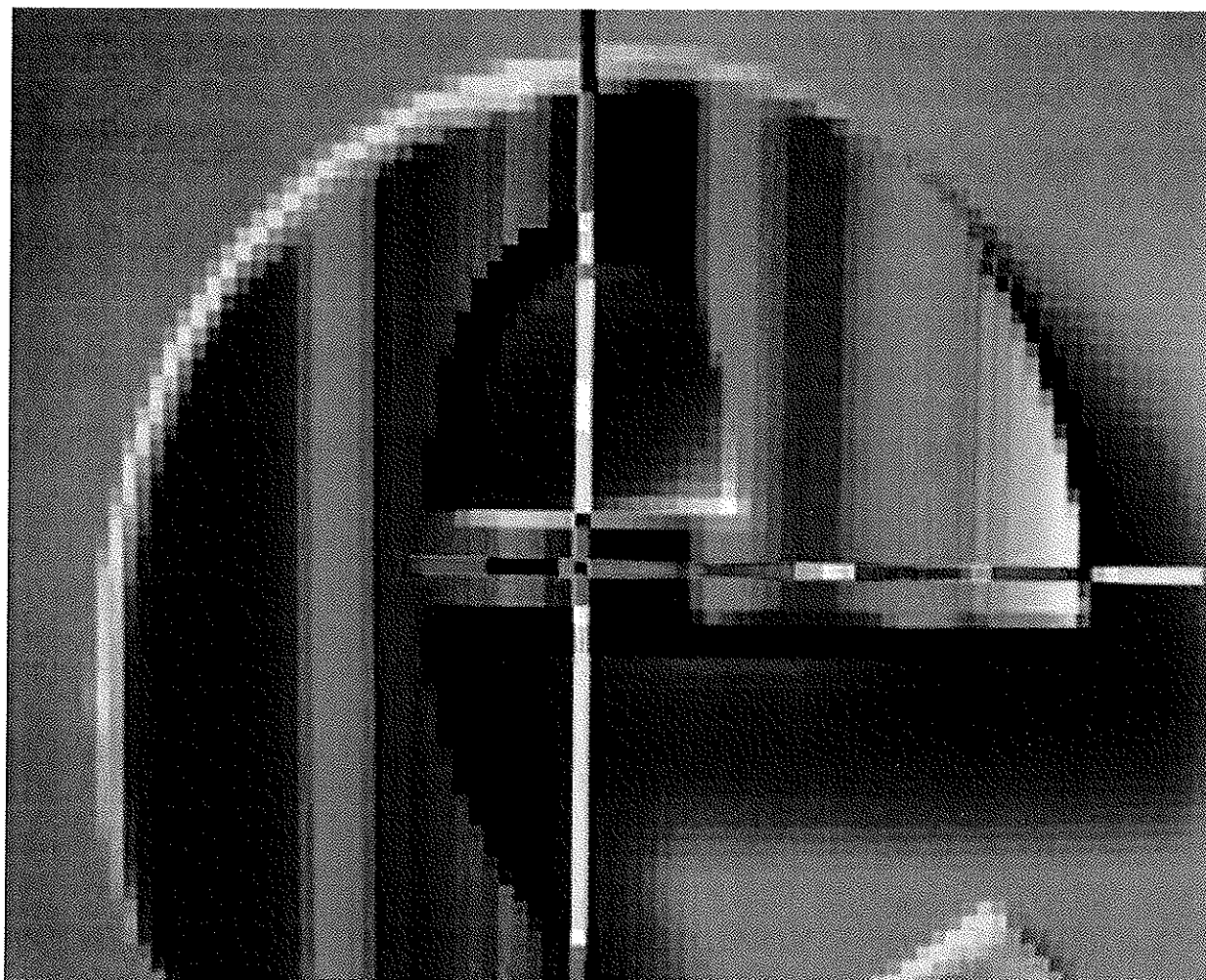


**ENVIRONMENTAL AND SOCIAL
ASSESSMENT REPORT FOR REPLACEMENT
OF UNIT “A” WITH NEW COGENERATION
COMBINED CYCLE POWER PLANT IN EL-TO
ZAGREB**



EKONERG - Energy Research and Environmental Protection Institute

Zagreb, April 2016



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EL-TO ZAGREB**

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Zagreb, April 2016

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EXECUTIVE SUMMARY

Project preparation and design

For the project: "New combined cogeneration plant as a replacement building for Unit A in EL-TO Zagreb", the Ministry of Environmental and Nature Protection issued Decision on the environmental acceptability with the application of the environmental protection measures and with implementation of the environment monitoring program (CLASS: UP/I 351-03/14-02/24, REF. NO.: 517-06-2-2-2-14-18, from 17 July 2014). The project holder is HEP-Proizvodnja d.o.o., Ulica grada Vukovara 37, Zagreb. Decision is based on Environmental Impact Assessment Study prepared by competent authority EKONERG Ltd from Zagreb.

For the aforementioned project, competent authorities also issued:

- Certificate on project compliance with the physical planning documents of the Ministry of Construction and Physical Planning (CLASS: 350-02/13-02/104, REF. NO.: 531-05-14-2 KM) dated 17 January 2014
- Decision by the Nature Protection Directorate of the Ministry for Environmental and Nature Protection (CLASS: 612-07/14-60/11, REF. NO.: 517-07-1-1-2-14-4) dated 17 February 2014 that the planned project is acceptable for the ecological network

During the environmental impact assessment procedure, the public discussion was carried out from 15 May to 13 June 2014 in Local Office Trešnjevka, Zagreb, Park stara Trešnjevka 2. Notice on the public discussion was published in daily newspaper „Jutarnji list“, notice boards of the City of Zagreb and their website, as well as the website of the Ministry together with the whole Study. A public presentation was held on 29 May 2014. No complaints, proposals or statements from the public or interested public were expressed during the public discussion. Apart from the City representatives, Study creators and project holders, the presentation was also attended by the representatives of the public, i.e. interested public, who had no complaints about the Study.

Project description

The proposed project includes construction and use of a cogeneration combined cycle power plant (CCCPP) powered on natural gas inside the existing plant - thermal power plant (EL-TO) Zagreb. The new CCCPP is planned to be constructed and commissioned at the beginning of 2018, but considering project development, commissioning can be expected, at best, in autumn 2019. When it starts up, the situation at the EL-TO location will be different than today. Since it is not cost-effective to invest into reconstruction of the existing facilities (Unit A, Unit B and boiler K-7), they will be decommissioned on 1 January 2018. At the time of commissioning of the new cogeneration unit at the EL-TO location, hot water boilers VK-3 and VK-4 and cogeneration units H and J will remain in operation. At that time, two new steam boilers PK-1 and PK-2 will also be in operation. Production plant CCCPP with auxiliary systems and connections to infrastructural systems shall be implemented inside the existing EL-TO Zagreb plant. The surface intended for CCCPP construction is 4700 m².

The basic supply connections of the planned project are: connection to the existing gas metering and reducing station, connection to the 110 kV switchyard, connection to the thermal system and connection to the industrial steam pipeline system. Other existing infrastructure to which the CCCPP shall be connected is: chemical water treatment system, connection to the wastewater drainage system, connection to the water supply system (for drinking water), road/traffic infrastructure, external hydrant network and other.

The EL-TO location can be accessed by two road entry/exit points, one from the north and one from the east side. These two entry/exit points, together with internal roads, are fire access points as well. The construction bases for the planned project are: the main plant facility (engine room for the accommodation of gas and steam turbine and generator; boiler room with boilers on exhaust gases; cooling system and other equipment of the water-steam cycle), central command and electrical plant building and pumping station of the network water.

Apart from construction of new facilities, the project also includes reconstruction of the existing facilities of gas metering and reducing station, thermal station and extension of the 110 kV switchyard.

The new CCCPP will only use natural gas as fuel and it will serve for electricity, process steam and heat generation. The rated electrical power shall be up to 150 MW, and the heat yield up to 120 MJ/s. In the Environmental Impact Assessment Study, CCCPP with rated electrical power of 140 MW and heat yield of 110 MJ/s was analysed, so numbers for inputs and outputs are given for that configuration. Generated process steam will have the features of 245°C and 11 bar, at the maximum quantity of 70 t/h. Total net efficiency of CCCPP plant operation will be 90%. It will be one highly efficient cogeneration unit.

The foreseen configuration of the new CCCPP is with two gas turbines, two exhaust gas boilers and one back-pressure steam turbine with extractions. The cooling system will have air cooled heat exchangers. It is expected that the CCCPP will produce:

- 825 GWh/year of electricity,
- 465 GWh/year of thermal energy and
- 289,000 t/year of process steam.

Expected plant working life is over 25 years.

Generated electricity will be exported into electricity transmission network through a 110 kV switchyard of the EL-TO plant. Process steam is to be used for industrial needs, while generated heat will be used in residential heating system of the city of Zagreb. Fuel used for CCCPP operation will be natural gas from the Republic of Croatia transport gas system. Natural gas consumption at the CCCPP nominal work regime (for ISO environment conditions, 15°C, 1,013 bar) is 2x2.5 kg/s, i.e. 25.348 Nm³/h.

The CCCPP plant will use demineralized water prepared in the existing chemical water treatment system. Approximately 4.5 t/h of raw water will be required in the work regime of electricity generation only and in the cogeneration regime without process steam generation. In a cogeneration regime with process steam generation, the need for demineralized water will depend on the quantity of delivered process steam. Raw water for technological needs

will be delivered via existing pipelines from the Knežija water intake structure. The EL-TO location demand for raw water will not increase through realization of the new CCCPP plant project. Other auxiliary substances required for CCCPP operation are oils, hydrochloric acid and sodium hydroxide, sodium phosphate, ammonia water, detergents and glycol.

Planned replacement of unit A with the new CCCPP in EL-TO Zagreb is located in the area of the City of Zagreb. The project is in line with the City of Zagreb Physical Plan ("Official Journal of the City of Zagreb", numbers 8/01, 16/02, 11/03, 2/06, 1/09 and 8/09) and the City of Zagreb General urban plan ("Official Journal of the City of Zagreb", numbers 16/07, 8/09 and 07/13).

Environmental impacts of the project

Impacts during project construction

Air: Dispersal of dust during project construction, especially from the active construction surfaces, has potentially the greatest impact on air quality. In addition to dust, various pollutants can be emitted, created as products from fossil fuel combustion in engines of machines and vehicles used for the construction. The impact during construction is variable in time and is limited to the construction site.

Water: Wastewater that will occur at the construction site needs to be properly drained to the existing sewage system in EL-TO Zagreb.

Noise: Noise will occur as a result of the construction machinery and vehicles related to the construction site. The calculation of noise propagation has indicated that, with noise protection measures, the noise level in the environment will be within acceptable limits.

Waste: Waste common for construction sites will be generated during the construction. Proper waste management, as specified by the regulations, can reduce to the minimum possible negative impact of waste on different aspects of the environment.

Landscape: Landscape structure at immediate project area will remain unchanged, and potential impact of planned project on the identity of landscape is indirect, long-lasting, minimum strength and is situated within the zone already altered by the existing impacts of the surrounding industrial infrastructure.

Transport: During the preparatory work and construction, higher truck traffic intensity will occur which can cause difficulties in normal transport. This potential impact is time-limited and can be minimized by applying appropriate mitigation measures in certain stages of construction. Accordingly, it is necessary to develop a project for temporary traffic regulation during the preparatory work and construction of the planned project.

Light pollution: Internal lighting already exists on the site, so during the construction, minimum construction lighting is expected, which contribution to the street lighting in Zagreb is negligible.

Hazardous substances: During the construction it is possible that certain number of small fuel tanks for the construction machinery will be located on the site. Proper storage of fuel tanks and application of appropriate measures to absorb any possible leakage will eliminate and / or quickly localize the effects on the environment.

Impacts during project operation

Air quality in Zagreb

Perennial measurement data indicate that the pollution level of sulfur dioxide, carbon monoxide, benzene, mercury and metals (Pb, Cd, As and Ni) in PM₁₀ particles at all Zagreb stations are lower than the limit values.

In the City of Zagreb there is a typical problem of urban air pollution associated with the exceedance of limit values for nitrogen dioxide, PM₁₀ and PM_{2.5} particles and benzo(a)pyrene in PM₁₀.

Exceeded limit values for ozone concentrations were recorded at the measuring stations in Zagreb as well as other parts of Croatia, whereby there is a significant interannual variability predominantly dictated by meteorological factors.

As regarding the CCCPP air impact, the most concerning condition is NO₂ concentration. In the period from 2011 to 2014, the exceedances of average annual NO₂ concentrations have been recorded on the measuring stations close to the busiest city roads and the most prominent was in the city center (Đorđićeva) due to pollution retention within the street. The number of exceedances of hourly concentrations has not been recorded more than allowed (LV of 200 µg/m³ is not allowed to be exceeded more than 18 times in a calendar year), at monitoring stations where the concentrations were measured by automatic measuring devices (Zagreb-1, Zagreb-2, Zagreb-3, Ksaverska cesta, Vrhovec).

The closest monitoring stations to the CCCPP location are Prilaz baruna Filipovića and Vrhovec stations. The distance between mentioned stations is about 800 meters. Average annual concentrations are 20 µg/m³ higher at the Prilaz baruna Filipovića station comparing to the Vrhovec station which is in residential area. Due to the distance between stations, the assumption is that they have the same level of "urban background pollution" and that mentioned value of 20 µg/m³ is mainly a result of emissions from road transport in the Prilaz baruna Filipovića where tens of thousands of vehicles pass every day.

Air: Regarding the potential air quality impact, the highest hourly concentrations of NO₂ are expected in any direction relative to the stack within one kilometer distance from it. Within the area of highest air quality impact, new unit will contribute with increase of hourly NO₂ concentrations in the maximum value of 10.6 µg/m³ or lower than 5% of the limit value of hourly NO₂ concentrations. The impact of new unit to the average annual NO₂ concentration level is less than 0.7 µg/m³ or less than 2% of the limit values.

Concerning the cumulative air impact, the existing gas turbines (H and J) are the major source of NO_x emission at EL-TO location for current and future emission scenario. The current and future cumulative impacts of EL-TO power plant are dominantly under the influence of existing turbine emission (units H and J). The future total emission of EL-TO power plant will not be increased because the old boiler units (K6, K7, K8, K9) will be shut down. Nevertheless, the CCCPP will significantly lower total EL-TO emission any time when it replaces units H and J production.

Water: During CCCPP operation, industrial wastewaters, stormwaters and sanitary wastewaters will be generated, which will be discharged into the Zagreb's public sewage system using existing internal sewage system of EL-TO Zagreb. Industrial wastewaters from the chimney drainage will be treated in the existing wastewater treatment plant. Wastewaters from washing of the boiler flue gas side and compressor blades will be collected in a new tank and transported by authorized company. Potentially contaminated stormwaters will be treated in new oil and grease separator.

Noise: Noise propagation calculation, as a result of the CCCPP operation, was conducted for the worst case scenario when all noise sources will be working simultaneously, whereby for the calculation were used the maximum values of noise and sound power. The calculation shows that the noise levels that will occur as a result of new unit, along the border of EL-TO complex, will be significantly lower than the allowed ones.

Waste: During CCCPP operation, waste from sewage systems cleaning (waste from oil separator) will be generated, as well as liquid waste from washing of the boiler flue gas side and various types of waste oils and oily wastes and other wastes generated from maintenance that are also generated today by EL-TO plant operation. Waste will be temporarily stored in the existing temporary storages of hazardous and non-hazardous waste, until the final disposal by the authorized company. By proper waste management, as specified by the regulations, possible negative impact of waste on different aspects of the environment will be reduced to the minimum.

Landscape: Impact of the planned project on visual quality of the landscape has been assessed as low, by applying the mitigation measures relating to the coloration concept (light gray, two-tone) and the facade design that will not emphasize the new facility.

Light pollution: Lighting system of planned project will not be a significant new source of light for residential buildings around EL-TO Zagreb. The contribution of lighting system from planned project is negligible to the street lighting in Zagreb.

Hazardous substances: Realization of the planned project will not significantly increase the quantity of substances and products with hazardous characteristics that are already on the site. Existing safety documentation of EL-TO Zagreb should be revised and amended related to the planned project. With proper design and construction of plant's part in which substances and products with hazardous characteristics will be stored, the probability of leakage is reduced to the minimum. By planning the mitigation/intervention measures and also installation of the proper safety equipment will create conditions for quick and effective action in case of leakage of hazardous substances.

1 PROJECT DESCRIPTION

1.1 DESCRIPTION OF CURRENT AND FUTURE STATE AT EL-TO ZAGREB LOCATION

In EL-TO Zagreb, there are more heat and electricity generation units. EL-TO Zagreb is primarily intended for heat generation, while electricity is generated in combined process – simultaneously with heat generation. The heat is delivered to consumers in two ways. Mostly through the district heating of Zagreb City in form of hot water (for heating and sanitary/domestic warm water) and other part through steam pipeline system for covering process steam and steam heating consumption.

Electricity is generated in back-pressure unit A with nominal output of 11 MW_e, unit B with nominal output of 30 MW_e with heating condenser, as well as in two gas turbine units operating in combination with heat recovery steam generators, making two cogeneration gas turbine units H and J. Besides the aforementioned units, auxiliary units of direct heat generation have been installed in EL-TO Zagreb as well. They consist of one low-pressure auxiliary steam boiler K-7 and two peak hot water boilers VK-3 and VK-4 - **tab. 1.1-1**.

Tab. 1.1-1: Existing units in EL-TO Zagreb

	Unit	Fuel	Nominal power	Year of commissioning
UNIT A	K-6	NG / HFO	100 t/h (115 bar / 520°C)	1970
	TA1	-	11 MW _e	
UNIT B	K-8	NG / HFO	100 t/h (115 bar / 520°C)	1980
	K-9	NG / HFO	100 t/h (115 bar / 520°C)	
	TA2	-	30 MW _e	
UNIT D	K-7	NG / HFO	80 t/h (17 bar / 240 °C)	1972
UNIT G	VK-3	NG / HFO	116 MW _{th}	1991
UNIT H	PTA-1	NG	25,2 MW _e	1998
	KU-1	-	7,6 MW _{th} + 64 t/h (17 bar / 240°C)	
UNIT J	PTA-2	NG	25,2 MW _e	1998
	KU-2	-	7,6 MW _{th} + 64 t/h (17 bar / 240°C)	
	VK-4	NG	116 MW _{th}	2013
		HFO	93 MW _{th}	

K-6, K-8, K-9 - high pressure steam boilers, TA1 - backpressure steam turbine, TA2 - condensing steam turbine, K-7- low pressure steam boiler, VK-3 and VK-4 – hot water boilers, PTA-1 and PTA-2 – gas turbines, KU-1 and KU-2 - heat recovery steam generators, NG – natural gas, HFO - heavy fuel oil

Flue gas discharges from units VK-3, VK-4, K-6, K-7, K-8 and K-9 (**tab. 1.1-1**) are connected to common outlet - reinforced concrete 200 m high stack. The CGT (cogeneration gas turbines) units H and J have two separate stacks, each 60 m high.

Locations of existing units and flue gas discharge stacks are designated in **Figure 1.1-1**.

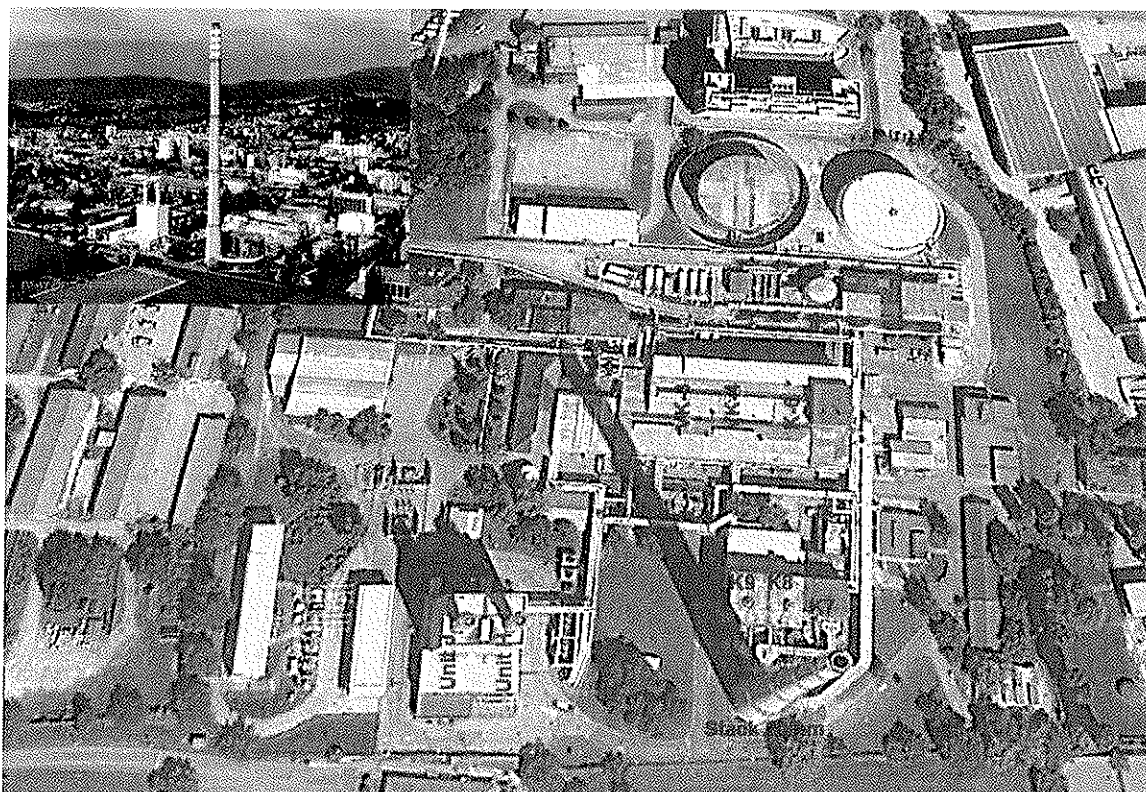


Figure 1.1-1: Existing units and flue gas discharge stacks

New cogeneration combined cycle power plant (CCCPP) was planned to be built and commissioned at the beginning of 2018, but related to the project development, its commissioning can be expected, at best, in autumn 2019. At the time of its start-up, situation in EL-TO will be different in relation to the present situation. Due to unprofitability of investing into reconstructions of existing units (Unit A, Unit B and boiler K-7), they will be shut down on 1 January 2018. At the time of new cogeneration unit start-up, the following units will be in operation in EL-TO:

- hot water boilers VK-3 and VK-4
- cogeneration units H and J.

New CCCPP in EL-TO will represent the basic district heating unit. Electricity generation will be secondary and new unit will be completely adjusted to requirements regarding heat, i.e. process steam supply. Net total efficiency of the CCCPP is 90%. Fuel for the new CCCPP will be natural gas.

During major part of the year, a heat demand will be covered primarily, while process steam demand will be covered in amount left over for extraction (the rest of process steam demand is covered by other units within EL-TO Zagreb).

After EIA procedure for new CCCPP, new projects at EL-TO site were planned and designed with commissioning planned for the second half of 2016: heat accumulator 1000 MWh, 150 MW_{th} and low-pressure steam boiler with nominal thermal power 32 MW_{th} (40,4 t/h steam: 17 bar / 235 °C). Additional steam boiler is also planned. Development plan for EL-TO Zagreb is given in **tab. 1.1-2**.

Tab. 1.1-2: Development plan for EL-TO Zagreb

Unit	
Unit A (K-6), Unit B (K-8, K-9) and boiler K-7	Out of operation 1 January 2018
Unit H and Unit J	Out of operation 1 January 2023
VK-3	Out of operation 1 January 2025
VK-4	No current plans for decommissioning
New CCCPP	Commissioning expected, at best, in autumn 2019
Two new low-pressure steam boilers	Commissioning planned for the second half of 2016, and second half of 2017 respectively
Heat accumulator	Construction planned for the second half of 2017

Heat accumulator consists of: storage tank (aboveground, vertical, atmospheric tank, 30 m diameter, 48 m high), pump station and internal water pipeline for connection to existing EL-TO Zagreb heat system. Tank is planned to be built on the location of existing heavy fuel oil storage tank and the pump station will be located near the existing heating station - **figure 1.1-2**.

Low-pressure steam boiler will be located near K7, K8 and K9 boiler building - **figure 1.1-2**.

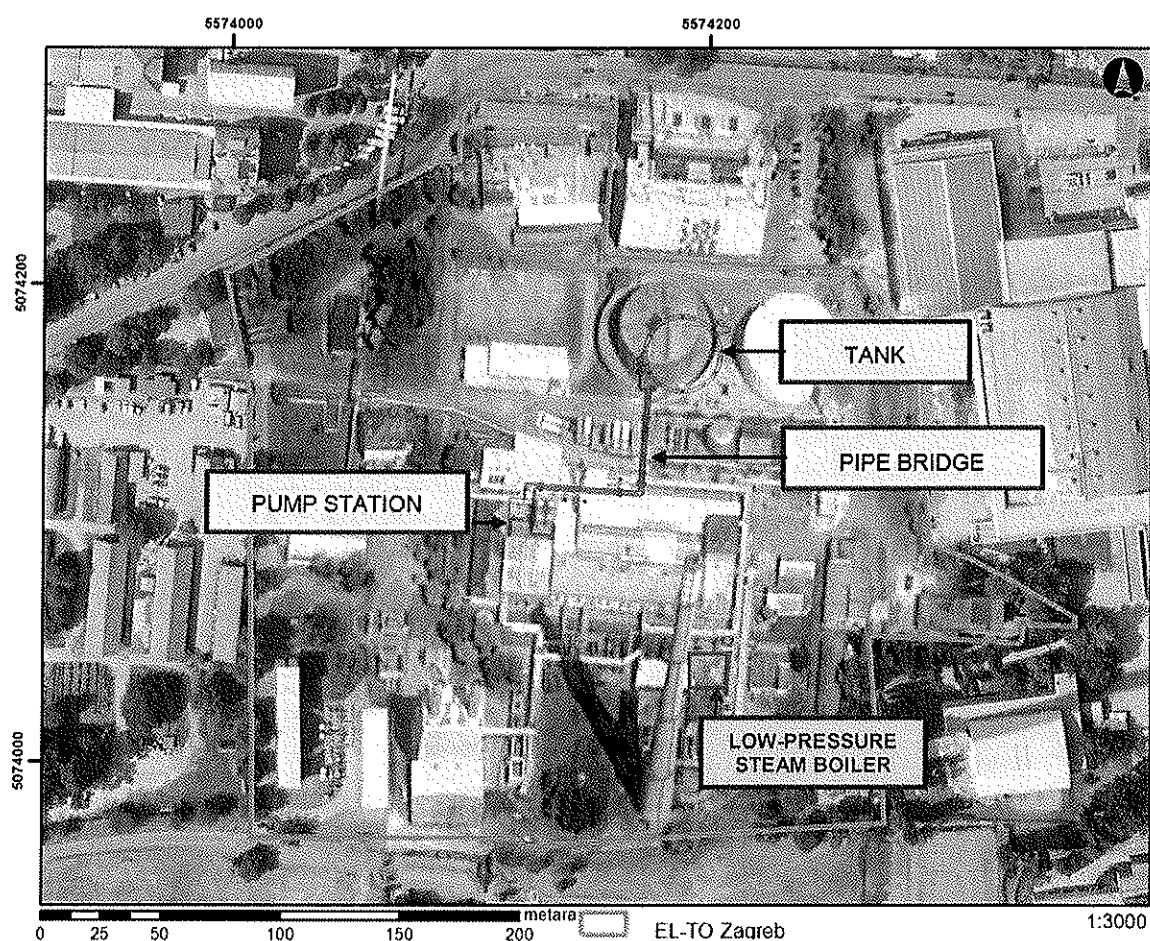


Figure 1.1-2: Locations of additional planned projects

1.2 RATIONALE OF THE PROJECT

The existing technological system of EL-TO Zagreb is complex – **chapter 1.1**.

In addition, the system is characterized by nearing the end of their life of all production units unless of course the newly built hot water boiler VK4. According to the standard technical criteria Unit A, which was built in 1969, expired on the available lifetime. Therefore, an increased maintenance is necessary, until the construction of a replacement unit, respectively by 2018. That time will be a transitional period, until the alignment with emission limit values by applying the principle of common stack (see **tab. 3.8-4**).

The same conclusion applies to the peak boiler K7. Life expectancy of Unit B, as regarding the number of hours of operation and the number of start-ups, should expire in 2018. In the first place, due to unprofitability of the reconstruction to achieve the emission limit values. The same life expectancy should be expected for units H and J, but they will stay in operation until 2023, also due to restrictions on the profitability of reconstruction in order to achieve the emission limit values by application of the exemption for district heating (see **tab. 3.8-6**). From the above listed data about the remaining operational life of existing generating units, an urgent need for construction of new high-efficiency cogeneration units is evident.

In addition to the replacement of old units, construction of new CCCPP will allow the destruction of "rigid" connection between electricity and heat generation, which characterizes the current EL-TO technological system. The new unit will enable higher generation of electricity outside the heating season, which so far has not been the case. By replacing the back-pressure unit A with new CCCPP, installed electrical power will be increased at the site and consequently the generation of electricity.

Construction of new CCCPP is an essential element in the process of harmonizing the EL-TO Zagreb plant with the requirements of obtaining the IPPC (Environmental) permit. The administrative process of obtaining integrated IPPC (Environmental) permit for EL-TO Zagreb plant is still under progress.

At EL-TO Zagreb new CCCPP will be the base district heating unit and its work will significantly reduce the operation of other production units. Electricity generation will be secondary and new unit will fully adapt to the requirements of heat and steam supply.

New CCCPP will use only natural gas as fuel. Total net efficiency of the plant will be 90%. It will be a high-efficient cogeneration unit.

1.3 DESCRIPTION OF PROJECT PHYSICAL PROPERTIES

The project considered in this environmental impact study is planned gas cogeneration combined cycle power plant (CCCPP). The CCCPP will be used for electricity, process steam and heat generation. The CCCPP unit with auxiliary systems and connections to infrastructural systems will be built within the existing EL-TO Zagreb (refer to **figure 1.3-1**). The area intended for CCCPP unit construction amounts 4700 m².

The main power connections of planned project are as follows:

- connection to existing gas metering-reduction station

- connection to 110 kV switchyard
- connection to heating system.

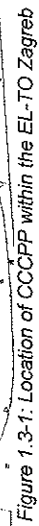
Other existing infrastructure to which new CCCPP unit will be connected is as follows:

- chemical water treatment system
- connection to process and sanitary waste water, as well as rainwaters distribution sewage system
- connection to water supply system (for drinking water needs)
- road/transport infrastructure
- external hydrant network,
- and other.

There are four road entries/exits, three on north and one on east side, by which it is possible to access EL-TO (refer to **figure 1.3-1**). The above mentioned four entries/exits along with internal roads are at the same time fire access roads as well.

The main building structures of planned project are as follows:

- main operation building (engine room for placing the gas and steam turbine and generator; boiler plant for placing the heat recovery steam generators; other equipment of water-steam cycle)
- cooling system with auxiliary equipment
- central control room and electric power facility.



Spatial arrangement of main building structures and associated infrastructure within EL-TO is indicated in **figure 1.3-1**.

Along with construction of new building structures, the project includes reconstruction of existing gas metering-reduction station, heating station and extension of 110 kV switchyard.

The basic CCCPP operation-generating parts are as follows:

- two gas turbines, one steam turbine, three electric generators
- two double-pressure heat recovery steam generators (HRSG)
- network water heaters
- water-steam cycle equipment
- Instrumentation and Control System (I&C)
- electric equipment (generator transformers and own consumption transformers, medium-voltage and low-voltage switchyards).
- network water pumping station
- air-cooled heat exchangers system
- natural gas supply and treatment system
- heating, ventilation and air-conditioning system
- fire alarm and extinguishing system
- auxiliary power facilities.

The planned CCCPP unit will be connected to the existing EL-TO infrastructure. Existing infrastructure has sufficient capacity to accept the proposed project. All connections will be carried out within the EL-TO. The CCCPP connection infrastructure is indicated in **figure 1.3-1**.

The main operation facility will be located in the western part of EL-TO Zagreb. It comprises engine room of two gas turbines with associated diffusers, boiler room of two boilers (Heat Recovery Steam Generator - HRSG) with their own 60 meters high stacks and steam turbine engine room - **figure 1.3-2**. Equipment of water-steam cycle partially will be placed in a boiler room and partially in the steam turbine engine room. These facilities will be derived from the steel supporting structure, which will be coated with building panels of determinate thermal and acoustic properties.

On the roof of the steam turbine engine room there will be summer coolers (heat exchangers, air-cooled), concealed with vertical barriers - **figure 1.3-2**. Cooling of closed cooling system will be performed by air-cooled heat exchangers, which will be the same type as the summer coolers. Closed cooling system (cooling system of CCCPP auxiliary systems) is used for cooling of oil, generator, feed pumps, etc. Air coolers of closed cooling system will be located on the roof of the central command and electrical plant building - **figure 1.3-2**.

The central command and electrical plant building will be located along the northern part of east side of the main operation facility - **figure 1.3-2**. Three transformers (two for gas turbine generators and one for steam turbine generator) will be placed in a fenced area along the eastern side of the steam turbine engine room - **figure 1.3-2**. Between transformer and adjacent buildings there are designed fire walls. Two transformers of own consumption will be located on the north of block transformers.

Tanks for the wastewater will be located on the north side of the CCCPP, along the boiler room. Tank of 5 m³ is designed for wastewater that will be transported from the location for external disposal/treatment, while tank of 20 m³ is designed for wastewater which will be treated at the site and discharged via internal sewage system into the public sewage system.

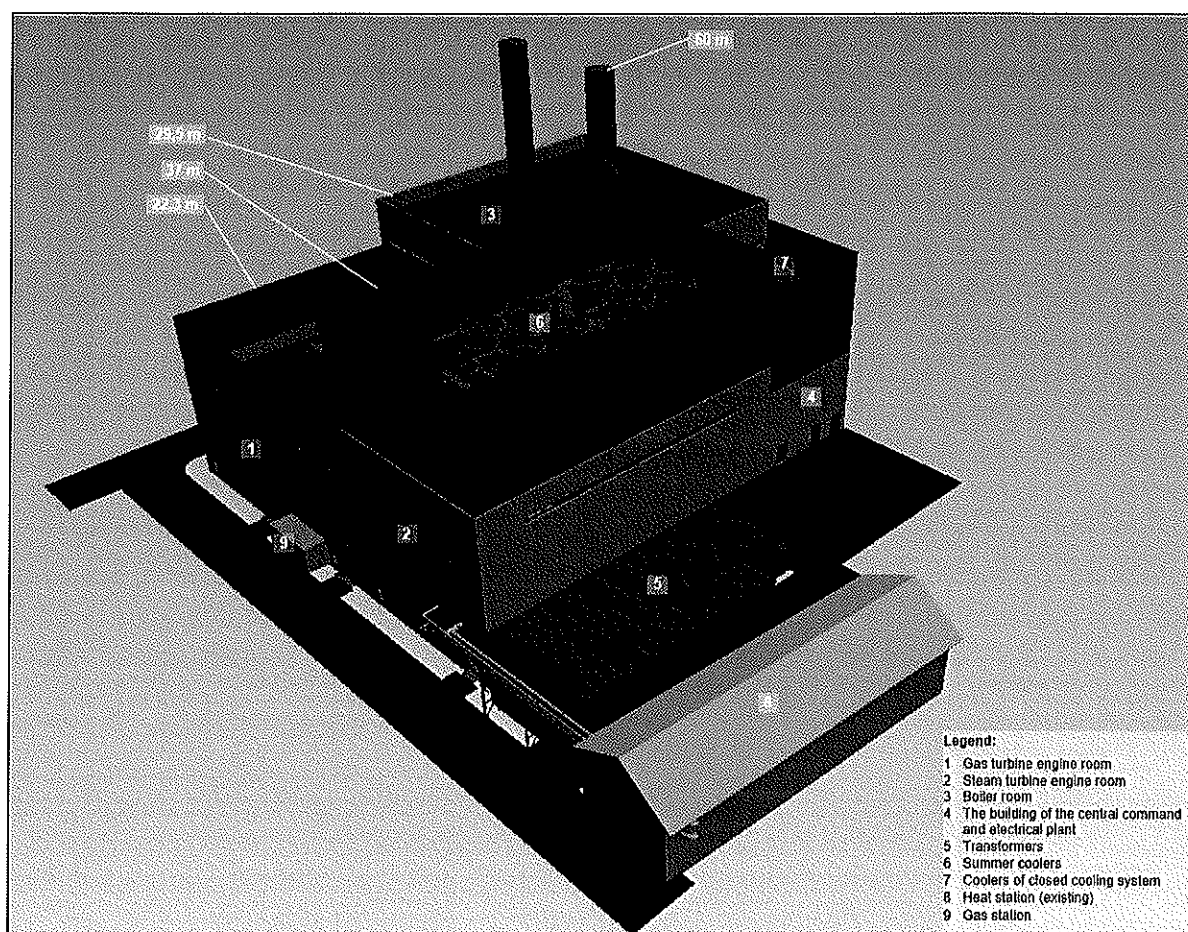


Figure 1.3-2: Three-dimensional display of new CCCPP

1.4 DESCRIPTION OF MAIN FEATURES OF TECHNOLOGICAL PROCESS

New CCCPP unit is configured with two gas turbines, two heat recovery steam generators (HRSG) and one extraction back-pressure steam turbine (refer to **figure 1.4-1**). The main feature of this configuration is high flexibility and availability. Namely, gas turbines are relatively limited as regarding reducing the capacity under 60%, primarily due to increase of specific fuel consumption. In the configuration with two gas turbines in subject, by shutting down one turbine, the load could be reduced even under 50% without increasing the specific consumption.

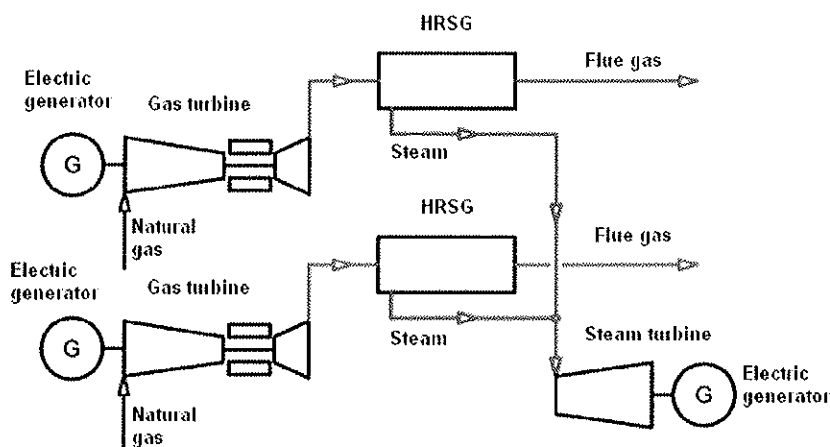


Figure 1.4-1: CCCPP unit configuration

The rated electrical power of new CCCPP shall be up to 150 MW and the heat output up to 120 MJ/s. In the Environmental Impact Assessment Study, CCCPP with rated electrical power of 140 MW and heat output of 110 MJ/s was analysed, so the numbers for inputs and outputs and also specific numbers for turbines power are given for that configuration. Final electrical power and heat output will depend on selected equipment supplier.

Each gas turbine has its own generator. The unit nominal output of gas turbines in standard ISO environmental conditions (15 °C, 1013 mbar, 60 % of humidity) amounts 2×50.5 MW. The CCCPP unit will mostly use natural gas as fuel.

The HRSGs are integral parts of CCCPP unit and their purpose is to generate superheated steam by using hot flue gases at the gas turbine exit. Operating parameters of heat recovery steam generators are selected in order to represent technically approved and acceptable solution of high total efficiency in combined process. The HRSG is of vertical, double-pressure design with two steam superheating systems. Additional HRSG firing is not assumed.

Steam turbine will be back-pressure with two extractions. Accordingly, it will be possible to operate in a mode of only electricity generation, as well as in cogeneration mode. The nominal output of steam turbine amounts 35 MW. The first steam turbine extraction will be carried out for the purpose of process steam generation with characteristics of 245 °C and 11 bar, in the maximum amount of 70 t/h. Uncontrolled extraction (0.4 – 1.15 bar) and back-pressure steam are assumed for heat generation. Total heat output amounts 110 MJ/s.

The CCCPP cooling system will be carried out with air-cooled heat exchangers. Two sections of heat exchangers are assumed. The first one is intended for cooling the steam from steam turbine, so called summer coolers (in the summer operation mode), while the other is used for cooling certain CCCPP systems (electric generators, lubricating oil system, feed pumps).

It is expected that CCCPP unit will generate 825 GWh/year of electricity in average. The planned heat generation is indicated in **tab. 1.4-1**. The plant expected service life amounts to over 25 years.

Tab. 1.4-1: Expected annual heat generation

Heat form	
Process steam generation	289,000 t/year
Hot water generation	465 GWh/year

The generated electricity will be placed to the transmission electric power network via EL-TO 110 kV switchgear. Process steam is assumed for industrial needs, while generated heat will be used in the city of Zagreb district heating system (DHS).

1.5 CONSUMPTION OF ENERGY AND GOODS

1.5.1 FUEL AND ELECTRICITY CONSUMPTION

Natural gas from the Republic of Croatia gas transmission system will be fuel for CCCPP unit. Natural gas consumption at CCCPP unit nominal operation mode (for ISO environmental conditions, 15 °C, 1.013 bar) amounts 2×2.5 kg/s, i.e. 25,348 Nm³/h.

Electricity consumption varies with mode of operation (from 0.9 MW in cogeneration mode with steam generation and 70% of one gas turbine operation to 3.2 MW in cogeneration mode with 100% of both gas turbine operation).

1.5.2 WATER CONSUMPTION

1.5.2.1 Process water

For the operation of new CCCPP it is necessary to ensure a sufficient amount of raw water which is, after appropriate treatment / demineralization, used in technological process. Raw water will be supplied by the existing supply system and treated in the existing chemical water treatment system.

Existing water supply, treatment and consumption is described in **chapter 3.7.3**.

The CCCPP unit will use demineralized water and required amount depends on operation mode.

The following amounts of demineralized water are required in the operation mode regarding only electricity generation and in cogeneration mode without process steam generation:

- 3.76 t/h for water-steam cycle make-up due to HRSG desludging and desalination losses
- 0.73 t/h for water-steam cycle make-up due to continuous sampling.

In cogeneration mode with process steam generation, needs of demineralized water depend on amount of delivered process steam. The following amounts of demineralized water are required at nominal process steam generation (70 t/h):

- 3.7 t/h for water-steam cycle make-up due to HRSG desludging and desalination losses
- 0.74 t/h for water-steam cycle make-up due to continuous sampling
- 70 t/h for process steam generation.

The prevailing need of demineralized water arises from process steam generation. Depending on the operation mode, new CCCPP will replace/reduce process steam generation in other generating units of EL-TO. After starting up new CCCPP, total annual needs of raw, i.e. demineralized water for EL-TO plant will not be changed. Total annual consumption of raw water for new CCCPP is estimated to 400,000 m³.

1.5.2.2 Sanitary and drinking water

Sanitary and drinking water for the project purposes will be supplied from the City of Zagreb public water supply system. The construction of new CCCPP will not increase the number of operating personnel, so there will be no increase in consumption of sanitary water in relation to the current situation.

1.5.2.3 Fire fighting water

Within new CCCPP, internal and external hydrant network will be constructed. External hydrant network will be connected to the existing hydrant system at EL-TO. Water for hydrant network will be supplied from the City of Zagreb public water supply system.

