SECTION 4. TERMS OF REFERENCE

("Employer's Requirements" Annex 3 of the Contract)

1. BACKGROUND

The Georgian Government has set its strategic objectives for the country's security, one of which is the energy efficiency and independence. Georgia is well-known for its enormous resources of water supply that has led to many initiatives for the development of the hydro power. Despite the clear advantage country has through hydro power, this type of energy production has one important disadvantage – the production is seasonal. Georgia is self-efficient during summer session but in winter the country is in the need of the electricity import. In order to eliminate this problem, the Government of Georgia (GoG) ordered JSC "Georgian Oil and Gas Corporation" (GOGC) to invest in the traditional ways of energy production – Thermal Power Plants.

In 2015, the state owned investment fund JSC "Partnership Fund" (PF), and the state owned JSC "Georgian Oil and Gas Corporation" (GOGC), have completed one of the biggest projects in the history of independent Georgia – the construction of the Combined Cycle Thermal Power Plant in Gardabani (Gardabani 1). The partnership of the two, has established LLC "Gardabani TPP" (GTPP), with 49% shares of PF, and 51% shares of GOGC. The Power Plant has 230 MW installed capacity, which has 56% efficiency ratio, equaling double compared to existing simple cycle Power Plants. The Gardabani 1 mainly serves to increase winter generation and reserve capacity for improved stability of the Georgian electricity system.

In September 2016 "Gardabani TPP2" LLC was established, with 100% ownership of GOGC, with the aim to construct Gardabani 2 Combined Cycle Thermal Power Plant. The Project was covering the construction of a 230 MW Combined Cycle Power Plant in Gardabani, eastern Georgia. The Project responds to the increasing needs of Georgia for electricity, addressing a growing concern for energy independence of the country. In late 2019 Construction of Power Plant completed successfully and currently it is under operation.

In September 2019 Government of Georgia issued decree №2047 "with the aim to construct Gardabani 3 Combined Cycle Thermal Power Plant (hereafter Project) by the "Georgian Oil and Gas Corporation" JSC. The Project envisages the construction of a 272 MW Combined Cycle Power Plant in Gardabani, eastern Georgia. The main objectives of the project are:

- Improve Georgia's energy security;
- Increase winter generation and reserve capacity for improved stability of electricity system.

The Project calls for the construction of a combined cycle power plant (CCPP) with installed capacity of 272 MW. The project is located in the Gardabani region, near the capital city of Tbilisi and adjacent area of CCPP Gardabani 1/ Gardabani 2. The Capital of Georgia - Tbilisi is 40 km from the project site.

The design, construction and commissioning of the project shall be implemented within scope of EPC/Turn Key Contract (Engineering, Procurement, Construction).
The construction period shall be 28 months from the Commencement Date.
The power plant shall consist of one (1) combined cycle block in a 2-2-1 configuration having two (2) Gas Turbine Generators (GTG) + two (2) Heat Recovery Steam Generators (HRSG) + one (1) Steam Turbine Generator (STG). Gas Turbine Generators and HRSG installations shall be located externally; Steam Turbine Generator installation shall be internal. The designed Plant life shall be at least 25 years. The fuel for the power plant shall be natural gas and no HRSG supplementary

firing. A DN500 pipeline will supply the plant with natural gas. The gas temperature in the territory of Gardabani varies from 0 °C to +30 °C and the gas pressure ranges from 9 bar (a) to 18.5 bar (a).

The Project also shall comprise closed loop cooling water system using an Induced Draught Cooling Tower. The cold circulation water from the circulating water pump house shall lead to the steam turbine condenser (for the condensation of the exhaust steam and thus acting as the heat sink for the power cycle) and the secondary side of the unit auxiliary plate heat exchanger (for cooling the passivated demineralized water in the primary side of the heat exchanger). The Power generated by GTGs and STG will be transmitted at a level of 500 kV. For this purpose, all generators shall be connected to the 500 kV switchyard via dedicated Generator step-up transformers and an overhead conductor. The 500 kV switchyard will be connected to the existing 500 kV switchyard through aerial transmission lines which shall be installed by the Contractor.

2. TECHNICAL DESCRIPTION OF PLANT

The proposal shall be relevant to "Engineering-Procurement and Construction (EPC)" of the Gardabani 3 Combined Cycle Thermal Power Plant Project in Gardabani Site, Georgia.

2.1 PROJECT DESCRIPTION

Fuel: Natural Gas
2 Gas Turbines: OM General Electric, Type 6F.03, Axial Exhaust,
2 Gas Turbine Generators: Brushless, 50 Hz,
Gas Turbine Starting Means: Electrical Motor with Black Start Generators,
1 Gas Turbine By-Pass Stack,
Heat Recovery Steam Generator: 2 Pressure system, Non-Reheat, Unfired, Natural Circulation,
Steam Turbine: Condensing, Single Flow;
Steam Turbine Exhaust: Axial Exhaust,
Steam Turbine Generator: Static or Brushless, 50 Hz,
Main Cooling System: Closed loop cooling water system using an Induced Draught Cooling Tower,
Demineralized Water System: Demineralized Water System shall be constructed,
Emergency Diesel Generator
500 kV Switchyard
Firefighting System
Gas Turbine Compressor Cleaning: Off-line Compressor Water Wash
Plant Control Philosophy: Automatic Start-up & Shutdown, Auto/Manual Control Remote Dispatching
Gas Turbine-Generator Enclosure: Outdoor with Acoustic Enclosure
Steam Turbine-Generator Enclosure: Indoor
HRSG: Outdoor

2.2 ESTIMATED PERFORMANCE

Measurement	*Unit*	*Value*
Performance of GT		
Gross Electrical Output at Generator Terminal of GTs	[kW]	175 200
Performance of ST		
Gross Electrical Output at Generator terminal of ST	[kW]	100 900
Performance of Combined Cycle (ISO Conditions and Special configuration**)**		
Gross Power	[kW]	276 100
Auxiliary Consumption	[kW]	4 100
Net Power	[kW]	272 000
Plant Net Efficiency	%	57.4

Note: Actual Gross Output, Actual Auxiliary Consumption, actual Net Output and Actual Plant Efficiency may change

Plant Net Efficiency considering actual configuration of plant should be no less than 55%

Actual test Values with conjunction of ISO Conditions variation and plant actual configuration, should be confirmed by relevant calculations.

3. DESIGN CRITERIA

SITE DESCRIPTION

The area of the Gardabani 3 Combined Cycle Thermal Power Plant is located adjacent area to the Northside boundary of CCPP Gardabani 1 and 2 km West from the town Gardabani and approximately 40 km South-East from Tbilisi. The absolute mark of the surface is 292-294 meters above sea level the final elevation shall be confirmed after Contractor finishes the leveling of the site. The Employer will provide the mobilization area with free of charge to the Contractor and there will be no limitation for the working hours of the Contractor for site. The Employer is responsible to obtain necessary permits for the plant construction according to Georgian Legislation. Contractor shall prepare and provide necessary documentation for construction permit in Georgian language to Employer according to №257 Ordinance (Consolidated Version) of the Government of Georgia (Date of issuing 31.05.2019) see ToR Annex III (Extract from №257 Ordinance). no later than 3 months from **Contract sign date**.

In addition, the Contractor shall provide no later than 2 months from **Contract sign date** to GOGC necessary information to prepare ESIA:

- Preparing reports on types and volume of anticipated **emissions** (technical report on stationary sources of the pollution and inventory of hazardous substances exhausted by them and marginal allowable norms of exhaustion/discharge of hazardous substances) for Implementation Phase, cumulative impact assessment with conjunction of existing facilities and preparation of mitigation measures(Stack design should be based on environmental studies.).
- Preparing reports on types and volume of anticipated **noise and vibration**, cumulative impact assessment with conjunction of existing facilities and preparation of mitigation measures.
- Preparing reports on types and volume of anticipated **water quality**, water use and discharged modelling, cumulative impact assessment with conjunction of existing facilities and preparation of mitigation measures.

Also, the contractor is obliged to fulfill the conditions set by the environmental decision and Construction permit terms. Contractor shall utilize his own health and safety plan. The process waste water (blow down of the HRSGs and cooling towers, waste water from water pre-treatment unit and surface waters from GT wash skids) shall be discharged to the existing Waste Water Treatment Plant (X 504011.766 ; Y 4589494.926) west of the plant boundary. The sanitary waste water shall be discharged into the same location. Storm water shall be discharged into the canal nearby the plant.

The Plant will use natural gas as fuel. The natural gas shall be supplied from Gas Main line at regulated pressure of 12.0 bar (a) to 54.0 bar (a) from the gas pipeline. Detailed gas analysis shall be performed by the Contractor.

GEOLOGICAL FEATURES

According to tectonic regionalization of Georgia (E. Gamkrelidze, 2000) the investigation territory is located in subzone of Marneuli, Bolnisi zone, Artvini-Bolnisi block. Neogene and Quaternary deposits take part in the region geological structure. Quaternary deposits are widely distributed in the investigation area. Genetically they are represented by alluvial and lacustrine-alluvial varieties.

Recent alluvial deposits are distributed along Mtkvari riverbed and floodplain as well as at Iveri highland territory. They are lithologically represented by boulders and cobbles, sands and gravels and sands and lean clays. Their thicknesses are from 5m to 20m, and more at some places.Within Gardabani plain boundaries which covers important area and I and II over-floodplain terraces, thickness of alluvial deposits reaches 20-50m. Neogene deposits are widely distributed and represented by upper Pliocene Apsheron stage, upper Pliocene Sarmatian stage deposits; middle Miocene deposit complex and lower Miocene Kotsakhuri horizon. Basic deposits are covered with Quaternary deposits thickness of which is to 50m. Apsheron stage is represented by continental deposits: thick packs of conglomerates, sands, lean clays and variegated color clays. Their thickness is 200-250m. These deposits are open by boreholes at Gardabani plain. Upper Miocene Sarmatian stage – is lithologically represented by variegated clays, sandstones and conglomerates. Thickness of these deposits vary within 100-600m areas (these deposits coincidently continue middle Miocene rocks). Middle Miocene deposit complex – is lithologically represented by clays, sandstones, conglomerates and mark interbeds. These deposits are open by boreholes below upper Pliocene and Quaternary deposits on the left bank of the river Mtkvari. Their thickness is 400-900m. Lower Miocene deposits – Kotsakhuri horizon is lithological represented by thin bedded carbonated clays. Whitish sandstone and sand interbeds with small thickness are locally observed in clay section. This horizon thickness is 400-900m within the region areas.The construction site and its adjacent territory is represented by technogenic genesis gravelly and clayey soils to 1.5-2.5m depth; and below them to 30.0m surveyed depth – by alluvial garvels and cobbles. According to literature and fund material data thickness of gravels and cobbles of old alluvial terrace of the river Mtkvari is quite big. It is confirmed by data of boreholes drilled now within the construction site areas. Gravelly layer bed (bottom) was not crossed in none of boreholes drilled to 30m depth; so thickness of these deposits exceeds the surveyed depth. Rock varieties of upper Pliocene (Apsheron) continental molasse deposits do not come out on the surface; they are entirely located below Quaternary cover and are represented by alternation of lean clays, sandstones and 5-10m thick conglomerate beds. The older – marine Aghchagil deposits are located in 150m depth. The investigation is located in Artvini-Somkhiti block, Bolnisi zone which is, by its side, significantly complicated by intersecting tectonic faults. The zone is located in medium seismic risk area. According to macro seismic regionalization scheme of Georgia, earthquake with 7-8 scale intensity threats to areas populated in this territory (Gardabani, Akhali Samgori, Gamarjveba, Kesalo and etc). According to existing statical data, earthquackes with high magnitude that can make significant harm to modern constructions and impact on relief morpho dynamics often took part in hystorical and the recent past as well. Below we give existing statical data for the closest populated areas (Marneuli, Gardabani) of the investigation site and unidimensional coefficient of seismic waves for the existing populated territories:

1. Gardabani (3390) – 0.11 m/sec2; 7 scale;

2. Aghtakla (3400) – 0.14 m/sec2; 8 scale;

3. Akhalsheni (3415) – 0.11 m/sec2; 7 scale.

According to the seismic regionalization map of Georgia the investigation territory is located between 7 and 8 scale seismic active zones (Order #1-1/2284 given by Minister of Economic Development of Georgia, dated October 07, 2009, Tbilisi, (Construction Norms and Rules "Seismic Resistance Construction" pn 01.01-09)). Contractor is obliged to prepare all necessary geotechnical studies for plant design.

