Annexure D- Infrastructure Planning & System Design Scenario

City Power has recently received an application for 42 MVA connection at 11 kV to Data Centre in the North Eastern Region of Johannesburg. The existing primary substations in close proximity are Westfield Substation (88/11 kV) and Longlake Substation (88/11 kV), both of which does not have sufficient capacity to meet the demand of the application. There is insufficient space to upgrade the abovementioned stations. The HV supply to these stations also have limitations on the Overhead Lines thus eliminating the option of connecting to these stations. City Power has decided to Establish an HV Supply (88 kV) by means of an Overhead Line from Sebenza Substation (275/88 kV) which has sufficient capacity. The 88 kV Switchgear at Sebenza Substation is an Indoor GIS with three Spare Bays however it is not equipped with the necessary cabling and Transition Yard. There are also no HV Overhead Lines or HV Underground leaving Sebenza to the corridor of the Data Centre Location.

The Data Centre has submitted a Ramp-up Plan as follows:

Year 1	Year 3	Year 10
20 MVA	30 MVA	42 MVA

City Power also wishes to de-load a nearby substation of 8 MVA load (8 distributors @ approximately 1 MVA per distributor) as soon as the proposed substation has been constructed and commissioned. The loads are purely residential.

There is also no primary substation in the vicinity, therefore City Power will be required to construct a new electrical network covering the following scope:

- Laying of 88 kV Cables from Indoor GIS to Transition Yard
- Construction of 88 kV Overhead Lines from Sebenza Transition Yard which is 8km away
- Construction of Substation/Switching Station Buildings and associated Civils and Earth Works
- Construction of an 88 kV Outdoor High Voltage Yard with Busbar System and associated auxiliaries
- Installation of 88/11 kV, 45 MVA Transformers and their associated auxiliaries
- Installation of an 11 kV Medium Voltage Indoor Switchgear
- Installation of all associated Secondary Plant Protection, Control and Monitoring equipment
- Installation of Medium Voltage Cables from Proposed Substation to Data Centre located 100 Metres away adjacent to one another

- Installation of medium voltage reticulation networks (townships are approximately 1km from the proposed substation site)

The bidder is required to provide a full-functional design report taking into consideration the following:

- GA layout for the Transition Yard, Proposed 88/11 kV Substation,
- Civil and electrical designs to be used
- Typical overhead lines and underground cable design (route, stringing chart, conductor/cable selection, Structure Selection)
- Firm capacity and Contingency capacity (N-1), volt drop and fault levels calculations
- SCADA, Fire and Security, Metering, Telecommunications and Protection
- Assume load calculations for Residential Loads
- All land acquisition tasks including Servitude Acquisitions Geotechnical and environmental studies have been concluded

The design shall take into consideration time and cost to construct, safety and security of infrastructure, load growth over a 20 year period at an average load growth of 1 MVA every 5 years per distributor. The load growth is only applicable to the Residential Loads.

Case Study Scoring Criteria

Technical Evaluation Criteria		**Scoring**	**Weight**
1. Provide detailed design drawings and equipment/services specifications covering the following: • 88kV Underground Cables system • Transition Yard General Arrangement • 88kV overhead lines system • Substation primary plant equipment • Substation General Arrangement • Typical civil drawings • The system single line diagram • MV Cabling to Data Centre General Arrangement		**All provided = 10 Points Incomplete/not provided = 0 Points**	**35**
2. Provide simulated results of the designed system on the following: • Loading profile • Simulation of fault levels across the entire network • Scenarios to cater for N-1 contingency on the system		**All provided = 10 Points Incomplete/not provided = 0 Points**	**20**
3. Protection and Security of the Network: • Provide technical details of the protection, SCADA, batteries and		**All provided = 10 Points Incomplete/not**	**25**

telecommunication requirements and operation • Provide detailed integrated security system design • Provide details of advanced metering infrastructure for statistical data analysis on the 88kV intake side and transformer 11kV incomers		**provided = 0 Points**	
4. Provide a typical BoQ for the proposed system: • 88kV Underground Cables system • Transition Yard • 88kV overhead lines system • 88/11 kV Proposed Substation • MV Cabling to Data Centre • MV Reticulation Network		**All provided = 10 Points Incomplete/not provided = 0 Points**	**20**