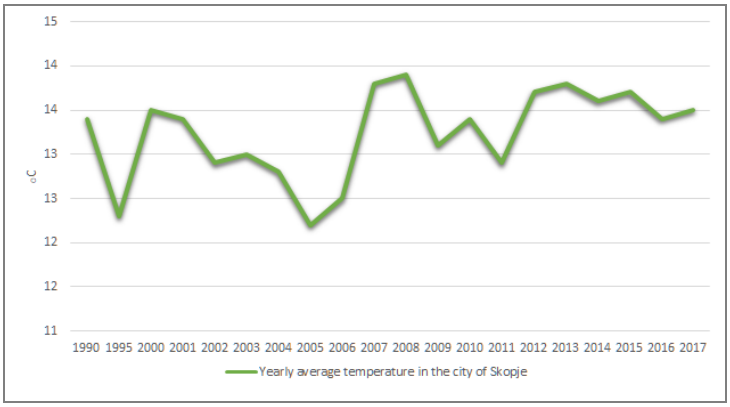


Figure 6: Annual Average Temperature in Skopje 1990-2017 (Source: http://www.moepp.gov.mk/?page_id=5683)

Precipitation is relatively low due to the pronounced rain shadow of Prokletije Mountains to the northwest, precipitation

[2] Based on Google Maps

Issue	*Updated baseline information*

being only a quarter of what is received on the Adriatic Sea coast at the same latitude. Driest months are usually August and July. The precipitation is highest from October to December and from April to June. Annual precipitation sums for the period 1990-2017 are shown in Figure 7. Precipitation varied throughout this period from 300 mm to 800 mm. The total duration of sunshine in the Skopje valley is around 2,100 h/year.

Figure 7: Annual precipitation in Skopje in 1990-2017 (Source: http://www.moepp.gov.mk/?page_id=5699)

According to meteorological observations from the Petrovec weather station in 2017, the most frequent wind directions are north-east, east and south-east. Distribution of wind speed and direction are presented in Figure 8. Based on the wind rose, the settlements that have the potential to be affected from odour and emissions to air are: Aerodrom, Gorno Lisice, Dolno Lisice (south-south west) and Trubarevo (east).

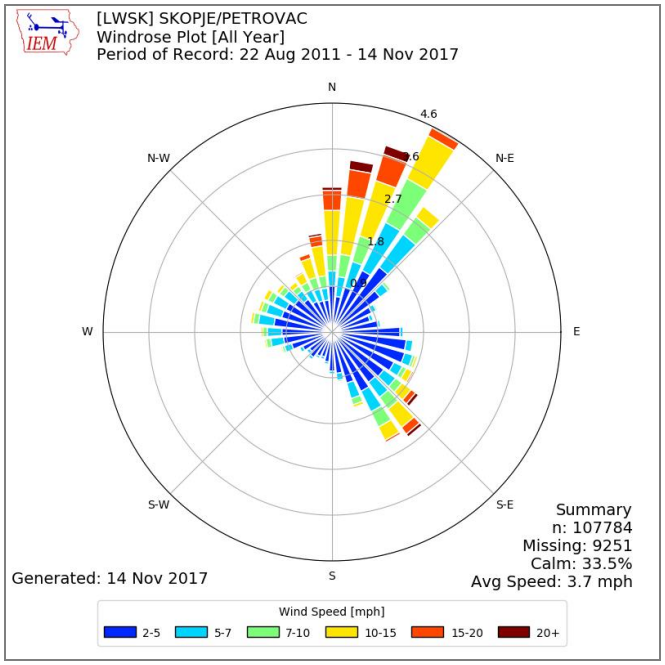


Figure 8: Wind rose with Average Wind Speed and Direction during 2011- 2017, MS Petrovec

(Source: Source:https://mesonet.agron.iastate.edu/sites/windrose.phtml?station=LWSK&network=MK__ASOS)

Air quality	**Monitoring of air quality:** the state automatic monitoring system for ambient air quality covers the area of Skopje with 5 monitoring stations (MS). The nearest MS to the project location is in the settlement Lisice at a distance of 3.2 km (presented in Figure 9). The MS in Lisice is located in the eastern part of Skopje in an industrial and residential area. The pollutant substances measured at MS Lisice are: O_3, NO_2, SO_2, CO and PM_{10}.