Below mentioned Environmental Conditions are Regional.

PRECIPITATION

The average amount of annual atmospheric precipitation is 540mm; from November to March - 136mm, and from April to October – 404mm. The maximum daily atmospheric precipitation is

147 mm. The region of the area belongs to the snowy region 2. The area of the snow covers per 1 m2 of the horizontal surface for the snowy region 2 is 1,2 kPa H.

Air filter selection for plant shall be done considering nearby Infrastructure, also humidity and dust.

WIND

An average annual wind speed is 2.1 m/s, the highest monthly average – 2.7 m/s in March, the lowest – 1.6 m/s in November and December; the normative value of wind pressure is 0.48 kPa, and on the circular 10 mm diameter cross section on elements, the regulatory wall thickness of the ice at 10m from the ground surface is 10mm

AMBIENT TEMPERATURE

The climate of the plant area is continental, subtropical with hot dry summer and mild winters with unstable weather - an abrupt change in air temperature and rainfall. The average annual temperature is 12.8°c, the absolute maximum +42°C; and the absolute minimum -20 °C; design ambient temp. +15°C.

Plant Design Conditions

The following shall be used as the basis for plant design:

Measurement	*Unit*	*Value*
Site Altitude	m	292-294
Site pressure	mbar	976
Ambient dry-bulb temperature	°C	15
Ambient relative humidity	%	68
Grid Voltage	kV	500
Grid Frequency	Hz	50

FUEL SPECIFICATIONS

The design fuel will be Natural Gas. The combined cycle power plant shall be designed to operate satisfactorily when firing Natural Gas. The Contractor shall undertake any analysis required to determine composition and LHV of fuel gas to ensure proper design of the plant.

RAW WATER REQUIREMENT

The raw water shall be collected from the settling ponds (shall be constructed by contractor) and nearby canal at the north-west side of the plant area.

Contractor is Obliged to analyze the water quality in canal and select plant equipment's accordingly.

PLANT ARRANGEMENT

The equipment shall generally be arranged in coordination with the Employer. The equipment arrangement and access shall minimize personnel exposure to physical harm during the operation, testing, or maintenance of the equipment. Consideration shall be given to avoiding low clearance passageways and tripping obstacles.

EMISSIONS

Air emissions and noise emissions shall be as per the Georgian Legislation requirements.

CODES AND STANDARDS

The power plant shall be built to USA and EU codes and standards. A detailed listing of applicable standards shall be submitted within the Proposal in the RFP by the participant and approved by the Employer. Any deviations from above standards shall be approved by the Employer.

TESTING

The Performance Test shall be conducted in accordance with ASME PTC 46 to demonstrate that the facility can meet the Guaranteed Gross Electrical Output and the Guaranteed Emissions Limits. All electrical testing shall be done according to Georgian Transmission Grid Code.

THE PLANT MAJOR EQUIPMENT

This paragraph describes the proposed plant's major equipment selection, equipment description, reference list of major equipment suppliers. Equipment and materials described herein shall be factory tested in accordance with manufacturer's standard procedures:

EQUIPMENT	VENDOR
GAS TURBINES	GENERAL ELECTRIC
STEAM TURBINE	GENERAL ELECTRIC
	SIEMENS
	ANSALDO ENERGIA
GENERATORS[1]	GENERAL ELECTRIC
HRSG	AALBORG
	NEM
	NOOTER ERIKSEN
	FOSTER WHEELER
	DOOSAN
	CMI
	RAFAKO
BOILER FEED WATER PUMPS	FLOWSERVE
	SULZER
	KSB ITUR
	KIRLOSKAR
	TORISHIMA
	HYUNDAI
	HYOSUNG/EBARA
STEP UP TRANSFORMERS	ABB
	HYUNDAI
	SIEMENS
HV AUXILIARY TRANSFORMER	ABB
	HYUNDAI
	SIEMENS
LV AUXILIARY TRANSFORMER	ABB
	HYUNDAI
	SIEMENS

GENERATOR CIRCUIT BREAKER	ABB
	GENERAL ELECTRIC
	SIEMENS
MV/LV SWITCHGEARS	SIEMENS
	ABB
	SCHNEIDER
GAS COMPRESSORS	ATLAS COPCO
STEAM BYPASS VALVES	CCI
	FLOWSERVE
	TYCO
	TLV
	SIEMENS
	ABB
	SAMSON
	WONIL
FIRE PUMPS	PETTERSON
	AURORA
	ITT
	PEERLESS
AIR COMPRESSOR	ATLAS COPCO
	INGRESSOL
CRANE AND HOIST	KONE
	IŞIK
	BVS
ISOLATED PHASE BUS	SIMELECTRO
	GENERAL ELECTRIC
	ALFA STANDARD
DISTRIBUTED CONTROL SYSTEM	HONEYWELL
	SIEMENS
	ABB
	EMERSON
MV/LV CABLES	SUD KABEL
	NEXANS
	PRYSMIAN
	SURTERI

[1]Remark : The generator of Steam Turbine can be the same VENDOR's as Steam Turbine.

In case of AUTHORIZED LICENSED manufacturer, final product & design package shall be approved by the above-mentioned vendors.

General Description of the Plant

The designed plant shall have the capability to operate on both full condensing modes. The plant shall have Main Condenser cooled by the Cooling water from the Cooling Tower. In the full condensing mode, the Steam Turbine exhaust steam directed to the Main Condenser shall be cooled by the cooling water circulating between the Main Condenser & the Cooling Tower. The steam condensed in the Main Condenser shall then forwarded to the HRSG by the Condensate Forwarding Pumps.

The plant is intended to be operated on Combined Cycle operation mode. However, By-Pass Stack shall enable power plant to operate in Simple Cycle operation mode.

WATER DRAINAGE SYSTEM

A surface drainage system shall be provided by appropriate grading and sloping to direct surface run-off, not at risk of contamination from potential spills of fuel, oils and coolants, away from equipment and structures. Unlined swales and ditches collect, concentrate and discharge the run-off flow to the water channel at west side of the plant area.

ASPHALT PAVING/SURFACING/SIDE WALKS

Asphalt concrete roads and sidewalks with curbstones shall be provided within the plant boundary by the Contractor and shall be marked and painted. Roads shall be 6 m (for main roads) and 4 m (for maintenance areas) wide.

BOUNDARY WALL/FENCE/GATES

It is considered to construct a site boundary wall from all sides around the new plant area. Plant boundary wall shall be reinforced concrete columns, with concrete slabs. The height of the boundary wall shall be 2.4 m and additionally 600mm high 'Y' shaped MS Angle frame for concertina wire loop and column width of 300mm. Chain Link Fence shall be provided around transformers and switchyard. Security System (CCTV; Infrared indicators & etc.) shall be installed by the Contractor.

LIGHTING SYSTEMS

Outdoor lighting shall be high pressure sodium vapour type and shall provide illumination in areas of normal personnel traffic, such as: Building exteriors, Equipment areas, Walkways and stairs, Roadways. Aviation obstruction lighting shall be provided in accordance with International Standards.

GROUNDING

The grounding system consists of bare copper cables and ground rods and provides a metallic ground connection for all electrical apparatus installed in the power plant in order to bond building steel, exposed metal structures and other non–current carrying metallic parts. Grid calculation shall be made according to IEEE Std 80.

PLANT CABLING

XLPE insulated fire resistant, copper conductor, Medium Voltage cables shall be utilized for the MV cable systems.

PVC insulated, copper conductor, Low Voltage cables shall be utilized for the LV cable systems.

All cable for 6.3 kV class service shall have solid dielectric insulation and 90degC maximum continuous conductor temperature. Cable for 6.3 kV class services shall be shielded. All cables for 380/220V service shall have conductors with solid dielectric insulation and 90degC conductor temperature.

Cables shall be installed in duct banks in the outdoor areas.

It should be considered a backup power supply (for own consumption) of the 6,3 kV bus bar from the existing 6,3kv switchgear of Gardabani TPP 2 (X 504464 Y 4589732).

It will be necessary to install two new 6,3 kV feeders in Gardabani TPP 2 switchgear, as there are no spare feeders available. 8-8,2 MW feeder is required from 6,3 kV bus bar 02BBA and 4-4,5 MW from 6,3 kV bus bar 02BBB

Transmission lines (Cables) will be required to be installed between Gardabani TPP 2 and Gardabani TPP 3, that will capable of carrying requested power.

There are the following requirements for additional feeders:

- Bus bar A

Model: UniGear ZS1

Breaker type	VD4/P
rated voltage	6.3 kv
rated current	1250 A
frequency	50 Hz
CT	1250/1

- Bus bar B

Model: UniGear ZS1

Breaker type	VD4/P
rated voltage	6.3 kv
rated current	630 A
frequency	50 Hz
CT	500/1

Also 24 core Optical network cable should be installed between abovementioned TPP's

LIGHTNING PROTECTION

The power plant facility shall be protected by a lightning protection system designed in accordance with international standards.

Lightning protection for Plant structures such as buildings, towers and stacks shall be provided. Ground rods or ground mats connected to the grounding system are located at the base of each structure. The lightning protection shall be in accordance with IEC and local practice, Lightning Protection Code.

FIRE DETECTION & ALARM SYSTEMS

A fire detection & alarm system shall be provided to all areas within the Plant and Site. The system shall include: a main fire control panel located in the central control room that monitors the status of various detectors and pull boxes and drives sound alarm equipment in case of fire condition; fixed water protection systems, with Gas protection to enclosure; fire alarms and portable appliances.

The design of these systems shall comply with the current requirements of the National Fire Prevention Authority (NFPA Codes and standards).

- Certified engineer shall be presented at design stage
- Contractor is obliged to inform and agree with Emergency Management Service of Georgia fire system, including fire station (Depot).

CATHODIC PROTECTION SYSTEM

Buried pipes shall be protected by factory coating and wrapped by suitable corrosion-resistant materials on pipe welds.

A cathodic protection system (*impressed current cathodic protection ICCP*) shall be installed for corrosion protection of underground metal pipes. For the protection of other underground structures and equipment, sacrificial galvanic anodes of magnesium, zinc, aluminum or ICCP system shall be installed.

For the protection of underground structures, extensive piping systems, and in locations where soil resistivity is high, an ICCP system shall be used.

500 KV SWITCHYARD UGL & OHL[1]

500 kV Switchyard needs to be installed which shall be connected to the Georgian State Electro System 500 kV switchyard (GSE Switchyard) via Over Head Lines or Underground lines (In case of Underground line construction is chosen, technical specifications and superiority of the selected option should be agreed with GSE by EPC Contractor). The new 500 kV Switchyard shall have VT bay furnished single bus with arrangement with three (3) incoming bays for GT-GSUT -1, GT-GSUT -2 & STG-GSUT & one outgoing bay to GSE Switchyard. The new switchyard shall also have RTU (Remote terminal unit) along with control cables for operation through plant DCS which will be located in Main Control building. The cable connection in the GSE Switchyard shall be performed by the GSE with assistance of the Contractor.

The 500 kV Switchyard shall be equipped with SF6 circuit breakers, CTs, VTs, Metering units, Lightning arrester, wave trap and other required components for measurement and recording of necessary electrical parameters and appropriate electrical protection systems. For additional details see ToR Annex I.

DM WATER

Contractor shall build according to International Standards a new water treatment system including reserve tanks, dedicated for Gardabani 3.

POTABLE WATER SYSTEM

Potable Water shall be sourced (pipeline shall be constructed) from existing potable water main line (X 503512.961 ; Y 4589518.387) and distributed as required. One 15m^3 potable water storage tank shall be installed with 2x100% potable water pressurization / distribution pumps.

