





Table 41 Assessment of environmental impacts from the WWTP in Skopje City

Assessment of Environmental Impacts from the Waste Water Treatment Plant in Skopje City

Construction phases-identification of the impact of the construction activities on the physical environment, socio-economic life and public health of Skopje City citizens

Environment	Type of the Impact	Positive (+) or Negative (-)	Magnitude	Extent/Location/Where the Impact Occurs	Timing when Impact Occurs	Duration of an Impact	Reversible/ Irreversible	Likelihood of an Impact	Significance
Physical/Natural Environment									
Topography and geology	direct	negative	medium	area	immediate	short-term	reversible	probable	local
Bottom Elevation	direct	negative	low	area	immediate	short-term	reversible	probable	local
Hydrological situation-quantities, flows or levels of rivers, lakes, etc...	direct	negative	low	area	immediate	short-term	reversible	probable	local
Wildlife and Ecosystem	direct	negative	low	area	immediate	short-term	irreversible	unlikely	local
Metecology	direct	negative	low	area/volume	immediate	short-term	irreversible	probable	local
Landscape and visual environment	direct	negative	low	area/volume	immediate	short-term	irreversible	probable	local
Exhaust or fumes (land use)	direct	negative	high	area	immediate	long-term	irreversible	certain	local
Sensitive areas	indirect	negative	medium	volume	immediate	short-term	reversible	probable	local
Site-quantities, humidity, stability or credibility of soils	direct	negative	low	area	delayed	short-term	irreversible	unlikely	local
Water and energy resources	direct	negative	medium	area	immediate	short-term	irreversible	probable	local
Climate and Global Warming	indirect	negative	low	area/volume	delayed	medium-term	irreversible	probable	national
Water quality	direct	negative	high	area/volume	immediate	short-term	reversible	certain	local
Soil pollution	cumulative	negative	low	dispersion	delayed	long-term	reversible	probable	local
Noise (construction)	direct	negative	high	area/volume	immediate	long-term	reversible	certain	local
Vibration	direct	negative	high	area/volume	immediate	long-term	irreversible	certain	local
Electromagnetic									
Ground subsidence									
Climate risks									
Voluntary resettlement and Land acquisition	direct	negative	low	area	immediate	long-term	irreversible	certain	local
Local decision-making	indirect	positive	low	dispersion	delayed	long-term	reversible	certain	local
Institutional services	direct	positive	high	dispersion	immediate	long-term	reversible	unlikely	local
Health and safety	direct	positive	high	dispersion	immediate	short-term	reversible	certain	local
Cultural/historical heritage	indirect	positive	high	area	immediate	short-term	reversible	unlikely	local
Local conflicts of interest	direct	negative	low	area	immediate	short-term	reversible	unlikely	local
Gender/Children's rights	direct	negative	low	area	immediate	short-term	irreversible	probable	local
Infectious diseases	indirect	negative	low	dispersion	delayed	short-term	reversible	unlikely	local
Employment and quality of employment	direct	positive	high	dispersion	immediate	medium-term	reversible	certain	national
Demography	indirect	positive	medium	dispersion	delayed	short-term	reversible	probably	national
Economy/development	indirect	positive	high	dispersion	delayed	short-term	reversible	certain	national
SHES	indirect	positive	high	dispersion	immediate	short-term	reversible	certain	national
Farming/Community development									

Legend: +/level of categories:  
 Magnitude: High, Medium, Low  
 Extent: Location-Area, Volume, Dispersion  
 Timing: Immediate, Delayed  
 Duration: Short-term, Medium-term, Long-term  
 Reversibility: Reversible, Irreversible  
 Likelihood of an Impact: Certain, Probable, Unlikely  
 Significance: Local, Regional, National, Transboundary, Global  
 Impact Score: A-: Large Impact; B: Medium Impact; C: Uncertain Impact; No Score Me or negligible impact

The assessment of the environmental impacts from the WWTP in Skopje City was done using several criteria in order to identify the *significance of the impact* taking into account following impact parameters: *the type of impact* (if it has a direct or indirect effect), *magnitude* (low, medium, high), *extent or location where the impact occurs* (area, volume or dispersion of effect), *timing when the impact occurs* (immediate or delayed), *duration of the impact* (if it is a short-term, medium-term or long-term impact), *reversibility of the impact* (reversible or irreversible), *likelihood of an impact* (certain, probably or unlikely to happened) and *the border of significance* (if the impact has global, transboundary, regional or only local significance with it's effects).

The evaluation of the impact of the project activities on the all environmental, health and social/economic elements using above mentioned criteria and parameters was done for both construction and operational phase. Upon the evaluation of the impact parameters, the impact score was identified by the Consultant Team for each affected element.

The Consultant Team prepared the Table 41- Assessment of Environmental impacts from the Waste Water Treatment Plant in Skopje City addressing the significance of the impact to each of the affected element both in positive or negative manner.

The impact score was scaled from No impact, Negligible impact, C(low impact), B(medium impact) and A (large-adverse impact).

In the WWTP construction phase the adverse impact will occur on existing or future land use during the expropriation of the land from the private owners and on generation of the inert waste during the construction works.

The medium negative impact will occur based on the changes of the landscape and visual environment, usage of water and energy supply during the construction works, generation of the noise and vibration from equipment and vehicles used and air pollution caused by emissions from vehicles and construction machinery.

The airborne dust will be caused by excavation, vehicle movement and materials handling, particularly downwind from the construction site.

The traffic congestion will be caused by pipeline construction and increased construction traffic in urban part of Skopje City. Roads may be fully or partially closed during construction, causing temporary inconvenience to residents, commercial operations and institutions.

The impact on archaeological and cultural sites has not been expected due to the fact that the location for collector system is already urbanized area and we suppose that the investigations have been carried in the past. If some archaeological rarity show up during the construction works, the stopping of the

construction work should be done and the responsible authorities should be informed.

The construction works (noise and vibration, new road construction) would affect the Hunting area (The proposed land for WWTP and all facilities are the protected Hunting Area) with direct impact on species movements and decreasing of the hunting activities. Within Hunting Area there is an Arboretum near by the WWTP location with more than 100 different trees for research and educational purposes. The direct impact on the Arboretum is not expected.

There is possible impact of the project activities both in construction and operation phase on workers health and safety, so the special measures should be taking into account to provide the workers protection.

The project activities within the construction phase have large positive impact on social and economic elements like: development of the small and medium enterprises which will provide different sub-contractor services to the investor, new employment opportunities for various population groups and strengthening the institutional (communal – Public Communal Enterprise “Vodovod I kanalizacija” and energy supply) services at local –municipality and vertical (municipality-City of Skopje) level. The positive impact could be expected at the strengthening and good cooperation (based on strong agreement) between all decision-making groups (different affected municipalities, members of Municipality Councils, urban planners, environmental NGOs, etc.).

As it is the large scale project, the representatives from all affected municipalities should take active participation within the decision-making process at all project phases (preinvestigation, issuing permits and license for construction works, operation of the WWTP and all service facilities). Also each municipality should take active role for the public awareness and discussion with their citizens about the benefits of the project, schedule of project tasks, mitigation measures that would be applied and willingness to pay the communal taxes issues.

The WWTP operational phase will cause the large adverse impact on the energy consumption due to the large demand for equipment energy supply, generation of the sewage sludge and other waste from the primary treatment and the offensive odors (containing reduced compounds such as hydrogen sulphide and oxidized compounds as aldehydes) from the facility. Less impact will be cause to the air quality due to increase levels of exhaust and suspended particulates in the air as well as from emissions of combustion gases from transport of the sludge.

The construction and operation (including the maintenance costs also) of the WWTP will increase the communal and water supply fee affecting the household budget for all citizens of Skopje City. Especially the social vulnerable groups will be affected by increasing the fees due to the fact that at the moment they are not able to pay these fees.

The willness to pay campaign should be performed in parallel with the construction of the WWTP presenting the positive impact of the WWTP on the water quality and indirectly to public health and safety including the improvement of farming and community development.