Issue	*Updated baseline information*

Figure 9: Distance between MS Lisice and location of the WWTP

The air quality assessment is based on measurement data available from the period 2010-2015 (from MS Lisice).

During this period, **PM10 particles**:

- exceeded constantly above the annual limit value (40 µg/m³), ranging from 78.7 in 2010 to 124.7 µg/m³ in 2012;
- exceeded the daily limit value (50 µg/m³), which is not to be exceeded more than 35 times in a calendar year. The limit was exceeded 151 times in 2017 and 263 in 2012.

Based on the Climate Change Strategy (UNDP and City of Skopje, 2017), heating participates with 91% in the total emission sources for particulate matter in Skopje.

For sulphur dioxide (SO_2), the critical values of 20 µg/m³ were not exceeded during the same period. The main emission sources for SO_2 in Skopje are road transport (56%) and industrial production (33%), with a minor contribution from non-industrial combustion (9%) and energy production (2%) (source of data: Climate Change Strategy).

Nitrogen Oxides (NOx): The annual limit value of 40 µg/m³ was exceeded during 2011 and 2012. The main emission sources of NOx in the Skopje region are road transport (46%) and industrial production (45%), with a minor contribution from energy production (5%) and non-industrial combustion (4%) (source of data: Climate Change Strategy).

Carbon monoxide (CO): According to the national legislation, CO concentrations are regulated by one limit value, calculated as maximum of daily 8-hour averages and set at 10 mg/m³. The limit values were exceeded in 2013 and 2015. The main emission sources for carbon monoxide in Skopje are non-industrial combustion (59%), road transport (25%) and industrial processes (16%), whereas the contribution of other sectors is negligible (source of data: Climate Change Strategy).

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	During the second site visit conducted on 13 August 2018, the Consultant conducted noise measurements on the borders of the WWTP site (4 sampling points). Measurements were conducted by means of a Sound Level Meter Model: SL-4012 and data processed by the software LUTRON sound system. Coordinates and a map of the measuring points are provided in Figure 10 and Table 2.

Issue	*Updated baseline information*

Figure 10: Noise Level Measuring Points around the WWTP Site

The measured noise levels at 3 out of 4 points (except point 1) were within the limit values for area with **4th degree** of noise protection according to national legislation (i.e. non-residential areas exclusively intended for industrial activities, storage activities and other production facilities). The exceeding noise level at point 1 was due to ocasional truck transport on the unpaved road. The trucks are owned mainly by the contractor engaged for construction of the sewage collector (left and right) and other companies that use sand from the surrounding sand separations activities in the vicinity of the site.

Table 2: Measured Levels of Ambient Noise

Noise level point	*Coordinates*	*Average noise level (dB)*	*Max. noise level (dB)*
1	*N:41°58'35.26'' E: 21°30'14.17''*	*56*	*76*
2	*N:41°58'35.26'' E: 21°30'14.17''*	*37*	*42*
3	*N:41°58'35.26'' E: 21°30'14.17''*	*45*	*55*
4	*N:41°58'35.26'' E: 21°30'14.17''*	*41*	*56*

Geology and terrain stability	The project area lies on a Q2al 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.

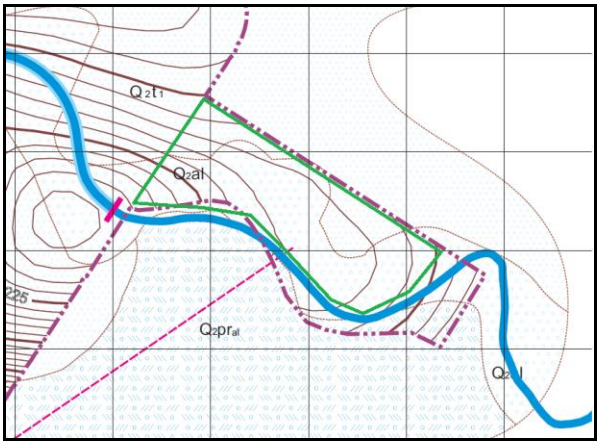


Figure 11: Geological Map (Source: GUP Skopje 2012-2022)