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[1] Coordinates for GSE Switchyard:

1	X 504151	Y 4590171
2	X 503931	Y 4590346
3	X 504084	Y 4590540
4	X 504302	Y 4590368

Approximate Distance from PP to Switchyard - 1200 meters.

FIRE PUMP STATION

The Power Plant shall have its dedicated indoor Fire pump station. The Fire Water Pump shall be installed near cooling water pump house and Cooling Tower Basin shall be used as fire water reservoir.
Water based firefighting system shall be installed as follows:

a) Firefighting installation for buildings and equipment.
b) Site fire hydrant ring system.
c) Firefighting pumping installation (one electric and one diesel driven fire pumps).
d) Fire alarm system.

The installation shall include electric and diesel driven fire pumps, electrically driven jockey pump (to maintain pressure in the ring main system), pump starting and control equipment, strainers, lifting equipment, pipework, valves, supports, instrumentation and all equipment necessary for the satisfactory operation of the system.
A control panel shall be provided in the fire pump house to facilitate maintenance and to allow the pumps to be started and stopped both manually and automatically.
Automatic starting of the pumps shall be arranged in sequence by means of diaphragm operated switches which, on pre-determined drops in pressure in the fire protection system shall start the pumps. The control equipment shall include a logic circuit, which will initiate starting of the standby electric fire pump or the engine driven pump if the motor driven pumps fail to start in a pre-determined time or if the pressure is not restored after operation of the motor driven pumps.

ELECTRICAL CONTROL BUILDING

Electrical Control Building shall be built by the Contractor. Relevant HVAC system (with possibility of individual temperature modes in different areas) shall be available in the building.

GAS SUPPLY SYSTEM

The Gas supply to the new plant shall be done by contractor from the GPRMS (Gas Pressure Reducing and Metering Station) at the south-east part of the new plant area. Contractor shall realize connection to the GPRMS. Contractor shall install DN 500 factory Coated pipeline (Std: API 5L PSL 2; Steel Grade X52) and connect to GPRMS. The Contractor shall construct Regulatory Metering Station (the valve station together with necessary filtering and metering equipment, hereafter RMS) within the plant boundary. Electrical power connection and I&C signaling to the RMS shall be under Contractor Scope. All the Land Acquisition works related to the natural gas pipeline is in Employer Scope.
ESD Valve shall be installed by contractor at outlet of GPRMS and shall be integrated in DCS system

RMS shall include filtration system and chromatograph

Plant should have ability to operate without compressor station at maximum of 54 bar and all sufficient infrastructure (heater and etc…) shall be installed.

4. SPLIT OF OBLIGATIONS

Contractor's and Employer's general scope of services & supply and responsibilities are defined in the following matrix. The list of power plant supporting systems is not exhaustive.

No.	Task	Responsible		Remarks
		Contractor	Employer	
1	**SCOPE OF SERVICES**			
1.1	PROJECT MANAGEMENT	√		
	Periodic Scheduling Reports	√		
	Engineering and Design	√		
	Procurement	√		
	Manufacture & Fabrication	√		
	Marine Transportation, Unloading, Storage	√		Port of Poti or Batumi
	Inland Transportation	√		
	Customs Clearance	√	√	The contractor shall provide all necessary documents.
	O&M Manuals	√		Including the equipment specification from manufacturer.
	As Built Drawings	√		
	Training	√		Shall be conducted by Vendor Representative
	Warranty	√		*24 (twenty-four)* months from the Taking-Over Date.
1.2	FINANCIAL SERVICES			
	Performance Bond	√		10% of the total Contract price
	Advance Payment Bond	√		15% of the total Contract price
	Warranty Bond	√		5% of the total Contract price
	Financing		√	
1.3	TAXES	√	√	
1.4	INSURANCE			
	Marine & Transport Insurance	√		
	Erection All Risk Insurance	√		

No.	Task	Responsible		Remarks
		Contractor	Employer	
	Third Party Liability Insurance	√		
	Workmanship Compensation Insurance for the Contractor's personnel	√		
1.5	SITE SERVICES			
	Site Management	√		
	Supporting the Contractor in Interfacing and Coordination with Permit Authorities		√	
	Temporary Land for Mobilization, Lay Down, Storage and Camp Area	√	√	Employer will provide sufficient area nearby the territory of the Power Plant Area at no cost to the Contractor. Contractor, also shall obtain the permit for camp construction.
	Temporary Works and Facilities	√		
	Services and Facilities for the Employer and the Employer's Representative for temporary use during construction (office space approx. 150 sq.m (10 rooms), including meeting room). Also, utilities, internet, restroom & portable water shall be provided.	√		
	Studies and Calculations Required to Integrate the Power Plant into the Transmission System.		√	Including but not limited to load flow, insulation and protective device coordination studies outside the plant boundary
1.6	CONSTRUCTION, ERECTION, AND PRE-COMMISSIONING.			
	Construction & Erection of the Equipment within the Contractor's Scope of Supply	√		
	Construction Management	√		
	Construction Labor	√		
	Vendor Technical supervisory Support	√		
	Construction Potable Water	√		
	Construction Water	√		
	Construction Power	√		
	Construction Standard Tools & Equipment	√		
	Construction Special Tools & Equipment	√		
	Testing and Pre-commissioning	√		
	Work Permit for Expatriate Labor/Technician	√	√	The Employer will assist in obtaining necessary permits and visas. The cost of work permits and visas will be borne by the Contractor.

No.	Task	Responsible		Remarks
		Contractor	Employer	
1.7	CONSTRUCTION QUALITY CONTROL			
	Statutory Third-Party Authority Inspections	√		As required by standard and codes.
	Quality Assurance Plans, Procedures, Programs, Audits, and Reports	√		
1.8	TESTING, COMMISSIONING AND START-UP			
	Management	√		
	Fuel		√	The Employer is responsible for NG cost.
	Water	√		RAW, DM and etc.
	Electrical Power for Start-up and Commissioning	√		
	Electrical Load for Start-up and Commissioning	√		
	Start-up and Commissioning Consumables	√		
	Procedures	√		
	Vendor Technical Advisory Support	√		
	Standard and Special Test Instruments, Tools and Equipment	√		
	System Walk down and Turnover	√		
	Equipment Commissioning	√		
	Start-up and Commissioning Spares	√		
	Punch List Administration	√		
	Care and Custody of the Plant up to the Provisional Acceptance Date	√		
	Equipment Function Test and Pre-commissioning	√		
	Operation & Maintenance of the Plant up to the contractually agreed Provisional Acceptance Date	√		
1.9	PERFORMANCE TESTING			
	Leadership	√		
	Fuel, Raw Water, Electricity	√		The Employer is responsible for NG cost.
	Operators	√	√	
	Data Collection	√		

No.	Task	Responsible		Remarks
		Contractor	Employer	
1.10	RELIABILITY RUN TEST			According to Georgian Transmission Grid Code
	Leadership	√		
	Fuel, Raw Water, Electricity	√		The Employer is responsible for NG cost.
	Operators	√	√	
	Data Collection	√		
1.11	SITE Environmental Health and Safety Management	√		According to Legislation and International best practice.
2	**SCOPE OF SUPPLY - CIVIL**			
2.1	TOPOGRAPHIC SURVEYS, DETAIL SOIL INVESTIGATIONS AND REPORTS	√		Employer provides Preliminary Topographic Survey, only for informational purposes, see ToR Annex IV
2.2	SITE WORK			
	Clearing/Grubbing	√		
	Earthwork for General Site Levelling	√		
	Earthwork	√		
	In site roads and surfacing	√		
	Access Roads Out of the Power Plant	√		
	Landscaping	√		
	Rain Water Drainage	√		Discharge to the canal.
	Storm Drainage Facilities beyond the Site Capable of Preventing Flooding of the Site	√		Discharge to the canal.
	Dewatering	√		
	Demolition and/or Relocation of Existing above and Underground Facilities	√		
	Disposal of construction waste materials and excess excavated material	√		
	A datum line with three (3) permanent site bench marks providing data covering elevation, longitude and latitude.		√	
2.3	PILING	√		As and if required.
2.4	FOUNDATIONS	√		
2.5	PIPE RACKS	√		
2.6	BUILDINGS			

No.	Task	Responsible		Remarks
		Contractor	Employer	
	Steam Turbine Hall	√		
	Electrical Control Building	√		The electrical equipment (UPS, batteries, panels, dry transformers), control room, and office for tech & shift staff will be located inside the building. The Electrical Control building shall be 3 story and additionally underground cable facility.
	Boiler Feed Water Pump Building	√		
	Fire Pump Building	√		
	Furniture for the Buildings	√	√	The special furniture for control rooms shall be supplied by the Contractor.
	Administrative Building	√		See ToR Annex II
	Fire Station (Depot)	√		Design shall be prepared according to №119 Resolution; Construction of depot is optional and will be decided by Employer
	Hazardous waste storage building	√		
	Chemicals Warehouse	√		See ToR Annex II
	Main warehouse	√		See ToR Annex II
	Shelter warehouse	√		See ToR Annex II
	Workshop	√		See ToR Annex II
	Guard House	√		
	Laboratory (Incl. Tools and Equipment's)	√		See ToR Annex II
	STG Hall	√		
	Water Treatment System Building	√		
2.7	OTHER STRUCTURES	√		
	Security Towers	√		
	Firewalls for Transformers	√		
	Effluent pit	√		
	Fencing around the project site	√		
2.8	PAINTING AND INSULATION	√		
2.9	HVAC SYSTEMS	√		
2.10	CRANES AND HOISTS	√		Shall be installed in Workshops, Warehouses, STH and Etc.
3.	**GAS TURBINE & GENERATOR**			Outdoor type

No.	Task	Responsible		Remarks
		Contractor	Employer	
3.1	TWO (2) GAS TURBINE & GENERATOR PACKAGES	√		
3.2	GAS TURBINE AIR INLET SYSTEM			
	Air inlet filter and accessories	√		As per ambient conditions
3.3	GAS TURBINE AUXILIARY SYSTEM			
	Fuel Gas System	√		
	Lube Oil System	√		
	Hydraulic Oil System	√		
	Compressor Washing System	√		
3.4	GENERATOR & AUXILIARIES			
	Generator	√		
	Generator circuit breaker	√		
	Generator isolated phase bus duct	√		
	Generator neutral grounding cubicle	√		
3.5	ELECTRICAL SYSTEMS AND EQUIPMENT			
	Excitation system	√		
	Turbine Starting System	√		
	AC Motor Control Centers	√		
	PCC	√		
	DC Panel Board	√		
3.6	GAS DETECTION AND FIRE PROTECTION SYSTEM			
	Gas Detection System	√		
	Fire Detection System	√		
	Fire Extinguishing System	√		
3.7	NOISE ENCLOSURE FOR GAS TURBINE	√		
3.8	VENTILATION SYSTEM FOR ENCLOSURE	√		
3.9	CONTROL AND INSTRUMENTATION			
	Turbine control system	√		
	Generator control system	√		
	Turbine and generator protection system	√		

No.	Task	Responsible		Remarks
		Contractor	Employer	
4	**HEAT RECOVERY STEAM GENERATOR**			
4.1	TWO (2) SET OF HORIZONTAL TYPE HRSG AND AUXILIARIES			Outdoor type
	HRSG	√		
	Dearator	√		
	Insulation internal casing	√		
	Insulation external drum & piping	√		
	Ladders, stairs, walkways	√		
4.2	HRSG EXHAUST SYSTEM			
	Main stack	√		Design shall be in compliance with environmental studies.
	Blanketing plates	√		
	Aircraft warning lighting	√		
	Platform and stair lighting	√		
4.3	CONTINUOUS EMISSION MONITORING SYSTEM(CEMS)	√		
4.4	**BYPASS STACK**			
	Diverter damper	√		For one Gas Turbine only
	Guillotine damper	√		For one Gas Turbine only
	By pass stack	√		For one Gas Turbine only & Design shall be in compliance with environmental studies.
5	**STEAM TURBINE PACKAGE**			
5.1	ONE (1) STEAM TURBINE (FOR TWO SETS OF GAS TURBINE) AND AUXILIARIES			
	Steam Turbine	√		
	Acoustical enclosure	√		
	Stop and control valves	√		
	Admission valves	√		
	By pass valves	√		
	Exhaust hood system	√		
	Steam sealing system	√		
	Gland sealing system	√		
	Turning Gear	√		

