18 July 2024

The Director: Services and Infrastructure
Bitou Local Municipality
Private Bag X1002
Plettenberg Bay
6600

Attention: Ms. Asiphe Mgoqi

Dear Ma'am,

ELECTRICITY CAPACITY INVESTIGATION FOR THE MANOR HOUSE RE-DEVELOPMENT AT ERF 10190 IN PLETTENBERG BAY: CAPACITY ANALYSIS OF THE BULK ELECTRICAL SERVICES

The request by Mr. Andy Paterson of MORE Family Collection for GLS Consulting to investigate and comment on the bulk electricity services for the proposed re-development project on Erf 10190 Plettenberg Bay, refers.

This document should inter alia be read in conjunction with the Electrical Master Plan (performed for the Bitou Municipality) dated December 2022.

The proposed re-development on Erf 10190 was not taken into consideration in the December 2022 Master Plans for the existing and future electrical networks. This document should inter alia be read in conjunction with the following documents:

- Milkwood Manor Conceptual Pack – Project ERF 10190 (MORE Family Collection)
- Electrical Master Plan (performed by GLS Consulting for the Bitou Local Municipality) dated December 2022.
- NRS 034-1 (2007) /SANS 507 (2007): Electricity distribution — Guidelines for the provision of electricity distribution networks in residential areas
- NRS 048-2: Quality of Supply.
- Geo-based Load Forecast Standard – Eskom Group Technology Guideline Document
- Information document no. 1: Bitou Local Municipality zoning scheme by-law November 2016 Bitou Local Municipality Development Charges Policy
- Latest electrical network diagrams for Bitou Local Municipality from Lyners and Partners:
  - *20076E-003 – Plettenberg Bay SLD (Existing)*
  - *3-601-DIAG-REV S - Sept 2019*

The estimated maximum demand of the proposed re-development on Erf 10190 was provided by Clinkscales Maughan-Brown (CMB) on behalf of the developers via email. The proposed re-development will be conducted on Erf 10190, where there is an existing guest house named Milkwood Manor. The guest house is situated near Lookout Beach next to the Keurboomsrivier. No provision was however made in the December 2022 Electrical Master Plan for the additional load from this re-development on this erf. The existing landuse and tariff of the stand provided indicate that the erven will be used for commercial purposes, as it is being used as place of hospitality.

1. Distribution Zone

The proposed re-development is located near Lookout Beach, along the banks of Keurboomsrivier and on Salmack Road. The suburb falls within SS-1 Main (Ferdinand) distribution zone. Supply to the proposed re-development will be accommodated within the SS-1 Main distribution zone. SS-1 Main currently has two incoming feeders from the Eskom Plett Main Substation supplying the substation at 11 kV.

The substation is currently shared with Eskom, the portion belonging to BLM is the 11kV switching section. The installed capacity of the substation is 20 MVA with 2x10 MVA transformers belonging to Eskom supplying the substation. The Notified Maximum Demand (NMD) for the substation is 15.5 MVA.

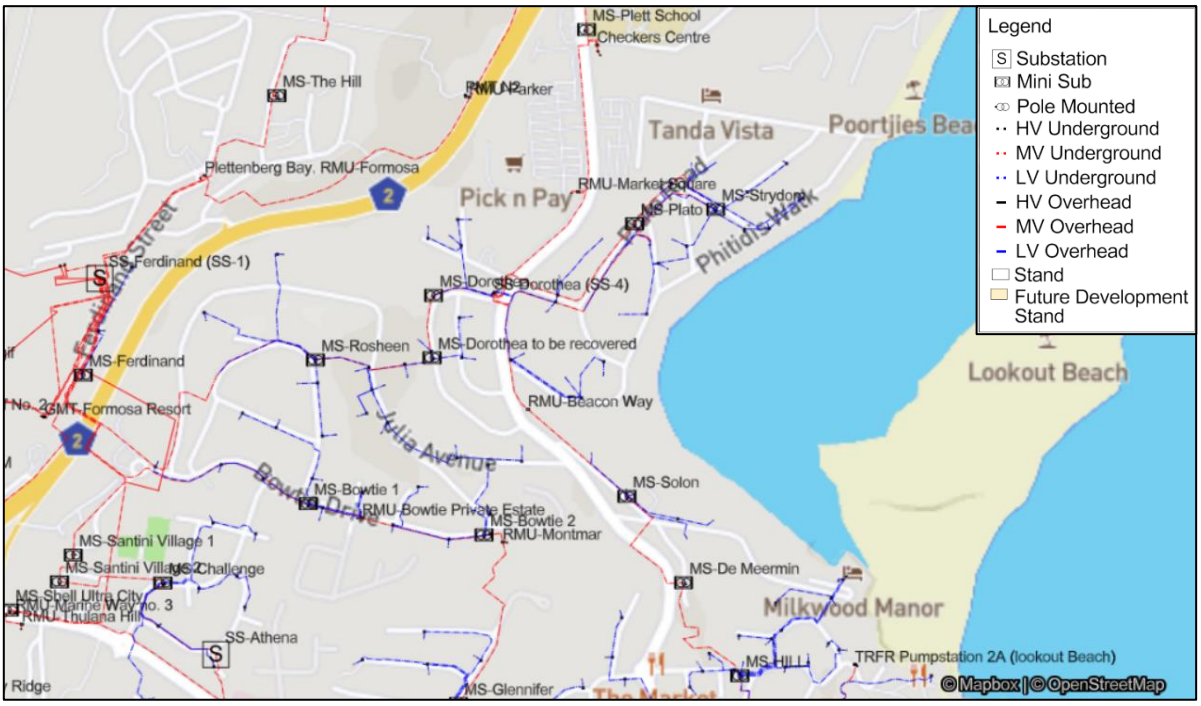


Figure 1: Distribution network of SS-1 Main (Ferdinand)

As per the latest MV reticulation diagrams created by Lyners and Partners, SS-1 Main receives the incoming 11kV and distributes the power through 11 outgoing feeders. The incoming feeders are 11 kV 183mm^2 Cu XLPE conductors from Eskom's Plett Main Substation. The outgoing feeders from the substation are either 11kV 95mm^2 or 70mm^2 Aluminium PILC underground cables. The substation provides electricity to the Plettenberg Bay CBD, a portion of Bossiesgif, Piesang Valley, Signal Hill and all the way north past Goose Valley along Keurboomsrivier. The two outgoing feeders supplying power to the Lookout Beach area is the 95mm^2 Aluminium PILC underground cable running towards MS Roshen and the 70mm^2 Aluminium PILC underground cable running towards MS Santini Village 1. Within proximity of Erf 10190, there is 70mm^2 Copper PILC underground cables supply power to suburb along De Meermin and The Hills streets. The development has several LV reticulation conductors supply the surrounding residential area and pumpstations.

2. Electrical Demand

Additional capacity provision at Erf 10190 was not catered for in the updated Bitou Electricity Master plan of December 2022. This study therefore investigates the increase in supply capacity for the re-development. The stand currently has a low voltage bulk meter connection with a NMD of 90 kVA.

There is building expansions planned on the development. Table 1 below shows a summary of the estimated demand for the proposed re-development. The additional demand was calculated using the ratio between the existing NMD.

Table 1: MD estimation for the building expansion

Zoning	Area [SQM]	NMD [kVA]
Existing Building	563,87	**90**
New Building Expansion	571,8	**38.53**
Total	**1 135.67**	**128.53**

The demand calculation conducted in Table 1 is based on the expansions detailed in Figure 2 of the conceptual design plans provided by MORE Family collection for the re-development. There are three main extensions conducted on the north, west and east side of the building. Additional parking bays are also established for the hotel and public. The areas of the parking spaces are not included in the demand calculations.