EBRD Performance Requirement 3 – Resource Efficiency and Pollution Prevention and Control

REQUIREMENTS	REALIZATION
Water	
<p>(16) Clients must seek to minimize the project's water use, and in situations where a project-specific water supply needs to be developed, the client will seek to utilize water for technical purposes that is not fit for human consumption, where feasible.</p> <p>(17) All technically and financially feasible and cost-effective opportunities for water minimization, reuse and recycling in accordance with GIP must be identified and considered as part of the project design.</p> <p>(18) For projects with a high water demand (greater than 5,000 m³/day), the following must be applied:</p> <ul style="list-style-type: none"> • a detailed water balance must be developed, maintained and reported annually to the EBRD • opportunities for continuous improvement in terms of water use efficiency should be identified • specific water use (measured by volume of water used per unit production) must be assessed • operations must be benchmarked to available industry standards of water use efficiency. <p>(19) The client will need to consider the potential cumulative impacts of water abstraction upon third party users and local ecosystems. Where relevant, the client will assess the impacts of its activities on the water supply to third parties and will need to demonstrate that its proposed water supply will not have adverse impacts on the water resources crucial to third parties or to sensitive ecosystems. As part of the client's environmental assessment process, the client will identify and implement appropriate mitigation measures that favor the prevention or avoidance of risks and impacts over minimization and reduction in line with the mitigation hierarchy approach and GIP.</p>	<p>For technological purposes well water (not potable water) will be used – see chapters 1.4.2.1 and 3.7.3.</p> <p>In the system of process steam supply for consumers, there are no condensate return lines. This is existing infrastructure and it is managed by other company HEP-Toplinarstvo d.o.o.</p> <p>After starting up new CCCPP, total annual needs of raw, i.e. demineralized water for EL-TO plant will not be changed.</p> <p>According to the hourly demi water consumption in cogeneration mode with process steam generation (74.44 m³/h), daily water consumption/demand will be about 1800 m³.</p> <p>Technological water is supplied from separate water intake - water well Knežija with six wells. The EL-TO Zagreb has a water permit to use water from the water well at the site Horvaćanska cesta for technological purposes in quantities of 1,735,000 m³ per year (4750 m³ per day). Permissible operating maximum is 55 l/s. Water abstraction has no impact on water abstraction upon third party users and local ecosystems.</p> <p>In case of very poor hydrological situation in the water well, i.e., in case all the wells are at the minimum level, and because of the importance of maintaining EL-TO heat generation, the use of well water is suspending and transferring to use the water for technological purposes from public supply system, until the improvement of hydrological conditions – according to the <i>Operating</i></p>

REQUIREMENTS	REALIZATION
	<i>regulation on the use of water from wells in various hydrological situations and in different time periods, 2000.</i>
Resource efficiency <p>(6) The environmental and social assessment process will identify opportunities and alternatives for resource efficiency relating to the project in accordance with GIP. In doing so, the client will adopt technically and financially feasible¹ and cost effective² measures for minimizing its consumption and improving efficiency in its use of energy, water and other resources and material inputs as well as for recovering and re-utilizing waste materials in implementing the project. The key focus will be on activities that are considered the project's core functions, but similar opportunities in the client's other business activities that are not part of the project will also be considered. Where benchmarking data are available, the client's assessment will make a comparison of its operations with GIP to establish the relative level of efficiency.</p> <p>(7) The client will integrate resource efficiency measures and the principles of cleaner production into product design and production processes with the objective of conserving raw materials, energy and water and, at the same time, reducing release of pollutants into the environment.</p>	
<p>For new CCCPP, related to resource efficiency, as a plant for electricity, heat and steam generation from fuel burning, energy efficiency is important. Higher energy efficiency means less fuel, water and other resources consumption and lower air emissions, wastewater emissions and waste generation for amount of power generated.</p> <p>Total net efficiency of the plant will be 90% and it will fall in the high-efficient cogeneration units.</p>	

1.5.3 CHEMICALS CONSUMPTION

Other substances required for CCCPP operation are oils, hydrochloric acid and sodium lye, sodium phosphate, ammonia water, detergents and glycol.

1.6 PROJECT ALTERNATIVES

During the development of conceptual technical design of new CCCPP, cooling system alternatives were evaluated. Other project alternatives have not been evaluated.

¹ Technical feasibility is based on whether the proposed measures and actions can be implemented with commercially available skills, equipment and materials, taking into consideration prevailing of local factors such as climate, geography, infrastructure, security, governance, capacity and operational reliability. Financial feasibility is based on commercial considerations, including relative magnitude of the incremental cost of adopting such measures and actions compared with the project's investment, operating and maintenance costs.

² Cost-effectiveness is determined according to the capital and operational cost and financial benefits of the measure considered over the life of the measure. For the purpose of this PR, a resource efficiency or GHG emissions reduction measure is considered cost-effective if it is expected to provide a risk-rated return on investment at least comparable to the project itself.

1.6.1 COOLING SYSTEM ALTERNATIVES

The following cooling system alternatives were evaluated:

- Cooling system with dry-wet heat exchangers and
- Cooling system with dry heat exchangers (air-cooled heat exchangers).

Air-cooled heat exchangers cooling system alternative was chosen.

In relation to chosen alternative, alternative with dry-wet heat exchangers differs also in equipment arrangement at EL-TO site - **figure 1.6-1**.

Benefits of cooling system with air-cooled heat exchangers are:

- Avoided creation of water mist in adverse weather conditions (winter season)
- Lower level of noise emission
- Lower process water consumption and emission of process wastewaters
- A higher level of energy efficiency for the proposed plant configuration.

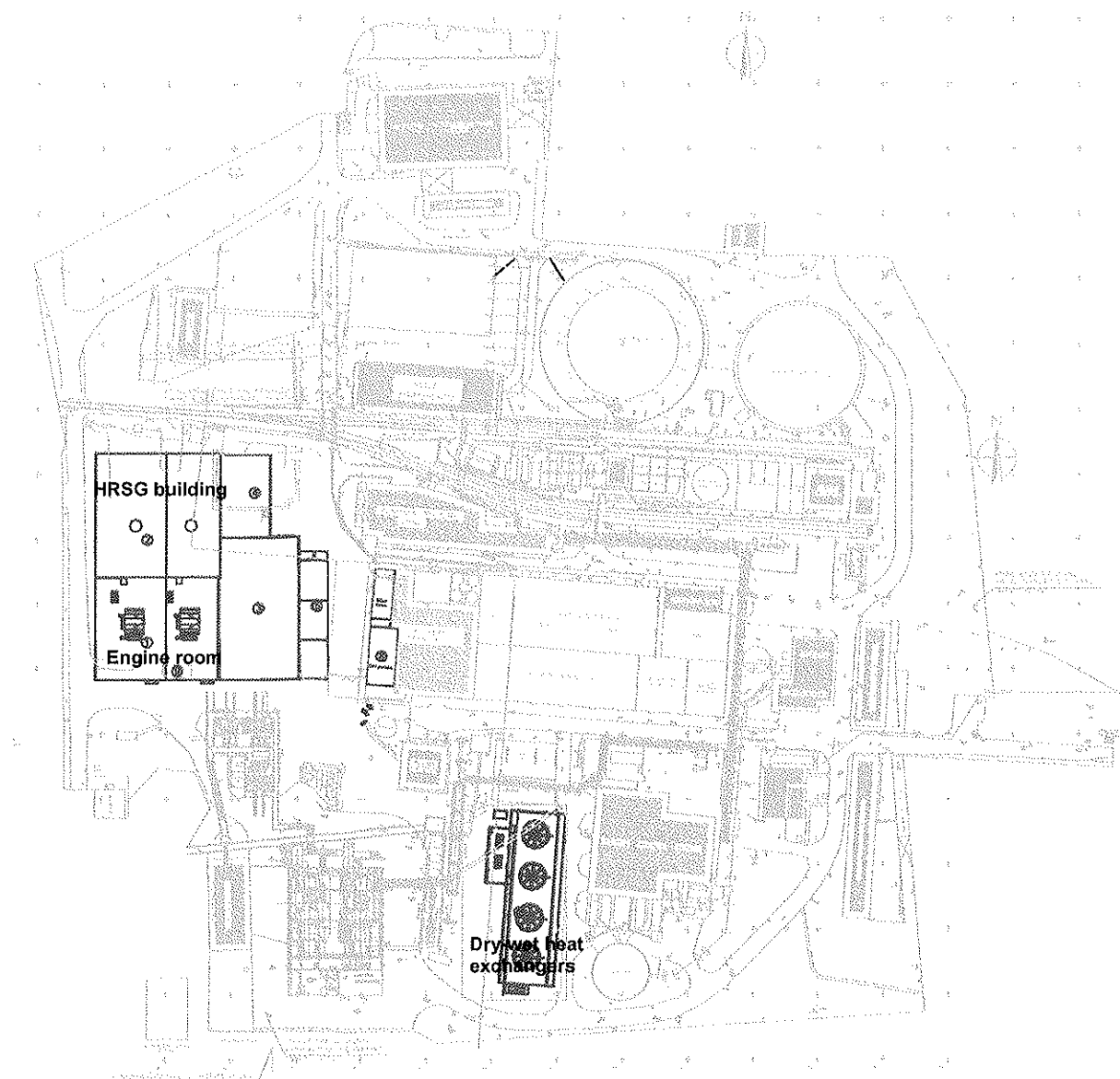


Figure 1.6-1: Layout of EL-TO Zagreb with new CCCPP with dry-wet heat exchangers
(A non-selected alternative)

1.6.2 DO-NOTHING ALTERNATIVE

If current consumption of heat and steam is analysed, it can be determined that with the existing units of EL-TO Zagreb security of end users supply is satisfactory. On the other hand, increase in consumption as well as the planned decommissioning of some units in the period from 2018 to 2023, makes supply of consumer severely compromised i.e. ultimately it will be no longer possible.

All this shows that construction of new unit is the necessity because only construction of new production units can meet the long-term environmental protection criteria and enable EL-TO Zagreb to freely fulfil obligations to heat and steam consumers.

1.7 LIST OF TYPES AND AMOUNTS OF SUBSTANCES REMAINED AFTER TECHNOLOGICAL PROCESS

1.7.1 EMISSIONS TO AIR

The basic emission pollutants are nitrogen oxides (NO_x), carbon monoxide (CO) and volatile organic compounds (VOCs) in much small amounts. Other emission pollutants, such as particulate matters PM₁₀ and sulphur dioxide occur in almost irrelevant amounts.

The emission limit values for CCCPP are related to two gases NO_x and CO, while for other substances, as it concerns very low emissions, no limit values are prescribed.

According to technical-technological solution, the CCCPP will use dry low NO_x combustion system/chamber (DLN). By this technique, the limit values for gas turbines prescribed in Croatian regulation (OG 117/12, 90/14) and in EU Directive for industrial emissions (2010/75 EU) can be achieved, as indicated in **tab. 1.7-1**.

Tab. 1.7-1: ELV for CCCPP (gas turbines) using gas fuels

Plant	Nitrogen oxides expressed as NO _x	Carbon monoxide CO
Gas turbines (CCCPP), using natural gas as fuel ^{(1) (2)}	50 ⁽¹⁾ mg/m ³	100 mg/m ³

⁽¹⁾ For one-cycle gas turbines, with efficiency higher than 35% - determined in accordance with load conditions according to ISO standards – ELV for NO_x is $50 \times \eta / 35$ where η is gas turbine efficiency, determined in accordance with load conditions according to ISO standards, expressed as a percentage.

⁽²⁾ ELVs are in mg/m³ and relate to the dry flue gas at temperature of 273 K and pressure of 101.3 kPa, for a given oxygen content of 15%.

For CCGT/gas turbines, ELV for NO_x and CO from **tab. 1.7-1** applies only for loads over 70 %.

At the plant load level of 70 to 100%, NO_x emission will amount to about 31 mg/m³, while CO emission will amount to 6.5 mg/m³, according to guarantees of one of the manufacturer.

In **tab. 1.7-2** annual emissions for different operating hours are given. Operation of turbines for 3500, 5000 and 7000 equivalent hours at maximum power per year is assumed.

*Tab. 1.7-2: Annual emissions for planned operating hours**

Pollutant	h/year (on rated power)		
	3500	5000	7000
	t/year		
NO _x	111.55	156.6	219.2
CO ⁽¹⁾	223.10	313.2	438.5

Pollutant	h/year (on rated power)		
	3500	5000	7000
	t/year		
CO ₂ ¹⁾	14.50	20.36	28.5
PM ₁₀	2.45	3.45	4.8
SO ₂	0.47	0.66	0.9
NM VOC	4.02	5.64	7.9

* Calculation of SO₂ based on measurements of S in natural gas, PM₁₀ and NMVOC from EMEP / CORINAIR factors

¹⁾ Based on ELVs, ²⁾ Based on expected emissions

Greenhouse gases emission amount from 190,611 t/year (3500 operational hours) to 395,185 t/year (7000 operational hours). In relation to greenhouse gas emissions in the Republic of Croatia in 2013, GGH emissions of new CCCPP represent 0.78% - 1.61% of total national greenhouse gas emissions and 1.05% - 2.18% of emissions from energy sector.

EBRD Performance Requirement 3 – Resource Efficiency and Pollution Prevention and Control

REQUIREMENTS	REALIZATION
Greenhouse gases	
<p>(14) The client's environmental and social assessment process will consider alternatives and implement technically and financially feasible and cost-effective options to avoid or minimise project-related greenhouse gas (GHG) emissions during the design and operation of the project. These options may include, but are not limited to, alternative project locations, techniques or processes, adoption of renewable or low carbon energy sources, sustainable agricultural, forestry and livestock management practices, the reduction of fugitive emissions and the reduction of gas flaring.</p> <p>(15) For projects that currently produce, or are expected to produce post-investment, more than 25,000 tonnes of CO₂-equivalent annually, the client will quantify these emissions in accordance with EBRD Methodology for Assessment of Greenhouse Gas Emissions. The scope of GHG assessment shall include all direct emissions from the facilities, activities and operations that are part of the project or system, as well as indirect emissions associated with the production of energy used by the project. Quantification of GHG emissions will be conducted by the client annually and reported to the EBRD.</p>	<p>Because of the purpose and positive effect of this project:</p> <ul style="list-style-type: none"> - replacement of old unit A (units B and K7) - district heating base unit in EL-TO Zagreb - reduced engagement of other units at the site - electricity generation will be secondary, new unit will be fully adapted to the requirements for heat and process steam delivery - destruction of "rigid" connection between electricity and heat generation, which characterizes the current EL-TO technological system. The new unit will enable higher generation of electricity outside the heating season <p>Also because of placing the project within the existing thermal-heating power plant with developed infrastructure (fuel supply, water supply, electricity, heat and process steam generation and supply to consumers) alternative project locations, techniques or processes, adoption of renewable or low carbon energy sources are not considered.</p> <p>GHG emission reduction is achieved by high efficiency of the new cogeneration combined cycle unit.</p>

1.7.2 EMISSIONS OF WASTEWATERS

During project usage, rainwater, process and sanitary waste waters will be generated, which after appropriate treatment will be discharged via existing mixed internal sewage system to the city of Zagreb public sewage system. Upon the CCCPP realization, existing amounts and types of waste waters from EL-TO will not be changed.

Process wastewater after being treated in the existing wastewater treatment plant will be discharged via internal sewage system in the public sewage system. Process wastewater contaminated with heavy metals will be delivered to a licensed waste collector, while the process wastewater from HRSG will be injected into hot water system - **tab. 1.7-3**.

Storm waters from paved surfaces (roads, handling areas) will be treated in the precipitator/separator and then discharged into the existing internal sewage system. Clean storm water will be discharged without treatment in an internal sewage system or on the surface of their own terrain in a way that does not endanger the neighboring plots.

Sludge (if it occurs) from transformer bund (oil sump) will be delivered to a licensed waste collector.

Sanitary wastewater will be discharged into existing mixed internal sewage system.

Tab. 1.7-3: Process wastewater treatment

Source	Quantity	Occurrence frequency	Treatment
1. Heat recovery steam generator (HRSG)/boiler			
1.1 HRSG blow down and desalting	3.0 t/h	Continuously	Injection into existing hot water system.
	7.0 t/h	During start-up in duration of 2 hours	Injection into existing hot water system.
1.2 Sampling from water-steam cycle	0.73 t/h	Continuously	Injection into existing hot water system.
1.3 Washing of flue gas side of the HRSG	5 m ³ /washing	Ones in three years, during regular maintenance	Collection in new 5 m ³ tank and delivery to a licensed waste collector.
1.4 HRSG stack drainage	2 m ³ /day	Continuously	Collection in new 20 m ³ tank and transport via new pumping station into existing units H and J wastewater collection basin. Then transport to existing neutralization basin and final discharge into existing mixed sewage system.
2. Gas turbine			
2.1 Washing of compressor blades	0.5 m ³ /washing	Ones in 3 months, during regular maintenance	Collection in new 5 m ³ tank and delivery to a licensed waste collector.

1.7.3 WASTE GENERATION

The waste will be generated during regular plant maintenance. It concerns waste packaging, various types of waste lubricating oils, waste insulation oils and heat transfer oils, wiping cloths

and materials. Various construction waste will be generated as well (metal waste, waste wires and cables, glass insulators and ceramic insulators). The waste management will be carried out, including separate waste collection by types, appropriate temporary disposal and delivery of individual types of waste to collectors with appropriate waste management authorizations.

EBRD Performance Requirement 3 – Resource Efficiency and Pollution Prevention and Control

REQUIREMENTS	REALIZATION
<p>Pollution prevention and control</p> <p>(8) The client's environmental and social assessment process will determine the appropriate pollution prevention and control methods, technologies and practices ("techniques") to be applied to the project. The assessment will take into consideration the characteristics of the facilities and operations that are part of the project, the project's geographical location and local ambient environmental conditions. The assessment process will identify technically and financially feasible and cost-effective pollution prevention and control techniques that are best suited to avoid or minimise adverse impacts on human health and the environment. The techniques applied to the project will favour the prevention or avoidance of risks and impacts over minimisation and reduction, in line with the mitigation hierarchy approach and consistent with GIP, and will be appropriate to the nature and scale of the project's adverse impacts and issues.</p> <p>(9) Clients will structure the projects to meet relevant EU substantive environmental standards, where these can be applied at the project level.³ Certain projects that, due to their nature and scale, would be subject to the EU Industrial Emissions Directive and will be required to meet EU Best Available Techniques (BAT) and related emission and discharge standards, regardless of location.</p> <p>(10) Where no EU substantive environmental standards at project level exist, the client will identify, in agreement with the EBRD, other appropriate environmental standards in accordance with GIP. In addition, projects will be designed to comply with applicable national law, and will be maintained and operated in accordance with national laws and regulatory requirements. When host country regulations differ from the levels and measures presented in EU environmental requirements or other identified appropriate environmental standards, projects will be expected to meet whichever is more stringent.</p> <p>(11) Projects involving new facilities and operations are expected to meet EU substantive environmental standards or other agreed environmental standards, and</p>	
<p>CCCPP will use dry low NO_x combustion system/chamber (DLN). By this method, the limit values for gas turbines prescribed in Croatian regulation (OG 117/12, 90/14) and in EU Directive for industrial emissions (2010/75 EU) can be achieved.</p> <p>NO_x and CO emissions to air will be continuously monitored by CEMS.</p> <p>Those techniques are Best Available Techniques (BAT) according to the Reference Document on Best Available Techniques for Large Combustion Plants, July 2006.</p> <p>Wastewaters (especially process) will be treated (neutralization/sedimentation, treated in oil separator/precipitator) on site or off-site and discharged via existing internal sewage system into public sewage system or recycled (injection into the existing hot water system). Emissions will be periodically monitored by authorized laboratory and it will be lower than prescribed ELV from regulation and IPPC permit respectively.</p> <p>Those techniques are Best Available Techniques (BAT) according to the Reference Document on Best Available Techniques for Large Combustion Plants, July 2006.</p> <p>As regarding noise emissions, project will comply with national standards for maximum permissible rating noise level in open space – chapter 3.9 and 5.3.</p>	

³ For the purpose of this PR, EU environmental standards can be applied at the project level where the EU secondary legislative document itself contains clear quantitative or qualitative requirements that are applicable at the project level (as opposed to the ambient level, for example).

REQUIREMENTS	REALIZATION
<p>national regulatory requirements from the outset. Projects that involve rehabilitation of existing facilities and/or operations are expected to meet the requirements of paragraph 9 and/or 10 over a reasonable period of time, to be determined by a formal assessment of their performance against the applicable standards.</p> <p>(12) In respect of projects located in the EU member states and the EU acceding, candidate and potential candidate countries which involve the rehabilitation of existing facilities and/or operations and where relevant EU substantive environmental standards have been identified, the time frame to achieve compliance with these standards should take into account any nationally agreed time frames. For projects in all other countries, the time frame for achieving compliance with EU substantive environmental standards should take into account local conditions and the cost of application, and should be consistent with the European Neighbourhood Policy and any bilateral agreements or action plans agreed between the EU and the relevant host country.</p> <p>(13) Throughout the project life cycle, the client will apply pollution prevention and control techniques consistent with the mitigation hierarchy approach to minimise potential adverse impacts on human health and the environment while remaining technically and financially feasible and cost-effective. This applies to the release of pollutants due to routine, non-routine or accidental circumstances.</p>	

2 LEGAL REQUIREMENTS

Upon the completion of accession negotiations with the European Union in June 2011, Croatia also adopted a vast majority of the Union *acquis* in its legislation. Adoption of the rest of the *acquis* is carried out by the Croatian accession to the EU on 1 July 2013.

For the project purposes, main legal requirements related to the environmental issues are defined by the following laws and bylaws:

- Environmental Protection Act (OG 80/13, 78/15), Regulation on Environmental Impact Assessment (OG 61/14)⁴, Regulation on Environmental Permit (OG 8/14) and Regulation on Information and Participation of the Public and Public Concerned in Environmental Matters (OG 64/08): prescribe the obligation of EIA procedure conduction and Environmental Permit (according to IED) obtaining for this type of projects. Prescribe the EIA and EP procedure and public participation.
- Air Protection Act (OG 130/11, 47/14), Regulation on Limit Values for Pollutant Emissions from Stationary Sources into the Air (OG 117/12, 90/14) and Ordinance on Monitoring Pollutant Emissions into the Air from Stationary Sources (OG 129/12, 97/13): prescribe the ELVs for CCGT, monitoring requirements and data delivery to competent authorities.
- Water Act (OG 153/09, 63/11, 130/11, 56/13, 14/14) and Ordinance on Wastewater Emission Limit Values (OG 80/13, 43/14, 27/15): prescribe water protection measures, wastewater ELV, monitoring requirements and data delivery to competent authorities.
- Act on Sustainable Waste Management (OG 94/13), Ordinance on Waste Management (OG 23/14, 51/14, 121/15, 132/15) and Ordinance on the Waste Catalogue (OG 90/15): prescribe measures for waste management; define type of waste by key number.
- Environmental Protection Act (OG 80/13, 78/15) and Regulation on the Prevention of Major Accidents involving Dangerous Substances (OG 44/14): prescribe protection measures for dangerous substances handling and storage, documentation for safety management and data of dangerous substances delivery to competent authorities.
- Noise Protection Act (OG 30/09, 55/13, 153/13) and Ordinance on Maximum Permissible Noise Levels in Areas where People Work and Live (OG 145/04): prescribe noise protection measures, maximum permissible noise levels in open space during project construction and operation and monitoring requirements.
- Act on Protection from Light Pollution (OG 114/11): prescribes light pollution protection measures.
- Nature Protection Act (OG 80/13): prescribes nature protection through conservation of biodiversity, landscape diversity and geodiversity and protection of natural areas. Ordinance on the Assessment of Acceptability for the Ecological Network (OG 146/14)⁵ and Regulation on Ecological Network (OG 124/13, 105/15) prescribe procedure of assessment of project impact on ecological network and define areas of ecological network in Croatia (Natura 2000).

⁴ Repealing Regulation on Environmental Impact Assessment (OG 64/08, 67/09).

⁵ Repealing Ordinance on the Assessment of Acceptability of Plans, Programs and Projects on the Ecological Network (OG 118/09).

- Ordinance on the Pollutant Emission Register (OG 87/15): prescribes obligation of emissions data delivery in the Pollutant Emission Register.

Other laws and bylaws important for the project:

- Ordinance on Heavy Transport (OG 119/07, 52/08), Act on Roads (OG 84/11, 22/13, 54/13, 148/13, 92/14) and Road Traffic Safety Act (OG 67/08, 48/10, 74/11, 80/13, 158/13, 92/14, 64/15): regulate heavy transport conduction and other issues related to the road traffic safety that could be disrupted during project construction.

3 BASELINE CONDITIONS

3.1 PROJECT LOCATION

Location of new CCCPP is the existing plant / power plant EL-TO Zagreb, located on c.p. 561/1 c.m. Trešnjevka. EL-TO Zagreb is located in the City of Zagreb, in the city district Trešnjevka - north. East of EL-TO Zagreb there is Dom sportova (sport hall) and winter swimming pool Mladost, residential buildings and a Four Points Panorama hotel. South of EL-TO Zagreb there are sports and recreational areas, to which are connected residential buildings, mainly family homes. West of EL-TO Zagreb there is recycling yard and facilities of company Water Supply and Drainage Ltd. Further is a space of Zagreb hockey association and Park pravednika među narodima, green areas respectively. North of EL-TO Zagreb there is a business building of Raiffeisen bank (RBA), Magazinska and Zagorska Street and international railway line M101⁶, behind which there are residential buildings and commercial buildings and facilities. EL-TO Zagreb location and its surroundings are presented in **figure 3.1-1**.

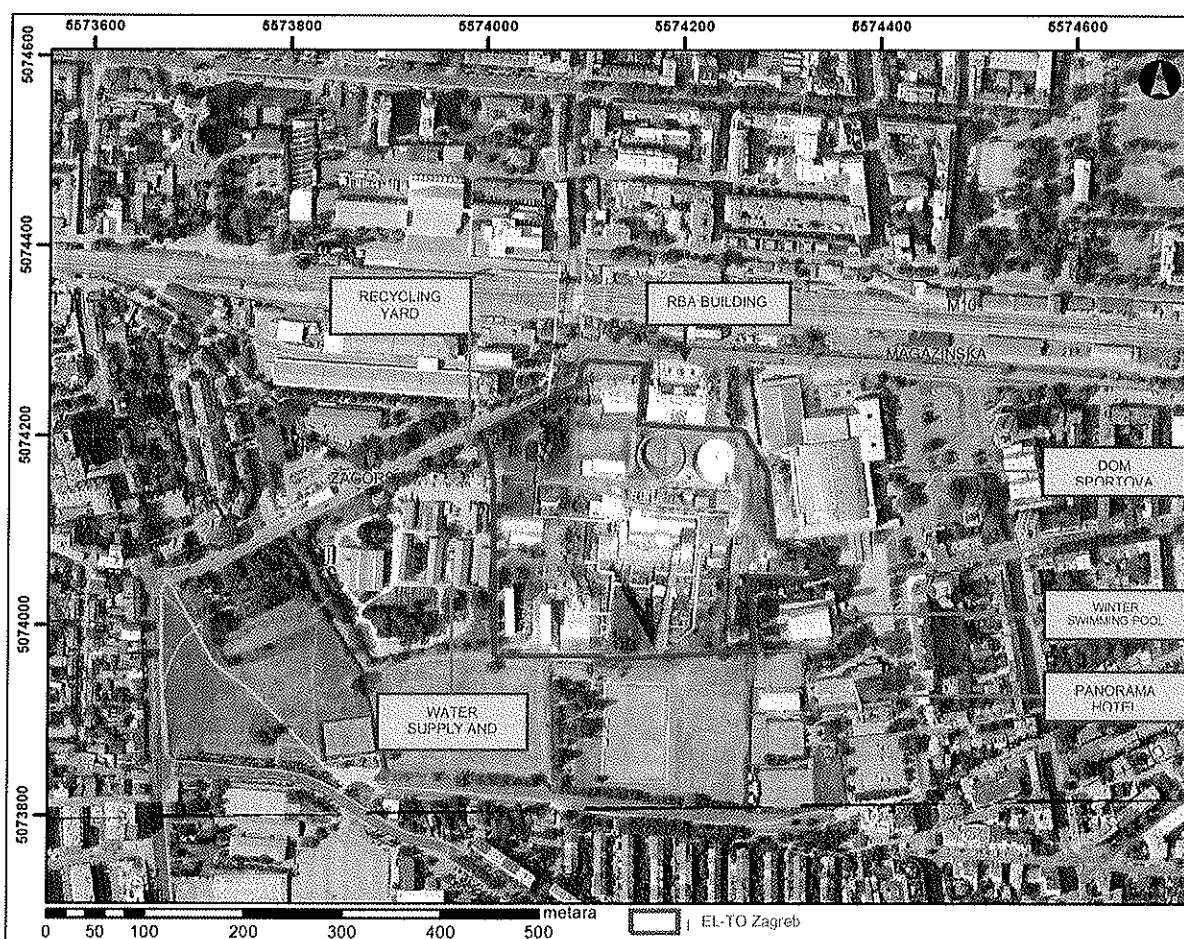


Figure 3.1-1: EL -TO Zagreb and its surroundings

⁶ International railway line (Dobova) – State border - Savski Marof - Zagreb Central railway station, part of RH1 corridor

3.2 AIR QUALITY

In Zagreb area, air quality is monitored at three stations of the national network (Zagreb-1, Zagreb-2 and Zagreb-3) and six stations of the city network (Đorđićeva ulica, Ksaverska cesta, Peščenica, Prilaz baruna Filipovića, Siget and Susedgrad) which locations are shown in **figure 3.2-1**. At the stations for special purpose the impact of certain pollutants is monitored. The impact of EL-TO gas turbines (units H and J) is monitored at the location Vrhovec (**figure 3.2-1**), the impact of landfilled Jakuševac is monitored at station in the immediate vicinity, while the impact of wastewater treatment plant is monitored at several measurement points around the Central unit for wastewater treatment plant Zagreb.



Figure 3.2-1: Air quality monitoring stations in relation to project location

Many years of measurements show that the level of pollution by sulfur dioxide, carbon monoxide, benzene, mercury and metals (Pb, Cd, As and Ni) in particulate PM10 at all Zagreb stations is below the limit values.

In Zagreb area there is a typical problem of urban air pollution associated with the exceedance of limit values for nitrogen dioxide, PM10 and PM2.5, and benzo(a)pyrene in PM10.

At Zagreb's monitoring stations, as well as in other parts of Croatia, exceedance of the target values for ozone were recorded, whereby there is a significant inter-annual variability predominantly conditioned by meteorological factors⁷.

In terms of the air impact of planned CCCPP the most important is condition of NO₂ air pollution in EL-TO vicinity. In **figure 3.2-2** the average annual concentrations of NO₂ at nine stations in Zagreb in the period from 2011 to 2014 are presented. Exceedance of limit value of average annual NO₂ concentrations occurs at measuring stations located in some of the busiest city roads, but most prominent in the city center (Đorđićeva) because of retention of pollution within the streets. At monitoring stations, where concentrations are monitored with automatic measuring devices, no exceedance of limit values of hourly concentrations greater than allowed⁸ has been recorded.

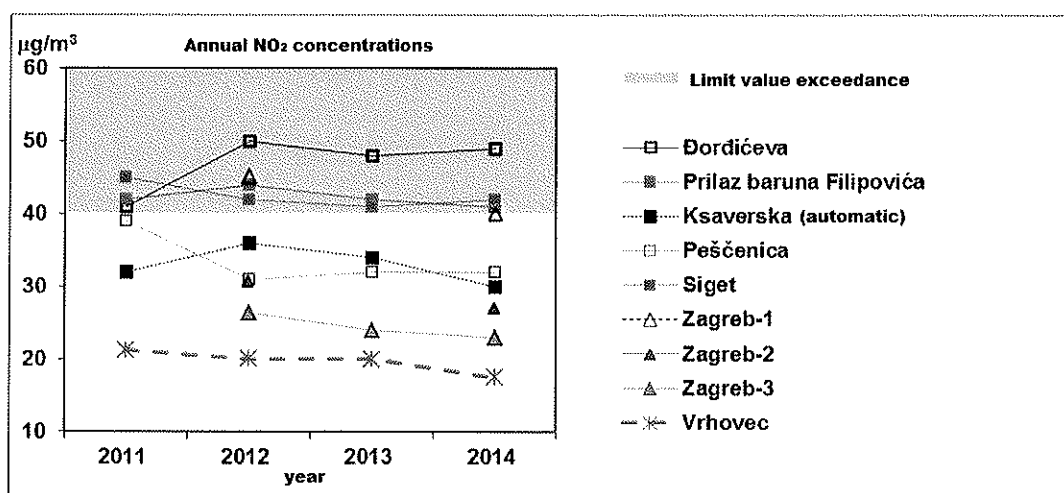


Figure 3.2-2: Annual NO₂ concentrations at Zagreb monitoring stations in period from 2011 to 2014⁹

The project location's (EL-TO) nearest monitoring stations are Prilaz Baruna Filipovića and Vrhovec (**figure 3.2-1**). Mentioned monitoring stations are about 800 meters distant. At the monitoring station Prilaz Baruna Filipovića average annual concentration is for about 20 µg/m³ higher than the concentrations at station Vrhovec, located in a residential area. Due to the distance between stations, we can say that they have the same level of "urban background pollution" and that this 20 µg/m³ is mainly a result of emissions of road traffic in the Prilaz Baruna Filipovića where tens of thousands of vehicles pass daily¹⁰.

⁷ The hot, dry summers with prolonged periods of high air pressure over a large area of Europe lead to increased concentrations of ozone. (EEA, 2013, Air Quality in Europe – 2014 report, EEA Report No 5/2014, European Environment Agency)

⁸ Limit value of 200 µg/m³ not to be exceeded more than 18 times in a calendar year.

⁹ Data sources: Annual air quality monitoring reports, IMI, EKONERG

¹⁰ Action plan for City of Zagreb air quality improvement

3.3 CLIMATE AND METEOROLOGICAL DATA

According to Köppen climate classification, Zagreb has a climate type Cfbwx". This code represents a set of indexes that indicate that Zagreb has a moderately warm rainy climate (C), with no dry periods (f), with less precipitation in cold season, (w), warm summers (b) and rainy periods in early summer and late autumn (x").

Characteristics of temperature and precipitation regimes are determined according to climate normals for the period from 1961 to 1990 at the meteorological station Zagreb - Maksimir.

Air temperature and precipitation

At the meteorological station Zagreb - Maksimir average annual temperature is 10.3 °C. The coldest month is January with an average temperature of -0.8 °C and the warmest is July with 20.1 °C in average. Annual average temperature and precipitation change is shown in **figure 3.3-1**. In the lowland regions of the continental Croatia there is a relatively large value of annual amplitude of monthly average values for which the station Zagreb - Maksimir is 20.9 °C.

The average annual precipitation at the meteorological station Zagreb - Maksimir is 852 mm. Annual average precipitation change shown in **figure 3.3-1** is continental type with maritime influence. Although most rainfall is in a warm part of the year, which is characteristic for continental type of precipitation regime, the appearance of secondary maximum in late autumn points to the maritime influence. In average, June is the month with the highest (100 mm) and February with the lowest (42 mm) precipitation.

Given the latitude and location in the interior of the continent, the snow is usual. At the station Zagreb - Maksimir for the period 1961-1990 the average was 35.2 days per year with snow cover. The snow is prevalent in the period from November to March and the most snow days are recorded in January (average 13.4 days).

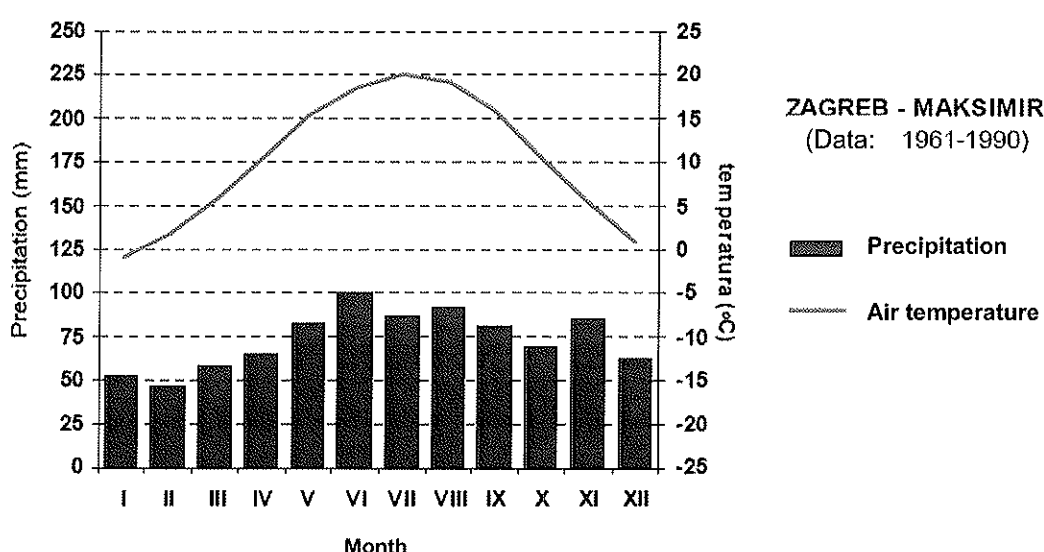
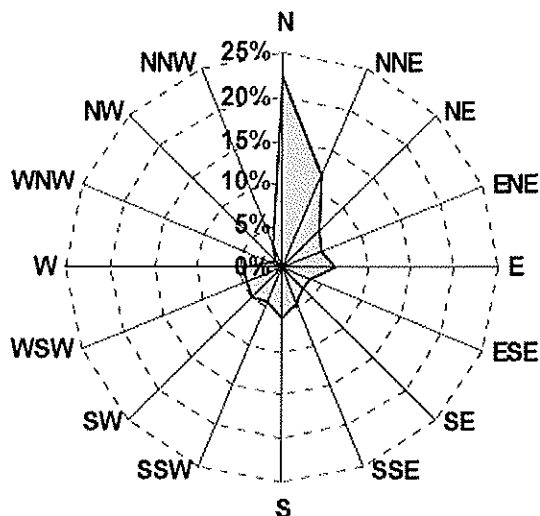


Figure 3.3-1: Annual air temperature and precipitation change
(Meteorological station Zagreb – Maksimir)

Wind

Specifics of the airflow regime in the wider area of Zagreb is that it is directed southwest-northeast. Wind rose for Zagreb – Maksimir station, obtained from data for the period 1978-1987, is shown in **figure 3.3-2**. In Zagreb prevails airflow from the northern quadrant, with prevailing winds in N and NE direction. In overall, winds from the northeast quadrant, directions from N to E, account for half of the cases. Among the winds with pronounced southern component, five-wind directions from SE to SW constitute twenty percent of the data.



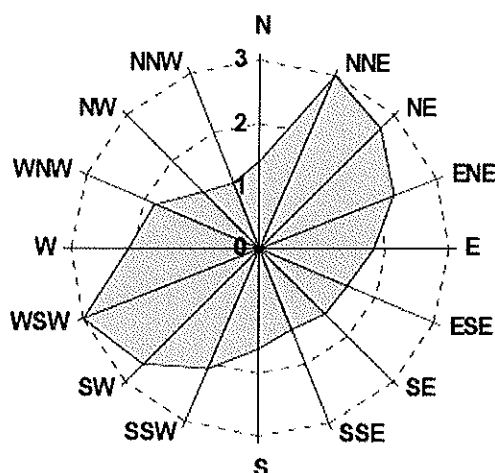
WIND ROSE Zagreb – Maksimir
(data 1978 – 1987)

Calms: 7%

Figure 3.3-2: Wind rose for meteorological station Zagreb - Maksimir

At the Maksimir station winds are generally weak to moderate. Average annual wind speed, depending on the direction, ranges between 1 and 3 m/s (**figure 3.3-3**). Because of channeling the flow in the Medvednica direction, the largest average speed have winds of northeast and southwest direction.

Calm, light winds with speed of less than 0.3 m/s occur in 7.3% of cases. The most frequently occurrence is early in the morning.



AVERAGE ANNUAL WIND SPEED (m/s)
PER DIRECTIONS
Zagreb – Maksimir
(data 1978 – 1987)

Figure 3.3-3: Average annual wind speed per direction for meteorological station Zagreb – Maksimir

3.3.1 CLIMATE CHANGE

Below are briefly described previously observed climate change and projections of climate change in the 21st century on the basis of regional climate simulation models¹¹.

A statistically significant increase in air temperature on the entire Croatian area in the period from 1961 to 2010 is determined, with an increase higher in the continental part than in the coastal area and Dalmatian hinterland. In relation to referent climatic period from 1961 to 1990, annual air temperature has been increased by 0.6°C in the period 1991-2001 and in the period 2000-2010 by 1.0°C in average in the Croatia¹². This statistically significant increase in annual air temperature is consistent with the observed global trends. The annual amount of precipitation in the period 1961 to 2010 shows a statistically significant reduction in precipitation in the mountainous region of Gorski Kotar and Istria and the southern coast. Statistically insignificant increase in precipitation was recorded in the eastern lowlands, while in other Croatian areas of there is statistically non-significant reduction in precipitation.

For the period from 2011 to 2040, projections are made under simulation of two emission scenarios¹³ by different climate models. For the SRES¹⁴ A2¹⁵ emissions scenario, the results of dynamic adjustment by regional climate model RegCM were analyzed and conducted by the Meteorological and Hydrological Service (MHS). For the SRES A1B¹⁶ emissions scenario, results show a relation to the simulation of various combinations of global and regional climate models implemented in the framework of the European project ENSEMBLES.

Simulation MHS RegCM and ENSEMBLES for the period 2011 - 2040 predict an increase in temperature in all seasons in entire Croatia. The largest increase in air temperature can be expected in the summer along the Croatian Adriatic coast and in its hinterland. However, according to MHS RegCM results, largest increase of about 1 °C can be expected in the northern Adriatic, while according to ENSEMBLES simulations, increase from 1.5 °C to 2 °C is to be expected in the central and southern part.

¹¹ 6th National Report of Republic of Croatia on Climate Change

¹² For Croatia, the spatial mean values were calculated as the arithmetic average of the decade temperature for 11 meteorological stations in Croatia. Decade temperature is the average for each decade. The first decade refers to the period of 1961-1970, and the last for period of 2001-2010.

¹³ Emission scenarios take into account assumptions about future demographic, social, economic and technological development on the global and regional levels.

¹⁴ SRES scenarios are defined in special IPCC report (Nakićenović N. i sur. (2000): *Special report on emission scenarios*. A special report of Working Group III of the IPCC. Cambridge University Press, Cambridge, page 599). SRES scenarios are used in 3rd and 4th IPCC report.

¹⁵ Scenario A2 predicts continual increase of world population, with regionally oriented economic development and technological change. This scenario represents the continuing growth of greenhouse gas emissions throughout the 21st century.

¹⁶ Scenario A1B which represents a balanced development of all energy sources is a variation of A1 scenario that predicts increase of the world population by the middle of the 21st century, followed by a gradual reduction of the population, but rapid economic growth in the 21st century. Scenario A1 predicts an integrated future world where there is a rapid expansion of new and efficient technologies, and subtype B denotes a balanced use of all energy sources. According to this scenario, emissions are also rising rapidly up to half of the 21st century followed by a slower decline in emissions.