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

Issue	*Updated baseline information*

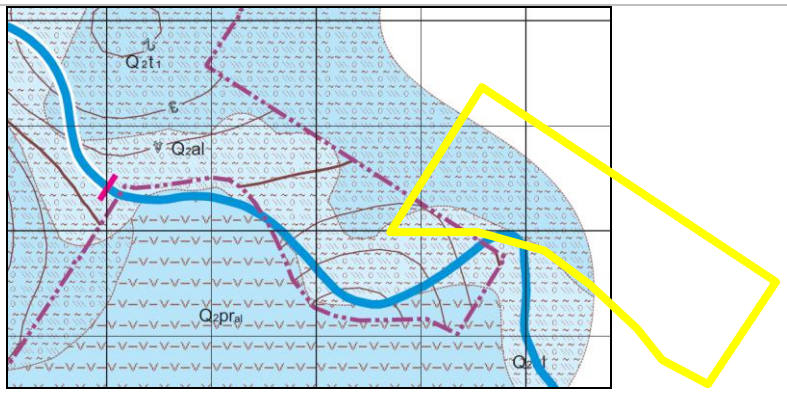


Figure 12: Soil Map (Source: GUP Skopje 2012-2022)

Hydrology	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.
Surface water quality	Water quality status of main surface watercourses is regulated by the *Law on Water* and the *Decree on Classification of Waterways, Lakes, Accumulations and Groundwater*. The following indicators are relevant for surface water quality and classification of water according to national legislation: • Organoleptic indicators (visible colour and colour, notable smell, turbidity and transparency, tasting of water sample-taste, colour, odour and feel); • pH - acidity; • Dissolved oxygen; • Mineralisation (suspended matters, total dry residue after filtration, total dissolved solids); • Eutrophication (total phosphorus, total nitrogen, chlorophyll "a", primary production, saprobe index, level of biological productivity); • Microbiological pollution (most probable number of thermo-tolerant coliform bacteria); • Radioactivity; • Hazardous substances (metals and their compounds, other inorganic parameters, phenols, hydrocarbons, halogenated hydrocarbons, nitrated hydrocarbons, pesticides, other organic compounds). According to these indicators, surface waterbodies are classified into 5 classes (Class I is the best quality, Class V is the worst quality). National legislation defines these classes as follows:
Class I	*This is very clean, oligotrophic water, which in its natural state can, with possible disinfecting, be used for drini suitable for mating and cultivation of noble types of fish – salmonides. The buffering capacity of the water is content of nutrients and bacteria, contains very slight, occasional anthropogenic pollution with organic matters (*
Class II	*This is very clean, mesotrophic water, which in its natural state can be used for bathing and recreation, water s can be used - after usual methods of purification (coagulation, filtration, disinfection, etc.) - for drinking and capacity and oxygen saturation present throughout the years are good. The loadings may lead to slightly increas*
Class III	*This is moderately eutrophic water, which in its natural state can be used for irrigation, and after usual purif require drinking water quality. Buffering capacity of the water is low, but it maintains the (pH value) acidity at a oxygen deficit occurs. The level of primary production is considerable, and some changes in community structure substances is evident as well as microbial pollution. The concentration of the harmful substances varies from nat*
Class IV	*This is strongly eutrophic, polluted water, which in its natural state can be used for other purposes only after ce leads to higher levels of acidity, and which affects the development of the offspring. In the epilimnion there is ox Algal blooming is common. Increased decomposition of organic matter simultaneous with water stratification c occurrences of more tolerant species fish populations may happen and benthic organisms can be affected. Mici recreation. Harmful substances emitted or released from the sediment (deposits) can affect the quality of the aq from levels of chronic to acute toxicity to aquatic life.*

Issue	*Updated baseline information*
Class V	*This is severely polluted, hypertrophic water, which in its natural state can be used for other purposes. The wate for many fish species. Large problems occur with the oxygen regime, namely saturation in hypolimnion; absen Decomposers dominate over producers. Fish and benthic species are systematically not present. Concentrati aquatic life.*

The monitoring of surface water quality in FYR Macedonia is done by National Hydrological Metrological Services (NHMS) through the RIMSYS program (River Monitoring System), and the collected data is processed by the Ministry of Environment and Physical Planning. The natural and artificial surface water bodies as well as ground waters are classified according to their quality status following the water classification system described above.