No.	Task	Responsible		Remarks
		Contractor	Employer	
	Turbine drain system	√		
	Lube oil system	√		
	Hydraulic oil system	√		
	Insulation	√		
5.2	ELECTRICAL SYSTEMS AND EQUIPMENT			
	Excitation system	√		
	AC Motor Control Centre's	√		Incorporated in plant MCC
	DC Panel Board	√		
5.3	GENERATOR & AUXILIARIES			
	Generator	√		
	Generator circuit breaker	√		
	Generator isolated phase bus duct	√		
	Generator neutral grounding cubicle	√		
5.4	CONTROL AND INSTRUMENTATION	√		Controlled by DCS
	Turbine Control System	√		
	Generator Control System	√		
	Turbine & Generator Protection System	√		
6	**SCOPE OF SUPPLY – ELECTRICAL**			
6.1	TRANSMISSION LINE (OHL)	√		In case of Underground line construction is chosen, technical specifications and superiority of the selected option should be agreed with GSE by EPC Contractor
6.2	HV SWITCHGEAR/SUBSTATION	√		
6.3	HV OHL BETWEEN GRID AND CCPP	√		
6.4	TRANSFORMERS			
	Generator Step up Transformers for GTG	√		
	Generator Step up Transformer for STG	√		
	Unit Auxiliary Transformers	√		
	Station Auxiliary Transformers	√		
6.5	MEDIUM VOLTAGE SWITCHGEARS	√		
6.6	LOW VOLTAGE SWITCHGEARS	√		

No.	Task	Responsible		Remarks
		Contractor	Employer	
6.7	MCC PANELS	√		
6.8	AC DISTRIBUTION SYSTEMS	√		
6.9	DC SUPPLY AND UPS SYSTEM	√		
6.10	GENERATOR CONNECTIONS	√		
6.11	PROTECTION RELAYING SYSTEM	√		
6.12	ELECTRICAL MONITORING SYSTEM	√		
6.13	ELECTRICITY TARIFF METERING	√		
6.14	CABLES AND RACEWAY/DUCT BANK SYSTEM	√		
6.15	GROUNDING SYSTEM	√		
6.16	POWER PLANT LIGHTING			
	Road lighting	√		
	Building lighting	√		
	Equipment lighting	√		
6.17	COMMUNICATION SYSTEM	√		Within plant area telephone and internet system.
6.18	ALARM, ACCESS CONTROL, PUBLIC ADDRESS, CCTV AND SECURITY SYSTEMS	√		
6.19	EMERGENCY DIESEL GENERATOR	√		
6.20	BLACK START DIESEL GENERATOR	√		With a grid (national) rebuild complete function
6.21	CATHODIC PROTECTION AND HEAT TRACING (for all necessary pipe and vessel facilities)	√		
7	**INSTRUMENTATION & CONTROL SYSTEM**			
7.1	DCS	√		
	Large screen display	√		3x55” and 1x70” Displays
	Programmable Logic Computers	√		
	Relaying/metering/protection	√		
	RTU/SCADA system	√		
7.2	LOCAL INSTRUMENTS AND CABLES	√		

No.	Task	Responsible		Remarks
		Contractor	Employer	
7.3	PLC	√		Auxiliary system.
8	**SCOPE OF SUPPLY - BALANCE OF PLANT "MECHANICAL"**			
8.1	FUEL SYSTEM (NATURAL GAS)			
	Fuel Gas Pipe Line from Main line tie-in point to GPRMS		√	
	Gas Pressure Reducing, Regulation and Metering Station (GPRMS)		√	
	Gas Pipeline from GPRMS to plant	√		
	Natural Gas Compressor Station with Canopy	√		Gas compressor electrical engines should be equipped with soft starter unit
	Gas Regulatory Station (RMS)	√		Inside Plant. Shall have ability to work without regulation
	GT Fuel Auxiliary System	√		
	Fuel Gas Piping within the Site Boundary	√		
8.2	RAW WATER SUPPLY SYSTEM			
	Settling Pond construction	√		Capacity Should be defined by engineer based on plant water volume requirements.
	Raw Water piping and pump station (with canopy)	√		
	All other required equipment, Connection Piping, Valves, and Piping Fittings	√		
8.3	RAW WATER TREATMENT SYSTEM			Shall be built by the Contractor.
	Flocculator	√		Design should be done according sample analysis results, taken in accordance of standards and canal water turbidity level
	Service Water Pump	√		
	All required equipment/facilities Connection Piping, Valves, and Piping Fittings	√		
8.4	DEMINERALIZED WATER TREATMENT SYSTEM			
	Two demineralized water transfer pumps	√		

No.	Task	Responsible		Remarks
		Contractor	Employer	
	Demineralized water storage tank	√		As per relevant standards.
	Intermediate product tanks	√		As per relevant standards.
	Acid and Caustic Tanks	√		As per relevant standards.
	All required equipment/facility, connection Piping, piping fittings, valves, instruments, and controls	√		
8.5	COOLING WATER SYSTEM			
	Mechanical Induced Draft Cooling Tower	√		
	Circulating Water Pump	√		
	Circulating Water Chemical Dosing Skid	√		
	All required equipment/facilities, Connection Piping, Valves, and Piping Fittings	√		
8.6	CLOSED COOLING WATER SYSTEM			
	Auxiliary coolers & Auxiliary cooling water expansion tank	√		As per relevant standards.
	Heat Exchanger	√		
	CCW Circulation Pumps	√		
	All required equipment/facilities, Connection Piping, Valves, and Piping Fittings	√		
8.7	WASTE WATER TREATMENT			
	Sewage Treatment Plant	√		The Contractor's scope is to install sewage system within the site boundary and pipeline from the Site boundary to the existing waste water treatment plant (X 504011.766; Y 4589494.926)
	Sanitary Lift Station	√		
	Oily Wastewater Separator System	√		
	Waste Water Collection Pit	√		
	Waste Water Transfer Pump	√		
	Connection Piping, Valves, and Piping Fittings	√		
8.8	POTABLE WATER SYSTEM			
	Potable water pipeline	√		Tie-in (X 503512.961; Y 4589518.387)
	Potable Water Storage Tank	√		

No.	Task	Responsible		Remarks
		Contractor	Employer	
	Potable Water Supply Pump	√		
	Connection Piping, Valves, and Piping Fittings	√		
8.9	MAIN STEAM SYSTEM			
	HP steam system	√		
	LP steam system	√		
8.10	CONDENSATE SYSTEM	√		
8.11	CONDENSER AIR REMOVAL SYSTEM	√		
8.12	BOILER FEED WATER SYSTEM	√		
	Boiler feed water pumps	√		
	Piping, valves, and instrumentation	√		
8.13	CHEMICAL INJECTION & DOSING SYSTEM	√		
8.14	STEAM AND WATER SAMPLING AND ANALYSIS	√		
8.15	BOILER BLOW-DOWN SYSTEM	√		
8.16	STEAM BYPASS SYSTEM	√		
8.17	INSTRUMENT AIR SYSTEM	√		
8.18	SERVICE AIR SYSTEM	√		
8.19	Nitrogen Generation System	√		
8.20	FIRE PROTECTION SYSTEM	√		
	Fire Hydrant System	√		
	Carbon Dioxide System	√		For GT
	Water Spray System	√		
	Portable Fire Extinguishers	√		
	Firefighting Pumps	√		
	Fire Water Ring Main Piping	√		
	Fire Detection System	√		
8.21	PAINTING AND INSULATION	√		
8.22	HVAC SYSTEM	√		

No.	Task	Responsible		Remarks
		Contractor	Employer	
8.23	CRANES AND HOISTS	√		
8.24	LABORATORY TOOLS AND APPARATUS	√		
8.25	PIPING SYSTEM	√		
8.26	PLANT DRAIN SYSTEM	√		
9	**OTHERS**			
9.1	WORKSHOP EQUIPMENT		√	
9.2	I & C WORKSHOP EQUIPMENT		√	
9.3	FUEL SYSTEM (NATURAL GAS) ANALYSIS	√		Analysis required to determine composition and LHV of fuel gas to ensure proper design of the plant
9.4	ALL OTHER REQUIRED EQUIPMENT, CONNECTION PIPING, VALVES, AND PIPING FITTINGS, CABLING ETC.	√		
9.5	GENERAL SYSTEMS PROGRAMS AND SOFTWARE	√		Last Available Versions
9.6	FINAL VENDOR LIST AND CONTACT DETAILS for all installed equipment	√		Final vendor list is required in order to enable the Employer to purchase spares.
9.7	CONTINUOUS EMISSION MONITORING SYSTEM	√		

5. DOCUMENTS FOR APPROVAL OR REVIEW BY THE EMPLOYER

5.1 GENERAL

Drawings and documentation shall be detailed and complete to ensure that the Power Plant will conform to the Employer's requirements and also enable the design requirements to be fully implemented during the procurement and site construction phases. All drawings and documentation submitted shall:

- Reference and be compatible with all interface drawings
- be no larger than AO, however standard A2 size is preferred, in case A2 is not readable, original size will be submitted
- contain a project specific Title Block; and the specific format to be discussed and agreed by both Employer and Contractor show specific revision changes to facilitate effective tracking and review
- be provided in both AutoCAD.dwg and searchable PDF versions incl. "as built" drawings.

5.2 SUBMISSION DISTRIBUTION AND FORMAT

Design drawings, calculation reports and other document submissions shall be clearly legible and transmitted in both English and Georgian Language or bilingual Georgian-English. Submission shall be by electronic copy (in searchable PDF format and Auto CAD.dwg (2004 or higher version)

for drawings), with parallel hardcopy - from 2 to 5 hard copies as requested by Employer. Provided that for Employers review and approval submission will be only in electronic copy followed by hard copies after approval. All electronic submissions shall be printable without special software or required significant conversion. Scanned documents are not acceptable, except of the cases when it is unavoidable and necessary. In the event of conflict between the electronic and hard copy submission, the hard copy shall prevail.
Technical data lists for Equipment, Instruments, Cables, etc., and Bill of Materials, included in the documents should be in EXCEL format.
The CONTRACTOR shall arrange for the efficient distribution of contract documentation to enable the timely review of the project engineering design by the Employer and/or the Employer's Representative.
Documents (drawings, instructions and manuals) shall be of such quality and with such legibility that hardcopy reproductions may be prepared by the Employer with every line, character and letter clearly legible and usable for further reproduction.
Documents shall be searchable.

The preliminary 'Document Listing' is summarized below which gives the main categories of documentation.