Projections of future precipitation MHS RegCM and ENSEMBLES show significant seasonal and regional variability within Croatia in the near future (2011-2040). According to MHS RegCM simulations, most significant changes can be expected in the autumn precipitation amounts when most parts of Croatia can expect a reduction except in Slavonia where the model predicts a statistically significant increase in precipitation. The ENSEMBLES projections were made with a combination of 18 models, so the results are different in terms of the direction of seasonal trends¹⁷ and Croatian areas for which these changes relate. Most ENSEMBLES projections agree with assumption that in the autumn a reduction in the Dalmatian hinterland and mountain Croatia can be expected, and that in winter an increase in precipitation in northwestern Croatia and Kvarner can be expected.

The ENSEMBLES simulations predict an increasing impact of global warming by the end of the 21st century, with expected rise in temperature in all seasons, but most in the summer. The highest temperature rise is expected in central and southern Dalmatia where within a period from 2041 to 2070 the average summer temperature will be increased in the range 3 °C – 3.5°C, and more pronounced increase in summer temperatures ranging 4.5°C - 5 °C is expected in the period 2070-2099.

The ENSEMBLES simulations show that by the end of 21st century, growing parts of Croatia will be affected by more pronounced changes in precipitation. According to these projections, the impact of climate change on precipitation will manifest through increase of average total amount of precipitation in winter and reduction of total amount of precipitation in summer.

3.4 GEOLOGIC AND SEISMIC FEATURES

In the wider area of EL-TO Zagreb dominate deposits of alluvial layers of the first and second Sava terrace (changes coarse gravel and sand in the thickness of 10-25 m), proluvium (mainly coarse-grained gravel mixed with sand and clay, thickness not exceeding 10 m) and alluvial sediment of recent Sava flows (predominantly coarse-grained sand and gravel), which is with 1-1.5 m high terraced department separated from the first Sava terrace.¹⁸ At EL-TO Zagreb location, in period from December 2013 to January 2014, investigation works were carried out which included three exploration wells. Identified deposits are composed of: (1) black silty clay, sand with a lot of dust on the depth of 0-1 m, (2) brown clay, gravel at depths of 1-5 m, (3) brown clay, gravel, sand at a depth of 5-15 m, (4) blue-gray clay at a depth of 15-20 m (5) powder, sand with fractions of gravel, clay brown and blue-gray at depth of 20-30 m.¹⁹

In 1987, the seismic map based on so-called probabilistic process was made. Based on a database of earthquakes that occurred in the period 1901 to 1980, the maximum intensity of an earthquake that can be expected for different return periods was determined. According to this map, wider area of the project site is located within two seismic zones of 7 and 8 degrees MCS scale, for a return period of 100 years, within zone of 8 degrees MCS scale, for a return period of 200 years and within zone of 9 degrees MCS scale, for a return period of 500 years.

¹⁷ Some models predict the increase, and the other reduction of precipitation in the same area.

¹⁸ Source: Basic geological map of the Republic of Croatia (List Zagreb)

¹⁹ Source: The minutes of conducted geotechnical investigation works on the building construction of new combined-cycle cogeneration plant at EL-TO Zagreb site

In 2012, new maps were published, which express seismic risk by acceleration of the soil, not the intensity and for a return period of 95 or 475 years. New maps are made on the basis of modern data and methods and are comparable with maps of European countries that are in line with a set of regulations issued by the EU under the name Eurocode 8. In the wider area of EL-TO Zagreb horizontal peak ground acceleration of type A (agR) for a return period of $T_p = 95$ years expressed in units of the gravitational acceleration ($1\text{ g} = 9.81\text{ m/s}^2$) is between 0.12 and 0.14 g and for EL-TO Zagreb location that is 0.128 g.²⁰ For the return period of $T_p = 475$ years expressed in units of the gravitational acceleration ($1\text{ g} = 9.81\text{ m/s}^2$) is between 0.24 and 0.26 g and for EL-TO Zagreb location that is 0.252 g - **figure 3.4-1**.

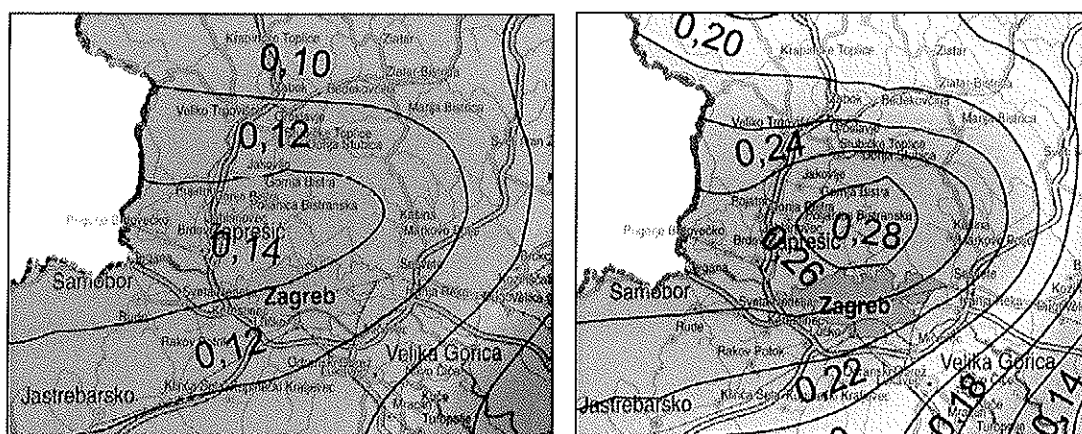


Figure 3.4-1: Seismic maps for wider area of EL-TO Zagreb for return period of 95 years (left) and 475 years (right)²¹

3.5 HYDROGEOLOGICAL FEATURES AND RELATION TO WATER SOURCE PROTECTION ZONES

The main reserves of groundwater in Zagreb are related to deposits of Quaternary age in the lowland area along the Sava River. These are mostly well-permeable gravel with layers of impermeable or poorly permeable finoclastic sediments. In the background of gravel there are clay - marl deposits of Plio Quaternary age, which limit the extent of an active aquifer to depth. Deposits of Quaternary age were deposited in morphologically very irregular area of separated deep pools. Investigation works carried out in the period from December 2013 to January 2014 at EL-TO Zagreb, determined the level of groundwater at least 5.5 m below the surface¹⁹.

Location of EL-TO Zagreb, as well as the greater part of Zagreb, is in the III. zone of sanitary protection of water sources Stara Loza, Sašnjak, Žitnjak, Petruševac, Zaprude and Mala Mlaka. Zones of sanitary protection in Zagreb are shown in **figure 3.5-1**.

²⁰ Source: Earthquake map of the Republic of Croatia territory

²¹ <http://seizkarta.gfz.hr/karta.php>

Construction of new units for heat and electricity generation is not prohibited in this zone; however, special attention is needed in plant design and operation in order to protect groundwaters in terms of safe storage of hazardous substances and their manipulation, proper waste management, wastewater treatment, waterproof drainage system and other measures to protect groundwater.

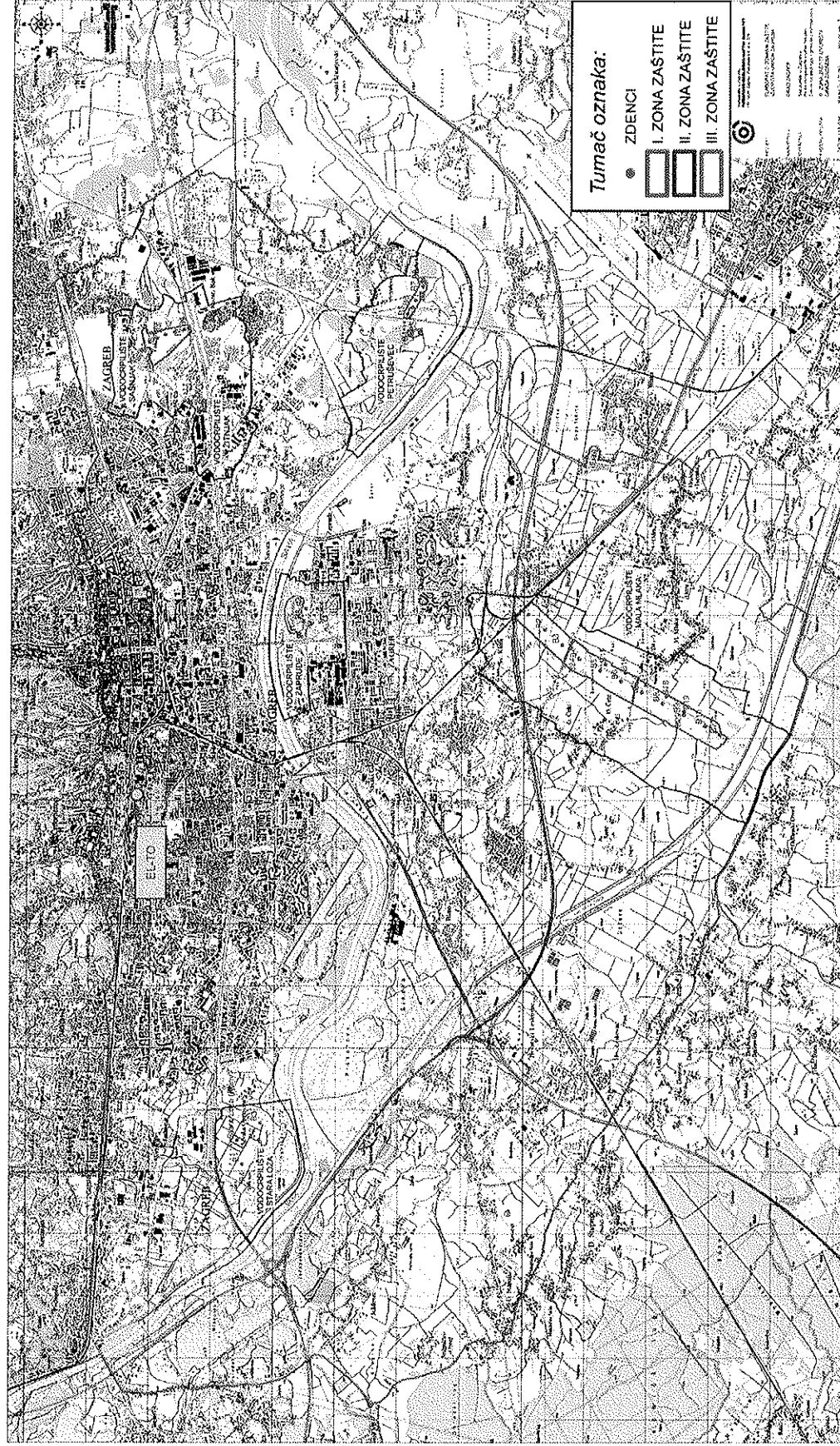


Figure 3.5-1: Zones of sanitary protection in Zagreb²²

²² Source: Decision on water source Stara Loza, Sašanjak, Žitnjak, Petruševac, Zaprude and Mala Mlaka protection (OG City of Zagreb 21/14)

3.6 HYDROLOGICAL CHARACTERISTICS

The main watercourse in the area of Zagreb is river Sava. Next to it, in Zagreb area there are other surface water bodies - lakes and streams. On EL-TO location there are no surface water bodies. The nearest surface water body is a stream located west from EL-TO Zagreb, at a distance of about 1 km.

The Sava River is of great importance for events in the aquifer of area location. In Zagreb Sava river has features of the middle course river with bed cut into alluvial deposits. From the confluence of Sutla to Oborovo total flow length is approximately 73 km and the main river bed has a width of about 100 m. From Zaprešić to Ivanja Reka river Sava is separated from the hinterland by dikes for flood protection. Therefore, for EL-TO location the probability of flooding is low²³ - **figure 3.6-1**. Upstream and downstream of that area Sava is overflowing in a wide area with many blind backwaters.

Rainfall in its catchment area mainly affects water levels of Sava, so high water after snow melting in the Alps mountains is frequent. The largest measured flow of Sava near Zagreb of 3.126 m³/s was recorded in October 1964. Mean flow of the Sava River for the period 1926-1988 amounted 314 m³/s, and for the period 1975-1995 - 308 m³/s. The lowest recorded flow occurred in 1947, 47.5 m³/s, and in 1971, 53.5 m³/s. It is a quite large ratio of minimum and maximum flow (1:65). The above mentioned classifies Sava in a group of rivers with very variable flow dependent on hydro-meteorological conditions, which has a direct impact on the change of groundwater level in the impact area of the river.

²³ Return period greater than 100 years (return period of 100 years is for flooding with medium probability of occurrence).

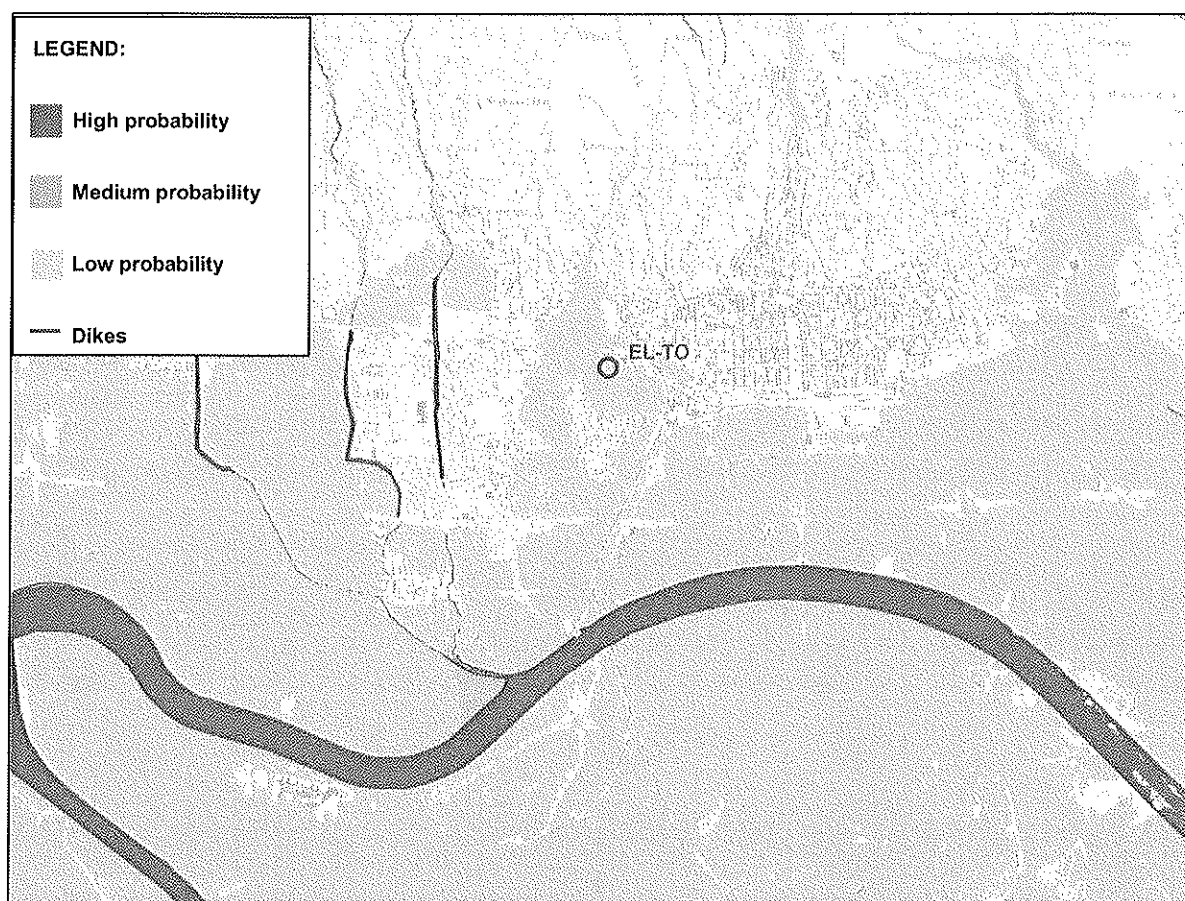


Figure 3.6-1: Map of probabilities of flooding²⁴

3.7 WATER

3.7.1 GROUNDWATER QUALITY

According to the Croatian waters' Report of the state of groundwaters in 2013, at stations in Zagreb area groundwater quality is as follows²⁵: Given the concentration of nitrates and active substances in pesticides a good chemical state has been determined at all stations on which those parameters were monitored. With respect to specific pollutants - dissolved metals (arsenic, cadmium, lead and mercury), chlorides, sulfates and orthophosphates good chemical state has been determined at all stations on which those parameters were monitored.

With respect to specific pollutants - ammonia and artificial synthetic substance, on two monitoring stations at inflow area of water wells Kosnica bad chemical state with regard to

²⁴ Source: <http://korp.voda.hr/>

²⁵ For groundwater only data relating to the quality standards of the Regulation on water quality standards (OG 73/13, 151/14, 78/15), are presented.

ammonia has been determined, and at two monitoring stations at inflow area of water wells Žitnjak bad chemical state has been determined regarding the sum of trichloroethene and tetrachloroethene. At other stations on which these parameters have been monitored, good chemical state is achieved. With respect to conductivity, good chemical state has been determined at all stations.

3.7.2 SURFACE WATER QUALITY

At monitoring stations of surface waters Sava - Jankomir and Sava - Petruševac, given the specific pollutants and physical-chemical quality elements, good ecological state²⁶ and good chemical state²⁷ is estimated in 2013. In terms of quality of cyprinid waters segment, water state at two stations was estimated as good.

3.7.3 WATER SUPPLY

Process water is supplied from separate water intake - water well Knezija with six wells. The EL-TO Zagreb has a water permit to use water from the water well at the Horvaćanska cesta site for technological purposes in quantities of 1,735,000 m³ per year (4750 m³ per day). Permissible operating maximum is 55 l/s. The quality of raw well water is given in **tab. 3.7-1**.

Tab. 3.7-1: Raw well water quality

Temp:	14 °C	HCO ₃ ⁻ :	446 mg/l
pH:	around 7	Cl ⁻ :	41 mg/l
TOC:	0,1 mg/l	SO ₄ ²⁻ :	48 mg/l
Ca ²⁺ :	148 mg/l	NO ₃ ²⁻ :	33 mg/l
Mg ²⁺ :	22 mg/l	SiO ₂ ²⁻ :	10 mg/l
Na ²⁺ :	19 mg/l		

For the abstraction of water for technological purposes in EL-TO Zagreb, HEP d.d. signed with the State Directorate for Water Management a Contract for concession for water abstraction for technological purposes (from 17 March 1999), which, as well as permit, is valid for a period of 20 years.

The extracted water is used as technological/process and cooling water. From water wells water is transported by industrial pipeline of 2.3 km length, to the EL-TO plant (from the south side), to chemical water treatment system. This water is used for preparation of demineralized water.

²⁶ Ecological state estimation has the label of intermediate level of reliability since there is no assessment of biological quality elements.

²⁷ The chemical state of surface water refers to their load with priority hazardous substances for which at the EU level, in Directive 2008/105/EC are given the standards of quality, which are transferred to our regulations governing water quality standards. The estimation of the chemical state has an intermediate level of reliability, which means that the data are limited or insufficient for some or all priority substances discharged (less than 12 data).

For the purposes of water preparation, in 2009 a new chemical water treatment plant was put into operation, with the capacity of $3 \times 150 \text{ m}^3/\text{h}$. It consists of three ion exchange lines with ion exchange resins in a fluidized bed, as well as associated equipment for production of demineralized water and demi water tank (1000 m^3).

In process of raw well water demineralization, ion exchange resins is used (cation, anion and inert), and for their regeneration chloride acid (HCl) and sodium hydroxide (NaOH) solution is used.

Demi water after being heated in the thermal water treatment plant is used for supply of high-pressure steam generator (feed water) to produce process steam and electricity and additionally of hot water pipelines for hot water boilers (for heating the Western part of Zagreb).

For cooling of generators and other parts of plant, closed system of cooling water with air-cooled heat exchangers is used. In the system there is about 150 m^3 of cooling water in recirculation, which is periodically refilled. Eventual surpluses from the system can (after cooling) be discharged into sewer.

For sanitary purposes water from the city water supply system is used via two connections (on average $<1\%$ of the amount of well water for process and cooling purposes).

In exceptional cases (in case of long shutdown of well station) for the production of demineralized water, water from the city water supply system can be used. It is supplied through the pipeline $\varnothing 200 \text{ mm}$ in amount of about $250 \text{ m}^3/\text{h}$. By shut-off valves system, mixing of well's water and water from the city water supply system is disabled.

Water from the city water supply system is also used in hydrant network. Water for firefighting is supplied by two connections from the water supply network of the City water supply system of which one is reserve.

Water consumption in EL-TO Zagreb in period 2009 – 2012 is given in **tab. 3.7-2**.

Tab. 3.7-2: Annual water consumption in EL-TO Zagreb in period 2009 – 2012

Water consumption, m^3/year	Well water – process and cooling water	City water supply system – sanitary water
2009	1,493,812	15,657
2010	1,275,740	12,490
2011	1,117,140	25,359
2012	1,064,012	27,696

3.7.4 WASTE WATER MANAGEMENT

At EL-TO plant location, mixed internal sewage system is constructed, which includes:

- sanitary wastewaters,
- stormwaters from traffic areas and roofs,
- oily stormwaters and
- industrial wastewaters.

Sanitary wastewaters are discharged through a siphon into the existing mixed internal sewage system.

Stormwaters from the asphalt surfaces of roads by longitudinal and cross fall are drained through the sink with precipitator in manholes and by connecting pipes in the existing route of mixed sewage. Roof waters from buildings are collected by horizontal and vertical gutters and through manholes drained into the mixed internal sewage system.

After pretreatment of certain types of wastewaters, they are discharged via mixed internal sewerage system into the public sewerage system.

At EL-TO Zagreb location, wastewaters are discharged via two outlets (**figure 3.7-2**):

- K1 (shaft east – 1) discharge of sanitary, process, cooling and storm wastewaters (cleaned, oiled, potentially polluted)
- K2 (shaft south – 2) discharge of stormwaters in case of overload of K1 outlet.

At EL-TO Zagreb location, two wastewater treatment plants are in operation (see **figure 3.7-2**):

- Plant for wastewater treatment from regeneration of ion exchange resins (wastewaters from chemical water treatment plant). The plant consists of five neutralization basins (with capacity of 100 m³ each), and two sedimentation basins (150 and 100 m³) with transitional basin and associated pumps. In the neutralization basins and after the pump, pH value is continuously measured.
- Plant for oily wastewaters treatment from „mazutno gospodarstvo“ (oily wastewater from the fuel unloading station and condensate from the fuel heater). The plant contains oily water separator with two separators connected in series. Capacity of separation basin is nominally 45 m³/h and maximum 90 m³/h. In separation basin, rotary cooler of condensate from „mazutno gospodarstvo“ is located as well. In the treatment procedure coagulator of oil is added. The sediments (sludge) from wastewater treatment and from oil-water separator as hazardous waste is handed over to the person authorized for management of this type of waste.

Wastewaters from the restaurant, before being discharged into the sewage, pass through the grease trap. Sanitary wastewaters are not treated before being discharged into the internal sewage system.

Wastewaters of the city of Zagreb are discharged to Sava river after being treated in central wastewater treatment plant (CWTP) located in east part of Zagreb - **figure 3.7-1**. CWTP has primary and secondary treatment stages (mechanical and biological treatment). 3rd stage (removal of phosphor and/or nitrogen) is in project phase and it has to be in operation till 31st of December 2018 according to legal requirements.



Figure 3.7-1: Sewage and water supply network in city of Zagreb²⁸

²⁸ Source: <https://geoportal.zagreb.hr/karta>

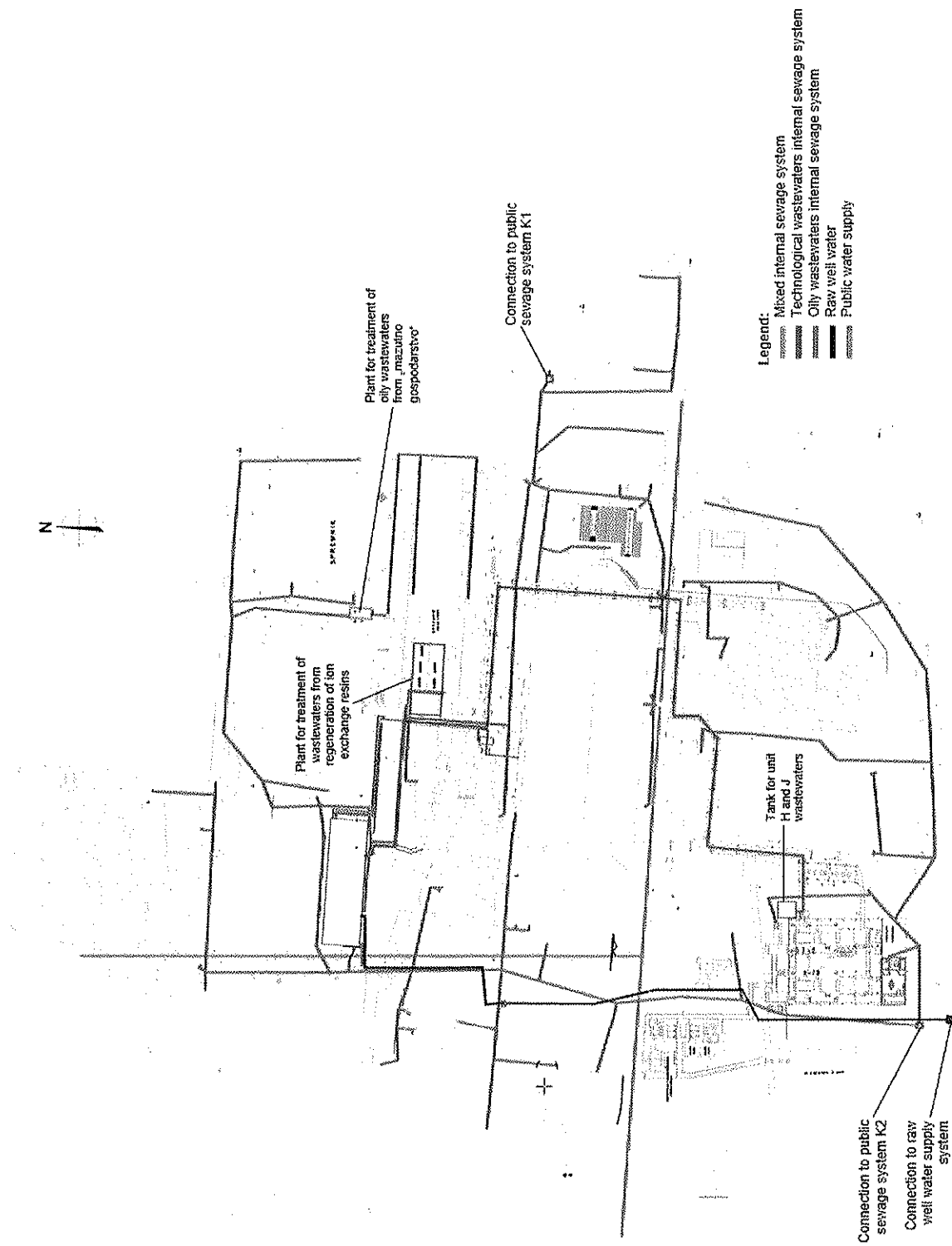


Figure 3.7-2: Water supply and wastewaters sewage system in EL-TO Zagreb

3.8 EMISSIONS TO AIR

In EL-TO Zagreb emissions of air pollutants were decreased in recent years as a result of reduced use of heavy fuel oil as fuel for boilers. This trend is expected to continue due to necessity of using liquid fuel with less than 1% sulfur, as well as complete replacement of liquid fuel with natural gas.

Annual emissions in the air from EL-TO production units in the period 2009 – 2015 are given in **tab. 3.8-1** - **tab. 3.8-3**. Annual emission trend is shown in **figure 3.8-1**.

Tab. 3.8-1: Annual NO_x emissions (t/year) in the air from EL-TO Zagreb in period 2009 – 2015

Year	Unit A	Unit B	K-7	VK-3	VK-4	Units H and J	TOTAL
2009	59.90	138.02	10.39	27.39	-	683.60	919.30
2010	46.05	121.44	6.49	11.44	-	724.90	910.32
2011	31.33	94.84	2.64	3.59	3.05	661.94	797.39
2012			120.87			719.22	840.09
2013			84.27			719.19	803.46
2014			86.36			520.02	606.38
2015			121.47			360.60	482.07

Tab. 3.8-2: Annual SO₂ emissions (t/year) in the air from EL-TO Zagreb in period 2009 – 2015

Year	Unit A	Unit B	K-7	VK-3	VK-4	Units H and J	TOTAL
2009	400.05	1088.81	22.14	128.70	-	14.97	1654.67
2010	189.39	714.91	2.55	45.71	-	16.01	968.57
2011	145.77	612.94	0.91	18.46	23.43	15.12	816.63
2012			529.73			15.52	545.25
2013			177.21			15.15	192.36
2014			167.22			10.77	177.99
2015			253.30			7.7	261.00

Tab. 3.8-3: Annual dust emissions (t/year) in the air from EL-TO Zagreb in period 2009 – 2015

Year	Unit A	Unit B	K-7	VK-3	VK-4	Units H and J	TOTAL
2009	10.51	22.15	0.61	2.36	-	3.09	38.71
2010	6.05	16.00	0.18	0.99	-	3.31	26.53
2011	4.12	11.16	0.08	0.35	0.14	2.96	18.80
2012			10.94			3.20	14.14
2013			7.65			0.98	8.63
2014			7.78			0.69	8.47
2015			9.73			1.78	11.51

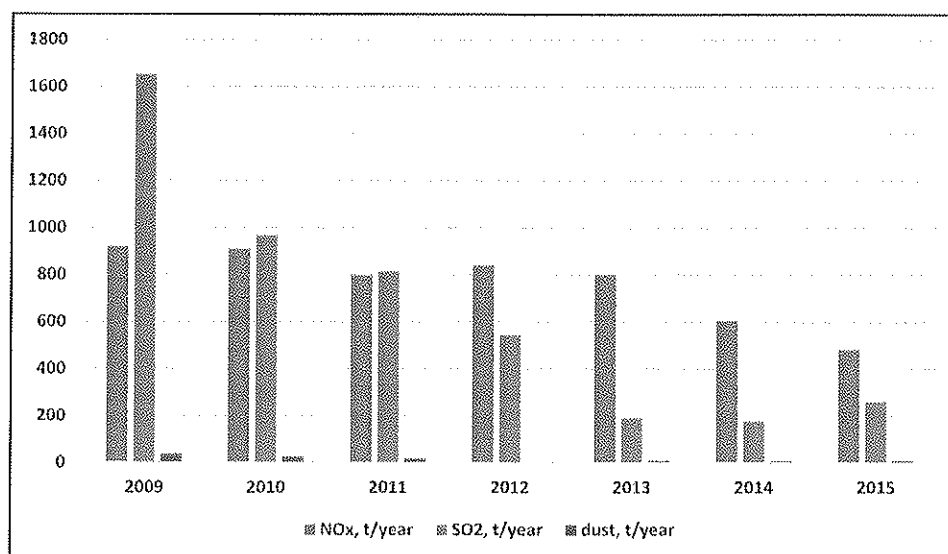


Figure 3.8-1: EL-TO Zagreb annual air emissions trend in period 2009-2015

Obtaining of IPPC permit for the existing units is in the process. Up to 31 December 2017, higher ELVs are set for EL-TO production units (higher than ELVs for existing large combustion plants according to the Regulation on Limit Values for Pollutant Emissions from Stationary Sources into the Air (OG 117/12, 90/14) and Industrial Emissions Directive) given the transitional period for harmonization of the Treaty of the Republic of Croatia Accession to the European Union (Official Gazette - International Treaties No. 2/2012 of 28 March 2012).

Emission limit values (ELVs) for existing EL-TO units are given in **tab. 3.8-4 – tab. 3.8-6**.

Tab. 3.8-4: ELVs of units K-6, K-7, K-8, K-9 and WK-3

Natural gas		From 1 January 2016	From 1 January 2018
NO _x	mg/m ³	300	100
CO	mg/m ³	100	100
SO ₂	mg/m ³	35	35
Dust	mg/m ³	5	5
Fuel oil		From 1 January 2016	From 1 January 2018
NO _x	mg/m ³	675	150 / 200*
CO	mg/m ³	175	100
SO ₂	mg/m ³	1700	200 / 250*
Dust	mg/m ³	75	20 / 25*

* Depends on number of units in operation

Tab. 3.8-5: ELVs of unit WK-4

Natural gas		From 1 January 2016	From 1 January 2018
NO _x	mg/m ³	100	100
CO	mg/m ³	100	100
SO ₂	mg/m ³	35	35
Dust	mg/m ³	5	5

Fuel oil		From 1 January 2016	From 1 January 2018
NO _x	mg/m ³	400	150 / 200*
CO	mg/m ³	175	100
SO ₂	mg/m ³	350	200 / 250*
Dust	mg/m ³	30	20 / 25*

* Depends on number of units in operation

Tab. 3.8-6: ELVs of units H and J

Natural gas		From 1 January 2016	From 1 January 2023
NO _x	mg/m ³	300	50
CO	mg/m ³	100	100
SO ₂	mg/m ³	35	35
Dust	mg/m ³	5	5

3.9 NOISE

Noise levels in the open space, related to noise emissions of existing units of EL-TO Zagreb, were measured for the purpose of Environmental Impact Assessment Study for new CCCPP project in January 2014 and for the purpose of IPPC permit obtaining in March 2016²⁹.

Maximum permissible rating³⁰ noise levels in open space are given in Ordinance on Maximum Permissible Noise Levels in Areas where People Work and Live (OG 145/04). Those levels depend on noise zone of the project in subject and its vicinity. Noise zones are related to the use of space determined in spatial planning documents. In **tab. 3.9-1** maximum permissible rating noise levels in open space according to the Ordinance (OG 145/04) are given.

Tab. 3.9-1: Maximum permissible rating noise levels in open space

Noise zone	Space use	Maximum permissible rating noise level L _{RAeq} (dB(A))	
		(L _{day})	(L _{night})
1	Zone intended for rest, recovery and medical treatment	50	40
2	Zone intended only for housing and residence	55	40
3	Zone of mixed, predominantly residential use	55	45
4	Zone of mixed, predominantly business use with housing	65	50
5	Zone of commercial use (manufacturing, industry, warehouses, services)	On the border of the building plot in the zone noise should not exceed 80 dB (A)	

²⁹ Report on noise measurement in open space, SONUS Ltd, March 2016

³⁰ Rating level: each predicted or measured acoustic level with added adjustment.

Adjustment: any value that is added to the predicted or measured acoustic level to take into account some noise features.

Noise zone	Space use	Maximum permissible rating noise level L_{RAeq} (dB(A))	
		(L_{day})	(L_{night})
		On the border of this zone noise should not exceed the permissible levels of the zone with which it borders	

Measurement in January 2014 is conducted at two measuring points, while measurement in March 2016 at 16 measuring points – **figure 3.9-1**. Measurements are conducted during, related to noise protection, critical night period.

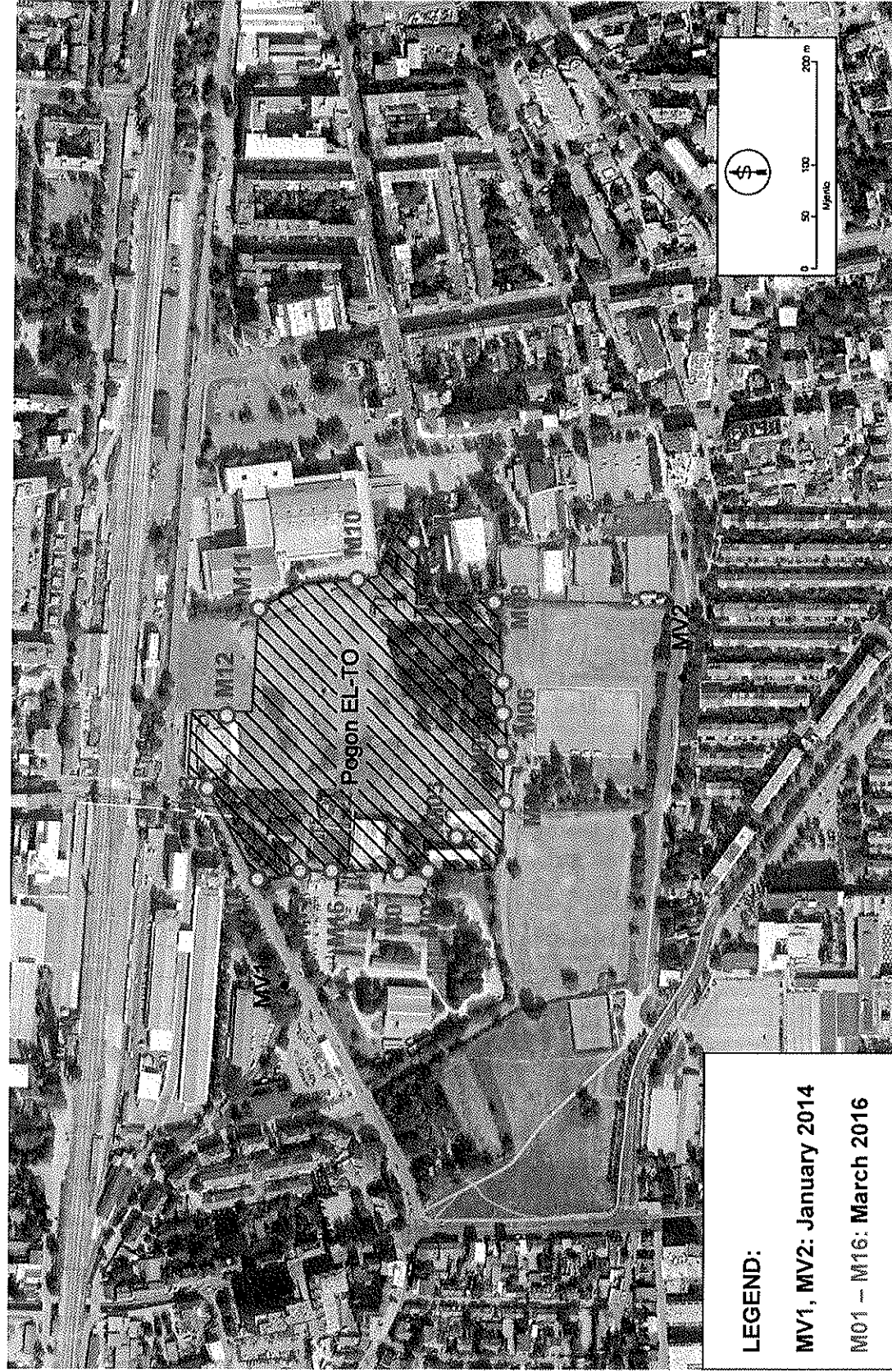


Figure 3.9-1: Distribution of noise measuring points

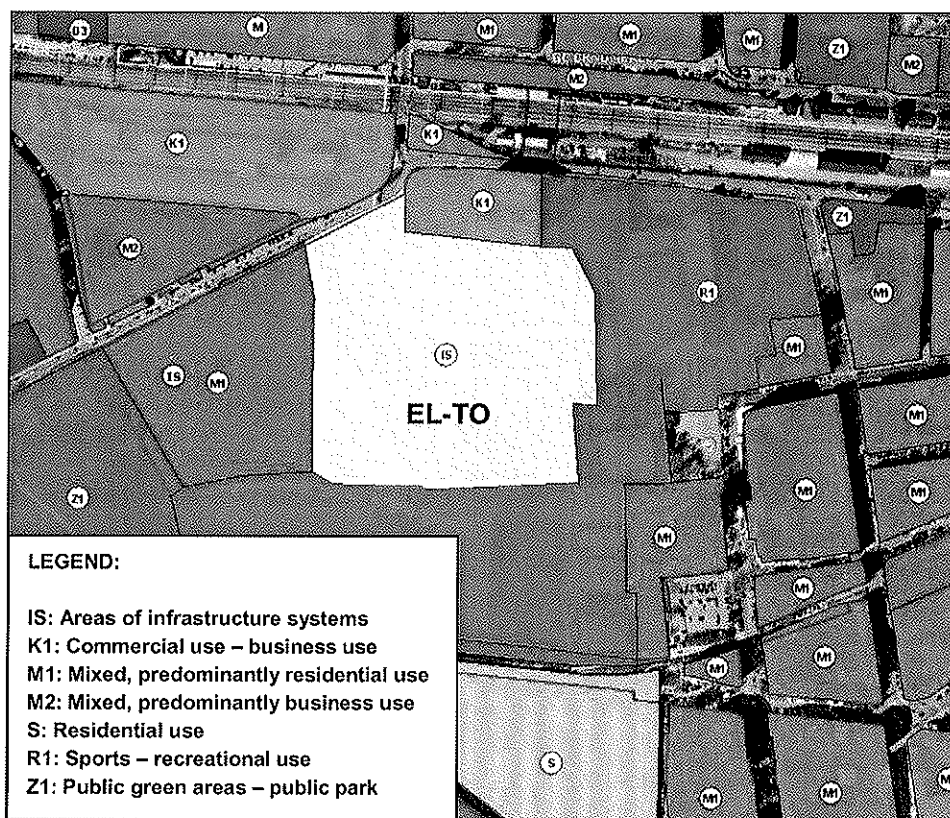


Figure 3.9-2: Spatial use in EL-TO surroundings according to GUP Zagreb³¹

According to **figure 3.9-2**, measuring points are in the following noise zones:

- MV1: zone 4 (M2),
- MV2: zone 2 (S),
- M03 – M13: zone 5 and
- M01, M02, M14 – M16: zone 3 (M1).

In **tab. 3.9-2** noise measuring results are given.

Tab. 3.9-2: Measured equivalent noise levels

Measuring point	$L_{A,eq}$ (dB(A))	k (dB)	$L_{RA,eq}$ (dB(A))	Max limit L_{night} $L_{RA,eq}$ (dB(A))
MV1	59			50
MV2	52			40
M01	52.8	-	52.8	45
M02	53.3	-	53.3	45
M03	60.9	-	60.9	80
M04	50.0	-	50.0	80
M05	57.6	-	57.6	80
M06	53.9	-	53.9	80
M07	54.9	-	54.9	80
M08	56.7	3	59.7	80

³¹ Source: <https://geoportal.zagreb.hr/karta>

Measuring point	$L_{A,eq}$ (dB(A))	k (dB)	$L_{RA,eq}$ (dB(A))	Max limit L_{night} $L_{RA,eq}$ (dB(A))
M09	52.0*	-	52.0*	80
M10	61.3	-	61.3	80
M11	57.2*	-	57.2*	80
M12	48.1	-	48.1	80
M13	53.8	-	53.8	80
M14	46.2	-	46.2	45
M15	46.6*	-	46.6*	45
M16	51.5*	-	51.5*	45

Noise levels measured in points M09, M11, M15 and M16 are dictated by noise from the environment that could not be isolated. In other points, measured noise levels are result of EL-TO Zagreb operation.

Noise levels measured in points MV1, MV2, M01, M02, M14 – M16 exceed maximum permissible levels for the night period and are below the maximum permissible levels for the day period.

3.10 LANDSCAPE FEATURES

Location of the project is within the EL-TO Zagreb, in the area of industrial subtype of cultural landscape. EL-TO Zagreb is located within the overall cultural landscape completely built urban areas of the western part of Zagreb, where there are alternate elements of industrial landscape, residential and commercial buildings of various volumes and transport corridors. **Figure 3.10-1** shows view from the air on the subject area.

