PROJECT APPRAISAL DOCUMENT

Heating and cooling in the House of Culture

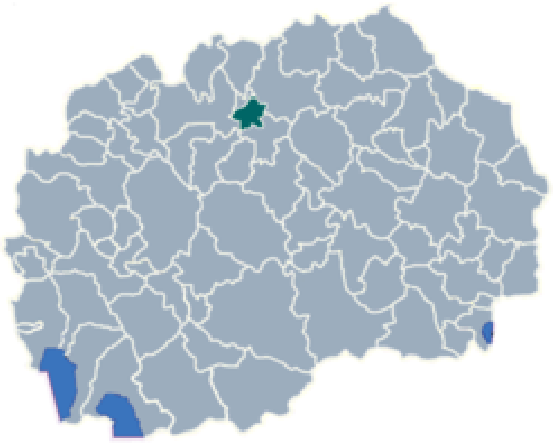
October 2013

ILINDEN MUNICIPALITY

I. PROJECT DESCRIPTION

A. GENERAL INFORMATION ON THE MUNICIPALITY

1. Location map



2. General information

As an independent local self-government unit, the Ilinden municipality has been established in 1996. Total area of the municipality is 98.7km², and according to the last National Census carried out in 2002 the population number is 15,894. The municipality has its flag and coat of arms which were adopted in the time when the municipality was established.

Ilinden municipality is located in the immediate vicinity of the City of Skopje, more precisely 10km from the city center and is located in the eastern part of Skopje valley, on the very location where Skopje-Kumanovo-Veles triangle meets. The municipal headquarter is located in the populated area of Ilinden, formerly called Belimbegovo. It borders Gazi Baba municipality to the west, Aracinovo municipality to the northwest and Petrovec municipality to the east and south.

The municipality has excellent traffic connections since the main roads M-1, M-3 and M-4 from the international highways are passing through it. These are: Corridor 10 (E-75) north-south and Corridor 8 (E-65) east-west, the main railway line Belgrade-Skopje-Athens and the International Airport “Aleksandar the Great”.

The territory comprises 1,240ha of construction land and 9,430ha agricultural land. Total of 6,980ha (74%) is arable land of which: 4,500ha agricultural crops, 1,000ha gardening crops and 500ha fruit growing crops. 2,400ha (25%) are pastures and meadows and only 50ha are covered by forest. 5-10ha are prone to erosion.

Table 1: Land usage in the Municipality of Ilinden

No.	Settlement	Alt.ab. sea level	Population	Households	Construction land (ha)	Number of constructed objects	Agricultural land (ha)			
							Total	Arable (fields, vineyards)	Pastures	Forests
1	Ilinden	230	4.931	1.307	400	1.330	1.050	920	130	/
2	Marino	229	3.533	1.000	120	1.178	200	170	30	/
3	Kadino	228	2.090	552	130	657	830	770	60	/
4	Mralino	227	821	216	120	329	800	600	200	/
5	Bunardzik	290	352	97	90	228	400	380	18	2
6	Ajvatovci	320	232	63	50	179	860	500	340	20
7	Miladinovci	270	1.276	345	150	478	1.460	750	690	20
8	Bujkovci	300	946	244	60	226	780	520	259	1
9	Mrsevci	330	651	192	60	260	730	620	107	3
10	Buchinci	370	226	68	15	90	665	450	213	2
11	Tekija	290	304	76	20	112	830	650	179	1
12	Deljadrovci	295	532	138	25	185	825	650	174	1
TOTAL			15,894	4,298	1,240	5,252	9,430	6,980	2,400	50

The area of agricultural land by type of crop is as follows: wheat 10,100ha, barley 1,200ha, corn 1,000ha, beet, sunflower 200ha, garden-stuff 1,000ha, forage crops 500ha. According to the ownership structure 3,000ha are state owned agricultural land and 6,430ha are in private ownership.

As around 88% of the total land is agrarian, it implies that Ilinden municipality is, obviously, an agricultural region that is using 74% of its arable soil. The rest are pastures and industrial zones. According to the Master Urban Plan, 4,000ha are planned to be used as agricultural land which means that the Municipality exceeds the plans by 75% (6,980 ha as arable land).

The municipality altitude is between 230 and 550 meters above the sea level. The terrain configuration is mostly flat (80%) and the remaining are small hills in the north and east areas.