Document List	**Submittal Time from the Contract sign date.** ***(Mentioned submittal times are for 1st Version/Issue of the Document)***
Engineering Deliverable List **(For Review)**	30 days – Preliminary 90 days – Final
Project Level 2 Schedule **(For Approval)**	60 days
Project Level 3 Schedule **(For Review)**	2 months look ahead Level 3 Schedule to be submitted with monthly reports.
Design Drawings & Calculations (**For Approval)**	Progressively
General Layout – Plot Plan **(For Approval)**	15 days
Electrical Single Line Diagram **(For Approval)**	30 days
Flow Diagrams **(For Approval)**	75 days
P&IDs **(For Approval)**	90 days
Materials Specification's (**For Approval)**	Progressively
Plant Major Equipment Specifications **(For Review)**	20 days prior to order
Controls and DCS Architecture **(For Approval)**	Progressively
Building Architecture **(For Approval)**	Progressively
Building Standards and Codes to be used **(For Approval)**	Progressively
Detailed Layouts and Arrangement Drawings **(For Approval)**	Progressively
Wiring Diagrams **(For Approval)**	Progressively
Monthly Progress Report **(For Review)**	Progressively
Vendor List (Final vendor list is required in order to enable the Employer to purchase spares.) **(For Review)**	Progressively
Construction Procedures **(For Approval)**	Progressively

Project Management Plans (HS, ENV, Waste Management, QA/QC, Pre-commissioning & commissioning) **(For Approval)**	Prior to commencement of the construction.
Project Quality Plan **(For Approval)**	60 days
Detailed ITPs & Test Procedures **(For Approval)**	30 days prior draft procedures, 15 days prior final procedures prior to commencement of the related tests and activities
List of consumables and spare parts for operation purposes **(For Review)**	No later than 12 months before completion of construction
Commissioning and Testing Schedule incl. firm amounts of natural gas required **(For Review)**	6 months prior to commissioning
As Built Drawings **(For Review)**	Within 30 days after Take Over
O&M Manuals **(For Approval)** The final issue of the-Operation & Maintenance Manuals (specific to the as built Gardabani 3 power plant) reviewed by the Employer and the Employer's Representative in 5(five) printed copies and 1 (one) electronic file (CD).	No later than 42 days from submission of Taking-Over Certificate
O&M Manufacturers Manuals **(For Review)** For each Plant equipment delivered on site.	No later than 14 days from delivery on site

5.3 DOCUMENTATION REVIEW AND APPROVAL

The Employer's or Employer's Representative's review or approval on Contractor's Documents shall not relieve the CONTRACTOR of its obligation to meet the requirements of the Contract (whether this be the Technical Specification, Plant Functionality or Guarantees).

Response time for Document Review by the Employer shall be 14 working days from date of receipt of the document electronic copy. Electronic copies will be submitted by e-mail and/or by FTP server, the details of which will be discussed in the execution phase. The Employer shall make every effort to make the review in a shorter time than 14 working days and in particular in the event that the CONTRACTOR highlights where specific documents are critical for early review. Comments may be provided to the CONTRACTOR either by email and/or fax with comments listed or by marked up drawing with accompanying cover-note. The Cover-Note shall state that the Contractor's Documents complies with the Contract, or the extent to which it does not comply. If Contractor's Document fails to comply, it shall be rectified, resubmitted and reviewed in accordance with the turnaround time specified above. For each part of the works, execution of such part of the works shall not commence prior to the approval of Contractor's Documents by the Employer or Employer's Representative. If the Contractor wishes to modify any design document which has previously been approved, the Contractor shall immediately give notice to the Employer. Thereafter, the Contractor shall submit revised documents to the Employer in accordance with the above approval procedure.

Detailed Document review and approval procedure (including numbering and coding) will be discussed in the execution phase.

Specification of Requirements

For JSC Georgian Oil and Gas Corporation to Connect Gardabani Thermal Plant-3, a Combined Cycle Thermal Power Plant (CCTPP) in Gardabani Municipality, to the Power Grid

JSC Georgia Electrosystem is not against of connection by JSC Georgian Oil and Gas Corporation of Gardabani Thermal Plant-3, a 276.1 MW (Gross) Combined Cycle Thermal Power Plant (CCTPP) in Gardabani Municipality (X= 504593; У=4589422), to the Power Grid subject to the following requirements:

1. The Applicant to select a site and build the relevant plant of the required capacity (276.1 MW) and a 500/11-kV substation, with all the necessary equipment and devices;
2. A designated space to be allocated in S/S Gardabani-500 to set up a 500-kV line bay with all the necessary modern equipment and devices
3. A 500-kV single-circuit power transmission line (OHL) to be built between the line bay to be set up in the 500-kV switchgear of S/S Gardabani-500 and the design S/S 500/11 kV to be built by the Applicant;
4. The route, length, wire type, grade and section of the to-be-built 500-kV OHL to be ascertained at the design phase;
5. The route of the to-be-built 500-kV OHL to be agreed with the relevant organization(s);
6. The scope of reconstruction-restoration works to be determined at the design phase;
7. The 500-kV line bay of S/S Gardabani-500 to be equipped with the digital protection, control and automation relays integrated into the digital protection and control relays present in S/S Gardabani-500; the digital protection terminals that entail a digital protection relay (at both ends of the line) shall have the following functional capabilities:

Protection Set I

- Differential protection (with optical communication);
- 5 remote protection zones;
- 4-step residual current protection;
- Maximum current protection;
- Emergency current protection (with two interphase steps and two zero steps);
- Breaker backup;
- 3-phase automatic changeover switch;
- 1-phase automatic changeover switch;
- Remote and local control of the bay;
- Fault site identification;
- Logging and storing emergency records and oscillograms;
- Synchronism detection;
- Communication facility;
- Time synchronization.

Protection Set II

- Differential protection (with optical communication);
- 5 remote protection zones;
- 4-step residual current protection;

- Maximum current protection;
- Emergency current protection (with two interphase steps and two zero steps);
- Breaker backup;
- 3-phase automatic changeover switch;
- 1-phase automatic changeover switch;
- Remote and local control of the bay;
- Fault site identification;
- Logging and storing emergency records and oscillograms;
- Synchronism detection;
- Communication facility;
- Time synchronization.

8. GSE to report the relay protection settings of the to-be-built 500-kV power transmission line (OHL) in S/S Gardabani-500;
9. All connections to Gardabani Thermal Plant-3 to be equipped with modern digital protection and control devices, the relay protection settings of each element to be reported [to] and agreed with GSE;
10. The Applicant to set up, for each Gardabani Thermal Plant-3 and the 500-kV power transmission line, a synchronized phasor measurement system (the technical details of which must be agreed at the design phase with GSE), and provide for the following:
    - The synchronized vector measuring system must transmit data to S/S Gardabani-500 subject to the requirements of IEEE C37.118 provided, however, the port(s) of the PMU(s) and communication device(s) is/are not used for other purposes and are physically isolated from other networks;
    - The time synchronization of the synchronized phasor measurement system must be carried out through GPS.
    - The current and voltage circuits of any PMU(s) used in the synchronized phasor measurement system must be connected to the protection precision class coils of the current and voltage transformers;
    - PMUs in the synchronized phasor measurement system must be capable of reporting messages in the performance classes P and M);
    - PMUs used in the synchronized phasor measurement system must be capable of reporting at the rate of 50 messages per second;
    - For each unit, the synchronized phasor measurement system must measure the following parameters:
        - Y-voltage and phase-lag angle of the all the generator status' three phases;
        - Phase current and phase-lag angle of the all the generator status' three phases;
        - Generator stator voltage frequency;
        - Generator stator voltage frequency variation rate;
        - Field voltage;
        - Field current;
        - Generator breaker state (discreet signals – breaker on / off);
        - Unit (transformer) breaker state (discreet signals – breaker on / off);
        - Turbine
        - Guide vane position (analogous signal equivalent to the guide vane opening/closing range of 0-100%).

- The synchronized phasor measurement system must measure the following parameters for the 500-kV Overhead power transmission line:
  - Y-voltage and phase-lag angle of the all the three phases;
  - Phase current and phase-lag angle of the all the three phases;
  - Voltage frequency;
  - Voltage frequency variation rate;
  - State of breaker(s) (discreet signals – breaker on / off).

11. Within no later than 10 (ten) business days prior to the examination by the commission, after the design has been agreed, the Applicant shall present:

    - List of relay protection and automation equipment protocols;
    - Protocol of testing the relay protection and automation equipment under the agreed design;
    - Documents attested to by the company (according to the map of the settings of the EPP connections) stating that the settings agreed with GSE have been provided in the relay protection and automation equipment).

12. In Gardabani Thermal Plant-3, GSE will ensure the arrangement of Emergency Control Automatics (ECA), for which purpose the User shall ensure the following:
    - To allocate, in the line of the control and protection cabinet(s) of each unit, space for an ECA cabinet, to which the following must be brought:
      - Respective cables to be connected to the protection precision class coils of the current and voltage transformers connected to the generator stator circuit (technical details to be agreed at the design phase);
      - Respective cables to be connected to the interlocks of the generator breaker and transformer unit breaker (technical details to be agreed at the design phase);
      - Respective cables to be connected to the shutdown circuit of the generator breaker or transformer unit breaker (technical details to be agreed at the design phase)
      - Cables to the DC and AC power supplies (technical details to be agreed at the design phase).
    - To allocate, in the line of the control and protection cabinet(s) of the 500-kV power transmission line (OHL), space for an ECA cabinet, to which the following must be brought:
      - Respective cables to be connected to the interlocks of the 500-kV power transmission line (OHL) breaker, bus switch and line isolating switch (technical details to be agreed at the design phase);
      - Cables to the DC and AC power supplies (technical details to be agreed at the design phase).
13. Automatic regulation of revolutions per minute (frequency) on the generators;
14. The frequency regulator must have the ability to adjust the statism coefficient droop within the range of 2%-8%;
15. The power plant must have ability to participate in Frequency Containment Reserves (FCR) and thus
    a. the power activation/deactivation speed must be ≥ 3% Pnom/s [180%Pnom/min];
    b. the value of primary reserve shall be no more than 12%Pnom In a limited period of time determined by Balancing Market;
16. The PP must be capable of taking part in Frequency Restoration Reserves (FRR):
    a. The plant turndown with minimum load of 21%Pnom up to 6 hours per day;

b. Stable working ability within 21-100%Pnom.

17. The PP must be capable of taking part in Replacement Reserves (RR):
18. The generator drive governor must be capable of operating in a forced mode for at least 10 seconds.
19. The generator drive system must be equipped with a Power System Stabilizer (PSS);
20. The PP must be capable of:
    a. generating reactive power
    b. consuming reactive power
21. The generator drive system must have the following operating modes:
    a. Voltage control mode (V);
    b. Reactive power control mode (Q);
    c. Power factor control mode (cosf);
22. The nominal power factor of the PP must be less than 0.85 (cosf<0.85);
23. The PP must be capable of operating within the following frequencies in the relevant periods of time:

47.0 – 47.5 Hz 20 sec
47.5 – 48.5 Hz 30 min
48.5 – 49.0 Hz 60 min
49.0 – 51.0 indefinitely
51.0 – 51.5 Hz 30 min
51.5 – 52.5 Hz 30 sec
52.5 – 53.0 Hz 10 sec

24. The PP must be capable of operating to an allocated load in an autonomous mode. When the PP operates in an autonomous mode, the generator speed control system must also be capable of operating within the frequency range of 45.0 Hz – 55.0 Hz;
25. The PP must be capable of operating within the following voltage limits:

0.85 – 0.90 pu 60 min
0.90 – 1.12 pu indefinitely
1.12 – 1.15 pu 20 min

26. The PP must be capable of withstanding the frequency derivative, i.e., maintaining a parallel operation with the system:
    - if the frequency derivative value does not exceed 1.5 Hz/sec (measured in a 200 ms time interval by a 20 ms increment) and, in addition,
    - The network frequency does not exceed 50.75 Hz.
27. The PP must have a start black-start capability:
    a. cold start – in maximum 2 hours;
    b. warm start – in at least 1 hour;
    c. hot start – in at least 35 minutes.
28. The PP gas turbine must have ability to operate autonomously;
29. Maximum power loss resulting from the deactivation of one unit of PP must be less than 50% of the total power generation (<50%);
30. The number of PP activations must not exceed 270 per year; in addition, it shall have the ability of 50 urgent switch off during a year and 3 urgent switches off a day using system automatic.
31. The design specifications for each of the PP generators, excitation systems, speed control

systems, power system stabilizers (PSS) must be presented to be approved by GSE;

32. Must be integrated into the Emergency Control System and be capable of withstanding sudden (emergency) blackouts without being damaged;
33. Frequency and voltage ramping settings must be agreed with GSE;
34. The details of the functional capabilities of the relay protection and automation equipment to be agreed and specified with GSE on the design phase;
35. In S/S Gardabani 500, the digital relay(s) of the newly added bay must be fully integrated into the Station Control and Monitoring System (SCMS), i.e. SCADA, Level 2 (this involves setting up digital relays, integrating them into the SS communication network, integrating them into the existing SIEMENS GW&HMI control and monitoring system, updating them and testing (including locking) them. Technical details to be agreed at the design phase;
36. For reliability purposes, a circular (using two cables) optic-fiber communication system must be set up between the Gardabani CCTPP-3 and S/S Gardabani-500 control buildings under the following terms and conditions:
    - **On the one hand,** instead of the earthing cable, the following must be mounted from portal to portal of the 500-kV power transmission line (OHL) to be built between Gardabani CCTPP-3 and S/S Gardabani-500: OPGW optic-fiber cable with single mode (SM) optic cores. On the premises of both substations, the communication line from the portal joint box to the telecommunications cabinet must be set up using a ground dielectric SM optic-fiber cable with Rodent Protection, double protective layer, placed in a corrugated plastic pipe. The cables in the telecommunications cabinets in both substations must be terminated with an optic distribution frame (ODF).
      Note: if the OPGW cable cannot be built along the entire route of the 500-kV overhead PTL to be erected because it would cross any other existing overhead PTLs, the need for arranging ground dielectric optic-fiber cable sections from pole to pole at such cross points must be provided for.