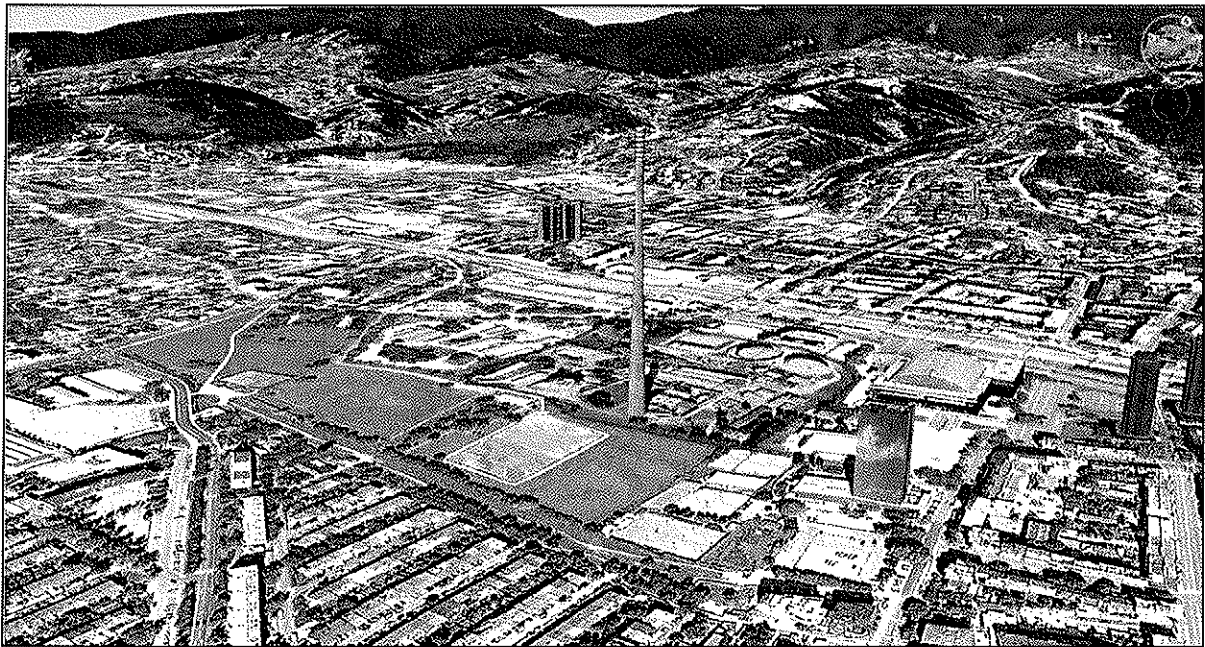


Figure 3.10-1: View of the project area with individual elements in 3D

3.11 TRANSPORTATION SYSTEM

3.11.1 ROAD TRAFFIC

Major international and national routes pass through Zagreb area as it is on the transport hub between Central and Southeast Europe and Adriatic Sea - **figure 3.11-1 (right)**. The road network in the City is very developed. Public transport in Zagreb consists of bus and tram transport and taxi transport.

The location of EL-TO Zagreb is well connected to the transportation infrastructure of Zagreb and Republic of Croatia. On the north side next to the location there are heavy traffic roads Magazinska and Zagorska - **figure 3.11-1 (left)**.

Through city road network and city bypass, EL-TO has access to many state roads and highways - **figure 3.11-1 (right)**:

- D1 B.C. Macelj – Krapina – **Zagreb** – Karlovac – Gračac – Knin – Brnaze – Split (D8)
- D3 B.C. Goričan – Čakovec – Varaždin – Breznički Hum – **Zagreb** – Karlovac – Rijeka (D8)
- A1 **Zagreb** (hub Lučko, A3) – Karlovac – Bosiljevo – Split – Ploče – Opuzen – state border with Bosnia and Herzegovina) and BiH border– Dubrovnik
- A2 B.C. Macelj – Trakošćan – Krapina – **Zagreb** (hub Jankomir, A3)
- A3 B.C. Bregana – **Zagreb** – Slavonski Brod – B.C. Bajakovo
- A4 B.C. Goričan – Varaždin – **Zagreb** (hub Ivanja Reka, A3)

At EL-TO site there are internal roads. The location can be accessed by four road entrances / exits, three on the north and one on the east side (these are also the fire accesses), as can be seen on **figure 1.3-1**.

3.11.2 RAILWAY TRAFFIC

The railway corridor lines make the main backbone of the Zagreb railway junction (Corridor RH1 - a former Pan-European Corridor): railway line M101 State border - Savski Marof - Zagreb Main Station and the railway line M102 Zagreb Main Station - Dugo Selo.

Figure 3.11-2 shows the network of railway infrastructure that connects Zagreb with the rest of the country and with other countries (source: www.asz.hr).

EL-TO location is well connected to the railway infrastructure of the city of Zagreb and Republic of Croatia. On the north side next to the site, the railroad Zagreb – Ljubljana is passing.

EL-TO Zagreb has a network of internal railway tracks for delivery of liquid fuel and chemicals (**figure 3.11-1 (left)**) that are connected by industrial track on state railway network at marshalling yard Črnomerec.

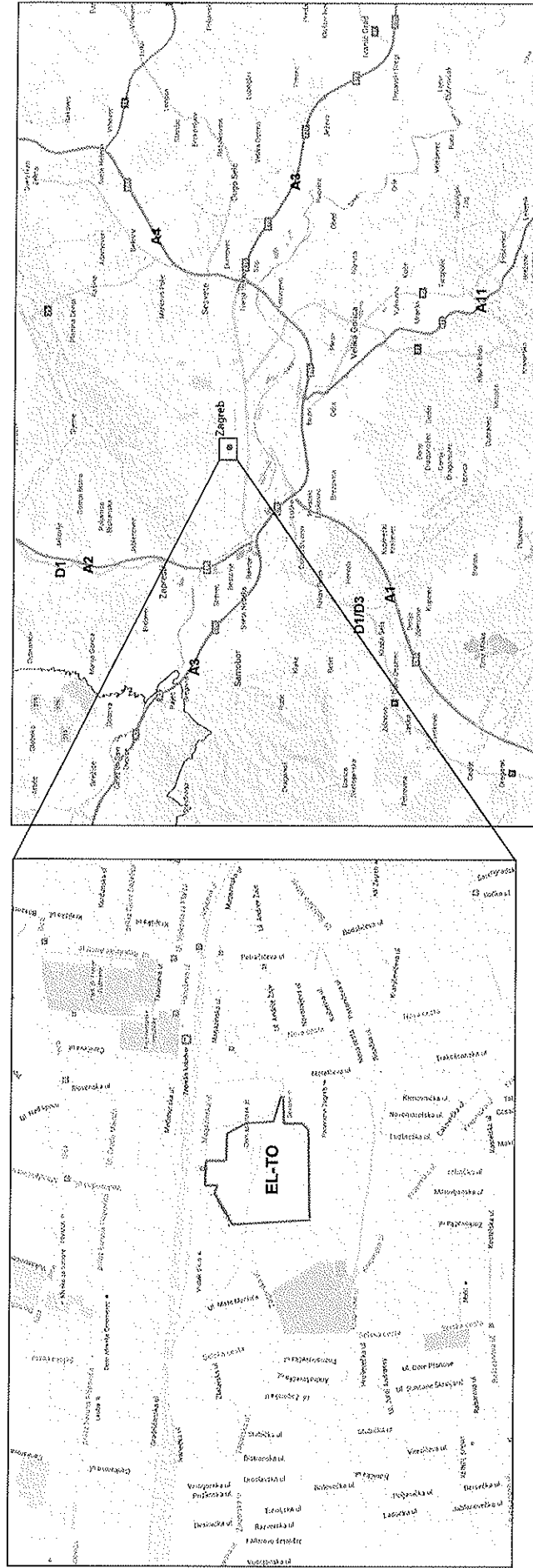


Figure 3.11-1: Road network in the vicinity of EL-TO plant (left), relation of Zagreb and international and national transport routes (right)

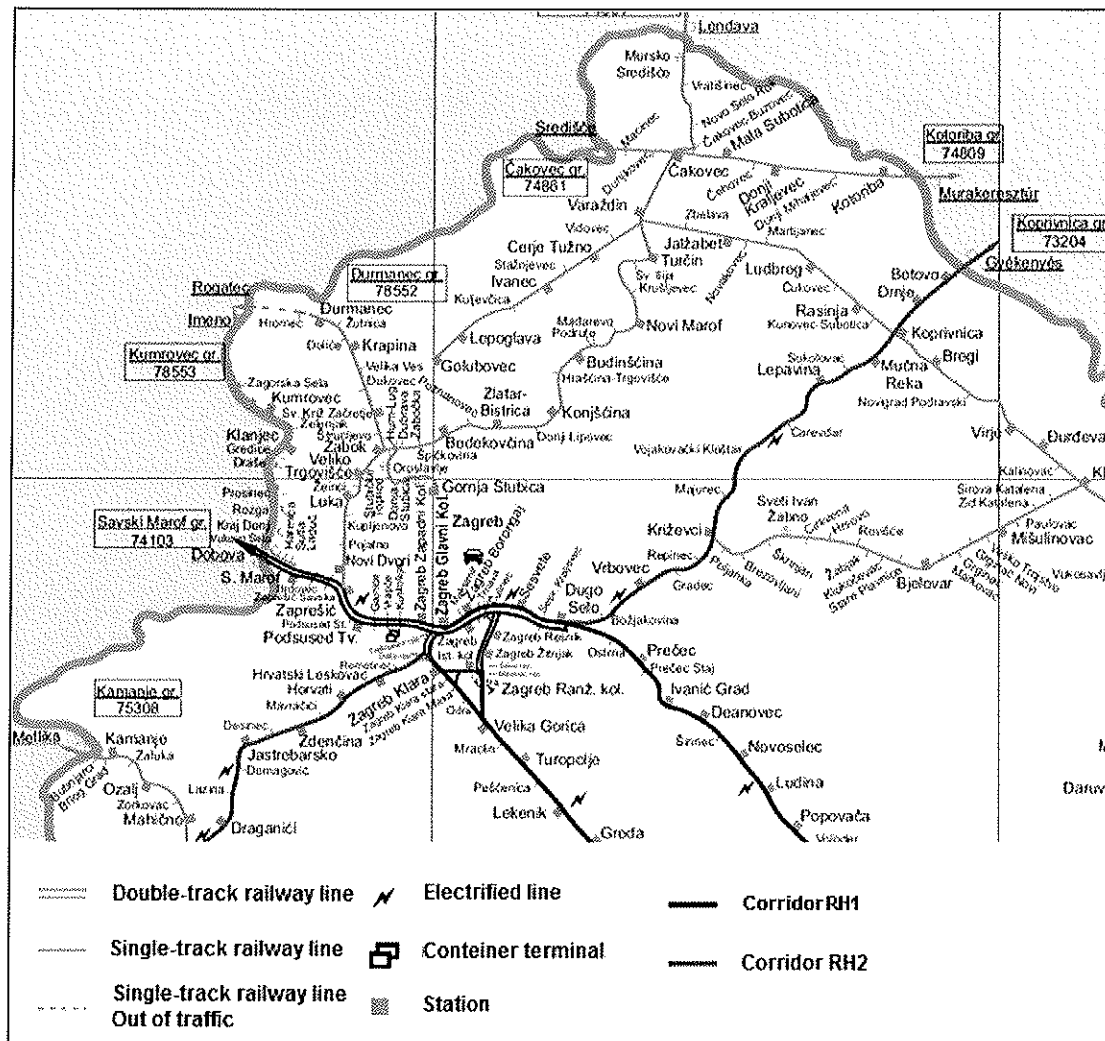


Figure 3.11-2: Network of railway infrastructure

3.12 ENERGY INFRASTRUCTURE

3.12.1 ELECTRICITY

The sources of electricity in the City of Zagreb are TE-TO Zagreb and EL-TO Zagreb. Electricity is distributed in the City by about 10 300 km of electricity lines.

EL-TO Zagreb is connected to the electricity supply system of the city of Zagreb in two places:

- 110 kV network – by power substation PS 110 kV EL-TO
- 30 kV network – by power substation PS Uklopna IX

Connection to 110 kV network is derived via power substation 110 kV EL-TO located on southwest part of EL-TO Zagreb (**figure 3.12-1**), which is designed as shielded closed plant.

3.12.2 FUEL

Operation fuel of EL-TO Zagreb is natural gas and (heavy) fuel oil. Natural gas is supplied from gas metering-reduction station "South" located in Botinec, through high-pressure pipeline. Distribution of gas to gas turbines and other units is ensured by the gas metering-reduction station which is located on the southeast side of EL-TO Zagreb - **figure 3.12-1**. Natural gas from the city pipeline is used only in exceptional cases when gas supply from its own pipeline is disabled, with special permission of Gradska Plinara Zagreb Ltd. (company for natural gas distribution in the City of Zagreb).

Fuel oil is delivered by railway tankers and stored in two tanks, which are located on the northeast side of EL-TO site. Distribution of fuel oil to the production units is done by pressure screw pumps.

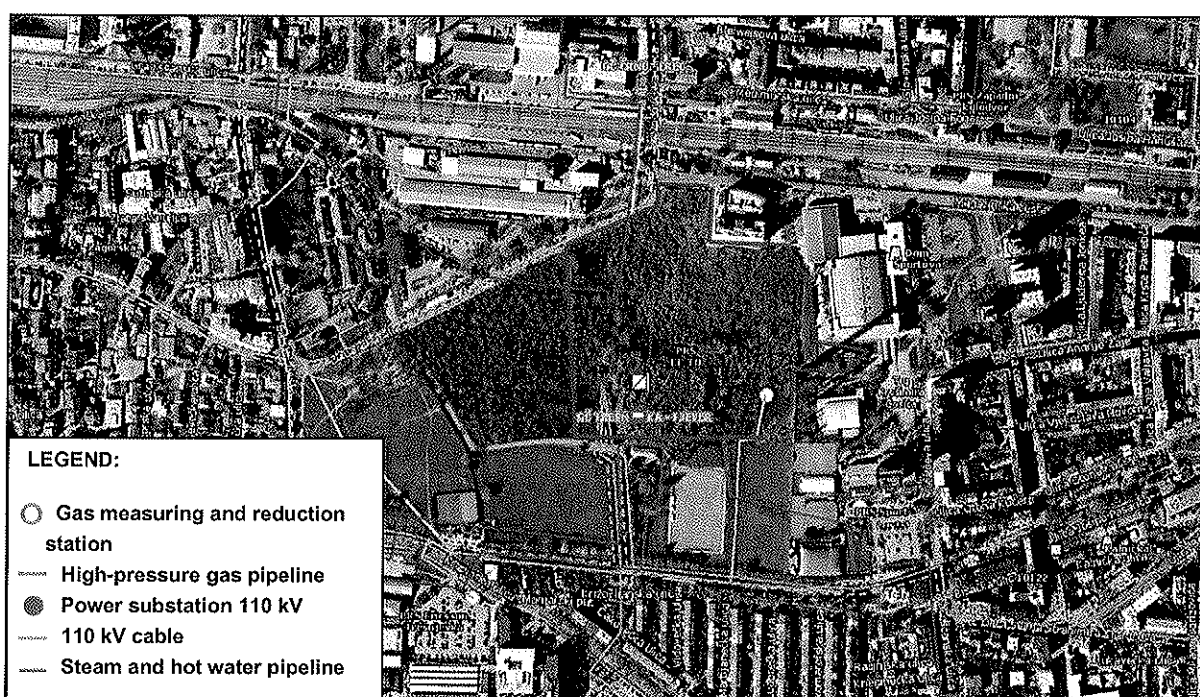


Figure 3.12-1: EL-TO connections to energy network³²

3.12.3 HEAT SYSTEM³³

3.12.3.1 Hot water pipeline network

The city of Zagreb hot water network is a double-pipe type (supply and return line), laid in the trenches or trenchless directly into the ground. In trenches, steel pipes are thermally insulated

³² Source: <https://geoportal.zagreb.hr/karta>

³³ Investments program in cogeneration units of the production facilities of HEP for electricity and thermal energy supply in the city of Zagreb until 2030, Energy Institute Hrvoje Požar, EKONERG Ltd, ELEKTROPROJEKT d.d., December 2013

with mineral wool and protected by bituminous paper. While at trenchless laying, pre-insulated steel pipes are used (PUR foam and protective plastic tube).

Trenches are protected by plastic bandages from moisture penetration. Most of the network was built in the period from 1962 to 1980. By 1990, hot water pipelines were primarily placed in trenches and afterwards pre-insulated steel pipes were laid down.

Two main hot water pipelines with following dimensions (supply/return) exit from EL-TO Zagreb:

- 1) 800/850 mm
- 2) 500/500 mm

Design parameters of hot water network are as follows:

- Temperature (supply/return): 130/70 °C
- Pressure: 16 bar

However, due to the age of network, pressure on supply side does not exceed 12 bar.

3.12.3.2 Steam network

Steam network is similar to a hot water network. It is partly laid in trenches and partly above the ground, on supports (mostly low above the ground). Steam lines are made of steel pipes, insulated with mineral / glass wool and protected from external influences.

Steam network does not have condensate return. Total heat load of steam consumption is 139 t/h (connected load).

Three main steam lines with diameter of 400 mm exit from EL-TO Zagreb. Consumers connections vary according to consumption and pipe diameters are from 50 to 250 mm.

The steam operating parameters are constant throughout the year. Only delivered amount is changing in accordance with consumers' heat demands. The steam parameters from EL-TO Zagreb are: pressure of 17 bar and temperature of 225 °C.

3.13 SOCIO-ECONOMIC CHARACTERISTICS

The City of Zagreb, which has 790,017 inhabitants, is the capital of the Republic of Croatia. It has the status of local government (city) and also a position of regional government or county. Zagreb participates with 18% in total population of the Republic of Croatia, covers the area of about 640 km² and includes 70 settlements.

Seventeen city districts with local committees are units of local government in the City of Zagreb, through which citizens participate in decision-making on matters of self-government scope of the City and local affairs. The basis for territorial division of the City constituted a historical tradition.

An exceptional geographic location with significant infrastructure systems of wider area, such as bypass network, input-output highways and state roads, an extensive railway network, airport, freight terminals and telecommunication connections, allows Zagreb a good connection with all parts of Croatia and neighboring countries.

Zagreb is situated in the area where two key areas of Croatia are combined - the Danube and the Adriatic. As a result, Zagreb has a central position in relation to three secondary centers of Croatia - Rijeka, Split and Osijek, and the majority of the centers of the lower order. Such favorable spatial relation results in suitable road distances that usually do not exceed 400 km. The exception are connections to remote area of southern Dalmatia.

The share of Zagreb population in total population of Croatia is constantly growing. In line with population growth, population density in this area is increasing, while at the national level population and population density declines. The dynamics of population growth in the period from 1991 to 2011 is smaller than in the previous intercensal periods (**figure 3.13-1**).

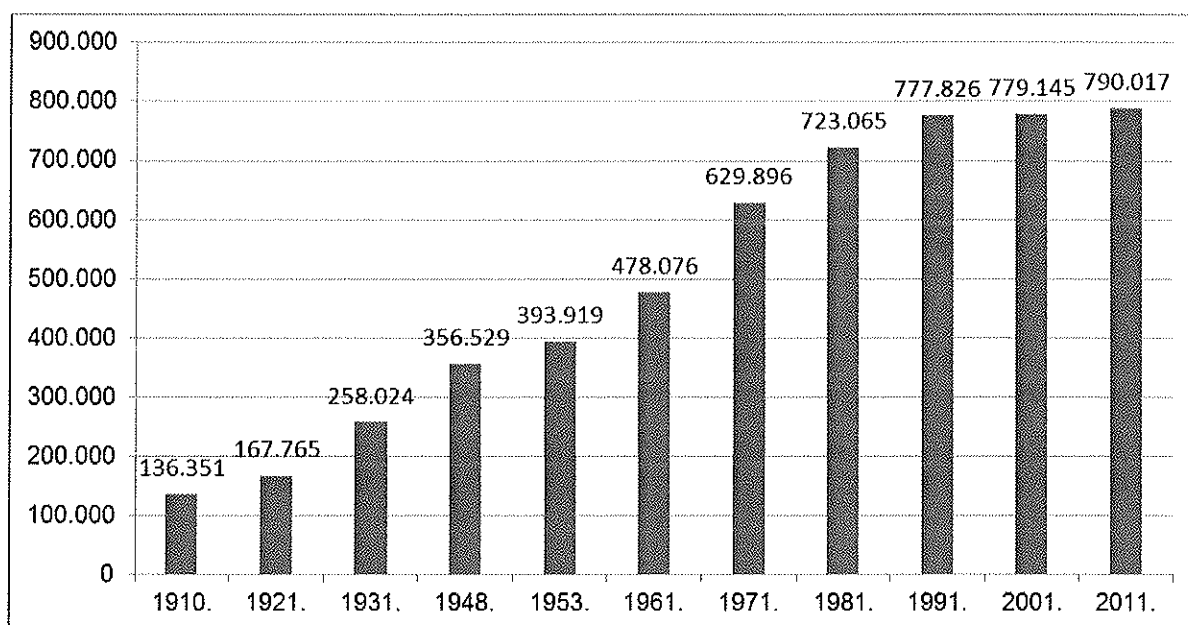


Figure 3.13-1: Population of the City of Zagreb according to the Census 1910-2011

Population growth should be attributed to the positive migration balance. Although emigration processes are getting stronger, Zagreb's population by type of general movement still has the characteristics of immigration.

The proportion of people over 65 is substantial and amounts 17.3%, while the share of young people 0-14 is decreased to 14.7%, with a tendency to decrease even further.

The settlement of Zagreb dominates with 688,163 inhabitants or 87% of total population on 34% (urban area) of total area. This settlement also dominates in concentration of economic and public facilities and infrastructure systems. Within it, according to the criteria of functional, morphological, geographical and historical characteristics, seclude space beneath Sljeme, the historical center, an area of urban renewal, New Zagreb and the city "edges".

The second largest town settlement is Sesvete with 54,085 or 6.8% of population. On the remaining 63% of the territory of the City of Zagreb there are 68 mostly suburban, weaker or stronger urbanized settlements with several rural settlements. They are situated in the southern (31 settlements) and eastern part of the City of Zagreb (37 settlements) and their rural, agricultural and forest area gradually occupy the network and the building of transport and utilities infrastructure, commercial zones and the newly built parts of the settlement.

The planned project will be located within the existing plant EL-TO, which is located in the city district Tresnjevka-north. According to the last Census, there are 55 425 residents in this city district. The basic data on population of the city district Tresnjevka-north are as follows:

- average age of population 40.8 years
- population density 9,499 inhabitants/km²
- number of households 21,644
- number of apartments 25,639.

Economy and employment

The economic development in Croatia, including the City of Zagreb, in recent years has been marked by the economic crisis. Although this area is the center of economic potential of Croatia, economic situation, characterized by blocked investments and a lack of business initiatives, resulted in a record number of unemployed in January 2014 (47,796 people, 12.6% of total number of unemployed in Croatia).

At the end of December 2013, there were 46,588 unemployed persons registered in Zagreb, which is 2.6% more than in December 2012. The Croatian Employment Service, Regional Office Zagreb³⁴, indicates in its educational structure of the unemployed that most numerous were people with secondary vocational school lasting for 4 or more years and grammar school (32.5%), followed by persons with secondary vocational school lasting up to 3 years and schools for skilled and highly skilled workers (28.0%), persons with primary education (17.6%), persons with university and postgraduate degrees (11.8%), persons with first degree colleges, higher education and professional studies (7.1%) and persons with no schooling and primary school leavers (3.0%).

The movement of annual average number of unemployed during the period 2008-2013 is presented in **figure 3.13-2**.

³⁴ Includes City of Zagreb and Zagrebačka County.

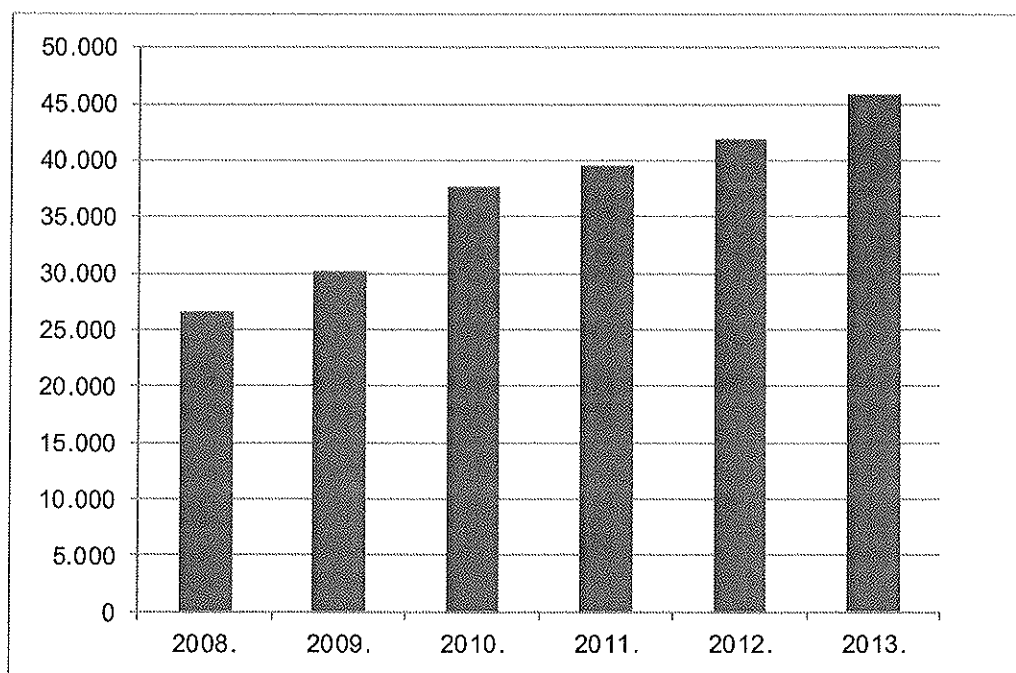


Figure 3.13-2: The number of unemployed people in the City of Zagreb in the period 2008-2013

About 30% of gross domestic product is created in the City of Zagreb and it employs more than a quarter of total employed in the Croatian economy. The economy of the City of Zagreb in 2012 achieved 36.6% of total export and 59.6% of total import of Croatia.

This area is marked by the highest concentration of urban, economic, financial, commercial, scientific, educational, religious, cultural and health resources of the Republic of Croatia. The most important economic sectors are production of electrical appliances, chemical, pharmaceutical and textile industries and food industry. Zagreb is an international trade and business center and traffic intersection between Central and Eastern Europe.

According to the Central Bureau of Statistics, on 31 December 2012, there were 95,649 legal persons registered in the City of Zagreb, which is 32.5% of total registered business entities in Croatia. In Zagreb are situated the headquarters of the most important economic entities in Croatia.

The structure of legal persons in Zagreb is as follows:

- companies - 57,491 of which 40,801 active
- enterprises and cooperatives - 23,973 of which 209 active
- institutions, associations and organizations - 14,185 of which 5,575 are active.

These data should be accompanied by 16,503 entities in crafts and freelancers.

The City has the most registered legal entities in trade and wholesale and in professional, scientific and technical activities. An overview of registered legal entities in the City of Zagreb in 2012 divided by activities is given in **figure 3.13-3**.

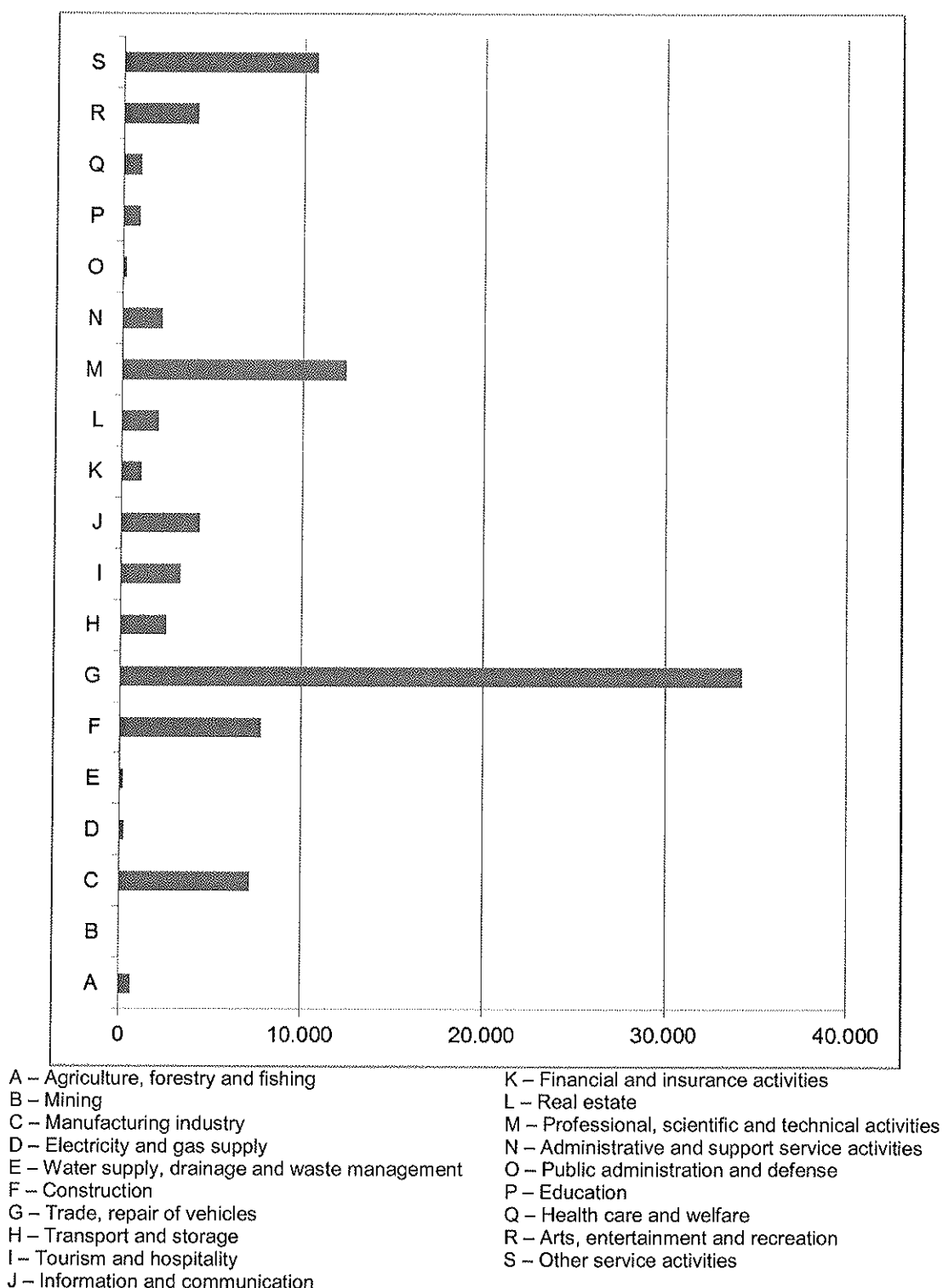


Figure 3.13-3: Number of registered legal entities in Zagreb in 2012 by activities

The City of Zagreb is business and cultural touristic destination which attractiveness is justified in its distinctive identity of content and important geo-traffic location.

3.14 HEALTH AND SAFETY

For EL-TO Zagreb a "Vulnerability Assessment" has been prepared, in which risk facilities and possible sources of danger have been identified. The worst-case accident and its effect has also been estimated.

In EL-TO Zagreb dangerous substances are used and operations performed there can pose risk to the environment, i.e. in case of accident it can lead to major or minor environmental pollution and in the worst possible case to environmental disaster.

Possible sources of danger in EL-TO are:

- (a) Technological and process sources,
- (b) Unauthorized and uneducated persons access and
- (c) Natural (external) sources (e.g. earthquake, flooding, storm).

Technological and process sources of danger

Risk facilities of EL-TO Zagreb are:

1. Risk objects containing heavy fuel oil: storage tanks SG-1 and SG-2, tank wagon loading station, fuel oil station
2. Risk objects containing natural gas: metering-reduction station Botinec, 2 MRSs in EL-TO Zagreb, gas pipelines from MRS to consumers,
3. Chemicals storage,
4. Chemical water treatment and wastewater treatment,
5. Storage of compressed technical gases,
6. Storage of flammable liquids,
7. Transformers,
8. Systems for lubricating (turbine oils),
9. Hazardous waste storage,
10. Production units.

Risk facilities containing dangerous substances with consequences in case of accidents are described in **tab. 3.14-1**. Their locations with the extent of impact of incident related to leaking or fire of heavy fuel oil tank are shown in **figure 3.14-1**.

Dominant dangerous substance in EL-TO Zagreb is heavy fuel oil due to its quantity (**tab. 3.14-1**). In Vulnerability assessment, the case of heavy fuel oil leakage from storage tank due to the rupture of tank wall was analyzed as the worst-case scenario, as well as nonfunctioning of organizational and technical tanks protection measures, whole stored fuel leakage on the ground around tanks, formation of a pool and ignition by external fire source to create a fire.

Tab. 3.14-1: Risk facilities in EL-TO Zagreb

No.	Risk object	Dangerous substance	Quantity [t,m ³]	The warning label	Object description	Technological process	Potential danger
1.	Heavy fuel oil storage tanks	Heavy fuel oil (HFO)	13.600 (SG-1) + 15.790 (SG-2) m ³	Toxic (T) Carcin. cat 2	2 above ground fixed-roof tanks placed in concrete bunds	- HFO storage - tank filling and discharging for units operation	leakage fire
2.	Fuel loading station	Heavy fuel oil (HFO)	max. 500 t	Toxic (T) Carcin. cat 2	2 tank wagon loading stations with steam heating of tank wagons and fuel + location for car-tank loading 500 t – maximum fuel unloading quantity	- HFO loading	leakage fire
3.	HFO station	Heavy fuel oil (HFO)	max. 500 t	Toxic (T) Carcin. cat 2	Object for HFO preheating and pumping placed between two loading stations with base for retention of leaked fuel. In Ex design.	- HFO pumping - HFO heating and preparation	leakage fire
4.	Gas pipelines and old and new MRS	Natural gas	~ 0.2 t	Extremely flammable (F+)	Gas pipelines from MRS Botinec to MRS EL-TO and from MRS to consumers (production units). 2 MRS with fence in Ex design. 0.2 t – maximum natural gas quantity consumed by full capacity.	- natural gas supply from MRS to production units	fire explosion
5.	Chemicals storage	Ammonium hydroxide (NH ₄ OH, 25%) Sodium hypochlorite Levexin 15 Degreaser SC-131	2 t 0.1 t 2 t 0.6 t	Dangerous for the environment (N) Corrosive (C) Toxic (T) Dangerous for the environment (N) Toxic (T)	Ventilated facility (building) with 4 separate compartments in Ex design. Connected to the sump for spills collection. Under lock and labeled. Chemicals stored in plastic drums and containers (50, 60 and 200 kg).	- filling and storage in drums and containers - pumping - for feed water conditioning	leakage poisoning
6.	Chemical water treatment (tanks and neutralization basin)	Chlorovodic acid, HCl (32%) Sodium hydroxide (NaOH, 48%)	250 m ³ 100 m ³	Corrosive (C) Irritant (Xi) Corrosive (C)	5 (HCl) and 2 (NaOH) tanks with 50 m ³ capacity each, placed in concrete bund/basin, below ground level. In band/basin there are pipeline system for filling and discharging and it is connected to neutralization basin. It has fence and it is labeled.	- ion exchange regeneration - waste water neutralization in neutralization basin (concrete)	leakage leakage
7.	Storage of flammable liquids	Transformer and turbine oils	Up to 2 t	-	Building with three separate compartments and oil sumps in Ex	- storage of fresh oils in original package	leakage

No.	Risk object	Dangerous substance	Quantity [t,m ³]	The warning label	Object description	Technological process	Potential danger
					design. Labeled.		
8.	Storage of compressed technical gases	acetylene, propane-butane, oxygen	0.07 t 0.07 t 0.1	Extremely flammable (F+) Oxidizing agent (O)	Facility with separate compartments. It has fence and it is labeled. In Ex design. Gases are in steel bottles under the pressure (propane – butane: 35 kg, other: 7 kg)	For welding	release in the air fire explosion
9.	Transformers	transformer oils	90 t	-	Transformers cooling system. Transformers are equipped with collection sump	- transformers cooling	leakage fire
10.	Systems for lubricating	turbine oils	40 t	-	Systems for lubricating gas and steam turbines – engine room with concrete floor that can accept the entire contents of turbine oils. Below sewage system level.	- turbine lubricating	leakage
11.	Hazardous waste storage	Fly ash, sludge from boilers cleaning, oiled waste, electronic waste etc.	~ 80 t/god	Depends on waste type	Mobile eco-storage for hazardous waste with bund, under lock. Eco-tanks for hazardous waste in concrete bund/basin connected to sump and separator; "big-bags" on concrete covered surface.	- storing of hazardous waste generated in production and auxiliary facilities	leakage, shedding
12.	Odorizing station Botinec	tert-butyl mercaptane	0.12 t	Extremely flammable (F+) Irritant (Xi)	In steel 40 kg barrels in odorization station	Natural gas odorization	Fire Irritant poisoning
13.	Units H and J	Natural gas		Extremely flammable (F+)	According to technical and fire protection regulations. In Ex design.	- electricity, steam and hot water production	fire explosion
14.	Steam and hot water boilers	HFO, natural gas, oils etc.		Extremely flammable (F+) Toxic (T)	According to technical and fire protection regulations.	- electricity, steam and hot water production	fire explosion

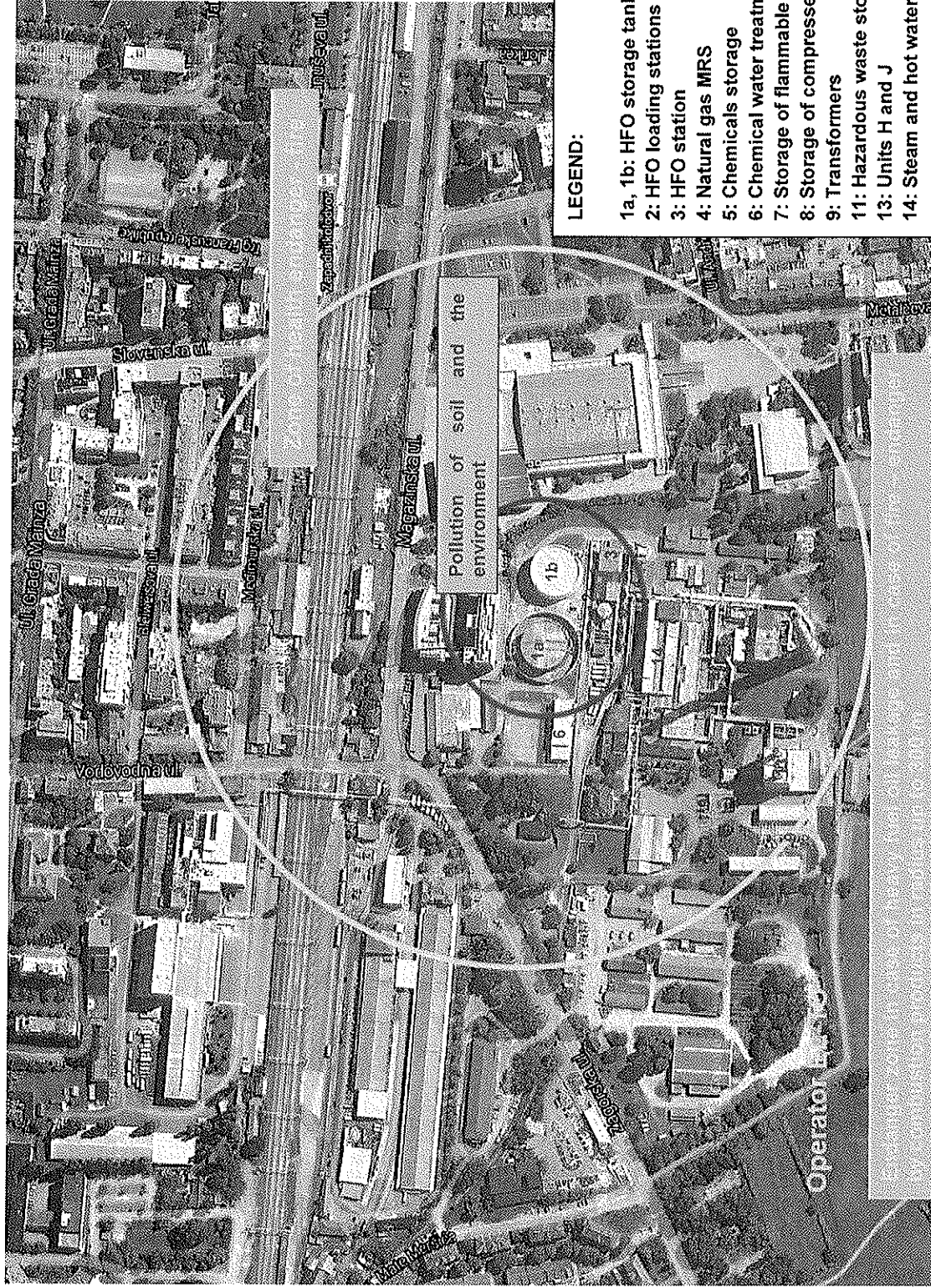


Figure 3.14-1: Locations of risk facilities in EL-TO Zagreb and extent of impact of incident related to leaking or fire of heavy fuel oil tank in EL-TO Zagreb

By using US EPA methodology (40CFR68) endanger zones are determined in radius of 100 – 150 m. In synergy, in case of fire of total HFO quantity, radius of zone of health endanger would be 300 m.

Given that in endanger zone there are buildings of gathering a large number of people (sports buildings, bank, hotel...) and residential buildings, in such case it would be required to take active measures of people alarm/notification and protection (partial evacuation from nearest buildings, closing of windows and air conditioning systems, medical help).

It should be noted that the probability of nonfunctioning of all protection measures on fuel oil tanks (including passive measures, therefore bunds) is extremely small and that heavy fuel oil is not flammable, but only substance that burns.

Natural (external) sources of danger

Earthquake

EL-TO Zagreb location is endangered by earthquake frequency and intensity with estimated intensity up to 8° MSK and in the return period of 500 years up to 9° MSK. Earthquake of the strongest expected intensity would have strong effects on the plant, although the key units are built for the expected intensity of earthquake. Temporary suspension of main activities is likely (checking the state and damage, especially tanks of dangerous substances, pipelines, etc.).

Earthquake of the highest intensity would have essential characteristics of a major accident, with significant consequences for the economy (heat and electricity supply), for the protection of life and health of workers, population, material goods and the environment, and the recovery would be long-lasting.

Flood

EL-TO Zagreb location is not affected by floods. In the closer contact area there are no permanent watercourses, nor appearance of torrential water and soil permeability to large amounts of rainfall is good.

A smaller network of drainage channels with occasional water flows exists, but it cannot, during high waters, threaten the EL-TO area or vice versa. The dominant watercourse is the Sava River, which flows south from the EL-TO area, with sufficient protection system in a wider area (from Zaprešić to Ivanja Reka River Sava is separated from the hinterland by dikes for flood protection) - **figure 3.6-1**.

Other natural sources

Extreme weather events (drought, heat wave, storm or hurricane and strong wind, hail, extreme snowfall, ice and landslides) can have some impact on plant security or may extend the time for intervention of operational and rescue forces and increase consumption of resource in protection and rescue. In the last 10 years in this area no natural disaster in connection with any of these extremes has been declared. Given the specific construction of objects and facilities

where dangerous substances are located and standards that are used in design, listed extreme weather events do not pose a serious threat to the plant.