The construction and operation of the WWTP will significantly reduced the direct discharge of untreated waste water contributing to the long-term improve of the waste water discharged to Vardar River and improvement of ground water. The WWTP development should be done according the requirements of the national standards (they are in process of preparation and adoption transposing the EU legislation into the national legislation) as well as EU Urban Waste water Directive (EU Directive 91/271/EEC amended with Directive 98/15/EC and Regulation (EC) 1882/2003. It will ensure compatibility with the Vardar River transboundary (Macedonia-Greece) water management and water quality. The WWTP operation will positively affect the welfare of people through the new employments, decreasing the health care costs for water borne diseases and improvement of the agriculture through providing the clean ground water for irrigation.

Also, the construction of the collection sewage network will improve the living conditions (sanitation and hygiene for residents) through the decrease in number of already existed sewage pits where currently the sewage network is missing.

### 3.1 Alternatives

In this survey the three alternatives proposed within the "Wastewater, Water Quality and Solid Waste Management of Macedonia – Wastewater Management System Skopje" (Kruger Study, 1999) were taken into account during the process of identification the WWTP construction and operation activities and significant environmental impacts. The zero alternative has been analyzed as a basic as usual scenario that will happened if there is no WWTP project development for Skopje City urban waters.

#### 3.1.1 Alternative I

The Alternative I comprises a 100% centralized solution, in which all wastewater is carried to the designated location of the Central Wastewater Treatment Plant at the left bank just downstream of the present urban area in Trubarevo settlement. This Alternative has been shown in Figure 15.

The advantages of the centralized solution are:

- Centralized operation and maintenance – increased operational effectiveness. Besides the treatment process itself it also refers to the handling and disposal of process residues like sand, solid waste and sludge;
- Environmental impact of WWTP limited to one central location only ;
- Ease of monitoring and quality control, as well as of self monitoring required by the IPPC, Urban Wastewater Treatment and Sludge Directives;

- Competent operator (Public Communal Utility - Vodovod I Kanalizacija) with sufficient capacities and technical staff;
- High environmental effectiveness.

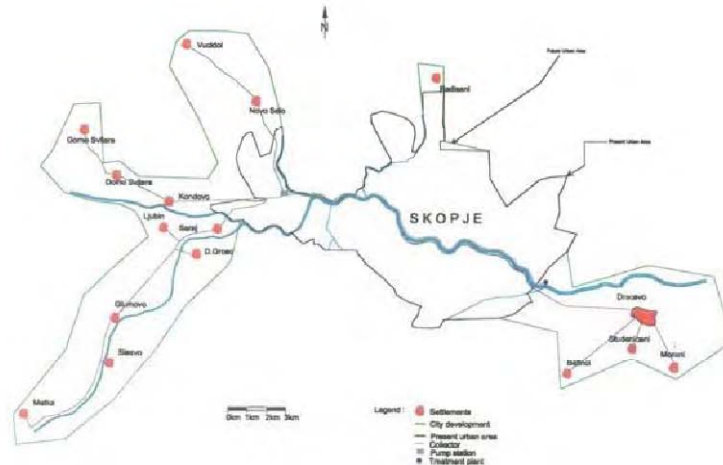


Figure 15 The map of the alternative I

The feasibility studies elaborated until now envisage connection of the two rural areas (Saraj incl. Kondovo and Novo Selo) adjacent to Skopje City to the wastewater collector. This design requires construction of two siphons across Vardar River.

Drawbacks of Alternative I in technical & environmental terms are the following:

- Extensive sewerage network/collectors carrying water to the WWTP (eg. more than 30 km, from Matka). Long sewer lines may lead to production of hydrogen sulfide ( $H_2S$ ), a colorless, toxic and flammable gas is responsible for the foul odor of rotten eggs and flatulence. It often results from the bacterial break down of organic matter in the absence of oxygen in sewers. The process of uncontrolled anaerobic digestion produces methane and carbon dioxide rich biogas – increasing the overall GHG emission. As methane is about twenty times more potent as a greenhouse gas as carbon dioxide this may have significant negative environmental effects;
- Increased diameter of the collectors – right side;
- Construction of two serious infrastructural components – siphons across Vardar River. These require serious attention – as Vardar River has to be partially impounded in the construction phase. In the operation phase, depending on the technical design, it may require pumping, and hence, increased energy consumption;
- Limited flexibility – the treatment relies on one plant only. It may be significant in extraordinary circumstances – failures, breakdowns or natural disaster situations. This may however, be easily overcome by including safety features & standby capacities the design of the WWTP.

In 2007 the Feasibility Study for preparation of project documentation for construction of sewerage and waste water treatment in Municipality of Saraj was managed by REC Country Office Macedonia providing several alternatives as solutions for waste water treatment from Saraj municipalities. It means that Saraj and Novo Selo municipalities will solve the waste water treatment problems separately from urban part of Skopje City and the Alternative 1 proposed by Kruger Study will be rejected.

### 3.1.2 Alternative II

The Alternative II (Figure 16) includes the WWTP in Trubarevo for treatment of the waste waters from the urban part of Skopje City and Dracevo settlement only, taking into account that there will be separate WWTPs for Saraj and Novo Selo settlements. As it looks as a feasible solution at this moment and the Master Basic Plan has been prepared for this project, the Consultant Team has analyzed this project alternative in more details. The full analysis on interactions of project activities/actions with different environmental elements and the impact assessment was carried out for this alternative.



Figure 16 The map of the alternative II

The main disadvantages of this alternative are:

- The need for a large-scale WWTP that will have to accommodate and treat wastewaters from the major part of the population in the area;
- The settlements like Ilinden, Aracinovo and many others are not included in the system;
- There is a need for separating of storm water and industrial wastewaters from the system;
- The adverse impacts will occur on existing or future land use during the expropriation of the land from the private owners, generation of the inert waste during the construction works;
- During the operational phase the adverse impact on environment will occur due to the generation of the sewage sludge and other waste from the



primary treatment and the offensive odors from the facility as well as the huge energy consumption for equipment energy supply;

But the Alternative II has also very positive impact on different environmental elements like:

- Significantly reduced the direct discharge of untreated waste water (communal and industrial) contributing to the long-term improve of the waste water discharged to Vardar River;
- Shorter length of the sewage network (around 20 km) compare with Alternative I;
- Positively affect the welfare of people through the new employments, decreasing the health care costs for water borne diseases and improvement of the agriculture through providing the clean ground water for irrigation;
- Ease monitoring and quality control at the on-site laboratory and the responsible institutions.

### 3.1.3 *Alternative III*

Alternative III incorporates the following attributes opening the discussion about the future development prospects:

- a) Multiple smaller separate WWTPs for left and right banks of the River Vardar that will include the present sewerage systems of Saraj, Novo Selo, Ilinden, Aracinovo, Dracevo, Madzari, and others that still do not have such systems;
- b) One central WWTP for the central urban region of Skopje city at Trubarevo;
- c) Separation systems for storm waters, industrial waters and domestic sewage;
- d) Multiple treatment systems of the WWTP that will include aerobic and anaerobic treatment methods as III and IV stage after physical and chemical treatment of the water;
- e) Introduction of ERM systems (Eco Remediation Systems) via constructing of the wetlands for the domestic or industrial sewage that is left outside the sewerage systems.

This alternative is minimizing the impacts on the environment coming from extensive work on sewerage network, over passing the River Vardar, construction of very large WWTP what will represent the environmental hazard during the construction phase but also during the operation phase, and finally this system will include the wastewaters from the settlements that are still outside the sewage system.

Incorporation of anaerobic treatment in the system and especially ERM methods will significantly decrease the emission of pollutants to air, water and groundwater, while in the same time enabling the remediation of already destructed habitats, creation of new jobs and economical benefits coming from the treatment process like biogas or organic manure for agriculture.

Finally, postulation of a system based on multiple small WWTPs with projected capacity will enable more comprehensive treatment of smaller quantities of wastewater, will be able to follow the changes in the population densities in smaller areas, and will not represent a major environmental damage and hazard either during construction or operation.

For sure the full impact assessment for this alternative should be performed in order to identify all interactions between the construction and operational phase activities with environmental elements affected, especially the basic concept on decreasing the impact on environment with localization of the impact on one site and difficulties with operation, maintenance and management of several WWTPs.

