

VOLUME 3
EMPLOYER'S REQUIREMENTS
Section 1 - General Provisions

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1.1 Introduction

These General Provisions are to be read in conjunction with the rest of Volume 3 and in particular the Technical Requirements described in the following sections:

- Section 2 Particular Design Requirements
- Section 3 Civil Works Requirements
- Section 4 Mechanical Works Requirements
- Section 5 Electrical Works Requirements

Section 2 provides specific design requirements whereas Sections 3, 4 and 5 provide general specifications for civil, mechanical and electrical works respectively.

1.2 Scope of Works

1.2.1 Project Objectives

The main objective of this Contract is the design and construction of a sanitary solid waste landfill to environmentally sound treatment and disposal of waste generated within the Subotica Region.

To reach the objectives, the following Works should be provided:

- Preparation of designs for the whole works needed for operation of the sanitary landfill, solid waste cells as well as the leachate treatment plant, SBR, landfill gas treatment system, the waste separation lines and composting facilities;
- Design and Construction of the sanitary landfill including all the waste disposal cells and all other accessories, access road, internal roads, infrastructure (electricity supply, water supply, sewage system, etc.);
- Design and Construction of the leachate treatment plant;
- Design and Construction of the Materials Recovery Facility (waste separation);
- Design and Construction of the Composting Plant.

The Contractor should design and build the contracted project in complete manner which includes all parameters relating to the required shape, type, quality, tolerances, functional standards, safety criteria, and limits on the whole-life cost of the permanent works upon completion; the tests which must be successfully passed both during and after construction; the expected and required performance of the permanent works upon completion; the design life and durability of the permanent works upon completion; how the permanent works are expected to be operated and maintained upon completion; the operational software and manuals to be supplied; and details of the spare parts required to be provided and their cost.

The treatment and disposal of the waste shall be conducted in accordance with the prescribed Serbian national requirements and conditions and shall further contribute to achieving the following particular project objectives:

1. Improved environmental protection
2. Introduction of new and upgrade of the existing level of service to the population with regard to waste transport, treatment and disposal
3. Improved protection of public health and reduction of public health risks
4. Creation of prerequisites for sustainable urban and economic development

5. Achieving compliance with the relevant EU Directives.

The scope of works included in this tender is essential for achieving the abovementioned overall objectives of the Subotica Landfill Project.

1.2.2 General Scope of Work

The system of waste treatment proposed is based on the method of waste separation, composting of the biodegradable organics and disposal of residuals in the landfill cells.

Under this Contract the Contractor is required to deliver to the Beneficiary, fully functional, tested and operating landfill facilities, including a Materials Recovery Facility, Composting Plant, Leachate Treatment System, SBR and Landfill Gas Treatment System.

The Contractor's scope of services/supply shall include all elements/aspects to ensure the proper implementation of the project which includes the design, construction and commissioning of the Regional Landfill Complex, training of the Beneficiary's personnel and the supervision and management of the initial Facility's operation.

The Contractor duties shall include, but are not necessarily limited to, the following:

- Preparing all documents and design to enable the Beneficiary to obtain all necessary permits according to the relevant national legislation for supplying the RWMC with electricity, potable water, technological water, telephone, gas (if available) etc.
- All required facilities, connections and equipment for the establishment of the electrical supply, telecommunications potable and non-potable water shall be included in the scope of works.
- Further the Contractor has to include in his proposal a sum for the connection fees (including all necessary equipment and works) for these services to the appropriate utility companies.
- Preparing all documents and design to enable the Beneficiary to obtain/ modify construction permit according to the Serbian Law on Planning and Construction published in the Official Gazette of RS No 72/2009 and 81/2009, as amended..
- Preparation of all necessary documents and designs (civil, structural, architectural, mechanical, electrical, technological etc.) encompassing regional landfill complex and other "non-construction" activities for the regional landfill complex, in English language, to the Engineer for approval. After the approval of the designs by the Engineer, the Contractor will prepare designs, documents and drawings in Serbian language for all kind of permits, necessary for the Contractor or the Beneficiary, all in accordance with the Serbian Law on Planning and Construction published in the Official Gazette of RS No 72/2009 and 81/2009, as amended. This includes redesign of the existing documentation (Environmental Impact Assessment -EIA, Preliminary design and others) if the designed technology includes technical solution which basically differ from the technology proposed in the conceptual design and described in existing EIA study.
- The documents and drawings to be submitted by the Contractor shall be prepared by a designer proposed by the Contractor and approved by the Engineer. The designer shall hold all necessary licences as required by the national legislation.
- Co-ordination of the designs with all necessary authorities;
- Construction and installation, erecting and commissioning of the Works for water supply and discharge pipelines (if applicable).

- All channels and interconnecting pipe-work within and between process units, structures and for inlet systems, bypass systems, outlets, washout systems, service water systems, process related piping and connections to the channels and pipe systems; within the limits of the Contract as required, including pipes and drains of any description and of all materials with all fittings, valves and pipe protection, both coating and lining.
- Mechanical, Electrical, Instrumentation, Control and Automation (MEICA) equipment, including motors and pumps.
- Monitoring program during RWMC, including MRF, Composting plant, LTP and SBR operation, in accordance with legal regulations in Serbia;
- Laboratory equipment, furniture and spare parts.
- Mobile instruments for analysis of treated leachate and landfill gas,
- Chemicals, if required, for 3 months operation period
- Workshop equipment and furniture, and spare parts as listed in this Tender documents.
- Supervisory Control and Data Acquisition (SCADA) System for the LTP, SBR and MRF.
- Regulators, instruments, indicators, recorders, gauge plates, platforms, floor plates and frames, fixed and portable ladders, handrail, flanges, connectors, gaskets, bolts, nuts, flexible couplings, nameplates, identification tags and bandages, cable splices, glands, boxes, junctions and ancillary material; fasteners, clips, stands, trays, hangers, all other auxiliary materials of any description and all materials.
- Spare parts for fixed and mobile MEICA equipment, including instrumentation and control required for 2 years operation after issue of the Final Acceptance Certificate in accordance to these requirements.
- Testing, commissioning and handover documentation.
- Testing, start-up and trial operation, commissioning of the plant and preliminary handover (issuing Provisional Acceptance Certificate);
- Training of operational staff.
- Supervision, management and operation of the LTP, SBR and MRF till the Final Acceptance Certificate is issued.
- Defects notification period for 12 months after issue Provisional Acceptance Certificate, until the issue of the Final Acceptance Certificate;
- Guaranteed operational (OPEX) cost period for 2 years, for the Regional Landfill Complex, including MRF, LTP and SBR plants, after issue Provisional Acceptance Certificate;
- Guaranteed quality of the leachate treated at LTP for 1years after issue Provisional Acceptance Certificate until the issue of the Final Acceptance Certificate;
- Guaranteed quality of the waste water treated at SBR for 1 years after issue Provisional Acceptance Certificate until the issue of the Final Acceptance Certificate;
- Compliance with process guarantees and with guaranteed OPEX costs;

1.3. Documents to be provided at Tender Stage

This Contract represents a single contract. The Works Contract will have five sections, as follows:

Section	IPA Works Contracts Subotica	Contract Conditions
1	Design as required and Construction of the Regional Landfill in Subotica, including all auxiliary works	FIDIC Yellow
2	Design and Construction of Materials Recycling Facility with waste separation at the regional Landfill Complex of Subotica	FIDIC Yellow
3	Design and Construction of LTP and SBR with waste separation at the regional Landfill Complex of Subotica	FIDIC Yellow
4	Design and Construction of Composting Plant at the Regional Landfill Complex of Subotica	FIDIC Yellow
5	Supply of all mobile equipment necessary for the operation of above facilities	FIDIC Yellow

The Beneficiary's Requirements in this document refer to the Design and Construction and Supplies of all above mentioned.

In order to evaluate the offer, the Tenderer shall provide a sufficiently detailed design for the Works with, wherever possible, brands and models for equipment to be supplied.

All drawings and documents to be submitted by the Contractor shall be delivered both in hard and soft copies (in Word, Excel and CAD as related).

The Tenderer shall furnish his Design Proposal in accordance with the specifications of these Tender Requirements for the Main Proposal.

The design proposals and documents prepared by the Tenderer shall comprise as a minimum the requirements, as listed in Volume 1 Section 4 Form 4.6.10.

Should the Tenderer be selected as the Contractor, the Contractor will be expected to honour the offers made.

1.4. Project Background

1.4.1 Waste Management Background Information

The situation regarding waste management in Serbia is as follows:

The biggest problems in the field of environment in the Republic of Serbia have been caused by poor practice in waste management, by air and water pollution, and by loss of water resources. In particular, the state of waste management in Serbia is still in a state of reorganisation and it may be causing public health and environmental hazards. The collection of waste is quite well organised in urban areas, but not so in rural areas. Landfilling is the only waste disposal method, and in 2011, Serbia is disposing of waste at 164 officially registered municipal landfills. The existing disposal sites generally do not meet the technical requirements of sanitary landfills and their capacity in most municipalities is already exhausted. In addition to the registered landfills there are over 4,000 illegal dumpsites of different size in rural areas. Dumpsites present a potential risk for underground and surface water and soil, due to the high concentration of organic matter and heavy metals.

Current waste management analysis includes basic information about the participants in waste collection and transport, waste quantities and composition, technical equipment (vehicles and containers) which are in use for waste collection and transport, waste reuse and recycling, conditions on the existing dumpsites, assessment of the impact of dumpsites on the environment, public health and economic aspects.

The Government of the Republic of Serbia adopted a new National Waste Management Strategy in April 2010. The revised version follows the same approach as the previous Strategy, but gives an updated list of the waste management regions and a more detailed scheme for different waste streams. According to the new Strategy, 26 waste management regions are envisaged. The National Strategy also includes an Action Plan for its implementation with precise administrative and technical measures and deadlines for their realization. Regarding progress made in terms of policy and legislation towards harmonization with the EU, waste management is one of the priorities of the Government of Serbia.

One of the 26 waste management region schemes is planned for the City of Subotica and six municipalities [further referred to as the Subotica Region]. The region lacks a proper sanitary landfill, resulting in a very negative impact on the environment and also on general public health.

The region, which is composed of one City (Subotica) and 6 municipalities (Backa Topola, Kanjiza, Senta, Novi Knezevac, Mali Idos and Coka), does not have a proper sanitary landfill. The existing landfills in each municipality result in a very negative impact on the environment and also on the general public health. The waste management in the municipalities of Subotica region is handled by the Public Utility Companies (PUC) (except in Kanjiza). These companies are responsible for collection, transport and disposal and they directly and indirectly charge the population for these services. The economy of the whole region is dominated by the City of Subotica.

According to 2011 census, the population in the Region is 256.128

On average, the number of residents per square kilometre is 97, meaning that the population density is less than the average figure for Serbia (99 residents/km²).

Regarding transport, all municipalities in the Subotica area are well connected to the main road network, except Novi Knezevac which is off the main roads. Infrastructure is rather well-developed, owing to the fact that the City of Subotica is located on road and rail Corridor 10. The most significant road course is the international highway E-75, Budapest - Subotica - Belgrade - Nis - Skopje - Athens, referred to as Corridor 10 in the strategy on

economic development of Serbia, and magistral roads M 22.1 Novi Sad - Subotica - Horgos, M 24 Kikinda - Subotica, M 17.1 Sombor - Subotica, and the network of regional roads connecting smaller settlements.

Besides the road courses, international railway route Belgrade - Novi Sad - Subotica - Budapest, as well as railway Sombor - Subotica and Subotica - Senta, run through the municipality.

The municipality of Backa Topola has also has a very favorable traffic and geographical position since international roads run through this area and they are: state road of I order, highway E-75, state road I order M 22.1 Novi Sad - Subotica - Horgos and railway route Budapest - Subotica - Belgrade, as well as state roads of II order No. 108 and 119, connecting neighboring large city centers. Regional roads are the road Backa Topola - Novo Orahovo - Tornjos - Bogaras - Senta, Backa Topola - Bajsa, Backa Topola - Njegosevo - Bagremovo and regional road Backa Topola - Backi Sokolac - Stara Moravica - Pacir - Bajmok.

The municipality of Mali Idos is situated on the international highway E-75. Magistral road M 22.1 Novi Sad - Subotica - Horgos and local roads run through the municipality.

Kanjiza plays an important role in international traffic and goods transportation. The municipality of Kanjiza, as one of the border municipalities, represents the most frequent entry-exit area to and from Central European countries. The road and railway crossing on Serbian-Hungarian border near Horgos is located at the territory. This road crossing is among the most frequented border crossings. The most significant routes are the international highway E-75, magistral roads M-24 and M-22.1, regional road P-119, Senta - Kanjiza - Horgos and P-111 Kanjiza - Tresnjevac - Velebit - Male Pijace.

Railway routes that pass through Kanjiza are: Subotica - Horgos - Segedin, Subotica - Bikovo - Orom - Senta and Senta - Tresnjevac - Kanjiza - Horgos.

Kanjiza is also a municipality with a river. The biggest natural water course in this area is the Tisa River which also represents the east border of the municipality. The Tisa River has not been designated as a navigable river, although the transportation of goods between North Banat and North Backa is conducted on the river.

Railway infrastructure comprises the railway Zrenjanin - Padej - Ostojicevo - Sanad - Coka - Novi Knezevac.

The municipality of Novi Knezevac does not have a good traffic position, since it is far away from the main roads, where the traffic is most frequent

Regarding water resources, the area of North Bačka is poor as far as surface watercourses are concerned. Surface waters in the project region consist of rivers, canals, lakes, ponds and marshes. The two natural limits of the area, the Danube and Tisa Rivers are the largest and most important waterways. In the Subotica region the rivers of Kireš, Krivaja and Cik can be identified as water sources. The common characteristic of these waters is that they are supplied with water through run-off or infiltration from the surrounding terrain. Consequently, their water regime depends on the meteorological conditions in the catchment area. They are low water streams, with mostly temporary water supply. Therefore, discharge of water varies from zero up to a certain size, while in a dry period length a large part of their bed would be empty. To a lesser extent, the use of their water is for irrigation of agricultural areas, as well as sports and recreation in the form of fishing.

Palic Lake occupies an area of 560 ha, with an average depth of 2.4 m and a total volume of 10 million m³ of water. The Lake is 8 km long from the northern bank to the end of the western arm, and the width varies from 350 to 950 m. In the near vicinity of the Palić Lake lies the Ludaš Lake.

The Palić Lake is a natural lake located in the northern part of Serbia near Subotica, next to the Serbian–Hungarian border. It is a shallow lake typical for the Pannonian Plain, where the entire water column is frequently mixed. The Lake is used for recreational purposes but it is also a collector for treated municipal waste waters coming from the lagoons for active sludge water treatment.

1.4.2 Geographic Setting

The Subotica area, which is the area served by the project, covers seven municipalities in an area of 3102 km² and has a population of 256.128. It consists of the whole North Bačka district and the municipalities of Kanjiža, Senta, Čoka and Novi Kneževac from the North Banat.

The main spatial characteristics of the region are the flat relief, very good soil structure, relatively favourable climatic conditions, and a relatively extensive network of good quality asphalt roads.

Location of the site

The Plan of Detailed Regulation (PDR) for the regional landfill shows that it occupies the area of 46 ha, out of which 31.6 ha is planned for waste disposal, while it encompasses the whole of parcel No. 2635 of cadastral municipality of Bikovo which is property of the City of Subotica.

The chosen location of the regional landfill is within the territory of the City of Subotica, while it is 19.7 km south-east from Subotica, (i.e. east from main highway, E-75), and between the settlements of Bikovo, Orom and Novo Selo.

The location is surrounded by agricultural land that is in use. At present, the area does not have any structures, and there is neither a formed traffic network nor any other infrastructure.

Infrastructure

Access to the landfill location will be available directly from the local road L 10, Bikovo road, which connects Subotica with the settlements of Bikovo and Orom. The plot is located on the right side of the road (toward to Orom). The access road is asphalted, about 5m wide.

The nearest inhabited places are Orom village, 1.6 km away to the East, Bikovo, 4.5 km to the North- West, and Višnjevac village, 5 km away to the South – West.

There is no power supply, telecommunications structure, heating or supply of natural gas. There is no sewage network in the zone (i.e. at the site where the regional landfill is going to be built). In this part of Vojvodina, organized water supply is provided exclusively by using groundwater aquifers over 100m deep, while the current landfill is located outside the water supply network. The nearest area where there is a water supply network is the village of Bikovo at a distance of 2.4 km.

1.4.3 Meteorology

The Subotica area belongs to a climatic zone with extremely hot summers and cold winters and with a very small annual amount of precipitation. There are major fluctuations in air temperature, precipitation and wind, while autumns are warmer than springs, and the transition from winter to summer is more severe than the one from summer to winter. The sun rays have the largest angle during the summer (longest day of the year, 68 ° 42.39), and smallest angle during the winter (shortest day of the year, 28 ° 18.39). The temperatures, precipitation and relative humidity are shown on the table below.

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Table 1.1: average Temperatures and precipitation in Subotica Region

	jan.	feb.	mar.	apr.	may.	jun.	jul.	aug.	sep.	oct.	nov.	dec.	god
Temperature													
Abs. Max	16,0	19,9	25,0	30,5	35,5	38,5	38,2	38,0	35,1	29,5	23,0	17,5	38,5
Mean Max	3,7	6,1	11,5	17,4	23,6	27,0	28,6	28,5	23,0	18,0	9,9	4,0	16,6
Mean Min	-2,9	-2,5	1,7	6,7	11,9	15,1	16,6	16,2	11,7	7,4	2,3	-1,8	6,7
Abs. Min	-23,5	-20,5	-14,5	-4,2	1,7	5,5	8,8	8	3,6	-5,9	-9,6	-21	-23,5
Precipitation													
Max height of Prec. In 24h. (mm)	25,5	20,1	23,9	31,6	47,7	94,3	48,7	45,5	58,0	60,0	45,2	28,1	94,3
Mean Precipitation (mm)	32,6	28,4	35,9	44,7	50,0	69,5	62,3	51,9	55,7	42,1	49,2	51,2	47,8
Relative Humidity (%)													
	86	80	75	70	67	67	66	68	75	78	84	87	76

1.4.4 Geology and Hydrogeology

1.4.4.1 Geological composition of the Terrain

The project area belongs to the geotectonic unit of Pannonian mass formed by older layer (pre-Neogene), block structures deposited with tertiary and quaternary sediments.

Geotechnically, six quasi-homogenous environments, which are different in composition, structural properties and physico-mechanical characteristics, were separated in the terrain (Geotechnical research conducted by Hidrozavod DTD – September-October 2010). Those were:

- ✓ Typical - unaltered loess
- ✓ Altered (degraded) loess
- ✓ Buried soil
- ✓ Sandy soil
- ✓ Pond dust
- ✓ Underlying clay

The coefficient of soil permeability under the landfill body must be lower than $k = 1.0 \times 10^{-9}$ m/s. Since water tightness has not been confirmed, it can be concluded that the landfill bottom should be supported by artificial hydro-isolation (i.e. an impermeable liner, such as high density polyethylene - HDPE).

1.4.4.2 Hydro-geological characteristics of the terrain

One of the most important aquifers in the area, related to the landfill project, is one with a free level, having been formed in loess deposits.

Loess is characterized by complex inter-granular porosity. It has high primary cylindrical porosity particularly expressed in continental type of loess out of which the loess plateau is mostly formed. It often has numerous holes and channels that can be up to several centimeters wide, and this makes the loess heterogeneous, regarding its filtration characteristics. These channels and holes provide high water permeability features in vertical direction, and considerably lower in horizontal direction. Loess porosity ranges from 30% to over 50%.

The vertical water permeability of loess ranges from 10^{-4} to 10^{-8} m/s, and it is most often about 10^{-6} m/s (in its original state and unaltered primary structure). Laboratory testings gave filtration coefficients of unaltered and altered loess: $k = 1.3 \times 10^{-6}$ to 4.3×10^{-5} m/s. Specific structure and loess porosity provide conditions for fast infiltration of precipitation and surface waters in the zone above the aquifer.

Still, significant precipitation is sometimes retained in local depressions due to compacted topsoil sediments. Aquifers with free water level can be formed within loess and sandy sediments. Variations in the water level occur in the zone of underlying stratum of 'buried soil' and sands. The aquifer is recharged by precipitation from wider area and loess sediments with typical cylindrical porosity.

Loess enables fast water flow which is slowed down as it approaches the layer of 'buried soil' which has poor permeability features and does not represent a hydro-geological barrier. The water is then infiltrated deeper into the sands and altered lower loess horizon.

The formation of aquifers in the loess above the horizon of 'buried soil' occasionally occurs after sudden and strong precipitation. However, this condition can occur only once a year, or once in several years. This aquifer is mostly recharged with atmospheric precipitation (rain, snow, etc.), and much less from the aqueous layers of Subotica Sands in the north.

Complex loess composition in its vertical profile is caused by the presence of poor permeability features of scud and dark clay (so called buried soil), which provides conditions for locally created aquifers. A free aquifer in loess can also be considered as unique, with maximum and minimum level of groundwater depending directly on the precipitation infiltration.

Recharging of aquifers is accomplished by precipitation, and partly by inflow of aquifer waters from eolian sands. Discharging of aquifers is achieved by ground waters running off towards the boundary parts of loess plateaus. Waters from aquifers are discharged into surface accumulations and water courses. Part of this water is also evaporate-transpired in the dry period. This is less common than artificial discharging achieved by wells that are dug and drilled for the irrigation purposes and their use as technical water.

The regime of aquifers formed in loess is pluvial-alluvial, owing to the formation of occasional and constant flows. Water from aquifers, as well as the surface watercourses occurring on the border of eolian sands, run-off towards boundary areas of loess plateaus and terraces, continuing toward constant receptors found at lower erosion levels. Surface accumulations (e.g. Palicko and Ludosko Lake), springs and diffused surface waters are formed at some places.

The depth of the aquifer can range from few to twenty meters under the terrain surface. Depending on the hydrological cycle, annual aquifer level oscillations are high, but they become more stabilized when analyzed from a multi-annual perspective. The maximum difference in the hydrological maximum and minimum level of the aquifer is 10 m. Average annual oscillations are around 5 m.

The maximum recorded level of groundwater was 99.52m above sea level. The quality of ground waters depends on precipitation. In the period of hydrological minimum, water is retained longer within the rock mass, evapo-transpiration increases together with total mineralization which ranges from 0.3 to 1 g/l. Water temperature is from 11 °C to 16 °C. Waters from this area belong to a hydro-carbonate group of waters, and are in the class of waters with calcium and magnesium. Those are most frequently hard waters with increased content of iron and nitrogen ions. Waters from these aquifers are commonly exposed to direct pollution, due to their position and intensive agricultural and crop production. Also, these waters are exposed to industrial and municipal pollution (e.g. 'wild' landfills). This aquifer is not significant for the water supply system used by the inhabitants.

The composition is relatively constant which is explained by the character of groundwater flow from the point of recharge to the place of exploitation. In terms of quality of these waters are considered to be of conditional high-quality.

Groundwater in the area was examined for chemical and physical properties with the view to its domestic use (i.e. hydrodynamic or hydro-chemical study of the aquifer, groundwater flow or relation between water-bearing horizons).

The examinations confirmed specific water quality characterized by extremely low hardness and high natural organic content, which gives water the characteristic opalescent pale-yellow colour, both properties very uncommon for ground water.