Protection measures

In EL-TO Zagreb many protection measures are applied for prevention of accidents:

- Measures for proper and safe handling and maintenance of equipment, vehicles, installations etc.,
- Monitoring and control of equipment and installations,
- Insurance against unauthorized access and
- Technical (passive) measures: design of equipment and objects/systems according to technical standards and regulations related to:
 - protection against earthquakes and landslides,
 - fire alarm, protection against fire and technological explosions,
 - protection against dangerous properties of substances that are used and stored,
 - protection against the spread of pollutants in soil, water or air in case of accidents (e.g. bunds, safety valves, separators, sewage systems and waste water treatment, etc.).

In each shift, EL-TO has a fire department on duty consisting of one professional firefighter and three employees trained as volunteer firefighters. Fire alarm, obligations and procedures are defined in the Plan of fire and technological explosions protection.

Transport of dangerous goods from the manufacturer/supplier to the warehouses of EL-TO Zagreb, as well as hazardous waste from the plant is carried out by company authorized to manage hazardous substances and possesses the appropriate vehicles, equipment and trained staff. EL-TO Zagreb transports only small amounts of hazardous substances within the site by its own vehicles.

In the event of an accident, collision or rollover, during the transport of dangerous goods from the manufacturer to the warehouse of EL-TO Zagreb, if the consequence is contamination at the plant site or outside it, the driver is obliged to immediately inform a responsible person in the facility of EL-TO Zagreb, company-carrier and the nearest police officer.

Emergency measures to prevent the spreading of hazardous substances into the environment is carried out, if necessary, by external authorized professional companies and in case of major accidents the County 112 center Zagreb is informed.

Emergency plans

EL-TO plant has several internal documents for managing safety issues in terms of accidents prevention and/or activities in case of accident occurrence:

- Operational plan for protection and rescue,
- Safety report,
- Internal emergency plan,
- Plan of fire and technological explosion protection,
- Operational plan of emergency measures in case of accidental water pollution and
- Evacuation plan.

In those documents, a personnel responsible for acting in case of accidents is appointed and notification schemes to responsible authorities (County 112 center – key spot of communication, fire brigade, ambulance etc.) are given.

Operational plan also establishes training plan for personnel education and program of exercises for emergency simulation (minimum ones per year).

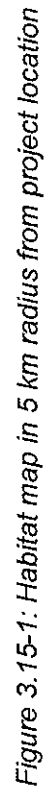
Actions outside the EL-TO plant border are also subject of plans of higher order and actions of external service. Plans of higher order, Vulnerability assessment and Plan for protection and rescue for the City of Zagreb have been prepared.

3.15 BIOLOGICAL AND ECOLOGICAL RESOURCES

Project is planned in the urban area of the City of Zagreb, in the center of western part - the city district Trešnjevka and all elements of the project will be situated within the existing EL-TO Zagreb plant. The characteristics of the project's location are conditioned by many years of anthropogenic influence, so on the project site there are no individual protected plants and animal species. The entire location of the project is degraded area related to the aspect of flora and fauna.

Figure 3.15-1 shows the map of habitats in the 5 km radius from project location.

The project location (Zagreb) belongs to Euro Siberian region. Position of the city on southern slopes of Medvednica on one side and low-lying banks of the Sava River on the other side determines the floristic richness. Due to the urban character of area, natural vegetation - complexes of oak forest, vegetation of floodplains – is for the most part degraded, altered by human activities respectively. Analysis of available data on flora in the city and surrounding areas indicates various habitats in the city center, residential areas and surrounding area and there are approximately 1,500 kormofit species. Most of the biotope is under direct anthropogenic influence (e.g. forest biotopes on Medvednica, ruderal flora in the city center, etc.).



3.16 PROTECTED AREAS

According to the spatial data of the State Institute for Nature Protection - Protected Areas of Croatia³⁵, the project site is not in area protected under the Nature Protection Act (OG 80/13) in the category of strict reserve, national park, special reserve, nature park, regional park, nature monument, significant landscape, park forest and / or park architecture monument.

The project location is not even in the area protected or registered by physical planning documents. The closest protected areas are monuments of landscape architecture that are protected by measures of General urban plan (GUP) of Zagreb. They are at distance of 200 - 300 meters from EL-TO Zagreb site. The relation of EL-TO Zagreb and protected areas is shown in **figure 3.16-1**, **figure 3.16-2** and **figure 3.16-3**.

³⁵ <http://natura2000.dzrp.hr:6080/arcgis/rest/services/zasticenapodrucja/zasticenapodrucja/MapServer>

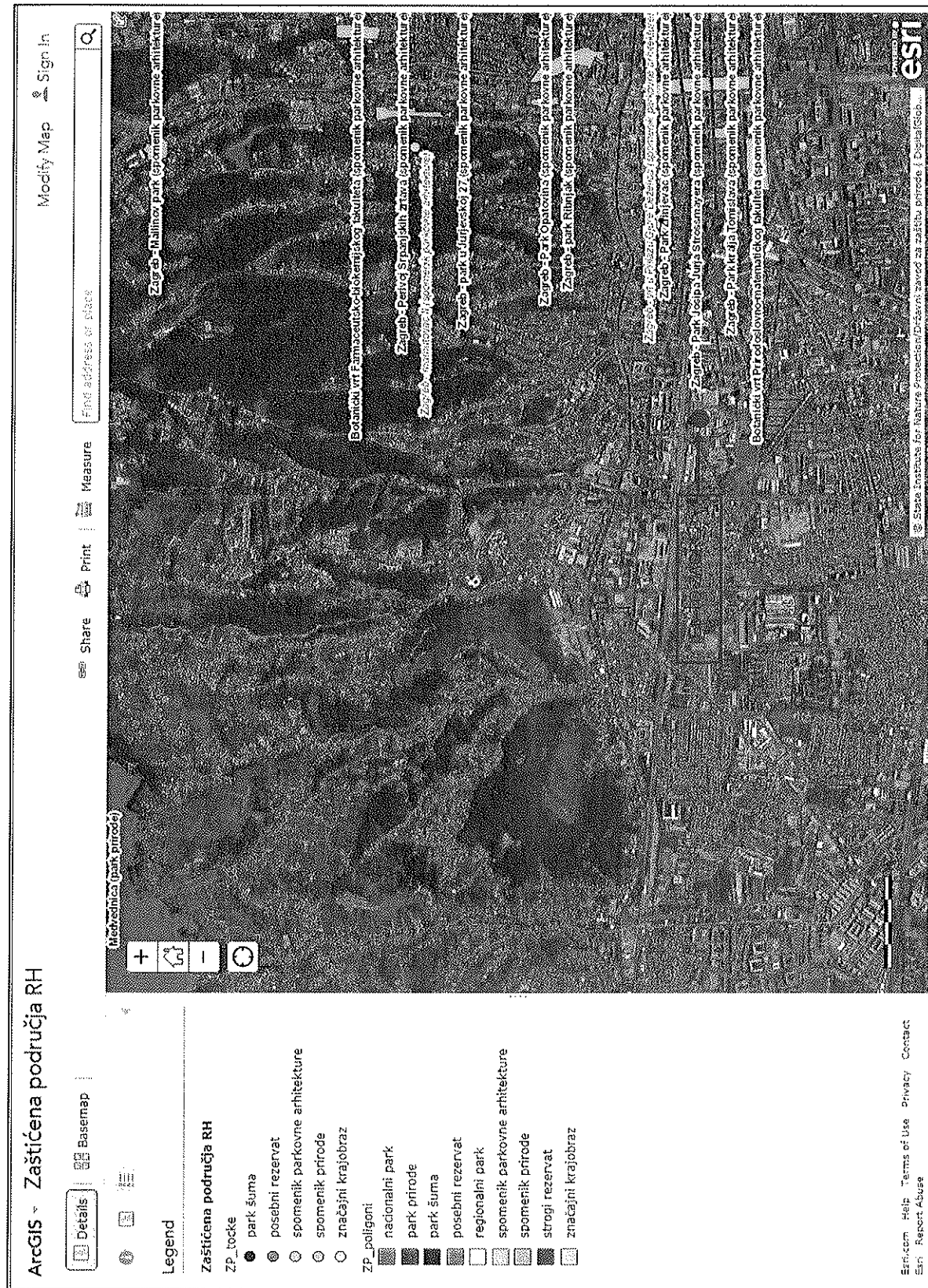


Figure 3.16-1: Relation of EL-TO Zagreb and areas protected under the Nature Protection Act (OG 80/13)

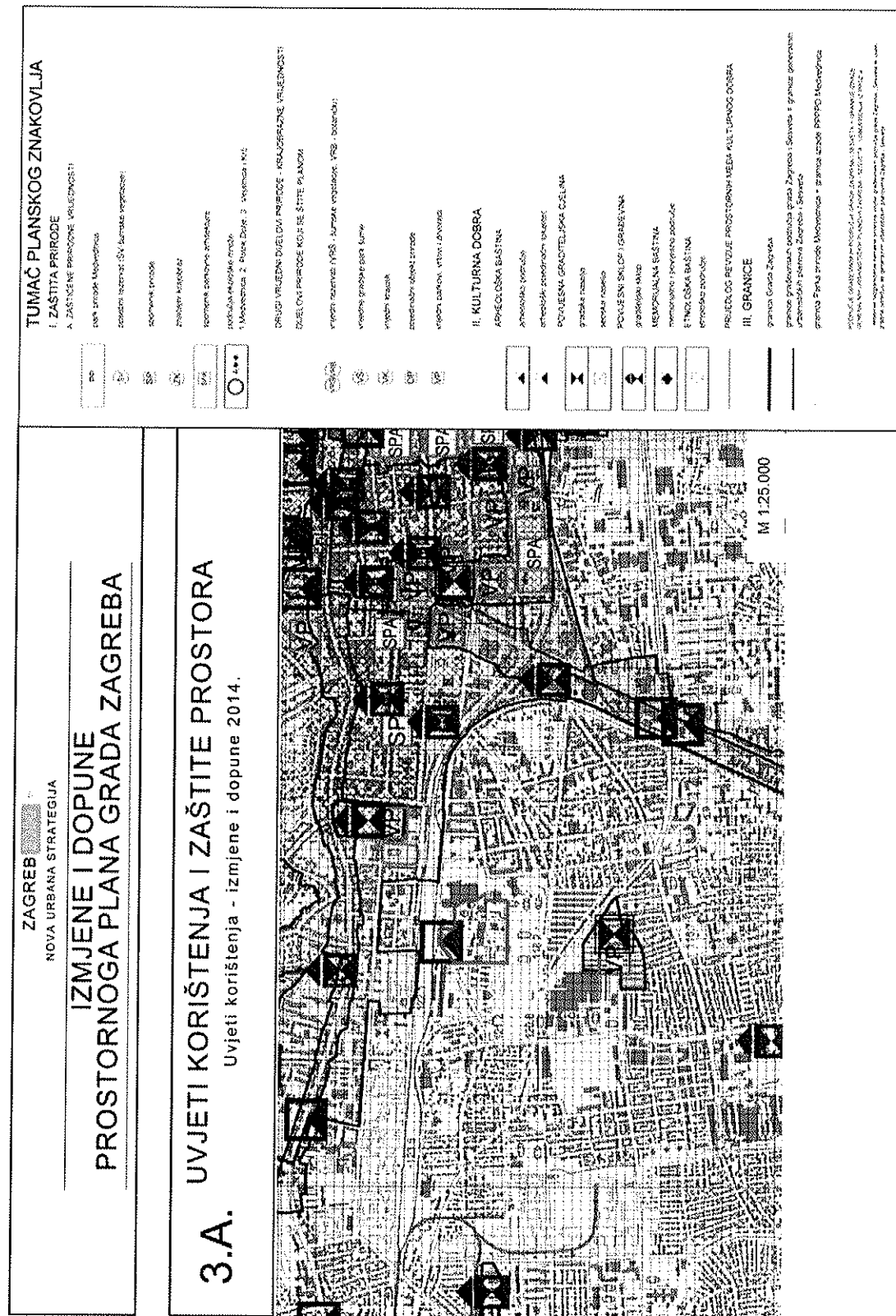


Figure 3.16-2: Relation of EL-TO Zagreb and by Spatial plan of City of Zagreb protected natural values and cultural heritage

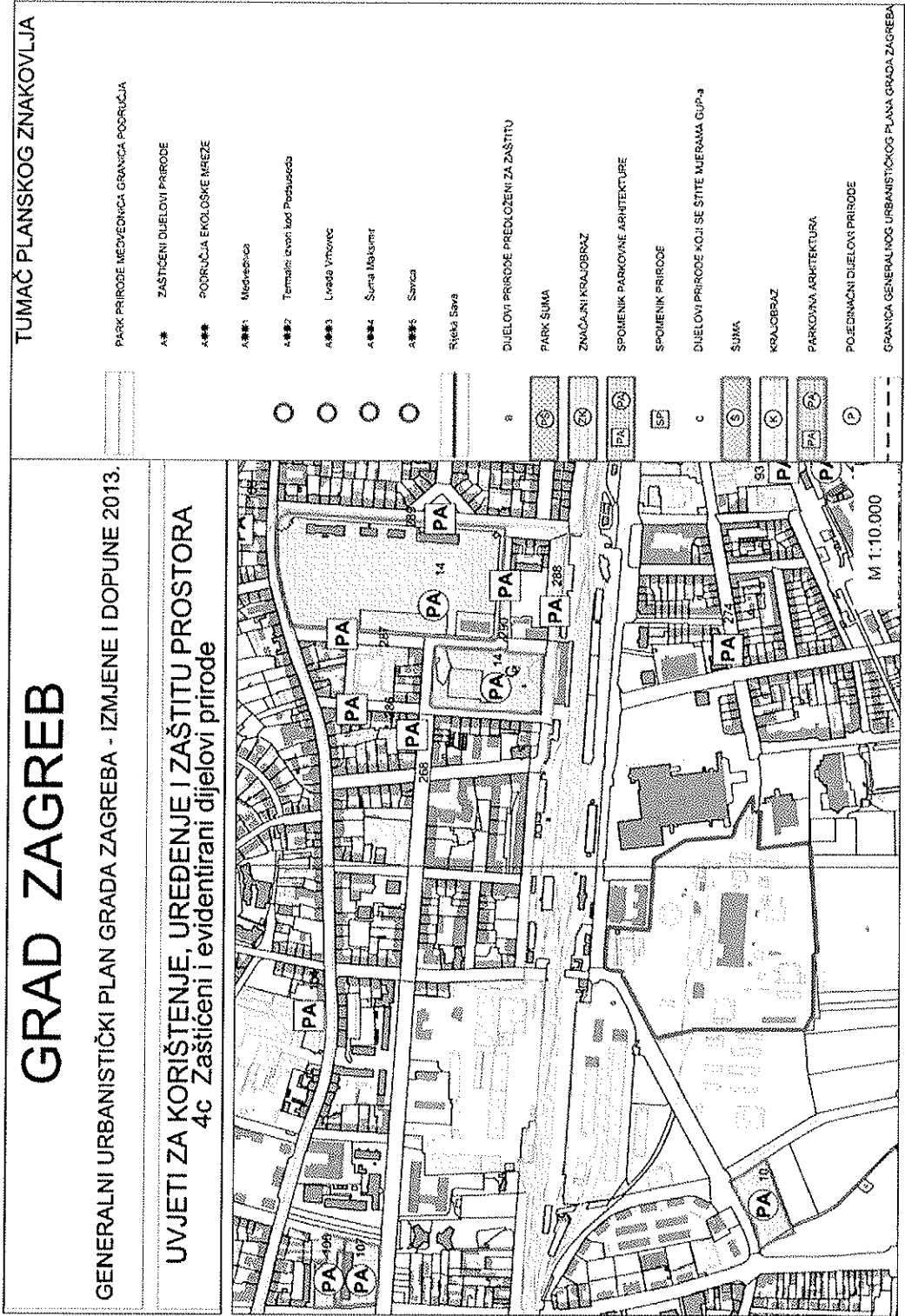


Figure 3.16-3: Relation of EL-TO Zagreb and by GUP Zagreb protected and registered natural areas

3.17 ECOLOGICAL NETWORK (NATURA 2000)

The project location is not in ecological network. The nearest area of ecological network is conservation area important for species and habitat types HR2000583 Medvednica. HR2000583 Medvednica covers an area of 18,531.81 hectares. It is located north of the project location, at distance of about 4.5 km to the nearest point. The relation of project location and ecological network is shown in **figure 3.17-1**.

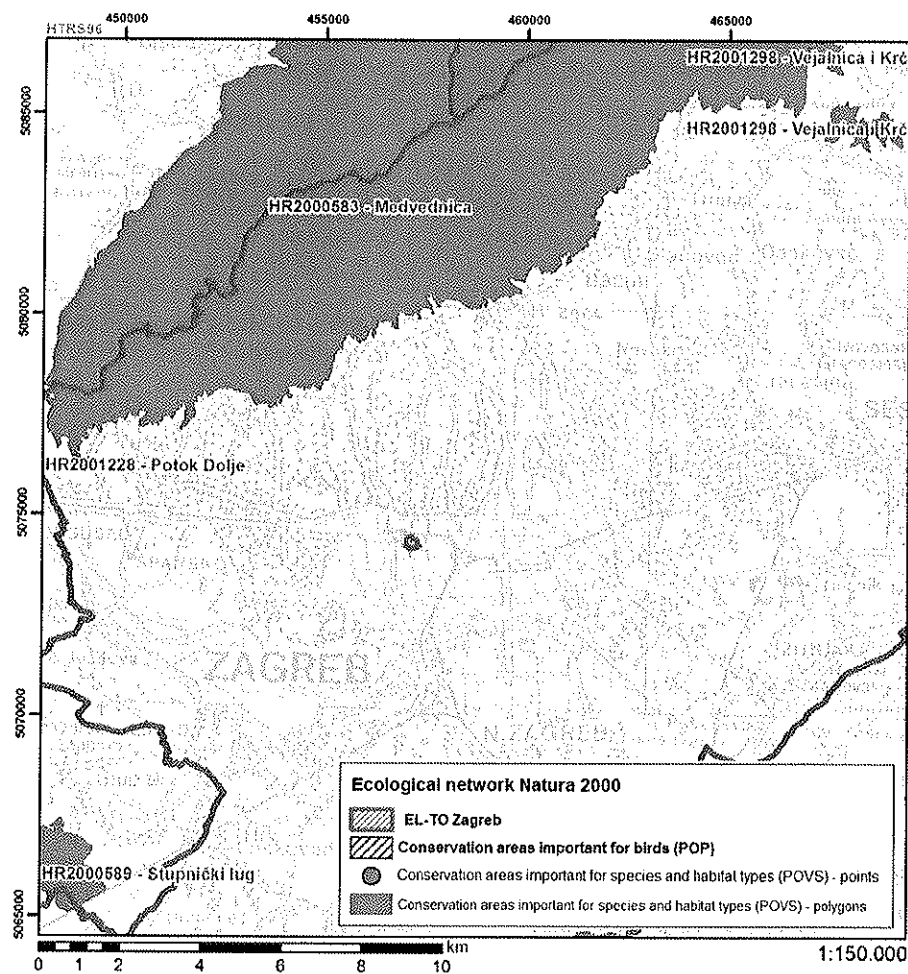


Figure 3.17-1: Relation of project location and ecological network areas

EBRD Performance Requirement 6 – Biodiversity Conservation and Sustainable Management of Living Natural Resources

REQUIREMENTS	REALIZATION
General requirements	
Assessment of issues and impacts	
<p>(7) The assessment process will characterize the baseline conditions to a degree that is proportional and specific to the anticipated risk and significance of impacts. The baseline assessment will consider, but will not be limited to, loss of habitat,³⁶ degradation and fragmentation, invasive alien species, overexploitation, migratory corridors, hydrological changes, nutrient loading and pollution, as well as impacts relevant to climate change and adaptation. In planning and carrying out biodiversity-related baseline and impact assessments, the client will refer to relevant good practice guidance, utilizing desktop and field-based approaches as required. Where further investigations are needed to provide greater certainty of the significance of potential impacts, the client should carry out additional studies and/or monitoring before undertaking project-related activities that could cause irreversible impacts.</p> <p>(8) Through the assessment process, the client should identify and characterize, early in the project life cycle, the potential project-related opportunities, risks and impacts on biodiversity. The extent of the assessment should be sufficient to characterize the impacts, based on their likelihood and the significance and severity of impact, and reflect the concerns of potentially affected communities and, where relevant, other stakeholders. The assessment should also consider direct, indirect and cumulative impacts and evaluate the effectiveness and feasibility of the mitigation measures to be applied to the project. The assessment process should include consideration of potential <u>landscape level impacts</u>, as well as impacts on the ecological integrity of the ecosystems, independent of their protection status and regardless of the degree of their disturbance or degradation.</p> <p>(9) The assessment will consider the use of, and dependence on, ecosystems by potentially affected communities and/or Indigenous Peoples whose use of these biodiversity resources may be affected by the project. The assessment will also consider the project's dependence on these ecosystems. Where the project has the potential to impact these ecosystems, and where the client has direct management control or significant influence, adverse impacts should be avoided. If these impacts cannot be avoided, the client will minimize them and/or implement appropriate mitigation measures with</p>	<p>The project is planned in urban area of the City of Zagreb, in the center of western part - the city district Trešnjevka and all elements of the project will be situated within the existing EL-TO Zagreb plant. The characteristics of the project's location are conditioned by many years of anthropogenic influence, so on the project site there are no individual protected plants and animal species. The entire project location is degraded area related to the aspect of flora and fauna – see chapter 3.15 and figure 3.15-1.</p> <p>The project is, as determined in the process of environmental impact assessment, acceptable for the environment, along with application of environmental protection measures and implementation of the environment monitoring program prescribed by law and established under the Decision issued by the Ministry in July 2014.</p> <p>Due to the above mentioned facts, the project will have a negligible impact on biodiversity.</p> <p>Impact on landscape is assessed in chapters 4.5 and 5.5 and mitigation measures are defined in chapter 6.</p>

³⁶ Habitat is defined as a terrestrial, freshwater or marine geographical unit or airway that supports assemblages of living organisms and their interactions with the non-living environment.

REQUIREMENTS	REALIZATION
<p>an aim to maintain the overall functionality of these ecosystems.</p> <p>(10) For projects that could potentially have such impacts on Indigenous Peoples and local communities, the client will provide opportunities for fair and equitable sharing of the benefits derived from the utilization of living natural resources in accordance with: (i) the requirements for addressing economic displacement issues in PR 5; (ii) the specific requirements relating to managing potential issues and impacts on Indigenous Peoples in PR 7; and (iii) the stakeholder engagement requirements provided in PR 10.</p>	
<p>Biodiversity conservation requirements</p> <p>(11) Where the assessment has identified potential project-related impacts to biodiversity, the client will manage its risks in accordance with the mitigation hierarchy and GIP. The client should adopt a precautionary approach and apply adaptive management practices in which the implementation of mitigation and management measures are responsive to changing conditions and the results of project monitoring throughout the project life cycle.</p> <p>(12) Notwithstanding the above, some areas affected by the project may be considered "priority biodiversity features"³⁷ which include: (i) threatened habitats; (ii) vulnerable species; (iii) significant biodiversity features identified by a broad set of stakeholders or governments (such as Key Biodiversity Areas or Important Bird Areas); and (iv) ecological structure and functions needed to maintain the viability of priority biodiversity features described in this paragraph.</p> <p>(13) Where the assessment has identified that the project could have significant, adverse and irreversible impacts to priority biodiversity features, the client should not implement any project-related activities unless:</p> <ul style="list-style-type: none"> • there are no technically and economically feasible alternatives • the overall benefits outweigh the project impacts on biodiversity • stakeholders are consulted in accordance with PR 10 • the project is permitted under applicable environmental laws, recognizing the priority biodiversity features • appropriate mitigation measures are put in place, in accordance with the mitigation hierarchy,³⁸ to ensure no net loss and preferably a net gain of priority biodiversity features over the long term, to achieve measurable conservation outcomes. <p>(14) The most sensitive biodiversity features are defined as critical habitat, which comprise one of the following: (i)</p>	

Due to the project location and its characteristics, it will not have a significant negative impact on nature protected areas and ecological network.

Before EIA procedure, a Decision that the planned project is acceptable for ecological network was issued by the Nature Protection Directorate of the Ministry for Environmental and Nature Protection (CLASS: 612-07/14-60/11, REF. NO.: 517-07-1-1-2-14-4, from 17 February 2014).

³⁷ Priority biodiversity features are a subset of biodiversity that is particularly irreplaceable or vulnerable, but at a lower priority level than critical habitats (as defined in paragraph 14).

³⁸ As a last resort, where any significant residual impacts remain, the client may need to consider the use of compensatory measures, such as biodiversity offsets.

REQUIREMENTS	REALIZATION
<p>highly threatened or unique ecosystems; (ii) habitats of significant importance to endangered³⁹ or critically endangered species; (iii) habitats of significant importance to endemic or geographically restricted species; (iv) habitats supporting globally significant migratory or congregatory species; (iv) areas associated with key evolutionary processes; or (v) ecological functions that are vital to maintaining the viability of biodiversity features described in this paragraph.</p> <p>(15) Where the assessment has identified that the project could have adverse impacts on a critical habitat, the client will retain experienced external experts to conduct the assessment of the potential adverse impacts on this critical habitat.</p> <p>(16) Critical habitat must not be further fragmented, converted or degraded to the extent that its ecological integrity or biodiversity importance is compromised. Consequently, in areas of critical habitat, the client will not implement any project activities unless the following conditions are met:</p> <ul style="list-style-type: none"> • no other viable alternatives within the region exist for development of the project in habitats of lesser biodiversity value • stakeholders are consulted in accordance with PR 10 • the project is permitted under applicable environmental laws, recognizing the priority biodiversity features • the project does not lead to measurable adverse impacts on those biodiversity features for which the critical habitat was designated as outlined in paragraph 14 • the project is designed to deliver net gains⁴⁰ for critical habitat impacted by the project • the project is not anticipated to lead to a net reduction in the population⁴¹ of any endangered or critically endangered species, over a reasonable time period⁴² 	

³⁹ As listed on the International Union for the Conservation of Nature (IUCN) Red List of Threatened Species. The determination of critical habitat based on other listings is as follows: (i) if the species is listed nationally/regionally as critically endangered or endangered, in countries that have adhered to IUCN guidance, the critical habitat determination will be made on a project-by-project basis in consultation with competent professionals; and (ii) in instances where nationally or regionally listed species' categorisations do not correspond exactly to those of the IUCN (for example, some countries more generally list species as "protected" or "restricted"), an assessment will be conducted to determine the rationale and purpose of the listing. In this case, the critical habitat determination will be based on such an assessment.

⁴⁰ Net gains are additional conservation outcomes that can be achieved for the biodiversity values for which the critical habitat was designated. Net gains may be achieved through the development of a biodiversity offset and/or, in instances where the client could meet the requirements of paragraph 16 of this Performance Requirement without a biodiversity offset, the client should achieve net gains through the implementation of programmes that could be implemented in situ (on-the-ground) to enhance habitat, and protect and conserve biodiversity.

⁴¹ Net reduction is a singular or cumulative loss of individuals that prevents the species' ability to persist at the global and/or regional/national scales for many generations or over a long period of time. The scale (for example, global and/or regional/national) of the potential net reduction is determined based on the species' listing on either the (global) IUCN Red List of Threatened Species and/or on regional/national lists. For species listed on both the (global) IUCN Red List of Threatened Species and the national/regional lists, the net reduction will be based on the national/regional population.

⁴² The time frame in which clients must demonstrate "no net reduction" of critically endangered and endangered species will be determined on a case-by-case basis and in consultation with external experts

REQUIREMENTS	REALIZATION
<ul style="list-style-type: none"> • a robust and appropriately designed, long-term biodiversity monitoring and evaluation programme aimed at assessing the status of critical habitat is integrated into the client's adaptive management programme. <p>(17) In such cases where a client is able to meet the requirements defined in paragraph 16, the project's mitigation strategy will be described in a Biodiversity Management Plan or Biodiversity Action Plan, wherever appropriate.</p> <p>(18) In instances where biodiversity offsets are proposed for priority biodiversity features or critical habitat, the client must demonstrate through an assessment that the project's significant residual impacts on biodiversity will be adequately mitigated to meet the requirements of paragraphs 13 and 15-17, as applicable. In these instances, the client will retain experienced external experts with knowledge in offset design and implementation.</p>	
Legally protected and internationally recognized areas of biodiversity value	
<p>(19) Where the project occurs within or has the potential to adversely affect an area that is protected through legal or other effective means,⁴³ and/or is internationally recognized,⁴⁴ or proposed for such status by national governments, the client must identify and assess potential project-related impacts and apply the mitigation hierarchy so that impacts from the project will not compromise the integrity, conservation objectives and/or biodiversity importance of such an area.</p> <p>(20) If the assessment identifies that the project has the potential to adversely impact priority biodiversity features and/or critical habitat within the legally protected areas or internationally recognized areas of biodiversity value, the client will seek to avoid such impacts in accordance with paragraphs 13 or 15-17 respectively. In addition the client will:</p> <ul style="list-style-type: none"> • demonstrate that any proposed development is legally permitted, which may have entailed that a specific assessment of the project-related impacts on the protected area has been carried out as required under national law • act in a manner consistent with any government recognized management plans for such areas • consult protected area managers, relevant authorities, local communities and other stakeholders on the proposed project in accordance with PR 10 • implement additional programmes, as appropriate, to promote and enhance the conservation objectives of the protected area. 	<p>Due to the project location and its characteristics, it will not have a significant negative impact on nature protected areas and ecological network.</p> <p>Before EIA procedure, a Decision that the planned project is acceptable for ecological network was issued by the Nature Protection Directorate of the Ministry for Environmental and Nature Protection (CLASS: 612-07/14-60/11, REF. NO.: 517-07-1-1-2-14-4, from 17 February 2014).</p>
Invasive alien species	

⁴³ This PR is guided by the IUCN definition of "Protected Area".

⁴⁴ Sites identified under international conventions or agreements, including, but not limited to, UNESCO Natural World Heritage Sites, UNESCO Man-and-Biosphere Reserves and the Ramsar List of Wetlands of International Importance.

REQUIREMENTS	REALIZATION
<p>(21) The client must avoid and proactively prevent accidental or deliberate introduction of alien species that could have significant adverse impacts on biodiversity, specifically:</p> <ul style="list-style-type: none"> the client will not intentionally introduce alien species into areas where they are not normally found unless this is carried out in accordance with the regulatory framework governing such introduction. Under no circumstances must species known to be invasive be introduced into new environments. the client will identify potential risks, impacts and mitigation options related to the accidental transfer and release of alien species⁴⁵ where alien species are already established in the country or region of the proposed project, the client will exercise diligence in not spreading the invasive species into areas in which they have not already been established. As practicable, the client should take measures to eradicate such species from areas having biodiversity importance over which they have management control. 	Not applicable.
Sustainable management of living natural resources	
Scope of application	
<p>(22) This PR applies to projects which involve the primary production of living natural resources or where such resources are central to the project's core function.⁴⁶</p>	Not applicable.

3.18 CULTURAL HERITAGE

According to data from the Register of Croatian cultural monuments⁴⁷, on EL-TO Zagreb location there are no protected, preventively protected and/or registered cultural properties⁴⁸. According to the physical planning documents and as shown in **figure 3.16-2** and **figure 3.18-1**, in the area of EL-TO Zagreb there is an individual archeological site.

This archaeological site is registered individual archaeological site dated to the period of antiquity⁴⁹ because there is a bronze vessel found in the bottom of the antique well, which is

⁴⁵ With respect to the international shipping of goods and services, this PR is guided by the International Convention for the Control and Management of Ship's Ballast Water and Sediments (BWM). Clients seeking EBRD finance for a project involving such shipping activities are expected to comply with appropriate obligations developed in the framework of this convention.

⁴⁶ Projects that include crop or livestock production, natural or plantation forestry, aquaculture or fisheries, and production and use of biomass for energy or biofuel production are subject to this PR.

⁴⁷ Source: <http://www.min-kulture.hr/default.aspx?id=6212>

⁴⁸ Manifestation of the City Institute for Protection of Monuments of Culture and Nature (CLASS: 612-08/2013-01/761, REF.NO.: 251-18-02-13-2, 30 December 2013)

⁴⁹ Manifestation of the City Institute for Protection of Monuments of Culture and Nature (CLASS: 612-08/15-01/360, REF.NO.: 251-18-02-15-2, 15 July 2015)

now kept in the Archaeological Museum. One pitcher from the well is also mentioned. This well is not in the area where project construction is planned.

EBRD Performance Requirement 8 – Cultural Heritage

REQUIREMENTS	REALIZATION
Scope of application	
(7) Recognizing that sites, objects or cultural traditions representing cultural heritage value or significance could be discovered in unexpected locations, a project is subject to the provisions of this PR if it: <ul style="list-style-type: none">• involves significant excavations, demolitions, movement of earth, flooding or other changes in the physical environment• is located in, or is in the vicinity of, a cultural heritage site recognized by the country of operation• may have an adverse impact on the intangible forms of cultural heritage of people, including Indigenous Peoples.	Not applicable – see chapter 3.18.

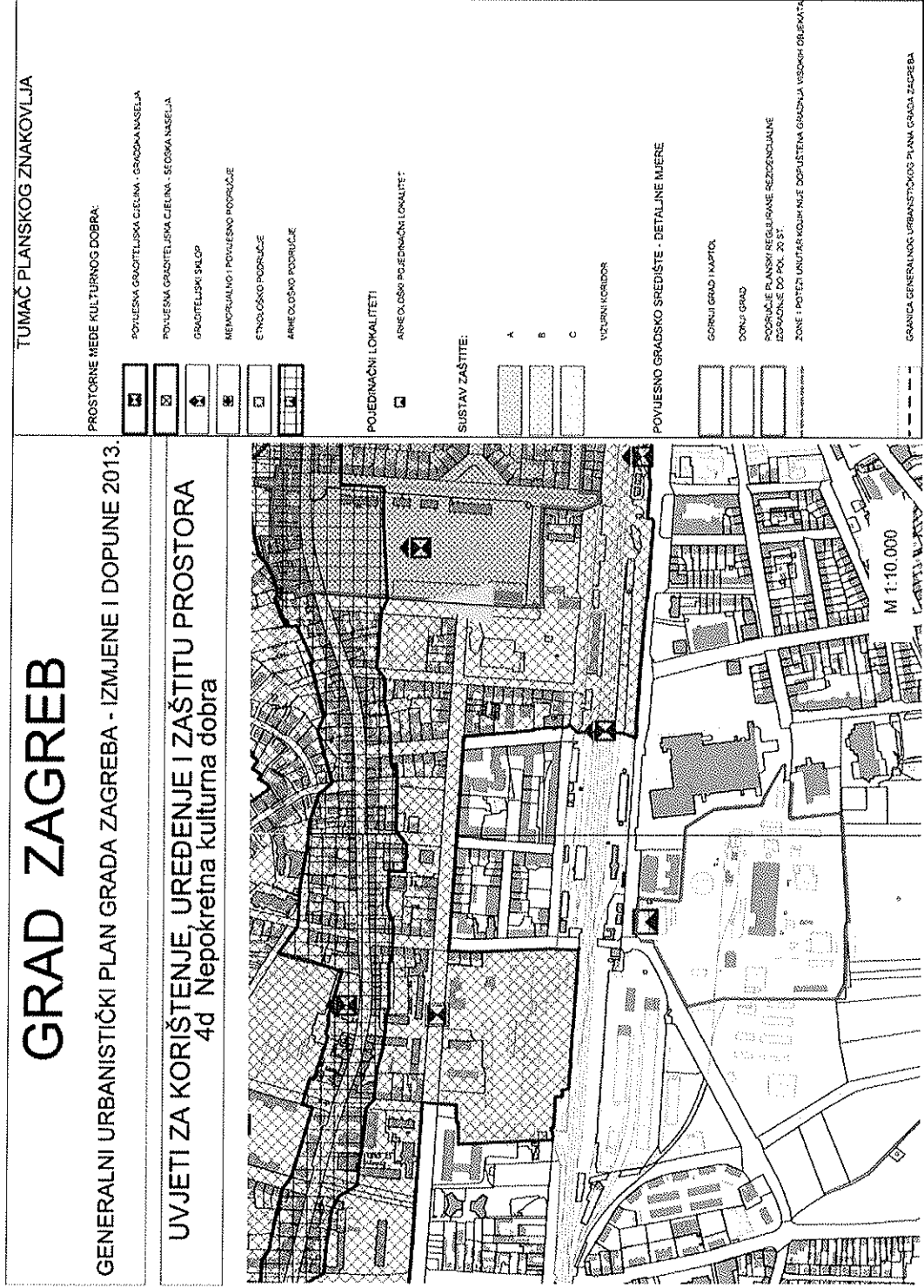


Figure 3.18-1: Relation of EL-TO Zagreb and immovable cultural properties from GUP Zagreb

3.19 STAKEHOLDER ENGAGEMENT PRACTICES

For the project, the Environmental Impact Assessment procedure was carried out. Part of the procedure is, according to the Environmental Protection Act (OG 80/13, 78/15), public discussion (information and participation of the public and public concerned in environmental matters).

The public discussion was carried out from 15 May to 13 June 2014 in Local Office Trešnjevka, Zagreb, Park stara Trešnjevka 2, every working day from 8:30 a.m. to 3:30 p.m. for 30 days. Notice on public discussion was published in daily newspaper „Jutarnji list“, on notice boards of the City of Zagreb and their website, as well as the website of the Ministry of Environmental and Nature Protection together with the whole Study. A public presentation was held on 29 May 2014 in the Local Office Trešnjevka. No complaints, proposals or statements from the public or interested public were expressed during the public discussion. Apart from the City representatives, Study creators and project holders, the discussion was also attended by the representatives of the public, i.e. interested public, who had no complaints about the Study.

For existing EL-TO plant⁵⁰, procedure of issuing IPPC permit is in progress. Public discussion was carried out from 27 July 2015 to 26 August 2015 in the Ministry of Environmental and Nature Protection, Radnička cesta 80, Zagreb. Notice on public discussion was published in daily newspaper "Večernji list" and on the notice-boards and website of the City of Zagreb, including website of the Ministry of Environmental and Nature Protection together with the Summary of Permit application and TTR⁵¹. The public presentation was held on 30 July 2015 in Zagreb, Radnička cesta, in the Ministry of Environmental and Nature Protection. No complaints, proposals or statements from the public or interested public were expressed during the public discussion.

Before commissioning of new CCCPP, the Permit for existing EL-TO plant will need to be amended with conditions and monitoring for new unit. In order to obtain the Environmental permit⁵², a Permit application shall go through procedure which part is the public discussion. As for the existing plant, public and interested public will have (again) the opportunity to give comments about the project primarily in the field of Best Available Techniques application.

3.20 ENVIRONMENTAL MANAGEMENT SYSTEM

EL-TO Zagreb has established and certified integrated system of quality and environmental management in accordance with the international standards ISO 9001: 2008 and ISO 14001: 2004 since 2007.

⁵⁰ Obligation according to Annex 1 of Regulation on the procedure for determining integrated environmental protection requirements (OG 114/08) - combustion installations with a thermal input exceeding 50 MW.

⁵¹ Document in which technical characteristics of the plant are described.

⁵² According to Regulation on Environmental permit (OG 8/14) based on Directive 2010/75/EU on industrial emissions.

An integrated system of quality and environmental management is manifested through an integrated policy of quality and environmental management, unified system of documentation and records management as well as through documentation encryption system, unique training system related to quality and environment, joint conduction of internal audits and assessment of the Management Board as well as a unique system of conduction of corrective and preventive actions and more.

Implemented integrated system of quality and environmental management is regularly internally assessed and evaluated by the external authorized certification organizations.

The organizational structure, as well as the powers and responsibilities of EL-TO Zagreb are stipulated by the Regulations on organization and systematization of HEP-Proizvodnja d.o.o. – **figure 3.20-1.**

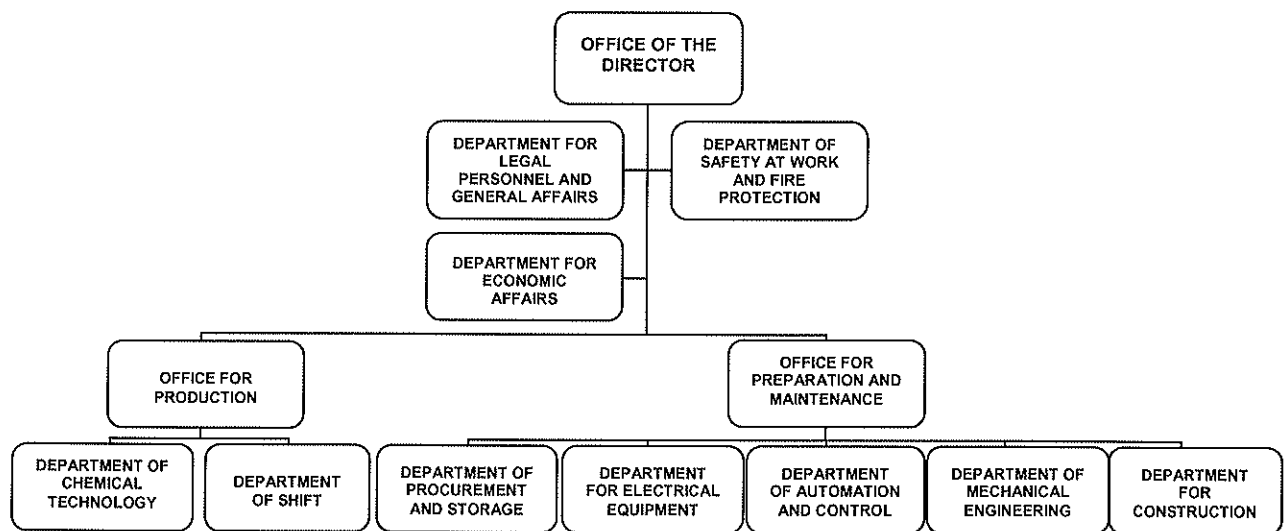


Figure 3.20-1: EL-TO Zagreb organizational scheme

Part of EBRD Performance Requirement 1 (Assessment and Management of Environmental and Social Impacts and Issues) is the establishment and maintenance of Environmental and Social Management System and related issues – described below.