#### **3.1.4 No Project (Zero) Alternative**

The No Project Alternative would result in the proposed WWTP project not being constructed and would avoid construction and operation related impacts.

The future urbanization and population growth and rapid industrialization of Skopje City and surrounding settlements will result in increasing volumes of untreated domestic and industrial wastewaters being discharged into Vardar River. The current problem with discharging the un-treated communal and industrial waters into Vardar River and adverse impact on environment and human health that was identified several years ago still is one of the "hot spot" in water management in Macedonia.

The polluted surface water quality would continue to affect the ground water, threatening irrigation activities and drinking water safety (taken from the ground waters) affecting the health of urban and rural residents. The downstream water quality will be affected due to the fact that Skopje City is the most populated and industrialized town on national level. The quality and yields of agricultural land and products will be reduced. The quality of life and the standard of living of residents of the proposed project area will deteriorate. The impose to the different water borne diseases will continue and the costs for health care will increase rapidly. The aquatic life will be damaged as well as area's ecosystem.

The opportunities for local municipalities (Gazi Baba, Centar, Karpos, Kisela Voda) to carry out sustainable economic development will be diminish taking into account the small and medium enterprises development.

The Vardar River is the transboundary water body that has been shared between Macedonia and Greece, so the river water quality is one of the essential environmental issue discussed with our neighbors during the transboundary water management negotiations.

In 2005 Macedonia has granted EU candidate status and a condition for EU membership is that the candidate country aligns its national legal system with EU legislation. The transposition of the EU water related directives has been started and the provisions from all WWTP related EU Directives (EIA Directive, IPPC

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Directive, Urban Waste Water Directive, Sewage Sludge Directive and others) should be approximated into the primary and secondary legislation. So, the pressure from legal obligations on national and transboundary level will be very strong and the No project Alternative seems not realistic any more.

The comparison between the Alternative II and Zero Alternative refer to the impact assessment on different environmental elements has been given at the Table 42/

Table 42 Comparison between the alternative II and Zero alternative impact assessment

Environmental Element	ALTERNATIVE II		ZERO ALTERNATIVE
	Construction phase	Operation phase	
<b>Physical / Natural Environment</b>			
Topography and geology	No impact	No impact	No impact
Groundwater	C (-)	A (+)	A (-)
Bottom Sediment	Negligible impact	Negligible impact	No impact
Hydrological situation-quantities, flows or levels of rivers, lakes, etc..	No impact	Negligible impact	No impact
Wildlife and Ecosystem	Negligible impact	B (+)	A (-)
Meteorology	No impact	No impact	No impact
Landscape and visual environment	B (-)	Negligible impact	No impact
Existing or future land use	A (-)	Negligible impact	No impact
Sensitive areas	B(-)	C(+)	No impact
Soils-quantities, humidity, stability or erodibility of soils	Negligible impact	Negligible impact	No impact
Water and energy resources	B (-)	A (-)	No impact
Climate and Global Warming	Negligible impact	C (-)	No impact
<b>Public Hazardous Elements</b>			
Air quality	C (-)	B (-)	No impact
Water quality	No impact	A (+)	A (-)
Soil pollution	Negligible impact	C (-)	A (-)
Waste (construction)	A (-)	Negligible impact	No impact
Waste (solid liquid)	C (-)	A (-)	No impact
Noise and Vibration	B (-)	C (-)	No impact
Electromagnetic	No impact	Negligible impact	No impact
Ground subsidence	No impact	No impact	No impact
Offensive odors	No impact	A (-)	No impact
<b>Social Environment</b>			
Involuntary resettlement and Land acquisition	C (-)	No impact	No impact
Livelihood and local economy	B (+)	A (+)	A (-)
Social institutions	Negligible impact	Negligible impact	No impact
Local decision-making institutions	A (+)	B (+)	
Institutional services	A (+)	A (+)	No impact
Health and safety	C (-)	B (+)	A (-)
Housing conditions	B (+)	B (+)	A (-)
Socially vulnerable groups	No impact	B (-)	No impact
Cultural, historical heritage	No impact	No impact	No impact
Local conflicts of interest	C (-)	C (-)	No impact

Environmental Element	ALTERNATIVE II		ZERO ALTERNATIVE
	Construction phase	Operation phase	
Water use	C (-)	A (+)	A (-)
Gender, children's rights	No impact	No impact	No impact
Infectious diseases	Negligible impact	C (-)	A (-)
Employment and quality of employment	A (+)	B (+)	B (-)
Demography	No impact	Negligible impact	No impact
Economy development	B (+)	A (+)	A (-)
SMEs	A (+)	B (+)	A (-)
Farming/Community development	No impact	A (+)	A (-)

Impact Score: A- Large impact; B-Medium impact; C-Uncertain impact; No or negligible impact

(+) positive impact; (-) negative impact

### 3.2 Mitigation measures, Monitoring Plan and Institutional arrangement

The main purpose of the EIA process is to identify potentially significant adverse impacts at the early planning stage and to propose mitigation measures and monitoring plan for overall monitoring of the implementation of mitigation measures and project results.

The mitigation measures propose the implementation of decisions or activities designed to prevent, reduced, remediate or compensate the impacts on different environmental elements through all phases of the project development (design, construction, operation and decommissioning phase). All these decisions and activities need to be recommended within the Management Plan for Mitigation and Monitoring as a part of the EIA Study as a necessary elements of environmentally sound project design. The Management Plan should recommend feasible and cost-effective measures to prevent or reduce significant adverse impacts to acceptable level, to estimate the impacts and costs of the proposed measures and institutional and training requirements to implement the measures.

The Consultant Team has already performed the impact assessment of the WWTP project (construction and operational phase) identifying those environmental elements affected by the significant impact from various project activities (shown at Table 41).

The Table 43 with proposed mitigation measures for the project development and operation has been designed and fulfilled pointed out the environmental elements affected by the contraction /operational activities with significant impacts, mitigation measures, mitigation strategy and responsible institution to perform the proposed measures.

The Table 43 shows the specific mitigation measures for WWTP for Skopje City.

In general term the recommendations for the overall assessment and mitigation measures could be summarized with the following:

- The environmental aspects have to be taken into account from the start of the design of the project;

- The best available technology for operation and control of the WWTP should be applied;
- The technology should comply with the stringent requirements of both national and EU standards;
- The effective industrial pre-treatment program should be made in accordance with the national legislation based on EU Directives requirements (especially on IPPC, Urban Waste Water, Sewage Sludge disposal and generally waste water management);
- The monitoring should be applied to the detailed design and construction of the WWTP to ensure that work is carried out to high construction standards;
- The good working practices on all contractors should be imposed to minimize noise and vehicles emissions, minimize traffic and keep the site as clean as possible during the construction phase;
- The construction supervision engineer should duly consider environmental aspects during construction works;
- The good construction inspection practices and good environmental management should be placed to ensure that the WWTP and collector systems are built to specifications;
- The environmental training programme before construction begins should be held for all contractors and construction supervisors;
- The set-up of the strong institutional support for proper continuous operation and maintenance of the WWTP ensuring the adequate budget for spare parts, laboratory equipment and chemicals, trained technicians, specialized technical assistance;
- The construction should be immediately suspended if any archaeological or cultural rarities are found.

The aim of the Monitoring Plan is to assess the overall implementation of the proposed mitigation measures. The crucial environmental elements that should be monitored during the construction and operation phases of the WWTP project are:

- Water (Ground water, Industrial waste water, Urban waste water entering WWTP, Discharge water from WWTP to receiving waters);
- Air emissions and air quality (Including the odour occurred);
- Noise and vibration;
- Waste (Hazardous waste, Inert waste, Sewage Sludge);
- Soil quality;
- Health and Safety

The monitoring plan has been given in Table 44.

The detailed Monitoring Programme should be defined in the full EIA Study that will evaluate the extent and severity of environmental impacts compared to the predicted impacts and performance of the environmental protection measures and compliance with related national and international technical standards.