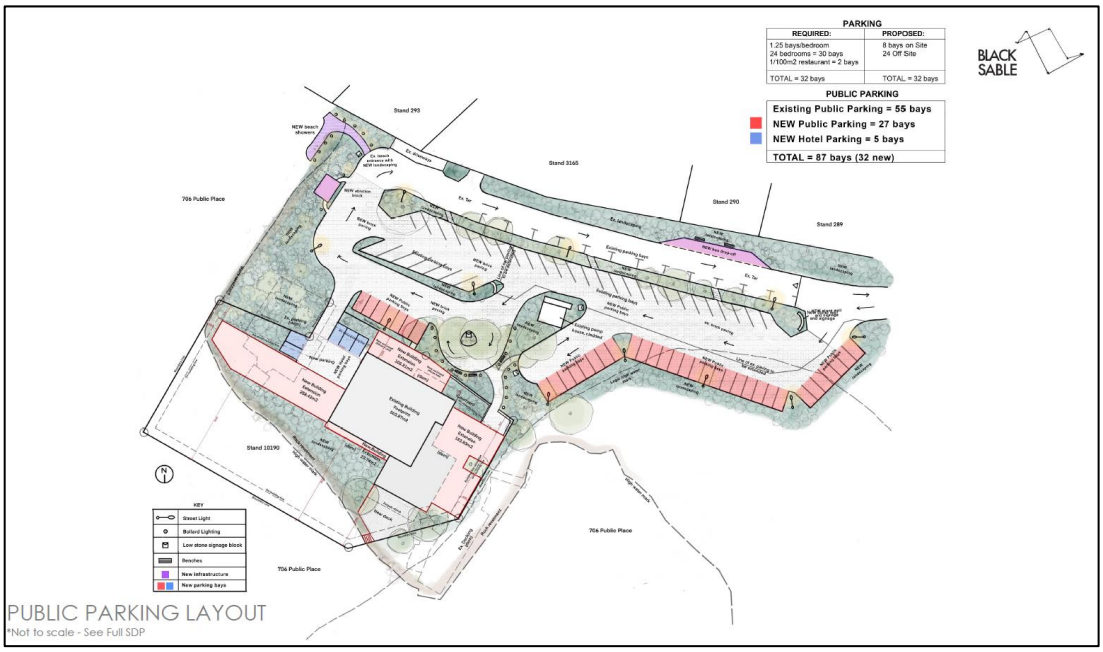


Figure 2: Conceptual Design Plans

As stated earlier, CMB estimated the new demand for the Erf to be 138 kVA. This means an additional 48 kVA. Considering the proposed development's location and intended land use, the likelihood of backyard dwellers occupying this development erf is extremely low. It was also confirmed that there may be expansions are expected on the development leading to an increased demand. Therefore, there is a potential for increase in demand erf. For this re-analysis study, the estimated maximum demand of 138 kVA will be used to assess the capability of the existing municipal infrastructure to cater for this additional demand.

The estimated load profile allocated to this Erf as derived from the 2022 electrical master plan for hospitality developments within the SS-1 Main (Ferdinand) distribution zone as well as the Eskom Geo-Based Load Forecast Standard. As part of the electrical masterplan conducted for Bitou Local Municipality, customized load profiles were created based on the customer consumption patterns, and these were compared to the Eskom standard Geospatial Load Forecast profiles. Figure 3 displays the daily load profile within the SS-1 Main distribution zone for hospitality loads.

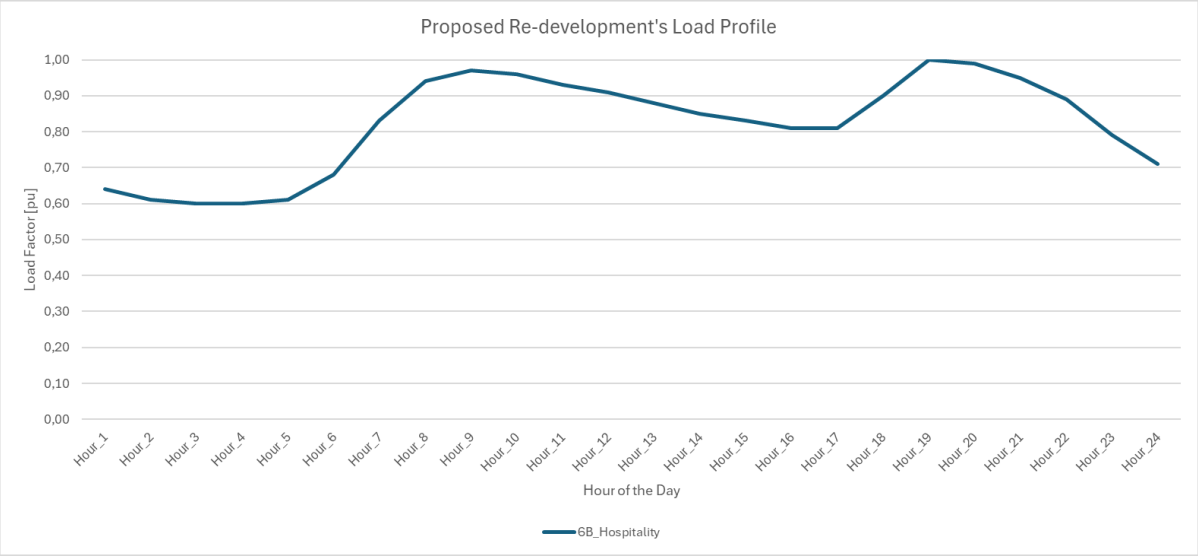


Figure 3: SS-1 Main Hospitality Load Profile

6B_Hospitality is made up of guest houses and developments used for hospitality services, as per Eskom's GLF Standard. The load profile shown in the figure below is also derived from the 2022 electrical master plan for holiday accommodation developments within the SS-1 Main (Ferdinand) distribution zone. The daily load profile within in the SS-1 Main distribution zone peaks at 19:00 in the evening as per the assigned load profile. This is in line with the system peak for the SS-1 Main distribution zone consolidated load profile.

3. Status Quo Analysis

3.1. Reticulation Network

The Plettenberg Bay area is supplied from SS-1 Main. The network is mainly configured with interconnected rings made up of underground conductors. The supply area is mainly residential and holiday accommodation with ring main units switching power supply of the MV reticulation and miniature substations stepping down the 11 kV supply to a 400 V three phase supply that is either directly supplying customers, or in most cases, has the phases further split to provide 230 V low voltage supply to the residents.

Erf 10190: The development is located within the Plettenberg Bay on Samlack Road on the banks of Keurboomsrivier near Lookout Beach. The area has the below MV infrastructure:

- 1x 630 kVA miniature substation that is located on Hill Street, namely, MS Hill,
- 1x 315 kVA miniature substation, MS-De Meermin, that is located on the end of Solon Crescent and Salmack Road.
- 1 x 315 kVA miniature substation, MS Lookout, located on the corner of Hill and Sydney Street.