REQUIREMENTS	REALIZATION
Environmental and Social Management Systems	
(15) Clients are required to establish and maintain an ESMS appropriate to the nature and scale of the project and commensurate with the level of its environmental and social impacts and issues in line with GIP. The objective of such a management system is to integrate the implementation of environmental and social requirements into a streamlined and coordinated process and to embed it in the main operational activities of the client assessment of impacts and issues.	<p>EL-TO Zagreb has implemented quality and environment management system according to ISO 9001:2008 and ISO 14001:2004 – Appendix 1.</p> <p>In management of new CCCPP operation, this system will be applied.</p>

REQUIREMENTS	REALIZATION
Environmental and Social Policy	
(16) The client will establish, as appropriate, an overarching policy defining the environmental and social objectives and principles that enable the project to achieve sound environmental and social performance. The policy will provide a framework for the environmental and social assessment and management process consistent with the principles of the PRs.	Part of the EMS is the Policy on quality and environmental management. This Policy defines the environmental and social objectives and principles that enable EL-TO Zagreb to achieve sound environmental and social performance. This Policy will be applied to the new CCCPP.
Environmental and Social Management Plan	
<p>(17) Taking into account the findings of the environmental and social assessment process and the outcomes of stakeholder engagement, the client will develop and implement a programme of actions to address the identified project's environmental and social impacts and issues and other performance improvement measures to meet the PRs. Depending on the project, the programme may consist of a combination of documented operational policies, management systems, procedures, plans, practices and capital investments, collectively known as Environmental and Social Management Plans (ESMPs).</p> <p>(18) The ESMP will reflect the mitigation hierarchy and, where technically and financially feasible, favour the avoidance and prevention of impacts over minimisation, mitigation or compensation, and ensure that all relevant stages of the project are structured to meet applicable laws and regulatory requirements and the PRs. Where affected individuals or groups are identified as disadvantaged or vulnerable⁵³ during the appraisal process, the ESMP will include differentiated measures so that adverse impacts do not fall disproportionately on them and they are able to take advantage of opportunities to benefit from the project. Where relevant, the ESMP will also cover management of third party and supply chain issues.</p> <p>(19) The level of detail and complexity of the ESMP will be commensurate with the project's impacts and issues addressing risks, impacts and opportunities specific to the project. The ESMP will define desired outcomes as measurable events to the extent possible with elements such as targets and performance indicators that can be tracked over defined periods. Recognizing the dynamic nature of the project development and implementation process, the ESMPs will be responsive to changes in project circumstances, unforeseen events, regulatory changes and the results of monitoring and review, and will be updated from time to time.</p>	<p>Environmental and Social Management/ Action Plan is created based on environmental protection measures from EIA procedure (Permit) and additional measures related to the EBRD Performance Requirements (PRs). Social part of the plan is given in the Stakeholder Engagement Plan (SEP).</p> <p>ESAP includes measures for contractors working on project sites or perform work to meet the requirements of client's EMS, Occupational safety system and labour and working conditions by incorporating relevant conditions into tender documents and contractual agreements with those third party employers.</p>

⁵³ For the purpose of this Policy, vulnerable groups refers to people who, by virtue of gender identity, sexual orientation, religion, ethnicity, indigenous status, age, disability, economic disadvantage or social status may be more adversely affected by project impacts than others and who may be limited in their ability to claim or take advantage of project benefits. Vulnerable individuals and/or groups may also include, but not be limited to, people living below the poverty line, the landless, the elderly, women and children headed households, refugees, internally displaced people, ethnic minorities, natural resource dependent communities or other displaced persons who may not be protected through national legislation and/or international law.

REQUIREMENTS	REALIZATION
<p>(20) The ESMS, including any specific requirements and actions it sets out, will apply to the project regardless of whether it is carried out directly by the client or through contractors or subcontractors. It is the client's responsibility to ensure that contractors working on project sites meet these requirements by adopting and implementing an appropriate contractor management system. Effective contractor management includes:</p> <ul style="list-style-type: none"> • assessing environmental and social risks associated with contracted works and services and incorporating relevant ESMP conditions into tender documents as appropriate, contractually requiring contractors to apply these standards and provide for mitigation of non-compliance • overseeing that contractors have the knowledge and skills to perform their project tasks in accordance with the contract conditions • monitoring contractor compliance with the contract conditions • in the case of subcontracting, requiring contractors to have similar arrangements with their subcontractors. 	
<p>Organizational capacity and commitment</p> <p>(21) The client will establish, maintain and strengthen, as necessary, an organisational structure that defines roles, responsibilities and authority to implement the ESMS for ensuring ongoing compliance with relevant national regulatory requirements, and the PRs. The client will designate specific personnel, including management representative(s), with clear lines of responsibility and authority to maintain and implement the ESMS. Key environmental and social responsibilities will be defined and communicated to the relevant personnel. The client will provide adequate support and human and financial resources on an ongoing basis to achieve effective and continuous environmental and social performance.</p> <p>(22) The client will ensure that employees with direct responsibility for activities relevant to the environmental and social performance of the project are suitably qualified and trained.</p>	<p>The organizational structure, as well as the powers and responsibilities of the EL-TO Zagreb are stipulated by the Ordinance on organization and systematization of HEP-Proizvodnja d.o.o. (HEP Bulletin no. 174).</p> <p>All activities related to environmental protection at the site are managed by: environmental protection coordinator within the Director's Office of HEP-Proizvodnja d.o.o., environmental protection coordinator located in the Chemical Technology Department of EL-TO Zagreb and Head of Chemical Technology Department.</p> <p>Regular internal communication between the persons in charge of environmental protection and heads of other departments and services is in order to maintain and improve the environmental protection system and complementary systems that deal with occupational health and safety and fire protection.</p> <p>There is regular communication with competent authorities of state and local governments in charge of environmental issues, Physical Planning and Construction, the economy and health care and with inspection services.</p> <p>Activities related to the organization of implementation of all activities to ensure that implemented and certified quality and environmental management system is established, implemented and maintained in accordance with all the requirements of ISO 9001: 2008 and ISO 14001: 2004 are managed by the Representative of Administration for quality and environment. Representative acquaints the Management with all major problems affecting the quality and environmental management system. Through annual audit of the</p>

REQUIREMENTS	REALIZATION
	system conducted by the Management, Representative provides monitoring of efficiency and continuous system improvement.
Supply chain management <p>(23) A client is required to identify risks associated with its supply chain. Where the client can reasonably exercise control over its primary suppliers, the environmental and social assessment process will also consider whether the primary supply chains central to the project's core operational functions are likely to be associated with environmental and social risks. If this is the case, the client will adopt and implement a supply chain management system commensurate to the complexity of these supply chains and associated environmental and social issues appropriate for the nature and scale of the project. The management system will include processes for taking action to address environmental and social issues identified during the supply chain assessment or ongoing monitoring, taking into account: (i) whether the client caused or contributed to the issues; (ii) the client's leverage over the supplier; (iii) how crucial the relationship is to the client; (iv) the severity of the issues; and (v) whether terminating the relationship with the supplier would itself have adverse consequences. Requirements for labour standards in the supply chain are outlined in PR 2; requirements for supply chains for living natural resources are defined in PR 6.</p>	
Project monitoring and reporting <p>(24) The client will monitor the environmental and social performance of the project. This monitoring is intended to: (i) determine whether the project is being implemented in accordance with the PRs; and (ii) learn lessons, allocate resources and identify opportunities for continuous improvement.</p> <p>(25) Monitoring requirements will be proportional to the</p>	
<p>Supply chain related to the operation of new unit is fuel supply - natural gas. For the purposes of operation of the existing EL-TO Zagreb units, HEP-Trgovina d.o.o. in the name and on behalf of HEP d.d., purchases natural gas for HEP-Proizvodnja d.o.o. on open market (domestic or foreign) by making a contract on gas supply with the selected supplier. For billing metering point connected to the transmission system of the transmission system operator PLINACRO Ltd. (as is the case for EL-TO Zagreb), gas supply contract can be made with two or more suppliers (in accordance with the General conditions of gas supply (OG 158/13)) who are registered for the performance of market gas trading activities in Croatia or in international market.</p> <p>For the purposes of HEP-Proizvodnja d.o.o., for the purpose of EL-TO Zagreb plant respectively, natural gas supply on an annual basis for this year 2015/2016 is contracted with two suppliers (Prvo plinarsko društvo d.o.o. and INA d.d.), while the portion of annual demand is bought on foreign market in Austria. Additional demands for natural gas are settled by monthly, weekly and daily tenders from various suppliers, in addition to the already mentioned, such as Crodux plin d.o.o., Geoplin d.o.o., MET Croatia d.o.o., EconGas d.o.o., Proenergy d.o.o. etc.</p> <p>Danger in relation to the supply chain may occur in the event of inability of natural gas supply to EL-TO Zagreb plant, because in that case heat supply for the west part of Zagreb is in danger. In case of gas shortages in Croatia, district heating plants have an advantage in supply in relation to other industrial facilities. From the standpoint of the security of natural gas supply, EL-TO can also, for the purpose of heat generation, use backup liquid fuel (medium fuel oil with less than 1% of sulfur) in existing production units such as boilers. If the inability of supply is related to failures in the transmission system, there is a possibility of gas supply from the public gas distributor Gradska plinara Zagreb d.o.o., while as emergency backup in case of problems in the supply of 7-10 days, there are strategic commodity reserves that HEP-Proizvodnja d.o.o. asked the Ministry of Economy.</p>	
<p>The client will perform regular monitoring of project development related to the project's environmental and social performance.</p> <p>Client will appoint responsible person(s) for this monitoring and third party (independent experts) to complement or verify this monitoring and create half-</p>	

REQUIREMENTS	REALIZATION
<p>nature of the project and its environmental and social impacts and issues. Monitoring will address:</p> <ul style="list-style-type: none"> • any significant environmental and social impacts and issues identified during the environmental and social assessment process • relevant parts of the PRs as identified during the project assessment process and subsequent monitoring as appropriate • actions specified in the ESMP or ESAP, where relevant • grievances received from workers and external stakeholders, and how they were resolved • any regulatory monitoring and reporting requirements • any monitoring/reporting required by other parties (for example, off-takers, financiers or certification bodies). <p>(26) The client will ensure that adequate systems, resources and personnel are in place to carry out monitoring. The client should review the results of monitoring and initiate corrective actions as necessary. In addition, the client may use third parties, such as independent experts, local communities or civil society organisations, to complement or verify its own monitoring information. Where relevant authorities or other third parties have responsibility for managing specific impacts and issues and associated mitigation measures, the client will collaborate with the relevant authorities or other third parties in establishing and monitoring such mitigation measures.</p> <p>(27) The client will provide regular reports to the EBRD on the environmental and social performance of the project, including compliance with the PRs and implementation of the ESMS, ESMP, ESAP and Stakeholder Engagement Plan where appropriate. Based on the monitoring results the client will identify and reflect any necessary corrective and preventive actions in an amended ESMP or ESAP, as agreed with the EBRD. The client will implement agreed corrective and preventive actions, and follow up on these actions to enhance their performance.</p> <p>(28) The client must promptly notify the EBRD of any environmental or social incident or accident relating to the client or the project which has, or is likely to have, a significant adverse effect.</p> <p>(29) The client must promptly notify the EBRD of any changes to the project's scope, design or operation that is likely to materially change its environmental or social impacts and issues. The client will carry out any additional assessment and stakeholder engagement in accordance with the PRs and amend the ESMP or ESAP in accordance with the findings, as agreed with the EBRD.</p> <p>(30) For projects that could have significant adverse environmental and social impacts and issues, the client may be required to engage relevant external experts to perform periodic independent reviews of the project, or to carry out monitoring of specific environmental or social</p>	<p>annual report on project's progress to the EBRD. This monitoring is defined in ESAP and SEP.</p> <p>Based on the monitoring results the client will identify and reflect any necessary corrective and preventive actions in amended ESMP or ESAP, as agreed with the EBRD. The client will implement agreed corrective and preventive actions and follow up on these actions to enhance their performance.</p> <p>Client will promptly notify the EBRD of any environmental or social incident or accident related to the client or the project.</p> <p>Client will promptly notify the EBRD of any changes to the project's scope, design or operation that is likely to materially change its environmental or social impacts and issues. Client will carry out any additional assessment and stakeholder engagement in accordance with the PRs and amend the ESMP or ESAP in accordance with the findings, as agreed with the EBRD.</p>

REQUIREMENTS	REALIZATION
issues. The scope of this work and follow-up actions will be determined on case-by-case basis.	

3.21 LABOUR AND WORKING CONDITIONS

The EBRD Performance Requirements 2 is related to the Labour and Working Conditions with objectives to:

- respect and protect the fundamental principles and rights⁵⁴ of workers
- promote the decent work agenda⁵⁵ including fair treatment, non-discrimination and equal opportunities of workers
- establish, maintain and improve a sound worker-management relationship
- promote compliance with any collective agreements to which the client is a party, national labour and employment laws
- protect and promote the safety and health of workers, especially by promoting safe and healthy working conditions
- prevent the use of forced labour and child labour as it relates to project activities.

PR 2 requirements are described below.

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General	
(5) Projects are required to comply, at a minimum, with (i) national labor, social security and occupational health and safety laws, and (ii) the fundamental principles and standards embodied in the ILO conventions. ⁵⁴	Project as new EL-TO unit will comply with national labor, social security and occupational health and safety laws. Republic of Croatia ratified ILO conventions 3,8,9, 11-14, 16-19, 22-25, 27, 29, 32, 45, 48, 53, 56, 69, 73, 74, 81, 87, 90-92, 98, 100, 102, 103, 105, 106, 109, 111, 113, 116, 119, 121, 122, 129, 132, 135, 136, 138, 139, 147, 148, 155, 156, 159, 161, 162, 182 and 185. ⁵⁶ In accordance with this, project will also comply with fundamental principles and standards of ILO conventions.
Management of worker relationships	
Human resources policies	
(6) The client will adopt and/or maintain human resources policies and management systems or procedures appropriate to its size and workforce that sets out its approach to managing the workforce in	Human resources management policies in EL-TO Zagreb are defined vertically through the Human Resources Management Department of HEP d.d., administration and personnel services of the company and plant

⁵⁴ ILO conventions 29 and 105 (forced labour), 87 (freedom of association), 98 (right to collective bargaining), 100 and 111 (discrimination), 138 (minimum age) 182 (worst forms of child labour).

⁵⁵ Decent work sums up the aspirations of people in their working lives. It involves opportunities for work that is productive and delivers a fair income, security in the workplace and social protection for families, better prospects for personal development and social integration, freedom for people to express their concerns, organise and participate in the decisions that affect their lives and equality of opportunity and treatment for all women and men.

⁵⁶ <http://www.nhs.hr/dokumenti/konvencije/>

REQUIREMENTS	REALIZATION
accordance with the requirements of this PR and national law. These policies and procedures will be understandable and accessible to workers, and in the main language(s) spoken by the workforce.	management. Documentation from the domain of human resources management is in personnel services and is available to people within the organization that are specifically appointed for the collection, analysis, use and delivery of data to third parties with valid legal justification for data request.
Working relationships	
<p>(7) The client will document and communicate to all workers their rights under national labour and employment law and any applicable collective agreements, working conditions and terms of employment including their entitlement to wages, hours of work, overtime arrangements and overtime compensation, any benefits (such as leave for illness, maternity/paternity or holiday), and when any material changes occur. This information will be understandable and accessible to workers and available in the main language(s) spoken by the workforce. Human resources management systems will respect the rights of workers to privacy and data protection.</p> <p>(8) Communications should be managed with a view to providing the workers with: (i) adequate information, in particular, on changes anticipated that might affect the workforce and (ii) the opportunity to provide comments as part of continuous improvement, including how to raise grievances as detailed in paragraph 20.</p>	<p>All information regarding the conditions of work and employment, the right to salary and other rights and obligations of workers are available through the Collective Agreement for HEP Group (OG 132/14). Also, all information relevant for workers are available through HEP's intranet InfoHep, Internet website of HEP and competent personnel departments.</p> <p>For EL-TO Zagreb there is no specific Ordinance on labor. EL-TO Zagreb is not a legal person, but as an organizational unit established within HEP-Proizvodnja d.o.o. Therefore the Ordinance on labor is adopted on the level of HEP-Proizvodnja d.o.o.</p>
Child labour	
<p>(9) The client will comply with all relevant national laws or international labour standards regarding employment of minors, whichever provide a higher degree of protection for the child, related to the employment of minors.</p> <p>(10) The client will not employ children in a manner that is economically exploitative, or is likely to be hazardous or to interfere with the child's education, or to be harmful to the child's health or physical, mental, spiritual, moral, or social development. Young people below the age of 18 will be identified by the client and will not be employed in hazardous work. All work of persons under the age of 18 shall be subject to an appropriate risk assessment and regular monitoring of health, working conditions, and hours of work.</p>	<p>Jobs that may not be executed by workers under 18, women, especially pregnant women and workers with reduced working capacity are determined in the hazard assessment, in accordance with the provisions of the Labour Law and Law on Occupational Safety.</p> <p>As a rule, specified categories of workers must not be allocated to particular working conditions, to shift work and other activities that may adversely affect their health. This is all according to the Ordinance on Occupational Safety of HEP-Proizvodnja d.o.o.</p> <p>A minor may not perform tasks with special working conditions, except for a minor who has completed professional secondary education for these jobs and who meets other legal requirements according to the Law on Occupational Safety (OG 71/14).</p>
Forced labour	
<p>(11) The client will not employ forced labour, which consists of work or service not voluntarily performed that is exacted from an individual under threat of force or penalty. This covers involuntary or compulsory labour, such as indentured labour, bonded labour or similar labour-contracting arrangements, or trafficked persons.⁵⁷</p>	Not applicable.

⁵⁷ Trafficking in persons is defined as the recruitment, transportation, transfer, harbouring or receipt of persons by means of a threat or use of force or other forms of coercion, abduction, fraud, deception, abuse of power, or of a position of vulnerability, or the giving or receiving of payments or benefits to achieve the consent of a person having control over another person, for the purpose of exploitation.

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Non-discrimination and equal opportunity <p>(12) Projects will comply with relevant requirements on non-discrimination related to employment. In particular, with reference to the project, the client will:</p> <ul style="list-style-type: none"> • not make employment decisions on the basis of personal characteristics, such as gender, race, nationality, political opinion, affiliation to a union, ethnic, social or indigenous origin, religion or belief, marital or family status, disability, age, sexual orientation or gender identity, unrelated to inherent job requirements • base the employment relationship on the principle of equal opportunities and fair treatment, and will not discriminate with respect to all aspects of the employment relationship, including recruitment and hiring, job assignment, compensation (including wages and benefits),⁵⁸ working conditions and terms of employment, including reasonable adaptation of the workplace related to disabilities, access to training, promotion, termination of employment or retirement, and discipline. • take measures to prevent and address harassment, including sexual harassment, bullying, intimidation and/or exploitation. <p>The following measures will not be considered discrimination: special measures of protection or assistance to remedy past discriminatory actions; promotion of local employment opportunities; or selection for a particular job based on the inherent requirements of the job, which are in accordance with national law.</p>	
Workers' organizations <p>(13) The client will not discourage workers from electing workers' representatives, forming or joining workers' organisations of their choosing or from bargaining collectively. The client will not discriminate or retaliate against workers who act as representatives, participate, or seek to participate, in such organisations or bargain collectively. In accordance with national law, the client will engage with such workers' representatives or organisations and provide them with information needed for meaningful negotiation in a timely manner. Where national law substantially restricts the establishment or functioning of workers' organisations, the client will establish an independent process for workers to express their grievances and protect their rights regarding working conditions and terms of employment appropriate to its size and workforce.</p>	
Wages, benefits and conditions of work <p>(14) Wages, benefits and conditions of work offered (including hours of work) should, overall, be at least comparable to those offered by equivalent employers in</p>	
<p>There will be no new employment for the new project. For control and management of new CCCPP operation, existing workers from EL-TO plant will be employed.</p> <p>There are few workers' organizations related to EL-TO plant (HEP d.d.):</p> <ul style="list-style-type: none"> -Hrvatski elektrogospodarski sindikat - HES, -Nezavisni sindikat radnika HEP-a d.d. - NSR HEP, -Strukovni sindikat radnika HEP-a TEHNOS, -Novi sindikat, <p>There is also Workers Council and General Workers 'Council.</p> <p>EL-TO cooperates with Workers Council and General Workers' Council and all workers syndicates and provide them with information needed for meaningful negotiation in a timely manner (e.g. in case of collective dismissals).</p> <p>All information regarding the conditions of work and employment, the right to salary and other rights and obligations of workers are available through the</p>	

⁵⁸ The client will take into consideration the principle of equal remuneration for work of equal value. The client will take into consideration the principle of equal remuneration for work of equal value.

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<p>the relevant country/region and sector concerned.</p> <p>(15) Where the client is a party to a collective bargaining agreement or is otherwise bound by it, such agreement will be respected. Where such agreements do not exist, or do not address working conditions and terms of employment, the client will provide reasonable working conditions and terms of employment.</p> <p>(16) The client will identify migrant workers and ensure that they are engaged on substantially equivalent terms and conditions to non-migrant workers carrying out the same work.</p>	<p>Collective Agreement for HEP Group (OG 132/14). Also, all information relevant for workers are available through HEP's intranet InfoHep, Internet website of HEP and competent personnel departments.</p>
Occupational health and safety	
<p>(17) Clients will provide workers with a safe and healthy work environment, and projects will comply with the provisions of PR 4.</p>	<p>EL-TO Zagreb as organizational unit within HEP-Proizvodnja d.o.o. in terms of occupational health and safety has implemented the Ordinance on Occupational Safety of HEP-Proizvodnja d.o.o.</p> <p>This internal document defines the implementation organization of safety at work, rules of safety at work and rights, obligations and responsibilities of workers.</p>
Worker accommodation	
<p>(18) Where a client provides accommodation for workers, the accommodation shall be appropriate for its location and be clean, safe and, at a minimum, meet the basic needs of workers. In particular, the provision of accommodation shall meet good international industry practice.⁵⁹ Workers' freedom of movement to and from the employer-provided accommodation shall not be unreasonably restricted.</p>	<p>EL-TO workers accommodation is solved in accordance with the Ordinance on housing needs of employees that applies to all members of the HEP Group.</p>
Retrenchment	
<p>(19) Prior to implementing any collective dismissals⁶⁰ in connection with the project, the client will carry out an analysis of alternatives to retrenchment. If the analysis does not identify viable alternatives to retrenchment, the client will develop and implement a retrenchment plan to assess, reduce and mitigate the adverse impacts of retrenchment on workers, in line with national law and good international industry practice and based on the principles of non-discrimination and consultation. The selection process for retrenchment will be transparent, based on fair, objective, consistently applied criteria, and subject to an effective grievance mechanism. Clients will provide reasonable notice of changes to employment conditions to the unions concerned (where they exist), and to workers and their representatives and, where appropriate, relevant public authorities. This consultation will aim to reduce and mitigate potential adverse effects of job losses on the workers concerned. The outcome of the consultations will be reflected in the final retrenchment plan. All outstanding back pay and social security benefits and pension contributions and benefits will be paid: (i) on or before termination of the working</p>	<p>There is a possibility and in the past there were collective dismissals carried out. The procedure is carried out in accordance with applicable provisions of the Labor Act and the Collective Agreement for HEP Group. In all phases of collective dismissal of workers there is participation of Workers Council and General Workers' Council and all workers syndicates in accordance with the Act on representativeness of employers' associations and syndicates, ensuring maximum transparency of the process and timely information to all stakeholders in the process.</p>

⁵⁹ EBRD/IFC Guidance Note "Workers' accommodation: processes and standards", 2009.

⁶⁰ Collective dismissals are defined in Article 1 of EU Directive 98/59.

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relationship to the workers; (ii) where appropriate, at a point in time agreed with the worker; or (iii) payment will be made in accordance with a timeline agreed through a collective agreement.	
<p>Grievance mechanism</p> <p>(20) The client will provide an effective grievance mechanism for workers (and their organisations, where they exist) to raise workplace concerns. The client will inform the workers of the grievance mechanism at the time of hiring, and make it easily accessible to them. The mechanism should involve an appropriate level of management and address concerns promptly, using an understandable and transparent process that provides timely feedback to those concerned, without any retribution. The mechanism should also allow for confidential complaints to be raised and addressed. The mechanism should not impede access to other judicial or administrative remedies that might be available under law or through existing arbitration or mediation procedures, nor should it substitute for grievance mechanisms provided through workers unions or collective agreements.</p>	<p>There is a possibility of raising a complaint to the working conditions in accordance with the Labor Act, Ordinance on labor, Collective Agreement and Law on Occupational Health and Safety, as well as other regulations. All decisions regarding the exercise of rights and obligations arising from employment must be reasoned and have guidance on the protection of rights. When hiring, a worker is informed on all rights and obligations arising from employment, also of the grievance mechanism.</p>
<p>Non-employee workers</p> <p>(21) For non-employee workers engaged by the client through contractors or other intermediaries to work on project sites or perform work directly related to the core functions of the project, the client will use reasonable efforts to: (i) ascertain that these contractors or intermediaries are reputable and legitimate enterprises; and (ii) require that they apply the requirements stated in paragraphs 6-18 and 20 above. When the client contracts non-employee workers directly, the client will apply the requirements of paragraphs 6 to 18 and 20 above.</p> <p>(22) In accordance with PR 1, the client will establish policies and procedures for managing and monitoring the performance of third party employers in relation to the project and requirements of this PR. In addition, the client will assess and use reasonable efforts to incorporate these requirements in contractual agreements with such third party employers and, where relevant, will develop and implement a contractor management plan.</p> <p>(23) A client is required to identify risks associated with non-employee workers. The client will ensure that non-employee workers have access to an effective grievance mechanism that meets the requirements of PR 2. In cases where the third party is not able to provide a grievance mechanism, the client will provide an effective grievance mechanism to serve workers engaged by the third party.</p>	<p>ESAP includes measures for contractors working on project sites or perform work to meet the requirements of client's EMS, Occupational safety system and <u>labour and working conditions</u> by incorporating relevant conditions into tender documents and contractual agreements with those third party employers.</p>
<p>Supply chain</p>	
<p>(24) As part of the supply chain assessment process</p>	<p>Supply chain related to the operation of new unit is fuel</p>

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<p>outlined in PR 1, the client will identify and assess the risk of child labour and forced labour⁶¹ being used in its supply chains of goods and materials which are central to the core functions of the project (core supply chains).</p> <p>(25) If the client learns that child labour or forced labour in contravention of ILO standards are present in a core supply chain, the client will take appropriate steps to remedy this in accordance with the requirements below.</p> <ul style="list-style-type: none"> • If child labour is detected, good faith efforts should be made to remediate or mitigate the problem. The client should only continue to procure such goods or materials from that supplier, having received satisfactory undertakings or evidence that the supplier is committed to implementing a programme in line with GIP to eliminate such practices within a reasonable time frame. The client will report on progress with the implementation of such programme on a regular basis. • In relation to forced labour, the client should only continue to procure such goods or materials from that supplier having received satisfactory undertakings or evidence that the supplier has taken appropriate steps to eliminate the conditions that constitute forced labour. • Where there is a risk of child and/or forced labour, the client will monitor its primary supply chain on an ongoing basis in order to identify any significant changes in its supply chain and new risks or incidents of child and/or forced labour. <p>Additionally, where significant safety issues are identified among primary supply chain workers, the client will introduce procedures and mitigation measures to ensure that relevant suppliers are taking steps to prevent these situations.</p> <p>(26) The ability of the client to fully address these risks will depend on the client's level of management control or influence over its primary suppliers. The client will shift the affected primary supply chain over an agreed time frame to suppliers that can demonstrate that they are complying with this PR.</p>	<p>supply - natural gas. For the purposes of operation of the existing EL-TO Zagreb units, HEP-Trgovina d.o.o. in the name and on behalf of HEP d.d., purchases natural gas for HEP-Proizvodnja d.o.o. on open market (domestic or foreign) by making a contract on gas supply with the selected supplier. For billing metering point connected to the transmission system of the transmission system operator PLINACRO Ltd. (as is the case for EL-TO Zagreb), gas supply contract can be made with two or more suppliers (in accordance with the General conditions of gas supply (OG 158/13)) who are registered for the performance of market gas trading activities in Croatia or in international market.</p> <p>For the purposes of HEP-Proizvodnja d.o.o., for the purpose of EL-TO Zagreb plant respectively, natural gas supply on an annual basis for this year 2015/2016 is contracted with two suppliers (Prvo plinarsko društvo d.o.o. and INA d.d.), while the portion of annual demand is bought on foreign market in Austria. Additional demands for natural gas are settled by monthly, weekly and daily tenders from various suppliers, in addition to the already mentioned, such as Crodux plin d.o.o., Geoplin d.o.o., MET Croatia d.o.o., EconGas d.o.o., Proenergy d.o.o. etc.</p> <p>Gas suppliers are mostly EU companies, so they had to comply with legislation in the field of labour and working conditions.</p>
Security personnel requirements	
<p>(27) When the client retains employees or contractors to provide security to safeguard its personnel and property, it will agree a standard of practice and behavior for the security personnel, guided by the principle of proportionality and GIP⁶² in terms of hiring, rules of conduct, training, equipping and monitoring of such personnel. The client will make reasonable inquiries to satisfy itself that those providing security services are not implicated in past abuses, will ensure they are trained adequately in the use of force (and where applicable, firearms) and appropriate conduct towards workers and the local community, and require them to act within the</p>	<p>Security company that conducts security and protection of EL-TO Zagreb is Sigurnost Osijek d.o.o. Checking of the company is carried out in the procedure prior to the conclusion of the contract execution services, related to the conditions of no-criminal record and no criminal conviction, and the law defines the terms of security business.</p> <p>There have been no cases of complaints against the security services either by workers or the surrounding population.</p>

⁶¹ As defined in ILO conventions 138, 182, 29 and 105.

⁶² For example, the Voluntary Principles on Security and Human Rights.

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<p>applicable law. The client will not sanction any use of force except when used for preventive and defensive purposes in proportion to the nature and extent of the threat. The client will establish and maintain an effective grievance mechanism to allow the affected community and workers to express concerns about the security arrangements and actions of security personnel, and will inform communities and workers of the availability and use of the grievance mechanisms, in accordance with this PR and PR 10.</p> <p>(28) If government security personnel are deployed to provide security services for the client, the client will identify and assess potential risks arising from such use, communicate to the relevant public authorities its intent that the security personnel act in a manner consistent with paragraph 27 above, and encourage the relevant public authorities to disclose the security arrangements for the client's facilities to the public, subject to overriding security concerns.</p> <p>(29) The client will investigate any allegations of unlawful or abusive acts of security personnel, take action (or urge appropriate parties to take action) to prevent recurrence, and report unlawful and abusive acts to public authorities.</p>	<p>Investing complaint is made possible by receipt of the registry book (direct, by mail or other verifiable form of communication) in EL-TO plant in case of complaints from individual workers or other persons.</p>

4 OVERVIEW OF POTENTIAL ENVIRONMENTAL IMPACTS DURING PROJECT PREPARATION AND CONSTRUCTION

4.1 AIR

During construction, the air quality impact is a result of flue gas emissions from vehicles and equipment used during construction, i.e. emissions from trucks and construction machines. This emission depends on site activities, i.e. on types and intensity of activities.

As regarding the air quality impact, a dust fugitive emission could be significant as partly a result of construction works (site cleaning, excavation, earthwork, etc.) and partly due to dust rising during movement of construction machines and vehicles on the site.

Measures implemented on the site should ensure that impact during construction is not noticeable within the closest residential areas.

4.2 WATER

The waste waters will be generated at the site (potentially oily and conditionally polluted rainwaters, waste waters from mechanization, facilities and equipment washing), collected and treated and then discharged via existing sewer system to the public sewage system.

Sanitary waste waters will be discharged into existing sanitary sewage system.

The impact intensity will depend to a large extent on careful planning of activities, their intensity and particularly on the Contractor's due diligence during carrying out the activities. Critical activities will be carried out under supervision, including the environmental impact aspects as well.

4.3 NOISE

Noise will occur during construction works as a result of operation of construction machines and equipment, as well as heavy trucks related to the site operation.

The highest allowed noise levels as a result of site operation are defined in Article 17 of the Ordinance on Maximum Permissible Noise Levels in Areas where People Work and Live (OG 145/04).

During daily period, allowed equivalent noise level amounts 65 dB(A). Within the period from 8 a.m. to 6 p.m., exceeding of additional 5 dB is allowed.

During night period, the equivalent noise level may not exceed values from table 1 of the Ordinance on Maximum Permissible Noise Levels in Areas where People Work and Live (OG 145/04).

Exceeding of allowed noise levels by 10 dB is allowed by exception, in case it is required by technological process lasting up to one night at most, i.e. up to two days within the period of 30

days. The Contractor is obliged to notify sanitary inspection on exceptional exceeding of allowed noise levels in written and to register it into construction journal.

Calculation of noise propagation⁶³ in the environment is carried out for the worst case – simultaneous work on the excavation of foundations and concreting in which four excavators and three cranes are in operation. Noise of transport trucks is negligible compared to the noise of those working machinery and equipment. The calculation uses the maximum sound power of the working machinery: $L_w \leq 110$ dB(A) for the excavators and $L_w=105$ dB(A) for cranes.

The calculated noise levels that will occur at the reference points as a result of activities of project construction during these operating conditions are given in **tab. 4.3-1**. During all other phases of construction, noise emissions to the environment will be much lower.

Tab. 4.3-1: Noise levels at the reference points during construction

Reference point	$L_{A,eq}$ [dB(A)]
G1 - Reiffeisen bank building (north of EL-TO)	52,1
G2 – boundary area with office buildings (northwest of EL-TO)	61,4
G3 – boundary area with residential buildings (south of EL-TO)	53,0

Noise levels are lower than permitted for the entire day period, from 7 a.m. to 11 p.m.. Graphic display of noise propagation from construction site is presented in **figure 4.3-1**.

⁶³ Calculation of noise propagation in the environment was carried out by commercial computer software "Lima", the method according to ISO 9613-2 / 2000: Attenuation of sound propagation outdoors - General method of calculation - the noise from industrial sources.

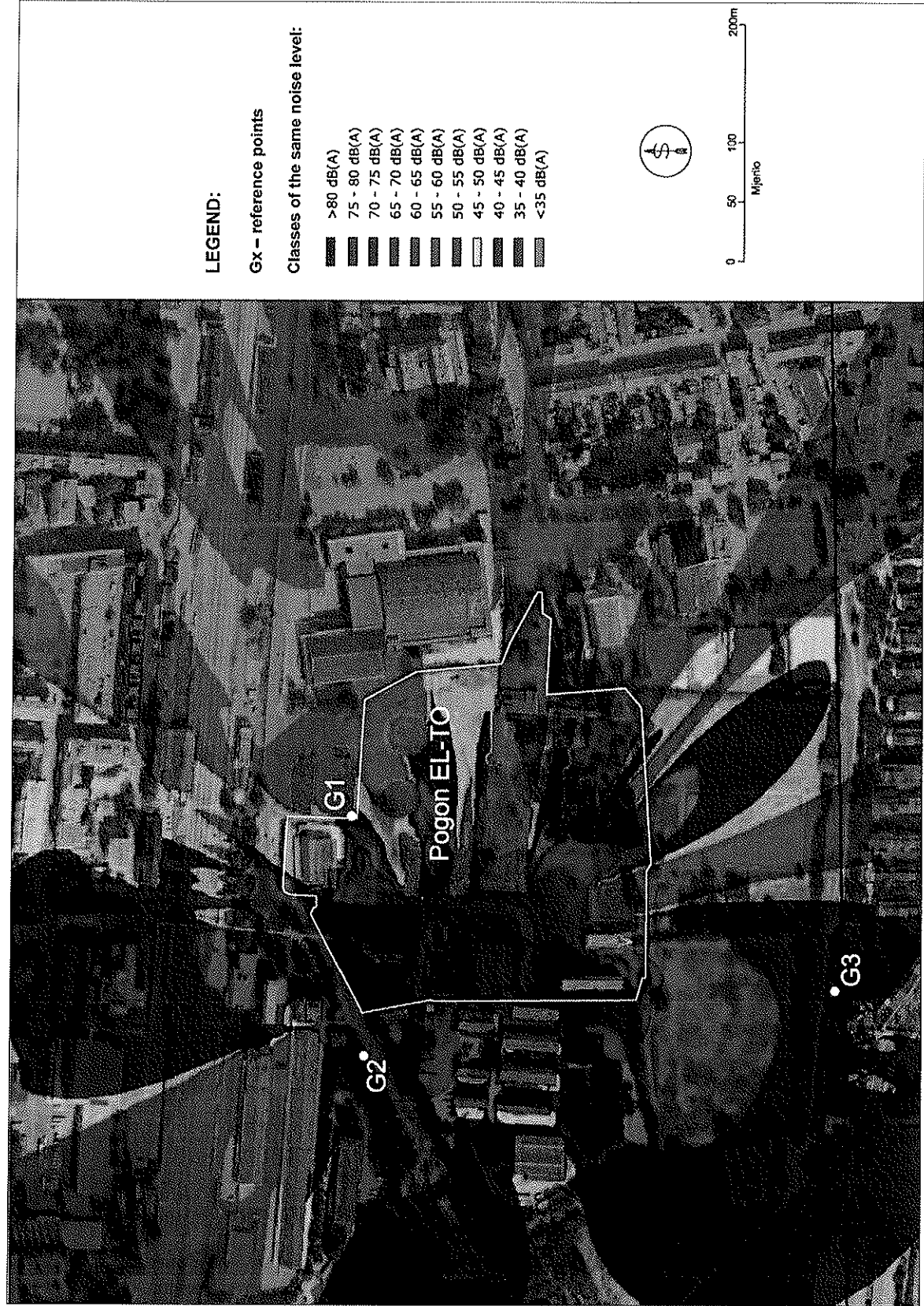


Figure 4.3-1: Graphic display of noise propagation from project construction site

4.4 WASTE

The site preparation, including removal of existing storage building⁶⁴ and EL-TO administration building⁶⁵, proceeds to the construction of new CCCPP. Buildings removal will be carried out in accordance with prepared projects of storage and administration building removal.

While removing the buildings, large amounts of various types of construction waste will be generated: waste concrete and asphalt, waste iron and steel, aluminium, tiles/ceramics, insulation mineral wool, waste wood, glass, waste plastic, waste wires and cables. Generation of smaller amounts of oily waste is possible as well.

During site preparation, excavation material will be generated and used for terrain landscaping and backfilling where required. Part of unused earth material should be transported and disposed to appropriate location intended for construction waste management.

The management of waste generated during buildings removal and site preparation should be carried out by legal entities authorized for managing individual types of waste. The advantage in waste management is given to recovery procedures in relation to waste disposal procedures.

All waste generated during construction should be collected separately by types and temporary disposed in existing temporary storages of hazardous and non-hazardous waste in EL-TO. The waste transport should be complied with construction dynamics.

4.5 LANDSCAPE FEATURES

The planned construction will be a continuation of reinforcing the ambient transformation into industrial subtype of cultural landscape within the area of highly urban tissue of block-type construction in the west part of the City of Zagreb, i.e. it concerns the local impact. The construction of new building structures in EL-TO Zagreb will be carried out within the industrial area preserving its homogenous character. The structure of planned unit is assumed in the area where there is existing administration building and storage building. The landscape structure of narrower area remains unchanged, while landscape impact is indirect, long-term, of minimum power and carried out within the zone already changed by existing impacts of surrounding industrial infrastructure.

4.6 POPULATION AND AREA IN RELATION TO TRANSPORT NETWORK

The existing EL-TO Zagreb location is well connected to the City of Zagreb transport infrastructure, i.e. the Republic of Croatia. On north side, there are quite frequent Magazinska and Zagorska roads passing by the location.

Several types of transport can be selected during preliminary works and construction:

⁶⁴ Project of storage removal within the EL-TO plant, EKONERG Ltd, 2014

⁶⁵ Project of the existing administration building removal, ELEKTROPROJEKT d.d., 2014

- 1) Group or organized transport of workers to the site
- 2) Individual transport of workers to the site
- 3) Site visits
- 4) Cargo transport from the site
- 5) Cargo transport to the site
 - construction materials
 - special cargo

All transport network loads and potential difficulties in transport represent impacts, which will occur mostly during preliminary works and construction and terminate upon the work termination, i.e. their duration is limited and could be minimized by implementing appropriate measures in individual phases of preliminary works and construction. Slightly larger traffic increase is expected in rush hours at maximum loads.

For the purpose of reducing the negative impact of transport load increase, it is required to prepare the project of temporary traffic control during preliminary works and construction, which should define access points to existing transport system and ensuring all potential collision points during preliminary works and construction. Traffic control can be carried out by placing the traffic signs, occasional slowing down and/or redirecting the traffic on certain roads.

Besides the road network, the railway infrastructure is available as well, thus it is possible to use the railway as alternative, ecological and cost-efficient way of cargo transport to the site.

4.7 LIGHT SOURCES

In general, construction works are not carried out during night, but sites are illuminated mostly due to safety reasons, i.e. due to supervision. Since the location of planned project is within EL-TO Zagreb, where the access is restricted and strictly controlled and where external lighting of internal roads already exists, it can be expected that site lighting will be minimum. In case some construction works will be carried out during night in order to fulfil contractual deadlines, the site will be illuminated in duration required for carrying out such necessary works. The site lighting contribution to the City of Zagreb night lighting is irrelevant.

4.8 DANGEROUS SUBSTANCES

During construction, it is possible that fuel storage tanks (canisters and barrels) will be located at the site. Classic petrol and diesel fuels are flammable products, dangerous for water environment and harmful for human health. However, by their appropriate storing – protected against the sun and precipitation in water-proof tank farm, without any sparking or ignition source nearby, by controlled access and using absorption agents for covering potentially spilt fuel in case of fuel leakage or spilling, the environmental impacts are eliminated and/or quickly localized.

4.9 SOCIAL AND ECONOMIC IMPACT

In providing construction services and goods, advantage will have the domestic enterprises (it is expected that domestic companies will work on civil works and installation of equipment.). During the construction of new CCCPP estimated number of workers at the site is up to 370. During construction, a presence of construction workers will contribute to the increased economic activity that will be also manifested in increase of demand for the activities of tertiary sector (services, trade and transport) as well as secondary activities.

5 OVERVIEW OF POTENTIAL ENVIRONMENTAL IMPACTS DURING PROJECT OPERATION

5.1 AIR

The impact of CCCPP is based on the description provided by Environmental Impact Assessment Study for the new CCCPP project. Additionally, new issues related to the future EL-TO emissions and recently adopted Zagreb air quality plan are discussed here.

5.1.1 EMISSION TO AIR

At EL-TO Zagreb location, new CCCPP will be the base load unit of district heating system. CCCPP will use only natural gas as a fuel. The realization of CCCPP project will significantly reduce the usage of existing generating units, as well as total emission of air pollutants from EL-TO Zagreb will be reduced.

Comparison of hourly emissions of Unit A and new CCCPP is given in **figure 5.1-1**. In relation to existing Unit A, new CCCPP will generate significantly more electricity and heat (cca. seven times more).

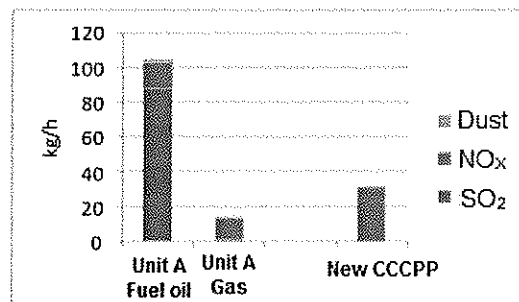


Figure 5.1-1: Emissions of SO₂, NO_x and dust from Unit A (current state) and new CCCPP

New CCCPP is planned to be put into commercial operation, at best, in autumn 2019. The transitional period for compliance with the Directive on industrial emissions⁶⁶ will be ended at 1 January 2018. Therefore, certain EL-TO generating units will be put out of operation.

In years after commissioning of new CCCPP, hot water boilers VK-3 and VK-4 and gas turbine units H and J will be still in operation and all generating units will use natural gas as a fuel.