The municipality has quite modest hydrographic features. There are no permanent natural rivers with the exception of the drainage basin of the Suva Reka river comprising two smaller rivers mostly dry during the year. This situation is changed by the drainage channels and high underground waters, which are also used for irrigation of the agricultural land. There are two main and several smaller drainage channels with the total length of around 60km.

B. DEMOGRAPHIC AND ECONOMIC PROFILE

The municipality comprises 12 settlements. By last national Census of 2002 there are 4298 households with average 3.7 family members. The population density is 150 people per km². The natural population growth in the last 5 years is an average of 1% per year.

Table 2: Total population number according to populated areas, households and apartments in the Ilinden municipality according to the 2002 National Census results

Settlement	Population	Households	Apartments
Ilinden	4931	1307	1509
Marino	3533	1000	1140
Kadino	2090	552	734
Mralino	821	216	252
Ajvatovci	232	63	126
Bunardzik	352	97	183
Miladinovci	1276	345	407
Mrshevci	651	192	213
Tekija	304	76	119
Deljadrovci	532	138	191
Buchinci	226	68	98
Bujkovci	946	244	280
TOTAL	15894	4298	5252

Table 3: Individual households according to their type, size and composition in the Ilinden municipality

Type of household	Number
Individual households	4298
Households with one family	3241
Married couples with children	2300
Married couples without children	699
Mother with children	158
Father with children	58
Unmarried couples with children	8
Unmarried couples without children	18
Households with two or more families	728
Households without families (total)	329
Households without families – living alone	311
Households without families – with more members	18

The age structure shows that 13% of the total Ilinden population is more than 60 years old, which is far above the average in Macedonia. Male population is more numerous: 51.5% to 48.5% of female share.

Table 4: Age structure of population (2002 Census data)

Age	Total	Men	Women
0-19	4394	2253	2141
20-60	9368	4921	4447
Over 60	2128	1006	1122
Unknown	4		4
Total:	15894	8180	7714

According to the ethnic affiliation most of the population is Macedonian (87.8%) followed by Serbs (5.7%) and Roma (2.7%).

Table 5: Population by ethnic groups (2002 Census data)

Ethnicity	Percent	Total
Macedonians	87.8	13959
Serbs	5.7	912
Roma	2.7	428
Albanians	2	352
Turks	0.1	17
Other	1.4	226

1. Educational structure

Population structure by education is presented below. Data indicate dominant share of secondary educated people. In the group of people over 10 years old, 95.7% are literate.

Table 6: Population by education background

Educational level, over 15 years of age	Total
No school	655
Not completed elementary education	1771
Elementary education	3774
Secondary education	6157
High education	120
University education	174
Magistrate	/
Doctorate	2

Table 7: Population over 10 years age by gender and literacy

	Men	Women	Total
Literate	6891	6219	13110
Illiterate	123	473	596

2. Employment

The population age 15-64 is 12639. Out of this number only 51% are economically active. The unemployment rate is 35% and employment rate is 33.5%.

Table 8: Labor market characteristics (2002 Census data)

		Active			Non-active
		Total:	Employed	Unemployed	
Total labor force (15-64)	12639	6486	4240	2246	6153
- Men (15-64)	6480	4286	3082	1024	2194
- Women (15-64)	6159	2200	1158	1042	3959

Most of the population is employed in construction (over 50%), and subsequently in industry (35%) and in agriculture (5%).

C. GENERAL DESCRIPTION OF THE PROJECT

The project assumes installation of heating, cooling and ventilation systems in newly constructed House of Culture located in the Ilinden settlement.

The construction was financed with the EU funds. In 2008 the EC announced competition among municipalities for infrastructure project in function of local population. Ilinden municipality

applied with the project on construction of House of Culture and received the grant of EUR 200,000 (final grant amount was increased to EUR 210,000). For this money the brick structure was constructed. Then, the municipality provided EUR 250,000 to finance interior arrangement. The building was launched in November 2012. The building is located in Ilinden settlement, which is the biggest in the municipality and comprises 31% of population (4,931 persons). The municipality consists of 12 settlements and besides Ilinden, the houses of culture exist in 9 remaining settlements, but with much smaller capacities.

The new House of Culture in Ilinden comprises cinema, library, civil marriage registration hall, communal sport enterprise, local group on national dances, and exhibition hall. The only missing element is system of cooling and heating of the building.