Table 43 Mitigation measures

Environmental Elements	Construction/Operation Action/activity	Impact during Construction phase	Impact during Operational phase	Mitigation measures	Mitigation strategy	Responsible institutions
Physical / Natural Environment						
Groundwater	During construction of collector pipelines local disturbances of groundwater table can be expected. Also some pollution due to leakages during pipelines re-connection & reconstruction.	C (-)	A (+)	Planning & organization of construction works should ensure minimization of leakages of polluted wastewater to groundwater.	Good planning and organization of construction works.	<ul style="list-style-type: none"> <li>Supervising Engineer</li> <li>Designer</li> <li>Contractor</li> </ul>
Landscape and visual environment	Disturbances during construction phase are inevitable – however short term. Operation phase: WWTP	B (-)	Negligible impact	Good construction practices have to be implemented – including fencing and protection of building sites according to positive national legislation. The design of large infrastructure objects (WWTP, pumping stations, etc...) should be made in most environment friendly way and by implementing BAT for this types of structures.	Architectural design of the WWTP to be appropriate to the conditions of the selected location	<ul style="list-style-type: none"> <li>Employer (VfK)</li> <li>Designer – Architecture</li> <li>Design reviewer</li> </ul>
Sensitive areas	Disturbances during construction works with land use, occupation of the land, noise and vibration, construction of new roads will affect the Hunting Area (the location of the WWTP is within the protected Hunting Area).	B (-)	C (+)	Good construction practices have to be implemented – including fencing and protection of building sites according to positive national legislation. The noise and vibration mitigation measures should be applied.	Minimize or Diminish effect	<ul style="list-style-type: none"> <li>Investor</li> <li>Procurement Department at Skopje City Authority</li> <li>State and Municipality Environmental Inspectorate</li> <li>Ministry of Agriculture, Forestry and Water Economy-Department for Hunting</li> </ul>
Existing or future land use	Land use change at the location of WWTP and the (new) sewage sludge landfill are inevitable.	A (-)	Negligible impact			<ul style="list-style-type: none"> <li>Employer (VfK)</li> <li>Designer – Architecture</li> </ul>

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Environmental Elements	Construction/Operation Action/activity	Impact during Construction phase	Impact during Operational phase	Mitigation measures	Mitigation strategy	Responsible institutions
Water and energy resources	Increased consumption of energy during construction and especially operation phase.	B (-)	A (-)	Energy (electricity) Design of the technological process should provide as much use of gravity flow as possible. Equipment & machines and technology selection should also include 'energy efficiency' as selection criterion. Monitoring of process performances to be installed & used for adjustments and improvements. Maintenance plan for the equipment to be prepared and duly implemented.	ToR for the main design of the WWTP include 'energy efficiency' as one of the main criteria ToR to favor use of renewable energy – possibly biogas from own process	<ul style="list-style-type: none"> <li>Employer (VIK)</li> <li>Designer – Technology</li> </ul>
Climate and Global Warming	Construction phase – negligible impact. Operation phase – increased emission of GHG.	Negligible impact	C (-)	Minimize emissions of GHG from the technological processes – treatment. Possible measure – construction of system for collection and storage of emitted gas. Biogas may be used in the process, either as generated electricity or directly for heating and drying processes. To be analyzed in detail during elaboration of main design. Application of BAT for sludge treatment, transport and deposition at landfill.	Collection and storage of biogas emitted in the technological processes. Use of gas for own energy needs. BAT application for sludge treatment	<ul style="list-style-type: none"> <li>Employer (VIK)</li> <li>Designer – Technology</li> </ul>
Public Hazardous Elements						
Air quality	The construction activities will initiate gases emissions of dust-suspended particulates (PM <sub>10</sub> , PM <sub>2.5</sub> ), emissions from the mobile sources (vehicles and construction machinery) of CO <sub>2</sub> , NO <sub>x</sub> , PAH, SO <sub>2</sub> . The airborne dust will be caused by excavation, vehicle movement and materials handling, particularly downwind from the	C (-)	B (-)	The mitigation measures to minimize dust generation during construction will included: <ul style="list-style-type: none"> <li>Construction site, transportation routes and materials handling sites should be water-sprayed on dry and windy days, especially near residential areas (urban part of Skopje);</li> <li>Vehicles and construction machinery will be required to be</li> </ul>	Minimize or Diminish effect	<ul style="list-style-type: none"> <li>Investor</li> <li>Subcontractors</li> <li>Operator of the WWTP</li> </ul>

Environmental Elements	Construction/Operation Action/activity	Impact during Construction phase	Impact during Operational phase	Mitigation measures	Mitigation strategy	Responsible institutions
	<p>construction sites.</p> <p>The operation activities will cause emissions into air from energy sources (GHGs-methane) and digesters for activated sludge.</p> <p>The toxic gases and vapors emitted during the waste water treatment will be present as a result of chemical and biological processes in the sewer and at the WWTP. (hydrogen sulphide as the most important toxic gas considered). These gases could accumulate in long-distance trunk sewers resulting in structural damage, sewer leakage.</p> <p>Traffic congestion will be caused by collector system construction and increased construction traffic in urban part of Skopje. Roads may be fully or partially closed during construction causing temporary inconvenience to institutions and residents.</p>			<p>properly maintained and to comply with relevant emission standards;</p> <ul style="list-style-type: none"> <li>➤ Construction materials should be stored in appropriate places covered to minimize dust;</li> </ul> <p>The measures for avoidance and minimization of impact from the corrosive and toxic gases are:</p> <ul style="list-style-type: none"> <li>➤ Inspection of potential sources;</li> <li>➤ Reasonable spacing between manholes to allow access and sampling to track sources;</li> <li>➤ Implementation of the emergency response plans if the accident occurs;</li> <li>➤ The hydrogen sulphide could be reduced by local ventilation system.</li> </ul>		
Soil pollution	<p>The negligible impacts on soil arising from WWTP development construction activities and low impact during the operation phase. The compaction of soil can be expected due to vehicle movement, ground contamination from the spillage of materials such as vehicle fuel, sewage sludge, construction waste, chemicals.</p>	Negligible impact	C (-)	<p>The possible mitigation measures for minimization of the soil pollution are:</p> <ul style="list-style-type: none"> <li>➤ Transportation vehicles should be enclosed to avoid potential leakage;</li> <li>➤ Promptly clean-up spills of transported material on public roads;</li> <li>➤ Restriction of the amount of heavy metals intended to be disposed on the agricultural land according to the national and international standards.</li> </ul>	<p>Minimize or Diminish effect</p>	<ul style="list-style-type: none"> <li>• Investor</li> <li>• Subcontractors</li> <li>• WWTOperators</li> <li>• Accredited laboratories</li> </ul>



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Environmental Elements	Construction/Operation Action/activity	Impact during Construction phase	Impact during Operational phase	Mitigation measures	Mitigation strategy	Responsible institutions
Waste (construction)	<p>During the construction phase there are several actions that effect waste generation – inert waste, communal and commercial waste. The inert waste will be generated by the construction works, the temporary accommodation of workers and administrative work will cause municipal waste that can be disposed on Drisla Landfill.</p> <p>During the WWTP operation only communal and commercial waste can be expected</p>	A (-)	Negligible impact	<p>The good waste management practice should be applied including:</p> <ul style="list-style-type: none"> <li>➢ The contract with the company for waste collection and transportation should be signed for collection and transport of waste to the Drisla Landfill or the Landfill for inert waste (nowadays it is not exist);</li> <li>➢ The construction waste should be promptly removed from the site;</li> <li>➢ The materials should be covered during the transportation to avoid waste dispersion;</li> <li>➢ Burning of construction waste should be prohibited;</li> <li>➢ Internally (at the WWTP site) the first selection should be performed by types of waste: PET bottles, paper, batteries and glass;</li> <li>➢ Possible hazardous waste from the laboratory should be collected separately;</li> <li>➢ The identification of the type of waste, quantity</li> </ul>	<p>Minimize or Diminish effect</p>	<ul style="list-style-type: none"> <li>• Investor</li> <li>• Subcontractors</li> <li>• WWTOperators</li> <li>• Accredited laboratories</li> </ul>
Sewage Sludge	<p>The technological process applied at the WWTP will generate dewatering sewage sludge. The type of the waste (non-hazardous or hazardous if contains the dangerous substances from the industrial waste waters) will be the criteria where to dispose the sludge- to the Drisla Landfill or other new</p>	C (-)	A (-)	<p>Preparation of the Sludge Disposal Management Plan.</p> <p>The Plan should be in line with the national legislation or technical standards already exist in EU (EU Directive on the protection of the environment and in particular of the soil when sewage sludge is used in agriculture (86/278/EEC).</p>	<p>Minimize or Diminish effect</p>	<ul style="list-style-type: none"> <li>• Investor</li> <li>• Subcontractors</li> <li>• WWTOperators</li> <li>• On-site laboratory</li> <li>• Accredited laboratories</li> </ul>