    - **On the other hand,** a ground dielectric SM optic-fiber cable with Rodent Protection, double protective layer, placed in a corrugated plastic pipe must be buried between the telecommunications cabinets in the Gardabani CCTPP-3 and S/S Gardabani-500 control buildings. At both ends, the cable in the telecommunications cabinets must be terminated with an optic distribution frame (ODF).

37. The optic cores of the optic-fiber cable must comply with ITU-T G.652D Recommendation Link;
38. The Joint Box, ODF, Pigtails, optic-fiber connectors, the ground dielectric optic-fiber cable the OPGW optic-fiber cable shall preferably be made by the same manufacturer;
39. The quantity of the specific materials required for the construction of the OPGW optic-fiber cable, ground dielectric optic-fiber cable as well as the precise technical details of equipment to be agreed at the detailed design phase;
40. A Station Control and Monitoring System (SCMS), i.e. SCADA, Level III, must be set up to provide remote control and monitoring (National Control Center) of the design PP/SS power equipment. The system must ensure exchange of telecommunications of the PP (all connections) with National Control Center using the communication elements of SCADA, Level I;

    The SCADA, Level I communication elements may include:

- GW (GateWay), a data collection and transmission equipment between the PP and National Control Center to collect information, transmit it to SCADA, Level I for PP control;
- ICON multiplexor. Tele protection and Automatic Emergency Control for OHL;
- L3 switches – to connect the design PP to the communication network of the current SCADA, Level I.

41. The design PP must be provided with at least two telephones for personnel on duty to maintain direct communication with National Control Center;
42. Support shall be provided (the participation of the relevant G3 engineer in preparing the configuration of SCADA, Level I communication element to ensure mutual compatibility on a protocol level) during the Remote Control and Monitoring configuration/testing;
43. The SCADA, Level I communication elements in the design PP must be accommodated in secure space with micro climate.
44. Uninterrupted power supply must be provided for the SCADA, Level I communication elements in the design PP;
45. An electricity billing meter to be installed for the line bay to be set up in the 500-kV switchgear of S/S Gardabani-500;
46. A control electricity meter to be installed for the line bay of the 500-kV OHL (connecting to S/S Gardabani-500) in Gardabani TPP-3;
47. Technical meters to be installed on the PP generators, auxiliary power transformers and at the points defined by Article 66.6, Chapter 8 of the Network Rules
48. The Applicant to prepare the design to set up the billing meter and connecting it to an upper Electric current control and metering system and dully agree it with GSE before commencing the works, provided the field works are performed according to this agreed design;
49. The design to set up the control and technical meters and connecting them to an upper Electric current control and metering system to be prepared by GSE, provided the field works are performed according to this agreed design;
50. The meters identified at paragraphs 45, 46 and 47 of these Requirements must be set up in compliance with the respective requirements of all the normative acts applicable in Georgia, including (but not limited to):

    a) respective requirements of Chapter 8 (Metering Procedure) of the Network Rules approved by Resolution №10, 17.04.2014 of the Georgian National Energy and Water Supply Regulatory Commission as well as any other applicable industry requirements related to metering.

    b) respective requirements of the Technical Regulation on Approval of the Rules of Operation of Electric Power Plants and Networks (Government of Resolution №434, 13 December 2013), including (but not limited to) Article 56;

    c) respective requirements of the Rules of Operation of Electric Power Plants and Networks (approved by Order №52, 4 October 2010 of the Minister of Energy of Georgia), including (but not limited to) Article 56;
51. In the course of designing and setting up the network and during the operation of the facility, the requirements of the Rules for Setting up Electric Installations, the Rules for Delivering and Consuming Electricity (Electric Power), the Safety Rules, the Network Rules, and other normative acts applicable in Georgia must be fully complied with;
52. What with disturbances arising in the power grid for a variety of reasons, limitations may apply subject to the emergency control requirements of GSE;
53. The Applicant's design documentation for connecting the TPP to the power grid to be developed subject to these the technical requirements, and submitted to GSE for approval;
54. The Applicant may conduct the works under the design only after the design has been approved;

55. If these technical requirements are not complied with in full, GSE shall be released from responsibility for a reliable connection of the design SS, TPP and OHL to the power grid;
56. Before the facility is connected to the power transmission network, the Applicant shall submit all the primary and secondary electrical equipment measurement protocols issued by an accredited person for the Applicant's SS, TPP and OHL (the protocols to given an opinion on the serviceability of equipment). The Applicant must submit the required protocols at least 10 business days prior to the examination by the commission.
57. The facility to be connected to the electrical network after the Commission for Examination of Works for Compliance with Requirements has conducted an onsite inspection and issued a Commission Report.

Note:

1. EPC contractor is obliged to submit completed technical project within 3 (three) months after the signing of the contract to GSE. The project must be accompanied by all relevant documents required by the GSE including plans, diagrams and other drawings, also Project shall be expertised and conclusion must be provided. The project of connection to the transmission network and the attached documentation must be submitted to the GSE in Georgian language, both in material (printed) and in electronic versions.

2. In case of 500kv underground transmission line is chosen, EPC contractor is responsible to prepare a comprehensive study for connection of PP to the substation "Gardabani-500", which should include both technical issues related to the construction of the cable line and the issues of its reliability of substation. It is also advisable to study the planned inspections and the possibilities and conditions for emergency situations.

EPC Contractor must submit Above mentioned Study to GSE no later than 2 (two) months after the signing of the contract.

Within 1 (one) month from the submission of the Study, GSE will review the results of the Study and in case the underground cable is acceptable for operational, technical, dispatching and other topics, GSE confirms the suitability and written confirmation will issued which shall include additional GSE requirements and conditions regarding the cable line arrangement.

Split of Obligations

No.	Task	Responsible	
		Contractor	GSE
1	The Applicant to select a site and build the relevant plant of the required capacity (276.1 MW Gross) and a 500/11-kV substation, with all the necessary equipment and devices;	√	
2	A designated space to be allocated in S/S Gardabani-500 to set up a 500-kV line bay with all the necessary modern equipment and devices		√
3	A 500-kV single-circuit power transmission line (OHL) to be built between the line bay to be set up in the 500-kV switchgear of S/S Gardabani-500 and the design S/S 500/11 kV to be built by the Applicant;	√	
4	The route, length, wire type, grade and section of the to-be-built 500-kV OHL to be ascertained at the design phase;	√	
5	The route of the to-be-built 500-kV OHL to be agreed with the relevant organization(s);	√	
6	The scope of reconstruction-restoration works to be determined at the design phase;	√	√
7	The 500-kV line bay of S/S Gardabani-500 to be equipped with the digital protection, control and automation relays integrated into the digital protection and control relays present in S/S Gardabani-500; the digital protection terminals that entail a digital protection relay (at both ends of the line) shall have the following functional capabilities: **Protection Set I** · Differential protection (with optical communication); · 5 remote protection zones; · 4-step residual current protection; · Maximum current protection; · Emergency current protection (with two interphase steps and two zero steps); · Breaker backup; · 3-phase automatic changeover switch; · 1-phase automatic changeover switch; · Remote and local control of the bay; · Fault site identification; · Logging and storing emergency records and oscillograms; · Synchronism detection; · Communication facility; · Time synchronization. **Protection Set II** · Differential protection (with optical communication); · 5 remote protection zones; · 4-step residual current protection; · Maximum current protection; · Emergency current protection (with two interphase steps and two zero steps); · Breaker backup; · 3-phase automatic changeover switch; · 1-phase automatic changeover switch; · Remote and local control of the bay; · Fault site identification; · Logging and storing emergency records and oscillograms; · Synchronism detection; · Communication facility; · Time synchronization.		√
8	GSE to report the relay protection settings of the to-be-built 500-kV power transmission line (OHL) in S/S Gardabani-500;		√

9	All connections to Gardabani Thermal Plant-3 to be equipped with modern digital protection and control devices, the relay protection settings of each element to be reported [to] and agreed with GSE;	√	
10	The Applicant to set up, for each Gardabani Thermal Plant-3 and the 500-kV power transmission line, a synchronized phasor measurement system (the technical details of which must be agreed at the design phase with GSE), and provide for the following: · The synchronized vector measuring system must transmit data to S/S Gardabani-500 subject to the requirements of IEEE C37.118 provided, however, the port(s) of the PMU(s) and communication device(s) is/are not used for other purposes and are physically isolated from other networks; · The time synchronization of the synchronized phasor measurement system must be carried out through GPS. · The current and voltage circuits of any PMU(s) used in the synchronized phasor measurement system must be connected to the protection precision class coils of the current and voltage transformers; · PMUs in the synchronized phasor measurement system must be capable of reporting messages in the performance classes P and M); · PMUs used in the synchronized phasor measurement system must be capable of reporting at the rate of 50 messages per second; · For each unit, the synchronized phasor measurement system must measure the following parameters: o Y-voltage and phase-lag angle of the all the generator status' three phases; o Phase current and phase-lag angle of the all the generator status' three phases; o Generator stator voltage frequency; o Generator stator voltage frequency variation rate; o Field voltage; o Field current; o Generator breaker state (discreet signals – breaker on / off); o Unit (transformer) breaker state (discreet signals – breaker on / off); o Turbine o Guide vane position (analogous signal equivalent to the guide vane opening/closing range of 0-100%). · The synchronized phasor measurement system must measure the following parameters for the 500-kV Overhead power transmission line: o Y-voltage and phase-lag angle of the all the three phases; o Phase current and phase-lag angle of the all the three phases; o Voltage frequency; o Voltage frequency variation rate; o State of breaker(s) (discreet signals – breaker on / off).	√	
11	Within no later than 10 (ten) business days prior to the examination by the commission, after the design has been agreed, the Applicant shall present: · List of relay protection and automation equipment protocols; · Protocol of testing the relay protection and automation equipment under the agreed design; · Documents attested to by the company (according to the map of the settings of the EPP connections) stating that the settings agreed with GSE have been provided in the relay protection and automation equipment).	√	
12	In Gardabani Thermal Plant-3, GSE will ensure the arrangement of Emergency Control Automatics (ECA), for which purpose the User shall ensure the following: · To allocate, in the line of the control and protection cabinet(s) of each unit, space for an ECA cabinet, to which the following must be brought: o Respective cables to be connected to the protection precision class coils of the current and voltage transformers connected to the generator stator circuit (technical details to be agreed at the design phase); o Respective cables to be connected to the interlocks of the generator breaker and transformer unit breaker (technical details to be agreed at the design phase); o Respective cables to be connected to the shutdown circuit of the generator breaker or transformer unit breaker (technical details to be agreed at the design phase) o Cables to the DC and AC power supplies (technical details to be agreed at the design phase). · To allocate, in the line of the control and protection cabinet(s) of the 500-kV power transmission line (OHL), space for an ECA cabinet, to which the following must be brought: o Respective cables to be connected to the interlocks of the 500-kV power transmission line (OHL) breaker, bus switch and line isolating switch (technical details to be agreed at the design phase); o Cables to the DC and AC power supplies (technical details to be agreed at the design phase).		√
13	Automatic regulation of revolutions per minute (frequency) on the generators;	√	
14	The frequency regulator must have the ability to adjust the statism coefficient droop within the range of 2%-8%;	√	
15	The power plant must have ability to participate in Frequency Containment Reserves (FCR) and thus a. the power activation/deactivation speed must be ≥ 3% Pnom/s [180%Pnom/min]; b. the value of primary reserve shall be no more than 12%Pnom In a limited period of time determined by Balancing Market;	√	
16	The PP must be capable of taking part in Frequency Restoration Reserves (FRR): a. The plant turndown with minimum load of 21%Pnom up to 6 hours per day; b. Stable working ability within 21-100%Pnom.	√	

