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BULK SERVICES REPORT

DEVELOPMENT OF A PORTION OF THE REMAINDER OF ERVEN 464 GEORGE, 324 AND 2819 PACALTSDORP (GWAYANG DEVELOPMENT SITE): ELECTRICAL ENGINEERING SERVICES REPORT

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Contents

Figures

Tables

1 Introduction

1.1 Background

The proposed development area is located within the urban area of George, situated to the south and east of Groeneweide Park residential area and the George Show Grounds and to the west of the Tamsui Industrial area. The site is restricted to the North by the R102 (Airport Road), and to the South by the N2 National Road. The western side of the site encompasses the Gwayang Wastewater Treatment Works (WWTW) and shooting range. The remaining area of the site is generally vacant and used for cattle grazing.

1.2 Plan of development

The intention of power supply to this development will mainly be from the Municipal 66kV network which partially cross over the development with 132kV Overhead Lines from Eskom. The 66kV feeder line connects Schaapkop and Proef Plaas substations. The Figure below indicate the site with the Overhead Line routes.

Figure 1: Site Layout Plan

1.3 Land Use & Zoning

The table below indicate the various land use categories and contribution to the load requirement. 16.3% of this development is allocated to light and heavy Industrial stands. The residential portion amounts to 7% which include 1968 Group and Apartment Housing Units. Figure 2 indicate the positioning of each category.

Table 1: Land Use Areas

Land Use								
Land Use Description	**Zoning - George Integrated Zoning Scheme By-Law**	**Units**	**Stands**	**Area (ha)**	**FAR**	**GLA (m2)**	**% of total area**	**% of units**
Group Housing	General Residential Zone II Group Housing	136	4	3.89	na	na	2%	6.9%
Apartment Housing	General Residential Zone IV Flats/Apartments	1832	7	9.16	1.0	91585	5%	93.1%
Light Industrial	Industrial Zone I	na	29	20.28	0.8	162277	11%	na
Industrial	Industrial Zone II	na	21	30.57	0.8	244572	17%	na
Mixed Use / Business / Retail								
Creche	Community Zone I	na	1	0.27	1.0	2662	0%	na
Private Open Space	Open Space Zone II	na	1	0.68	na	na	0.4%	na
Muncipal								
Open / conservation areas etc.	Open Space Zone I	na	15	57.62	na	na	31.8%	na
Planned roads	Transport Zone II	na	1	31.92	na	na	17.6%	na
Total number of units/stands		**1968**	**91**	**181.3**			**100%**	**100%**