NHMS performs quality control measurements in 20 measurement points (MP) for surface water control in the country. Two MPs on the Vardar River are relevant for WWTP:

1. Lepenec on the inflow in the river in the west part of the City of Skopje
2. Taor on the river

The locations of all MPs are shown in the map below – MPs relevant to the Project (Lepenec and Taor) are marked with red.

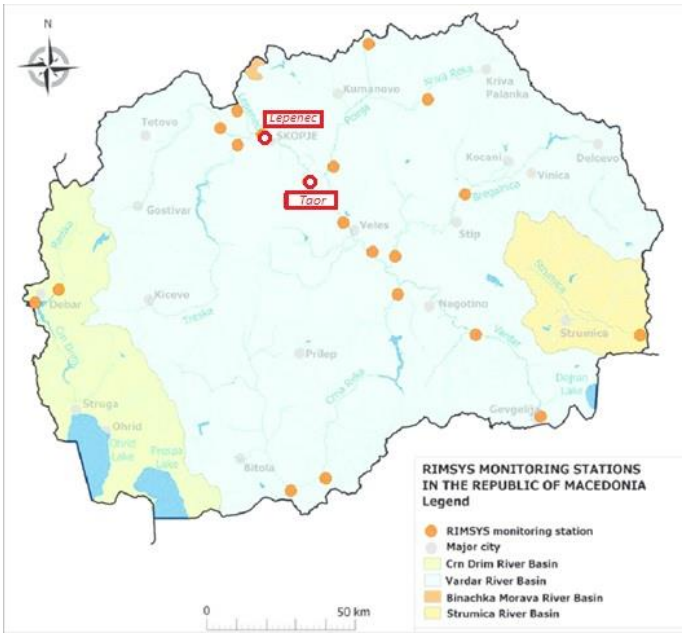


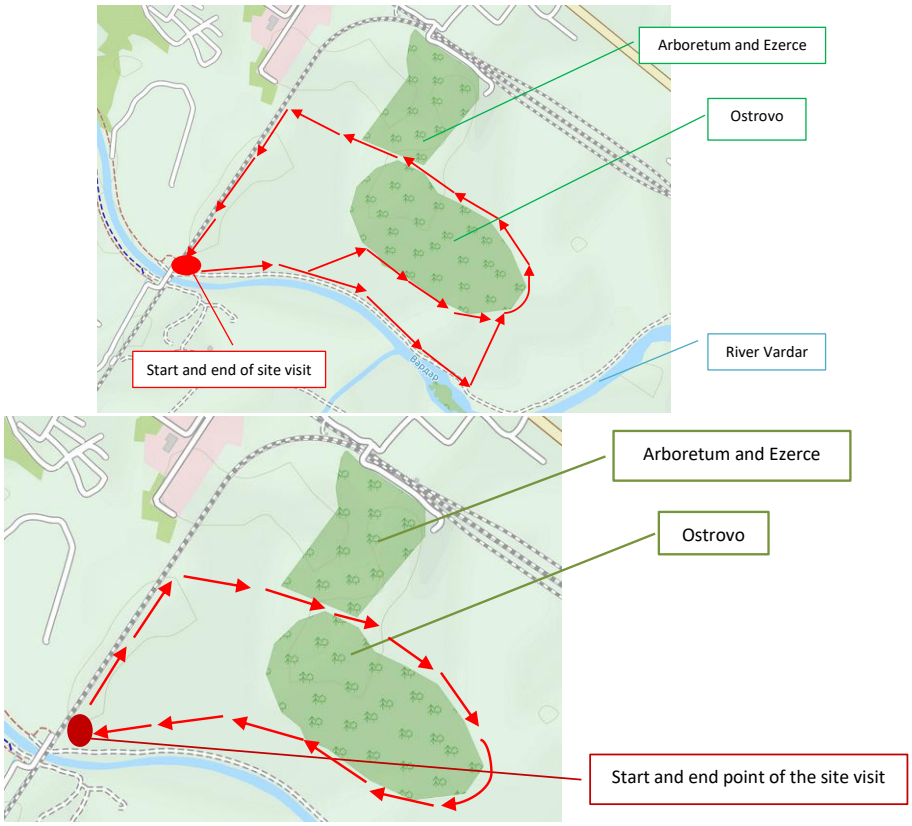
Figure 13: RIMSYS Monitoring Stations

The relevant parameters for surface water quality at two MPs (Lepenec and Taor) provided in the annual Report on Environmental Quality[3] are summarised in Table 3 below.

Table 3: Surface Water Quality of the Vardar River at the Measurement Points Lepenec and Taor (2015, 2016, 2017)

Parameter	Class of water					
	2015		2016		2017	
	Lepenec	Taor	Lepenec	Taor	Lepenec	Taor
Dissolved oxygen	I	II	I	I	I	III
Five-daily biochemical oxygen consumption	III	II	II	III	II	II
Chemical oxygen demand	I	II	II	II	II	II
Fe, Mn, Zn, Cr, Pb ions	I – II	I – II	I – II	I – II	I – II	I – II
Cd ions	III-IV	III-IV	III-IV	III-IV	III-IV	III-IV
Nitrate	I – II	I – II	I – II	I – II	I – II	I – II
Nitrite	III-IV	III-IV	III-IV	III-IV	I – II	III-IV

[3] For the period 2015, 2016, 2017, issued by the Ministry of Environment and Physical Planning

Issue	*Updated baseline information*
	The results of water quality analyses in the same period at the MP Lepenec show that the water is classified into classes I and II, with the exception of two parameters: nitrites (2015 and 2016), and cadmium ions and BOC5 (only in 2015), which is why the overall water quality classification is **class III and IV.** The results of analyses in the same period at the MP Taor show that the water is classified into classes I-II for Fe, Mn, Zn, Cr, Pb ions and nitrates; II for BOC5 and COD; and III-IV for nitrites and cadmium ions. The overall water quality classification therefore **is class III and IV.**