The obtained properties indicate stable quality, increased temperature (about 295 K), pH variation within a narrow range (from 8.1 to 8.2), and negative redox potential (-40 mV) from the presence of reductive agents. Water emits 'sulphurous odour' produced by anaerobic processes. The type of water, by its inorganic content, is $\text{Na}^+\text{HCO}_3^-$. Sodium exceeds the maximum allowed concentration (MAC) for drinking water, whereas calcium and magnesium concentrations are very low which is rare for ground waters.

The concentrations of Fe and Mn are also somewhat unusual for ground water. Hydrocarbonates are dominant anions, followed by silicates, while sulphate, chloride and fluoride concentrations are very low. Ammonia nitrogen is higher than the maximum allowable concentration (MAC) for drinking water, which is common for ground waters. It is interesting to note that organic nitrogen is relatively high, probably incorporated into the structure of humic substances. In addition to the common free CO_2 , there are gaseous constituents such as methane and free hydrogen sulphide that give water its nasty smell and taste. The absence of oxygen also affects its sensory quality. Total β -radioactivity also is below the allowed limit. The concentrations of phenols and mineral oils are very low (i.e. at the detection limit), and pesticides are undetected, not even in traces.

Total polycyclic aromatic hydrocarbons (PAH) are below the MAC for potable water. It should be also noted that fresh ground water is bacteria-free, which is and has been a strong argument for its use despite the evident defects. The argument is however irrelevant having regard to the prevailing distribution conditions, because other factors in major distribution systems that conduct water of the given quality generate secondary pollutants. It is worth noting that the potential trihalogen methane (dominantly chloroform) varies between 350 and 400 $\mu\text{g}/\text{dm}^3$.

1.5 General Performance Requirements

The contract is based on a performance specification which reflects the Contracting Authority's requirements.

The Contractor shall propose his own Technical Proposal for all parts of the works and take full responsibility for it. The Contractor's solutions have to comply with these technical specifications described in these Tender documents, and are not considered as another alternative.

All designs, materials, workmanship and tests have to comply with requirements of these Technical Specifications, Serbian Legislation and applicable standards.

The Particular Design conditions are more precisely defined in Volume 3, Section 2 of these Technical Requirements.

It shall be the responsibility of the Contractor to ensure that all works necessary to ensure the intended performance of the new facilities, are included in his Tender documents.

No additional costs shall be awarded for subsequent design changes resulting from the Contractor's failure to fully understand and assess the works before Tendering.

1.6 Site Organization

The site shall mean all areas where Works has to be completed as defined in the Contract.

1.6.1 Security of the Site

The Contractor shall provide following measures as minimum for security of the site as described below.

- Security guard (watchmen)
- Fencing and barriers
- Outside lightning

The Contractor shall be required to provide watchmen after normal working hours to guard all utilities, plants, equipment, material, etc. delivered on site and to ensure that all signs, lights, fences, etc. are in their proper place. The watchmen shall be responsible to guard all work carried out under this Contract, as well as to guard any goods or materials provided by the Beneficiary for use in the works falling under this contract. The provision of watchmen shall continue until the Provisional Acceptance Certificate is issued.

The Contractor is to provide, install and maintain suitable barriers and fences to protect the work, construction camp, storage yard, existing facilities and construction and installation operations and to remove the same after completion of the works.

The Contractor is to clean the site and repair any damage that may have been caused by him.

The Contractor shall provide, maintain and remove, on completion of the Works, any temporary fencing around the work areas and he shall operate appropriate security measures on access roads, but without prejudice to his obligations such as maintenance of free access for the Engineer and any other persons entitled to such access.

All open excavations shall be protected sufficiently to ensure the safety of workmen and to keep out the public and livestock.

Outside lighting, around the office buildings, storage yards and on the parking area, shall be installed to the satisfaction of the Engineer.

1.6.2 Signboards

The Contractor shall, at his own expense, provide, install and maintain signboards at the site after the Contractor has been given access to the site.

One project signboard will be required at the main entrance to the Site. This signboard shall be prepared according to Construction and Planning Low

Two signboards and commemorative plaques have to be provided and erected by the Contractor at the entrance of the RWMC and at the corner of the access road to the RWMC and the main road.

The Contractor shall obtain instructions from the Engineer regarding information to be displayed on the all three types of the signboard.

The dimensions and text on the signboard shall be as per the requirements in the latest version of the visibility guidelines of the EC Communication and Visibility Manual for EU External Actions, point 3.7, which may be obtained from http://ec.europa.eu/europeaid/work/visibility/index_en.htm.

The Contractor shall not undertake or allow billposting or advertising of any kind upon the Works without the written consent of the Engineer.

1.6.3 Contractor's Operations on Site

1.6.3.1 Working Hours

Subject to any provision to the contrary contained in the Contract, none of the Works shall, save as hereinafter provided, be carried out during the night or on locally recognised day of rest without the consent of the Engineer, except when work is unavoidable or absolutely necessary for the saving of life or property or for the safety of the Works, in which case the Contractor shall immediately advise the Engineer. The provisions of this Clause shall not be applicable in the case of any work which it is customary to carry out by multiple shifts.

1.6.3.2 Enter to the land

The Contractor should have no need to enter land other than access road and the proposed construction sites. If, however, the Contractor requires entry onto lands, beyond the sites boundaries, the Contractor shall request permission from the Engineer.

The Contractor is expected to take the relevant visibility actions.

1.6.3.3 Documentation which shall be available on the site

On the site, the Contractor shall have documentation according to the relevant regulations, as follows, but not limited to:

- the decision on registration in the court register, or an operating licence;
- the approval for the performance of construction activity and the agreement on association of contractors in conformity with a special act;
- the document on the appointment of the Engineer;
- the Building Permit that includes the Preliminary/Main Design;
- Preliminary/Main Designs;
- the reports of the design auditors on the audit performed, if prescribed;
- site diary;
- attestation on conformity of the incorporated construction products, attestation of conformity issued according to a special act for the incorporated equipment, documents on conformity of a specific part of the construction work with the essential requirements according to a special regulation and evidence of quality, which must be obtained during the performance of construction and other works pursuant to the Law on Planning and Construction, a special regulation or the design which also prescribe the obligation of auditing the part of the construction work completed up to then and the auditing of construction and other works which are underway;
- the setting-out study of the construction work;
- Environmental Management Plan
- any other documentation as well as permits and approvals which the contractor is required to have on the site after the commencement of construction pursuant to special regulations.

Above mentioned documentation shall be after the completion of construction kept for permanent safekeeping by the Beneficiary.

1.6.4 Accommodation and Facilities on Site

All buildings, offices and/or other facilities shall comply with the local regulations or generally accepted standards, and the Contractor shall obtain the approval of the

appropriate Authority prior to construction. The Contractor shall also construct and maintain adequate roads or paths to all buildings.

All accommodations, buildings, storage containers etc., fixtures and fittings provided under this Clause shall be removed and the site reinstated at the end of the Contract, as instructed by the Engineer.

1.6.4.1 General

For the duration of the contract, including the Defects Notification Period (DNP), the Beneficiary shall put at the disposal of the Contractor, free of charge, an area within the landfill site for accommodation and other facilities and storage of materials and equipment.

The Contractor shall make his own arrangements for the connection of the Site to utilities, e.g. water supply and power (if available). Connection, consumption of power and water use operation and maintenance and removal of the service utilities described in this clause will be paid for by the Contractor.

The Contractor shall insure the site offices against fire, burglary and other risks during the entire works contract period.

1.6.4.2 Accommodations for the Contractor

As from the date of commencement of works, and thereafter, the Contractor shall provide, maintain, service and unless otherwise described remove from site, on the issue of the tests on completion certificate, appropriate mobile accommodation complete with sanitary facilities for the use of his site employees. The Contractor shall ensure that his employees do not at any time loiter on, or adjacent to, the site of works, or in any way enter or otherwise make unlawful use of contiguous public or private property, and are not otherwise a nuisance to third parties. The Contractor will be required to comply with all current Serbian health and safety regulations (including all regulations and codes of practice made or approved there under) and comply with all other construction regulations and the working rules of any industry appertaining to all work personnel employed on the site.

New buildings shall not be used for sanitary accommodation, mess-rooms or other accommodation requirements unless specifically approved for such use by the Engineer.

The Contractor shall establish for his own use and at his own expense fax, telephone and internet connections at the site. He shall also provide and maintain on approved sites, sufficient stores, tanks and workshops for the proper storage of materials, fuel plant and equipment. The stores shall be of such size and construction to provide adequate storage and protection of stocks of material, fuel, spares, etc, in quantities ensuring uninterrupted progress of the work. Workshops shall be suitably equipped to provide for carrying out major repairs, overhaul or modification by the Contractor of all plant and equipment in or on the Works. The Contractor shall allow in his rates for all costs related to provision of the offices and workshops for his own use.

Prior to construction of the site facilities, the Contractor shall prepare drawings for site facilities which will cover the following aspects of the works:

- Location and arrangement of the Contractor's buildings and offices, including access facilities, utilities and fencing;
- Location and arrangement of work-yards, workshops, depots and stores for equipment, fuel and materials, including access facilities, electricity, water and telephone connections and fencing;
- Location of and proposals for the temporary works required for constructing the Works;

- Working drawings and calculations for all the temporary works proposed by the Contractor for constructing the Works.

1.6.4.3 Offices for the Engineer

The Contractor shall provide, equip and maintain in good working order, for the duration of the Contract one office for the sole use of the Engineer and his principals, employees and agents on the site in Subotica in such a location and position as directed by the Engineer; accessible by motor vehicle from the adjacent public roads or along temporary all-weather access ways and with adequate parking space nearby. The office shall measure at a minimum 4 m x 8 m, of a construction and design suitable for the climatic conditions prevailing. It shall be equipped with:

- Four office desks, 1.6 m x 0.9 m x 0.8 m high with three drawers and four chairs
- Two lockable double door metal filing cabinets 1.8 m x 0.8 m x 0.4 m, with a total of six lockable drawers each
- Washroom with wash-basin, and toilet, complete with all accessories and necessary water and sewage treatment facilities
- air-conditioning unit(s) with summer/winter conditioning
- 2 swivel chair with armrests;
- 4 stacking or folding chairs;
- 1 hanging file or plan chest suitable for AO size prints;
- 2 wastepaper basket;
- 2 two drawer filing cabinet;
- 1 wall mounted pin board, 1,000 x 2,000 mm in size.
- Four desk lamps
- One coffee machine and associated cups and saucers
- One refrigerator of minimum 100 litres capacity
- The office shall be adequately provided with running potable water and electricity

The Contractor shall arrange for, provide, install/construct and maintain adequate and sufficient means of telecommunication for the use of the principals, personnel and agents of the Engineer. This shall include:

- One telephone connection and one new telephone/fax/scanner (min A4 format)/photocopier (min A3 format) combination.
- Wireless internet connection (broadband)
- One PC and one laser printer

The connection and machine shall be for the sole use of the Engineer. The electricity, water supply, cleaning and maintenance costs of these offices will be met by the Contractor(s) till the Final Acceptance Certificate is issued.

All offices (i.e. layouts) shall be approved by the Engineer prior to the construction.

Offices shall be regularly cleaned for so long as it is in use and suitable arrangements shall be made for the disposal of waste arising from the office.

For the entire construction period the Contractor has to supply the office with water for sanitary installations facilities and drinking water.

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All facilities shall be approved by the Engineer. The Contractor shall ensure that all equipment is kept in good repair and shall repair or replace, as directed by the Engineer, any equipment that becomes unserviceable.

For the Engineer the Contractor shall provide a separate connection direct to a telephone exchange of a telecommunication code system and internet connection for the exclusive use of the Engineer.

Office for the Engineer shall be ready for use by the Engineer one months after the date for Commencement of Works.

All the equipment, after the completion of the works, shall be the property of the Beneficiary.

The Contractor shall provide the Engineer with one new personal vehicle and one new 4x4 vehicle (pick-up truck) for use for the period of the construction and Defect Notification Period. The Contractor shall bear the costs for registration, insurance and servicing for both vehicles and the Engineer shall bear all other expenses, including servicing and repairs caused by misuse.

Minimum requirements for the personal vehicle are:

- engine type: turbo diesel
- engine power: 75 kW
- number of doors: 5
- number of seats: 5
- air conditioning: automatic
- trunk capacity: 500/1300 litres
- emissions: Euro 5
- other: ABS + MBA + MSR, ESP
front and side airbags for driver and passenger

Minimum requirements for the 4x4 vehicle are:

- engine type: turbo diesel
- engine power: 90 kW
- cabin: double cab
- number of doors: 4
- number of seats: 5
- air conditioning: manual
- load compartment area: 2 m²
- payload: 900 kg
- emissions: Euro 5
- other: ABS + MBA + MSR, ESP
front and side airbags for driver and passenger
selectable 4WD with low range gears

Cars shall be property of the Beneficiary after the end of the Defect Notification Period. The Contractor shall bear all costs related to the transfer of ownership.

- Meeting facilities

The Contractor must provide facilities for meetings on site for 15 participants.

Meeting room shall be provided with the following furniture:

- 3 tables, each approximately 1,200 x 2,000 mm in size;
- 15 folding or stacking chairs;

- 1 wall mounted blackboard, 1,000x 2,000 mm in size;
- 1 wall mounted pin board, 1,000x 3,000 mm in size;
- 1 shelf unit for approved samples with 5 tiers of shelves 400 mm wide x 2,400 mm long overall.

1.6.4.4 First Aid Arrangements

The Contractor shall provide and maintain at his own expense on the Site, adequate and easily accessible first-aid facilities for treatment in case of accidents during the execution of the Works under the Contract and such outfits and personal protection equipment (PPE) as may be required in any relevant laws, ordinances and regulations for the time being in force. The places where these items are kept shall be prominently marked.

A sufficient number of the Contractor's employees shall be fully qualified in first aid, such that a first aid man is immediately available in case of accident at any time and at any place and the persons so designated shall be made known to all employees by the posting of their names and designations in a prominent position on the Site.

Any order from the Engineer as to extension of or alternation to such first aid facilities or services shall be promptly carried out.

1.6.4.5 Assistance to the Engineer

The Contractor shall render such assistance with facilities, labour, construction plant and materials as at any time may be required by the Engineer directly or indirectly in connection with the works.

The costs of such assistance shall be borne by the Contractor if such assistance is intended for or provided for or specified in the Contract; if any assistance is required by the Engineer which is not so intended and not provided for and not specified, then the cost of such assistance shall be borne by the Beneficiary.

The Contractor shall make available and keep in sound condition and appropriately calibrated on the Site surveying equipment as required under the Contract. The equipment is not necessarily for the sole use of the Engineer.

1.6.5 Site Services

1.6.5.1 General Utilities

Where utility services are not already available on the site, the Contractor is to make his own arrangements for the supply of electricity, water, telephone and sewerage until such time as the permanent works are available for use.

The Contractor shall provide and maintain wherever required adequate supplies of electricity at a suitable voltage and compressed air for all operations to be undertaken to complete the Contract. The Contractor shall also make these services available to subcontractors and, when instructed by the Engineer, to other contractors and employees of the Engineer.

The Contractor shall be responsible for entering into any agreements with the appropriate suppliers, and shall issue all notices and pay all fees, dues, rents, charges and other costs incurred thereby.

The Contractor shall, in connection with such supplies, adopt precautions to ensure the safety of all personnel.

The Contractor shall consult all relevant authorities and owners of services before commencing any excavations and shall satisfy himself as to the exact position of existing services that affect or may be affected by the works. If any service is found to exist, but is

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not as indicated in the contract, then the Contractor shall at once give written notification to the Engineer. The Contractor shall record the position of all located existing services on the site plan, a copy of which shall be made available to the Engineer by the Contractor.

The Contractor shall execute the works in such a manner, that he does not damage or interfere with existing services on the site. If damage or interference is so caused the Contractor shall make his own arrangements to execute the repairs at his own cost, and to the approval of the Engineer and the relevant authority.

It shall be the Contractor's responsibility to safeguard by means of temporary or permanent supports or otherwise all pipes, cables, structures and other things that would be liable to suffer damage if such precautionary measures were not taken. This applies to all such items, existing and proposed, owned by the Beneficiary or others.

The Contractor may in his design require making connections to existing pipework. Connections between existing pipework and new pipework shall not be made until the necessary inspection and tests have been completed and the Engineer has approved the new pipework.

The Contractor shall arrange at his own cost the supply and distribution of electricity, potable water, telephone, compressed air and other services as are necessary to his site establishment and shall provide, maintain and remove on completion all pipes, cables and fittings which carry such services to his operations. All electrical installations forming part of such temporary installations shall comply with current Serbian regulations.

- **Site Lighting and Electrical Power**

The Contractor shall provide adequate lighting for the proper execution and inspection of the works. If the Engineer considers the intensity of lighting to be inadequate for the proper execution and inspection of the work being undertaken the Contractor shall install such additional lighting as the Engineer may require.

The Contractor shall provide and maintain efficient temporary lighting and power supplies for all parts of the works as may be necessary and shall, in connection with such supplies, adopt precautions to ensure the safety of all personnel.

The minimum standard of temporary lighting required in all structures, culverts, underground chambers and the like shall be one 200 watt bulb to every 8 meters length. Such lighting shall be maintained throughout the Contract until the end of the Defects Notification Period (DNP) or until an alternative date as may be agreed to by the Engineer.

- **Drinking Water and Technical Water**

The Contractor shall provide wherever required adequate supplies of potable and service water of proper quality and pressure for all operations to be undertaken to complete the Contract. The Contractor shall also make these services available to subcontractors and, when instructed by the Engineer, to other contractors and employees of the Engineer.

The Contractor shall be responsible for entering into any agreements with the appropriate suppliers, and shall issue all notices and pay all fees, dues, rents, charges and other costs incurred thereby.

- **Hygiene**

The Contractor shall clean as necessary and maintain the site in a hygienic condition and shall comply with the equipment of the Safety Officer appointed by the Engineer and any instructions of the Engineer.

The Contractor shall provide, install, maintain and remove at the end of the Contract or when directed by the Engineer, adequate toilet facilities including flushing toilets, hot water and showers for the use of his own staff and that of the Engineer adjacent to or as part of

their site offices and additional suitable facilities in various parts of the site as necessary for the use of his workmen.

- **Communication**

The Contractor shall provide and maintain adequate communications around the site. A telephone network internet connected with the telephone service required by the Engineer shall serve principal offices, installations and site facilities. If the Contractor supplements the telephone network with a radio communications network he shall allow the Engineer reasonable use of the facility.

1.6.5.2 Cleanliness on Site

The Contractor shall make every effort to keep the site tidy and in orderly manner and to take at any time every possible precaution against the contamination of subsoil and groundwater. The Contractor shall be responsible for making all arrangements for the disposal of solid and liquid wastes from the site. Furthermore, he shall give strict instructions to all persons employed by him to use the sanitary accommodation provided at site.

1.6.5.3 Access Roads

The Contractor shall, at his own expense, carry out all protective works and strengthening of public streets and roads used by him as necessary to avoid damage from heavy loads and plant moved to the site. He shall also construct, maintain and remove temporary access roads as he may require for carrying out the works at his own expense. The Contractor shall observe all restrictions, which apply to public roads. He shall comply with all reasonable restrictions, which may be imposed by the Engineer, the Police or other competent Authorities.

Public and private streets, roads and other surfaces used by the Contractor shall be kept free from dirt and rubbish and be cleaned as required by the Engineer. Immediately after ceasing the use of any temporary road the Contractor shall restore the road to the satisfaction of the Engineer and the responsible Owner Authority.

1.6.5.4 Public Roads Cleanliness

The Contractor shall minimise pollution of public roads. The Contractor shall take all measures to keep all public roads clean of any spillage or droppings from his own and his sub-contractor's vehicles travelling to and from the site. All such spillage or droppings shall be immediately cleared to the satisfaction of the Engineer and appropriate Public Authority.

The Contractor shall indemnify the Engineer against all claims by the third parties, which may arise out of the Contractor's failure to comply with this Section.

1.6.5.5 Storage of Equipment and Materials in Public Space

Construction materials and equipment shall not be stored outside the site of the RWMC.

Where Works has to be completed on public spaces, all plant and excess material shall be removed immediately from the site.

1.6.5.6 Traffic Arrangements

The Contractor shall as far as required, comply with all requirements and recommendations of the Police and Public Authorities regarding traffic arrangements and road safety measures on public roads outside the RWMC site.

The Contractor shall, if needed, prepare Traffic Management Plan provide permits, provide and install all barriers, signalization and traffic signs according to TMP, permit and approval of the Engineer.

Traffic diversions, if necessary, shall be planned and arranged with the responsible Authorities by the Contractor and harmonised with the Engineer. No diversion shall be implemented without the written consent of the responsible Authority and after appropriate information has been provided to the Engineer. Access to the site shall be available to vehicles of emergency services and residents in the areas.

The Contractor shall provide, erect and maintain on the sites and at locations on the access to the sites all traffic signs and traffic control signals, as necessary and/or as may be required by the Police Authority for the safe direction and control of the traffic. The location and size of all such signs and the lettering thereon shall be approved by the Engineer before erection of the signs.

The Contractor shall re-position, cover or remove signs as required during the progress of the works.

1.7 Health & Safety

1.7.1 Legal Issues

The Contractor shall use his best endeavours to ensure, so far as is reasonably practicable and, to the satisfaction of the Engineer, the health, safety and welfare at work of his employees including those of his subcontractors and of all other persons on the site.

The Contractor shall comply with the requirements of European Directives 92/57/EEC dated 24.06.1992 and 89/391/EEC dated 12.06.1989 and Serbian law concerning the Health and Safety Protection and all relevant national health and safety regulations.

The Contractor shall execute the works in a manner complying with the best European and/or Serbian Safety Regulations and Standards.

Should the Engineer consider that the Contractor's method of working is unsafe or that there are insufficient or inadequate safety barriers or other devices or that there is insufficient safety or rescue equipment, the Contractor shall change his method of working or install or strengthen safety and rescue equipment if so instructed. Such instructions shall not relieve the Contractor of any of his responsibilities under the Contract.

The Contractor shall notify the Engineer immediately of any accident that occurs, whether on site or off site, in which the Contractor is directly involved, and which resulted in any injury to any person whether directly concerned with the site or a third party. Such initial notification may be verbal and shall be followed by a written comprehensive report within 24 hours of the accident.

Transportation of any material by the Contractor shall be in suitable vehicles, which do not cause spillage when loaded, and all loads shall be suitably secured. Any vehicle, which does not comply with this requirement or any of the local traffic regulations and laws, shall be removed from the site.

Construction activities may give rise to noise nuisance. The normal health and safety controls will be required to safeguard the Contractor's staff and labourers and the residential and passing population.

The Contractor has to enable access to sites at any time to any external institutes or experts carrying out safety inspections.

The Contractor's attention is drawn to the number of hazards that are likely to be encountered when carrying out the works that could affect the health and safety of his operatives, the Beneficiary's (and the Beneficiary's) employees, and members of the general public.

Prior to the commencement of any hazardous operation, the Contractor shall submit a safety method statement to the Engineer for his approval.

All operators have to be trained prior to commencing work and adequately supervised whilst carrying it out.

All plant and equipment is to be suitable for the task to be undertaken and properly inspected tested prior to being put into operation.

The Contractor shall appoint licensed H&S officer at the site, responsible for safety and protection against accidents. This person shall be qualified for this responsibility, and shall have the authority to issue instructions and take protective measures to prevent accidents and to coordinate with Beneficiary's nominated person (koordinator za bezbednost i zdravlje na radu).