17	The PP must be capable of taking part in Replacement Reserves (RR):	√	
18	The generator drive governor must be capable of operating in a forced mode for at least 10 seconds.	√	
19	The generator drive system must be equipped with a Power System Stabilizer (PSS);	√	
20	The PP must be capable of: a. generating reactive power b. consuming reactive power	√	
21	The generator drive system must have the following operating modes: a. Voltage control mode (V); b. Reactive power control mode (Q); c. Power factor control mode (cosf);	√	
22	The nominal power factor of the PP must be less than 0.85 (cosf<0.85);	√	
23	The PP must be capable of operating within the following frequencies in the relevant periods of time: 47.0 – 47.5 Hz 20 sec 47.5 – 48.5 Hz 30 min 48.5 – 49.0 Hz 60 min 49.0 – 51.0 indefinitely 51.0 – 51.5 Hz 30 min 51.5 – 52.5 Hz 30 sec 52.5 – 53.0 Hz 10 sec	√	
24	The PP must be capable of operating to an allocated load in an autonomous mode. When the PP operates in an autonomous mode, the generator speed control system must also be capable of operating within the frequency range of 45.0 Hz – 55.0 Hz;	√	
25	The PP must be capable of operating within the following voltage limits: 0.85 – 0.90 pu 60 min 0.90 – 1.12 pu indefinitely 1.12 – 1.15 pu 20 min	√	
26	The PP must be capable of withstanding the frequency derivative, i.e., maintaining a parallel operation with the system: · if the frequency derivative value does not exceed 1.5 Hz/sec (measured in a 200 ms time interval by a 20 ms increment) and, in addition, · The network frequency does not exceed 50.75 Hz.	√	
27	The PP must have a start black-start capability: a. cold start – in maximum 2 hours; b. warm start – in at least 1 hour; c. hot start – in at least 35 minutes.	√	
28	The PP gas turbine must have ability to operate autonomously;	√	
29	Maximum power loss resulting from the deactivation of one unit of PP must be less than 50% of the total power generation (<50%);	√	
30	The number of PP activations must not exceed 270 per year; in addition, it shall have the ability of 50 urgent switch off during a year and 3 urgent switches off a day using system automatic.	√	
31	The design specifications for each of the PP generators, excitation systems, speed control systems, power system stabilizers (PSS) must be presented to be approved by GSE;	√	
32	Must be integrated into the Emergency Control System and be capable of withstanding sudden (emergency) blackouts without being damaged;	√	
33	Frequency and voltage ramping settings must be agreed with GSE;	√	
34	The details of the functional capabilities of the relay protection and automation equipment to be agreed and specified with GSE on the design phase;	√	
35	In S/S Gardabani 500, the digital relay(s) of the newly added bay must be fully integrated into the Station Control and Monitoring System (SCMS), i.e. SCADA, Level 2 (this involves setting up digital relays, integrating them into the SS communication network, integrating them into the existing SIEMENS GW&HMI control and monitoring system, updating them and testing (including locking) them. Technical details to be agreed at the design phase;		√
36	For reliability purposes, a circular (using two cables) optic-fiber communication system must be set up between the Gardabani CCTPP-3 and S/S Gardabani-500 control buildings under the following terms and conditions: · **On the one hand,** instead of the earthing cable, the following must be mounted from portal to portal of the 500-kV power transmission line (OHL) to be built between Gardabani CCTPP-3 and S/S Gardabani-500: OPGW optic-fiber cable with single mode (SM) optic cores. On the premises of both substations, the communication line from the portal joint box to the telecommunications cabinet must be set up using a ground dielectric SM optic-fiber cable with Rodent Protection, double protective layer, placed in a corrugated plastic pipe. The cables in the telecommunications cabinets in both substations must be terminated with an optic distribution frame (ODF). **Note:** if the OPGW cable cannot be built along the entire route of the 500-kV overhead PTL to be erected because it would cross any other existing overhead PTLs, the need for arranging ground dielectric optic-fiber cable sections from pole to pole at such cross points must be provided for. · **On the other hand,** a ground dielectric SM optic-fiber cable with Rodent Protection, double protective layer, placed in a corrugated plastic pipe must be buried between the telecommunications cabinets in the Gardabani CCTPP-3 and S/S Gardabani-500 control buildings. At both ends, the cable in the telecommunications cabinets must be terminated with an optic distribution frame (ODF).	√	

37	The optic cores of the optic-fiber cable must comply with ITU-T G.652D Recommendation Link;	√	
38	The Joint Box, ODF, Pigtails, optic-fiber connectors, the ground dielectric optic-fiber cable the OPGW optic-fiber cable shall preferably be made by the same manufacturer;	√	
39	The quantity of the specific materials required for the construction of the OPGW optic-fiber cable, ground dielectric optic-fiber cable as well as the precise technical details of equipment to be agreed at the detailed design phase;	√	
40	A Station Control and Monitoring System (SCMS), i.e. SCADA, Level III, must be set up to provide remote control and monitoring (National Control Center) of the design PP/SS power equipment. The system must ensure exchange of telecommunications of the PP (all connections) with National Control Center using the communication elements of SCADA, Level I; The SCADA, Level I communication elements may include: · GW (GateWay), a data collection and transmission equipment between the PP and National Control Center to collect information, transmit it to SCADA, Level I for PP control; · ICON multiplexor. Tele protection and Automatic Emergency Control for OHL; · L3 switches – to connect the design PP to the communication network of the current SCADA, Level I.	√	
41	The design PP must be provided with at least two telephones for personnel on duty to maintain direct communication with National Control Center;	√	
42	Support shall be provided (the participation of the relevant G3 engineer in preparing the configuration of SCADA, Level I communication element to ensure mutual compatibility on a protocol level) during the Remote Control and Monitoring configuration/testing;	√	
43	The SCADA, Level I communication elements in the design PP must be accommodated in secure space with micro climate.	√	
44	Uninterrupted power supply must be provided for the SCADA, Level I communication elements in the design PP;	√	
45	An electricity billing meter to be installed for the line bay to be set up in the 500-kV switchgear of S/S Gardabani-500;		√
46	A control electricity meter to be installed for the line bay of the 500-kV OHL (connecting to S/S Gardabani-500) in Gardabani TPP-3;	√	
47	Technical meters to be installed on the PP generators, auxiliary power transformers and at the points defined by Article 66.6, Chapter 8 of the Network Rules	√	
48	The Applicant to prepare the design to set up the billing meter and connecting it to an upper Electric current control and metering system and dully agree it with GSE before commencing the works, provided the field works are performed according to this agreed design;		√
49	The design to set up the control and technical meters and connecting them to an upper Electric current control and metering system to be prepared by GSE, provided the field works are performed according to this agreed design;	√	
50	The meters identified at paragraphs 45, 46 and 47 of these Requirements must be set up in compliance with the respective requirements of all the normative acts applicable in Georgia, including (but not limited to): a) respective requirements of Chapter 8 (Metering Procedure) of the Network Rules approved by Resolution №10, 17.04.2014 of the Georgian National Energy and Water Supply Regulatory Commission as well as any other applicable industry requirements related to metering. b) respective requirements of the Technical Regulation on Approval of the Rules of Operation of Electric Power Plants and Networks (Government of Resolution №434, 13 December 2013), including (but not limited to) Article 56; c) respective requirements of the Rules of Operation of Electric Power Plants and Networks (approved by Order №52, 4 October 2010 of the Minister of Energy of Georgia), including (but not limited to) Article 56;	√	√
51	In the course of designing and setting up the network and during the operation of the facility, the requirements of the Rules for Setting up Electric Installations, the Rules for Delivering and Consuming Electricity (Electric Power), the Safety Rules, the Network Rules, and other normative acts applicable in Georgia must be fully complied with;	√	√
52	What with disturbances arising in the power grid for a variety of reasons, limitations may apply subject to the emergency control requirements of GSE;	√	√
53	The Applicant's design documentation for connecting the TPP to the power grid to be developed subject to these the technical requirements, and submitted to GSE for approval;	√	
54	The Applicant may conduct the works under the design only after the design has been approved;	√	
55	If these technical requirements are not complied with in full, GSE shall be released from responsibility for a reliable connection of the design SS, TPP and OHL to the power grid;	√	√
56	Before the facility is connected to the power transmission network, the Applicant shall submit all the primary and secondary electrical equipment measurement protocols issued by an accredited person for the Applicant's SS, TPP and OHL (the protocols to given an opinion on the serviceability of equipment). The Applicant must submit the required protocols at least 10 business days prior to the examination by the commission.	√	
57	The facility to be connected to the electrical network after the Commission for Examination of Works for Compliance with Requirements has conducted an onsite inspection and issued a Commission Report.	√	√

ToR_Annex №II

Facility Structures on the design territory of Gardabani CCTPP

Terms of Reference

Main parameters and key technical solutions of the facilities

1. Administrative Office Building and Security Buildings

Number of floors – two-floor building and basement;

Building dimensions: length 46 m, width 16 m;

The following must be located on the first floor of the building:

- Reception;
- Dining-room for 50 persons;
- Locker room with 30 lockers;
- Shower room – toilet;
- Two hotel type rooms with WC;
- Two rooms (one for server and IT staff);
- Relaxation room for staff;
- Storage and utility premises;
- Ventilation, fire and other equipment assembly room.

The following must be located on the second floor of the building:

- One office room for the manager, secretary room with the reception and communication with the meeting room;
- Meeting room;
- Three office rooms (large);
- Ten office rooms (small);
- Relaxation room for staff;
- Kitchen area;

- Archives;
- At least 2 WCs

The following must be located on the basement of the building:

- Various storage and utility rooms, in agreement with the Purchaser.

Security staff building:

- One floor;
- 2 rooms;
- WC;
- 4 (four) security guard towers with the minimum height of 5 m must be arranged on the territory;

Other parameters of the building to be designed shall be defined on the basis of the calculation, in agreement with the Purchaser.

General technical solutions

Building type

- Frame – reinforced concrete structure;
- Walls – small-size building blocks;
- Insulation of the structure should be considered;

The building must be equipped with:

- Power supply and water supply systems;
- Sewage system;
- HVAC (heating/ventilation/air conditioning) system;
- Fire protection system;
- Communication lines: telephone connection, Internet, security sensor and surveillance systems.

The design shall be developed on the basis of conducting of engineering-geodesic, engineering-geologic and engineering-hydrometeorological reconnaissance works.