Flora and fauna and biodiversity	Two site visits (27 July and 13 August 2018) were undertaken by the Consultant's environmental experts in order to identify and screen significant flora and fauna species relevant for the Project location and its surroundings. Observation was undertaken at three sub-project locations: • WWTP site • Location along the river Vardar (near the WWTP site) and • Protected area Ostrovo. The Project team identified the flora species on site based on its expertise. Photos and several plant samples were taken for further identification of species. Fauna species were determined using line transects and sample counts. Ornithofauna was determined by using binoculars, observing the nests and listening to the characteristic sound of some bird species. Based on the site visit observations, the Project location is characterised as a modified area with agricultural crops (wheat) where ruderal vegetation is evident. Corn crops are also found north from the Project area, and at the location Ostrovo east-north east from the Project location. The tables below provide the list of identified flora and fauna species and an assessment of screening against relevant EU Directives (Habitat & Birds Directive) and Bern Convention for: (i) the project location; (ii) species near river Vardar; and (iii) biodiversity at protected area Ostrovo. The figures below show the route of biodiversity surveyors (Figure 14) and the position of the undertaken sample counts during both site visits (Figure 15).  *Figure 14: Surveying Directions during the First Site Visit (left) and Second Site Visit (right)* Maps showing observation points where the site visits were conducted and flora and fauna species were recorded are given

in Figure 15.

Figure 15: Surveying Directions Points for Identification of Flora and Fauna during the First Site Visit (left) and Second Site Visit (right)

Biodiversity at project location

During the two site visits, site-specific flora species were determined, and the full list of found species is given in Appendix F - List of Flora Species. Regarding the potentially endangered flora species, only the species *Fraxinus excelsior* (European ash), IUCN status: Near threatened – NT, from the category of the conservation concern was found at the location of Ostrovo. Based on the findings from the site visits, there are no endangered / endemic plant species at the project location or the vicinity of the location. The project location is typical agricultural land where ruderal vegetation (*Onopordum acanthium*, *Datura stramonium*, etc.) is evident.