The Contractor shall send to the Engineer details of any accident as soon as possible after its occurrence. The Contractor shall maintain records and make reports concerning health,

safety and welfare of persons, and damage to property, as the Engineer may reasonably require.

The Engineer will require the Contractor to remove (or cause to be removed) any person employed on the works who persist in any conduct that is prejudicial to safety, health or the protection of the environment.

Any part of the site that is designated as a "restricted area" may not be entered without a "permit to work". All places occupied by live, operational, mechanical, electrical or chemical equipment, and "live" sewers, manholes and chambers will usually be so designated. The Contractor shall not allow any of his operatives or sub-contractors to enter such an area until a permit has been issued. When the Contractor requires such a permit he shall give 7 clear days' notice to the Engineer, who will arrange with the appropriate authority to issue one. When the Contractor receives such a permit he shall comply with any precautionary requirements that may be specified in it and shall hold the permit until the end of the period covered and then return it to the Engineer. Compliance with the requirements of the permit shall not absolve the Contractor from any responsibilities under the Contract.

Contractor shall prepare an "Emergency Response Plan" and submit to the approval of the Engineer.

The Contractor shall provide the necessary monitoring equipment required for entry to hazardous or potentially hazardous atmospheres. Monitoring of all hazardous or potentially hazardous atmospheres shall be carried out by the Contractor and a suitable register maintained.

The Contractor shall provide all necessary rescue equipment that shall be regularly checked and maintained. A register of equipment checks shall be kept on site. The Contractor shall ensure that an adequate number of his operatives are fully trained in the use of breathing apparatus and rescue techniques.

1.7.2 Health & Safety Plan

An outline of the Health and Safety Plan (HSP) shall be provided with the Contractor's tender.

The necessary procedures for the most common types of emergencies should be provided in the outline HSP.

In the Final Health & Safety Plan, to be provided to the Engineer within 2 months after the award of the Contract but not later than two weeks before the works start,

The Contractor shall elaborate and manage the Health & Safety plan for the works in the frames of this Contract. The Health & Safety plan shall include the following areas:

- safety devices and trained personnel on the site
- the list of names and contact telephones of the Contractor's staff, responsible for safety guarantee
- personnel staffing levels for all the project stages on the site and working with the special parts of the machines
- personnel qualification in respect to the executed activities
- post-accident order and responsibility
- fire security and prevention of combustible/chemicals leakage.

The Contractor has to observe all the relevant state and local regulations and practice codes. The Health & Safety plan shall be approved by local authorities and the Engineer.

The Contractor shall submit one copy of The Health & Safety plan to the Engineer before commencement of the works on the site.

In the chemical agents' storage place the emergency shower and emergency aid box shall be placed for the use in case of emergency during the work with reagents.

1.7.3 Safety Officer

The Contractor shall appoint a full time licensed Safety Officer at the Site, responsible for maintaining safety and protection against accidents. This person shall be suitably qualified for this responsibility, and shall have the authority to issue instructions and take protective measures to prevent accidents.

- First medical aid

The Contractor shall provide and maintain in working condition all the equipment necessary for rendering the first aid in case of accidents or other emergency situations. This equipment shall be kept ready on the site and in other places of regular work of the Contractor's personnel. The Contractor shall ensure that in every such place a person with the relevant knowledge about the elementary first aid procedure is available, who is able to render aid in case of injury.

Before commencement of the works the Contractor shall submit to the Engineer the list of employees trained in rendering of the first aid.

1.7.4 Health & Safety General Issues

1.7.4.1 Safety Method Statements

Prior to the commencement of any operation on the site, the Contractor shall submit a Method Statement together with H&S chapter to the Engineer for his approval.

1.7.4.2 Safety Equipment, PPE and Hygiene

The Contractor shall install and maintain adequate provisional safety equipment such as handrails for all platforms, unsecured ceilings and gangways of scaffoldings and high formwork elements, accessible tops of high walls and stairways for all temporary and permanent Works.

Life belts, swimming belts and rescue bars for open basins are to be provided, as appropriate.

PPE: Personal Protective Equipment:

Personal protective equipment shall be available and used by operatives when appropriate, including as a minimum:

- Safety helmets
- Eye protection
- Ear (hearing) protection
- Hand protection
- Foot protection

Hygiene:

Adequate welfare facilities shall be provided, including as a minimum:

- Drinking water
- Toilets
- Washbasins with warm water, soap and towels

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- Clean / dry / warm areas equipped with tables and chairs at which food can be eaten.

1.7.4.3 Accidents, Extraordinary Events

The Contractor shall give immediate written notice to the Engineer of any accident or extraordinary event on the work site giving details of the same whether or not such an accident or event affects the progress of work. The Contractor is also obliged to report on any measure taken.

National and internationally accepted safety standards shall be strictly considered. A security plan, which includes the relevant standards, shall be submitted to the Engineer for approval before commencement of the works.

- Emergency measures

The Contractor shall organise all the formalities in such a way that he is able to quickly call upon the personnel outside the normal working hours, if it is necessary for taking the emergency measures connected with the works. In the Engineer's constant disposition shall be the list of addresses and telephone numbers of the Contractor's employees, who in the respective moment are responsible for organisation of emergency works.

The Contractor shall acquaint himself and shall acquaint his personnel with the relevant local order in force in the emergency cases.

- Access of emergency services

The Contractor shall inform the fire and police services before closing up of any street outside the border of the site or its part, and shall receive the Beneficiary's approval for every activity of this kind. The fire and police services shall be informed, when the streets are opened again for the transport of emergency services. The method applied in the construction works as much as possible shall decrease the access embarrassment for fire and police services and this access shall in no case be deterred.

The Contractor shall leave his night contact telephone number in the police station, on the territory of which the construction works are being executed.

- Excavations

Protection of all the excavations shall be ensured with the help of temporary barriers, warning signs, cones and signal lights in order to prevent accidents with humans and property damage. All the signs shall be written in Serbian and shall comply with the requirements of local authorities.

The Contractor shall take precautionary measures in order to prevent human injuries due to open trenches. All the trenches, excavated materials, equipment and other obstacles, which may be dangerous for humans, shall be well-lightened during the time period starting half an hour before sunset until half an hour after sunrise, as well as in other low visibility circumstances. The amount and position of lamps shall be sufficient in order that the scope of structures and location are clearly understandable.

1.7.4.4 Fire Prevention

The Contractor shall take all the necessary precautionary measures in order to prevent the fire close to the works, buildings etc. and shall provide relevant fire fighting equipment, if such arise. It is not allowed to burn waste or construction waste on the site.

If fire or explosion risk close to the works is caused by the location of combustible tanks or similar dangerous plants or equipment, the Contractor shall immediately notify local authorities and the Engineer about such risk. The Contractor shall take all the precautionary measures and shall execute all orders issued by local authorities and the Engineer in order to prevent outbreak of fire or explosion.

In the Contractor's constant disposition shall be staff trained in fire fighting and relevant equipment in order to fight the fire irrespective of the cause of its outbreak.

During the performance of the Contract the Contractor shall make arrangements to the satisfaction of the Engineer for the protection of the permanent works and any temporary works and any adjacent property from fire and, if required, he shall give the Fire Authority admittance to all facilities periodically to inspect the fire prevention arrangements.

Particular care must be exercised in connection with the operation of electric arc welding equipment, oxyacetylene cutting equipment and other processes involving the use of naked lights. Special arrangements will be necessary for the storage of highly flammable liquids on the site.

The Contractor shall remove all rubbish and material of a flammable nature and take such other steps as the Engineer may require but this shall not relieve the Contractor of any of his obligations under the Contract.

1.7.4.5 Equipment Safety

The Contractor is obliged by his signature to supply the machines, devices, pieces of equipment and the like complete with the safety protection required for accident prevention according to regulations of the local accident insurance associations or trade associations.

All plant and equipment is to be suitable for the task to be undertaken and properly inspected/tested prior to being put into operation.

1.7.4.6 Security

The Contractor shall, at his own expense, case up and suitably protect all work liable to injury, either by the weather or by the method adopted for the execution of the Works and take all precautions against the contamination of the works.

1.7.4.7 Training

All operatives are to have been suitably trained prior to commencing work and are to be adequately supervised whilst carrying it out.

1.7.4.8 Reporting

The Contractor shall send to the Engineer details of any accident as soon as possible after its occurrence. The Contractor shall maintain records and make reports concerning health, safety and welfare of persons, and damage to property, as the Engineer may reasonably require.

1.7.4.9 Removal from Site

The Engineer will require the Contractor to remove (or cause to be removed) any person employed on the Works who persists in any conduct that is prejudicial to safety, health or the protection of the environment. Similarly any equipment that is unsafe shall be removed from site.

1.7.4.10 Restricted Areas and "Permit to Work"

Any part of the Site that is designated as a 'Restricted Area' may not be entered without a 'Permit to Work'. All places occupied by live, operational mechanical, electrical or chemical equipment, and 'live' sewers, manholes and chambers will usually be so designated.

The Contractor shall not allow any of his operatives or sub-contractors to enter such an area until a permit has been issued. When the Contractor requires such a permit he shall give 7 clear days' notice to the Engineer, who will arrange with the appropriate authority to issue one. When the Contractor receives such a permit he shall comply with any precautionary requirements that may be specified in it and shall hold the permit until the end of the period covered before returning it to the Engineer.

Compliance with the requirements of the permit shall not absolve the Contractor from any responsibilities under the Contract.

1.7.4.11 Hazardous Atmosphere

The Contractor shall provide the necessary monitoring equipment required for entry to hazardous or potentially hazardous atmospheres. The monitoring of all hazardous or potentially hazardous atmospheres shall be carried out by the Contractor and a suitable register maintained. Planned monitoring should be part and planned within EMP –SSIP.

1.7.4.12 Provision for Emergencies

Suitable arrangements are to be made to cater for emergencies, including:

- First aid equipment (dressings, etc.)
- Person(s) trained to administer first aid
- Communication with, and transport to, the nearest hospital with an accident or emergency department
- Monitoring equipment
- Rescue equipment
- Fire fighting equipment
- Communication with nearest fire brigade station

The Contractor shall provide all necessary rescue equipment that shall be regularly checked and maintained. A register of equipment checks shall be kept on site. The Contractor shall ensure that an adequate number of his operatives are fully trained in the use of breathing apparatus and rescue techniques.

1.7.4.13 Unauthorised Persons

No unauthorised persons are allowed on the Site. The Contractor shall instruct all such persons to keep out and shall take steps to prevent trespassing in accordance with the General Conditions of Contract.

1.8 Quality Assurance System

1.8.1 QA - System

A comprehensive Quality Assurance System, (QA-S), covering all aspects of the Contract and the Works must be implemented, documented and maintained by the Contractor during the period of the Contract. The QA-S shall as a minimum consist of:

- Quality Assurance Plan (QA-Plan)
- Quality Control Plan (QC-Plan)

The system shall comply with a recognised international Quality Assurance Standard.

An outline of the QA/QC Plan shall be provided with the tender Volume I, Form 4.6.7.

The Quality Assurance System for the Company shall show the overall QA Organisation and the lines of responsibility, monitoring and action. Furthermore, the overall principles and procedures for establishing Quality Assurance Plans, Control Plans, QA Organisation, etc. for specific projects and contracts, sub-contractors and suppliers shall be provided.

As a minimum the Contractor shall, as part of his tender, submit the QA System for the Company, Quality Assurance Plan and initial Control Plans for the Works included in this Contract, providing all important and critical activities for controls, inspections and tests to fulfil the specifications.

It is a general requirement that works are only sub-contracted to companies with an effective QA System.

1.8.2 QA / QC - Plan

The Contractor shall present for the Engineer's approval his detailed QA/QC-Plan for all quality assurance efforts or measures for the Works or sections thereof. Such a QA/QC-Plan shall be presented to the Engineer not later than two weeks before the commencement of the Works or an approved section of the Works.

The QA/QC-Plan shall include controls as specified in the Contract as well as any other normal and special controls that the Contractor finds necessary in order to ensure the quality of his work.

The QA/QC-Plan shall, for each control activity, describe the type, method, criteria for approval and documentation and who is responsible for performing the activity.

If the Engineer does not approve the QA/QC-Plan as submitted, then the QA/QC-Plan shall be amended for further approval. Subsequent changes in terms of the quality assurance work will not cause changes in agreed deadlines or contract sums.

1.8.3 Quality Assurance QA-Plan

The QA-Plan shall comprise at a minimum the Contractor's initial proposed Quality Control Plans describing important and critical verification activities based on the Tender Documents and the Contractor's own considerations in respect of execution of the Works.

The QA-Plan shall, as a minimum, cover the following issues:

- Staff and management organization (organogram, staff qualifications & experience etc.). The person responsible for the Contractor's QA shall be authorised and qualified to take decisions on quality assurance issues, and his reference and communication lines to the Company's overall quality assurance organisation and its responsible management shall be clearly shown. Persons performing quality control and testing shall be independent of those executing or supervising the Works;

- Management plan (procedures, information systems, etc.)
- Quality control plans (procurement, design, construction, etc.)
- Document Control (information system, storage, dissemination, archive, etc.)
- Management of sub-contractors and suppliers, and requirements of their QA Systems
- Control of materials and workmanship, defects and material reconciliation, procedures for corrective actions, etc.
- Handling of deviations, additions or variations to the Contract Documents.

The Contractor's system of management of current documentation for the execution of the Works shall include his sub-contractors and suppliers.

The person responsible for the Contractor's QA-Plan shall be authorized and qualified to take decisions on quality assurance issues, and his reference and communication lines to the Company's overall quality assurance organization and its responsible management shall be clearly shown. His duties shall as a minimum be as follows:

- Management of documents.
- Management of procurement.
- Management of sub-Contractors and suppliers, and requirements to their QA-P's.
- Control of materials and workmanship, defects and material reconciliation, procedures for corrective actions, etc.
- Handling of the deviations, additions or variations to the Contract Documents.

Persons performing quality control and testing shall be independent of those executing or supervising the Works.

The Contractor's system of management of documents for the execution of the Works shall include his sub-Contractors and suppliers, and shall be designed to ensure the following:

- Only valid and approved documents are used for the execution of the Works;
- A complete record of changes and amendments to documents is maintained

The Contractor shall present with his offer a preliminary Control Plan describing important and critical control activities which shall be based on the Tender Document and the Contractor's own consideration in respect of execution.

1.8.4 Design Quality Control

The Contractor's designer shall institute a quality assurance system to ensure that his design is completed with due care and attention as per the technical requirements.

The designer must maintain a documented Quality Control Plan (QC-P) which is compatible with the Contractor's QC-P plan. Sub-providers shall either agree to comply with the providers QC-P or have their own documented QC-P in place.

The QC-P for design shall cover the following activities:

- Selection and assignments of appropriate qualified professionals to perform the project tasks
- Appointment of qualified specialists to oversee and review all elements of the work and carry out a consistent, deliberate program of quality control

- Creation of a design team with a management structure conducive towards quality and continually improving the quality process
- Procedures to ensure that all personnel involved in performing the work have a clear understanding of the scope and intent of the overall project as well as their own responsibilities
- Procedures to prepare appropriate design criteria and environmental assessment
- Procedures for preparation and dissemination of the project schedule to ensure that all personnel involved in performing the work are aware, and understand the importance of meeting intermediate deadlines as well as final completion dates
- Procedures for peer reviews to be conducted by qualified personnel outside of the design team
- Procedures for maintaining documents recording the quality control process properly, to the degree appropriate to each project

The Contractor must present for the approval of the Engineer his quality assurance plan and quality control plans.

1.8.5 Construction Quality Control

The responsibility rests with the Contractor to produce work which conforms in quality and accuracy of detail, to the Contracting Authority's Requirements.

The Contractor must, at his own expense, institute a quality control system and provide experienced engineers, foreman, surveyors, material technicians, other technicians and other technical staff, together with all transport, instruments and equipment to ensure adequate supervision and positive control of the Works at all times. All quality controls shall be recorded by documents which format and content shall be approved by the Engineer.

Within one month of the commencement of the Works, the Contractor shall present for the Engineer's approval his detailed Quality Control Plan for all quality assurance efforts or measures for the works or sections thereof. However, such QC-P shall be presented to the Engineer not later than one week before any actual construction activity.

The QC-P shall include controls as specified in the Contract as well as any other normal and special controls that the Contractor finds necessary in order to ensure the quality of his work.

The QC-P shall for each control activity describe the type, method, range, time/frequency, criteria for approval and documentation and who is responsible for performing the activity.

If the Engineer does not approve the QC-P as submitted, then the QC-P shall be amended for further approval. Subsequent changes in the range and contents of the quality assurance work will not be allowed as a reason to extend agreed deadlines or to increase contract sums.

1.8.6 Documents Control

During the Contract period, the Contractor shall, to the satisfaction of the Engineer, document that the Works comply with the quality assurance requirements stipulated in the Contract or approved during the Contract period.

Consequently, based on the approved QA-S and the QC-Ps, the Contractor shall during the execution of the works carry out and document the quality control and its compliance with the stipulated requirements.

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The Contractor's quality control does not limit his responsibility for completing the Works according to the Contract.

At any time during the period of the Contract, If the Engineer can substantiate that the Contractor's control and/or documentation is not functioning as planned or is not being adhered to, the Contractor must propose improvements to remedy the situation at his own cost and within the agreed time for completion.

All control activities specified in the Control Plan shall be documented.

The QC-Ps and all other issues related to the QA-S shall be kept and maintained by the Contractor in the Quality Manual.

On the basis of the QA-P and QC-Ps the Contractor shall produce the necessary form for registration, log books, and check lists, etc., before the Works are commenced.

All documentation shall be provided with identification, the date and signature of the person responsible for the documentation. The identification shall as a minimum comprise: name of project; activity number as defined in the QC-P; time and place of control activity.

All original documentation shall be inserted in Control File in the Quality Manual, which shall be kept and maintained by the Contractor at the project site throughout the period of the project. In addition to the control documentation the Control File shall also include all other relevant quality documentation. The Engineer shall have full access to the Control File at all the times.

- **Method of documentation and filing during execution of the Works**

All control activities specified in the Control Plan shall be documented. The CP's and all other issues related to the QA System shall be kept and maintained by the Contractor in the QA filing system, which shall be kept at the project site throughout the period of the Project.

On the basis of the QAP and CP's the Contractor shall produce the necessary forms for registration, log books, and check lists, etc. before work is commenced.

All documentation shall be provided with identification, the date and signature of the person responsible for the documentation. The identification shall as a minimum comprise: name of project, activity number as defined in the CP, time and place of the control activity.

The Engineer shall have full access to the filing system and he may without notice commission a quality audit.

The Contractor makes the documents up-to-date (list of documents, indication of the revision in course, nature of validation etc.) in order to assuring their traceability.

Finally, the Contractor will be responsible for keeping his quality assurance plan up-to-date in accordance with the quality assurance procedure and the events of the Contract.

- **Document identification and numbering**

The Contractor shall design a document and drawing numbering system. The document identification and numbering system shall be submitted to the Engineer for approval as part of the QA-S.

- **Quality audits**

The Engineer can at all times audit the quality assurance procedure of the Contractor in the design or construction phase.

The audit is performed with reference to the quality assurance plan of the Contractor and on the basis of the quality assurance procedure.

The auditor establishes an audit report revealing the found gaps or non-compliance not later than three weeks after the performance of the audit.

Within a period of 10 working days counted from the date of the reception of the report, the Contractor indicates in writing the corrective actions he wishes to implement, their planning, and the name of the responsible of the control over these corrective actions.

- Standards and recommendations

The Contractor shall make sure that the quality control complies with the effective Serbian standards and take guidance from the following international standards:

ISO 9000 Standards for the quality control and assurance - Guideline for selection and utilisation

ISO 9001 Quality system - Model for the quality assurance in conception development, production, installation, and after-sales support

ISO 9002 Quality system - Model for the quality assurance in production and installation

ISO 9003 Quality system - Model for the quality assurance in controlling and final tests

ISO 9004 Quality control and element of the quality system - Guidelines

ISO 8402 Quality management and quality assurance - Vocabulary.

1.9 Technical Standards and Building Regulations

In accordance to these Technical Requirements the Contractor shall ensure that his Designs incorporate the following key principles:

- For all required works and services specified in this Tender Dossier, the relevant Serbian standards and codes of practice shall apply. In any case, if Serbian standards are more strict or dominant, they shall apply to replace other standards given or not given in other parts of this document.
- For works and services where no relevant Serbian standards or codes of practice exists, DIN and EN shall be applied.
- The proposed application of other standards and code of practice for certain works and/or services shall be such as to ensure equal or higher than the specified quality and safety of works, and to facilitate operation, inspection, maintenance, repairs, lubrication and similar operations.
- In any case, it is required to state standards and code of practice to be used for each service and work, accompanied by explanations to demonstrate to the satisfaction of the Engineer that application of these standards and codes of practice shall give required quality, safety, functionality and durability of the works.
- The applicable version of any standard shall be that valid 28 days prior to the latest date for submission of tenders.

1.9.1 SI-Units

SI units (Système International d'Unités) of measurement shall be used throughout this Contract. All calculations and technical information shall be in SI units.

The Contractor shall transfer all information and data originating in another system into the SI System.

1.9.2 Reference Standards

The Serbian standards shall be predominant and other acceptable standards and codes in their latest Edition which satisfy also the harmonised National (Serbian) Standards are acceptable and may be used throughout this Contract.

In referring to the Standard Specifications the following abbreviations are used:

DIN	Deutsches Institut für Normung e.V. - German Institute for Standardisation
DVGW	Deutsche Vereinigung des Gas- und Wasserfachs e.V. - The German technical and scientific organisation on Gas and Water
EN	European Standards
FIDIC	Fédération Internationale des Ingénieurs-Conseils, Geneva
IEC	International Electrotechnical Commission
ISO	International Organisation for Standardisation
SRBS	Harmonised National (Serbian) Standards
TS	Serbian Standard, to be applied in harmonised editions, only
VDE	Verband Deutscher Elektrotechniker – German Association for Electrical, Electronic & Information Technologies
SRPS	SRPS -Serbian Standards

The Contractor shall supply and maintain in his office on the site at least one complete set of all Standard Specifications referred to in the Contract. In addition, one set shall be made available for the use by the Engineer's Team.

Except where otherwise specified, all materials and workmanship shall comply with the requirements of the latest editions of European, Serbian and German standards and codes of practice and any other Standards, which referred to in the Specifications but are superior to the Serbian standards and regulations. A list of the Standards is included in the Annex to this Section.

The Standards and Codes to be used for the Works shall be current at 28 days prior to the last Tender submission date.

1.9.3 Other Standards

Where such standards and codes are National, or relate to a particular country or region, other authoritative standards which ensure an equal or higher quality than the standards and codes specified will be accepted subject to the Engineer's prior review and written approval.

Differences between the standards specified and the proposed alternative standards must be fully described in writing by the Contractor and submitted to the Engineer, with a translated copy of the relevant standards in the English language, at least 28 calendar days prior to the date when the Contractor desires the Engineer's approval.

In the event that the Engineer determines that such proposed deviations do not ensure equal or higher quality, the Contractor shall comply with the standards specified in the documents.

Only materials in accordance with approved standards shall be used in the Works.

1.9.4 Copies of Standards on Site

The Contractor shall purchase and keep on site at least one copy of each of the Standards, Codes and Manuals or approved National Standards, which are referred to in the Specifications. In addition the Contractor shall keep on site a copy of any other Standard, Code or Manual or National Standard, which applies to materials supplied.

Copies of the standards shall be available at any time for reference at the office of the Engineer. If the Engineer requires an English or Serbian translation of any of the Standards or Manuals the Contractor shall provide a typed copy of the translation within 7 days of receiving a written request from the Engineer.