Environmental Elements	Construction/Operation Action/activity	Impact during Construction phase	Impact during Operational phase	Mitigation measures	Mitigation strategy	Responsible institutions
	special landfill for hazardous waste.			<p>The Plan should be based on the following issues:</p> <ul style="list-style-type: none"> <li>➢ Monitoring sludge quality (heavy-metals concentrations in sludge);</li> <li>➢ Identifying land for disposal taking care on the concentrations of heavy metals in soil where the sludge is planned to be used;</li> <li>➢ Restrictions on amounts of metals which may be added annually to the land.</li> </ul> <p>The frequency for sludge analysis with sampling and analysis methods (soil sampling, sludge sampling and methods for analysis) should also be define into the Sludge Disposal Management Plan.</p>		
Noise and Vibration	The construction activities and traffic will cause noise and vibration due to the machinery and vehicles used for digging of the collector system and WWTP construction, transport of workers, transport of goods and materials. The potentially affected will be nearby residents (during the construction of collector system the urban part of	B (-)	C (-)	<p>The pre-treatment of the industrial waste waters should be established (according the IPPC permit) and the authorization for the discharges into urban sewage collecting systems should be entered into force (with adoption of the Draft Law on Waters)</p> <p>Due to the fact that the construction works for the collector system have to be done within the urban part of Skopje City, the noise control measures should be implemented to minimize impacts.</p> <p>Noise impact should be minimized by:</p> <ul style="list-style-type: none"> <li>➢ Limiting construction activities to the daytime only.</li> </ul>	<p>Minimize or Diminish effect</p>	<ul style="list-style-type: none"> <li>• Investor</li> <li>• Procurement Department at Skopje City Authority</li> <li>• State and Municipality Environmental Inspectorate</li> </ul>

Environmental Elements	Construction/Operation Action/activity	Impact during Construction phase	Impact during Operational phase	Mitigation measures	Mitigation strategy	Responsible institutions
	Skopje will be the most affected)			<ul style="list-style-type: none"> <li>➤ The selection of mechanical and electrical equipment with low noise level characteristics during tendering procedures;</li> <li>➤ Modification of the design specifications – low noise ventilation fans, pumps and electromotor drives;</li> <li>➤ Installation of noise enclosures or buffers</li> <li>➤ The equipment and machinery installed at the proposed WWTP would meet all national noise regulation for max. allowed noise levels at day and night time;</li> </ul>		<ul style="list-style-type: none"> <li>• V I K (Vodovod i Kanalizacija)</li> </ul>
Offensive odors	<p>Odour from a WWTP is caused by the presence of one or more compounds in sewage.</p> <p>Compounds such as sulphides, mercaptans, disulphate and volatile fatty acids are responsible for the odour. The gas phase of hydrogen sulphide is the most common cause of odour complaints and is generally formed in the sludge concentration area of the plant (digester and sludge dewatering unit). This area has low dissolved oxygen and the highest concentration of odour compounds. Hydrogen sulphide is the main cause of the "rotten egg" gas described as offensive and noxious by most people.</p>	No impact	A (-)	<p>The remedial measures to minimize the potential odor problem of the WWTP include:</p> <ul style="list-style-type: none"> <li>➤ To include the biofilters into the project design to capture and treat odour from the sludge concentrator process and dewatering units;</li> <li>➤ To control the odor sources;</li> <li>➤ To cover the sludge processing facilities;</li> <li>➤ To avoid storing dewatering sludge in the plant;</li> <li>➤ To create a greenbelt around the plant;</li> <li>➤ To plant of trees as much as possible</li> </ul>	<p>Avoid/Minimize impact/Minimize effect</p> <ul style="list-style-type: none"> <li>• Investor</li> <li>• WWTP Operator</li> </ul>	
<b>Social Environment</b>						

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Environmental Elements	Construction/Operation Action/activity	Impact during Construction phase	Impact during Operational phase	Mitigation measures	Mitigation strategy	Responsible institutions
Involuntary resettlement and Land acquisition	<p>The proposed land (37 ha) for the WWTP location in Trubarevo has been dedicated for the hydro system, around 30 ha are state owned and only around 6 ha of land belong to 4 private persons. The analysis of the cadastre information shows that the land proposed for collector system belong to state and also 84 private persons have the ownership on the land where the collector lines should be passed.</p> <p>The resettlement impacts has not been identified.</p>	C (-)	No impact	<p>The Acquisition Plan should be done identifying the follow issues:</p> <ul style="list-style-type: none"> <li>➢ Identification of the people affected by the acquisition of land;</li> <li>➢ People affected by the temporary use of land for the water pipelines and sewer construction;</li> <li>➢ The compensation according the legal framework;</li> <li>➢ Monitoring and evaluation of the land acquisition</li> </ul>	Provide Compensation	<ul style="list-style-type: none"> <li>• Investor</li> <li>• Ministry of Transport and Communication</li> </ul>
Change in land use and local resources	<p>The medium adverse impact could be occurred during the construction works on the land nowadays occupied with garden yards where the collector system should be placed. It is mainly into the urban part of Skopje in different municipalities.</p>	B (-)	B (+)	<p>The strong public awareness programme should be launched in order to inform the public about the project development activities, benefits of the project and compensation procedure.</p>	Provide Compensation	<ul style="list-style-type: none"> <li>• Investor</li> <li>• Ministry of Transport and Communication</li> </ul>
Health and safety	<p>The low adverse impact could occurred during the construction works for the workers and public.</p>	C (-)	B (+)	<p>In order to avoid and minimize the impact the following Health and Safety measures should be applied by the sub-contractors:</p> <ul style="list-style-type: none"> <li>➢ Security measures like: perimeter fence, life jackets, work in pairs on dangerous tasks, warning signs for the public around the construction site;</li> <li>➢ Maintain a good level of personal hygiene-have on site installations for washing, cleaning;</li> <li>➢ Health protection-first aid kits and medical service on sites</li> </ul>	Avoid impact/ Repair or Rehabilitation	<ul style="list-style-type: none"> <li>• Investor</li> <li>• Subcontractors</li> <li>• Vodovod i Kaalizaciona</li> </ul>

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Environmental Elements	Construction/Operation Action/activity	Impact during Construction phase	Impact during Operational phase	Mitigation measures	Mitigation strategy	Responsible institutions
Local conflicts of interest	The construction and operation phase of the WWTP and collector system can affect the interests of the local self-governments and the City of Skopje. The affected municipalities are: Centar, Kisele Voda, Karpos and Gazi Baba (especially Trubarevo settlement). All permits for construction and operation works should be obtained at the national and local level at all affected municipalities.	C (-)	C (-)	The strong agreement between all municipalities within Skopje (especially the affected ones) and Skopje City authority should be signed to avoid conflict of interest. As it is the large scale project, the representatives from all affected municipalities should take active participation within the decision-making process at all project phases. The perfect coordination between all authorities within the municipalities and City of Skopje authority on various day by day activities should be established.  Each municipality should take active role for the public awareness and discussion with their citizens about the benefits of the project, schedule of project tasks, mitigation measures...	Reduce or Eliminate over time	<ul style="list-style-type: none"> <li>Investor</li> <li>Mayors of the affected municipalities and Mayor of Skopje City</li> <li>Ministry of Local self-government</li> <li>Union for Local-self governments (ZELS)</li> </ul>
Infectious diseases	Very low impact on development of infectious diseases could be occurred during the operation in case of uncontrolled disposal of the sludge (development of insects). On other hand the waste water treatment facility will have a positive impact on the improvement of Vardar River water quality and consequently will decrease water borne diseases.	Negligible impact	C (-)	The mitigation measures are based on the implementation the Sludge Disposal Management Plan, good transport practice of the sludge, good environmental management at the project sites and WWTP during the operation.	Minimize or Diminish effect	<ul style="list-style-type: none"> <li>Investor</li> <li>WWTP Operator</li> <li>Sub-contractors</li> </ul>