Site-specific fauna species were also determined, and the full list of found species is given in Appendix E - List of Fauna Species. The found fauna species at the location are typical for rural / agricultural areas (swallows, pigeons, sand martins, butterflies - *Pieris brasicae*, *Lycaena Icarus*, etc.) Endangered, endemic or protected fauna species were not detected at the location, and no nests or animal shelter to raise the cubs were identified.

Regarding the fauna species at the WWTP site, several ornithophauna species of conservation concern were identified, as follows:

- *Ciconia ciconia* (White stork) from Annex I of the Birds Directive were identified near the project location and near Ostrovo; four units (captured in flight and found on ground in the meadow) of bird species determined
- *Merops apiaster* (European bee-eater) from Annex II[4] of the Bern Convention
- *Pica pica* (Eurasian magpie) from Annex II, Part B[5] of the Birds Directive and Annex III[6] of the Bern Convention.

[4]Annex II BC - Strictly protected fauna species to the Bern Convention
[5]Annex II, Part B - The species listed in annex II may be hunted under national legislation. Member states shall ensure that the hunting of these species does not jeopardize conservation efforts in their distribution area. The species referred to in Annex II/B may be hunted only in the member states in respect of which they are indicated.
[6]Annex III - Protected fauna species according to the Bern Convention

Issue	*Updated baseline information*
	All of the identified species make nests above ground, except for the *Merops apiaster* (European bee-eater). No other fauna species of conservation concern were found at WWTP site. Regarding the fish species from the Vardar River of conservation concern, the species were determined based on desk research. One endemic species could be found in the middle of the river flow, i.e. *Squalius vardarensis* (Vardar chub), and one *Alburnoides bipunctatus* (Schneider) from Annex II of the Bern Convention. Regarding the fauna species found in the surrounding area near the River Vardar, the following species of conservation concern were identified: • One unit of *Phalacrocorax pygmaeus* (Pygmy cormorant) from Annex I of the Birds Directive during flyover above the access bridge near the WWTP site • Four juvenile units of *Larus minutus* (Little gull) from Annex I of the Birds Directive in the Vardar River (at the access bridge) • *Streptopelia turtur* (European turtle dove) near the Vardar River, based on its characteristic sound. The IUCN[7] status of this bird species is: Vulnerable (VU) • *Pica pica* (Eurasian magpie) from Annex II, Part B of the Birds Directive and Annex III of the Bern Convention. • *Anas platyrhynchos* (Mallard) from Annex II, Part A and Annex III, Part A[8] of the Birds Directive • *Podarcis tauricus (*Balkan wall lizard*)* from Annex II of the Bern Convention • *Columba palumbus* (Common wood pigeon) from Annex II, Part A[9] and Annex III, Part A of the Birds Directive, and Annex III of the Bern Convention • *Streptopelia decaocto* (Eurasian collared dove) from Annex II, Part B of the Birds Directive. For found species at Ostrovo, please refer to the section 'protected areas' below.
Protected areas	The Natural Monument "Ostrovo" is situated in close proximity to the WWTP site (approx. 50-100 m from the site). It was designated as protected in 1976 by the Assembly of the City of Skopje (III degree of protection which is equivalent to III category according IUCN). This area covers 0.29 km^2 and is a relict ecosystem (specific flora and fauna) of the former riverbed of the Vardar River. The regulation of the water from the river and cutting of the meander (Figure 16) has most likely changed the occurrence of species. Based on information provided by MoEPP in August 2018, the area is still protected within the boundaries from 1976 in line with the *Law on Protection of Nature*[10]*,* even though there are no precise data on biodiversity values of this area. There are indications that species like butterflies, Odonata, Fish, Amphibians (Triturus), Reptiles (marsh turtles, water snakes), and Mammals (Spalacidae species, bats, *Lutra lutra*[11] - otter) could be present, as well as colonies of water and swamp birds (Ciconiidae, Ardeidae, *Phalacrocorax pygmeus*[12] - Pygmy cormorant *Alcedo atthis,* etc). In 2010, the *Proposal of the Law on Designation of the Protected area - Integral Area of Ostrovo, Arboretum and Ezerce* (within Arboretum) was suggested to the Government of FYR Macedonia with the aim of revalorisation/re-categorisation of the area. Based on information provided by MoEPP, the Proposal was rejected due to the fact that the Faculty of Forestry does not have the capacity to manage the new protected area.