The design plan for HVAC system of the building assumes heating/cooling installation with fan coil units. The radiators are planned in toilets only. Additionally, it is planned to install ventilation on the first floor, where the cinema is located.

In order to improve energy efficiency it is planned to utilize the potential of the groundwater and the possibility to get heat energy by introducing heat pumps.

The following activities are planned:

- Drilling 2 boreholes Ø250mm x 50m for water supply and one borehole Ø350mm x 85m for water return;
- Installing 2 water well pumps with capacity 324 l/min. and 250 l/min.;
- heat exchanger;
- geothermal pump - ground source heat pump (GSHP) as a central heating and cooling system with heat capacity Qh= 125.8kW, and cooling capacity of Qc= 82.3kW;
- all installation works from wells to heat pump (GSHP);
- all installation works from heat pump (GSHP) to the heating and cooling system of the building;
- installation of radiators and fan coil units;
- ventilation system in the cinema on the first floor.

The heat exchanger, geothermal heat pump, boiler for liquid fuel and all equipment for normal function of heating and cooling installation are placed in the mechanical room on the ground floor. The boiler for liquid fuel will be used in exceptional cases only, when the geothermal heat pump will be in defect. Therefore, the boiler capacity is only half of estimated needs.

The aim of these activities is reduction of CO_2 emissions.

D. STRATEGIC GOALS

This project addresses strategic goals of the municipality and refers to the "Strategic Plan on Local Economic Development 2012-2016".

Strategic area 4: ENVIRONMENTAL PROTECTION
4.1. Integrated and sustainable management and treatment of the communal waste
4.2. Upgrading of ecological mindset
4.3. Application of the alternative (renewable) energy sources

In section 4.3 the municipality planned the following actions:

4.3.1. Preparation of the energy efficiency program,

4.3.2. Implementation of the energy efficiency projects in the public buildings and street lighting,

4.3.3. Education and promotion of energy efficiency and renewable energy sources.

This sub-project addresses the action 4.3.2. The basic goals of the project are as follows:

- Energy efficiency – to provide energy efficient solution for heating/cooling of the public building;
- Improved safety - the manipulation with huge quantities of oil is avoided;
- Easier and automated manipulation with the system;
- Increased comfort - the rooms are warmed up every morning on time with the use of timers.

II. SOCIAL IMPACT

A. SOCIOLOGICAL STUDY

1. Methodology

The methodological approach is based on the concept that corresponds to implementing a sociological study using the Five Input Parameters approach. These five input parameters are: Social and gender diversity, Institution, rules and behavior, Stakeholders, Participation, Social risk.

The sociologic study was performed on the spot and included observation, meetings with focus groups and interviews. In addition it includes the face-to-face interviews with top officials of the municipality (the Mayor and municipal employees). These interviews involved using a series of questions relevant for this project.

2. Social diversity and gender

Based on the information presented in chapter I.B one may conclude:

- Ilinden municipality is located in close relation to the capital of the country, which results in many positive side effects for the benefit of the municipal population,
- High share of agricultural land does not determine the municipal profile, where industrial sector is equally developed,
- The population is older than the country average and is dominated by male population,
- Dominant position by ethnicity has Macedonian population with share of 88%, followed by Serbs and Roma,
- Unemployment rate is slightly higher than country average (by Census data).

The project beneficiaries are all inhabitants of the municipality, therefore none ethnic, gender or age group is privileged. Therefore, it is expected the project is supported by all citizens.

3. Institutions, rules and behavior

The contractor will be selected according to the World Bank procurement rules. The contractor will have to provide guarantees for the realization of the project. The municipal council might request information from the mayor in reference to the project's realization at any time. In addition, based on the experience with another project completed and financed with MSIP loan (Energy efficiency with ground source heating pumps in public facilities: elementary school in Ilinden and kindergarten in Marino"), the municipality has proved the capacity to implement this type of project.

4. Stakeholders

Analyzing the social impact of this project it is necessary to identify main stakeholders – organizations, groups or individuals who might have interest in success of the project, can contribute/ affect project implementation, or can directly or indirectly influence the design and implementation. The following stakeholders were identified: mayor, municipal administration, inhabitants, political parties, local social organizations like NGOs or media. The legal framework requires organization of consultations on any infrastructure projects proposed by the municipality.