Impact Score: A- Large impact; B-Medium impact; C-Uncertain impact; No Score-No or negligible impact

Mitigation strategy: Avoid Impact; Minimize or Diminish effect; Repair or Rehabilitation; Reduce or Eliminate over time; Provide Compensation

Table 44 Monitoring plan and Institutional arrangement

Elements to be monitored	Monitoring parameter/indicator	Frequency and duration of the monitoring	Institutional arrangement
<b>Water</b>	According to the Draft Law on Waters and the secondary legislation transposing the EU Water Framework Directive (2000/60/EC) and EU Groundwater Directive 2006/118/EC  Groundwater quantitative status – Groundwater level  Groundwater chemical status – Conductivity  pH value oxygen content nitrate ammonium Concentrations of pollutants	One sampling prior to installation of the WWTP; one sampling per year during the operation of the plant  According to the Draft Law on Waters and the secondary legislation transposing the EU Water Framework Directive (2000/60/EC) and EU Groundwater Directive 2006/118/EC	State Administrative Body for Water Management (The Ministry of Environment and Physical Planning according to the Governmental Decision dated April 2007) Municipalities and the City of Skopje/ Hydrological Monitoring network and Local Monitoring networks that should be established  Macedonian Environmental Information Center (collecting and analyzing the results and preparation of the reports)  Accredited Laboratories  * The secondary legislation should be prepared and adopted (transposing the EU related legislation) regulating the monitoring parameters, frequency and analytical methods for performing the ground water analysis
<b>Groundwater</b>	According to Urban Waste Water Directive (91/271/EC) and Draft Law on Water  At least the following parameters:  BOD <sub>5</sub> COD Total suspended solids  Other parameters monitored by the Laboratory at the Vodovod   Kanalizacionija: Nitrates Nitrites Ammonium	At the moment: According to the Programme of the Laboratory at Vodovod   Kanalizacionija	State Administrative Body for Water Management (The Ministry of Environment and Physical Planning according to the Governmental Decision dated April 2007)  Municipalities and the City of Skopje  Laboratory at Vodovod   Kanalizacionija/ WWTP Laboratory  Macedonian Environmental Information Center (collecting and analyzing the results and preparation of the reports)
<b>Urban Waste waters</b>			

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Elements to be monitored	Monitoring parameter/indicator	Frequency and duration of the monitoring	Institutional arrangement
	pH value Total N Total phosphorous Chloride Sulphates Phenols	According to the Draft Law on Waters and the secondary legislation transposing the EU Water Framework Directive (2000/60/EC) and Urban Waste Water Directive (91/271/EC)  The EU Directive on Urban Wastewater prescribes minimum 24 samples on annual level for WWTP above 50 000 p.e. for the first year of operation  According to the conditions within the IPPC permit	Accredited Laboratories  The secondary legislation should be prepared and adopted (transposing the EU related legislation) regulating the methodology, monitoring parameters, frequency and analytical methods for performing the urban waste water analysis  State Administrative Body for Water Management (The Ministry of Environment and Physical Planning according to the Governmental Decision dated April 2007)  Macedonian Environmental Information Center (collecting and analyzing the results and preparation of the reports)  Self-monitoring at the industry-site  Accredited laboratories
<b>Industrial waste water</b>	Depends on the type of industry  Required according to the IPPC permit and according to Law on Environment, Draft Law on Waters and technical standards given into the Urban Waste Water Directive (91/271/EC)	According to the Annual Programme of each responsible institution  The monitoring on meteorological parameters, SO <sub>2</sub> , NO <sub>2</sub> , NO, CO, O <sub>3</sub> , ozone and SPM is on-line and daily/monthly average value has been presented.	The national network of the Ministry of Environment and Physical Planning;  The network of the Public Health Institute (PHI) and its regional branches located in Skopje and major cities in the country;  The network of the Hydro-Meteorological Administration (HMA) under the Ministry of Agriculture, Forestry and Water Economy.  Macedonian Environmental Information Center (collecting and analyzing the results and preparation of the reports)
<b>Air quality</b>	According to Law on Ambient Air Quality  The following parameters have been monitored:  SO <sub>2</sub> NO <sub>2</sub> , NO <sub>x</sub> , NO CO O <sub>3</sub> -ozone SPM (suspended particulate matters (PM <sub>10</sub> /opt. PM <sub>2.5</sub> )) Acidity Black smoke Meteorological parameters Toluene, benzene, benzene, toluene, ethyl-benzene, orto-xylene, para-xylene Pb		
<b>Urban part of Skopje City during the WWTP construction phase</b>			

Elements to be monitored	Monitoring parameter/indicator	Frequency and duration of the monitoring	Institutional arrangement
Emissions from the WWTP and ambient air quality surrounding WWTP during the operation (Trubarevo, Madzari and Kisela Voda settlements)	According to Law on Ambient Air Quality and the Rulebook for the max. allowed concentrations to be emitted into the air  The WWTP should apply for the IPPC permit and the permit will dictate the emissions from the WWTP and dispersion of the air pollutants to the surrounding settlements  SO <sub>2</sub> NO <sub>x</sub> CO SPM CH <sub>4</sub> Hydrogen sulphide	According to the conditions within the IPPC permit	Self-monitoring at the WWTP  Macedonian Environmental Information Center (collecting and analyzing the results and preparation of the reports)  Accredited Laboratories  *The secondary legislation on the Limit values of certain pollutants into the air with margins of tolerance according to the EU Air Framework Directive and daughter EU Directives should be prepared and adopted
Odor		When needed if the plant is emitting noxious odors	Relevant research laboratory or state institution and the laboratory within the WWTP  Macedonian Environmental Information Center (collecting and analyzing the results and preparation of the reports)
Generation and disposal of the waste	According to the Law on Waste Management and the Hazardous Waste Directive (91/689/EEC)  Type of waste Quantity of waste Import/export and transport of waste Risk assessment of the waste to the environment Dangerous substances content	When the waste has been generated the identification should be done according to the List of waste (Off. Gaz. 100/2005)	Ministry of Environment and Physical Planning through the state monitoring network that should be established according to the Law on Waste  Accredited Laboratories  The WWTP Operator and the Mayor of the municipality should prepared the identification list with daily data on the type of waste, quantity and characteristics of the hazardous waste
Hazardous waste			



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Elements to be monitored	Monitoring parameter/indicator	Frequency and duration of the monitoring	Institutional arrangement
Inert waste	<p>According to the Law on Waste Management</p> <p>Type of waste</p> <p>Quantity of waste</p> <p>The WWTP operator should approved that the inert waste is not soluble or anyhow physically or chemically react , it is not biodegradable or have an impact on the other materials</p>	<p>When the waste has been generated the identification should be done according the List of waste (Off. Gaz. 100/2005)</p>	<p>The municipalities and City of Skopje are responsible to establish the monitoring network for non-hazardous waste</p> <p>The WWTP Operator and the Mayor of the municipality should prepared the identification list with daily data on the type of waste and quantity as well as the approval for inertness of the waste</p> <p>Accredited Laboratories</p>
Communal and commercial waste	<p>According to the Law on Waste Management</p>		<p>The municipalities and City of Skopje are responsible to establish the monitoring network for non-hazardous waste</p>
Sewage Sludge	<p>The identification of the sewage sludge as a waste should be done for the disposal purposes as well as for the possible further usage at the agricultural land</p> <p>For the disposal purposes the hazardous substances should be analyzed according the EU Directive on Hazardous waste 91/689/EEC) and Waste Framework Directive (2006/12/EC)</p> <p>Hazardous substances</p> <p>For the usage of the sludge for agricultural land the following parameters should be analyzed (according the EU Directive on the protection of the environment, and in particular of the soil, when sewage sludge is used in agriculture 86/278/EEC)</p> <p>Heavy metals: Pb, Cd, Cr, CU, Ni,Zn,Hg</p> <p>Dry matter</p>	<p>When the waste has been generated the identification should be done according the List of waste (Off. Gaz. 100/2005)</p> <p>For the agricultural purposes the sludge must be analyzed at least every six months, but if the changes occur in the characteristics of the wastewater being treated, the frequency must be increased.</p>	<p>Ministry of Environment and Physical Planning through the state monitoring network that should be established according the Law on Waste</p> <p>Accredited Laboratories</p>