[7] International Union of Conversation of Nature

[8] Annex III, Part A - Member states shall prohibit, for all of naturally occurring birds in the wild state in the European territory of the member states, the sale, transport for sale, keeping for sale and the offering for sale of live or dead birds and of any readily recognizable parts or derivatives of such birds. The activities shall not be prohibited in respect of the species referred to in Annex III, Part A, provided that the birds have been legally killed or captured or otherwise legally acquired.

9 Annex II, Part A - The species listed in annex II may be hunted under national legislation. Member states shall ensure that the hunting of these species does not jeopardize conservation efforts in their distribution area. The species referred to in Annex II/A may be hunted in the geographical sea and land area where this directive applies.

[10] O.G. of FYR Macedonia, No. 67/06, with the latest amendments in 146/15

[11] Annex II and IV of the Habitat Directive

[12] Annex I of the Birds Directive

Issue	*Updated baseline information*

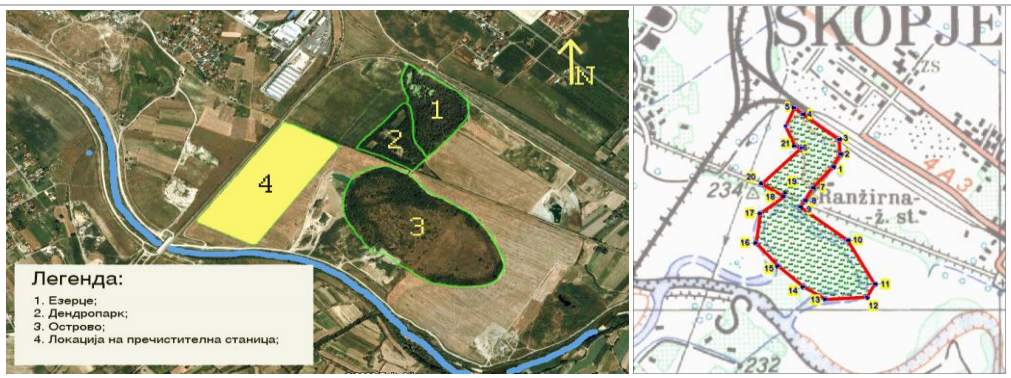


Figure 16: Position of Ostrovo (3), Arboretum (2) and Ezerce (1) in relation to the WWTP (4)

In the radius of 5 km, there are no other protected areas, no Natura 2000 sites identified, and no important areas for birds, plants and butterflies. The area is not included into the National Emerald network of protected areas.

The Consultant has also collected additional information on the natural values of "Ostrovo" and included this information in Appendix **Error! Reference source not found.**. The listed flora and fauna species have also been screened against the Habitat Directive, Birds Directive, IUCN global list and Bern Convention.

The Consultant's environmental experts observed the area by walking all around the location of Ostrovo, determining flora and fauna species through semi-transects[13] and sample counts. Ornithofauna was determined by using binoculars, observing of the nests and by listening to the characteristic sound of some species. During the site visit, plenty of units of invasive species *Robinia pseudoacacia* - Black locust were found along the Arboretum site. One plant species (*Fraxinus excelsior* - European ash) from the IUCN list was found.

Some of the found fauna species are species requiring special protection measures, such as:

- *Podarcis muralis (*Common wall lizard*)* from Annex IV[14] of the EU Habitat Directive and Annex II[15] of the Bern Convention
- *Podarcis tauricus (*Balkan wall lizard*)* from and Annex II of the Bern Convention
- *Garrulus glandarius* (Eurasian jay) from Annex II, Part B[16] of the Birds Directive and Annex III[17] of the Bern Convention
- *Oriolus oriolus* (Eurasian golden oriole) from Annex II of the Bern Convention
- *Carduelis carduelis* (European goldfinch) from Annex II of the Bern Convention
- *Sciurus vulgaris* (Red squirrel) from Annex III of the Bern Convention.