In line with those legal requirements the municipality organized public debate on the proposed project on October 2, 2013. The entrance was free to anyone interested, but invitations were sent via the local communities. There were 13 persons representing different communities. Technical

solution was presented as well as the financial conditions of the sub-loan (8.5 years with 3 years of grace period). The representative of the municipal administration presented the project and announced the timeframe. The contractor should be selected at the beginning of 2014, and the expected implementation period is 60 days. It was announced that similar systems will be installed in the municipal building and school sport hall. The public asked about the up to date experience with such heating/ cooling systems installed in the elementary school in Ilinden and kindergarten in Marino. It was presented that the current system is in function, and the only problem was drilling the wells, which have to be set at the appropriate deep: the clean water is estimated to be at 65-80m. In case of House of Culture, the required deepness will be 46m. The public asked how the technical solution was selected and whether other alternatives were considered. It was claimed that selected solution is the most efficient due to specific characteristics of the underground waters at this area. The public was informed that the municipality will have a possibility to apply for grant after successful implementation of the project. The grant will be used for procurement of equipment for conference hall in the House of Culture. The citizens expressed their support for the project.

Based on the public debate on October 4, 2013 the municipal Council approved the projects and the way of its financing. The municipal Council comprises 15 councilors representing different political parties (10 are from VMRO-DPMNE and 5 are from SDSM). All Councilors voted unanimously for the project. Based on this public consultation one may conclude that there is no resistance to the project and it has support of all citizens and their representatives. The citizens are fully informed about the project, its goals, costs and consequences. All stakeholders had access to information and could influence scope of the project. There are no NGOs active at the municipal territory. Citizens' interests are mostly expressed by political parties, which are present in the municipal Council. Voting results indicate that in a democratic procedure the majority of Council members supported project implementation. Based on this support expressed by citizens in public debate and their representatives in Council voting one might conclude that there is no resistance to the project.

The project will not cause a feeling of inequality among the citizens. All the municipal inhabitants are the beneficiaries of the project as the House of Culture in Ilinden will serve the whole municipal population. The project does not favor any social or ethnic group. The project was publicly consulted and approved by the majority of Councilors, therefore it is not expected that some group, organization or institution might cause some problems during implementation.

5. Participation

There is no need for any kind of voluntary participation or financial contribution from citizens, as all the costs will be covered with loan.

6. Social risks

The project does not carry social risks as it addresses all citizens in the municipality. It is considered cost-effective over a long run and will contribute to improvement in community standards of living in Ilinden municipality. The project is priority for the public administration and citizens.

This Project is not a subject to resettlement issues because refers to installation of equipment in the already existing building. As a result, there are no property issues in this sub-project.

Potential success of the project depends on its efficient implementation. The project is designed in such a way that during the loan repayment there should not be incurred any additional maintenance costs, except regular ex-ante predicted. The quality of project implementation will be provided by supervision on the selected company employed by the municipality. However, to achieve high quality of provided works citizens involvement is necessary.

III. ENVIRONMENTAL IMPACT

The project “Heating and cooling in the House of Culture” assumes installing an efficient system for heating, cooling and ventilation in newly constructed House of Culture in the Ilinden settlement, Ilinden municipality. In order to provide energy efficient facility, a geothermal heat pump is planned, which will use groundwater.

The building of House of Culture in Ilinden consists of ground, first and second floor. In the ground floor an exhibition area is located, while other smaller premises such as reception desk, storage room, mechanical room, wardrobe, bar and toilets are positioned around this area. A cinema together with a stage, projection booth and toilets are positioned on the first floor. The second floor consists of a conference room, library and offices.

This sub-project refers to thermo-technical installations in the new House of Culture by installation of water transmission (heat/cold) with fan coil units. It is planned to install ventilation on the first floor, where the cinema is located and the radiators are planned only in the toilets. As a back-up solution for the heating of the building, the installation of low temperature boiler with capacity of 60-70kW and reservoir with V=3m^3 is planned.

The entire HVAC (Heating, Ventilation and Air-conditioning) system consists of several activities: a)heating/cooling installation with fan coils, b) radiator heating installation and c) ventilation of premises.