The Cost of providing all the Standards mentioned and Standards required during the execution of the Works shall be included in the rates and prices and no payment will be made to the Contractor for these.

1.9.5 Matters not covered by Standards

Any materials and workmanship not fully specified herein or covered by the Standards, Codes or Manuals, shall be of such type and quality so as to produce a first class work. In such circumstance the Engineer shall determine whether all or any of the materials offered or delivered to the site are suitable for use in the Works and the Engineer's decision in this respect shall be final and conclusive.

1.9.6 Abbreviations and Terminology

Table 1 List of abbreviations and terms

%	shall mean	per cent
c	shall mean	centre
CA	shall mean	Contracting Authority
Day	shall mean	Calendar Day
DD	shall mean	Detailed Design
DIN	shall mean	Deutsches Institut für Normung e.V. German Standard
DN	shall mean	nominal diameter
EN	shall mean	Euro Norms
FFL	shall mean	Final floor level
h	shall mean	hour
HDPE	shall mean	High density polyethylene
ISO	shall mean	International Standards Organization.
kg	shall mean	kilogram
km	shall mean	Kilometre
kW	shall mean	kilo Watt (1000 Watts)
l	shall mean	Litre
L.S.	shall mean	lump sum
m	shall mean	Metre
m/d	shall mean	man-day
m²	shall mean	square meter
m³	shall mean	cubic metre
masl	shall mean	Meters above sea level
mm	shall mean	millimetre
mm²	shall mean	square millimetre
Month	shall mean	30/31 Calendar Days
MSDS	shall mean	Material Safety Data Sheet
pcs	shall mean	pieces
PE	shall mean	Population Equivalent
PM	shall mean	Project Manager
PVC	shall mean	Polyvinyl chloride
QAS	shall mean	Quality Assurance System
RC	shall mean	Reinforced Concrete
t	shall mean	tonne (1000 kg)
TA	shall mean	Technical Assistant
TR	shall mean	Technical Requirements

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1.10 General Design Requirements

1.10.1 Legislation

Based on the Requirements included in these tender dossiers, the Contractor shall, at his own cost, prepare main designs, with all necessary detailed drawings and data on construction works, including drawings and complete specifications of materials and workmanship to such detail that not only the works can be executed on site, but also that the Engineer can approve the Contractor's designs and intentions for the execution of the works. In addition, it is the responsibility of the Contractor to obtain all the necessary approvals, certificates and permits from the relevant authorities.

All design and construction activities are governed by the Law on Planning and Construction as published in the "Official Gazette of the Republic of Serbia", No. 72/2009, 81/09, 64/10, 24/11 and relevant secondary legislation.

Where certain conditions are not covered either by Serbian Law or EU Directives, alternative texts with adequate justification for the proposal can be proposed by the Contractor for the approval of the Engineer. In case where the texts are in a language different from the language of the Contract, the Contractor shall provide a translation. The Engineer shall issue his decision within 28 days of the receipt of all justified request.

Where there are contradictions between the different Laws and Directives, the matter shall be brought to the attention of the Engineer.

1.10.2 Permits

1.10.2.1 Building Permit

The Contractor is responsible to provide a design which includes all documents and drawings required in accordance with the Planning and construction Act or for the purpose of obtaining / modification the Building Permit. He shall submit the documents to the Engineer. The Beneficiary is responsible for the application for the Building Permit if the proposed technical solution needs new or modified Building Permit compared to the existing and available one. The Contractor shall assist the Beneficiary by providing additional details or by giving any clarifications if so required in the application procedure.

The Contractor shall pay for all necessary approvals, Technical Control of the Main Design and taxes related to Building Permits and all taxes and duties during execution of the Works.

The Contractor shall provide copies of any drawings and calculations as required for the issue of Building Permits and the cost shall be deemed to be included within the Contract Price.

The Contractor shall assist the Beneficiary in obtaining permits that only the Beneficiary may obtain.

The Contractor shall allow a realistic timescale for dealing with the third parties responsible, for permits etc., in his planning and programming of the works.

The Contractor shall comply with all conditions stipulated in any permits granted by third parties.

The Contractor shall comply with all the relevant authorities requirements stated in the approvals.

If the conditions under the Planning and construction Act prescribed are fulfilled, the relevant body is bound to issue the Building Permit

1.10.2.2 Using Permit

The Using Permit for a completed construction work will be issued by the Competent Authority, after it has been established in the final inspection that the construction work has been executed in compliance with the Building Permit, and in particular in compliance with the essential requirements for the construction work. The Contractor is obliged to assist the Beneficiary in obtaining Using permit (Technical acceptance) for the RWMC and to prepare all necessary documentation including Environmental Management Plan, Working Plan, Contingency Plan, etc, according to the Law on Waste Management (Official Gazette no 36/09 and 88/10) and Law on Planning and Construction (Official Gazette of RS No 72/09, 81/09, 64/10, 24/11).

All documentation for issuing Using Permit required to be in Serbian and translated to English. The Contractor must ensure the presence of the parties involved in the building at the final inspection.

The Contractor shall in the name of Beneficiary, no later than on the day of final inspection, make the following available to the committee for final inspection:

- the Site documentation;
- the surveying location plan of the as-built state for a completed construction work according to the issued act, which has been certified by the land registry office as part of the surveying study;
- documents on conformity or evidence of quality of a part of the construction work, issued by authorised bodies.

The Contractor shall reimburse the travelling expenses and per diem allowance for all members of the final inspection committee in an amount prescribed by special regulations.

1.10.2.3 Other Permits

The Contractor shall comply with all conditions as set out in other Permits or approvals, including, but not limited to, the following:

Location Permit

Decision on Approval of EIA Study

Conditions imposed by utility companies and public authorities (e.g. electricity, water company, roads, etc.)

The Contractor shall be responsible for ensuring that all the necessary conditions required by Serbian Laws are fully satisfied.

It shall be the responsibility of the Contractor to ensure that he has all necessary permits before he proceeds with any works and to advise the Engineer when any particular permit is no longer valid or is necessary.

The Contractor must therefore ensure that he has prepared all the documentation necessary for obtaining a permit in time for his own execution of the Works bearing in mind the required number of days specified in the Law for obtaining a particular permit. The Contractor must also allow sufficient time for the Engineer and the Beneficiary to process the request for a permit.

1.10.3 Site Conditions and Further Investigations

Available specific site conditions such as site boundary, topography, geotechnical conditions are part of preliminary design and available at the RWMC.

The Contractor shall review and assess the quality of this general information and where considered necessary he shall gather all additional information necessary to complete all the design work at his own cost. The Contractor shall assume responsibility for all such additional investigations and include these activities in the main schedule of activities.

Topography

The Contractor shall identify the Serbian mapping benchmarks and establish control points which shall be used for construction activities. The attributes of the topographical control points shall be communicated to the Engineer.

The Contractor shall carry out a detailed topographical survey of the site prior to the start of any construction works to record the existing situation. The survey shall be completed by an independent surveyor to be approved by the Engineer. The results of the survey shall be presented to the Engineer as a record of the existing site condition.

Levels and Benchmarks

The works shall be set out and tied to the local National Co-ordinate System. Except where otherwise specified all levels shall be in metres above mean sea level (m.a.s.l.) with an accuracy of three decimal places. The Contractor shall supply to the Engineer details of the value and location of the temporary benchmarks and reference points that he proposes to use.

The Contractor shall, before construction commences, establish from the reference points and benchmarks, an adequate system of control points and benchmarks at suitable locations on the site of the works, which shall be clearly marked, adequately referenced and properly recorded. Temporary benchmarks and survey stations shall, unless otherwise approved, be located clear of the construction works.

The Contractor shall establish, construct and protect during the period of construction of the Works, necessary additional benchmarks, which shall be checked periodically. The Contractor shall be solely responsible for carrying out these operations. He shall make the control points and benchmarks available to the Engineer together with the relevant records.

The Contractor shall submit to the Engineer for approval drawings in duplicate showing the locations and levels or co-ordinates as appropriate of each and every temporary benchmark and survey station used for the setting out of the works.

The Contractor shall be responsible for constructing the works in accordance with the data on levels, benchmarks and other points of reference in the vicinity of the site(s) if they are not shown on the drawings.

Setting out of the Works

The Contractor shall, before commencing execution of any given section of the Works, submit to the Engineer complete setting out details with supporting calculations and drawings (including drawings showing the locations and co-ordinates of the reference points used) in duplicate for approval.

The Contractor shall identify setting out dimensions for all structures by relating them to existing works and by interpretation of the drawings.

The locations of structures to be constructed as part of the Works shall be identified by reference to steel pins set in concrete or other approved markers set up by the Contractor, who shall also determine the co-ordinates of the markers and their distances from adjacent existing structures.

The Contractor shall set out sections of the Works at such times as may be directed by the Engineer to enable Utility Service Authorities to carry out temporary or permanent alterations to their equipment or buried services.

Data and information on levels, dimensions, alignments and gradients, other than these to be determined by the Contractor when preparing his structural and detailed design drawings, are shown on the drawings. Details not shown on the drawings shall be established by the Contractor during the execution of the Works.

The Contractor shall employ well-qualified and experienced surveyors approved by the Engineer for the execution of the survey work and setting out as described in the Contract. The survey instruments to be used by the Contractor shall be of the modern type, suitable for the work to be executed and shall be maintained in a first class condition. The instruments and/or equipment shall be subject to the approval of the Engineer.

For all survey instruments used in the works the Contractor shall submit recent calibration certificates issued by competent authorities. Further calibration of the instruments shall be carried out every three (3) months. All field-books, calculations, maps, survey records needed for legal purpose, etc. of survey activities mentioned above shall be handed over to the Engineer immediately after completion of the survey work.

Geotechnical Investigations

The Contractor shall assess the quality and applicability of the provided data and carry out all necessary geotechnical investigations he considers necessary for completing the design of all facilities included in this Contract.

Geological, hydro-geological and geotechnical surveys shall be completed in accordance with Serbian and other specified Standards (DIN 4021), including subsoil tests and ground water analysis.

Details of the number, location of the boreholes or trial pits and reference points that he proposes to use shall be submitted for approval to the Engineer.

The fieldwork to be carried out by the Contractor may comprise:

- Sampling and laboratory tests
- Penetration tests
- Plate bearing tests
- Permeability tests
- Ground water table and ground water quality determination

The site investigation work shall be carried out using modern methods and equipment and by fully competent staff under the Contractor's Project Manager. The equipment employed shall be such as to provide the necessary data.

If any suspicion of soil pollution is evident, samples must be taken and laboratory soil tests or field testing shall be carried out. Pollution shall mean that the material is considered as "unsound" and has to be replaced by "sound" material. "Unsound" soil structures (gypsum, salt, sulphate, etc.) have to be treated by taking appropriate technical precaution measures to achieve the necessary characteristics or they have to be replaced with "sound" material.

The Contractor shall use the results of his own site investigations to design in detail every aspect of the Works, permanent or temporary, which is affected by the subsoil. This design shall be entirely the Contractor's responsibility and it is a subject to the approval of the Engineer.

Existing Utility and Other Services or Buried Structures

Utilities, indicated in Volume 5, are given for information only and the accuracy of the details is not guaranteed. The Contractor shall make his own enquiries and shall carefully excavate inspection pits to locate accurately the utilities indicated to him by the drawings or by utility undertakings.

Before starting any work, the Contractor must carry out a survey of his work area to identify any services or structures (foundations, walls, archaeological findings, etc.), which may be present and may interfere with his design and the Works. The Contractor's design shall take into consideration the discovered utilities.

The Contractor shall take all necessary steps to inform himself, the Engineer, the Beneficiary and other Authorities responsible for water, sewerage, electricity and communications, and, where relevant, private companies, about the location of underground utilities / structures.

1.10.4 Design Documentation Requirements

The Contractor shall provide the Beneficiary with all necessary data, documentation and related information that are necessary in the process of applying for and obtaining of Permits by the Beneficiary. The Contractor shall provide all necessary assistance to the Beneficiary in obtaining design conditions from various authorities which will serve as the basis for the preliminary design.

The Contractor shall prepare a Main Design in accordance with Serbian Law for the all the facilities including the MRF plant and Composting Plant. On completion of the Main design, the Contractor shall present it for approval to the Engineer.

If Contractor's proposed Technical solution is not in line with available Preliminary Design and Revision Committee report Contractor has, on his expense and on his responsibility, to prepare his Preliminary Design. Notwithstanding the approval by the Engineer, the Preliminary design will have to be again submitted by the Beneficiary for review by the National Review Committee or other Serbian Authorities. In addition, an application for approval of the EIA Study for the project has been submitted to the Competent Authority. The Contractor will be expected to justify and amend his preliminary design to satisfy the requirements of the Review Committee and the decision of the Competent Authority (in respect of the EIA Study). Upon approval of the preliminary design, the Contractor shall prepare the Main design to cover all the facilities and plants.

The Main design shall be approved by the Engineer prior to a Technical Control revue to be arranged by the Beneficiary. Notwithstanding approval by the Engineer, the Contractor will be expected to justify and amend his main designs to satisfy the requirements of the design review. On full approval without reserve of the Main Design, the Beneficiary will apply for the Building Permit from the Competent Authority. The Contractor's obligation is to cover the costs for all abovementioned activities including the costs for Technical Control of the Main Design.

Construction activities can only proceed after obtaining the Building Permit.

1.10.5 Third Parties

The Contractor shall comply with all conditions stipulated in any permits granted by third parties, including conditions stipulated in those permits obtained by the Beneficiary.

1.10.6 Documents and Data furnished by the Engineer

The Engineer will provide access to the Contractor to all available documents, including the Feasibility Study Subotica Regional Landfill, EIA Study Subotica Regional Landfill and Preliminary Design.

The Contractor shall copy the documents, or parts of them, when he considers he needs such, and carry out himself all surveys, investigations, studies and analyses of any kind as may be necessary and specified elsewhere.

The Engineer will not entertain any claim by the Contractor on account of incompleteness or inaccuracy of drawings and data furnished by it, irrespective of when the Contractor shall discover such incompleteness or inaccuracy.

1.10.7 Principal Design Requirements

The design of the facilities shall be in accordance with best available European practice and applicable local design standards, and shall be such as to facilitate construction, operation, inspection and maintenance of all processes and equipment.

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The following fundamental objectives, minimum requirements and constraints shall be generally considered for the design of the RWMC and all Facilities and Plants:

- High operational safety and high system stability of the waste separation lines and composting treatment process with regard to the required Standards;
- High operation safety and high system stability of the leachate, waste water and sludge treatment process with regard to the required effluent standards;
- Ease of operation in order to allow the MRF, LTP, SBR and Composting Plant to be operated by reasonably experienced personnel and to minimize the number of personnel required;
- High flexibility of the treatment processes in order to easily allow plant operation to be adjusted according to the actual waste input (low and-or high quantities and temporary diurnal peaks for short periods of time) and to allow for keeping up with the effects of unexpectedly high waste quantities;
- High flexibility of the treatment process in order to easily allow LTP and SBR operation to be very well adjusted according to the actual leachate and waste water load;
- High degree of reliability using mechanical and electrical equipment with proven reliability record in similar works;
- Reduction of the volume of sludge and other residues in order to minimize disposal expenditures;
- Sufficiently high degree of redundancy by means of installed spare capacity and/or spare units of equipment to overcome without problem all normal maintenance situations and emergencies due to temporary malfunctioning (or non-functioning) of the main mechanical and electrical equipment and civil constructions
- Minimization of capital costs;
- Minimization of operation and maintenance costs
- Continuous operation of existing facilities with minimal disturbance when connecting new works;

1.10.8 Design Life

Civil, Structural and Building Works shall be designed on the basis of a 50-year service life. Mechanical and Electrical Equipment shall be suitable for 24 hour per day continuous operation and also under discontinuous operation under all local climatic conditions and be designed such that complete replacement shall not be required until at least 15 years after the Final Acceptance Certificate is issued

Parts subject to wear and tear, other than consumable items, shall have a design life of at least 5 years, all gearboxes shall have a calculated design life of at least 60,000 hours, assuming continuous operation.

Flood protection for the facilities shall be for a 1:100 year event.

The design shall be such that all materials, components and sub-components including connections or connecting methods shall have a design life compatible with the design life of the whole facility under all service conditions. The design of the facilities shall be in accordance with best practice and applicable Serbian design standards, and shall be such as to facilitate construction, operation, inspection and maintenance of all processes and equipment. All mechanical and electrical equipment to be supplied shall, wherever possible, have a proven reliability record in similar works.

A standard of operator comfort, according to the actual "state of the art" level, shall be provided by the incorporation of good access, equipment lifting devices, separate storage facilities for chemicals, adequate ventilation and lighting to all operating areas, machinery guards, proper electrical insulation facilities, noise suppression and insulation, suppression of vibrations, stairs, handrails, covers, etc.

The design of all facilities shall be such that the minimum design life shall be as presented on the following table:

Description / Subject	Design Life Years
Concrete structure, buildings, roads	50
Steel constructions	50
Pipes and sewers	50
Machine units, machines, fittings	20
Cables and accessories	20
Electrical equipment	15
Process control and SCADA equipment	10
Programmable Logic Controllers	10
Personnel Computers	5
Instrumentation	5

1.10.9 Requirements for Materials and Equipment

All materials and equipment shall conform to the technical specifications as provided in Volume 3. The following general requirements shall be applicable:

- Materials and equipment shall be suitable for the environmental, physical conditions which are likely to exist at their place of use;
- Whenever possible, the Contractor shall provide equipment of a similar nature from the same manufacturer, e.g. electric motors;
- Standardisation of types of equipment, such as pumps, mixers, valves, instruments, shall also be adopted;

The Contractor shall note that particular attention will be paid to these requirements. In cases where the proposed equipment is not standardised with regard to manufacturer and type, the Contractor shall be required to provide conclusive technical justification; considerations of price alone will not be accepted. Equipment and components that have not been standardised will not be approved.

1.10.10 Requirements for Operation Stability and Reliability

All the RWMC Facilities, the MRF and Composting Plant shall be designed for maximum operation stability, reliability and flexibility in respect of system operation / maintenance and the capital costs of replacing plant and equipment, considering at least the following requirements:

- Appliance of safety factors wherever necessary in order to cover unpredictable situations and conditions especially concerning variations in waste quantities and waste characteristics;
- Provision of indicating systems for an early stage warning of unpredictable situations and conditions such as the presence of substances entering the RWMC which could disturb the treatment process(es);
- Provisions to manage particular operation conditions like start-up, regular shut-down, emergency shut-down, operation with reduced number of process units, etc., without any deterioration of the waste management efficiency;
- Provisions to manage normally expected particular operation conditions like capacity under- and over-loading and shock loads, without any deterioration of the waste management efficiency;
- Provisions to manage normally expected failures in operation like bulking waste etc., for any process unit, without any deterioration of the waste management efficiency;
- Provision of by-passes of all principal process units so that each process unit can be put out of operation without stopping the whole waste management process;
- Provision of connection points sufficient in number and capacity for easy installation of additional and spare pumps, machines, aggregates;
- Provision of spare pumps, machines, aggregates in sufficient number and easily to install where fixed installation is not recommended for practical reasons;
- Simplification and standardisation of brands and types of equipment to allow for utmost interchange-ability of pumps and machines and to facilitate preventive maintenance;
- Provision of measures to allow for adjustment of certain processes, covering wide range of variables to cater for all possible operational conditions

1.10.11 Requirements for Operation and Maintenance

The design shall incorporate every reasonable precaution and provision for the safety of all staff concerned with the operation and maintenance of the works.

To guarantee access to all mechanical and electrical parts of the whole plant for cleaning, maintenance and repair, the following requirements shall be fulfilled as a minimum:

- The space between the different process units (conveyer belts, chambers, channels, pipes, machines, aggregates etc.) shall be big enough to guarantee acceptable accessibility for the working personnel to facilitate inspection, cleaning and repairs, especially when working with lifting units;
- All submersible equipment (e.g. pumps, mixers, etc.) shall be provided with sufficient lifting devices for operation and maintenance; A minimum gangway width of 0.80 m shall be provided between the main units (e.g. pumps);
- For heavy engines and for all mechanical and electrical parts (> 50 kg), appropriate lifting units such as cranes or assembling aids, etc., shall be provided where practical. For lighter units, mobile lifting units shall be provided;
- Moving parts shall be provided with adequate guards;
- Assembly orifice holes and access facilities such as doors and gates shall be provided. Access to assembly orifice holes over consolidated ways or lifting facilities must be guaranteed;

- All covers such as gratings for channels or assembly orifice holes shall be provided/designed with antiskid surface and constructed in such way that they can be opened by one person only, without danger;
- All railings and security installations shall be so arranged in that way that they can be removed easily and quickly in the case of assembly, disassembly, maintenance or repair of mechanical or electrical units;
- Handrails shall have a work safe height of 1.10 m, access bridges and stairs shall have a minimum clear width of 0.80 m;
- All conveyor belts, machines, tanks and reservoirs, etc., shall be provided with platforms and gangways, duckboards if they are not readily accessible; Access to platforms and gangways shall be simple (without vertical ladders, for instance);
- All tanks and chambers shall be designed in a way so that easy emptying is possible, either by providing a washout for each tank or a pump sump;
- The arrangement of the individual pieces of apparatus, pipelines and operational monitoring device must be such that the operation of the installation can be carried out unhindered and that any necessary repairs, which may arise, can be carried out without difficulty and without hindering the running of the other parts. Special care must be taken that the control systems and monitoring instruments are arranged so as to be easily visible;
- Adequate ventilation and lighting shall be provided to all operational areas especially in the MRF plant;
- Noise suppression and heat insulation shall be provided at appropriate locations;
- Accessible means shall be provided for the easy lubrication of all bearings, mechanisms and moving parts. Grease lubricating points shall be fitted with hexagon nipples.

1.10.12 Odour and Dust Control Requirements

The Contractor shall provide odour and dust control at all areas where principal sources of bad odours and dust are likely. All exhaust air streams must be treated in order to minimize odour and dust nuisances on the surrounding environment.

All process parts generating odours shall be situated inside enclosed structures and all foul air streams shall be collected from the potential odour producing units by forced ventilation and filtered.

The Contractor shall provide an odour control system at all potential sources of odour to the standards specified by the EU regulations.

The Tenderer shall provide as part of its Environmental Management Plan for period of the RWMC operation and for period of RWMC after care a detailed odour management plan, including technical details of proposed odour treatment and monitoring equipment and associated capital expenditure and operational expenditure cost estimates. Odour treatment must be implemented as part of the RWMC, particularly related to LTP, SBR, MRF and composting plant.

Measures that the Tenderer shall consider in its odour management plan should include but are not necessarily limited to

- further housekeeping, process and/or operational improvements over and above the minimal requirement;
- total enclosure of odour sources;

- the use of enclosure and venting (including ventilated buildings) - with end-of-pipe treatment (i.e. dilute/disperse or abatement) – for certain plant and equipment; and
- the installation of "best practice" odour monitoring equipment capable of detecting and reporting emissions in excess of agreed levels.
- The odour management plan supplied must include the results of air quality dispersion modelling to establish guideline emission standards, certified by an appropriately qualified person that demonstrates that the proposed odour control strategy will ensure no noxious or offensive odours will be detected at the boundaries of the RWMC.
- The format of the odour management plan should provide sufficient detail to allow operation and maintenance staff to understand clearly the operational procedures for both normal and abnormal conditions. The odour management plan should also include sufficient feedback data to allow site management (and environmental/regulatory inspectors) to audit site operations. Examples of relevant issues include:
 - a summary of the RWMC odour sources and the location of receptors;
 - details of the site management responsibilities and procedures for reporting faults, identifying maintenance needs, replenishing consumables, complaints action procedure;
 - odour-critical plant operation and management procedures (e.g. correct use of plant, process, materials; checks on plant performance, maintenance and inspection);
 - operative training;
 - maintenance and inspection of the RWMC (both routine and emergency response);
 - spillage management procedures;
 - record keeping - format, responsibility for completion and location of records; and
 - emergency breakdown and incident response planning including responsibilities and mechanisms for liaison with relevant public authorities and the regulators.