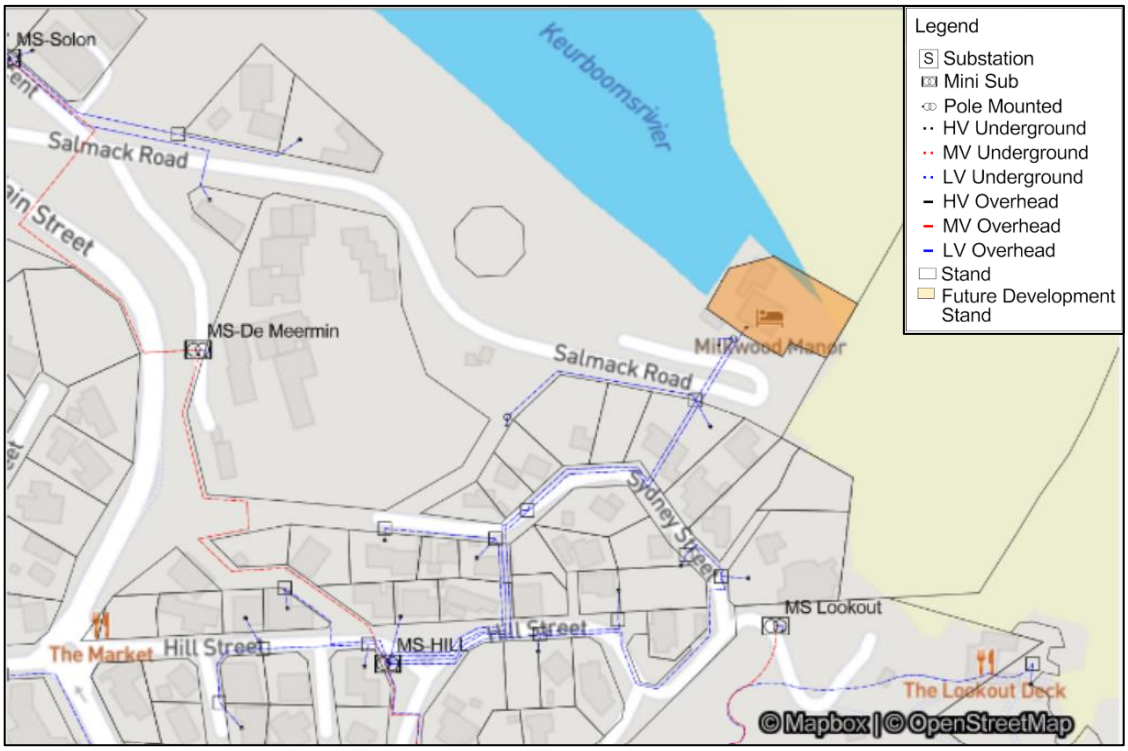


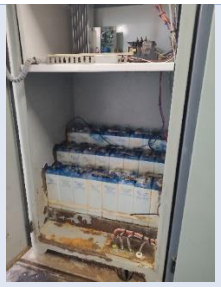
Figure 4: Map Diagram of Erf 10190's surrounding electrical network

The total installed capacity of the transformers within proximity of the proposed development area is 1 260 kVA. MS Hill is the miniature substation currently supplying Erf 10190. The estimated electrical maximum demand for the re-development is 138 kVA. The existing installed capacity of the equipment caters for the surrounding residential homes, residential flats, commercial properties, and holiday accommodations. The planning criteria documented in the December 2022 Electrical Master Plan advises that under normal operating conditions, the loading of the transformer should not exceed the nominal manufacturers name plate rating, whilst under contingency conditions, the transformer should not exceed the nominal manufacturers name plate by 20%. Where more than one customer is supplied from a transformer, a project should be initiated when the distribution transformer reaches 80% of its capacity.

A condition assessment was conducted by Lyners and Partners as part of the December 2022 Electrical Master Plan, where the condition of distribution equipment was visually inspected and reported on. Below are the results of the assets from condition assessment conducted on the transformers within the proximity of the proposed development that were allocated a rating of below 3 and require attention from the municipality's side:

Table 2: SS-1 Main Condition assessment

Asset ID	Description	Rating/Type	Location	Comment
32029	SS-Ferdinand (SS-1) Batteries 01		Plettenberg Bay	BTUs and batteries in poor condition. Some batteries standing loose in building on floor.
Images				



Asset ID	Description	Rating/Type	Location	Comment
?	SS-Ferdinand (SS-1) Switchgears	11kV Oil Circuit Breakers	Plettenberg Bay	Several loose circuit breakers in building (Laying around)

Images


Asset ID	Description	Rating/Type	Location	Comment
32034	SS-Ferdinand (SS-1) Telemetry		Plettenberg Bay	various telemetry equipment installed. Not sure if working properly

Images



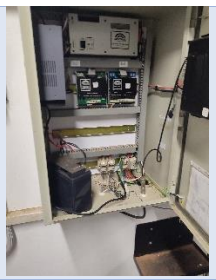



Table 3: SS-1 Main Yard Condition Assessment

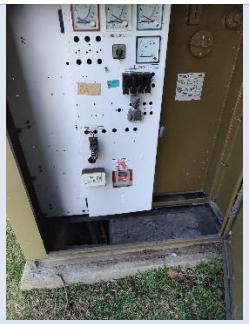
Asset ID	Description	Rating/Type	Location	Comment
32041	SS-Ferdinand (SS-1) Yardstone	Outdoor Substation	Plettenberg Bay	Outdoor equipment appears to not be in use. Vegetation within the yard

Images

Table 4: Miniature Substation Main Condition assessment results

Asset ID	Description	Rating/Type	Location	Comment
16380	MS Hill	630 kVA	Plettenberg Bay	Minor corrosion and dirt. Water standing in trenches. 630 kVA not 315 kVA

Images



Asset ID	Description	Rating/Type	Location	Comment
16393	MS Dorothea (old)	200 kVA	Plettenberg Bay	Severe oil leaks and severe corrosion. Many locks are not working or seized.

Images

Asset ID	Description	Rating/Type	Location	Comment
16386	MS Crescent	500 kVA	Plettenberg Bay	Severe corrosion and severe oil leaks

Images

Asset ID	Description	Rating/Type	Location	Comment
16379	MS Meermin	315 kVA	Plettenberg Bay	Pain peeling off, minor corrosion and minor oil leaks

Images

Asset ID	Description	Rating/Type	Location	Comment
16380	MS Lookout	315 kVA	Plettenberg Bay	MS Lookout not on drawing or list, replaced TRFR Pumpstation 2A. Corrosion. Low SF6 pressure

Images

Overall, the transformers within the proximity of the development are in fair to good condition, and do not require urgent intervention. However, the loading on MS Hill should be monitored over time once the re-development is completed as it is close to exceeding its name plate rating. The remaining miniature substations within the ring supplying the development are in poor to good condition, assets with poor rating are highlighted in the masterplan and have been listed for upgrades. Continuous

maintenance needs to be performed to ensure the longevity of the assets, and further inspections for any sudden changes in condition ratings due to vandalism, faults, environmental impacts etc.

3.2. Main Substation Capacity

The existing Plettenberg Bay town area is part of an 11 kV distribution network and is supplied from two 11 kV MV network feeders from Eskom with adequate capacity.

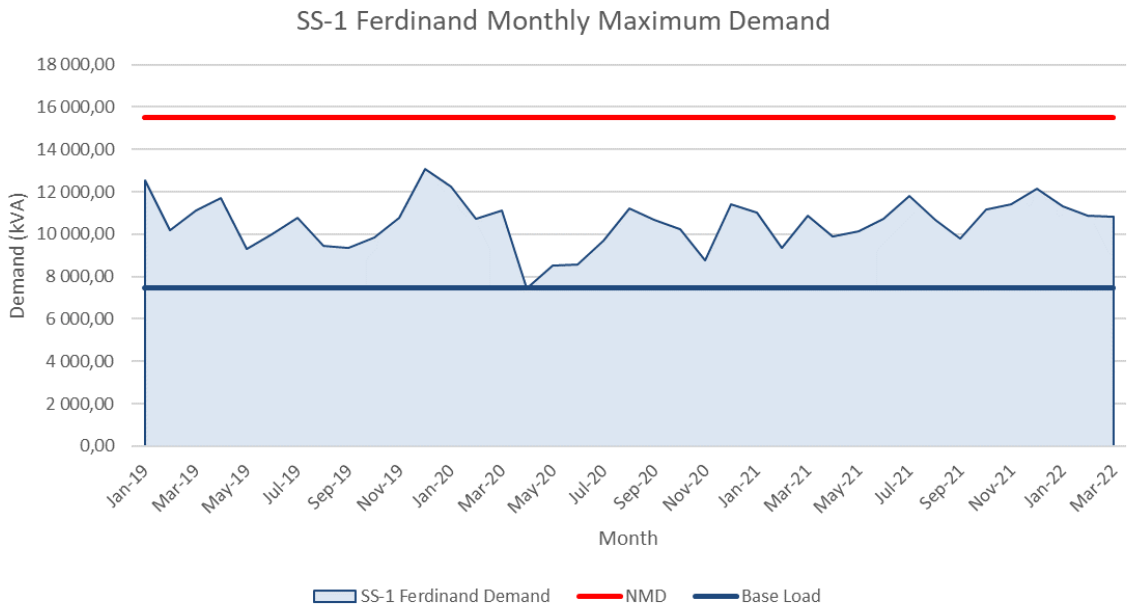


Figure 5: SS-1 Main monthly maximum demand trend

As mentioned previously, currently SS-1 Main has 2x10 MVA 66/11 kV transformers on Eskom portion of the substation. BLM receives its power through two double circuit 185mm^2 XLPE Cu conductors. As illustrated in 5, the loading of the substation is approximately only 48% of the NMD. The NMD of the substation is 15.5 MVA with a base load of 7.4 MVA and a maximum demand of around 13 MVA as at 2022 that occurred around December 2019 within its distribution zones.