The main components of the system are: two water supply wells with submersible pumps with capacity 324l/min and 250l/min and one water return well; heat exchanger; geothermal pump with heat capacity Qh= 125.8kW and cooling capacity of Qc= 82.3kW; circulation pumps and installations for the heating, cooling and ventilation system of certain premises in the building.

According the Project documentation, the following activities are planned: a) transport and installation of 2 water well pumps, b) delivery and installation of radiators in the toilets and fan coil units, c) transport and installation of geothermal pump - ground source heat pump (GSHP) as a central heating and cooling system, d) installation works from wells to heat pump, e)installation works from heat pump (GSHP) to the heating and cooling system of the building, f) painting the pipes with anticorrosion coating layer, g) transport and installation of Armaflex insulation, h)installation of ventilation system in the cinema on the first floor and i) installation of the back-up boiler and fuel oil tank. After finishing the installation activities the testing and start-up of the system should be performed, keeping the records from the startup of the system.

According the national legislation (Law on environment – Official Gazette No. 53/05, 81/05, 24/07, 159/08, 83/09, 124/10, 51/11, 123/12, 93/13) and secondary legislation, Project belongs to the Annex II Chapter X (j) - Projects for water abstraction and return of the groundwater not included in Annex I from the Degree for determination for EIA carrying out and Annex I Chapter XI – Infrastructural projects, point 12): – Projects for abstraction and return of the groundwater. For these types of projects the EIA Report should be prepared and the Report should be adopted by the Ministry of Environment and Physical Planning.

The EIA Report for the Project “Energy efficiency in public facilities in the House of Culture”, Ilinden municipality, was prepared and submitted to the Ministry of Environment and Physical Planning and the Decision no.11-3564/2 for approval the EIA Report and mitigation measures proposed were issued on 5.5.2010.

The environmental impacts are expected to be on short term basis during the installation of the HVAC system and the impacts will be with minor local significance. The good construction and installation practice could cover almost all mitigation measures proposed mainly to overcome the

OH&S risks and community risks that could appear as a result of settlement area and surrounding of the project site.

The project activities will be limited on the side around the House of Culture in Ilinden. The site is in rural settlement, residential area and no biodiversity and cultural heritage will be impacted.

During the project activities the following possible adverse health impacts to the workers were identified due to: a) not compliance with health and safety at work procedure during the installation of electrical and mechanical equipment and painting the pipes with anticorrosion coating layer, b) not compliance with waste management regulation and good practice, c) not compliance with refrigerant – chemicals regulation according their Material Safety Data Sheet of the R 410A refrigerant, d) improper handling and filling the back-up boiler and tank for fuel oil, e) noise disturbance during transport and installation of equipment and f) improper protection and fencing the site where the wells will be located.

The waste management aspects are relevant due to possible adverse environmental impact and health effects as a result of the a) generation of the different waste streams (mainly packaging waste from the electronic and electrical equipment package boxes – cardboard and plastic, broken pipes and fittings, paper, refrigerant, bins with paints for anticorrosion, bottles and a very small quantity of biodegradable waste) and b) inappropriate waste management with generated waste. The waste generated on the site will be collected by the municipal CSE “Ilinden” and finally disposed on the landfill “Drisla”. The sub-contractor should coordinate with the municipal staff and CSE staff on time and proper waste management.

The potential impacts on surface water and ground water may occur by the accidental release of refrigerant fluid R 410A and leakages from the back-up boiler and reservoir for fuel tank. The regular preventive maintenance actions and measures will ensure avoidance of leakages and water and soil pollution. During the operational phase the groundwater from the two boreholes will be continuously pumping and after usage of the heat from the ground water will be back in another two boreholes and are not expected emissions into groundwater. Groundwater quality will be with the same quality after returning.

During the activities for delivery and montage of all components of HVAC system and traffic due to the machinery and vehicles used for supply, transport of workers, different pumps and various materials and equipment could cause a noise and vibration disturbance to the sensitive receptors - the households living around the House of Culture, but it will be of minor significance. According the Law on noise protection (Official Gazette No. 79/07, 124/10, 47/11) the area belongs to the area with second degree of noise protection and the max. allowed noise level should be 50dB for night and 55dB for day and evening. The project activities are not envisaged during the evenings and nights.