The odour management plan should also indicate the frequency for regular reviews of the odour management plan throughout the term of the plant operation and details of any productive screening assessments to be undertaken of LTP operations to identify any potential odour problems.

Ventilation systems - air change rate of the buildings and/or of the structures shall provide a safe working environment to comply with international and Serbian regulations and to the following key-principles:

- Those areas, which will regularly be entered by personnel in the course of operating the plant, shall have a minimum air change rate of 6-7 air changes per hour.
- Those areas with hazardous and work guard potential concerning dangerous gas concentrations for hydrogen sulphide, methane gas and aerosols, shall have a minimum air change rate of 10 air changes per hour. Furthermore they are to be clearly indicated as hazardous areas.
- Those areas that would not normally be occupied or entered regularly may be ventilated to a lower air change rate and should be constructed from sulphate-resistant cement as determined by the Contractor in his proposal.

Arrangements for control and warning system of H_2S and CH_4 for the building and electrical rooms shall be provided where necessary.

The Contractor shall clearly identify in his proposal;

- Those areas which are to be ventilated to the minimum rate of 6-7 air changes an hour;
- Those areas which are to be ventilated to the minimum rate of 10 air changes an hour;
- Those areas which are to be ventilated to a lower rate;
- Those areas where no ventilation is to be provided.

Where necessary, the Contractor shall provide equipment for removing odours from the air which is to be ventilated out of the facilities. This is particularly applicable to process units where risks of odours are high. The proposed equipment shall be limited to simple filters for which cartridges can be easily replaced.

The material of the ductwork shall be stainless steel. The ductwork should be installed with a fall to one end of any straight section. Air from tanks is saturated and condensate will form. At all low points a moisture drain should be fitted. The moisture drain should take the form of a water trap whose length exceeds the difference between line pressure and atmospheric pressure at that point.

Each extraction point shall have a damper for flow adjustment. Each shall have some access to allow for measurement of flow during commissioning. This could be a simple hole for Pitot tube measurement. A non-return valve is a useful addition but can be omitted if the system design is correct.

The air velocity applied in the duct shall not generally exceed 10m/s. This is to limit the pressure loss in ductwork and restrict fan rating.

Any format of fan can be installed as long as the duty and the materials of construction are appropriate. The fans must be fitted with non-return dampers and isolation dampers for servicing. Fans should also be fitted with moisture drains which must have a trap fitted.

1.10.13 Noise

The noise levels shall be in accordance with the relevant Serbian noise environmental legislation.

The maximum acceptable noise levels are given in table

	Daytime 0700 hrs to 1900 hrs	Evening time 1900 hrs to 2300 hrs	Night time 2300 hrs to 0700 hrs
Along the RWMC boundary	65 dB(A)	60 dB(A)	55 dB(A)

In addition to the specifications of these requirements the Material Recovery Facility shall be designed to ensure that the maximum noise level at site boundaries shall not exceed an equivalent continuous sound level of 55dB(A) (LA_{eq}) when all equipment installed is being operated.

The noise level at a distance of 1.0 m from each sound-producing item of mechanical or electrical plant or equipment shall not exceed 72dB(A). The Contractor shall estimate and substantiate, by calculation to be submitted at design submission stage, the equivalent noise levels. Necessary measures to mitigate noise above the specified limits shall be taken.

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1.10.14 Vibraton

The vibration levels of the equipment should be such that the following limits are met:

1 For hand-arm vibration:

- the daily exposure limit value standardised to an eight-hour reference period shall be 5 m/s^2
- the daily exposure action value standardised to an eight-hour reference period shall be 2.5 m/s^2

2 For whole-body vibration:

- the daily exposure limit value standardised to an eight-hour reference period shall be 1.15 m/s^2 or, at the choice of the Member State concerned, a vibration dose value of $21 \text{ m/s}^{1.75}$
- the daily exposure action value standardised to an eight-hour reference period shall be 0.5 m/s^2 or, at the choice of the Member State concerned, a vibration dose value of $9.1 \text{ m/s}^{1.75}$.
- Workers' exposure to vibration shall be assessed or measured as specified in 2002/44/EC.

1.10.15 General Structural Design

The Contractor shall carry out the design and calculation for all structures included in the Works according to the scope of Works mentioned in this Tender Document, in general in accordance with the following design criteria:

- For the structural design of all reinforced concrete structures and water retaining structures the Serbian Standards and design regulations should prevail.
- Structures should be capable of withstanding external lateral soil and or water pressure when empty;
- Structures should be capable of withstanding internal water pressure when filled with water to maximum design water level and assuming no lateral external support from soil and/or groundwater;
- All structures in which the water levels can drop suddenly shall be secured against uplift by their own weights together with the surrounding soil. Where needed, anchors have to be installed;
- The safety factors should meet the requirements according to BAB and other RS standards when calculated.
- In order to incorporate the effects from thermal action, shrinkage and creep the Contractor should make the construction joints in accordance with the approved drawings. No other joints will be allowed. The Contractor shall make his structural documentation in accordance with the design and applicable standards and norms.

The structural design calculations, incl. drawings, shall supplement each other to meet the local authorities' requirements to obtain a building permit and final approval of the plant.

The Contractor may propose alternative design codes of practice subject to the approval by the Engineer.

1.10.16 General Electro / Mechanical and SCADA Design

The Contractor shall prepare and submit his drawings to the Engineer for approval. These drawings shall be fully dimensioned to illustrate the proposed final arrangement of the plant. The arrangement drawings shall contain full details of plant and pipe work

arrangements proposed by the Contractor including proposals for dismantling joints for pipe works disassembly.

All materials used shall be of the best quality of the class most suitable for working under the conditions specified and shall withstand the variation of temperature and climatic conditions arising under working conditions without distortion or deterioration or the setting up of undue stresses in any part, and without affecting the strength and suitability of the various parts for the work which they have to perform.

All mechanical and electrical equipment shall be thus designed considering:

- Provision of machinery, electrical systems, and instrumentation according to the principles of "simplicity" and "reliability" with long trouble-free service with low maintenance needs;
- All apparatus shall be designed to ensure satisfactory operation under the climatic conditions prevailing at the site, and under such sudden variations of loads, pressures, and/or voltages, temperatures as may be encountered under normal working conditions;
- All Electrical equipment shall be of adequate strength to withstand the stresses and forces imposed by the working and ambient conditions without distortion or deterioration affecting the efficiency and reliability of the plant; electromechanical forces that may be set up by the prospective short-circuit current.
- Electrical equipment shall be completely satisfactory for use with the mechanical equipment chosen;
- Each component or assembly shall have been proven in service in a similar application and under conditions no less arduous than those specified herein;
- Outdoor equipment shall be weatherproof and designed to prevent the collection of water at any point;
- Where equipment has to be protected from the weather, appropriate chambers, housing, shelter, structures shall be provided to maintain the desired environmental condition;
- Corresponding parts requiring replacement shall be interchangeable in order to limit the stock of spare parts required.

All works to be carried out under this Contract shall pay special attention to the local conditions, i.e. climatic, economic and cultural conditions, etc.

The Contractor shall prepare and submit to the Engineer for approval his final mechanical installation drawings.

The documents to be provided shall, as a minimum, consist of:

- Functional description
- P&I diagram including all functions and parts
- Drawings, plans and cross sections with indication of dimensions (in mm) and location of components including all machines and piping
- List of components showing make, type and amount with reference number to P&I-diagram
- Specification of materials
- Erection drawings for all equipment
- Data leaflets/brochures with unambiguous reference for all the equipment to be supplied

- Access ways, e.g. details on stairs, platforms, handrails hatches
- Lifting devices
- Hydraulic profiles
- Hydraulic calculations including all pipes, weirs, and others. Calculation method to be included.
- Performance curves for all relevant equipment, blowers, pumps, and others
- Documentation of how equipment can be operated and serviced
- Calculation of all structural steel statically and dynamic loads and forces.

Plan drawings shall be in an appropriate format and may be combined to show more than one type of installation.

Related to electrical installation the Contractor shall provide the following documentation:

a) Electrical installations

Design layout showing location of main components and wiring etc.;

- Full Beneficiary's Requirements of all main electrical equipment such as switchboards, switch gear, cables, fixtures, alarm and control system, instrumentation, transformers, and others
- Schematic electrical layout of the total installation in the form of single line diagrams showing power supply lines, switchboards, control boards and main switching equipment
- Wiring control systems in switchboards in the form of single line diagrams and key diagrams
- Drawings of face for switchboards
- List of components indicating manufacture, type and component number, ordering numbers, and others
- Tag numbering system
- List of cables
- List of signals.

b) Automation and SCADA system

- Schematic diagram showing configuration of the SCADA-system
- Functional description for each application program
- List of parameters and set-points. Name of each parameter should be in accordance with the name used by the master station
- Input / Output list.

Before the programming starts, the Contractor shall supply detailed planning materials including work plan, list of modules etc.

1.10.17 Preliminary Design

The Contractor shall prepare the Preliminary Design (PD) for the Facilities that were not analyzed in the available PD or were subject of sustainable changes.

The Contractor shall follow the recommended design concept as far as possible and the design shall be in accordance with the specifications, applicable standards, the Law on Planning and Construction and of sufficient quality for Republican level technical review.

Within the period stated in the Contractor's Programme the Contractors shall complete the Preliminary Design and submit it for approval to Engineer. The PD shall include the drawings, information and any other material defined by Planning and Construction Low.

The Contractor shall be responsible for completing any amendments required by the Engineer to ensure compliance with the requirements of the Contract.

Notwithstanding approval by the Engineer, the Contractor is also responsible to complete any amendments required by the Republican Technical Review Committee and the Technical Commission concerning EIA.

Five hard copies in Serbian shall be presented to the Beneficiary for the review purposes. The document shall also be presented to the Engineer in electronic format and also in editable electronic format.

1.10.18 Environmental Management Plan

The design of facilities of the RWMC including the LTP, SBR, MRF and the composting Plant shall satisfy the requirements of the Environmental legislation in Serbia. An Environmental Impact Assessment (EIA) Study, including proposals for mitigation measures, was prepared by independent environmental experts. The Contractor shall follow the recommendations of the EIA Study together with any conditions attached to the EIA approval decision by the Competent Authority and incorporate them in his Preliminary Design.

The Contractor's design shall include adequate measures for the reduction of sound and odour emissions as well as for the reduction of solid wastes produced. Moreover an energy-optimised design and operational concept, including treatment of odours for the MRF and Composting Plant is a precondition.

The construction of the RWMC will cause some environmental impacts, which should be identified and minimized as specified in the EIA Study.

The Contractor shall comply with the local and National requirements and the issued permission for buildings. The Contractor shall be legally responsible and financially liable to observe National environmental legislation.

The Contractor has the obligation to implement all mitigation measures that derive from conditions attached to the decision to approve the EIA Study.

- The Contractor is obliged, in parallel with detailed design, to elaborate Environmental management plan and Contingency Plan, for the RWMC operation period and RWMC after care period including the impact on environment of the waste management facilities and designed mitigation measures, management plans and monitoring of all effluents, including odours, noise, waste waters, gases, etc. This Plan has to be issued by the Contractor and approved by the Engineer, in English and Serbian, before Provisional Acceptance Certificate signing.

Program of monitoring environmental impact

The Tenderer shall provide, as part of its Environmental Management Plan, Programme for monitoring of environmental impacts. The programme shall encompass monitoring of all effluents, including but not necessarily limited to leachate quality and quantity, waste water, exit air, odour, noise, vibration, dust, for the landfill body, landfill gas treatment, LTP, SBR, MRF, composting plant, etc., including technical details of proposed monitoring places and monitoring equipment, frequency of monitoring, limits, mitigation measures in operation phase and in case of accidents (Contingency Plan), and associated capital expenditure and operational expenditure cost estimates. The programme for monitoring environmental impacts must be implemented as part of the RWMC and shall be in accordance with current legal regulations in Serbia, EIA Study, and relevant EU regulations.

The Contractor is obliged to prepare a detailed Programme for monitoring environmental status and Contingency Plan during the operation of the LTP, and after closure of the landfill, as a part of designs and documentation required by the Law on Planning and Construction. This Programme shall be a part of Environmental Management Plan on RWMC including impact on environment, and designed mitigation measures, management plans and monitoring of all effluents, including odours, noise, waste waters, gases, etc.

The Contractor shall be obliged, through a competent institution, to carry out testing of environmental quality on the site before start of the construction works ("0" status), during and after completion of the works, before commissioning and during the trial work, aiming at obtaining an adequate picture of environmental condition in this locality prior to the operation of the RWMC.

Related to monitoring of treated leachate, it will be necessary to provide measurement of treated leachate quality and quantity, before its recycling to landfill body.

For the suggested controls it will be necessary to prepare the programme of controls-EMP-SSIP, which will cover the wide spectre of environmental effects, which can be measured and compared. Data obtained should be recorded and used for providing information, intervening or indications of extraordinary situation for a specific segment on the site.

These monitoring-measurement results shall mandatory be notified to the public in a transparent manner.

1.10.19 Main Design

Based on the approved (following Republican Technical Review report) Preliminary Design, the Contractor shall complete a Main Design (MD)

The Main Design contains the final RWMC layout solution and final data about the micro location of the facilities, the final functional, construction and representational properties, the technical - technological and exploitation characteristics, the geological engineering and technical properties of the terrain and soil with final calculations of stability and safety, the technical, technological and organizational construction elements, the environmental mitigation measures, and the final infrastructure design.

The Main Design, ("Glavni projekat"), should be prepared in a way that one book for each discipline (technology description, civil works, structural, mechanical, electrical, hydro, water supply and sewage system, and SCADA) is done and divided in sections for each subject, as minimum:

- Technological design
- Architectural design with structures and units disposition
- Civil – structural design
- Design on electrical installation
- Design on mechanical units, equipment and installation
- Design on water supply, sewage (fecal and atmosphere), and hydrant network
- Design on telecommunication and SCADA
- Design on internal roads and connection to the acces road
- Design on horticulture of the site-landscaping
- Report on technology of construction

Also, the following shall, as a minimum, be elaborated in detail:

- Environmental Management Plan for RWMC operation period and after care period, including the impact on environment of the LTP and designed mitigation measures, management plans and monitoring of all effluents, including odours, noise, waste waters gases, etc.
- Fire protection
- Safety on work
- Geo-mechanical characteristics of the RWMC site
- Installed energy.

The MD shall be prepared in both English and Serbian language by licensed engineers as required by Serbian Laws.

Six hard copies in Serbian shall be presented to the Beneficiary for the purpose of design review –Technical control and for obtaining a Building Permit. One copy shall be returned to the Contractor with Engineer's comments. The document shall also be presented to the Engineer in electronic format and also in editable electronic format. Drawings are to be submitted in time for incorporation of comments without delaying the time schedule and the completion of the work.

In accordance with the Law, the abovementioned designs should be prepared by companies licensed for this specific type of projects.

Drawings and other information submitted at the previous stage that have been revised or updated shall be resubmitted, accordingly.

The Contractor's submission for approval shall be sufficient for the Engineer to be able to confirm that the Contractor's proposals conform to the Technical Specification and any relevant Codes and Standards. The submission shall be in English, or with an English translation. As a minimum it shall include,

- Calculations, detailing the applicable recognised Codes or Standards
- Drawings and sketches to clarify the submission
- Details of proprietary materials
- Details of any deviation from the Specification, with explanation
- Confirmation from a Contractor's QC manager that the submission has been checked for conformity with the Specification

Any deviation from the approved submission will require the prior approval of the Engineer.

The Engineer's review of drawings and calculations etc. shall serve as a spot check only to prove that the documents have been prepared in accordance with the tender dossiers. The Engineer's approval of the Working Drawings, Contract Records, etc., and of the Workshop test records etc., shall not relieve the Contractor of the obligation to meet the terms of the Specification and any of the plant or equipment which upon delivery to site is found to be incorrect or unsatisfactory, or which fails to perform its duty satisfactorily during commissioning or during the Defects Notification Period shall be replaced to the Engineer's satisfaction.

The Contractor shall be responsible for any discrepancies, errors, or omissions in the drawings and other particulars supplied by him, whether such drawings and particulars have been approved by the Engineer or not, provided that such discrepancies, errors, or

omissions are not due to inaccurate information or particulars furnished in writing to the Contractor by the Beneficiary or the Engineer. The Engineer shall be responsible for drawings and information supplied in writing by the Beneficiary or the Engineer and for the details of special work specified by either of them. The Beneficiary shall pay any extra cost reasonably incurred by the Contractor due to any alterations of the work necessitated by reason of inaccurate information so supplied to the Contractor.

1.10.20 Workshop Design and Drawings

For components manufactured off-site, the Contractor shall prepare designs and shop drawings which clearly demonstrate the functionality of the component as required by the solution defined in the Detailed Design.

The design and shop drawings shall clearly indicate as a minimum the following:

- Full dimensions to enable site installation
- Dimensions of supporting substructure
- Location of fixings, size and types
- Stresses and loads which will have to be supported by the supporting structure
- Installation instructions
- Lifting and handling requirements
- Environmental protection requirements including during storage
- Operation and maintenance requirements and manual

Additional Drawings

The Contractor shall prepare and submit all additional drawings and workshop drawings, including details for the construction and completion of the works on request from the Engineer. These additional drawings shall be based on the format and principles adopted for the Engineering Documents and shall be produced and submitted to the Engineer for approval.

The additional drawings prepared by the Contractor shall cover the following aspects of the works:

- Working drawings and calculations for all the temporary works proposed by the Contractor for constructing the Works;
- Full working drawings indicating the Contractor's proposed method of construction together with supporting calculations where applicable;
- General arrangement detail drawings showing access to safety equipment and emergency escape plans.

1.10.21 Requirements for Reports and Drawings

All reports, designs and drawings shall be prepared in English language except documents needed for Technical Acceptance after completion of the works and needed for fulfilling the legal requirements (site book, site diary, survey records, MD, PD, etc). These documents have to be both in English and Serbian language.

The detailed content of engineering documents, which shall be prepared by the Contractor and submitted for approval to the Engineer, shall be adequate for the purpose. The Engineer will reject all documents and designs in cases where he considers them to be unsatisfactory, not in compliance with these tender requirements or not sufficiently detailed. The Contractor shall be responsible for preparing all documents to a good standard, with the contents fully in accordance with the Technical Requirements. The

documents and drawings to be submitted by the Contractor shall take their final form after approval by the Engineer.

Design Documents and drawings shall be numbered following a system described in the Contractor's Quality Assurance System (QA-S). The numbering system shall clearly distinguish the source and the type of each document i.e. process, structural, electrical, SCADA and MEICA.

The Contractor shall maintain an electronic register of all reports, documents and drawings to be used under the Contract. The register shall be accessible by the Engineer.

Amendment and revision to any document or drawing shall be recorded as required by the QA-S and only the latest approved version shall be considered valid.

All drawings shall preferably be A1 and/or A3 paper sizes unless this is impracticable and shall comply with the requirements of the Engineer. Documents submitted, other than drawings and manufacturers' literature shall be A4 in size.

Any abbreviations used in drawings and documents shall be explained. Only SI units shall be used. All drawings and documents shall bear in a title box in A4 format (from top to bottom) the following information:

- Engineer and Beneficiary;
- Contractor;
- Contract Title;
- Contract Number;
- Project No:
- Document or Drawing Title:
- Scale:
- Date:
- Drawing Number:
- Revisions (No., date, made by, checked by, descriptions)
- Boxes for preparation of the drawing / document (made by, checked by, each date and signature)
- Box indicating drawing / document superseded
- Box indicating drawing / document to be read in conjunction
- Box indicating status of drawings ("working drawing / document" or "as-built drawing")
- Other boxes (preparation mode, size, CAD No., etc.)
- Boxes for approval signatures (Engineer, Contractor, or Beneficiary)

All drawings produced on CAD systems shall be in the form of black lines on a white background when printed. Use of coloured lines should be avoided. All line thicknesses; text height and text style shall comply with ISO standard.

All layout and arrangement drawings shall be to scale and shall include a graphical scale to aid the use of reproductions to different scales. All dimensions shall be given in SI metric units.

Drawing size shall comply with ISO standard and shall not be larger than A1. Calculations and other documentation shall include a cover page giving at least the same information as required to be shown on the drawings.

The Contractor shall propose through QC system one or more system(s) for numbering of all documents, manuals, drawings, electrical and mechanical components, cables, pipes.

1.10.22 Contractor's Designer

To carry out the detailed designs in accordance to the requirements of this tender and to the requirements of the national legislation (the Law on Planning and Construction), the Contractor shall only employ appropriately qualified and suitably experienced personnel who are familiar with all aspects of RWMC and Works in connection with RWMC, including MRF, LTP, SBR and composting plant, and also be well acquainted with PRAG, FIDIC, P&DB and Serbian Planning and Construction legislation.

The documents and drawings to be submitted by the Contractor shall be prepared by a design Engineer to be proposed by the Contractor and approved by the Engineer. The design Engineer shall hold all necessary licences (if any) as required by the Serbian legislation for the type of works to be constructed.

The Contractor shall include within his bid CV's of the key staff he intends to use. Change of key personnel shall only be made after CVs have been submitted to the Engineer and approved in writing by him.

1.10.23 Approval of Documents and Drawings

Documents and Drawings shall be submitted for approval to the Engineer as provided in the technical requirements.

Request for approval shall be submitted at least 28 days prior to the date on which the Contractor plans to start ordering material, start fabrication or start construction.

In his application for approval, the object, extent, section of works and purpose of the request for approval shall be clearly stated and it may be one of the following:

- Approval of preliminary design for submission to review committee
- Approval for proceeding to main design
- Approval for purchase of material or equipment
- Approval for shop fabrication
- Approval for shipping
- Approval for construction

Approval by the Engineer of the technical and equipment installation documents is a mandatory requirement prior to the ordering of any material and equipment. The Contractor shall not commence manufacturing or construction of any part of the Works before the approval of the Engineer to the relevant designs, drawings, specifications or other documents has been given and shall not make any changes on the approved drawings without the knowledge of and written approval by the Engineer. No work shall commence on any structure until complete submissions showing all details affecting its size or location have been approved.

The Engineer may not process the documents and drawings if they are not submitted in the specified manner or if the application is not complete. The Contractor shall not be entitled to make any claims as a result of this action.

The Engineer will also not process the application if construction drawings are not supported by an appropriate approved design and transferred to the drawings by the Contractor.

The fact that any document or drawing has been approved by the Engineer, the Beneficiary or any technical review committee, that no objection has been made to the details shown on these documents and drawings shall not relieve the Contractor of any of his responsibilities and shall not put any responsibility on to the Engineer or Beneficiary.