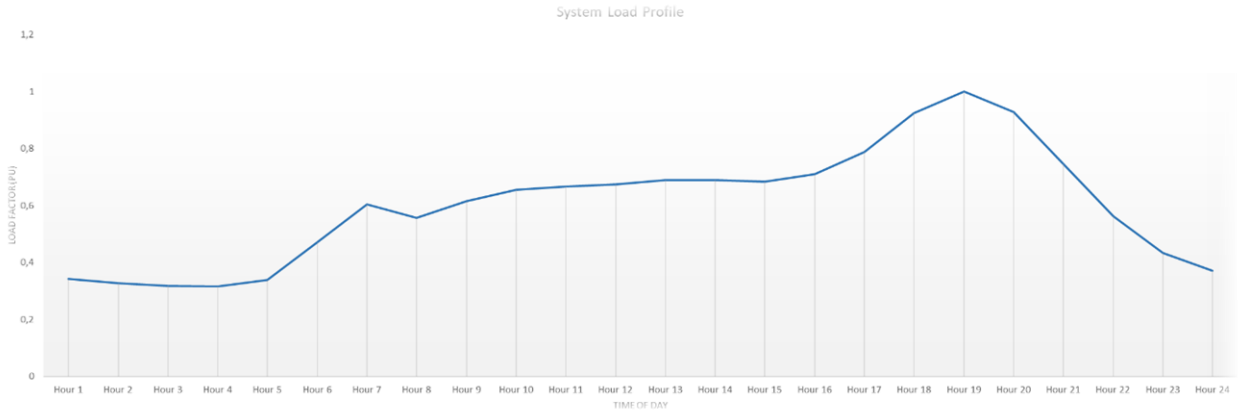


Figure 6: SS-1 Main typical load profile

The NMD is currently sufficient enough to cater for current and future additional load demands. The intake feeders from Eskom's portion of the substation are two double circuit 185mm^2 XLPE Cu conductors. Table 5 shows the installed capacity of the intake feeders.

Table 5: SS-1 Main Intake Feeders Carrying Capacity

Intake Feeder	Conductor Type	Material	Size (mm²)	Voltage (V)	Ampacity	MVA
Feeder 1 (Eskom)	XLPE	Copper	185	11 000	410	**7.81**
Feeder 2 (Eskom)	XLPE	Copper	185	11 000	410	**7.81**
Total Installed Capacity						**15.62**
Total Installed Capacity (Double Circuit)						**31.25**

The carrying capacity of the incoming feeders supplying SS-1 Main is 31.25 MVA with N-1 contingency provision of 15.62 MVA. The incoming feeders from Eskom's substation is a double circuit and dedicated to SS-1 Main. Of the ten outgoing feeders from SS-1 Main, six are 95mm^2 Aluminium PILC underground cables, two are 70mm^2 Copper XLPE underground cables whilst the remaining two are 70mm^2 Aluminium PILC underground cables.

3.3. MV Reticulation Carrying Capacity

Two feeders create ring-feeds encircling SS-Ferdinand and the development. One feeder consists of a 95mm^2 Copper PILC underground supply originating from SS-1 Main before becoming a 70mm^2 Copper PILC underground connecting to MS-Rosheen, traversing Julia Avenue and Beacon Crescent towards MS-Hill, supplying the development. The other feeder also comprises a 95mm^2 Copper PILC underground supply starting from SS-1 Main, extending towards MS-Shell Ultra City through Marine Way via the SS-Kloof (SS-2) and then towards MS-Aquarella and ultimately reaching the development (MS-Hill). Table 6 shows the carrying capacity of the two outgoing feeders from SS-1 Main towards the development and the ring's respective total carrying capacity.

Table 6: SS-Ferdinand Outgoing Feeders to Development Area Carrying Capacity

Outgoing Feeder	Conductor Type	Material	Area (mm²)	Voltage (V)	Nominal Ampacity (A)	MVA
70mm^2 Copper PILC	PILC	Copper	70	11000	207	**3.94**
95mm^2 Copper PILC	PILC	Copper	95	11000	245	**4.68**
Total Installed Feeder Capacity						**8.62**

The MV reticulation system from SS-1 Main towards nearby the development consists of 4 different types of cables, these is a mix of 95mm^2 and 70mm^2 Copper PILC cables starting at SS-1 Main through MS Rosheen and eventually reaching SS-Dorothea (SS-4). There is then a 120 mm^2 Aluminium PILC cable between SS-Dorothea (SS-4) and RMU-Beacon Way, there after a 95mm^2 Copper PILC cable running to MS-Solon, the remaining cable is a 70mm^2 Copper XLPE cable from MS-Solon through MS-De Meermin to MS-Hill which supplies the development. Table 7 shows the carrying capacity of the outgoing feeders from SS-Ferdinand.

Table 7: MV Feeders supplying the Development Area Carrying Capacity

Outgoing Feeder	Conductor Type	Material	Area (mm²)	Voltage (V)	Nominal Ampacity (A)	MVA
95mm^2 Copper PILC	PILC	Copper	95	11000	245	**4.68**
120mm^2 Aluminium PILC	PILC	Aluminium	120	11000	213	**4.06**

Outgoing Feeder	Conductor Type	Material	Area (mm²)	Voltage (V)	Nominal Ampacity (A)	MVA
70mm² Copper PILC	PILC	Copper	70	11000	207	**3.94**
70mm² Copper XLPE	XLPE	Copper	70	11000	240	**4.57**

3.4. Existing Network POC (Point of Connection) Capacities

The current POC supply of electricity to the development on Erf 10190 is from MS-Hill as indicated with the black circle in Figure 7 and Figure 8.

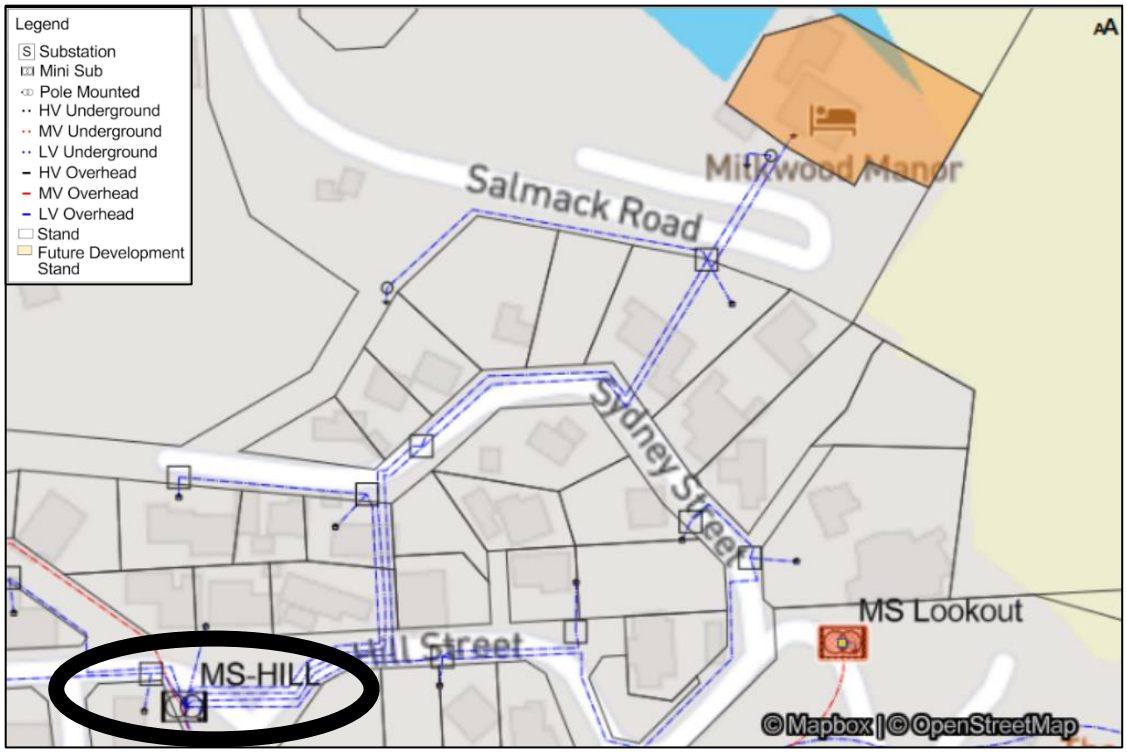


Figure 7: Existing POC for Erf 10190

Figure 8: Existing Development POC Location

For a Large Power User (LPU), a dedicated POC is most preferred and recommended for ease of NMD change and load flexibility. This allows the LPU to install the required equipment either through a transformer or electrical room for transformation and control.