In order to prevent the minor adverse environmental impacts and to ensure safety installation of the HVAC system with all equipment, the proposed mitigation measures before and during the project activities are included in the following Environmental Mitigation Plan. The main responsibility for implementation of the mitigation measures lay to the sub-contractor and supervisor (nominated by the Municipality) on daily basis. Some of the measures should be applied by the municipal staff (recording the waste quantities). The Monitoring Plan proposes tasks mainly dedicated to the supervisor and an environmental inspector who need to control the implementation of the mitigation measures by sub-contractor.

ENVIRONMENTAL MITIGATION PLAN

Project activity	Potential impact	Impact scale	Proposed mitigation measures	Responsibility
• **Preparatory works related to installation of heating, cooling and ventilation systems in newly constructed House of Culture located in the Ilinden settlement**	Possible adverse health impacts to the workers due to: - Unsafely start of installation works - Injury passing near by the open boreholes - Not compliance with health and safety at work procedure	Local/within the House of Culture/ short term/ minor	➢ Ensure marking out of the site where would be installed elements of the HVAC system in the House of Culture ➢ Adequate warning tapes and signage need to be provided during the installation works ➢ For the workers the health and safety measures should be applied: a) Security measures like: use of proper protective clothing and personal protective equipment , b) Health protection-fist aid kits and medical service on sites d) Apply the emergency and normal first aid procedure for any injury if such occurs through installation work ➢ Ensure the establishment of proper concrete secondary containment system for collection of leakage of fuel oil in accidental cases (with capacity to collect up to 60% of reservoir capacity) ➢ The House of Culture yard should be kept clean, without waste disposed	• **Contractor – Bidder** • **Supervisor**
• **Delivery, transport and installation of all components of the HVAC system involving the following activities:** - **Installing 2 water well pumps** - **heat exchanger** - **geothermal pump** - **installation works from**	Possible adverse health impacts to the workers due to: - Unsafely start of installation works - Not compliance with health and safety at work procedure - Not compliant with waste management regulation - Not compliant with refrigerant – chemicals regulation according their Material Safety Data Sheet of the R 410A refrigerant			
	Adverse environmental impacts could be expected due to effects on several environmental elements:			
	a) Landscape and visual environment	**Local / short term /minor**	• Carefully planning and design of the project activity in order to minimize the working area for installation of the equipment • The disposal of different chemicals on the site on open area is forbidden • The cleanup of the site should be done on daily basis • The site should be clean up immediately after accomplishment of the last activity and all waste has been collected • Collection of the generated waste on daily basis, selection of waste,	• **Contractor – Bidder** • **Supervisor**

Project activity	Potential impact	Impact scale	Proposed mitigation measures	Responsibility
wells to heat pump - **installation works from heat pump to the heating and cooling system of the building** - **installation of radiators and fan coil units** - **ventilation system in the cinema on the first floor**			transportation and final disposal on appropriate landfills (according the type of waste)	
	b) Air quality The paint that will be used for anti-corrosion layer to the pipes will cause the emissions of VOC on local level and the workers will be affected mostly. The R 410A refrigerant discharged in large quantities may contribute to the greenhouse effects as the R410A has Global warming factor of 1900 (CO_2 =1). The R 410A is a blend of hydro fluorocarbon or HCF compounds: 50% of R 32. 50% of R 215. No chlorine content, no ozone depletion potential and no on the Montreal Protocol list.	**Local/ short term/minor**	• The mitigation measures to minimize dust generation and reduction of emissions of other gases during installation phase will include: ➢ Parking place for the transportation vehicles should be provided within or outside the House of Culture yard ➢ Restriction of the vehicle speed within the location • The mitigation measures to avoid/minimize adverse impacts from the refrigerant R 410A will included: ➢ Avoid direct inhalation or skin/eye contact with the R 410A refrigerant ➢ Provide first aid to the victim according the Safety Data sheet for the product ➢ Try to stop release of the R 410A to the environment ➢ To keep containers with R 410A below 50˚C in a well-ventilated place ➢ Training on usage of breathing apparatus must be held for the workers who will install and maintain the refrigerant liquefied gas ➢ In the first aid kit, the breathing apparatus should be found and used if needed ➢ All refrigerant related equipment should be properly installed and maintained by a certified technician.	• **Contractor – Bidder** • **Supervisor**
	c) Noise and vibration The traffic and installation activities will	**Local/short term/minor**	• The main mitigation measures related reduction of level of noise and vibration are: ➢ The equipment should be fitted with appropriate noise muffling	• **Contractor – Bidder** • **Supervisor**