Elements to be monitored	Monitoring parameter/indicator	Frequency and duration of the monitoring	Institutional arrangement
	Organic matter pH value; nitrogen and phosphorus The identification of the limit values for concentrations of those heavy metals in soil The identification of the limit values for concentrations of those heavy metals in sewage sludge for use in agriculture The identification of the amounts of heavy metals which may be added annually to the land		
<b>Soil quality</b>	Currently there is no national regulation on this very important issue		Accredited Laboratories
<b>Noise and Vibration</b>	According to the Law on Noise and the technical standards from the Directive on Environmental Noise (2002/49/EEC) and the EU Directive for the out-door equipment (2000/14/EC) Noise level Outdoor Equipment noise level		The Central Laboratory of the MoEPP, which performs ad-hoc measurements upon request. The Public Health Institute, which perform measurements on the 14 monitoring stations in Skopje and the 4 monitoring stations in Bitola. *The secondary legislation should be prepared and adopted on the method, conditions and procedure for establishing and operating monitoring networks; monitoring methodology, conditions, method and procedure for submitting noise monitoring information & data

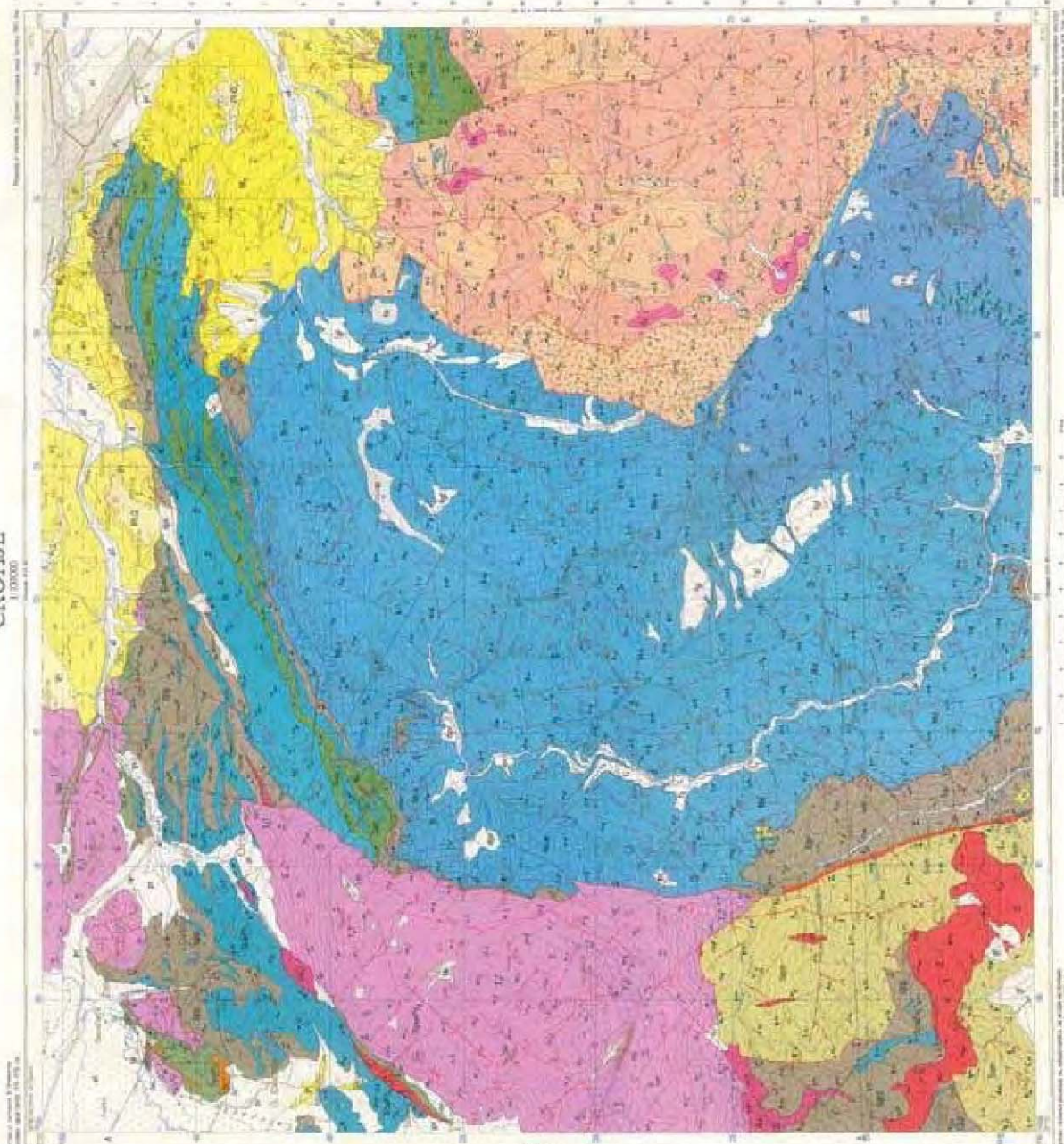
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Elements to be monitored	Monitoring parameter/indicator	Frequency and duration of the monitoring	Institutional arrangement
<i>Health and safety</i>	According to the Annual Programme of the Public Health Institute and its regional offices Drinking water quality Food quality Bathing water quality	According to the Annual Programme of the Public Health Institute and its regional offices	The Public Health Institute and the Health Institute at Skopje City

**ANNEX 1    Topography Map of Skopje City urban part**

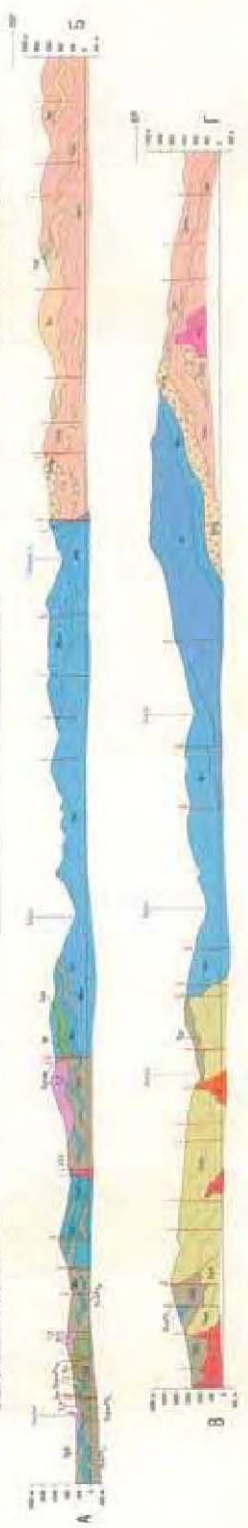


## ANNEX 2 Geology Map



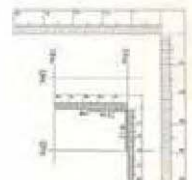
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## **ANNEX 3    Soil Quality location samples**