Landscape	The description of the landscape in the project area is based on a desk study and site visits conducted in July and August 2018. The area is characterised by lowland relief with the lowest elevation in the Municipality of Gazi Baba, thus providing gravity wastewater flow. Therefore, the location is the most suitable for collection of the urban wastewater from the City through a gravitation system and construction of the WWTP on this location in order to reduce operational costs. 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.
Ecosystem services	The ecosystem services at the area aimed for construction of the WWTP for the City of Skopje 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 (within approx. 1 km) are as follows (see map below for spatial reference): *Air distance* *Direction* *Neighbourhood*

[13] The Project team managed to undertake semi-transects since some of the locations were unreachable
[14] Animal and plant species of community interest in need of strict protection
[15] Annex II - Strictly protected fauna species
[16] Annex II, Part B - The species listed in Annex II may be hunted under national legislation. Member states shall ensure that the hunting of these species does not jeopardize conservation efforts in their distribution area. The species referred to in Annex II/B may be hunted only in the member states in respect of which they are indicated.
[17] Annex III - Protected fauna species

Issue	*Updated baseline information*

400 m	North	Three small dislocated clusters of houses in **Vardarishte** neighbourhood
650 m	North	Remaining part of **Vardarishte** neighbourhood
700 m	West	**Gorno Lisiche** neighbourhod
1100 m	Northeast	**Ergele** neighbourhood (part of Trubarevo settlement)

- **Vardarishte neighbourhood:**

Three small clusters of houses (2+3+3 houses) in the dislocated part of the neighbourhood are inhabited by Roma people. According to information obtained through interviews with the families living in these houses in August 2018, their main sources of livelihood include livestock keeping, collecting and selling recyclable waste and salaries.

The remaining part of the neighbourhood is dominantly urbanised and consists of approx. 100 houses. Roads are asphalted. According to information obtained through interviews with three resident families, the main sources of livelihood are salaries, pensions, and/or individual business.

- **Gorno Lisiche neighbourhood:**

  Gorno Lisiche is a suburban neighbourhood on the outskirts of the City, with 18,233[18] inhabitants, consisting mainly of individual houses. Roads are asphalted. The main sources of livelihood are salaries. A small number of families are involved in small-scale agriculture (individual greenhouses) on the right side of the Vardar River.

- **Ergele neighbourhood:**

  Ergele neighbourhood, consisting of approx. 40 houses, is part of the Trubarevo settlement. According to information obtained through interviews with two resident families, there is significant number of Roma households (speaking Albanian language). Some houses were noticed to be closed and uninhabited due to emigration to Germany, France and Italy. The main sources of livelihood are salaries, pensions, individual businesses, collecting and selling recyclables, and earnings sent by family members working abroad. There are no significant agriculture activities conducted by the residents of this neighbourhood.

Other settlements surrounding the WWTP are as follows (see map below for spatial reference):

1400 m	*Northwest*	*Madzari - Kvantashki neighbourhood*
1450 m	*Northeast*	*First houses of the main part of the village/rural settlement Trubarevo*
1500 m	*North*	*Hipodrom neighbourhood*

The following map shows the above mentioned neighbourhoods:

[18] Population and Dwellings Census, 2002

Issue	*Updated baseline information*
	 *Legend*: **1.** WWTP site **2/3/4.** Three small dislocated clusters of houses in Vardarishte **5.** Vardarishte **6.** Kvantashki (part of Madzhari) **7.** Ergele (part of Trubarevo) **8.** Headquarters of the company Fakultetsko Zemjodelsko Stopanstvo Trubarevo AD **9.** Remaining part of Trubarevo **10.** Gorno Lisiche **11.** Hipodrom
Cultural heritage	No additional information on cultural heritage is needed compared to the level of information given in the ESIA.