Project activity	Potential impact	Impact scale	Proposed mitigation measures	Responsibility
	cause noise and vibration due to the machinery and vehicles used for supply, delivery and montage of all components of heating and cooling system. Also, the transport of workers, different pumps and various materials could cause a noise and vibration.		devices that will reduce sound level especially because the site is in the yard of House of Culture ➢ As it is an residential area the level of noise should not exceed 55dB during the day and evening	
	d) Waste management Possible adverse environmental impact and health effects could occur as a result of the following: - generation of the different waste streams - inappropriate waste management with generated waste	**Local/ short term/minor**	• The good waste management practice should be applied through the preparation of Waste Management Plan at the beginning of the preparatory work • The Waste Management Plan should include: ➢ Identification of the different waste types that could be generated at the site (due to the materials used – soil (category III), broken pipes and fittings, paper, refrigerant, packaging waste of all materials and paints for anticorrosion, bottles, waste of food, waste from electrical and electronic equipment (WEEE) etc.) ➢ Classification of different type of waste according the national List of Waste (Official Gazette no.100/05) ➢ Identification of the hazardous and non-hazardous waste and separate them ➢ The small quantities of hazardous waste could be expected classified under code: 14 06 03 Waste from organic refrigerants and 08 01 11* waste from the use of coatings and paints ➢ The waste from the packaging bins of coatings and paints is hazardous waste and should be handled with special attention	• **Contractor – Bidder** • **Supervisor** • **Local self-government administration (recoding the waste quantities and preparation of Annual Report)** • **Environmental Inspector**

Project activity	Potential impact	Impact scale	Proposed mitigation measures	Responsibility
			(proper packaging, labeling with waste code and submitted to the authorized collector and transporter of hazardous waste) ➢ Small amount of solid municipal waste could be found (food, beverages), as well as packaging waste (paper, bottles, glass, etc.) ➢ Fulfillment of the Annual Report for non-hazardous waste management by the mayor and reporting to the Ministry of Environment and Physical Planning ➢ The contract with the company for waste collection and transportation should be signed for collection and transport of waste to the Drisla landfill ➢ The first selection should be performed by types of waste: PET bottles, paper, batteries and glass ➢ Possible hazardous waste (motor oils, vehicle fuels) should be collected separately and authorized collector and transporter should be sub-contracted to transport and finally dispose the hazardous waste ➢ The electronic and electrical waste (WEEE) will be generated at the end-of life of the heating and cooling system or during the operation life of the system	
	e) **Soil pollution** The negligible local impacts on soil arising from the spillage of materials such as vehicle fuel, motor oils and fuel oil from the reservoir for the back-up boiler. But the significance of the impact is very low	**Local/ Short-term impact/ Minor**	• The possible mitigation measures for minimization of the soil pollution could be: ➢ Transportation vehicles should be properly serviced and maintenance in order to avoid potential leakage; ➢ Promptly clean-up spills of transported material in the House of Culture yard and on the transportation route ➢ Construction of concrete secondary containment system for collection of up to 60% of the fuel oil volume within the full reservoir	• **Contractor - Bidder**

Project activity	Potential impact	Impact scale	Proposed mitigation measures	Responsibility
	f) Water and ground water There are few possible adverse impacts to ground water due to the well interference effects and groundwater contamination by the accidental release of refrigerant to the ground or by changing the chemical and physical properties of the ground water	**Local/Short-term/Minor**	• The following mitigation measures could be applied: ➢ To seal and backfill well and boreholes on properly manner ➢ To install system far away as possible from other water wells and sources of contamination	• **Contractor - Bidder**
• **Operational phase**	• **In general no environmental risks are expected** • **Possible very low environmental risk is expected by the broken pipe from the heating and cooling system and leakage of the refrigerant R 410A. If any of this occurs several possible environmental impacts could appeared, but in very limited low scale** • **Possible very low environmental risks for fuel oil leakages from the reservoir tank for back-up boiler** • **The regular maintenance, preventive measures for spare parts replacement and keeping records on regular maintenance the whole HVAC system is needed. The training of the building housekeeper on basic diagnostic activities is necessary as well as the list of service providers and on-phone support.**			