Bitou Local Municipality's current tariff guideline indicates that any electricity customer requiring a demand higher than 60 kVA or requiring a circuit breaker larger than 100 A should be classified a bulk user. In the case of this development, with an estimated demand of 138 kVA, the development already has a bulk meter LV supply point with an NMD of 90 kVA. For this analysis, only one scenario will be simulated, and this is the increased demand from the existing POC.

4. MV Supply Point Analysis

The development on Erf 10190 requires an increase of capacity from its existing supply point from Bitou Local Municipality to cater for the expansion of the site.

Based on the existing MV reticulation within the SS-1 Main distribution zone, the re-development can be supplied electricity from two outgoing feeders, namely MS-Rosheen or MS-Shell Ultra City. To assess the performance of the existing network state within the study area (Plettenberg Bay), GLS analysed the network via loadflow simulation using Edisan power systems simulation software. Based on the feeder routes, the following Table 8 shows the thermal loading and voltage regulation results for the different sections of the main supply to the re-development:

Table 8: Existing MV Feeder simulation results

From	To	Conductor Type	Length (m)	Nominal Voltage (kV)	Current Rating (A)	Current Loading (A)	Conductor Loading (%)	Voltage (p,u)
SS-1 Main	**Cable Joint 1**	95mm^2 Cu PILC 3Core	693,93	11	245	95,82	39%	1,00
Cable Joint 1	**MS Rosheen**	70mm^2 Cu PILC 3Core	261,25	11	207	95,96	46%	1,00

From	To	Conductor Type	Length (m)	Nominal Voltage (kV)	Current Rating (A)	Current Loading (A)	Conductor Loading (%)	Voltage (p,u)
MS Rosheen	**MS Dorothea (old)**	70mm^2 Cu PILC 3Core	236,32	11	207	90,71	44%	0,99
MS Dorothea (old)	**MS Dorothea**	95mm^2 Cu PILC 3Core	121,53	11	245	86,23	35%	0,99
MS Dorothea	**SS-Dorothea (SS-4)**	95mm^2 Cu PILC 3Core	119,57	11	245	85,38	35%	0,99
SS-Dorothea (SS-4)	**RMU Beacon Way**	120mm^2 Al PILC 3Core	251,69	11	213	43,65	20%	0,99
RMU Beacon Way	**MS Solon**	95mm^2 Cu PILC 3Core	244,86	11	245	43,70	18%	0,99
MS Solon	**MS De Meermin**	70mm^2 Cu XLPE 3Core	258,00	11	240	40,49	17%	0,99
MS De Meermin	**MS Hill**	70mm^2 Cu XLPE 3Core	287,50	11	240	38,15	16%	0,99

Based on the results, the MV conductors (from SS-1 Main towards the re-development) are loaded well below 80%. This means there is sufficient feeder capacity to supply the re-development on Erf 10190. According to NRS 048-2, the acceptable voltage per unit (p.u) for an 11 kV rated system should be between 0.95 p.u. to 1.05 p.u. under normal operating conditions. The feeder voltage (for the segments) is within the stipulated limits. This also confirms that the feeder is neither constrained nor compromised to cater for proposed load. Based on the results under Table 8, the proposed development can be connected along this feeder. The next section details customer connection methodology and results.

Figure 9: Existing Supply Feeders Loading Loadflow Simulation

Simulations

The estimated load size at Erf 10190 of 138 kVA being requested and thus falling within the bulk metering requirements. The proposed connection was formulated for simulation as described below:

- Increased demand on the existing LV POC

The municipality has full access to the Point of Connection (POC).

The development demand is increased by 48 kVA. The municipality will provide electricity to the customer via the 400 V bus. The additional demand provided by the re-development was added to the existing demand to simulate the impact on the conductors supplying the area.

Table 9 shows the simulation results:

Table 9: Existing Supply MV Feeders Loading Results

From	To	Conductor Type	Length (m)	Nominal Voltage (kV)	Current Rating (A)	Current Loading (A)	Conductor Loading (%)	Voltage (p,u)
SS-1 Main	**Cable Joint 1**	95mm^2 Cu PILC 3Core	693,93	11	245	100,31	48%	1,00
Cable Joint 1	**MS Rosheen**	70mm^2 Cu PILC 3Core	261,25	11	207	100,45	41%	1,00
MS Rosheen	**MS Dorothea (old)**	70mm^2 Cu PILC 3Core	236,32	11	207	95,21	46%	0,99
MS Dorothea (old)	**MS Dorothea**	95mm^2 Cu PILC 3Core	121,53	11	245	90,74	37%	0,99
MS Dorothea	**SS-Dorothea (SS-4)**	95mm^2 Cu PILC 3Core	119,57	11	245	89,89	37%	0,99
SS-Dorothea (SS-4)	**RMU Beacon Way**	120mm^2 Al PILC 3Core	251,69	11	213	50,48	21%	0,99
RMU Beacon Way	**MS Solon**	95mm^2 Cu PILC 3Core	244,86	11	245	50,54	24%	0,99
MS Solon	**MS De Meermin**	70mm^2 Cu XLPE 3Core	258,00	11	240	47,38	19%	0,99
MS De Meermin	**MS Hill**	70mm^2 Cu XLPE 3Core	287,50	11	240	45,04	22%	0,99

The MV reticulation can easily carry this additional load presented by the re-development. All the conductors' voltages and thermal loading fall within the prescribed limits. The loading on MS-Hill however will need to be monitored in future in case of overloading.

The contingency for this scenario would be the loss of the feeder from SS-Main towards MS-Shell Ultra City. In this case, the supply to MS-Hill instead is fed from MS-Bayview instead of MS-De Meermin. This scenario is likely to occur with the lose of the outgoing feeder from SS-1 Main to MS-Rosheen, or any of the feeders leading up to MS-Hill from that MV network. Under normal operating condition, the loading on the feeders operating under normal operating condition is seen in Table 10.