Approval by the Engineer will be accompanied by a hard copy of the document printed with the appropriate approved stamp. The results of the Engineer's review are categorised as follows:

Engineer's Review of Submissions		
Items submitted for review by the Contractor and returned by the Engineer will be categorised as follows:		
	Category	Description
1	"Approved"	Subject to its compliance with the Specification and conformity with the overall design, the Engineer has no comment on the submission.
2	"Approved with comments as noted"	Subject to its compliance with Specification and conformity with the overall design, the Engineer has comments on the submission but they are not such as to necessitate formal re-submission
3	"Rejected"	Submission is not compliant with the Specification & Tender Requirements or Standards. The Engineer will indicate the reasons for his not accepting of the submission; the Contractor shall amend or revise the submission accordingly and re-submit the item for review.
In the case of first submissions by the Contractor to the Engineer for review, each design, drawing and document shall reach the Engineer in time to allow the required 28 days for review by the Engineer before return to the Contractor.		
Re-submissions by the Contractor to the Engineer of the same design, drawing and document shall reach the Engineer in time to allow at least 14 days for review by the Engineer before return to the Contractor.		
Following receipt of the Contractor's programme for submissions the Engineer will notify the Contractor as to which particular drawings must be classified by the Engineer as "Approved" prior to the commencement of manufacture or construction on that section of the work by the Contractor. Otherwise, if the Engineer does not return to the Contractor his submissions after the review periods stated above, the Contractor might proceed with his programme as though the submissions had been categorised as "Approved" . Such assumed acceptance shall not relieve the Contractor of his sole responsibility for compliance with the Specification in the completed works.		

If within 28 days, or other specified period, such approval has not been granted, other than due to rejection of the submission by the Engineer, then approval will be deemed to have been granted. Any such approval deemed or otherwise will not relieve the Contractor of any of his obligations under the Contract.

1.10.24 Design Deliverables

All drawings, schedules, calculations and other documents to be submitted by the Contractor for the Engineer's approval shall be in both hard and soft copy and shall be in English or in English with translation in Serbian language, whereas the English version will prevail.

Where Engineer's approved documents have to be submitted for administrative reviews, 6 copies in Serbian language, as required by Law, shall also be submitted to the Beneficiary to enable the permitting procedures to be completed.

All draft documents and draft drawings shall firstly be submitted to the Beneficiary and Engineer for commenting. Then, the Contractor shall be required to prepare the final copy, incorporating any amendments arising from such comments. The drawings and other documents shall also be submitted on CD in a form acceptable to the Beneficiary and the Engineer.

1.10.25 Design Programme

A programme for submitting drawings, schedules, calculations and other required documents shall be submitted by the Contractor to the Engineer for approval in accordance with the Contract provisions. The programme shall identify the stages of submission and the drawings, schedules, calculations and other documents to be submitted for approval as required by the Engineer's Requirements and the Conditions of Contract.

An indicative programme for the design activities is provided hereafter:

Item	Indicative period from the Commencement Date	Comments
Quality Assurance system and Quality Control plan	1 Month	
Contractor's Preliminary Design according to Location Permit	4 months	For complete RWMC Facilities to be approved by the Engineer and by the competent Serbian Authorities in accordance with the Serbian Law on Planning and Construction (option if needed)
Contractors Detailed Design for Construction Permit	4 months (subject to approval of the Preliminary Design)	The design for the components of the RWMC Facilities to be constructed shall be prepared and reviewed fully in accordance with provision of the Serbian Law on Planning and Construction.

1.11 General Works Requirements

All works, whether specified in the Contract Documents or not and whether specified in part, incomplete or incorrectly or not explicitly described or only implied, must be completed to ensure that the Works shall be functional as per the technical requirements described in the Contract.

1.11.1 Civil Engineering Works

The term "Civil Engineering Works" shall mean the obligations of the Contractor under the Contract to cover all manufacturing, excavation, building, structures, process units and other construction Works, which shall be performed by the Contractor.

The following shall be included, but not limited to, within the limits of the Works:

- Site investigation, levelling, excavation, fill and other earth works
- New completed process units and buildings, incl. waste treatment facilities and associated wastewater, sewerage and leachate connections, treatment and disposal
- Civil works related to complete drainage systems and structures necessary for the disposal of process waste, overflow, and drainage water, waste or used chemical solutions (including from any laboratory) treatment sludge and storm runoff to receiving body
- Landscaping and similar area works with plant roads, temporary roads, and site facilities

- Indoor and outdoor sewerage systems including all sanitary installations inside the buildings
- Water supply plumbing, fixtures and fittings inside buildings
- Complete heating and ventilation/air-conditioning systems together with all facilities for all buildings and process units, which shall conform to these Requirements
- Complete potable and non-potable water supply systems for the Works for area supply, fire fighting, supply to all buildings and the RWMC, including all pipe-work with all necessary fittings, specials, valves, hydrants, storage and make-up tanks and service water systems, booster pumps, etc.
- Necessary equipment and material for all storm water and plant internal wastewater drainage system and treatment, including those to be separately provided for such as wastes from laboratory, waste or used chemical solutions
- All other works whether specified in the Contract Documents, (including the Contractor's proposal) or not, as necessary for the completion of the Works and the operation thereof, and as required under the terms of the Contract
- Excavation, laying of protection layers and general preparation of Landfill Body
- Excavation of trenches, laying of pipes, welding and protection of the pipes, transport and disposal of excess and demolished materials
- All works for the preparation of working paved areas, waste deposition plateaux, process and storage hangars
- Access road improvement, internal road system, parking lots
- All temporary and provisional works necessary for proper erection of the plant (temporary roads, keeping excavation free of water, excavation sheeting and bracing, etc.)
- Completion of all works which shall be provided under the Contract, whether specified in the Contract Documents or not, and whether specified therein in part, incomplete or not explicitly described or only implied.

1.11.2 Mechanical Installations

The term "Mechanical Installations" shall mean the obligations of the Contractor under the Contract to cover all manufacturing, delivery, assembling and installation, testing and commissioning of the required mechanical equipment and machinery for the process units, which shall be performed by the Contractor.

The following shall be included, but not limited to, within the limits of the Works:

- All materials and equipment for the RWMC operation, within and between process units structures including waste separation plant and composting facilities, sewage, leachate and other wastewater treatment facilities, sludge disposal facilities or other facilities belonging to the treatment and/or transport process
- Mechanical equipment and machinery, including motors and pumps and spare parts
- Complete piping system, incl. fixings and fittings
- Workshop equipment
- Laboratory equipment
- All other auxiliary materials of any description and all materials

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- Spare parts for fixed and mobile mechanical equipment

1.11.3 Electrical Systems

The term "Electrical Systems" shall mean the obligations of the Contractor under the Contract to cover all manufacturing, delivery, assembling and installation, testing and commissioning of the required power supply, power distribution and sub-distribution systems for the process units, which shall be performed by the Contractor.

The following shall be included, but not limited to, within the limits of the Works:

- Electrical power supply from the public mains network, including all co-ordination and technical clarification with the responsible power supply companies
- Transformer stations where included in the Contract;
- Emergency power generator, minimum capacity 100 KVA, complete with automatic power transfer panel
- Low tension main distributions, reactive power compensation units, battery systems, safety and protection devices, etc.
- Low tension systems, c/w separate low tension distributions at all process stages with switch gear panels, control systems for manual, automatic, local and remote control, PLC units, marshalling cabinets, safety and protection devices, etc.
- Complete SCADA, process control and instrumentation system, incl. all instruments required to supervise and control the various process stages, control systems, control centres at all major process sections, etc.
- Bi-directional telecontrol system between control points and local control centre.

1.11.4 Electrical Installations

The term "Electrical Installations" shall mean the obligations of the Contractor under the Contract to cover all manufacturing, delivery, assembling and installation, testing and commissioning of the complete lighting, telephone and signalling systems for indoor and outdoor (at/in all buildings, streets, ways, places, structures, etc.), including emergency lighting, sub-distributions, switches, light sensors, clock timers, poles, fittings and fixtures, etc., which shall be performed by the Contractor.

The following shall be included, but not limited to, within the limits of the Works:

- Standby generation with all switchgear and automatic switch over equipment;
- Local electricity distribution panels, starter panels, cable ways, motor control centres;
- Complete system of power outlet sockets for indoor and outdoor at/in all buildings, streets, ways, places, structures, etc. including sub-distributions, earth-leakage circuit-breakers, etc.
- Complete medium voltage-, low voltage-, communication-, signalling-cable-systems and wiring, including all connecting, mounting, routing, labelling and testing, etc. for the RWMC structures
- Telephone and telecommunication system for the RWMC, including all co-ordination and technical clarification with the responsible telephone company; all telephone instruments, exchanges, etc.
- Complete fire alarm systems, security systems, etc. for RWMC structures

- Complete earthing, lightning and over voltage protection and potential-equalisation-systems, etc. for the new MEICA equipment of the RWMC.

1.11.5 Dealing with Surface and Underground Water

The Contractor shall be responsible for dealing with water, whether from existing watercourses, surface water and storm water, drainage systems, ground water, underground springs or any other source or cause. In discharging and diverting water he shall avoid flooding or damaging other works or services, causing erosion and polluting watercourses.

The Contractor shall provide all temporary works and do all things which may be necessary to maintain those parts of the existing water supply, sewerage, and drainage systems and water courses which may be affected by his operations in a condition not less satisfactory than they were prior to the commencement of the works and shall maintain the normal flows therein at all times until the connections to the new system shall have been made except when written permission to interrupt the flows has been obtained from the Engineer.

The Contractor's method proposed for each location shall be subject to the approval of the Engineer. Such approval will not relieve the Contractor of his obligations under the Contract.

The Contractor shall perform all works for maintaining flow in the existing water supply, sewerage, and drainage systems and water courses including but not limited to the construction of diversion systems and relocations and other works necessary during the construction period including the removal and dismantling of such works on completion as required by the Engineer.

The Contractor shall as required by the Engineer keep excavations free from water and sewage whether caused by floods, storms or otherwise so that the works shall be constructed in dry conditions.

Unless otherwise specified the Contractor shall furnish, install, maintain and operate all necessary pumping and other equipment for de-watering the various parts of the works and for maintaining the foundations free from water as required for construction of each part of the works.

The Contractor's method of removal of water from the foundations will be subject to the approval of the Engineer. Where excavations for foundations of structures extend below the groundwater table, the portion below the water table shall be de-watered in advance of excavation unless specified otherwise.

The de-watering shall be accomplished in a manner that will prevent loss of fines from the foundation, will maintain stability of excavated slopes and the bottom of the foundation, will result in all construction operations being performed free from standing water, unless otherwise specified, and will result in all foundations being sufficiently dry for proper bonding of the backfill materials with the foundations and proper compaction of the materials placed.

The Contractor will be required to control any seepage along the bottom of the foundations and elsewhere prevent the accumulation of the standing water. Generally de-watering at foundations shall comply with the requirements of DIN 4095 or equal.

The Contractor shall be responsible for dealing with storm water, whether from normal or extraordinary rainfalls and weather conditions or any other source or cause. In discharging and diverting water he shall avoid flooding or damaging other works or services, causing erosion and polluting watercourses.

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Unless otherwise specified the Contractor shall furnish, install, maintain and operate all necessary pumping and other equipment for storm water protection and de-watering the various parts of the works.

1.11.6 Existing Underground Utilities / Structures

The Contractor shall (for his own safety) take care about any buried power cables, gas lines or pipes. He shall locate these utilities /structures sufficiently in advance of his construction operation and use modern detection equipment, to the satisfaction of the Engineer, in order to minimise the risks to damage or to interrupt the underground utilities/structures. The Contractor will be held responsible for maintaining these utilities and shall repair without any delay any damage caused by his operations at his own expense.

No excavating machines shall be used in the immediate surroundings of cables and/or pipelines unless approved by the Engineer. Special care shall be taken to ensure that the existing facilities are accessible in the case of an emergency.

Temporary works, which have to be made in the vicinity of the existing facilities during the execution of the works, shall be maintained by the Contractor and shall be removed as soon as practicable. Before works are started that might affect or damage neighbouring structures the Contractor shall have prepared a "Record of Evidence" by experts about the condition of the structure. This Record should include photographs to indicate any defects of the structure (i.e. dilapidation survey) before the execution of the works.

1.11.7 Contractor's Equipment

Details of all Contractors' Equipment to be used by the Contractor in the execution of the Works shall be submitted to the Engineer prior to its use.

The Engineer's consent to use the Contractor's Equipment will not be unreasonably withheld, but if in the Engineer's opinion circumstances arise which make it desirable that the use of the Contractor's Equipment should be suspended either temporarily or permanently, the Contractor shall change the method of performing the work affected and he shall be deemed to have no cause for claims against the Engineer on account of having to carry out the work by another method, nor shall he be deemed to have cause for claim if any order issued by the Engineer results in the Contractor's Equipment having to stand idle for a period of any duration whatsoever or having to be removed.

In particular, where it is impossible due to the proximity of, and danger to, existing roads, structures, or services, to excavate except by hand methods, then in such cases it shall be deemed reasonable for the purpose of this Clause for the Engineer to withhold consent to use the Equipment.

1.11.8 Other Contractors on the Site

The Contractor shall make appropriate allowance for liaison and co-operation with other contractors on the site and possible other contractors of any utility providers (gas, electricity, water and telephone) which might interfere with the Works under this Contract.

In case it is necessary for other contractors employed by the Beneficiary, and employees of the Beneficiary to work on and around the site, such other contractors and employees may reserve areas for use. The Contractor shall not enter or use these areas without the prior written permission of the Engineer, unless such entry is permitted elsewhere in the Contract, and shall not obstruct access to such areas without having provided an acceptable alternative access.

The Contractor shall not interfere in any way with any works, whether the property of the Engineer or of a third party and whether the position of such works is indicated to the Contractor by the Engineer or not. The Contractor shall respect the construction and finish

of works and articles supplied or installed by others and will be held responsible for any loss or damage thereto if caused by him, his employees or his subcontractors.

1.11.9 Subcontracted Works

The Contractor shall appoint licensed subcontractors for all those parts of the work described herein for which he is not himself an experienced, recognised and approved Contractor. The Subcontractors have to be approved by the Engineer or nominated in the original offer.

The Contractor shall submit for consent, the names of all proposed specialist subcontractors and suppliers of special manufactured items with full details of local agents or, if local agents do not exist, the procedures for service and supply of spare parts and shall indicate the precise sections of the work for which each will be responsible.

The Contractor shall provide evidence that each firm undertaking manufacture or fabrication has satisfactorily executed work of a similar nature. In the case of work, which the Contractor proposes to manufacture or fabricate on the site, the Contractor shall provide evidence that he can satisfactorily execute the work.

The Contractor shall be solely responsible for the overall co-ordination of the Contract. Direct formal communication between his sub-contractors and the Engineer will not be allowed.

1.12 Materials and Workmanship

1.12.1 Local and Environmental Requirements

All materials and manufactured items shall be suitable for the climatic and environmental conditions described in this specification.

The environmental conditions may be different in different parts of the Works and materials shall be selected and manufactured items designed accordingly to withstand the relevant corrosive elements. In particular:

- All materials shall be suitable for the environment expected at its built location and the Contractor must bear in mind the climatic condition which may dictate the use of particular material.
- All products or materials in contact with waste or a "waste-like" environment shall be non-biodegradable and resistant to these substances.
- All products or materials in contact with potable water shall not constitute a toxic hazard, shall not support microbial growth, shall not cause taste, odour, cloudiness and colouration of the water, and shall be approved by a recognised certifying authority as being suitable for use in potable water supply systems.

All local customs, laws and regulations relating to the supply or source of materials shall be complied with.

1.12.2 Material Safety Data Sheet

Any product or substance used by the Contractor or its Subcontractors, which are a toxic or hazardous substance, shall be identified to the Engineer by the Contractor's submission of a Material Safety Data Sheet (MSDS). The MSDS or a manufacturer's standard form shall be submitted to the Engineer to advise him of the use of such material during the project before the material is brought on site.

1.12.3 Quality of Manufacture and Standards

All materials and manufactured items supplied for incorporation in the permanent works shall be new, of high quality and of sound workmanship. They shall be purchased only from approved suppliers who shall be capable of demonstrating the suitability of their products by reference to similar works or certified test results.

Materials and manufactured items shall normally be certified as complying with relevant specifications of a recognised national or international standards organisation which shall be subject to the approval of the Engineer. Approval shall be in accordance with the Quality Assurance System.

The Technical Requirements indicate approved standards for specific materials as a quality guide for the materials and articles to be provided. This indication or schedule in no way prejudices the approval of any other equivalent or superior national or international standards. Also included in this schedule are publications for guidance on procedure and practice.

Where the requirements of the Specifications and an approved standard differ, the approved Standard's requirements will prevail.

Any reference to a Manufacturer/product is to be taken as indicative of quality only.

1.12.4 Warranty for Materials incorporated in the Works

Over and above the Design Life specified for items of plant and equipment, a warranty made out in the name of Beneficiary shall be provided by the manufacturer of the materials listed below. The warranty shall include appropriate dimensioning of

components, correct choice of materials (including auxiliary materials like ancillary materials of welding, corrosion protection coating) and workmanlike installation for the periods shown.

Description/Subject	Warranty Period [Years]
Special components and auxiliary equipment	5
Pipes, drains & sewage	5
Steel & Metal Constructions	2
Machine Units, Machines, Fittings	2
Cables & Accessories	2
New Electrical Equipment	2
Process Control & SCADA Equipment	2

The warranty period shall commence after the date stated on the Provisional Acceptance Certificate. This aspect shall be given special attention by the Contractor, when purchasing Plant and Materials intended for the Works.

1.12.5 Approval of Materials and Manufactured Items

Full information, as detailed below, for all proposed materials and manufactured items shall be submitted to the Engineer.

Prior to the placing of any order for materials or manufactured items, a Request for Approval shall be submitted in triplicate. The information shall be clearly and neatly presented in a standard format to be agreed with the Engineer. Four weeks should normally be allowed for approval and no orders shall be placed until one copy of the Request for Approval has been returned duly signed and dated. The information required is as follows:

- Name and address of proposed supplier or manufacturer;
- Reference numbers and title of relevant specifications of a recognised national or international standards organisation with which the materials or manufactured items will comply together with copies of the specifications in English
- Samples of materials representing the quality of the bulk of such materials the Contractor proposes to use;
- Manufacturers' literature and data sheets for articles and fabricated items;
- A description of the items to be supplied with a description of quality, grade, weight and strength;
- Sufficient information to demonstrate that the materials or manufactured items are suitable and comply with the Specification;
- Certificate of Origin confirming the eligibility issued by the chamber of commerce
- Any other information called for in particular clauses of the Technical Requirements.

Following approval of an order for manufactured items designed for incorporation in the Works detailed drawings and installation drawings shall be submitted for approval. Following approval three copies of such drawings shall be submitted.

Prior to despatch to site or to a designated place of storage the following shall be provided:

- Facilities for inspection and testing at suppliers' pits or quarries, manufacturers' works or at approved independent testing centres as appropriate. Inspection and /or witness testing may be carried out by the Engineer or other appointed Inspector;
- Details of the supplier's or the manufacturer's quality control test procedures;
- Manufacturers' "type" test certificates, or recent test results carried out on similar items, i.e. CE-certification, certificate of origin, etc;
- Warranty certificates;
- Shipping and consignment identification details.

All materials shall be delivered to the site a sufficient period of time before they are required for use in the Works to enable the Engineer to take such samples as he may wish for testing and approval.

The submission of details and samples under this Clause shall not relieve the Contractor from any of his responsibilities under the Contract.

1.12.6 Rejected Materials and Defective Work

Materials or work, which in the opinion of the Engineer, do not comply with the Specification, shall be classified as rejected materials or defective work and shall be cut out and removed from the Works and replaced as directed by the Engineer.

1.12.7 Materials in Stacking Yards

Considerable quantities of Material will have to be stored during the execution of the works. The Contractor shall take all reasonable precautions to protect these materials from any damage including fire and theft and shall furnish evidence of the insurance cover to this respect.

1.12.8 Method Statements

The Contractor shall provide in writing a general description of the arrangements and methods that the Contractor proposes to adopt for the execution of the Works. This shall be submitted to the Engineer at the same time as the Contractor's Detailed Design.

Detailed Method Statements shall show in detail the methods proposed by the Contractor for carrying out the principal activities of construction in full safety. In particular the Contractor shall indicate the resources (plant, personnel, materials) to be allocated, their timing and sequencing, emergency/contingency measures, and any other information required to clearly detail the proposed methods. All necessary health and safety and environmental measures required shall be clearly indicated.

For all elements of the Works, fully detailed method statements describing proposed construction techniques and programme for execution shall be submitted to the Engineer in duplicate. These shall be supported, where applicable, by calculations for temporary works for supporting excavated faces and shuttering of concrete. Flowcharts, sketches and drawings shall be included as necessary to facilitate comprehension.

Proposed Construction Methods shall be submitted to the Engineer, in two copies, at least 45 days before the start of relevant work. The Engineer will review and provide his comments within 15 days. The Contractor shall make final corrections (if any) and submit to the Engineer, for final approval, 21 days before the commencement of relevant work. Written approval shall be obtained before any work is commenced.

1.12.9 Alternatives

The Contractor is, during construction, at liberty to give technical proposal for items of plant or methods of construction for which he claims advantages to that indicated in the Specification and Drawings, providing the mode of operation and method of construction is fully detailed and is at least equal to that shown on the Drawings or implied in this Technical Requirements. The Contractor shall fully state his reasons for submitting any alternatives and the Contractor shall price separately any reduction in his rates if and where applicable. Alternative materials to those specified shall have an equivalent proven performance for its intended use, shall be demonstrated to be economically advantageous and suitable to sustain the design life of the Works.

The Engineer shall accept or reject any such alternative and shall not be under any obligation to give the reasons for any rejection to the Contractor.

1.12.10 Spare Parts

The Contractor shall supply spare parts for the first three (3) years of operation from the completion date stated after the issue of the Provisional Acceptance Certificate.

Spare parts shall be defined as components or parts, either consumable or repairable, used to maintain or repair machinery or equipment. A Bill of Materials for spare parts (spare parts list) shall be elaborated based on the manufacturers' recommendations and included in the offer.

1.12.11 Documents at Delivery

At the time of delivery of materials and goods, the Contractor shall submit the following documentation to the Engineer in one original and two certified copies:

1. All certificates, documentation of tests etc. of materials and goods to be used in the Works:
 - All documents verifying that inspection, control and tests performed are in accordance with the Specifications;
 - Identification lists with cross-references between documents and materials and goods.

1.12.12 Record Drawings

The as-built design of the works and plant shall be submitted both in English and Serbian language before Test of completion is done and Provisional Acceptance Certificate is issued. For the purpose of the Technical acceptance, 6 hard copies of the As built designs in Serbian language have to be submitted to Beneficiary.

The documents shall be stamped by the Engineer. If the Engineer fails to stamp and / or if he does not make any observations in a period of one month after their submission the documents will be regarded as being accepted.

The as-built documents have to be prepared according to Planning and Construction Low and contain the following documents:

- All drawings of the structures as constructed.
- Detailed arrangement drawing of the structures containing all the information on structural general arrangement, wall thicknesses, levels, line, pipe diameters, materials, bedding, ground conditions and connections etc.
- The Contractor shall perform the As-Built Design which is presenting the actual building conditions as they are erected on the site.