⁶⁶ Derogations from emission limit values associated with EU directives is set by the Treaty between member states of the European Union and the Republic of Croatia (OJ L 112, 24.4.2012)

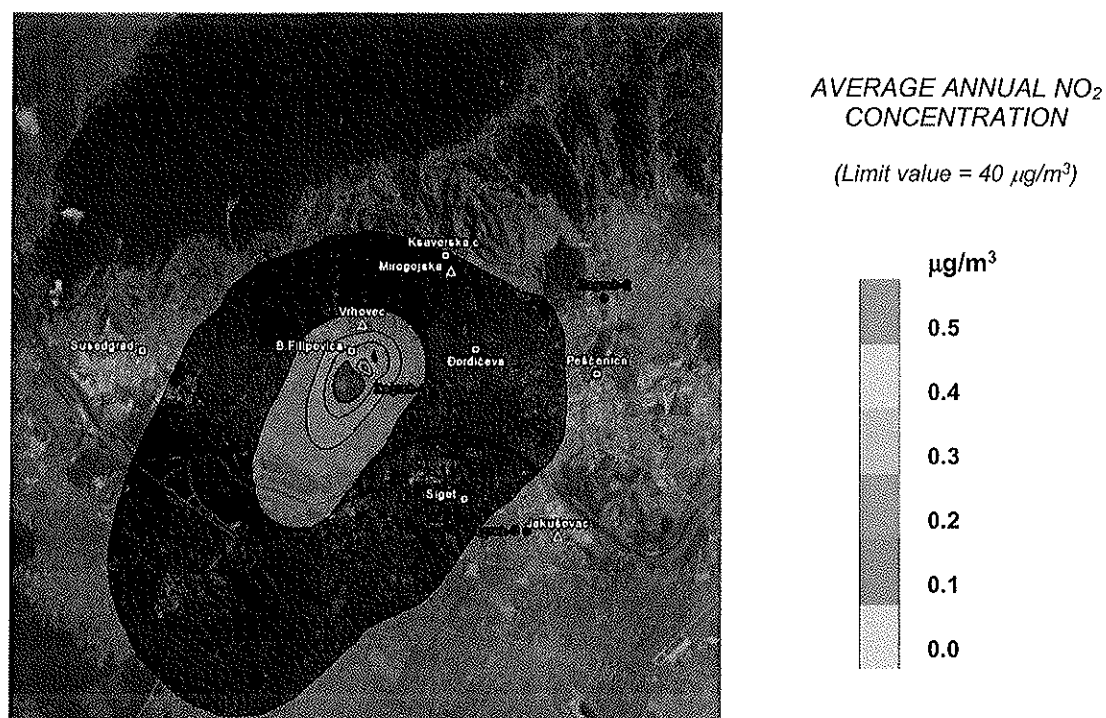


Figure 5.1-2: NO₂ concentrations within the area of 20x20 km during the new unit operation calculated by a dispersion model

Dispersion modeling results show that maximum impact of CCCPP on hourly NO₂ concentration is 10.6 µg/m³. That is less than 5% of the referent limit value (200 µg/m³). The impact of new unit at the average annual concentration of NO₂ is less than 0.7 µg/m³ or less than 2% of the referent limit value (40 µg/m³).

In terms of cumulative impacts, changes in total emissions of EL-TO must be taken into consideration. Before commissioning a new unit, the reconstruction of existing units (H, J) should be implemented and some old units will be shut down, which will significantly reduce total emissions in the future.

In the environmental impact assessment study of CCCPP the dispersion modeling is done for current and future emission scenarios for EL-TO power plant. The current and future emission sources in EL-TO power plant are:

Emission scenario	Units in operation
Current	K6, K7, K8, K9, VK4, H, J
Future	CCCPP, VK4, H(reconstructed), J(reconstructed)

Cumulative impact assessment for current and future emission scenario is modeled for total maximum emission that corresponds with maximum emission during heating season. Dispersion model calculation showed that future impact of total EL-TO emission on air quality will be less than current impact of EL-TO.

Low emission due to compliance with EU Industrial emission directive (2010/75/EC) and 60-meter high stack insures that CCCPP will have very low impact on air quality of surrounding area.

In the future there will be no significant adverse impacts due to CCCPP emission. Overall future cumulative emission of EL-TO power plant will be less since the fuel oil will not be used and old boiler units will be put out of operation.

Comment on emission limit values for existing gas turbines

At the time when process of environmental impact assessment for CCCPP was going on, emission limit values set by national legislation for existing gas turbines were different than they are today.

In the environmental impact assessment study future emission scenario includes emissions of reconstructed gas turbines H and J. That implies that gas turbines H and J will comply with NO_x limit value of 150 mg/m³ according to the Regulation on Limit Values for Pollutant Emissions from Stationary Sources into the Air (OG 117/12).

However, the "Regulation on Limit Values for Pollutant Emissions from Stationary Sources into the Air" was changed in July 2014 (OG 90/14). Now, NO_x emission limit value for existing gas turbine (> 50 MW_{th}) is 300 mg/m³. That is higher than actual emission of units H and J so there will be no reconstruction of those units in the future. In addition, there will be no change in H and J maximum hourly emissions in the future, but annual emission should be significantly lower when CCCPP becomes the base load unit of EL-TO power plant.

The existing gas turbines (H and J) are the major source of NO_x emission at EL-TO location (tab. 3.8-1) for current and future emission scenario. The current and future cumulative impacts of EL-TO power plant are dominantly under the influence of existing turbine emission (units H and J). The future total emission of EL-TO power plant will not be increased because the old boiler units (K6, K7, K8 and K9) will be shut down. Nevertheless, the CCCPP will significantly lower total EL-TO emission any time when it replaces units H and J production.

Recent development in EL-TO power plant

Recent EL-TO development plan includes building of new medium size boiler and heat accumulator.

A project of building up new 30 MW_{th} boiler at EL-TO location started in 2015. The purpose of building a new boiler is to increase security of supply and more efficient heat generation in EL-TO Zagreb. Nowadays, there is irrational production of electricity cogeneration units during low load in the summer and partly in transitional periods the year. The new boiler would be in operation about 1500 hours per year so the annual emission would be 8.6 tons of NO_x per year.

New 30 MW_{th} boiler will increase the safety of heat supply since the Unit A and the Unit K-7 are at the end of their planned life. Unit A, Unit B and boiler K-7 will be out of operation by the end of 2018, but a new combined cycle cogeneration power plants (CCCPP) will not be put in operation by that time. It is planned that the existing gas turbines (Units H and J) will be in operation by 1 January 2023. In the period 2018 - 2022 a new boiler is needed because of the security of heat supply and from 2023 new boiler is necessary to meet the needs for peak heat consumption.

Since new boiler is considered as medium size boiler (< 50 MW_{th}) the environmental impact assessment study was not obliged. Environmental impacts are considered within the process of issuing building permit. Part of the project documentation for issuing building permit was the Environmental report for building a low-pressure steam boiler with connection to the existing plant boilers K7, K8 and K9 at EL-TO Zagreb. Impact of new boiler as well the cumulative

impact of all EL-TO units was analyzed in that environmental report. According to dispersion modeling results, future cumulative impact of new 30 MW_{th} boiler and other EL-TO units (CCCPP, VK4, H and J) will be less than the current impact of EL-TO.

New 30 MW_{th} boiler at EL-TO will not cause the additional burden of NO₂ concentration in surrounding area.

Building permit for heat accumulator at EL-TO site was also issued in 2015. The environmental impact assessment was also part of documentation for issuing building permit. Heat accumulator is not a source of emission to air so there is no direct impact on air quality. Indirectly, heat accumulator has positive effect because it lowers the heat generation as well the air emission of boilers or gas turbines at EL-TO site.

Air quality plan for City of Zagreb

Based on Zagreb air quality monitoring data the non-compliance had been identified for NO₂, PM₁₀, PM_{2.5}, benzo(a)pyren and ozone in previous years. The air quality plan for the achievement of air quality standards for named pollutants was adopted in March 2015 (*"Action plan to improve air quality in the City of Zagreb, OG City of Zagreb 5/15"*).

Air quality monitoring stations located near the busy city roads had been reported exceedances of annual limit values of NO₂ since 1990's. There were no exceedances of 1-hour NO₂ limit value at Zagreb air quality monitoring stations. The traffic emission is the main cause of NO₂ non-compliance in Zagreb as is concluded in the air quality plan. The number of monitoring sites with exceedance of annual limit value varies from year to year. There is no clear trend in NO₂ annual concentrations at exceedance monitoring sites.

At Vrhovac air quality monitoring station, from year to year, the annual NO₂ concentrations are well below the limit values and also there is no exceedance of 1-hour NO₂ limit value. Even though the EL-TO power plant is the largest point source in the area, air quality monitoring shows that it does not cause the NO₂ non-compliance.

In the Zagreb air quality plan there are no mitigation measures regarding emission from EL-TO power plant.

5.1.3 IMPACT ON REGIONAL AND GLOBAL SCALE

Impact on regional scale is related to the secondary air pollutants and their deposition hundreds of kilometres from the source. Well-known secondary air pollutants are sulphates and nitrates (constituents of particulates) and ground-level ozone.

Acidification and eutrophication

Air emission of sulphur dioxide and its atmospheric transport lead to the conversion into sulphates, which are deposited by precipitation or in dry form. Precipitations become acidic and have a harmful effect on vegetation and forests. The CCCPP has negligible SO₂ emissions and therefore there is no impact on acidification.

Eutrophication is caused by the excessive deposition of nitrogen compounds. Nitrogen deposition on the Croatian territory generally remained at the same level in the last ten years.

Effect of CCCPP on nitrogen deposition should be viewed in the context of regional pollution or Croatian emission quotas⁶⁷ and quotas in the revised protocol to abate acidification, eutrophication and ground-level ozone (Gothenburg Protocol), to the Convention on Long Range Transboundary Air Pollution (LRTAP). The CCCPP NO_x emission in the maximum annual plant operation can reach 150 tons per year that is approximately 0.21% of the Croatian emissions in 2010, and, according to the scenarios for 2020, will represent approximately 0.33% of the emissions in 2020.

Ground-level ozone

Emissions of NO_x from CCCPP, along with other emissions of ozone precursors in Croatia, contribute to ozone formation but it is relatively minor contribution compared to contributions of other countries. It is shown that the emission from CCCPP is about 0.21% of Croatian emissions and the Republic of Croatia contributes to ozone concentrations with approximately 5 - 10 %, which means that the contribution of CCCPP is approximately 0.011 - 0.021 %.

Effect of the CCCPP on ozone formation on a regional scale should be viewed in the context of the existing quotas and new obligations of the Republic of Croatia under the revised Protocol to Abate Acidification, Eutrophication and Ground-Level Ozone (Gothenburg Protocol) (after 2020). The Republic of Croatia has prescribed emission limit values by which it evaluates the ability to meet commitments and which should be in accordance with the Best Available Techniques. The Republic of Croatia has the right to prescribe lower emission ceilings on its territory in the future, if required, and, in this regard, lower emission limit values for NO_x for combustion plants and gas turbines.

Impact on climate change

The combustion of natural gas produces emissions of CO₂ while other greenhouse gas emissions are relatively small. Greenhouse gas emission from CCCPP, will be in range 191 kt (3500 h/year) – 395 kt (7000 h/year) per year. This emission has no impact on the health of population in the area, nor the vegetation. Furthermore, this emission has no impact on local climate change. CO₂ emission from the plant increases the level of concentration in the atmosphere and this has an impact on climate change at regional and global levels. Change in the concentration of CO₂ in the immediate environment due to emission will be immeasurable.

The CCCPP emissions, in relation to greenhouse gas emissions in the Republic of Croatia in 2013 represent 0.78% - 1.61% of total national greenhouse gas emissions and 1.05% - 2.18% of emissions from energy sector.

5.2 WATER

During the use of this project, process, rainwater and sanitary waste water will be generated and through the existing internal sewerage system at the EL-TO location, discharged into the public sewerage system of the City of Zagreb.

Process waste water will be generated during desludging and desalting of boilers (waste water from boilers) and drainage of boiler stacks and occasionally from washing fire sides of the

⁶⁷ Regulation on emission ceilings for certain pollutants in the Republic of Croatia (OG 141/08)

boilers. During regular maintenance, the process waste water from washing the compressor blades will be generated as well.

Waste water from boilers will be introduced into the existing hot water system as a supplement to water losses. Process waste water from washing fire sides of the boiler and from washing the compressor blades will be collected in a new 5 m³ tank and transported by an authorized institution.

Sanitary waste water will be discharged into the existing drainage system of sanitary waste water.

Rainwater from traffic and maneuvering areas, after being treated in the oil and grease separator, will be drained to the existing sewage system.

Clean rainwater from the roofs will be drained directly to the existing drainage system.

5.3 NOISE

Dominant noise sources are placed in indoor spaces with façade walls and roofs made of thermal panels which sound reduction index equals $R_w = 30-46$ dB, except for the sources where this is not possible due to technological reasons. Entrance doors of noisy areas must meet the criteria $R_w \geq 30$ dB.

Dominant sources of noise during the plant operation are given below⁶⁸:

- gas-turbine unit (noise level in the engine room: $L_p \leq 85$ dB(A))
- air intake for gas turbines (2 air intakes: $L_w = 87$ dB(A))
- gas turbine ventilation (2 x 2 fans: intake: $L_w = 78$ dB(A); exhaust: $L_w = 77$ dB(A))
- engine room ventilation (10 fans: $L_w = 76$ dB(A))
- stacks ($L_w = 85$ dB(A))
- transformers (3 block transformers: $L_w \leq 90$ dB(A); 2 self-consumption transformers: $L_w = 75$ dB(A))
- air-cooled heat exchanger (summer coolers and closed system coolers: $L_w \leq 103$ dB(A))
- feed water pumps.

The area most threatened by noise of the new unit will be a residential area located directly along the western border of EL-TO and the areas with existing residential objects south of the EL-TO complex (south of Munjarski put, within the area planned for mixed – mainly residential purposes (M1) and residential purposes (S), according to the Master Plan) and northwest of the EL-TO complex (north of Zagorska street, within the area planned for mixed – mostly business purposes (M2), according to the Master Plan).

Six specific points were selected as immission reference points, of which three are located along the western fence of the EL-TO complex (border with an area of possible residential building) and one on each border of the other most vulnerable areas (refer to **figure 5.3-1**):

- R1 - R3: M1 zone border along the western fence of the EL-TO
- R4: M1 zone border south of the EL-TO
- R5: S zone border south of the EL-TO

⁶⁸ Data on the dominant noise sources, are based on data from potential vendors, with applied additional noise protection measures.

- R6: M2 zone border northwest of the EL-TO.

Based on the measurement of existing level of residual noise at the project location (**chapter 3.9**), in accordance with the provisions of Articles 5 (**tab. 3.9-1**) and 6⁶⁹ of the 'Ordinance', the maximum permissible noise levels that will be present at the reference points due to noise sources of the project in question, are as follows:

- R1, R2 and R3 (M1 zone border - West): 40 dB (A)
- R4 (M1 zone border - South): 40 dB (A)
- R5 (S zone border - South): 35 dB (A)
- R6 (M2 zone border - North): 45 dB (A).

Calculation of noise dispersion, as a consequence of CCCPP operations, was performed for the worst case, with all sources of noise being in use simultaneously. Maximum values of noise levels or sound power levels listed above were used in calculations.

The expected noise levels, which will occur at the immission reference points due to the operation of the new plant, are given in **figure 5.3-1**.

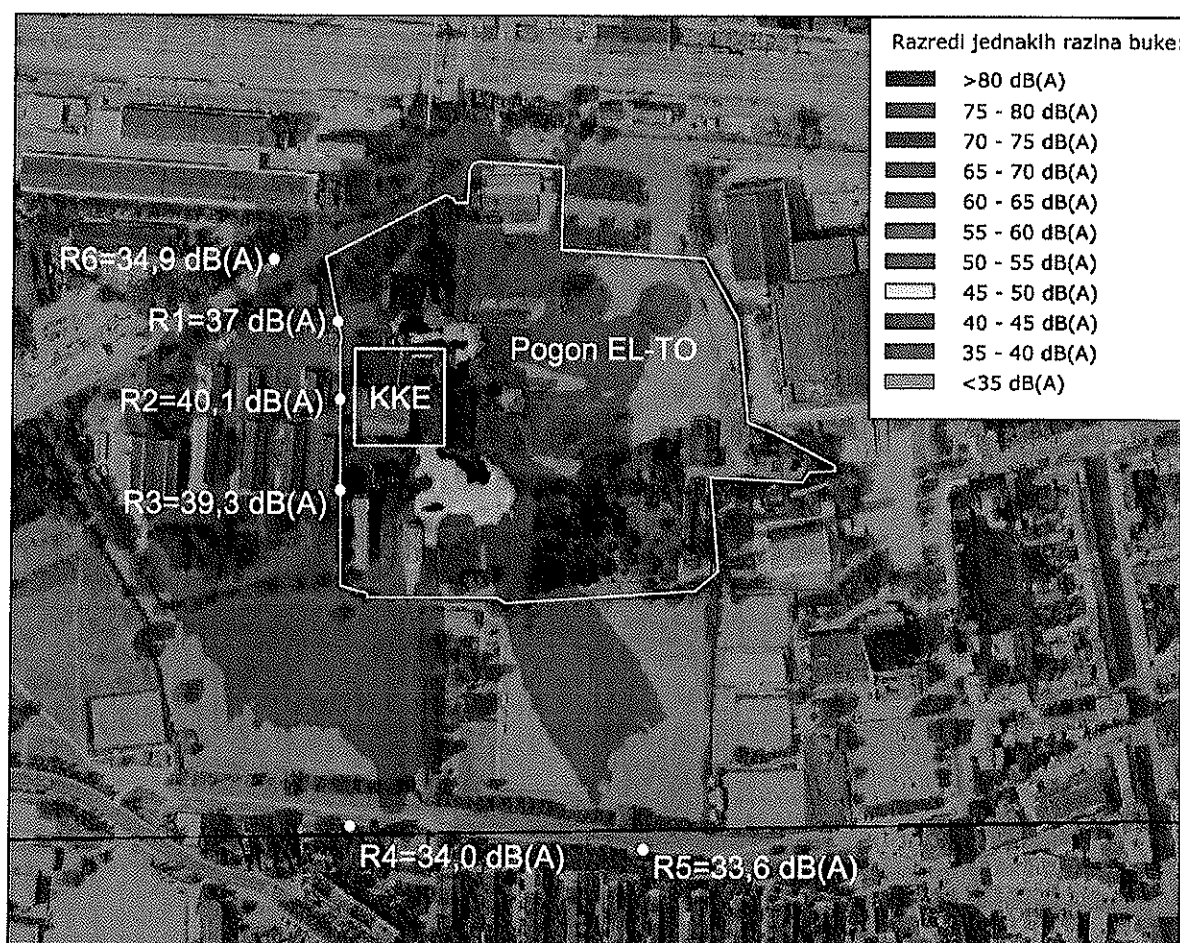


Figure 5.3-1: CCCPP noise dispersion into environment

⁶⁹ For areas where the existing level of residual noise is equal to or higher than permitted levels (**tab. 3.9-1**), immissions of noise that would be caused by newly designed, constructed or reconstructed and adapted building with associated sources of noise should not exceed the permissible noise levels minus 5 dB.

The calculation results show that the noise levels that will occur along the border of the EL-TO complex due to the operation of new plant will be significantly lower than the permissible noise levels.

5.4 WASTE

During the project use, waste will be generated during routine maintenance and repair works.

Oily waste water and waste sludge from the wastewater treatment from washing the floors in the boiler plant and engine room will be generated at the location. These wastes belong to the category 13 05 (hazardous waste). Waste sludge, separated oils and waste water (hazardous waste from the category 13 05) will also be generated during the maintenance of the rainwater drainage system around the new unit (precipitator/oil and grease separator).

Waste water from washing fire sides of the boilers, from washing the compressor blades will be collected at the project site in new tank (5 m³ capacity) and disposed by an authorized legal entity (KB 10 01 22*). The tank will be located on the north side near the HRS building.

Saturated or spent ion exchange resin from ion exchangers (KB 19 09 05) and used activated carbon (KB 15 02 03) will be present in the existing chemical water treatment plant, but not exceeding the current quantities.

During maintenance procedures, various types of waste lubricating oils for engines and gears (13 02 05*), waste insulating oils and heat transfer oils (hazardous waste from the category 13 03) as well as waste packaging of lubricating oils (15 01 10*), will be generated. During the maintenance of the facilities, waste from liquid fuels or other fuels (KB 13 07 03*) and oily wastes not otherwise specified (13 08 99*) will be generated as well. Waste paint, solvents and thinners (non-hazardous and hazardous waste from the category 08 01) and degreasing wastes containing dangerous substances (KB 11 01 13*) will be generated as well.

The following will be generated also: waste oil wiping and absorbing cloths and materials (15 02 02*), metal waste (non-hazardous waste from the category 17 04), waste wires and cables (17 04 11), glass insulators (17 02 02) and ceramic insulators (17 01 03), waste fluorescent tubes (20 01 21), waste printing toner (08 03 17), waste batteries (16 06 01*), nickel-cadmium batteries (16 06 02*), various other equipment containing hazardous components (16 02 13*), waste paper and cardboard packaging (15 01 01) and used tires (16 01 03).

In addition to the above types of waste, mixed municipal waste will also be generated (20 03 01).

The aforementioned wastes will be temporarily stored at the site in the existing temporary storages for hazardous and non-hazardous waste (**figure 5.4-1**) until their final disposal by authorized legal entities.

Proper management of waste generated during the plant operation involves separate collection of waste by type, its temporary storage and submission to authorized entities. In waste management, recovery procedures have the advantage over waste disposal procedures.

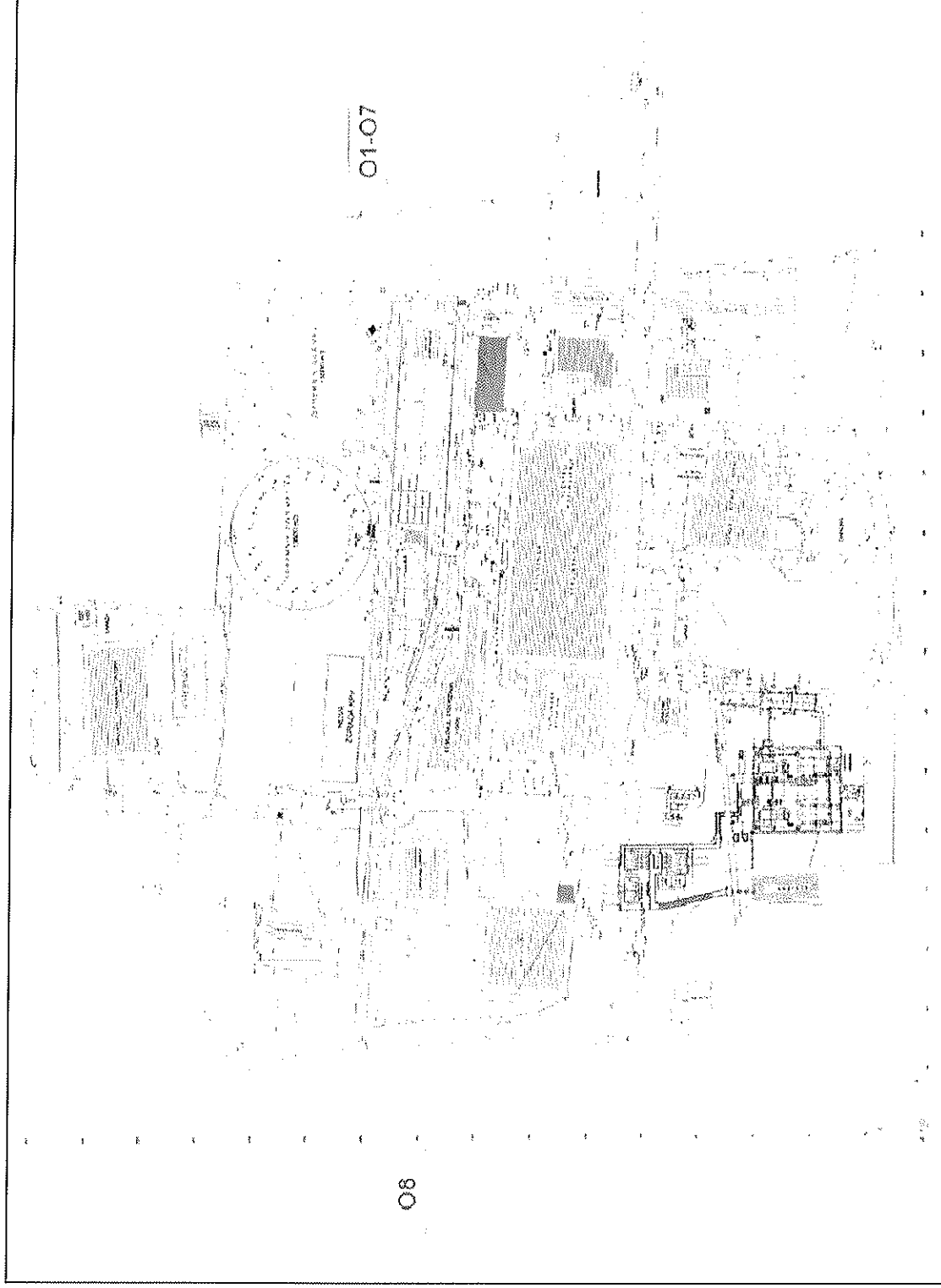


Figure 5.4-1: Locations of temporary waste storages

EBRD Performance Requirement 3 – Resource Efficiency and Pollution Prevention and Control

REQUIREMENTS	REALIZATION
Waste	
<p>(20) The client will avoid or minimise the generation of hazardous and non-hazardous waste materials and reduce their harmfulness as far as practicable. Where waste generation cannot be avoided but has been minimised, the client will reuse, recycle or recover waste, or use it as a source of energy; where waste cannot be recovered or reused, the client will treat and dispose of it in an environmentally sound manner.</p> <p>(21) If the generated waste is considered hazardous, the client will assess technically and financially feasible and cost-effective alternatives for its environmentally sound disposal considering the limitations applicable to transboundary movement and other legal requirements.</p> <p>(22) When waste disposal is transferred offsite and/or conducted by third parties, the client will obtain chain of custody documentation to the final destination and will use contractors that are reputable and legitimate enterprises licensed by the relevant regulatory agencies. The client should also ascertain whether licensed disposal sites are being operated to acceptable standards. Where this is not the case, clients will consider alternative disposal options, including the possibility of developing their own recovery and disposal facilities at the project site.</p>	<p>Project operation will generate waste from maintenance and repair works. Waste will not be generated in very large quantities. Its generation cannot be avoided or harmfulness reduced. In waste management, recovery procedures will have the advantage over waste disposal procedures.</p> <p>If waste couldn't be recovered or reused, the client will dispose of it in an environmentally sound manner via authorized waste management company.</p> <p>Management of waste will be conducted according to the regulatory requirements and environmental protection measures from Environmental permit and IPPC permit respectively. This includes keeping records of waste generation, storage and recovery/disposal via legitimate enterprises licensed by the relevant regulatory agencies, Ministry of Environmental and Nature Protection.</p>

5.5 IMPACT ON LANDSCAPE FEATURES

The structures of existing stacks and units H and J are also the most visible parts of the existing facility from the points located within living spaces and visually most exposed from the intersection of the Krapinska and Selska streets. These are large open surfaces without vegetation volume or built structures which open in-depth perspective on EL-TO at distance of 200-400 meters (distances of greatest potential impact).

The building of the planned unit will be visible from parts of living and traffic areas and intersections of the Selska and Krapinska streets and the southern part of the Park pravednika među narodima.

High vegetation, tree lines and high vegetation areas north of individual housing above Čakovečka street (Križovljanska, Vidovečka, Martijanečka, Ludbreska, Novomaroška, Klenovnička streets) largely obscure the view of the existing EL-TO structures from these residential streets in summer. Existing structures (existing buildings of units H and J) will further almost completely hide the new unit. The planned project will not be spatially dominant.

It is important to note that the structure (by shape and height) of two new stacks of new unit will be very similar to those of the existing units H and J.

The new unit by its volume will be a dominant object in the eastern part of Zagorska street, western part of Magazinska street and southern part of Vodovodna street, near the entrance to EL-TO. This is an area that has no high residential significance but has traffic, transient significance and economic purpose (warehouses), i.e. it is of a low-density housing and degraded visual quality.

In conclusion, the existing structures, buildings and facilities within the existing EL-TO fence, as well as water supply and drainage facilities on the west side of EL-TO site, will for the most part hide the lower parts of the planned unit, while areas of high vegetation that hide the existing EL-TO facilities will also contribute and obstruct the view of the planned unit, especially from the southern, western and eastern sides.

The impact of the planned project on visual quality of landscape has been assessed as low, with application of protective measures related to the concept of coloring (light gray, dual-tone) and construction of the façade, which will not emphasize the contrast of the facility.

5.6 LIGHT SOURCES DURING THE PROJECT USE

The project is planned in such a way that the largest part of the façade will be non-transparent and light sources from outer spaces will be represented only by window glasses of individual work premises, such as the command room. Given that the project site is located within the EL-TO Zagreb area, with already existing internal roads outdoor lighting, special outdoor lighting for the project is not planned. However, if lighting will be needed, it would have to be the minimum, with a beam of light directed towards the ground or buildings, with minimum dissipation in other directions.

With respect to (1) the position of the project location within the EL-TO Zagreb area, (2) dimensions of the project building, (3) distance between the project and residential areas from which it will be visible and (4) characteristics of the surrounding area of the project location, where public lighting is dominant at night, the conclusion is that the lighting of the facility will not be a significant new source of light for residential buildings near EL-TO Zagreb. The contribution of lighting of new facility to the night lights of the City of Zagreb is negligible.

5.7 DANGEROUS SUBSTANCES DURING THE PROJECT USE

The realization of the planned project will not significantly increase the quantity of dangerous substances and products that are already present at the EL-TO site - **tab. 5.7-1**.

Tab. 5.7-1: Additional quantities of dangerous substances related to operation of new CCCPP

Substance	The warning label	Quantity related to new CCCPP	Current quantity in EL-TO	Utilization
Natural gas	Extremely flammable (F+)	~ 0.24 t ⁷⁰	~ 0.2 t	Fuel for CCCPP
Turbine oil	-	~ 20.0 t	~ 41 t	Transformers cooling
Transformer oil	-	~ 60.0 t	~ 91 t	Turbine lubricating
Ammonium hydroxide (25%)	Dangerous for the environment (N) Corrosive (C)	~ 0.46 t	2 t	Feed water preparation
Diesel fuel	Harmful (Xn) Irritant (Xi) Carcin. cat 3 Dangerous for the environment (N)	~ 0.50 t	28,200 t of fuel oil	Fuel for reserve diesel engine

Nevertheless, all parts of the project which will include materials and products with dangerous properties should be designed and constructed in accordance with the regulations and in accordance with the properties of these substances and products, with application of good engineering practice and the best safety techniques. The existing documentation related to workers and public health and safety, listed in **chapter 3.14** should be revised and supplemented in regards to the planned project.

By designing and constructing the parts of the project containing substances and products with dangerous properties, the probability of their leakage is reduced to the minimum and through planning the intervention measures and procurement and installation of appropriate safety equipment, the conditions for prompt and effective action are created in case of leakage of substances and products with dangerous properties.

EBRD Performance Requirement 3 – Resource Efficiency and Pollution Prevention and Control

REQUIREMENTS	REALIZATION
Safe use and management of hazardous substances and materials	
(23) In all activities directly related to the project, the client will avoid or minimise the use of hazardous substances and materials, and consider the use of less hazardous substitutes for such substances and materials so as to protect human health and the environment from their potentially harmful impacts. Where avoidance or substitution is not feasible, the client will apply appropriate risk management measures in order to minimise or control the release of such substances/materials into air, water and/or land resulting from their production, transportation, handling, storage, use and disposal relating to project activities.	In the project operation small quantities of dangerous substances will be used - tab. 5.7-1 . Their harmfulness related to their quantity does not pose great danger to the human health and environment. Replacement of fuel (natural gas) which is extremely flammable and can cause fire and explosion in case of leakage and ignition is not possible.
(24) The client will avoid the manufacture, trade and use	Dangerous substances handling, transportation and storage will be carried out according to safety measures and appropriate design standards related to protection from fire and explosion and from environmental pollution due to the accidental release. Measures that will be

⁷⁰ For the purpose of this project a new gas pipeline DN 200 will be constructed within the EL-TO location with length of about 390 m. The pressure of natural gas in the pipeline is about 30 bar.

REQUIREMENTS	REALIZATION
of hazardous substances and materials subject to international bans or phase-outs due to their high toxicity to living organisms, environmental persistence, potential for bioaccumulation, or potential for depletion of the ozone layer.	applied are (mostly) the measures applied in design and management of existing plant. Hazardous substances and materials subject to international bans or phase-outs due to their high toxicity to living organisms, environmental persistence, potential for bioaccumulation or potential for depletion of the ozone layer will not be used in the project operation.
Pesticide use and management	Not applicable.

EBRD Performance Requirement 4 – Health and Safety

REQUIREMENTS	REALIZATION
General requirements for health and safety management	
<p>(9) The client will take steps to identify and prevent accidents, injury and disease to workers and affected communities arising from or associated with, or occurring in the course of the project activities and prepare and implement preventative measures and plans to manage health and safety risks in accordance with the mitigation hierarchy approach and good international practice (GIP).</p> <p>(10) The client will provide workers and affected communities with relevant information, guidance and training relating to health and safety hazards, risks, protective and preventive measures and emergency arrangements that are necessary for their safety throughout the project.</p> <p>(11) Where any accident, injury and disease arises or occurs in the course of works associated with the project, or there is a potential of such event, the client will investigate, document and analyze the findings and adopt measures to prevent reoccurrence and, where required by law, notify and cooperate with the relevant authorities.</p>	<p>Project will be realized within the existing EL-TO Zagreb plant where risk of accidents already exists and it is identified in internal documents.</p> <p>In Decision on the environmental acceptability with application of environmental protection measures and with implementation of the environment monitoring program issued by the Ministry in July 2014 (Environmental permit), preventive measures in the field of safety are prescribed. Those measures will be implemented in future project documentation. The project is not significant in terms of potential accidents related to the dangerous substances. Potential danger can cause handling of natural gas (connection pipeline, gas turbine) which is already present at the site. Good engineering practice and the best safety techniques will be implemented in the project.</p> <p>EL-TO plant has internal documents related to the risks, protective and preventive measures, emergency arrangements and training. In case of any accident related to the dangerous substances, there are defined action procedures that incorporate preparation of reports. Those documents will be used in project operation and will be updated according to the project.</p> <p>When it comes to death or serious injury or common injury of workers, it is reported to the Inspection of occupational safety (inspector comes to investigate), the Committee of occupational safety is convened, which must be held within 48 hours, injuries of workers must be reported to the Croatian Health Insurance Fund and entered into EL-TO application (application for occupational safety issues).</p> <p>For EL-TO plant risk assessment is made to reduce all risks to the minimum. Basic, special and recognized safety rules are applied. The cause of injury is always determined and additional measures are introduced (basic, special and recognized safety rules) to reduce the risk.</p>
Occupational health and safety	
<p>(12) The client will provide workers with a safe and healthy workplace, taking into account inherent risks in</p>	<p>Occupational health and safety measures for the project will be defined in Elaborate on occupational safety, which</p>

REQUIREMENTS	REALIZATION
<p>its particular sector and specific classes of hazards that may be present. The client will identify the health and safety risks and protection measures appropriate to the stage, size and nature of the project in accordance with relevant substantive EU Occupational Health and Safety (OHS) standards⁷¹ and GIP. The client will develop a project-specific health and safety plan, where appropriate, that will be integrated into the ESMS.</p> <p>(13) The client will implement occupational health and safety measures that will provide: (i) preventive and protective measures, including modification, substitution or elimination of hazardous conditions or substances; (ii) equipment to minimize risks, and require and enforce its use; (iii) personal protective equipment at no cost to the workers; and (iv) training to workers to use and comply with health and safety procedures and protective equipment. The client will require its non-employee workers, contractors and other third parties engaged to work on project sites or perform work directly related to the core functions of the project to comply with the health and safety plan.</p> <p>(14) During the course of any work activity the client will ensure that all workers are provided with continued and appropriate supervision to ensure adequate implementation, maintenance and enforcement of the health and safety measures.</p> <p>(15) The client will monitor the health of its workers and consult and encourage the workers to participate in matters related to health and safety in the workplace. This shall include, although not be limited to, accident investigation, risk assessment and selection of work.</p> <p>(16) Where there are specific risks associated with certain work activities that could result in adverse effects on the health and safety of workers with sensitivities such as age, gender, disability or short- or long-term health conditions, the client will carry out a risk assessment and make adjustments to prevent injury and ill health.</p>	<p>will be a part of documentation for issuing of Building permit.</p> <p>The client will implement occupational health and safety measures that will provide: (i) preventive and protective measures, including modification, substitution or elimination of hazardous conditions or substances; (ii) equipment to minimize risks and require and enforce its use; (iii) personal protective equipment at no cost to the workers</p> <p>All workers will be trained/are trained to use and comply with health and safety procedures and protective equipment, to be capable of work in a safe manner respectively according to the Ordinance on occupational safety of HEP-Proizvodnja d.o.o. and Occupational Safety Act (OG 71/14).</p> <p>Each external contractor must have a medical examination, must be capable of operating in a safe manner and must be trained in first aid. EL-TO have a statement about this for outside contractors. External contractors are monitored to perform work in a safe manner.</p> <p>Where there are specific risks associated with certain work activities that could result in adverse effects on the health and safety of workers with sensitivities such as age, gender, disability or short- or long-term health conditions, the client will carry out a risk assessment and make adjustments to prevent injury and ill health - according to the Ordinance on occupational safety of HEP-Proizvodnja d.o.o. and Occupational Safety Act (OG 71/14).</p>
Community health and safety	
<p>(17) The client will identify and assess project-related risks and adverse impacts to the health and safety of the potentially affected communities and will develop protection, prevention and mitigation measures proportionate to the impacts and risks, and appropriate to the stage, size and nature of the project. The client will cooperate with the relevant authorities and other stakeholders, as appropriate, on mitigation measures and plans. These measures will be consistent with the mitigation hierarchy approach and GIP.</p> <p>(18) Measures to avoid or mitigate community health and safety impacts of the project may be the responsibility of</p>	<p>Vulnerability assessment of EL-TO plant recognizes the greatest risk to the health and safety and also the environment from fuel oil storage in large quantities. This potential impact in case of accident is analyzed (pool fire).</p> <p>The planned project poses no significant additional risk to the health and safety. In future project documentation preventive measures will be implemented (technical measures) related to, especially, protection from fire and explosion and to the alarm system according to the regulation and standards.</p> <p>Cooperation of client with relevant authorities in matter of</p>

⁷¹ EU OHS standards mean substantive requirements in EU legislative requirements in the field of safety and health at work setting out minimum health and safety requirements for the protection of workers.

REQUIREMENTS	REALIZATION
the relevant public authorities. Under these circumstances, the client will clarify its role and its responsibility to notify and cooperate with the relevant authorities.	mitigation of impact of accidents is described in Operational plans.
Specific requirements for health and safety management	
Infrastructure, building and equipment design and safety	
<p>(19) The client will incorporate health and safety considerations into the design, construction, operation and decommissioning of the structural elements or components of the project in accordance with GIP, taking into consideration safety risks to third parties and affected communities. Structural elements will be designed and constructed by qualified and experienced professionals. Third-party life and fire safety audits should be undertaken both for existing buildings, which are used for communal purposes, and for new buildings prior to their commissioning or use.</p> <p>(20) The construction and major refurbishments of buildings used for communal purposes should be designed in accordance with the concept of universal access.⁷²</p> <p>(21) When structural elements or components, such as dams, tailings dams or ash ponds, are situated in high-risk locations and their failure or malfunction may threaten the safety of workers and communities, the client will engage one or more qualified experts with relevant and recognized experience in similar projects, separate from those responsible for the design and construction, to conduct a review as early as possible in project development and throughout the stages of project design, construction, operation and commissioning.</p>	<p>In Environmental permit issued by the Ministry in July 2014, preventive measures in the field of safety are prescribed. Those measures will be implemented in future project documentation (e.g. Elaborate on fire protection). This documentation will be revised by competent authorities before issuing construction permit. Fire protection and environmental protection inspections periodically undertake audits of existing plant. Before issuing Operating permit, in commissioning period, technical inspection will be carried out during which fire safety audit of new constructed facility (planned project) will be also carried out.</p>
Hazardous materials safety	
<p>(22) The client will prevent or minimize the potential for worker and community exposure to hazardous materials that may be released by the project. Where there is a potential for workers and the affected community to be exposed to hazards, the client will exercise due care to avoid or minimize their exposure by modifying, substituting or eliminating the condition or substance causing the hazards.</p> <p>(23) Where hazardous materials are part of existing facilities or operations associated with the project, the client will exercise due care when conducting start-up and decommissioning activities in order to prevent exposure of the workers and the affected community to such hazardous materials. Where use of such materials cannot be avoided, the client will take the necessary measures for handling, storage and transport in accordance with GIP.</p> <p>(24) The client will take reasonable efforts to ensure the safe transport of raw materials, and products, and</p>	<p>In this project, hazardous substances that may be released and posed danger by exposure to workers and affected community will not be used - tab. 5.7-1. Dangerous substance that can be released is natural gas which can cause fire and explosion but this gas is not toxic and it cannot be substituted with less hazardous fuel. In the event of a sudden pressure drop in gas pipeline it is necessary to close the valves on the pipeline in EL-TO Zagreb and act according to the special Ordinance on handling of natural gas at the site. In the existing plant there are no hazardous substances that can cause danger to workers and community by their release - tab. 3.14-1. All dangerous substances are stored safely and in the plant, all necessary measures are applied to avoid any accident – chapter 3.14. Safe transport of dangerous substances and waste is ensured - chapter 3.14.</p>

⁷² Universal access means free access for people of all ages and abilities in different situations and under various circumstances.

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transportation and disposal of wastes, and will implement measures to avoid or control community exposure.	
Product safety	
(25) Where the project involves production of and/ or trade in consumer products, the client should ensure product safety through good design and manufacturing processes, as well as adequate storage, handling and transportation for the product distribution. Good international practice should be followed, including general safety requirements specific to the product safety standards and codes of practice in a given business sector and country. (26) The client will identify and evaluate potential risks and impacts of their products on consumers' health and safety during the project assessment process. The approach to product safety should adhere to mitigation hierarchy and ensure adequate information on the product's health and safety risks is provided to consumers. For situations involving products which may pose serious health threats, the client will ensure product recall, and that product withdrawal policy and procedures are in place.	Not applicable.
Services safety	
(27) Where the project involves provision of services to communities, the client should ensure safety and quality of such services through appropriate quality management systems to make sure that such services do not pose risks and impacts on workers or community health and safety. (28) Where the project involves the provision of public services, the client should incorporate the principles of universal access, to the extent possible.	EL-TO Zagreb has quality management system implemented (ISO 9001). Provided services (products) are: electricity, heat and process steam. Through quality management system, quality of services is ensured (customer satisfaction). Customers are: HEP-Toplinarstvo d.o.o. (distribution of heat and steam), HEP-Trgovina d.o.o., HOPS d.o.o. (distribution of electricity) which provide services to community.
Traffic and road safety	
(29) The client will identify, evaluate and monitor the potential traffic and road safety risks to workers and potentially affected communities throughout the project life cycle and, where appropriate, will develop measures and plans to address them. For projects that operate moving equipment on public roads and other forms of infrastructure, the client will seek to prevent the occurrence of incidents and injuries to members of the public associated with the operation of such equipment. (30) The client will take into consideration relevant EU road and traffic safety management standards ⁷³ , identify road safety measures and incorporate technically and economically feasible and cost-effective road safety components into the project design to mitigate potential road safety impacts on the local affected communities. Where appropriate, the client will undertake a road safety audit for each phase of the project and routinely monitor incident and accident reports to identify and resolve	Potential traffic and road safety risks can occur in the construction stage of the project. This is evaluated in chapter 4.6 . Due to the need for good traffic organization during construction, especially during heavy loads transportation, Environmental permit defines appropriate protection measures: <i>Temporary traffic regulation plan shall be prepared for the period of construction of the planned project, which shall define points of access to the existing traffic system and secure all potential collision points during the construction of the planned project.</i> <i>All larger transportations which are not technologically conditioned shall be planned outside the traffic rush hour (06:00-09:00 and 15:00-18:00 o'clock), to decrease the traffic rush.</i> <i>In case of damaging existing roads (by using equipment,</i>

⁷³ Consistent with the objectives of Directive 2008/96/EC of 19 November 2008 on Road Infrastructure Safety Management.