Table 10: Alternative MV Supply Feeders Loading Results

From	To	Conductor Type	Length (m)	Nominal Voltage (kV)	Current Rating (A)	Current Loading (A)	Conductor Loading (%)	Voltage (p,u)
SS-1 Main	**Cable Joint 1**	95mm^2 Cu PILC 3Core	607,87	11	245	117,25	48%	1,00

From	To	Conductor Type	Length (m)	Nominal Voltage (kV)	Current Rating (A)	Current Loading (A)	Conductor Loading (%)	Voltage (p,u)
Cable Joint 1	**MS Shell Ultra City**	95mm^2 Cu PILC 3Core	333,21	11	245	117,44	48%	0,99
MS Shell Ultra City	**RMU Marine Way 3**	95mm^2 Cu PILC 3Core	12,33	11	245	99,90	41%	0,99
RMU Marine Way 3	**RMU Marine Way 2**	95mm^2 Cu PILC 3Core	484,74	11	245	86,48	35%	0,99
RMU Marine Way 2	**RMU Marine Way 1**	95mm^2 Cu PILC 3Core	8,39	11	245	86,50	35%	0,99
RMU Marine Way 1	**MS Marine Drive 1**	70mm^2 Cu PILC 3Core	59,56	11	207	83,55	40%	0,99
MS Marine Drive 1	**MS Mediclinic**	70mm^2 Cu PILC 3Core	55,85	11	207	77,17	37%	0,99
MS Mediclinic	**MS Park**	95mm^2 Cu PILC 3Core	240,43	11	245	77,17	31%	0,99
MS Park	**SS-Kloof (SS-2)**	70mm^2 Cu XPLE 3Core	418,73	11	240	73,67	31%	0,99
SS-Kloof (SS-2)	**MS Aquarella**	70mm^2 Cu XPLE 3Core	163,38	11	240	52,23	22%	0,99
MS Aquarella	**MS Square**	70mm^2 Cu XPLE 3Core	124,07	11	240	51,69	22%	0,99
MS Square	**MS Crescent**	70mm^2 Cu XPLE 3Core	156,95	11	240	26,21	11%	0,99
MS Crescent	**MS Caltex**	70mm^2 Cu XPLE 3Core	187,48	11	240	0,08	0%	0,99
MS Caltex	**MS Breach**	70mm^2 Cu XPLE 3Core	267,26	11	240	1,42	1%	0,99
MS Breach	**MS Church**	95mm^2 Cu PILC 3Core	156,41	11	245	5,33	2%	0,99
MS Church	**MS Gibb 1**	70mm^2 Cu XPLE 3Core	448,76	11	240	16,60	7%	0,99
MS Gibb 1	**MS Gibb2**	70mm^2 Cu XPLE 3Core	118,15	11	240	22,13	9%	0,99
MS Gibb 2	**MS Bayview**	70mm^2 Cu XPLE 3Core	54,39	11	240	24,13	10%	0,99
MS Bayview	**MS Hill**	70mm^2 Cu XPLE 3Core	336,05	11	240	29,46	12%	0,99

The loss of power supply to MS-Hill from the outgoing feeder towards MS-Rosheen is simulated. This is done to simulate a N-1 contingency that will allow power to flow through the other portion of the ring supplying MS-Hill from the other outgoing feeder from SS-1 Main to MS-Shell Ultra City through SS-Kloof (SS-2) and MS-Bayview. The results are seen in Table 11.

Table 11: Feeder Loading Results under N-1 contingency

From	To	Conductor Type	Length (m)	Nominal Voltage (kV)	Current Rating (A)	Current Loading (A)	Conductor Loading (%)	Voltage (p,u)
SS-1 Main	**Cable Joint 1**	95mm^2 Cu PILC 3Core	607,87	11	245	140,29	57%	1,00
Cable Joint 1	**MS Shell Ultra City**	95mm^2 Cu PILC 3Core	333,21	11	245	140,46	57%	0,99
MS Shell Ultra City	**RMU Marine Way 3**	95mm^2 Cu PILC 3Core	12,33	11	245	122,67	50%	0,99
RMU Marine Way 3	**RMU Marine Way 2**	95mm^2 Cu PILC 3Core	484,74	11	245	108,97	44%	0,99
RMU Marine Way 2	**RMU Marine Way 1**	95mm^2 Cu PILC 3Core	8,39	11	245	108,99	44%	0,99
RMU Marine Way 1	**MS Marine Drive 1**	70mm^2 Cu PILC 3Core	59,56	11	207	105,88	51%	0,99
MS Marine Drive 1	**MS Mediclinic**	70mm^2 Cu PILC 3Core	55,85	11	207	99,58	48%	0,99

From	To	Conductor Type	Length (m)	Nominal Voltage (kV)	Current Rating (A)	Current Loading (A)	Conductor Loading (%)	Voltage (p,u)
MS Mediclinic	**MS Park**	95mm^2 Cu PILC 3Core	240,43	11	245	99,59	41%	0,99
MS Park	**SS-Kloof (SS-2)**	70mm^2 Cu XPLE 3Core	418,73	11	240	96,03	40%	0,99
SS-Kloof (SS-2)	**MS Aquarella**	70mm^2 Cu XPLE 3Core	163,38	11	240	87,22	36%	0,98
MS Aquarella	**MS Square**	70mm^2 Cu XPLE 3Core	124,07	11	240	86,69	36%	0,98
MS Square	**MS Crescent**	70mm^2 Cu XPLE 3Core	156,95	11	240	62,63	26%	0,98
MS Crescent	**MS Caltex**	70mm^2 Cu XPLE 3Core	187,48	11	240	37,76	16%	0,98
MS Caltex	**MS Breach**	70mm^2 Cu XPLE 3Core	267,26	11	240	36,39	15%	0,98
MS Breach	**MS Church**	95mm^2 Cu PILC 3Core	156,41	11	245	32,38	13%	0,98
MS Church	**MS Gibb 1**	70mm^2 Cu XPLE 3Core	448,76	11	240	21,51	9%	0,98
MS Gibb 1	**MS Gibb2**	70mm^2 Cu XPLE 3Core	118,15	11	240	16,38	7%	0,98
MS Gibb 2	**MS Bayview**	70mm^2 Cu XPLE 3Core	54,39	11	240	14,24	6%	0,98
MS Bayview	**MS Hill**	70mm^2 Cu XPLE 3Core	336,05	11	240	9,35	4%	0,98

Under N-1 contingency, Erf 10190 is able to still receive electricity via the MS-Hill, having now been supplied through MS-Bayview side. The impact of the contingency scenario is the higher current loading on the remaining operating feeders surrounding the development, but none of these feeders have their thermal loading exceeded. In terms of voltage regulation, there is no significant voltage drop than when operating in normal conditions and is therefore still within the prescribed limits.

5. Implementation of Master Plan

As per Bitou Network Master Plan, the following upgrades to the existing bulk supply system from the SS-1 Main upgrade have been considered and analysed:

Bulk supply upgrades

- SS-1 Main: Completion of the additional 66/11kV 20MVA power transformer to add firm capacity.

This was proposed to accommodate future development areas within the existing distribution zone where the proposed development is situated and offer firm capacity to ensure reliability.

- SS-1 Main (Ferdinand) 11kV intake

According to the Master Plan, the projected demand is anticipated to surpass the current NMD by the year 2032. The intake point for the network is supplied by an Eskom substation, which is located adjacent to SS-1 Ferdinand. This substation is equipped with two transformers, each with a capacity of 10 MVA.

To address the upcoming demand increase, an additional 20MVA 66/11kV transformer is scheduled for installation in SS-1 Ferdinand in 2025. In the following year, 2026, the substation's NMD will be increased to 20MVA. By 2027, it is proposed that the substation's NMD should be further increased to 25MVA. Finally, by 2032, an additional 10MVA transformer should be installed in SS-1 to ensure the substation does not exceed its installed capacity.

SS-1 Ferdinand substation will see the installation of new 11kV circuit breakers in 2025. For 2027,

the proposed projects include upgrading the 800A rated busbars of nine 11kV circuit breakers to 1200A rated busbars in SS-1 Main.

MV reticulation upgrades

The Electrical masterplan recommended upgrades and asset replacements to strengthen the network and increase its reliability. The following network developments may impact the reticulation of electricity towards the development, during both normal and contingency conditions.

- The replacement of MS-Crescent and MS-Dorothea (old) was recommended due to the severe corrosion and oil leaks seen during the condition assessment performed by Lyner and Partners..
- The oil circuit breakers within SS-Dorothea require inspection and upgrade due to age.
- In 2024, there is a recommendation to replace the miniature substation MS-Dorothea (old), which is currently facing severe corrosion and oil leaks, with a new 315 kVA MS.
- During contingency, the backbone feeder running through MS-Shell Ultra City to SS-Kloof (SS-2) is to exceed its thermal loading in 2026. It is recommended that the backbone feeder be upgraded to 185mm^2 Cu XLPE (±1429m) between MS-Shell Ultra City to RMU Marine Way and to 95mm Cu XLPE (±778m) between RMU-Marine Way to SS-Kloof (SS-2) in 2025.