ENVIRONMENTAL MONITORING PLAN

What *parameter is to be monitored?*	**Where** *is the parameter to be monitored?*	**How** *is the parameter to be monitored?*	**When** *is the parameter to be monitored (frequency of measurement)?*	**Why** *is the parameter to be monitored?*	**Cost**		**Responsibility**	
					Construction	Operations	Construction of heating and cooling GHP system	Operation of heating and cooling GHP system
Project stage: Preparatory work and Installation of heating and cooling system								
The safety protection measures applied for the workers at the site	On the installation site	Visual checks	Every working day during the installation phase	To minimize the risks on occupational health and safety of the workers			Contractor - Bidder Supervisor	
Installation of the heating and cooling system (if the wells, boreholes and trenches are properly sealed and backfilled)	On the installation site	Visual checks and usage of tool	During the start up process	To set up efficient and safety heating and cooling system			Contractor – Bidder Supervisor	
Construction of the secondary containment system for collection of fuel oil collection in accidental cases	In the mechanical room	Upon the technical documentation about the volume of the system	During the start up process	To avoid the leakages of fuel oil in the soil/water during the filling of reservoir or any accidental cases			Contractor – Bidder Supervisor Municipal staff	
Leakage of the refrigerant R410A from the GHP unit	Within the mechanical room	With appropriate equipment	On annually basis	To ensure the efficient heating, cooling and ventilation system/To avoid and prevent environmental and health risks for workers				Authorized service staff to deal with refrigerant R410A sub-contracted by the House of Culture /Municipality

What *parameter is to be monitored?*	**Where** *is the parameter to be monitored?*	**How** *is the parameter to be monitored?*	**When** *is the parameter to be monitored (frequency of measurement)?*	**Why** *is the parameter to be monitored?*	**Cost**		**Responsibility**	
					Construction	Operations	Construction of heating and cooling GHP system	Operation of heating and cooling GHP system
Noise level	On the site	Monitoring of the noise levels dB (A) with appropriate monitoring devices	On regularly basis during the work, through site visits, in accordance with the national legislation	To monitor if the noise level is above/or below the acceptance noise level for that type of area - II exposure area for noise protection (55dB (A) during the day time)			Contractor – Bidder Supervisor	
Primary selection of the waste streams especially into two main groups (non - hazardous and hazardous waste) as they are generated at the spot Primary selection of non hazardous waste into several waste streams	On the site	Review the documentation – identification of the waste type according the List of waste	At the beginning of work with new material This is extremely important when the hazardous waste will be used – refrigerant R 410A and anticorrosion coating paints	To separate hazardous from the non-hazardous waste as well as packaging waste from biodegradable waste			Contractor – Bidder Supervisor	
Collection, transport and storage before final disposal of hazardous waste. Waste from anticorrosion paints	On safety temporary storage	Review the transportation list and conditions at the storage facility	Before the transportation of the hazardous waste (if there is any)	To avoid disposal on the site (at the House of Culture yard) or to mix it with non –hazardous waste and finally disposed on the Drisla Landfill. To improve the waste management practice on			Authorized Contractor for collection and transportation of hazardous waste subcontracted by the	

What *parameter is to be monitored?*	**Where** *is the parameter to be monitored?*	**How** *is the parameter to be monitored?*	**When** *is the parameter to be monitored (frequency of measurement)?*	**Why** *is the parameter to be monitored?*	**Cost**		**Responsibility**	
					Construction	Operations	Construction of heating and cooling GHP system	Operation of heating and cooling GHP system
				municipality and national level. To be in compliance with the environmental requirements for the hazardous waste management.			Contractor-Bidder /Environmental Officer/ Inspector for communal works	
Collection transportation and final disposal of the solid waste	On the site and around the site	Visual monitoring and reviewing the transportation and disposal lists from the sub-contractor	After the collection and transportation of the solid waste on regular base each day	There are health and environmental impacts on the workers			Contractor – Bidder who need to sign the contract with licensed company for collection, transportation and disposal of the solid waste	
Fulfilled Annual Report for collection, transportation and disposal of waste	Local self - government administration	Review of documentation – Identification waste List	After the accomplishment the task of collection, transportation, temporary disposal and final disposal of waste	To improve the waste management on local and national level To be in compliance with national legal requirements			Mayor / Ministry of Environment and Physical Planning	