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problems or negative safety trends. For clients with vehicles or fleets of vehicles (owned or leased), the client will provide appropriate training to workers on driver and vehicle safety. The client will ensure regular maintenance of all project vehicles.	<i>machinery and vehicles), it shall be necessary to inform the competent authorities to eliminate the damage.</i> Project operation poses no traffic and road safety risks.
Natural hazards	
(31) The client will identify and assess the potential impacts and risks caused by natural hazards, such as earthquakes, landslides or floods as these relate to the project. (32) The client will avoid and/or minimize the exacerbation of impacts caused by natural hazards or land use changes to which the project activities may contribute.	Risk of natural hazards are identified and assessed for existing EL-TO plant – chapter 3.14 . This can be applied to the planned project. The key units will be built for expected intensity of the earthquake (see chapter 3.4).
Exposure to disease	
(33) In order to help prevent or minimize the potential for worker and community exposure to diseases, taking into consideration differentiated exposure to and higher sensitivity of vulnerable groups, the client will develop appropriate mitigation in consultation with the relevant authorities. The client will take measures to avoid or minimize transmission of communicable diseases that may be associated with the influx of temporary and/or permanent project workers. (34) Where specific diseases are endemic in communities affected by the project, the client is encouraged to identify opportunities throughout the project life cycle to improve conditions that could help reduce their incidence, both among the workers and communities. The client will take measures to avoid or minimize transmission of communicable diseases that may be associated with the influx of temporary and/or permanent project labor.	During project construction maximum of 370 construction workers is expected on site. Protection of Population from communicable diseases is regulated by the Law on Population Protection from Communicable Diseases (OG 79/07, 113/08, 43/09). According to Article 26 Medical surveillance is carried out on persons in Croatia who come from countries where the disease malaria, cholera, viral hemorrhagic fevers or other disease specified by international agreement which Republic of Croatia is a Party. Medical surveillance includes health check to be performed immediately upon entry into the Republic of Croatia and control during the incubation period specified for each communicable disease.
Emergency preparedness and response	
(35) The client will be prepared to respond to incidents, accidents and emergency situations in a manner appropriate to the operational risks related to the project and the need to prevent or minimize their potential adverse impacts and in accordance with regulatory applicable requirements. ⁷⁴ (36) The client will identify and assess major-accident hazards, and will take all measures necessary to prevent major accidents or limit their adverse impacts on workers, affected communities and the environment, with a view to ensuring high levels of protection to people and the environment in a consistent and effective manner. Such measures will be identified in a major-accident	EL-TO plant has several internal documents for managing safety issues in terms of accidents prevention and/or activities in case of accident occurrence ⁷⁵ : <ul style="list-style-type: none"> - Operational plan for protection and rescue, - Safety report, - Internal emergency plan, - Plan of protection from fire and technological explosions, - Operational plan of emergency measures in case of accidental pollution of water and - Evacuation plan. Those internal documents will be updated with new

⁷⁴ As elaborated by Directive 2012/18/EU of 4 July 2012 on the control of major-accident hazards involving dangerous substances, amending and subsequently repealing Council Directive 96/82/EC (EU SEVESO III Directive).

⁷⁵ Some of these documents are prepared in accordance with - Environmental Protection Act (OG 80/13, 153/13, 78/15) and Regulation on the prevention of major accidents involving dangerous substances (OG 44/14). EU SEVESO III Directive has been transposed in Croatian law with those regulations.

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<p>prevention/emergency preparedness policy and an appropriate management plan, integrated into the client's overall ESMS. This plan will include organizational structures, responsibilities, procedures, communication, training, resources and other aspects required to implement such policy to ensure the client has the capacity to respond effectively to emergencies associated with project hazards, with the overall objective to:</p> <ul style="list-style-type: none"> • prevent, contain and control incidents so as to minimize the effects, and to limit damage to people, the environment and property • implement measures necessary to protect people and the environment from the effects of major accidents • communicate the necessary information to relevant emergency services or authorities, as well as to the potentially affected workers and public • provide for the restoration and clean-up of the environment following a major accident. <p>(37) For projects where major-accident risk is present, the client will assist and cooperate with the relevant authorities and the project affected community in their preparations to respond effectively to emergency situations. If local authorities or responders have little or no capacity to respond effectively, the client will play an active role in preparing for and responding to emergencies associated with the project, and will provide adequate evidence to demonstrate capacity to respond to reasonably predictable incidents, either directly or indirectly.</p>	<p>project and applied for new project if necessary.</p>

5.8 SOCIAL AND ECONOMIC IMPACT

EL-TO Zagreb except heat generation for heating of households and process steam for industry supply of the western part of Zagreb, also generates electricity to the Croatian power system. Although heat generation is the primary objective, the generation of electricity is also important. With an average annual energy generation of about 370 GWh, EL-TO covers over 11% of total energy of the City of Zagreb.

The planned increase in installed electrical power of EL-TO gives a reliable support of secure supply of the western and northern part of the city with electricity. This is particularly important in times of serious disturbances in the power system, as it reduces interruptions in the electricity and heat supply in Zagreb to the minimum.

The economical generation of environmentally friendly energy and developed energy system in the City of Zagreb (location, consumption and well-established supply) represent a major technological, but also general social value.

6 ENVIRONMENTAL PROTECTION MEASURES

6.1 ENVIRONMENTAL PROTECTION MEASURES DURING PROJECT PLANNING

6.1.1 GENERAL MEASURES

1. As a part of the Final Design, prepare a survey evidencing the manner in which the environmental protection measures and environment monitoring program from EIA Decision have been incorporated in the Final Design. The Survey shall be prepared by a legal entity possessing approval for performance of professional environmental protection activities - preparation of environmental impact assessment studies.
2. Prepare Elaborate of construction organization and project construction technology.

6.1.2 AIR QUALITY PROTECTION MEASURES

3. Combined cogeneration plant to be conceived as powered by natural gas with rated heat output of 234 MJ/s, under standard ISO environmental conditions (15°C, 1013 mbar, 60% humidity).
4. Two chimneys at least 60 m high to be designed for release of flue gases from exhaust-gas boilers.
5. Within the stacks of combined cogeneration plant, plan the implementation of continuous monitoring system of CO and NOx emissions, oxygen volume fraction, emitted mass flow rate and temperature in waste gases.
6. Foresee a design of gas turbines with dry combustion chamber with low NOx burners.

6.1.3 WATER PROTECTION MEASURES

7. A system for injection of boiler wastewaters into the existing hot-water system (boiler blow down and desalting and sampling from water-steam cycle) shall be foreseen.
8. For process wastewaters from chimney drainage, a connection to the existing EL-TO plant technological wastewater treatment and discharge system shall be foreseen.
9. For process wastewaters contaminated by heavy metals, a temporary storage in an adequate tank on the project location and transfer to an authorized person shall be foreseen.
10. For sanitary wastewaters, no-treatment system with discharge into the EL-TO plant's mixed sewage system shall be foreseen.
11. For potentially oiled and contaminated storm waters, treatment in precipitator/separator and connection to the existing EL-TO plant's mixed sewage system shall be foreseen.
12. Outlets with a trench for drainage of potential oil leakage into the bund (oil sump) shall be provided under the transformer. Sump shall be equipped in such a way so as to allow removal of contaminated collected water/sludge from EL-TO location.

13. A connection to the existing EL-TO plant sewage system and release on the surface of own terrain shall be foreseen for clean storm waters in such a way so as not to endanger surfaces of adjacent plots.

6.1.4 LANDSCAPE PROTECTION MEASURES

14. A construction site arrangement plan shall be prepared, which shall indicate the arrangement of all working surfaces at the least visually exposed locations.
15. Low-reflective materials for facade shall be used for new planned EL-TO unit and adequate architectural solutions shall be applied in order to visually reduce the volume.

6.1.5 NOISE PROTECTION MEASURES

16. A noise protection study shall be prepared, which shall take into account the limitations in relation to allowed noise immission levels, resulting from project operation.

6.1.6 PROTECTION MEASURES FOR TRAFFIC

17. Temporary traffic regulation plan shall be prepared for the period of construction of the planned project, which shall define points of access to the existing traffic system and secure all potential collision points during the project construction.

6.1.7 PROTECTION MEASURES FOR DANGEROUS SUBSTANCES

18. Project parts containing substances and products with hazardous properties shall be designed and constructed in line with the regulations, their properties and good engineering practice, i.e. by applying and/or installing adequate safety techniques.
19. Prior to obtaining the building permit, it is required to prepare and submit to competent authorities a revised Form of notice on the presence of hazardous substances at the plant. It shall be necessary to prepare/review and submit to competent authorities other safety documentation of the plant, within the deadlines set by a special regulation on prevention of major accidents including hazardous substances.

6.1.8 LIGHT POLLUTION PROTECTION MEASURES

20. In case of placing outdoor lighting at the newly planned facilities' micro location, in the design preparation and drafting phase, it shall be necessary to take account of light pollution prevention in order to select adequate lights and prevent unnecessary and excessive illuminance.

6.2 ENVIRONMENTAL PROTECTION MEASURES DURING PROJECT CONSTRUCTION

6.2.1 AIR QUALITY PROTECTION MEASURES

1. Wheels of vehicles entering public roads shall be cleaned/washed and, if necessary, accessing sections of public roads shall also be cleaned from dust and mud to prevent spreading of mud and dust from the construction site.
2. The cargo (bulk, construction) shall be transferred by technically valid vehicles and, if necessary, it shall be damped and covered by a protective cover to prevent dusting.
3. Take preventive measures at the construction site to minimize emissions of pollutants into the air during construction:
 - in case filter bags on the drilling rig or cement silo break, works shall be stopped and the bag shall be replaced,
 - unnecessary operation of construction machinery shall be avoided (machines shall be turned off),
 - earthwork and construction work contractors shall be requested to limit dusting to the construction site area by using protective fences or by dispersing water in dry or windy weather at active dusty construction site areas, in line with the type of works performed at individual construction site areas; silos of raw materials in the concrete batching plant shall be equipped with dedusters,
 - bulk materials shall be poured as close as possible to the surface to prevent dusting during loading/unloading of material into stockpiles or cargo vehicles as much as possible,
 - vehicle driving speed shall be adapted to the state of internal roads to decrease or avoid dusting of roads, as well as spilling of bulk material from vehicles,
 - open stockpiles of bulk material shall be damped or covered in dry and windy weather.
4. Construction machines made or imported after 13 February 2009, which are used during construction, shall possess a type approval in line with the Regulation on Measures for Prevention of Emissions of Gaseous Contaminants and Contaminants in the Form of Particles from Internal Combustion Engines which are Fitted into TPV 401 Non-road Mobile Machinery (OG 4/14).

6.2.2 SOIL AND WATER PROTECTION MEASURES

5. During construction, it is required to implement and use a distribution sanitary waste water and rainwater sewage system. The sanitary waste water discharge should be connected to the EL-TO sanitary sewage system. Potentially polluted rainwaters should be treated in oil separator and precipitator/clarifier and discharged to the EL-TO storm water sewage system.
6. The wastewater treatment should be carried out until the quality for discharge into the public sewage system.
7. It is required to ensure that mechanization and fuel manipulation is placed on water-proof surface with rainwater drainage through oil separator.
8. It is required to ensure appropriate absorption agents for treating the polluted soil on the construction site.

9. Closed tank of 2 m³ should be ensured for disposing the excavated earth polluted in case of spilling the fuel, lubricating oil or other substances hazardous for waters.
10. The certificates of authorized institutions that used materials have no impact on ground water quality should be submitted on technical inspection. 15 days prior to commencement of these activities, competent authority should be notified on scheduled activities, while as regarding the activities carried out within the ground water zone, it is necessary to require water supervision from competent authority.

6.2.3 LANDSCAPE PROTECTION MEASURES

11. Upon finalization of construction, repair the surfaces which were used for construction as well as any potential temporary roads and execute landscape adjustment.

6.2.4 NOISE PROTECTION MEASURES

12. The construction site should be organized in a way to minimize the noise spreading towards the closest residential areas.
13. During construction works, low-noise construction machines and equipment should be use.
14. Noisy works should be organized during the day and only exceptionally during the night, when required by technology.

6.2.5 WASTE MANAGEMENT MEASURES

15. Waste from storage and administration building removal should be separated at the site.
16. Management of waste generated during storage and administration building removal, as well as during site preparation, should be carried out by legal entities authorized for waste management. The advantage in waste management should be given to recovery procedures in relation to waste disposal procedures.
17. All waste generated during construction should be collected separately by types and temporary stored in existing temporary storages of hazardous and non-hazardous waste in EL-TO Zagreb.
18. Storage tanks with hazardous waste should be designed in a way to prevent the waste scattering, spreading and/or spilling, as well as rainwater entering. The storage tanks should be made of appropriate material, resistant to the temporary stored waste.
19. Organize waste removal in line with the dynamics of project construction.
20. Management of waste generated during construction should be carried out by legal entities authorized for waste management. Construction waste should be transported to appropriate location organized for construction waste management, except for waste that could be used as secondary feedstock (wood, glass, plastic, iron, steel, mixed metals). Waste generated during mechanization maintenance should be disposed by legal entities authorized for waste management. Municipal waste should be disposed by legal entities authorized for waste management.
21. Data on waste and waste management during preparation works and construction should be documented according to regulations. Data on waste management should be reported to the authorities on prescribed forms, i.e. should be submitted to the Environmental Pollution Register of the Environmental Protection Agency.

6.2.6 PROTECTION MEASURES FOR TRAFFIC

22. All large transports not being technologically conditioned should be planned within the period outside of so called rush hours (6 a.m. to 9 a.m. and 3 p.m. to 6 p.m.) in order to reduce the traffic load.
23. In case of damaging existing roads (by using equipment, machinery and vehicles), it shall be necessary to inform the competent authorities to eliminate the damage.
24. It is required to clean the access roads of dust and mud and all vehicles should get their tyres washed prior to entering the public roads.

6.2.7 PROTECTION MEASURES FOR DANGEROUS SUBSTANCES

25. In case there will be fuel storage tanks on the construction site for the construction purposes, the latter should be located in water-proof bund without discharge. The storage tanks should be protected against the sun and precipitations. Access to the tanks should be strictly controlled. There shall not be any sparking or ignition source nearby. The fire extinguishers should be placed nearby the tanks and appropriate absorption agents for covering potentially spilt fuel should be ensured.

6.3 ENVIRONMENTAL PROTECTION MEASURES DURING PROJECT USE

6.3.1 AIR QUALITY PROTECTION MEASURES

1. Natural gas will be used as fuel for combined cycle gas turbine cogeneration unit.
2. Maximum heat output (fuel-introduced heat) of the combined cogeneration plant shall be about 300 MJ/s.
3. Flue gases from CCCPP should be discharged through two stacks with minimum height of 60 m.
4. The emission limit values (ELV) of CCCPP are as follows:

	mg/m ³
NO _x (as NO ₂)	50
CO	100

Emission limit values are related to dry flue gases, at temperature of 273 K and pressure of 101.3 kPa, for defined oxygen volume share of 15 %.

5. The emission limit values (ELV) for NO_x and CO will be applied for loads exceeding 70 %.
6. The ELVs shall be regarded as having been complied with if based on the continuous measurements within calendar year:
 - all validated monthly average values are lower than ELV,
 - all validated 24-hour average values are lower than 1.1 ELV,
 - 95 % of validated hourly average values over the year are lower than 2 ELV.The values measured during the start-up and shut-down periods shall be disregarded.

6.3.2 WATER PROTECTION MEASURES

7. Wastewaters resulting from washing of boiler gas side and compressor blades shall be collected into a 5 m³ tank intended for that purpose and disposed of via an authorized person.
8. Waste water/sludge from transformer sump shall be delivered to an authorized person.
9. Wastewaters from project location should be discharged pursuant to the Ordinance on Wastewater Emission Limit Values (OG 80/13, 43/14).
10. Structural stability, functionality and impermeability of facilities for wastewater drainage shall be inspected in line with the provisions of the Ordinance on Technical Requirements for Sewage Facilities as well as on Deadlines for Mandatory Controls of Drainage and Wastewater Treatment Facilities Correctness (OG 3/11).

6.3.3 LANDSCAPE PROTECTION MEASURES

11. Plant cover should be maintained on regular basis.
12. The building facades should be kept cleaned, along with regular renovating of painted surfaces, i.e. replacement of worn out/damaged facade panels.

6.3.4 NOISE PROTECTION MEASURES

13. Elements and equipment of the project should be controlled and maintained on regular basis in order to avoid increased noise emissions.

6.3.5 WASTE MANAGEMENT MEASURES

14. Municipal waste shall be collected in municipal waste containers and disposed of by an authorized person.
15. Non-hazardous and hazardous waste should be collected in special storage tanks/containers, labelled according to legal requirements and designed in a way to prevent the waste scattering, spilling or evaporation and temporary storage separately by properties, types and physical state.
16. Waste sludges resulting from treatment of oiled wastewaters from storm waters drainage system maintenance shall be disposed or recovered by a person authorized for waste management.
17. Data on waste and waste management should be documented through register of waste and through prescribed forms.
18. Data on waste management should be reported to the authorities on prescribed forms, i.e. should be submitted to the Environmental Pollution Register of the Environmental Protection Agency.

6.3.6 PROTECTION MEASURES FOR DANGEROUS SUBSTANCES

19. It is required to ensure the implementation of measures defined in the Notification on Small Quantities of Dangerous Substances in any time.
20. The amendments to the Notification on Small Quantities of Dangerous Substances should be considered at least once in 3-year period from the day of submitting the Notification to the authorities.

6.3.7 LIGHT POLLUTION PROTECTION MEASURES

21. During the night, lighting shall be kept at the minimum level required for safety.

7 MONITORING PROGRAMME

7.1 AIR EMISSIONS MONITORING PROGRAMME

7.1.1 DURING TRIAL OPERATION

1. At CCCPP, before obtaining the operating licence, it shall be necessary to make first measurements of CO, NO₂, SO₂ and solid particles emissions.
2. The first measurements shall also be used to check the nominal heat output of the CCCPP and the efficiency rate at the nominal fuel consumption.

7.1.2 DURING REGULAR OPERATION

3. It is required to continuously monitor the emission of CO, NO₂, oxygen volume share, emitted mass flow and temperature in the CCCPP flue gases.
4. It is required to ensure continuous data transmission via computer network into the emission monitoring information system managed by the Environmental Protection Agency.
5. Monitoring of SO₂ and solid particles emission should be carried out every six months.
6. Automatic monitoring system for continuous emission monitoring of CCCPP should be calibrated and tested once a year.

7.2 WASTE WATER MONITORING PROGRAMME

7.2.1 DURING TRIAL OPERATION

7. In control shaft, prior to connecting to the public sewage system and after wastewater treatment, it is mandatory to measure the flow and to take composite samples for determining the wastewater composition.

8. The wastewater sampling should be carried out by own automatic sampling equipment, at least four times a year (on quarter basis), by taking composite samples (every hour during 24-hour period).
9. Wastewater composition testing shall be performed via an external authorized laboratory, by taking composite samples every hour during a 24-hour period.

7.2.2 DURING COMMERCIAL OPERATION

10. In control shaft, prior to connecting to the public sewage system and after wastewater treatment, it is mandatory to measure the flow and to take composite samples for determining the wastewater composition.
11. The wastewater sampling should be carried out by own automatic sampling equipment, at least four times a year (on quarter basis), by taking composite samples (every hour during 24-hour period).

7.3 NOISE MONITORING PROGRAMME

7.3.1 DURING CONSTRUCTION

12. In case there is a need for carrying out the construction works during night, it is required to measure the noise outdoors in front of the most threatened residential area south of EL-TO, south of Munjarski put. The monitoring should be carried out during first night works and repeated periodically every 30 days, until the night works are terminated.

7.3.2 DURING TRIAL OPERATION

13. The initial monitoring should be carried out during trial run. The noise should be monitored on reference points R1-R6 (**figure 5.3-1**).

7.3.3 DURING REGULAR OPERATION

14. The monitoring should be carried out in time intervals of two years and additionally when dominant noise sources are changed. The noise should be monitored on reference points according to the study, points R1-R6 and noise protection study. The monitoring should be carried out during unit operation at nominal capacity.

8 APPENDICES

8.1 APPENDIX 1: ISO 9001 AND 14001 CERTIFICATE



DNV BUSINESS ASSURANCE MANAGEMENT SYSTEM CERTIFICATE

Certifikat br./ Certificate No. 79885-2010-AQ-HRV-HAA

Ovaj certifikat potvrđuje da je sustav upravljanja tvrtke:
(This is to certify that the management system of:)

HEP PROIZVODNJA d.o.o.-EL TO Zagreb

Zagorska 1, 10 000, Zagreb, Croatia

u skladu s normom:
(has been found to conform to:)

ISO 9001:2008

Ovaj certifikat vrijedi za sljedeće područje:
(This certificate is valid for the following scope:)

Proizvodnja električne i toplinske energije iz tekućih i plinskih goriva

Production of electricity and heat from liquid and gas fuel

Datum Certifikacije:
(Initial Certification date:)

2010-06-16

Datum isteka:
(Expiry date:)

2016-06-15

Sukladnost sa zahtjevima norme u odnosu na
područje primjene provjerena je od strane Lead
Auditora

The audit has been performed under the
supervision of

Franjo Potak
Lead Auditor

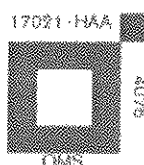
Mjesto i datum izdavanja:
(Place and date:)

Zagreb, 2013-04-05

Za akreditirani ured:
(Accredited Unit)

DET NORSKE VERITAS ADRIATICA
D.O.O.

Jelena Gruja



Neopozivanje uvjeta navedenih u Ugovoru o Certifikaciji može prouzročiti prestanak važenja ovog certifikata.
Važenost certifikata podliježe periodičnim provjerama - najmanje jednom godišnje - i recertifikaciji nakon svake izmjene.
(Lack of fulfillment of conditions as set out in the Certification Agreement may render this Certificate invalid.)
(The validity of this certificate is subject to periodic audits - at least annual - and to a complete re-assessment of the system every three years.)

DET NORSKE VERITAS ADRIATICA d.o.o. | Brijunska 32, 10140 Zagreb, HRV | +385 (0)21 968 50, Fax: +385 (0)21 968 50



DNV BUSINESS ASSURANCE MANAGEMENT SYSTEM CERTIFICATE

Certificate No. / Certifikat br. 76742-2010-AE-HRV-RvA

This certifies that /Ovaj certifikat potvrđuje da je

HEP PROIZVODNJA d.o.o.-EL TO Zagreb

Zagorska 1 - 10000 Zagreb - Croatia

Has been found to conform to the Management System Standard:
Sukladan uvjetima Standarda za sustav upravljanja:

ISO 14001:2004

This Certificate is valid for the following product or service ranges:
Ovaj certifikat vrijedi za sljedeće područje primjene:

Production of electricity and heat from liquid and gas fuel

Proizvodnja električne i toplinske energije iz tekućih i plinskih goriva

Initial Certification date:
Datum prve certifikacije:

2010-10-19

This Certificate is valid until:
Datum isteka certifikata:

2016-10-10

The audit has been performed under the
supervision of / Odgovorna osoba za provedbu
ocjene

Vladimir Subanovic
Lead Auditor

Place and date:
Mjesto i datum:

Agrate Brianza, 2013-09-03

for the Accredited Unit:
za Akreditirani uređ:

**DET NORSEE VERITAS CERTIFICATION B.V.,
THE NETHERLANDS**

Zeno Beltrami
Management Representative



Lack of fulfilment of conditions as set out in the Certification Agreement may render this Certificate invalid.

Det Norske Veritas Certification B.V. Zwollesweg 1, 2004 LB Breda, The Netherlands, TEL: +31 10 222 068 - www.dnv.com - info@dnv.nl

8.2 APPENDIX 2: LIST OF AUTHORS

EKONERG Ltd:

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SONUS Ltd:

Miljenko Henich, mag. ing. el. techn.

8.3 APPENDIX 3: REFERENCES AND SOURCES OF INFORMATION

Environmental impact assessment study for replacement of unit A with new CCCPP in EL-TO Zagreb, April 2014

Study of Environmental Protection for the heat accumulator in EL-TO Zagreb, EKONERG Ltd, August 2015

Study of Environmental Protection for the low-pressure steam boiler with the connection to the existing K7, K8 and K9 boiler room at EL-TO Zagreb, EKONERG Ltd, August 2015

Decision on the environmental acceptability for the project: "New combined cogeneration plant as a replacement building for block A in EL-TO Zagreb" with the application of the environmental protection measures and with implementation of the environment monitoring program (CLASS: UP/I 351-03/14-02/24, REF. NO.: 517-06-2-2-14-18, from 17th of July 2014)

Location permit for "Multipurpose operating building in EL-TO Zagreb" at cadastral plot 561/1 in c.m. Trešnjevka in City of Zagreb

Environmental and Social Policy, EBRD, May 2014

Action plan for City of Zagreb air quality improvement

NATIONAL INVENTORY REPORT 2015, Croatian greenhouse gas inventory for the period 1990-2013, October 2015

Annual air quality monitoring reports, IMI, EKONERG

EEA, 2013, Air Quality in Europe – 2014 report, EEA Report No 5/2014, European Environment Agency

6th national report of Republic of Croatia on climate change

Basic geological map of the Republic of Croatia (List Zagreb)

The minutes of the conducted geotechnical investigation works on the building construction of the new combined-cycle cogeneration plant at the site of the EL-TO Zagreb

<http://seizkarta.gfz.hr/karta.php>

Decision on water source Stara Loza, Sašnjak, Žitnjak, Petruševac, Zapruđe and Mala Mlaka protection (OG City of Zagreb 21/14)

<http://korp.voda.hr/>

Report on the chemical condition of groundwaters in the Republic of Croatia in 2013, Hrvatske vode, 2015

Report on the condition of surface waters in the Republic of Croatia in 2013, Hrvatske vode, 2015

<https://geoportal.zagreb.hr/karta>

Report on noise measurement in open space, SONUS Ltd, March 2016

Verified annual emissions of EL-TO Zagreb (2013 – 2015)

Investments program in cogeneration units of the production facilities of HEP for electricity and thermal energy supply in the city of Zagreb until 2030, Energy Institute Hrvoje Požar, EKONERG Ltd, ELEKTROPROJEKT d.d., December 2013

Vulnerability assessment of EL-TO Zagreb, May 2014

Operational plan for protection and rescue for EL-TO Zagreb, May 2014

Safety report – EL-TO Zagreb, April 2014

Internal emergency plan – EL-TO Zagreb, April 2014

<http://natura2000.dzrp.hr:6080/arcgis/rest/services/zasticenapodrucja/zasticenapodrucja/MapServer>

Spatial plan of City of Zagreb (OG City of Zagreb 8/01, 16/02, 11/03, 2/06, 1/09, 8/09, 21/14, 23/14 – consolidated text)

General urban plan of City of Zagreb (OG City of Zagreb 16/07, 8/09, 7/13)

<http://www.min-kulture.hr/default.aspx?id=6212>

Manifestation of the City Institute for Protection of Monuments of Culture and Nature (CLASS: 612-08/2013-01/761, REF.NO.: 251-18-02-13-2, 30 December 2013)

Manifestation of the City Institute for Protection of Monuments of Culture and Nature (CLASS: 612-08/15-01/360, REF.NO.: 251-18-02-15-2, 15 July 2015)

Project of storage removal within the EL-TO plant, EKONERG Ltd, 2014

Project of the existing administration building removal, ELEKTROPROJEKT d.d., 2014

8.4 APPENDIX 4: EBRD COMPLIANCE SUMMARY TABLE

Compliance with relevant EBRD Performance Requirements is given in detail within corresponding chapters. Not applicable Performance Requirements because of project location and characteristics are:

- PR 5 - Land Acquisition, Involuntary Resettlement and Economic Displacement,
- PR 7 - Indigenous Peoples,
- PR 8 - Cultural Heritage and
- PR 9 - Financial Intermediaries.

KPI Ref.	Performance Requirement	Score	Comments/ Issues	Actions Required	ESAP Ref.
1	Assessment and Management of Environmental and Social Impacts and Issues				
	Summary:				
1.1	Environmental and Social Assessment	FC	For planned project Environmental Impact Assessment procedure was conducted and Permit was obtained. Permit contains environmental protection measures and monitoring. Those measures and monitoring will be applied in the Main project (documentation for issuing Building permit) what will be confirmed by the Survey. For the operation of the project modification/ amendment of IPPC (Environmental) permit for existing EL-TO units should be issued. It will contain conditions for project operation, monitoring, reporting and decommissioning.	Environmental protection measures from the Permit. Issuing the modification/ amendment of IPPC (Environmental) permit for existing EL-TO units related to the project.	3.1 3.8
1.2	Environmental and Social Management Systems	FC	EL-TO Zagreb has implemented quality and environment management system according to ISO 9001:2008 and ISO 14001:2004. In management of new CCCPP operation, this system will be applied.	Application of existing quality and environment management system according to ISO 9001:2008 and ISO 14001:2004 system in the management of the project.	1.1
1.3	Environmental and Social Policy ⁷⁶	FC	Part of the EMS is The policy of quality and environmental management. This Policy will be applied to the new CCCPP.		1.1
1.4	Environmental and Social Management Plan	FC	Environmental and social action plan (ESAP) is created based on environmental protection measures from EIA procedure (Permit) and additional measures related to the EBRD Performance Requirements (PRs). Social part of the plan is given in Stakeholder engagement plan (SEP).	The client shall incorporate relevant conditions into tender documents and contractual agreements with third party employers (contractors working on project sites or perform work) to meet the requirements of client's EMS.	1.2

⁷⁶ Where the project represents a substantial extension to the client activities, confirm that Policy and supporting management systems and plans are appropriate for the new activities.

KPI Ref.	Performance Requirement	Score	Comments/ Issues	Actions Required	ESAP Ref.
1.5	Organisational Capacity and Commitment	FC	The organizational structure, as well as the powers and responsibilities of the EL-TO Zagreb are stipulated by the Ordinance on organization and systematization HEP-Proizvodnja d.o.o. (HEP Bulletin no. 174) – see chapter 3.20.	Application of existing or new organizational structure, especially in the field of environmental protection, and maintenance and improvement of EMS for the project management.	1.1
1.6	Supply Chain Management	FC	See chapter 3.20.		
1.7	Project Monitoring and Reporting ⁷⁷	FC	The client will perform regular monitoring of project development related to the project's environmental and social performance.	The client will appoint responsible person(s) for regular monitoring of project development related to the project's environmental and social performance and third party (independent experts) to complement or verify this monitoring and create annual report on project's progress to the EBRD.	1.3
2	Labour and Working Conditions				
	Summary:				
2.1	Human Resource Policies and Working Relationships	FC	See chapter 3.21.		
2.2	Child and Forced Labour	FC	See chapter 3.21.		
2.3	Non-Discrimination and Equal Opportunity	FC	There will be no new employment for the new project. For control and management of new CCCPP operation, existing workers from EL-TO plant will be employed.		
2.4	Workers Organizations	FC	See chapter 3.21.		
2.5	Wages, benefits, and conditions of work and accommodation	FC	See chapter 3.21.		
2.6	Retrenchment ⁷⁸	FC	See chapter 3.21.		

⁷⁷ At appraisal stage there will be limited information. Compliance assessment should address specific plans for monitoring and reporting (against for example ESAP requirements) and also consider whether there is evidence of weak monitoring/reporting by client on other relevant projects - which may reduce confidence in future performance.

⁷⁸ Will not be applicable to many projects at appraisal stage. However evidence, within the last 3 years of client approach to retrenchment which is not compatible with the Policy should be taken into consideration.

KPI Ref.	Performance Requirement	Score	Comments/ Issues	Actions Required	ESAP Ref.
2.7	Grievance Mechanism	FC	See chapter 3.21.		
2.8	Non-Employee Workers	FC	See chapter 3.21.	The client shall incorporate relevant conditions into tender documents and contractual agreements with third party employers (contractors working on project sites or perform work) to meet the requirements of labour and working conditions . Provisions of accommodation of construction workers (non-employee workers) shall meet good international industry practice.	2.1 2.2
2.9	Supply Chain	FC	See chapter 3.21.		
2.10	Security Personnel Requirements	FC	See chapter 3.21.		
3	Resource Efficiency and Pollution Prevention and Control <i>NB. Appraisal should carefully consider (and state) what regulations or standards have been applied to compliance assessment (eg EU, National, Sector Best Practice). Assessments should address consideration of the performance of alternative techniques.</i>				
	Summary:				
3.1	Resource Efficiency	FC	Total net efficiency of the plant will be 90% and it will fall in the high-efficient cogeneration units.		3.1
3.2	Pollution Prevention and Control - Air emissions	FC	CCCPP will use dry low NOx combustion system/ chamber (DLN) - BAT. By this method, the limit values for gas turbines prescribed in Croatian regulation (OG 117/12, 90/14) and in EU Directive for industrial emissions (2010/75 EU) can be achieved.	Environmental protection measures from the Permit related to the emissions to air. Continuous monitoring of NO _x and CO emissions to air. Continue measurements of NO ₂ concentrations at Vrhovec air quality monitoring station. Maintain the NO ₂ compliance at monitoring station Vrhovec.	3.1 3.2 3.3
3.3	Pollution Prevention and Control - Waste waters	FC	In wastewater treatment BAT will be applied – see chapter 1.6.	Environmental protection measures from the Permit related to the management and emissions of wastewaters. Monitoring of wastewaters emissions. Water regulation conditions (part of the Location permit) of Croatian waters	3.1 3.4

KPI Ref.	Performance Requirement	Score	Comments/ Issues	Actions Required	ESAP Ref.
3.4	Greenhouse Gases ⁷⁹	FC	Because of the purpose and positive effect of this project (see chapter 1.6.1) and its placement, alternative project locations, techniques or processes, adoption of renewable or low carbon energy sources are not considered. GHG emission reduction is achieved by high efficiency of the new cogeneration combined cycle unit.	Annual GHG emission calculation and report to EBRD in accordance with EBRD Methodology for Assessment of Greenhouse Gas Emissions.	3.6
3.5	Water	FC	In the system of process steam supply for the consumers, there are no condensate return lines. This is existing infrastructure and it is managed by other company HEP-Toplinarstvo d.o.o. After starting up new CCCPP, total annual needs of raw, i.e. demineralized water for EL-TO plant will not be changed – see chapter 1.4.2. Daily water consumption/demand will be around 1800 m ³ < 5,000 m ³ /day.	Special conditions (part of the Location permit) of Water Supply and Drainage Ltd.	3.5
3.6	Wastes	FC	If waste could not be recovered or reused, the client will dispose of it in an environmentally sound manner via authorized waste management company – see chapter 5.4.	Environmental protection measures from the Permit related to the waste management.	3.1
3.7	Hazardous Substances and Materials	FC	In the project operation small quantities of dangerous substances will be used – see tab. 5.7-1 . Dangerous substances handling, transportation and storage will be carried out according to safety measures and appropriate design standards related to protection from fire and explosion and from environmental pollution due to the accidental release. Measures that will be applied are (mostly) the measures applied in design and management of existing plant – see chapters 5.7 and 3.14.	Environmental protection measures from the Permit related to the hazardous substances. Preparation of Elaborate on fire protection and Elaborate on occupational safety as part of documentation (Main project) for issuing Building permit.	3.1 3.7

⁷⁹ Particular attention should be given to client demonstration of consideration of alternatives. Projects expected annually to produce more than 25,000 tonnes of CO₂ equivalent should provide an emission inventory and plans for annual reporting.

KPI Ref.	Performance Requirement	Score	Comments/ Issues	Actions Required	ESAP Ref.
4	Health and Safety				
	Summary:				
4.1	Occupational Health and Safety	FC	The client will implement occupational health and safety measures that will provide: (i) preventive and protective measures, including modification, substitution or elimination of hazardous conditions or substances; (ii) equipment to minimize risks, and require and enforce its use; (iii) personal protective equipment at no cost to the workers - see chapter 5.7.	Preparation of Elaborate on occupational safety as part of documentation (Main project) for issuing Building permit. Application of existing Ordinance on occupational safety HEP-Proizvodnja d.o.o. The client shall incorporate relevant conditions into tender documents and contractual agreements with third party employers (contractors working on project sites or perform work) to meet the requirements of occupational safety. External contractors will be monitored to perform work in a safe manner.	3.7 4.1 4.2 4.3
4.2	Community Health and Safety	FC	See chapter 5.7	Preparation of Elaborate on fire protection as part of documentation (Main project) for issuing Building permit. Application of existing internal document (amended with project data) related to the safety issues.	3.1 3.7
4.3	Infrastructure, Building, and Equipment Design and Safety	FC	See chapter 5.7	Environmental protection measures from the Permit related to the hazardous substances. Preparation of Elaborate on fire protection and Elaborate on occupational safety as part of documentation (Main project) for issuing Building permit.	3.1 3.7
4.4	Hazardous Materials Safety	FC	Dangerous substance that can be released is natural gas what can cause fire and explosion but this gas is not toxic and it can not be substituted with less hazardous fuel. Safe transport of dangerous substances and waste is ensured - chapter 3.14.		
4.5	Product and Services Safety	FC	See chapter 5.7	Application of existing quality management system.	1.1
4.6	Traffic and Road Safety	FC	Potential traffic and road safety risks can occur in the construction stage of the project. This is evaluated in chapter 4.6.	Environmental protection measures from the Permit related to traffic during construction.	3.1

KPI Ref.	Performance Requirement	Score	Comments/ Issues	Actions Required	ESAP Ref.
4.7	Natural Hazards	FC	Risk of natural hazards are identified and assessed for existing EL-TO plant in document Vulnerability assessment – chapter 3.14.	Design of project's key units for expected intensity of the earthquake.	4.4
4.8	Exposure to Disease	FC	Protection of Population from communicable diseases is regulated by Law on protection of population from communicable diseases (OG 79/07, 113/08, 43/09). According to article 26 Medical surveillance is carried out on persons in Croatia who come from countries where the disease malaria, cholera, viral hemorrhagic fevers or other disease specified by international agreement which Republic of Croatia is a Party.		
4.9	Emergency Preparedness and Response	FC	EL-TO plant has several internal documents for managing safety issues in terms of accidents prevention and/or activities in case of accident occurrence: - Operational plan for protection and rescue, - Safety report, - Internal emergency plan, - Plan of protection from fire and technological explosions, - Operational plan of emergency measures in case of accidental pollution of water and - Evacuation plan.	Application of existing documents related to the safety issues (e.g. Safety report, Operational plan for protection and rescue etc.)	4.5
5	Land Acquisition, Involuntary Resettlement and Economic Displacement				
	Summary: Project will be built within existing EL-TO Zagreb plant with connections to existing infrastructure so it pose no risk in this field.				
5.1	Avoid or minimise displacement	NA			
5.2	Consultation	NA			
5.3	Compensation for displaced persons	NA			
5.4	Grievance mechanism	NA			
5.5	RAP/LRP documentation	NA			

KPI Ref.	Performance Requirement	Score	Comments/ Issues	Actions Required	ESAP Ref.
5.6	RAP/LRP implementation	NA			
5.7	Monitoring	NA			
6	Biodiversity and Living Natural Resources				
	Summary:				
6.1	Assessment of Biodiversity and Living Natural Resources	FC/NA	The characteristics of the project's location is conditioned by many years of anthropogenic influence, so on the project site are not present individual protected plant and animal species. The entire location of the project is degraded area related to the aspect of flora and fauna. Before EIA procedure, a Decision that the planned project is acceptable for ecological network was issued by the Nature Protection Directorate of the Ministry for Environmental and Nature Protection (CLASS: 612-07/14-60/11, REF. NO.: 517-07-1-2-14-4, from 17 February 2014) – see chapters 3.15, 3.16 and 3.17.		
6.2	Conservation of Biodiversity	FC/NA			
6.3	Sustainable Management of Living Natural Resources	NA			
7	Indigenous People				
	Summary: There are no indigenous people related to the project.				
7.1	Indigenous People Assessment	NA			
7.2	Adverse Effects Avoidance and Indigenous Peoples Development Plan	NA			
7.3	Information Disclosure, Meaningful Consultation and Informed Participation	NA			
7.4	Grievance Mechanism and Prevention of Ethnically Based Discrimination	NA			

KPI Ref.	Performance Requirement	Score	Comments/ Issues	Actions Required	ESAP Ref.
7.5	Compensation and Benefit-Sharing	NA			
7.6	Impacts/Relocation on Traditional or Customary Lands and Cultural Heritage	NA			
8	Cultural Heritage				
	Summary: Project has no impact on cultural heritage; there are no protected, preventively protected and/or registered cultural properties on the project site – see chapter 3.18.				
8.1	Assessment and Management of Impacts on Cultural Heritage	NA	See chapter 3.18.		
8.2	Consultation with affected communities and other stakeholders	NA			
8.3	Project use of Cultural Heritage	NA			
10	Information Disclosure and Stakeholder Engagement				
	Summary:				
10.1	Stakeholder Engagement Plan	FC	<p>The Stakeholder Engagement Plan has been prepared to meet the EBRD standards (EBRD <i>Performance Requirements 10</i>).</p> <p>HEP d.d. will be responsible for monitoring and reporting the SEP implementation. Annual project progress reports will be public disclosed.</p> <p>The SEP could be revised during the implementation process, particularly in case of possible dates. Changes and possible delays because of external impacts will be explained in annual project progress reports.</p>	Preparation of annual project progress reports, which will include environmental and social impacts, health and safety performance, implementation of external grievance mechanism, implementation of SEP and ESAP.	10.1

KPI Ref.	Performance Requirement	Score	Comments/ Issues	Actions Required	ESAP Ref.
10.2	Operational Grievance Mechanism	FC	HEP d.d. has established an effective grievance mechanism to receive and facilitate resolution of stakeholders' concerns and grievances, in particular about the environmental and social performance. The grievance mechanism is ongoing process.		
	Overall Compliance				
	National Environmental, Social, Health and Safety Requirements	FC	For the project: "New combined cogeneration plant as a replacement building for block A in EL-TO Zagreb", The Ministry of Environmental and Nature Protection issued Decision on the environmental acceptability with the application of the environmental protection measures and with implementation of the environment monitoring program (CLASS: UPI/ 351-03/14-02/24, REF. NO.: 517-06-2-2-2-14-18, from 17th of July 2014). Environmental protection measures and EBRD PR requirements will be implemented in future project's documentation. This will be monitored and reported to EBRD by Annual Project Progress Reports.		
	EU Environmental, Social, Health and Safety Requirements	FC	During EIA procedure, main BAT requirements were taken in the consideration (ELVs, monitoring). Also the requirements of Best Available Techniques (BAT) Reference Document for the Large Combustion Plants, Draft 1, June 2013 were taken in the consideration. Republic of Croatia as the member state of EU has to implement all EU regulations.		