These implementations were proposed to accommodate future development areas within the existing distribution zone where the proposed re-development is situated and offer firm capacity to ensure reliability. The Capital Cost Schedule extracted from the 2022 Electrical Masterplan is displayed in Appendix C.

6. Development Schedule

An estimate draft quotation for the augmentation fees payable by the developer will need to be provided. The fee for this proposed development will need to be based on an amended maximum demand of 138 kVA. GLS estimates the augmentation fee for additional kVA demand to be established as per the calculation below. It is important to note that the final quotation and amount for an augmentation fee will be provided by the municipality once the application has been made to the Project Management Unit (PMU) department. A formal costing will be provided by the municipality. The Previous Agreed Notified demand for the Erf will be confirmed by the municipality.

Parameters:

- New Notified Demand = 138 kVA
- ERU = 10.35 kVA
- N.F = 0.5
- D.F = 0.3
- Augmentation Fees (ERU) = R24 345.90 (Price from BLM Tariff Book as of December 2023)

$$Augmentation\ fee = \frac{\text{Required kVAxN. F x Augmentation Fee (ERU)}}{\text{ERU x D. F}} = \frac{(138-90)\text{x}0.5\text{x}24\ 345.90}{10.35\text{x}0.3}$$

$$Augmentation\ fee = \text{R}182\ 740{,}10\ \text{VAT exclusive}$$

Equation 1: Augmentation fee calculation

This cost naturally does not include the infrastructure required to create the supply point for the proposed development. The quotation will be clear in noting that the applicant's electrician must supply all material and labour required for the complete installation of the service, including, where needed a mini-substation, metering unit, RMU cabling etc.

The proposed re-development, currently undergoing expansion that requires a capacity upgrade application. The zoning and landuse remain the same for the development. The development will consist of holiday accommodation units, ablution facilities and a restaurant. Total estimated demand for this entire development is sighted at 138 kVA.

7. Small-Scale Embedded Generation

The proposed re-development may make allowances for the installation of small-scale embedded generation (SSEG) technology as an additional alternative source. The developer and property owners should be aware of the current SSEG policy and should ensure that the SSEG installation is registered with the municipality and adheres to the requirements for SSEG. The system will abide by the necessary technical criteria before the installation commences. The potential SSEG installation may reduce the likelihood of any additional loading on the existing network infrastructure.

Within the SSEG requirements document, there is a maximum individual generation limit provided for generators connected to a shared LV feeder. This typically applies to small residential or commercial loads, and should not exceed 25% of the customer's NMD, and be up to maximum of 20kVA as per the NRS 097-2-3. For dedicated LV feeders, the maximum generator size is limited to 75% of the NMD.

8. Conclusion

The erven identified for the development is situated on land within the Plettenberg Bay area. The network around the erven is currently mainly supplied by SS-1 Main, which is the substation supplying electricity to Plettenberg Bay town area. SS-1 Main currently has enough capacity to carry the additional 48 kVA maximum demand brought by the proposed re-development on Erf 10190. The MV feeders supplying the surrounding area have sufficient capacity to carry the additional demand at the proposed development.

Capital projects recommended in the Electrical Masterplan conducted in 2022 are recommended to ensure reliable provision of services to customers in Bitou Local Municipality residing within the study area.

In the event of installation of small-scale embedded generation (SSEG) at the development, the SSEG system should be registered with the municipality, and the metering unit should include a bi-directional meter.

The developer will bear the costs of connecting to the existing MV connections and necessary Augmentation Fees. The network supplying the proposed area has not been experiencing major trips, recurring failures, or power interruptions due to overloading.

The developer of Erf 10190 in Plettenberg Bay will be liable for the payment of a Development Contribution (as calculated by Bitou Local Municipality) for bulk electricity infrastructure as per Council Policy. Also, find attached hereto Appendix A which includes general notes from Bitou Local Municipality regarding development approvals and conditions.

We trust you find this of value.

Yours sincerely

GLS CONSULTING (PTY) LTD

REG. NO.: 2007/003039/07

Per: T.K. MOKOENA

cc. MORE Family Collection
15 3rd Avenue,
Parktown North,
Randburg,
Johannesburg,
2193

Attention: Mr Andy Paterson

APPENDIX A: General Notes from Bitou Local Municipality attached to GLS Bulk Electricity Services Capacity Report

1. The GLS report is a services capacity report and the costs estimated in this report are only approximate values applicable at the time of the study.
2. Should the development be approved by Council the approval will be linked to certain development conditions. These conditions will be the official conditions applicable to the project and will take precedence over this report. Once approval is granted, Council will enter into a formal services agreement with the developer.
3. Costs for any network upgrades, etc, presented in the GLS report could change from time to time due to escalation, new tariff structures, additional requirements etc.
4. The Developer may be liable to pay a Development Contribution as per Council policy. The value payable will be calculated using Bitou Local Municipality's Development Contribution Calculator.
5. The Development Contribution monies are calculated according to the approved Council Policy at the time of payment.
6. The Development Contribution monies are payable before the approval of the building plan certificate or final approval of the subdivision for the transfer of units will be issued, as applicable for the type of development.
7. Where servitudes are required, all the costs and arrangements therefore will be for the developer's account.
8. The developer will be solely responsible for the cost of the link services as identified in the GLS report. The developer will also be responsible for the costs of upgrading to the minimum requirements of the services as identified in the GLS report. These costs may however be offset against the Development Contribution monies payable.
9. The above conditions are subject to any approved Council policies, which may be amended from time to time.

APPENDIX B: Planning Criteria extract from Bitou Local Municipality Electrical Master Plan

The Bitou Local Municipality Electrical Master plan lists a set of planning criteria which are guided by the standard electricity network installations and the relevant guidelines. These guidelines include The Network Code within the South African Grid Code; The Electricity Regulations Act and the Distribution Code. The NRS 048-2 also provides utilities with compatibility levels for reporting power quality. The planning criteria are used to assess network capacity and determine the need for and timing of network expansion, reinforcement, or re-configuration. It also was noted that there are non-negotiable regulations that all electricity users and distributors shall comply with. The following items from the planning criteria was extracted for which this proposed development will abide by:

- Equipment Loading
- Voltage regulation and selection
- Network Protection
- Network Fault Level

Equipment Loading

No electrical equipment shall be loaded above its designed rating under normal network configurations. Exception can be made for temporary abnormal conditions.

Transformers

Under normal conditions, the thermal loading of the transformers should not exceed the nominal manufacturer's name plate rating. In the case where more than one customer is supplied from a transformer, a project should be initiated when the distribution transformer reaches 80% of its capacity. For cases where the distribution supplies a single customer, the planner should inform the customer when the transformer reaches 80% of its capacity.

For each class of transformer, general limitations on current and temperature are recommended as listed in IEC354 Loading Guide for Oil-Immersed Transformers. These values provide a broad "operating envelope" which may be greatly affected by the following:

- Load Profile (Duration and Peak)
- Ambient Conditions
- Assumption of transformer thermal characteristics
- Voltage limitations
- Capability of transformer accessories

It is thus recommended that the nameplate thermal rating is used for planning purposes. Once a specific transformer approaches its nameplate thermal loading limits, an informed decision, backed by physical measurements and sample tests, should be made with regard to the upgrade strategy.

Switchgear

Normal manufacturer's name plate rating.

Overhead Lines

Under normal operating condition, the thermal loading of the overhead line should not exceed the nominal manufacturer's name plate rating. The overhead line rating based ambient temperature under normal conditions is 75 °C and 90 °C under contingency conditions. The planner should initiate a project when the thermal loading on the line reaches 100% of its normal condition rating.

Under contingencies (emergency), the overhead line rating based ambient temperature is 90 °C. The

thermal loading of the overhead line should not exceed its emergency rating. For high temperature conductors, the temperature under contingency conditions is 180 °C.

Cables

Normal cyclic rating, with maximum operating temperatures of 90 °C for XLPE cables; 70 °C for 11kV paper insulated cables.