- All other documents required by the Contract documents.
- It shall incorporate all the modifications/revisions affected during construction. Each hard copy shall be durably bound in a volume or volumes depending on bulk. All material except drawings shall be A4 size. Drawings shall be on A1/A2/A3 size sheets and shall preferably not exceed 297 mm in height folded and shall be bound into volumes. Volume titles shall be clearly inscribed on the front cover and on the spine of the cover. Drawings shall be marked "AS-BUILT", the cover of each binder shall be finished with a black waterproof and greaseproof material and the title printed gold block in easily readable lettering on the front and on the spine.
- In addition the Contractor shall arrange the complete as-built documentation in English and Serbian language as an Adobe-Reader file with adequate structure of the contents and additional, corresponding computer files and submit it on CD.
- All drawings shall be filed on CD as AutoCAD Drawings, DWG format and in Adobe pdf-format. The CD shall be handed over to the Engineer in two copies.

Record drawings for the Civil Works Plant installed, shall cover the Contractor's provision for the Plant delivered for erection in the Works as completed, incorporating all modifications carried out during construction or manufacture or after testing at the Contractor's or Sub-Contractor's and manufacturer's works and all modifications carried out in the course of the erection and commissioning and testing of Plant.

The drawings shall include those provided by the Contractor during the design, construction, structure and manufacturing period together with drawings submitted by him with his tender as appropriate. In addition, each item of plant and equipment, e.g. conveyer belts, motors, starters, cables, etc. shall be shown on detailed general arrangement drawings clearly marking the position of the component parts. All parts shall be numbered and the numbers given shall correspond to the spare parts list, pamphlets and descriptive matters.

Comprehensive electrical circuit diagrams and electrical schemes shall be provided showing the relation of one electrical item of equipment to another.

Drawings shall be accompanied by one set of indexed PDF files on CD or other optical media, of a type approved by the Engineer, of the record drawings and all the works instructions and all other drawings, shop drawings, fabrication diagrams and the like used in the manufacture, design, construction assembly or installation of the Works.

In addition to the foregoing, each item of electrical equipment shall be provided with schematic drawing and a wiring drawing.

The schematic drawing shall show the connections in a schematic form enabling the operation to be ascertained, while the wiring drawing shall show the individual components approximately in their relative physical positions, with the electrical connection shown exactly as wired, to enable a particular component or connection to be located on the actual equipment.

Every connection shall be numbered and the number given for a particular connection shall be the same on the schematic drawing, on the wiring drawing and as tagged on the actual equipment itself.

Where possible one suitably protected durable print of each of the appropriate electrical equipment drawings and diagrams shall be provided in a purpose made pocket for each cabinet.

1.12.13 Works during Defects Liability Period

The Contractor's remedial works after completion are subject to the same control conditions as the actual construction work.

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The filing system, including the QA documentation, shall be kept by the Contractor for minimum 6 years after the Defects Notification Period (DNP) has expired.

1.13 Management of contract, Works Programme and Reporting

1.13.1 Provisional Time Schedule

On approval of the design, the Contractor must prepare a works programme which takes into consideration the overall time schedule for completion of the works as follows.

The following provisional time schedule shall be considered for the completion of the Works:

- Quality Assurance System and Quality Control Plan within one month of commencement date
- The completion period for all works under the Contract shall be twenty seven (27) months what includes design period and three months test period and training of the stuff.
- Intermittent operation supervision of the MRF and Composting Plant during the Defects Notification Period with a total presence on site of one (1) month;
- Defects Notification Period shall be twelve (12) months under the Contract. The above one month operation supervision is included in these 12 months.

The duration and sequence of the various activities making up the Works may be varied by the Contractor to suit his own proposals for carrying out the Works, subject to the approval of the Engineer, under no consideration to extend the contract completion dates.

1.13.2 Works Programme

Pursuant to the requirements the works programme, which has to be submitted by the Contractor, shall show the planned monthly rates of progress between the programme dates for commencement and completion of each major item or work for the various stages of construction, in accordance with the Conditions of Contract.

The programme for the works shall take into account climatic conditions, drainage systems, groundwater, geo-technical data and other conditions, to ensure the completion of the works in accordance with the Contact.

The Contractor shall not be permitted to commence any construction work on that part of the works until the Engineer approves the drawings and calculations. Sufficient time for approval of materials and method statements must therefore be allowed for in the work programme.

The Contractor shall also allow in his program sufficient time required for taking over (Provisional Acceptance), Contractor's operation and training period and for the maintenance periods (Defects Notification Period) as stipulated in the Conditions of Contract.

1.13.3 Progress Reports

Reports and records which are submitted to the Engineer shall be in a format agreed by them and this shall include for electronic copies or any media required by the Engineer. Reports and records shall be signed by the Contractor's Representative or by another representative authorised by the Contractor.

Any publication, in whatever form and by whatever medium, including the Internet, shall carry the following text according to EU visibility requirements

Other elements of visibility that are also expected to be used after prior approval of the CA include:

- Press releases

- Press conferences
- Press visits
- Leaflets, brochures and newsletters
- Web sites
- Display panels
- Commemorative plaques
- Banners
- Vehicles, supplies and equipment
- Promotional items
- Photographs
- Audio-visual productions.

1.13.3.1 Monthly report

The Contractor shall prepare and submit to the Engineer copies of monthly reports in English language in accordance with the provisions of the Contract. Monthly reports shall be due on 7 days of the end of the reporting month. The reports shall be in a style and format as agreed with the Engineer and shall be submitted both as soft and hard copies as indicated below:

Submission to	Number of copies and language
PIU	electronic copy in English and Serbian
Beneficiary	electronic copy in English and Serbian
EUD	hard and electronic copy in English
Engineer	hard and electronic copy in English

In addition to the contents as required in the Conditions of Contract, the monthly reports shall include but not be limited to the following:

- Detailed description of Progress of works, divided into design, procurement, manufacture, construction, delivery to site, installation, testing, commissioning;
- Quality of works;
- Charts showing the status of construction documents, purchase orders, manufacture and construction
- For the manufacture of each main item of plant and materials, the name of manufacturer, manufacture location, percentage progress and the actual or expected dates of commencement of manufacture, Contractor's inspections, tests and delivery

Records of personnel and Contractor's equipment on site

Copies of quality assurance documents, test results and certificates of materials

Safety statistics, including details of hazardous incidents and activities relating to environmental aspects and public relations

- Any events, difficulties and problems arising during the reporting period;

Comparisons of actual and planned progress, with details of any aspects which may jeopardise the completion in accordance with the contract, and the measures being (or to be) adopted to overcome such aspects

- Follow up of the approved work programme: occurred delays, reasons for such delays, and measures to make up such delays; revision (if necessary) of the work programme;

financial and physical progress schedule

- Cash flow forecast based upon the forecasted progress of works;
- Photo report.

Each copy shall be durably bound in a volume or volumes, on size A4.

1.13.3.2 Interim Reports

The Contractor shall also prepare and submit to the Engineer two (2) printed copies and four (4) electronic version of any report related to any specific event(s) as and when requested to do so.

1.13.3.3 Site Closure Report

At the time of closure of the Site, the Contractor shall submit a Closure Report. The format of the report shall be agreed with the Engineer, but shall include the following details:

- Quantities of material used;
- Problems encountered;
- Environmental protection programme conducted;
- Materials, building semi products and equipment installed with proofs of their compliance;
- Quality Control data regarding materials, semi products and equipment installed;
- Maintenance Manuals;
- As-built drawings;
- Statements regarding changes to Building permit obtained.

Furthermore, the Contractor is obliged to prepare "Written statement about works performed and conditions of maintenance of building" completely in accordance with Serbian Law on Planning and Construction as published in the "Official Gazette of the Republic of Serbia", No. 72/2009, 81/09, 64/10, 24/11 and relevant secondary legislation in Serbian language.

1.13.4 Construction testing procedure

The Contractor shall divide the Works into elements of construction comprising of Work, materials and tests, and shall submit this list of elements of construction to the Engineer for consent.

For each element of construction, the Contractor shall submit to the Engineer a programme of tests and inspections in accordance with the Requirements, and shall submit to the Engineer a programme of tests and inspections in accordance with the Requirements, and shall describe the manner in which the tests and inspections are to be carried out.

Prior to the commencement of the construction of the Works the Engineer will select the particular materials for which the Contractor shall sample and carry out tests.

The Contractor shall notify the imminent commencement of the construction of each element of the Works via his submitted programme.

The Contractor's attention is drawn to the following:

Due consideration must be given to the need for timely submission of samples, test results requests for inspection etc. It is the Contractor's responsibility to ensure that the Engineer is provided with all information and the appropriate notice regarding issues which might require his approval and which could have an impact upon the Contractor's Programme or progress.

1.13.5 Intellectual Property Rights

All reports, supporting documentation and data (including topographical surveys) shall become the property of the Beneficiary.

1.13.6 Site Meetings

For appropriate co-ordination of the site activities regular weekly and special site meetings on request of the Engineer will be held. The Beneficiary, Contracting Authority and Contractor's Representative(s) shall attend such meetings with the Engineer or other parties requested by the Engineer.

These meetings are to serve as a forum in which all aspects of the management and operation of the Site can be discussed but shall not replace the day-to-day management and operational responsibilities of the Contractor and the Engineer.

The meetings will be chaired by the Engineer. The Engineer will prepare minutes of meeting (MoM) and supply to the Contractor with a copy for comments. Any comments must reach the Engineer within fourteen days after submission day. Beyond this period of time the MoM will be considered as accepted by all parties. It is a duty of the Engineer to forward the agreed revision of MoM to the Beneficiary and the CA.

Should the Contractor fail to send his representative(s) to any meeting at which his presence has been requested, all decisions shall be taken as if the Contractor had been present and agreed on subsequent actions and orders.

1.13.7 Works Diary

The Contractor will keep and sign a building diary on the Site in duplicate in which all remarks, instructions, decisions and the essential details of the Works shall be recorded daily. The Contractor shall keep the Diary in a format defined by Construction and Planning Law and to the Engineer's satisfaction.

The Engineer shall sign the diary daily and keep one copy of the signed diary by himself.

The Site Dairy has to be made in pairs (original + copy) in a manner that pages could not be substituted. One copy of diary Engineer is obliged to deliver to Employer and other copy is to be kept by Contractor.

After closure of Works the Site Diary becomes an official document about the Site. This diary shall be kept according to Serbian Law on Planning and Construction and as a minimum record:

- Date and day;
- Weather;
- Working hours;
- Labour;
- Mobile plant, giving number of mobile plant working brief and description of activity involvement and utilisation;
- Areas of working;
- Description of works performed;
- Materials, building semi products and equipment installed with proofs of their compliance;
- Samples taken for investigations;
- Inspections performed and proofs of quality of construction works;
- Details of accidents;
- Details of other incidents;
- Instructions to Contractor;
- Comments by Contractor;
- Comments by the Designer;
- Complaints received and action taken;
- Visitors to Site;
- Contactor's authorised signature on every page;

The Engineer shall record in Site Diary:

- compliance of set out works with Set out Elaborate and Main Design and approve the beginning of construction works on buildings;
- assessment of compliance of performed works with requirements from Main Design and technical regulations;
- approval or suspension of continuation of works;
- approval or prescribing the method of elimination of identified noncompliance of Works.

1.13.8 Photographs

The Contractor shall periodically take photos that will show the works progress, to show works that will be hidden later on and to support any claims etc. The photos shall be taken on his expense.

The Contractor shall keep a photographic record of the Works in progress or completed and any additional photographs as requested by the Engineer, on a weekly basis.

First photographs of at the Site and in the vicinity, where impacts of the construction (including by traffic) may be seen, shall be taken at the pre-construction stage. Each photograph shall be numbered and a statement shall be submitted giving the location, date when taken and a brief description or title.

The Contractor shall make digital photographs in colour with a good quality mirror reflex camera with good resolution changeable lenses. The resolution of the digital negative shall be at least 8 million pixels.

All photographs shall be made in CCD-RAW format. The RAW files serve as negatives. The Contractor shall transpose the RAW files in high quality JPEG format and issue the photographs weekly in both formats to the Engineer on CD.

The Contractor shall supply four copies of progress photographs, suitably inscribed, of a size not less than approximately DIN A4 format of such portions of the Works, in progress and completed, as may be directed by the Engineer. The negatives and prints shall not be retouched.

The negatives of the photographs shall be the property of the Beneficiary and no prints from these negatives may be supplied to any person or persons without the authority of the Beneficiary.

1.14 Operation & Maintenance Manuals and Training

1.14.1 General O&M issues

The Contractor shall provide suitably bound operating and maintenance manuals for all items of plant and equipment installed within the Works. The introduction shall include a general description of each item or process and its operation.

The instructions shall be clearly written in Serbian and English language and shall be suitable for all staff categories that will need to use them.

The manuals shall form the basis for training of the Beneficiaries' personnel and therefore the greatest importance will be attached to completeness and clarity of presentation.

It is emphasised that a collection of standard pamphlets of a general nature accompanied by drawings and descriptive matters relating to the plant or equipment as installed, will not be acceptable. In particular, information supplied by sub-Contractors and manufacturers employed by the Contractor, shall be coordinated into the comprehensive manual. Cross-referencing of descriptive matter, drawings and spare part lists must be complete.

The Contractor shall supply draft O&M documentation prior to training. Following the training programme and trial operation of the works these will be revised to take into account final agreed practices.

The submission of the final operation and maintenance manuals is a condition precedent to the issue of the Provisional Acceptance Certificate.

1.14.2 Tests on Completion

The pre-commissioning tests will be carried out in accordance with Volume III, Section 2 when all civil, mechanical, and electrical and control components and functions are finished, tested, and found to be in compliance with the contract conditions.

The commissioning tests will be carried out in accordance to Volume III, Section 2 when all civil, mechanical, and electrical and control components and functions are tested in operation, and found to be in compliance with the contract conditions.

After approval of the Engineer and issue of the Provisional Acceptance Certificate, the plant and equipment can be formally handed over to the Beneficiary.

1.14.3 Operating Conditions

It is envisaged that the new plant facilities will be attended normally during 5 days per week and 8 hours per day. During the remaining hours the facilities shall be manned with the minimum personnel required for on the job safety standards.

The design of the Works must be suitable for 24 hours per day continuous operation and extreme climatic conditions that could occur in the region, and ensure that the maintenance requirements of the plant and equipment are minimal. The Contractor may be called by the Engineer to demonstrate this for any component of the Plant proposed in his design, by service records and other technical data of such components installed in a similar working environment.

1.14.4 Operation and Maintenance Manuals

Operation and Maintenance Manuals shall be prepared and provided by the Contractor in accordance with the requirements of these Technical requirements.

The Contractor shall prepare and submit for the approval to the Engineer O&M procedure manuals in English and Serbian language which shall describe the complete functions and requirements for start-up operations, system control, waste quantity control, maintenance, safety, record keeping, and emergency response with shut down.

The Contractor shall not later than fourteen (14) days before commencement of the test on completion submit draft copies in both, hardcopies and softcopies, of the operation and maintenance manuals to the Engineer as indicated below:

Submission to	Number of copies and language
Beneficiary	1 copy in English 2 copies in local language
EUD	1 copy in English 1 copy in local language
Engineer	1 copy in English

The manuals shall be bound into suitable durable loose-leaf binders of A4 size. Copies of these manuals shall be used during the training courses for operation and maintenance.

The manuals shall deal separately with operation and maintenance.

All information in these manuals shall apply specifically to the equipment being supplied. The documentation shall be free from irrelevant matters such as the manufacturer's general literature. (In this case complete O&M documentation will be rejected!).

The manuals shall be arranged to provide separate volumes for each principal section of the works.

Manuals shall relate to as-built conditions and shall include all necessary drawings and diagrams for a proper understanding of the landfill facilities and all equipment, including the LTP, SBR, MRF plant and the Composting Plant.

For all installations, the manuals shall include:

- A general part comprising contents, description of the installation and relevant addresses and phone numbers
- Documentation - as built
- Functional description

- List of components indicating manufacture, type, component numbers, ordering numbers, other data and position
- Maintenance instructions stating maintenance routines and intervals
- Fault finding instructions
- Calibration reports for analogue signal circuits
- Data leaflets
- List of spare parts
- List of tools
- List of consumables
- List of available services.

For mechanical installations the manual shall further as a minimum include:

- Machinery type and serial no. (all in one chart)
- Operating instructions
- Lubrication charts and maintenance instructions (all equipment included in one chart)
- Fault finding details for rectification of basic faults
- List of spare parts giving part numbers in relation to a drawing preferably of the exploded view type. The list shall be appropriate for correct reordering of the complete component and its spare parts
- Brochures including all components accompanied with names and addresses of suppliers
- Performance curves, diagrams, test certificates, and others
- Specification of corrosion protection
- Specifications for repair of all painted/coated surfaces.

For all electrical components the manual shall be divided into separate sections for the following installations:

- Control panels
- Instruments
- Control and measuring components (signalling system)
- Other components.

The manual shall further for electrical equipment include but not be limited to:

- CE-labelling and declaration of conformity
- Layout drawings
- Schematic and wiring diagrams
- Detailed description
- Specific operation instructions
- Specific maintenance instructions
- Component list for all equipment

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- Fault-finding chart
- Emergency procedures

1.14.4.1 Operating Instructions

The Contractor shall provide the Beneficiary with operating instructions which shall give a detailed description for all operations likely to be carried out during the life of the facilities. The instructions shall cover the installation, commissioning, testing, operation and trouble shooting of all the facilities.

The instruction manuals shall describe the installation as a whole and shall give a step-by-step procedure for any operation likely to be carried out daily, weekly, monthly, and at longer intervals to ensure trouble-free operation. Where applicable, fault location charts shall be included to facilitate tracing the cause of malfunctions or breakdown and correcting faults.

A separate section shall be allocated for each type of equipment which shall contain all relevant information concerning the construction and operating principles of that item.

1.14.4.2 Maintenance Instructions

The operation and maintenance instruction manuals shall be supplemented by the supply of a comprehensive planned periodic maintenance programme especially for the LTP, SBR, MRF plant, the Composting Plant's operation, the equipment and machines and maintenance staff.

The Contractor shall produce the maintenance programme on a software basis, with all maintenance activities described separately for printing and all actions to be taken by the operator. The numbering system of plant shall be in accordance with the record drawings.

The Programme shall give overview reporting for set maintenance periods (e.g. weekly, monthly, yearly), and on an equipment basis. The latter can also be arranged on the basis of logical units (e.g. the separation line of the MRF). The reports shall include: work required, parts outstanding, and work completed.

The maintenance scheme shall be delivered to the approval of the Engineer and shall be provided complete at the time of the commissioning of the works. It shall have sufficient space for expansion if required to include any further routine work.

Concurrently with the progress of work on site the Contractor shall prepare the Operating and Maintenance Instruction Manuals which shall, at a minimum, include where applicable:

- Schedule of approved Record Drawings and documents
- Detailed description of the plant and its method of operation, control and protection. Recommended operation and routine check procedures
- Recommended care and maintenance routines together with the procedures for the repair and re-commissioning of major items of equipment and plant
- Recommended emergency control procedures
- Manufacturer's descriptive literature and technical data sheets in respect of each item of the plant and equipment including the recommended installation, care, maintenance and overhaul instructions, parts lists, etc., whereby the plant may be maintained correctly and whereby replacement spare parts, may be ordered without difficulty
- Exploded views of all items of plant with each component and reference number cross-referenced to the appropriate data sheet and spares schedule

- Schedule of the principal items of plant, equipment and components showing the title, maker, maker's type reference, serial number, rating etc. whereby reference to each is simplified
- Test results and curves, including all electrical test data and reports
- Particular reference is to be made in the operating and maintenance instructions to the: Safety precautions and instructions to be taken when operating the plant
- Pre-start check list
- Bearings and moving parts which require special attention; Type of lubricants to be used, and lubrication intervals
- Routine tests which are recommended to confirm that the plant is in good working order. Fault finding or trouble-shooting guide

A draft copy of the manuals in Serbian and a draft copy in English shall be provided to the Engineer for his approval 4 weeks, or as otherwise specified, prior to the Tests on Completion. The Manuals shall be used for commissioning and trial operation under the Engineer's supervision when their content and accuracy will be checked.

The Contractor shall have the draft O&M documentation available prior to training. Following the training programme and initial operation of the works these will be revised to take into account final agreed practices.

The final 3 copies in Serbian and 3 copies in English of the Manuals, together with an electronic version, incorporating amendments and additions as instructed by the Engineer, and the amendments as deemed necessary from the results of the training, shall be provided upon the satisfactory completion of the installation and testing of the Works, prior to the issue of the Provisional Acceptance Certificate.

The Provisional Acceptance Certificate will not be issued until all copies of the final instructions have been handed over.

Any additions, alterations or deletions which may be required following the experience gained during the defects liability period shall be incorporated into the final versions in the form of additional pages or complete replacement of sections as specified by the Engineer. All costs of these amendments shall be deemed to be included in the contract price.

These finally agreed documents shall be provided for the use of the Beneficiaries' operational staff as follows:

- 1 hard copies of the documentation in English
- 2 hard copies of the documentation in Serbian
- Electronic version of both English and Serbian documentation.

1.14.5 Training

1.14.5.1 General Requirements

The Contractors scope of works includes training of the Beneficiary's personnel and the assistance (supervision) of operation of the Landfill Facilities and equipment, including LTP, SBR, the MRF and the Composting Plant for a period of twelve months after issue of the Provisional Acceptance Certificate, coinciding with the Defects Notification Period (DNP). Assistance to the operations shall mean occasional visits by the Contractor's personnel to verify the efficient operation of all the facilities, plant and equipment. Further details are outlined in Section 2 in this Volume.

The objectives of this service are to ensure that, following provisional acceptance:

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- The initial operation of the landfill facilities, plant and equipment is established in an economic and professional manner.
- The data for the verification of the performance guarantee and of the guaranteed operational costs are gathered, recorded and processed in a controlled manner

An outline of the Training Programme shall be provided with the tender.

The Contractor shall provide on-the-job training to the End Recipient's operational personnel. The on-the-job training (O.J.T.) activities shall be based on the comprehensive Operation and Maintenance Manuals.

The objective of the training is to provide selected staff members of the Beneficiary with the necessary knowledge of technology, operation and maintenance of all equipment, installations and work included in the project, in order to ensure a sound and stable operation and maintenance of the project as a whole and the items of plant and equipment components supplied and installed under the Contract.

Training shall de facto take place starting with the entire erection of the facilities on site, the pre-commissioning and commissioning periods. The training shall be reinforced and consolidated during the Trial operation period.

In general the Contractor's on-site training for each type of works shall cover:

- Correct operation and understanding of the waste accepting processes, the waste treatment processes, overall systems, control systems and the technology applied
- Operation of systems, equipment and machinery
- Quality control
- Maintenance of equipment
- Safety procedures to be adopted
- All training and instructions shall be in the Serbian language

The training shall in general consist of familiarisation with the operational aspects of the systems as a whole, followed by familiarisation with specific items of plant and equipment.

The training shall be based on the actual plant and the implementation of operation and maintenance schedules outlined in the operation and maintenance manuals provided by the Contractor.

The training shall also be directed towards the specific requirements of the trainee, as the instruction and familiarisation of the various personnel involved will vary with respect to their operational capacity, as the personnel will require different aspects to be emphasised.

All training shall be successfully completed and demonstrated before Provisional Acceptance can take place. In respect of progress of works and the daily operation of the plant, equipment and systems, it is required that any systems or equipment has to be put into use by the Beneficiary before Provisional Acceptance. It is the Contractor's responsibility that all necessary instructions and training has been given to the Beneficiaries' personnel, for full understanding of the technology and operation, prior to commencement of the Beneficiaries' utilisation of such systems or equipment.

The Contractor shall provide all necessary training material and audio-visual aids including notes, diagrams, films and other training aids as necessary to enable personnel to undertake both self-taught refresher courses at a later date and to train replacement personnel.