2. Main warehouse

- One-floor thermally insulated structure of rectangular shape;
- Dimensions not more than 40 x 50 m (to be defined more precisely during the design);
- Structure height – 12 m (to be defined more precisely during the design);
- The foundation type to be selected on the basis of the geological-engineering studies;
- Frame type – metal structure;
- The structure must be stainless steel factory-made sandwich panels;
- Stainless steel shelves in six rows along the length of the warehouse;
- The floor must be made of reinforced concrete, with smooth/shiny surface;
- The structure must have three large-size and four small-size doors (passages for trucks, personnel and emergency exits);
- Electricity and lighting network must be provided;
- The structure must be equipped with a ventilation system to keep the internal space dry;
- Fire hydrants must be provided in the vicinity of the structure and fire alarm system must be arranged in the internal space;
- Openable windows must be made on the walls of the structure and rain shutters shall be installed on the external façade;
- A lifting crane with lifting capacity of at least 10 tons must be installed in the internal space of the structure to ensure relocation of freight within the storage room (so-called overhead crane);

3. Chemicals Warehouse

- One-floor thermally insulated structure of rectangular shape;
- 500 m^2 (to be defined more precisely during the design);
- Structure height – 8 m (to be defined more precisely during the design);
- The foundation type to be selected on the basis of the geological-engineering studies;
- Frame type – metal structure;
- The structure must be stainless steel factory-made sandwich panels;
- The floor must be made of reinforced concrete, with smooth/shiny surface;
- The structure must have one large-size and three small-size doors (passages for trucks, personnel and emergency exits);
- Electricity and lighting network must be provided;
- The structure must be equipped with a ventilation system to keep the internal space dry;

- Fire hydrants must be provided in the vicinity of the structure and fire alarm system must be arranged in the internal space;
- Openable windows must be made on the walls of the structure and rain shutters shall be installed on the external façade;
- A lifting crane with lifting capacity of at least 5 tons must be installed in the internal space of the structure to ensure relocation of freight within the storage room (so-called overhead crane);
- Two separate, independent storage room must be arranged inside the internal perimeter of the Warehouse;

4. Shelter warehouse

- One-floor thermally insulated structure of rectangular shape;
- 500 m^2 (to be defined more precisely during the design);
- Structure height – 6 m (to be defined more precisely during the design);
- The foundation type to be selected on the basis of the geological-engineering studies;
- Frame type – metal structure;
- The structure must be covered by stainless steel factory-made sheet panels;
- The perimeter of the structure must be cladded by stainless-steel factory-made mesh panels;
- The floor must be made of reinforced concrete;
- The structure must have two large-size and two small-size doors made of stainless steel factory-made mesh panels (passages for trucks, personnel and emergency exits);
- Electricity and lighting network must be provided;
- Fire hydrants must be provided in the vicinity of the structure and fire alarm system must be arranged in the internal space;
- A lifting crane with lifting capacity of at least 3 tons must be installed in the internal space of the structure to ensure relocation of freight within the storage room (so-called overhead crane);

5. Workshop

- One-floor thermally insulated structure of rectangular shape;
- Dimensions not more than 20 x 35 m (to be defined more precisely during the design);
- Structure height – 12 m (to be defined more precisely during the design);
- The foundation type to be selected on the basis of the geological-engineering studies;
- Frame type – metal structure;
- The structure must be stainless steel factory-made sandwich panels;
- Stainless steel shelves shall be arranged in one row along the length of the workshop;
- The floor must be made of reinforced concrete with smooth/shiny surface;
- The structure must have one large-size and four small-size doors (passages for trucks, personnel and emergency exits);

- Electricity, lighting and Internet network must be provided;
- The structure must be equipped with HVAC (heating/ventilation/air conditioning) system;
- Fire hydrants must be provided in the vicinity of the structure and fire alarm system must be arranged in the internal space;
- The workshop must be provided with water and sewage system;
- Openable windows must be made on the walls of the structure and rain shutters shall be installed on the external façade;
- A lifting crane with lifting capacity of at least 10 tons must be installed in the internal space of the structure to ensure relocation of freight within the workshop (so-called overhead crane);
- Three independent office rooms, two shower room-toilets and locker-room with 10 lockers must be provided in the internal space of the workshop;
- The structure must be provided with electricity and lighting network;

6. Laboratory (Incl. Tools and Equipments)

- One-floor thermally insulated structure of rectangular shape;
- Dimensions not more than 15 x 15 m (to be defined more precisely during the design);
- The laboratory shall be modular in design, enabling easy change of arrangement wherever applicable.
- Structure height – 5 m (to be defined more precisely during the design);
- The foundation type to be selected on the basis of the geological-engineering studies;
- Frame type – reinforced concrete;
- The structure must have two small-size doors (personnel and emergency exits);
- Electricity, lighting and Internet network must be provided;
- The structure must be equipped with heating/air conditioning system which must keep temperature within 18-28°C;
- The structure must be provided with water and sewage system;
- Openable windows must be made on the walls of the structure and rain shutters shall be installed on the external façade;
- Four independent office rooms must be provided in the internal space of the structure;
- The structure must be provided with electricity and lighting network;
- The structure must be provided with a ventilation system;
- The structure must be provided with a moisture absorption equipment (to be defined more precisely during the design);

Extract From
Resolution of the Government of Georgia
No. 257
May 31, 2019
Tbilisi

On the procedure of issuing a construction permit for facilities of special importance (except construction of radiation and nuclear facilities) and permit conditions

Article 31. Architectural design, structural and technological scheme

1. Pursuant to this Resolution, the second stage of issuing a construction permit is to approve the architectural design, structural and/or technological scheme.
For approval of the architectural-construction design, the permit seeker must submit the architectural design and/or if required, structural scheme and/or technological scheme.
2. In cases defined by the Resolution, as well as upon request of the Agency, the permit seeker shall submit the structural scheme and/or technological scheme at the second stage of issuing a construction permit.

Article 32. Content of the architectural design

1. Architectural design of a building (structure) includes:
a) Information about the facility subject to construction permit which includes:
a.a) title page, name and address of the facility;
a.b) list of sheets;
a.c) used conventional signs;
a.d) explanatory note containing description of the designing purposes:
  a.d.a) basis and purposes of designing;
  a.d.b) written description of the land parcel;
  a.d.c) contextual description of the design;
  a.d.d) description of the main structural system of the building (structure);
  a.d.e) description of the legislation used for designing;
a.e) technical data of the building (structure):
  a.e.a) area of the land parcel;
  a.e.b) size of the used K1 and development area;
  a.e.c) size of the used K2 and development density area, showing the development area of each floor;
  a.e.d) size of the used K3 and the landscaping area;
  a.e.e) area of the building (structure), including, if any, area of the residential house; apartment area(s); office premises; trade and household service area(s); production area; storehouse area; staircase and entrance areas; summer areas (balconies, terraces, verandas and loggias);

b) analysis of compliance with ‘Building and Structure Safety Rules" for buildings and structures;
b.a) occupancy and description of each use;
b.b) structure type(s);
b.c) height limitations;
b.d) area limitations;
b.e) requirements to the external wall openings;
b.f) requirements to passages;
b.g) requirements to fire protection systems;
b.h) requirements to fixtures of the water supply system;
b.i) other requirements, if applicable.
c) situational plan – scale 1:2000 or 1:1000;
d) photo material reflecting the current situation (distant and close-up views, specifying the date)
e) land parcel layout (specifying the coordinates) – scale 1:500 or 1:250:
e.a) land parcel layout shown on the land parcel topographical plan;
e.b) location and heights of buildings and structures;
e.c) land parcel access roads and domestic motor roads, parking lots, pathways, bicycle path, landscaping, improvement etc.;
e.d) if required, household waste container placement scheme;
e.e) in case of change of the ground surface, the ground surface change plan;
e.f) surface water removal scheme;
f) floor layouts at all levels and the roof layout – scale 1:200, 1:100 and/or 1:50:
f.a) layout of all floors and roof of the building, showing the cadaster border projection, floor surface elevations, ground elevation of the building (structure) in respect to the absolute ground elevation;
f.b) the building floor layouts must provide information about the basic floor sizes, room and/or space areas and their basic sizes as well as the basic sizes of passages;
f.c) furniture and/or other location layouts – in accordance with the Resolution of Georgia No. 41 dated January 28, 2016 "On approval of the Technical Regulations – Building and Structure Safety Rules";
g) lateral and/or longitudinal section(s) of buildings and structures – scale 1:200, 1:100 and/or 1:50:
g.a) sections of buildings and structures, must contain at least the ground surface elevations and the building and structure ground elevation in respect to the absolute ground elevation;
g.b) used materials, at the discretion of the permit seeker;
g.c) significant parts and/or details, at the discretion of the permit seeker – scale 1:20, 1:10 and/or 1:5;
h) all facades of the building and structure – scale 1:200, 1:100 and/or 1:50:
h.a) materials and colors used on the façade;
h.b) in case of existence of adjacent buildings, layouts – scale 1:500 and/or 1:200;
h.c) significant parts and/or details of the façade – scale 1:20, 1:10 and/or 1:5;
i) occupancy and passage layouts for buildings and structures – scale 1:200 and/or 1:100:
i.a) occupancy loads;
i.b) road-stair and other passage throughputs;
i.c) passages, access to passages, passways and exits from the building;
i.d) maximum distances to be covered to the passage;

i.e) access route;
i.f) if required, shelter areas;
i.g) if required, other requirements;
j) compliance of road-stairs, entrance ramps, banisters and door handles for buildings and structures with Building and Structure Safety Rules in the form of drawings – scale 1:50 and/or 1:20;
k) fire protection plans for buildings and structures – scale 1:200
k.a) requested quality fire-resistance delimiters;
k.b) used fire protection systems;
k.c) other requirements, if required;
l) building and structure facades in special construction regulation zones and historic protection zones where their basic dimensions, heights, including heights between floors must be specified, showing the ground crossing levels in respect to the absolute ground elevation, specifying the sizes of all openings and architectural details on the façade, façade (reference surface) drawings, showing schematic drawings of building facades (reference surfaces) located on the adjacent land parcels (for example, street layout); composite photographs and axonometric views defining architectural details, finishing-construction materials and colors (both in printed and digital form, showing all kinds of finishing materials, windows, stained-glass windows, banisters or other architectural elements used on facades in detail (including, showing the place of location of heating-air conditioning technical facilities), as well as the used paint color by RGB or RAL codes;
m) if required, mockup and/or referenced view(s) and/or composite photographs;
n) on the territory of Tbilisi, land parcel landscaping design as well, which together with other data must also contain the following information:
n.a) K-3 coefficient area;
n.b) types of green plantings to be planted (including, description – age, height);
n.c) landscaping design completion date;
n.d) person responsible for care of the planted green plantings;
n.e) length of care of the planted green plantings;
o) on the territory of Tbilisi, road traffic organization scheme showing the transport/road infrastructure of the design territory, showing connection to the survey territory;
p) additional material at the discretion of the permit seeker.

2. Parts of the architectural design defined by paragraph one of this Article may be submitted in a combined form.

3. In case of submission in a printed form - the architectural design must be submitted folded in A-4 format, stitched up in the binder /filer.

Article 33. Content of the structural scheme

1. In case of construction of structures (including, linear structures), the structural scheme includes:

a) explanatory note;
b) land parcel layout (where location of structures on land parcel(s) is shown in a physical context);

c) ground surface change plan (if any) for the territory required for the structure(s);
d) identification of ground elevation and reference to the absolute ground elevation;
e) schematic drawings of views/facades;
f) sections characterizing the structure(s);
g) layouts of all floors (if any) of the building.

2. By decision of the Client, the structural scheme may additionally include:

a) photos of the territory;
b) digital visualization and/or mockup.

3. Parts of the structural scheme defined by paragraph one of this Article may be submitted in a combined form, folded in A-4 format, stitched up in the binder /filer.

Article 34. Content of the technological scheme

1. Technological scheme includes:

a) explanatory note;
b) land parcel layout (where location of structures on land parcel(s) is shown in a physical context);
c) ground surface change plan (if any) for the territory required for the structure(s);
d) identification of ground elevation and reference to the absolute ground elevation;
e) schematic drawings of facades (reference surfaces);
f) sections characterizing the structure(s);
g) technological scheme of the respective production process(es);
h) layouts of all floors (if any) of the building.

2. By decision of the Client, the technological scheme may additionally include:

a) photos of the territory;
b) digital visualization and/or mockup.

3. Parts of the technological scheme defined by paragraph one of this Article may be submitted folded in A-4 format, stitched up in the binder /filer.

ToR_Annex_IV

საქართველოს ნავთობისა და გაზის კორპორაცია
GEORGIAN OIL & GAS CORPORATION

დეპარ. უფროსი	თ. ჯავახიშვილი
სამს. უფროსი	ა. სოფრომაძე
სამს. უფროსი	ს. კირაკოსოვი
საველე აგეგმვა	ა. სოფრომაძე
დაამუშავა	ს. კირაკოსოვი
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ტოპოგრაფიული გეგმა

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