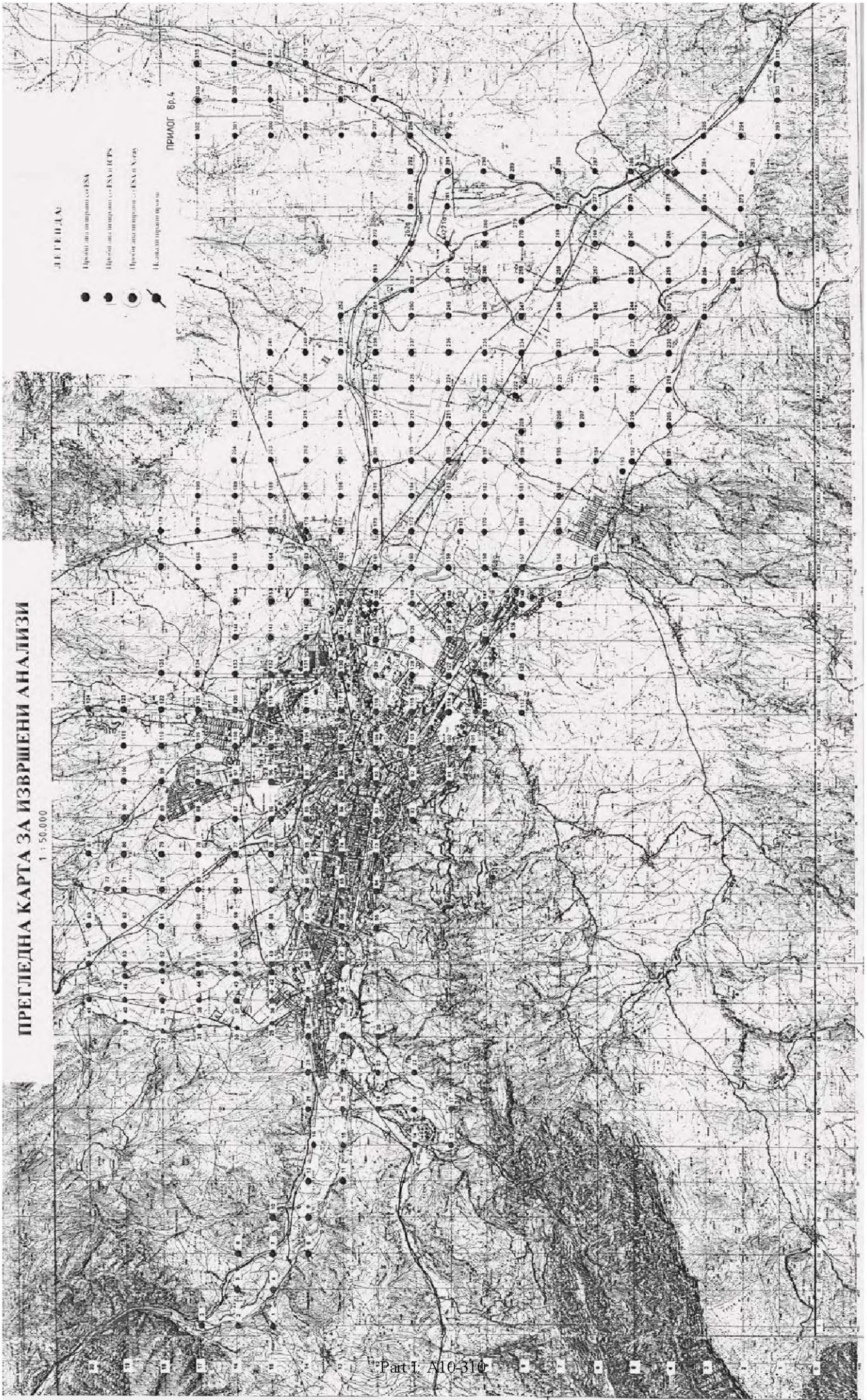
# ПРЕГЛЕДНА КАРТА ЗА ИЗВРШЕНИ АНАЛИЗИ

1 : 50 000

## ЛЕГЕНДА:

- Прегледни извршени со АСА
- Прегледни извршени со АСА и РРС
- Прегледни извршени со АСА и АСУ
- Не извршени прегледи

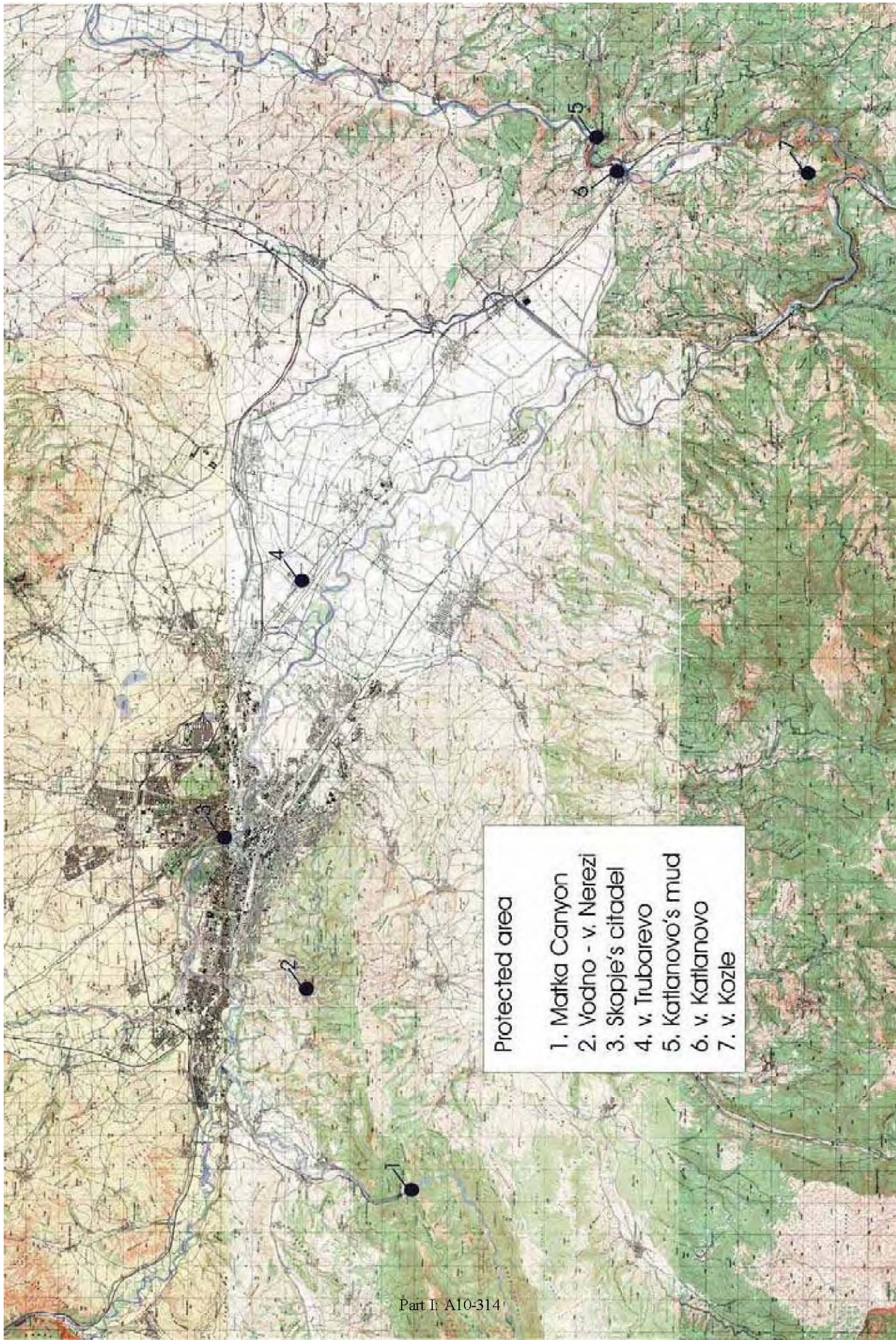
ПРИЛОГ Бр.4



**ANNEX 4a Google view on ecosystem Trubarevo location**



## **ANNEX 4b Topography Map with protected areas**



Protected area

- 1. Matka Canyon
- 2. Vodno - v. Nerezi
- 3. Skopje's citadel
- 4. v. Trubarevo
- 5. Kattianovo's mud
- 6. v. Kattianovo
- 7. v. Kozle

## **ANNEX 5 Reference documents**

**ANNEX V: Reference documents**

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