An outline training programme, together with a description of training material and samples of typical training material to be provided together with the C.V.'s of the intended

instructors shall be provided for the Engineer's approval a minimum 4 weeks in advance. Detailed programme and supporting documentation to be submitted for approval one month prior to commencing any such training.

The total allowance to cover the Contractor's expenses in connection with training shall be included in the tender.

1.14.5.2 Training Methodology

The on-the-job training activity shall follow the step-by-step procedure of how to perform and accomplish a certain task in the most efficient and effective way.

The Contractor shall organise a demonstration of how the task is to be done pointing out at each step the safety factors and possible hazards. The training process should be planned maintained and controlled in such a way that the Contractor will be able to assess the learning progress being made by the trainee.

The trainees should be given enough time to practice by actually performing the tasks under the scrutiny of the Contractor. This practical component of O.J.T. where the trainees actually perform the task should take not less than 50% of the training time. The Contractor shall coach and guide the trainee until the task and skill have been learned and mastered.

1.14.5.3 Training Areas

The Contractor shall perform On-the-job training in the following areas, but not limited to, whenever applicable:

- Operation and maintenance procedures for all process equipment, conveyor belts, motors, pumps etc. and instrumentation. For equipment which is provided and/or installed by the equipment supplier the first training shall be done by the equipment supplier
- Operation and maintenance of weighbridges, MRF equipment, composting plant equipment, leachate treatment and recirculating system, gas flaring system, SBR and all other equipment on site.
- Operation and maintenance of all Landfill equipment and machines;
- Procedures for calibration of measuring equipment;
- Sampling and laboratory testing;
- Operation of HV and LV installation;
- SCADA operation, adjustment of variables, reporting, testing;
- Safety procedures and operation/maintenance of safety equipment.

1.14.5.4 Training Prior to Trial Operation

Four weeks prior to the commencement of any pre-commissioning, setting to works tests, the Contractor shall submit to the Engineer a training programme indicating how he intends to train the Beneficiary's personnel in the operation of the Facilities and Plant. This should comprise but not be limited to:

- Formal instruction in a 'classroom' type environment
- Formal 'hands-on' training on the works itself
- Attendance of the Beneficiaries' personnel during pre-commissioning and setting to work

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- A period of Contractor's support whilst the Beneficiaries' personnel familiarize themselves with the operation of the works under the Supervision of the Contractor.

1.15 Environmental Considerations during execution of works

1.15.1 Environmental Management

The Contractor shall within 21 days from the Commencement date submit to the Engineer for approval an Environmental Management Plan (EMP) for the period of executing the Works. Further reference is made to the General Requirements.

An outline of the Environmental Management Plan shall be provided with the tender according to volume IV, Schedule 3.

The Contractor shall comply with the provisions of the EU standards and Serbian regulations with regard to environmental protection.

Legal and material consequences of possible non-observance of environmental requirements affecting construction, set forth in various legislation texts, shall be supported by the Contractor.

The Contractor shall be responsible for all matters whatsoever arising out of or in connection with the processing, removal, transport and disposal of arising, spoil, groundwater and other waste material in accordance with all applicable Environmental Laws.

In dealing with water and wastewater arising from the Works, including water from cleansing, testing or disinfections, the Contractor shall comply with the requirements of Serbian standard in regards to discharge of wastewater into sewers and into watercourses.

The Contractor shall take all reasonable measures to ensure his activities do not cause pollution of groundwater sources or surface watercourses.

The Contractor shall comply with the provisions and recommendations of any national or local regulations or codes of practice for noise and dust control on construction sites.

The Contractor shall take note of the Environmental Impact Assessment Study in particular the part in relation to the environmental impacts as a result of construction and do all reasonable effort to reduce impacts as much as possible

The following environmental protection measures shall be observed during the execution of the construction of the Landfill.

- **Demolition material**

Reuse of demolition materials as backfill for trenches and excavations or/and hard fill for construction foundations and roadways is possible, unless it is contaminated or hazardous materials such as asbestos are identified. The Contractor will be responsible for environmentally sound disposal of any material resulting from the demolition and other site materials under permission from the relevant local Authorities and shall be disposed of in a licensed tip.

Solid waste disposal of all construction material and disposal sites for excess and waste materials in an environmentally safe manner; the material should be recycled to the extent possible and where this is not possible, it should be disposed of away from the site in a suitable landfill cell. Burning on site will not be allowed.

Liquid waste management related to potential spills of combustibles and chemicals used during the construction in an environmentally safe manner away from the site in accordance with the national regulations.

Minimize equipment impacts related to the use of heavy machinery in relation to human health and the general environment. This includes minimizing potential damage on the vegetation, noise emissions, odour, dust and accidental spills of combustibles which may lead to the contamination of potable water;

Sanitary waste disposal from all human wastes at the construction camps in an environmentally safe manner (e.g., chemical latrines, package treatment system);

- **Excavated soil**

Excavated natural soil, which is free of cohesive components, salt, sulphate and/or clay materials, can be reused as backfill for trenches and excavations. The Contractor will be responsible for environmentally sound disposal of surplus materials under permission from the relevant local Authorities.

Quarries and borrow pits, the Contractor shall describe from where he will extract the materials and which measures he will take in order to minimize the environmental impact, during and after the construction period.

The Contractor shall meet the requirements of the relevant environmental authorities and obtain the required approvals in this respect.

In addition to the above-described measures, protection of the environment related to air, waste water, waste, noise, vibration and dust shall be controlled as described below.

- **Ground water**

With reference to the Geotechnical Investigations Report, the ground water table is below the top of the ground level. Temporary and/or permanent groundwater lowering will be required to allow for deep foundations, basement of tanks and trenches during construction to proceed. The Contractor will be responsible for ensuring these measures, as well as day- and surface water discharge.

- **Air pollution**

Construction may give rise to dust and vehicle exhausts. The normal health and safety controls will be required to safeguard construction and the residential and passing population.

By wetting in excavations, filling, scraping and levelling works during construction, dust emissions will be reduced. The excavation banks formed during the cutting in the area will be compacted and will be wetted along with the entire area. Loading/unloading operations will be carried out paying attention not to produce scattering. The trucks will be subject to speed limitations and during transportation their trailers will be covered. Also, new and well-maintained vehicles will be used to the greatest extent possible. Wind-break plates can be placed and wind-break trees can be planted in the site as additional measures.

- **Waste**

The waste oils and paints to be generated during the civil works will be collected in impermeable containers and delivered to the licensed companies. The fertile vegetable soil will be scraped and stored for reuse later.

Being listed as hazardous waste in the Commission Decision of 2000/532/EC, asbestos, paint, fluorescent lighting, mercury, acid and similar hazardous substances that exist in construction/demolition waste shall be collected separately from other types of waste and they shall be removed in accordance with the provisions of the Waste Framework Directive and the related Serbian legislation in force, Law on waste management

- **Noise Control during construction**

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The Contractor shall comply with the local and National requirements and the issued Building Permit. The Contractor shall be legally responsible and financially liable to observe Serbian environmental legislation.

The noise levels shall be in accordance with the relevant Serbian noise environmental legislation.

Generally, the Contractor shall ensure that the impact of noise due to construction activities is minimised through the use of good site management, plant maintenance and communications with adjoining property owners. Therefore, the Contractor shall employ the best practical means to minimise noise produced by his operations, including plant maintenance.

All vehicles and mechanical plant used on the works shall be fitted with effective exhaust silencers and shall be maintained in good and efficient working order for the duration of the works. Machines in intermittent use shall be shut down in the periods between the works or throttled down to a minimum. The Contractor shall remove from the works any item of plant, which, in the opinion of the Engineer, is ineffectively silenced. All compressors shall be "sound reduced" models fitted with properly lined and sealed acoustic covers which shall be kept closed whenever the machines are in use. All ancillary pneumatic percussive tools shall be fitted with mufflers or silencers of the type recommended by the manufacturers. Pumps and mechanical static plant shall be enclosed by acoustic sheds or screens where directed by the Engineer.

Any plant, such as generators and pumps, which is required to work outside the normal working hours shall be surrounded by an acoustic enclosure to the approval of the Engineer which shall restrict the noise level to not less than 5 dB(A) below levels quoted hereunder.

Piling, including temporary piling, shall be carried out by recognised noise reduced systems. Piling should not be carried out before 07:00 or after 20:00 without the written consent of the Engineer. When the use of explosives is permitted by the Engineer, blasting shall be restricted to the hours authorised in the Engineer's written consent.

With reference to the Directive 2002/49/EC of the European Parliament and of the Council of 25 June 2002 relating to the assessment and management of environmental noise, the Contractor shall in a distance of 1 km from the site boundaries ensure that the sound level arising from the construction of building does not exceed L_{day} (dBA): 70 and from the road construction L_{day} (dBA): 75. For strokes the noise level shall in a distance of 100 m from the site boundaries not exceed LC_{max} : 100 dBC.

Noise and disturbance shall be kept to the reasonable minimum as far as required for this project. The Contractor's attention is drawn to the close proximity of some working sites to buildings in continuous use. All plant and tools used at such sites above or near ground level shall be silenced or shall be of a silent type.

The Contractor shall take all necessary steps to ensure that his workmen carry out their duties in a quiet manner particularly when working at night.

The Contractor shall obtain the Engineer's consent to the details and arrangement of all plant before installation. All plant shall be kept in good condition and safe working order. Operation of any particular item of plant shall be stopped whenever, in the opinion of the Engineer, it is causing unreasonable noise or disturbance. The Contractor shall immediately take steps to eliminate such noise or disturbance or replace the plant.

Where compressors or generators are to be used for less than one-month suitable baffles or other provisions to reduce noise emission shall be provided, including the use of suitable acoustic baffles to reduce the emission of noise. Acoustic screening shall be provided for outside plant equipment to the satisfaction of the Engineer.

The Contractor shall take noise intensity readings as required by the Engineer and shall submit the results to the Engineer. The Contractor shall comply with any additional measures required by the Engineer to keep noise and disturbance, e.g. odours, to the minimum.

- **Vibration during construction**

The Contractor shall take all steps necessary to minimise vibration caused by plant and machinery used on the site. No machine shall be permitted, which uses a system of dropping a heavy weight, whether power assisted or by gravity, for the purpose of breaking up paving or foundations.

Vibrations shall be monitored by vibrometer where instructed by the Engineer. Vibrations associated with mechanical plant shall not exceed 2.5 mm/sec. as peak particle velocity in any perpendicular direction at the property boundary.

- **Dust emissions during construction**

Due to the nature and scope of the works, which will be undertaken on the site, dust from the construction works may be blown by prevailing winds across adjoining surfaces and lands near the site works. The Contractor shall keep dust emissions to a minimum in accordance with good site management procedures. If dust emissions from the site become a problem the following precautions can be taken on site:

- Wind barriers at soil piles
- Conveyor belts, trucks and other transporters are closed
- Materials are covered with plastic covers
- Compaction with binding material
- Upper layer of the land is watered.

1.15.2 Pollution Prevention

The Contractor shall not pollute or unnecessarily disturb lands, roads and other places on and around the Site. No trees or other vegetation shall be removed except to the extent necessary for the Works.

The Contractor shall take all reasonable precautions to prevent:

- Silting, erosion of beds and banks and pollution of rivers and watercourses;
- Interference with the supply to or abstraction from underground water sources;
- Pollution of the surface waters at site.

The Contractor shall provide, maintain and remove on completion of the Works, settling lagoons and other facilities to avoid pollution caused by the Contractor's operations such as but not limited to quarrying, aggregate washing, concrete mixing and grouting.

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ANNEX – List of Standards and EU Directives, CE marking

Generally all Serbian and internationally recognized Norms and Standards are accepted. Nevertheless with respect to safety, health and working protection the related standards and laws which are directly linked to local legal provisions, the local law respectively the relevant binding local standards and norms shall be applied.

The work must be performed according to the local rules and regulations and most recent relevant international codes, standards, accident prevention regulations.

The Engineering documentation shall correspond with ISO standards.

Works, materials, pipes and accessories shall be in accordance acceptable Serbian standards if the use of other standards is not specially requested or not defined by Serbian standards and regulations.

The Tenderer must clearly state his proposals concerning the use of Standards and Codes.

It is the Contractor's responsibility to provide sufficient evidence that any national or other standard the Contractor proposes will ensure an equivalent or higher standard to required according to RS standards.

The Contractor shall supply an indexed list of all standards, codes and associated standards referred to, to which the work is to be performed.

The quality control systems and plans shall be according to ISO 9000 and subject to approval of the Engineer.

This Section includes reference to publications for guidance on current practice on some topics. The editions of approved Standards used shall be those current 28 days prior to the date for the return of tenders.

The Contractor may be required to supply any of the Standards or publications listed in this section for the use of the Engineer's Representative (with English language translations where appropriate).

1.4.2. List of Serbian Standards

They include but are not limited to:

Environment health protection and safety

13.020	Environmental protection
13.030	Wastes
13.04.	Air quality
13.060	Soil quality. Penology
13.100	Occupational safety. Industrial hygiene
13.110	Safety machinery
13.120	Domestic safety
13.140	Noise with respect of human beings
13.160	Vibration and shock with respect to human beings
13.180	Ergonomics
13.200	Accident and disaster control
13.220	Protection against fire

- 13.230 Explosion protection
- 13.240 Protection against excessive pressure
- 13.260 Protection against electrical shock
- 13.280 Radiation protection
- 13.300 Protection against dangerous goods
- 13.310 Protection against crime
- 13.320 Alarm and warning system
- 13.340 Protection equipment

Electrical engineering

- 29.020 Electrical engineering in general
- 29.050 Conducting materials
- 29.060 Electrical wires and cables
- 29.180 Transformers. Reactors
- 29.240 Power transmission and distribution networks
- 29.260 Electrical equipment for working in special conditions

Electronics

- 31.020 Electronic components in general
- 31.200 Integrated circuits
- 31.220 Electromechanical components for electronic and telecommunications equipment
- 31.240 Mechanical structure for electronically equipment

Construction materials and building

- 91.010 Construction industry
- 91.020 Physical planning. Town planning
- 91.040 Buildings
- 91.060 Element of building
- 91.080 Structure of building
- 91.090 External structure
- 91.100 Construction materials
- 91.120 Protection of and in buildings
- 91.140 Installations in buildings
- 91.160 Lighting
- 91.180 Interior finishing
- 91.190 Building accessories
- 91.200 Construction technology
- 91.220 Construction equipment

Civil engineering

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93.010	Civil engineering in general
93.020	Earthworks. Excavations. Foundation construction. Underground works.
93.080	Road engineering
93.140	Construction of waterways and ports
93.160	Hydraulic construction

1.4.3. German DIN Standards

The German Standards referred to have been issued by Deutsches Institut für Normung (DIN), Burggrafenstrasse 4-10, 10787 Berlin, Germany.

List of German Standards referred, but not limited to:

DIN 488	Reinforcing steel
DIN 1045	Structural use of concrete, design and construction
DIN 1048	Testing methods for concrete
DIN 1055	Design loads for buildings
DIN 1084	Quality control of concrete
DIN 1164	Cement
DIN 1187	Unplasticised polyvinyl chloride (PVC-U), drainpipes
DIN 1212	Step irons for staggered manhole steps; brim shaped step irons
DIN 1229	Gully tops and manhole tops for vehicular and pedestrian areas
DIN 1388	Universal WC flush down type made of sanitary porcelain material
DIN 1390	Urinals of sanitary porcelain, wall hung
	DIN 1626 Welded circular unalloyed steel tubes subject to special requirements, technical delivery conditions
DIN 1910	Welding
DIN 1986	Drainage Systems on Private Ground
DIN 1988	Drinking water supply systems
DIN 4021	Soil; exploration by excavation and borings
DIN 4032	Concrete pipes and fittings
DIN 4033	Sewers and sewage pipelines; code of practice for construction
DIN 4034	Precast un-reinforced and reinforced concrete components
DIN 4035	Reinforced concrete pipes
DIN 4095	Subsoil, drainage for the protection of structures
DIN 4099	Welding of reinforcing steel
DIN 4226	Aggregates for concrete
DIN 4235	Compacting of concrete by vibrating
DIN 4279	Pressure test for pressure pipes
DIN 18121	Moisture Test
DIN 18122	Consistency Test
DIN 18123	Grading Tests

- DIN 18124 Density Test (solid volume without voids)
- DIN 18125 Density Test for Soils (including voids)
 - DIN 18126 Subsoil: Testing procedures and testing equipment, determination of density of non-cohesive soil, and maximum and minimum compactness
- DIN 18127 Proctor Test
- DIN 18134 Loading Test
 - DIN 18196 Earthworks soil classification systems and foundations for civil supervisory representative purposes
 - DIN 18201 Tolerances in building: Terminology, principles, application, and verification
 - DIN 18203 Tolerances in building precast concrete reinforced concrete and pre-stressed concrete components
- DIN 18330 Masonry works
- DIN 18331 Concrete and reinforced concrete
- DIN 18332 Natural stonework
- DIN 18333 Artificial stonework
- DIN 18334 Carpentry
- DIN 18336 Waterproofing against moisture
- DIN 18337 Waterproofing against pressurised water
- DIN 18338 Roofing
- DIN 18339 Plumbing works
- DIN 18350 Plastering
- DIN 18352 Tiling
- DIN 18353 Screening works
- DIN 18354 Bituminous paving
- DIN 18355 Joinery
- DIN 18361 Glazing
- DIN 18363 Painting works
- DIN 18365 Flooring
- DIN 18379 Ventilation works
- DIN 18381 Sanitary installations
- DIN 18550 Mortar
 - DIN 19531 Unplasticized polyvinyl chloride (PVC-U), socket pipes and fittings for discharge systems inside buildings
- DIN 19555 Step irons for single line installation
- DIN 19597 Manhole tops A 15
 - DIN 19695 Direction for transporting and storing of concrete pipes, reinforced concrete pipes, pre-stressed concrete pipes and fittings and concrete manhole shaft rings

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- DIN 28600 Ductile Iron Pressure Pipes and fittings, technical specification
- DIN 28603 Ductile Iron Pipes and fittings, TYTON Sockets (equivalent to EN 545)
- DIN 28610 Ductile Iron Pressure Pipes with sockets and inner cement lining, technical data and application (equivalent to EN 969)
- DIN 50049 Documents on material tests: suggestions for the configuration of documents
- DIN 52123 Testing of bitumen and polymer bitumen sheeting and felts
- DIN 52143 Bitumen roofing felt with glass fleece base
- DIN EN 32 Wall hung wash basins
- DIN EN 87 Ceramic floor and wall tiles; definitions, classification characteristics and markings

For approval proposed Standards shall be translated into English language.

1.4.4. German DWA/ATV/DVGW Standards

The regulations referred to have been issued by the GFA-Gesellschaft zur Förderung der Abwassertechnik e.V., Theodor-Heuss-Allee 17, D – 53758 Hennef, Germany; They include but are not limited to:

- ATV – DVWK - A 124 Planung und Bau von Abwasserpumpenanlagen, Juni 2000
- ATV - A 127 Richtlinie für die statische Berechnung von Entwässerungskanälen und -leitungen
- ATV - A 128 Standards for the Dimensioning and Design of Stormwater Structures in Combined Sewers, April 1992
- ATV - A 166 Structures for central Stormwater treatment and –retention, Constructive Design and Equipment, November 1999
- ATV - DVWK Advisory Leaflet M 176 Guidelines and Examples for the Design and equipping of Structures for central Stormwater treatment and -retention, February 2001
- ATV - A 111 Guidelines for the Hydraulic Dimensioning and Performance Verification of Stormwater Overflows in Sewers, February 1994
- ATV DVWK Advisory Leaflet M 177 Dimensioning and Design of Stormwater Overflows in Combined Sewers, Juni 2001

The Standards referred to have been issued by the German Vereinigung des Gas und Wasserfachs.

GW 310/II M Sicherung an Knickpunkten von Druckrohrleitungen

The Standards referred to have been issued by the German Bundesministerium für Verkehr (BMV), FGSV Verlag, Köln, Germany.

ZTV Asphalt – StB 94 Zusätzliche Technische Vertragsbedingungen für den Bau von Fahrbahndecken aus Asphalt

1.4.5. EN, IEC and ISO Standards

The EN Standards referred to have been issued by the European Comité of Standardisation; They include but are not limited to:

- EN 124 Gully tops and manhole tops for vehicular and pedestrian areas; Design requirements, type testing, marking
- EN 499 Classification of covered electrodes for manual metal arc welding of carbon steels, carbon-manganese steels and micro alloyed steels
- EN 598 Ductile Iron Pipes, fittings, accessories and their joints for sewerage application
- EN 14121-1 Safety of machinery - Risk assessment - Part 1: Principles
 - EN 12100 Safety of machinery - Basic concepts, general principles for design
 - EN 13850 Safety of machinery - Emergency stop - Principles for design
 - EN 60204-1 Safety of machinery. Electrical equipment of machines. General requirements
 - EN 14122 Safety of machinery. Permanent means of access to machinery
 - EN 61000 Electromagnetic compatibility
 - EN 12255 Wastewater treatment plants.
 - IEC 60073 Basic and Safety Principles for Man-Machine Interface, Marking and Identification - Coding Principles for Indicators and Actuators
 - IEC 60439 Low-voltage switchgear and controlgearcontrol gear assemblies
 - IEC 60947 Low-voltage switchgear and controlgearcontrol gear
 - IEC 60255 Measuring relays and protection equipment
 - IEC 61131 Programmable logic controllers
 - IEC 61082 Preparation of documents used in electrotechnology
 - IEC 60617 Graphical symbols for diagrams
 - IEC 60076 Power transformers
 - IEC 60364 Low-voltage installations
 - IEC 61024 Protection of structures against lightning.

The ISO Standards referred to have been issued by the International Standards Organization, Case Postale 56, CH-1211, Geneva 20 – Switzerland

- ISO 1106 Recommended practice for radiographic examination of fusion welded joints
- ISO 2531 Ductile iron pipes, fittings and accessories for pressure pipelines
- ISO 3452 Non-destructive testing-penetrate inspection-general principles
- ISO 4179 Ductile iron pipes for pressure and non-pressure pipelines-Centrifugal cement mortar lining - General requirements
- ISO 6600 Ductile iron pipes-Centrifugal cement mortar lining-Composition controls of freshly applied mortar
- DIN EN ISO 12994 Part 1 until DIN EN ISO 12994 Part 8 Corrosion protection of steel by coating and protective layers

1.4.7 EU Directives

The applicable EU Directives will be, but not limited to, as follows:

- Directive 99/31/EC on landfills
- Directive 91/271/EEC on urban waste water treatment
- Directive 97/23/EC on the approximation of the laws of the Member States concerning pressure equipment
- Directive 2006/42/EC on machinery
- Directive 2006/95/EC on the harmonisation of the laws of Member States relating to electrical equipment designed for use within certain voltage limits
- Directive 2004/108/EC on the approximation of the laws of the Member States relating to electromagnetic compatibility and repealing Directive 89/336/EEC
- Directive 94/9/EC on the approximation of the laws of the Member States concerning equipment and protective systems intended for use in potentially explosive atmospheres

Directive 1999/92/EC on minimum requirements for improving the safety and health protection of workers potentially at risk from explosive atmospheres

1.4.8. CE marking

The total installation and all parts of the plant shall be CE-marked in accordance with the Machinery Directive and related directives, norms and standards.

The CE marking shall include all required tasks as described in the directive included but not limited to:

- Technical dossiers
- Risk Assessments
- Declaration of conformities