Under normal operating conditions, the thermal loading of the cable should not exceed the nominal manufacturer's name plate rating. The planner should initiate a project when the thermal loading on the line reaches 100% of its normal condition rating.

Under contingencies (emergency), the thermal loading of the overhead line should not exceed its emergency rating.

Voltage Regulation and Selection

The steady-state criteria apply to the normal continuous behavior of a network and cover post – disturbance behavior once the network has settled. When planning a network, it is necessary to access the reactive power requirements under light and heavy load to ensure that the reactive demand placed on supply infrastructure, be it to absorb or generate reactive power, and does not exceed the capability of the supply source.

As per the section 3.4, the NRS 048 – Quality of Supply provides us with the voltage regulation as below:

- For voltages <500 V the standard voltage is 400 V three phase or 230 V single phase.
- For voltages >500 V the standard voltage is the declared voltage.

For all LV supplies <500 V Bitou LM needs to provide a standard voltage of 400/230 V, with a maximum variation ±5%. Older 380/220 V contracts are no longer valid and do not need to be enforced.

For any system voltage ≥ 500 V, the supply voltage shall not deviate from the declared voltage by more than 5% for any period longer than 10 consecutive minutes, the network shall be designed to achieve a continuous network voltage at a user's connection not exceeding the design limit 105% of nominal and falling below 95% of nominal voltage during normal and maintenance conditions.

For any system voltage < 500 V, the supply voltage shall not deviate from declared voltage by more than 10% for any period longer than 10 consecutive minutes.

Table 12: Steady-State Voltage Regulation Limits

Voltage Level [V]	Compatibility Level [%]
Voltage < 500V	±10%
Voltage ≥ 500V	±5%

Network Protection

The network shall be adequately protected via standard protection philosophies to protect equipment as well as personal safety of staff.

Network Fault Level

For safety reasons, the fault rating of any equipment shall not be less than the fault level in that part

of the network at any time and for any normal network configuration. The maximum fault levels on Bitou Local Municipality networks depend on the network and substation configuration and the upstream fault level.

Table 13: Fault Levels Limits

Voltage Level [kV]	Fault Level Limits [kA]
66	25
22	25
11	25

Equipment owned by the Bitou Local Municipality are designed to withstand these fault levels for 1 second. Depending on the new configuration of the network the above fault levels might change. A fault level analysis check should be done to re-adjust the fault level. Projects should be initiated where the fault current level exceeds 90% of the fault current level rating of equipment.

APPENDIX C: Electrical Masterplan Capital Cost Schedule:

Table 14: Estimate Network Development Capital Cost from the 2022 Electrical Master Plan

Priority	Substation Area	Project Description	Type	Category	Project Details	Total Cost (xR1000)
2023	Plettenberg Bay	Replace Battery Units	Substation Batteries	Refurbishment	Refurbish the protection back up battery storage units in SS-1 Ferdinand	**547,18**
2023	Plettenberg Bay	Replace Miniature Substation	Mini Substation	Reliability	Replace MS Crescent which is in poor condition (severe corrosion and severe oil leaks)	**964,79**
2024	Plettenberg Bay	Replace Miniature Substation	Mini Substation	Reliability	Replace MS Dorothea (Old) with a new 315 kVA MS (severe corrosion, severe oil leaks)	**771,83**
2024	Plettenberg Bay	Replace Transformer	Transformer	Reliability	Replace the auxiliary transformer in SS-2 Kloof with a new 500 kVA transformer	**681,04**
2024	Plettenberg Bay	Replace Miniature Substation	Mini Substation	Reliability	Replace MS Dorothea (Old) with a new 315 kVA MS (severe corrosion, severe oil leaks)	**771,83**
2024	Plettenberg Bay	SS-1 Ferdinand	Install Switchgear	Switchgear	New 11kV circuit breaker at SS-Kloof	**3 227,87**
2023	Plettenberg Bay	SS-4 Dorothea	Connect Cable	Cable	Terminate existing 240mm² Cu PILCA cable at 11kV circuit breaker inside SS-4.	**27,17**
2025	Plettenberg Bay	Replace Miniature Substation	Mini Substation	Reliability	Replace MS Rosheen with a new 315 kVA MS (Severe corrosion, evidence of oil leaks)	**771,83**
2025	Plettenberg Bay	Replace Miniature Substation	Mini Substation	Reliability	Replace MS Gibb 1 with a new 500 kVA MS (Minor corrosion, possible oil leaks, MS sunk into ground)	**964,79**
2025	Plettenberg Bay	Replace Ring Main Unit	RMU	Reliability	Replace RMU Marine Way No.1 with a new 11kV 3-Way RMU with a metering unit (oil leaks)	**468,62**
2025	Plettenberg Bay	Replace Ring Main Unit	RMU	Reliability	Replace RMU Marine Way No.2 with a new 11kV 3-Way RMU with a metering unit (Severe oil leaks, enclosure door does not fit the unit)	**468,62**
2025	Plettenberg Bay	SS-1 Ferdinand	Upgrade Cable	Cable	Upgrade 95mm² Cu PILC cable from SS-1 to MS Ultra City to maintain capacity during contingency in 2024 with 185mm2 Cu XLPE cable (1429.37m)	**1 875,95**
2025	Plettenberg Bay	SS-1 Ferdinand	Upgrade Cable	Cable	Upgrade 70mm² Cu XLPE cable from RMU Marine Way 1 to MS Park with 95mm² Cu XLPE cable in 2024 (778.523m)	**369,29**
2025	Plettenberg Bay	SS-1 Ferdinand	Install Switchgear	Switchgear	New 11kV circuit breakers at SS-Ferdinand (SS-1).	**1 613,93**
2025	Plettenberg Bay	Replace Metering Unit	Metering Unit	Reliability	Replace RMU Checkers metering unit (RMU not in use, cables jointed directly together, meter offline)	**192,61**
2026	Plettenberg Bay	SS-1 Ferdinand	Install Switchgear	Switchgear	Replace existing 5 x 11kV oil type circuit breakers with new 5x 11kV SF6/vacuum type circuit breakers.	**4 034,84**
2027	Plettenberg Bay	SS-1 Ferdinand	Install Switchgear	Switchgear	Upgrading 800A rated busbars of 9 x 11kV circuit breakers to 1200A rated busbars (SS-1)	**7 262,70**
2026	Plettenberg Bay	SS-1 Ferdinand	Additional Transformer	Transformer	Install additional 20MVA 66/11kV transformer in 2025	**10 646,36**
2026	Plettenberg Bay	Replace Doors	Substation Doors	Substation	Replace the existing SS-2 (Kloof) wooden door and lourves with new steel door and lourves.	**80,00**
2027	Plettenberg Bay	SS-1 Ferdinand	Increase NMD	Substation	Increase the substation NMD to 20MVA in 2026	**-**

(* Including P & G, Contingencies and Fees, but excluding VAT - Year 2022/23 Rand Value. This is a rough estimate, which does not include major unforeseen cost. Some upgrades and maintenance items may already have been performed by the municipality)

Legend

- HV Underground
- MV Underground
- LV Underground
- HV Overhead
- MV Overhead
- LV Overhead
- Substation
- Ground Mounted
- Mini Sub
- Pole Mounted
- Ring Main Unit
- Switching Station
- Proposed Development

MS-De Meermin
1 x 315 kVA

MS-De Meermin

Proposed
re-development

Erf 10190

Connected to existing
70 mm Ï PVC LV Cable

MS-Lookout
1 x 200 kVA

MS Lookout

MS-Hill
1 x 630 kVA

MS-HILL

MS-Gibb 2

MS-Gibb 1

MS-Bayview

SALMACKROAD

MAINROAD

SALMACK ROAD

SYDNEY STREET

CAMP STREET

HILL STREET

HARDING STREET

PLETZENSTREET

GIBBS STREET

FORMOSA STREET

SWIFT-SHURESTR

July 2024

Erf 10190 - Plettenberg Bay

GLS Infrastructure planning

Figure 1 (Draft)
Proposed Development
Erf 10190 - Plettenberg Bay
Existing Electricity Reticulation