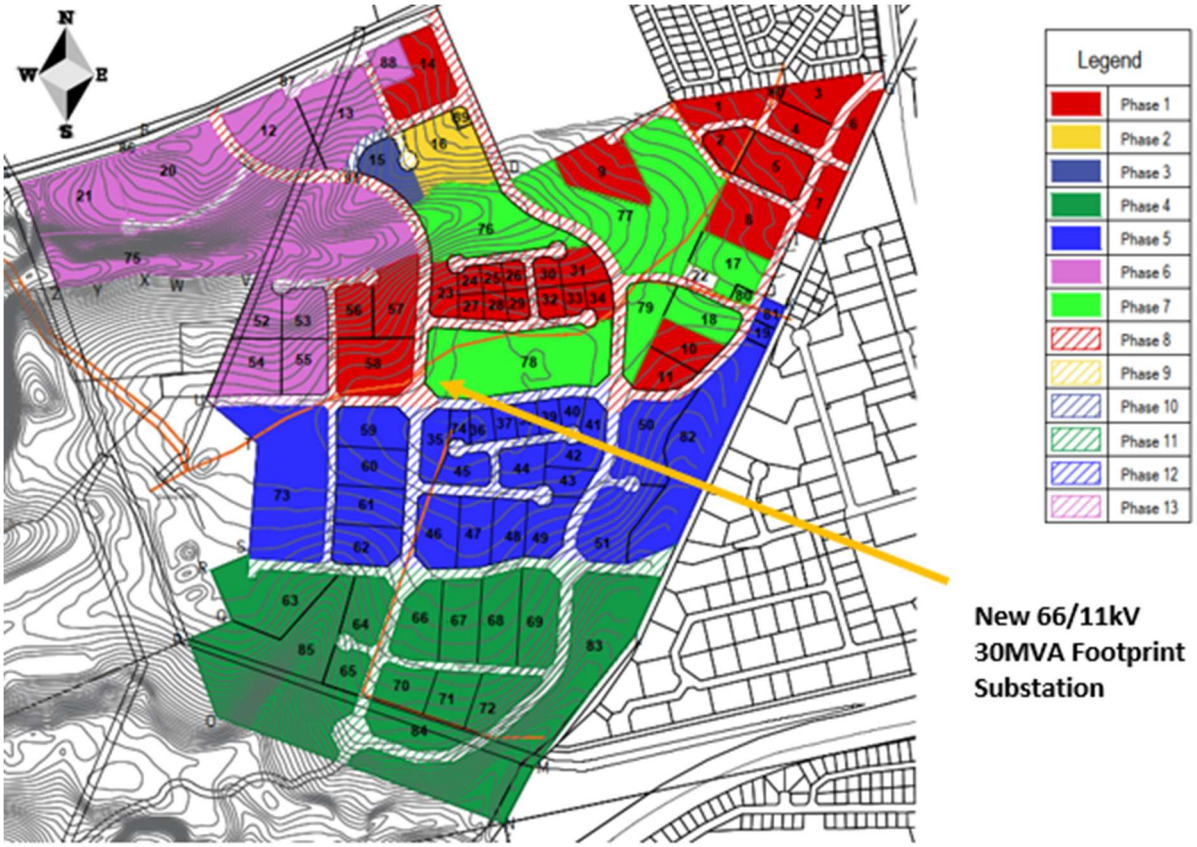

Figure 2: Land Use

2 Electrical

2.1 Design Standard

The design standards that will be used is as stipulated within the “Guidelines for human settlement planning and design” (the “Redbook Section 12”). These guidelines are used as best practice guidelines for any bulk service estimates and designs. NRS069:2018 and NRS034-1 were also utilized in determining the required additional load.

2.2 Estimated Electrical Demand

The estimated additional load requirement is indicated in table 2.

Table 2: Estimated Electrical Demand

Land Use Description	Zoning - George Integrated Zoning Scheme By-Law	Units	Stands	Area (ha)	FAR	GLA (m2)	kVA 0r VA/m²	Total Load kVA
Group Housing	**General Residential Zone II Group Housing**	**136**	4	-	na	na	4	546
Apartment Housing	**General Residential Zone IV Flats/Apartments**	**1832**	7	-	1.0	0	3.5	1,832
Light Industrial	**Industrial Zone I**	**na**	29	20.28	0.8	162277	40	6,491
Industrial	**Industrial Zone II**	**na**	21	30.57	0.8	244572	80	19,566
Mixed Use / Business / Retail		**na**	4	20.65			60	320
Creche	**Community Zone I**	**na**	1	0.27	1.0	2662	30	80
Private Open Space	**Open Space Zone II**	**na**	1	0.68	na	na	2.5	50
Muncipal		**na**	2	6.25			100	200
Open / conservation areas etc.	**Open Space Zone I**	**na**	15	57.62	na	na	2.5	50
Planned roads	**Transport Zone II**	**na**	1	31.92	na	na	80	80
Total number of units/stands		**1968**	**85**	**168.24**				29,214

2.3 Existing reticulation

There is sufficient spare capacity to supply the complete development area, see section 3. It is proposed to prioritise the development and supply it with power from the existing adjacent medium voltage networks both from Schaapkop and Proefplaas Substation areas.

The existing municipal street/area lighting principles will be applied in this new area for development.

It is proposed to establish a 30MVA 66/11kV substation eventually when the adjacent 11kV network do not have capacity as the development grows with phase development approach. The power will be a Loop In/Loop Out configuration from the existing 66kV Municipal Overhead Line. There is also an

indication that the Municipality will apply for a new 120MVA Transformer Bay at Schaapkop Substation for future growth which will then also pick up some of the Gwayang Development area. The table below indicate a typical breakdown or proposal to develop the area with the existing power availability.

It is based on percentages but will unfold depending on the demand and prioritization of the intended development.

3 Master Plan (GLS Consulting)

The following information was received from the Electrical Masterplan Consultant.

SS Blanco's 66 kV circuits feed into George via GM's Proefplaas 66 kV switching station and GM's SS Schaapkop 66 kV substation. SS Blanco's 132 kV circuit feeds into Eskom's SS Schaapkop 132 kV yard.

As is situation based on the George HV master plan.

- **Line**: Schaapkop-Proefplaas, Overhead line, characteristic type Bear, 66kV rated voltage, 0.65kA rated current.
- **Maximum conductor capacity**: 74 MVA
- **Normal operating loading**: 5.4 MVA (only 7.3%)
- **Available capacity**: 68.9 MVA (but this reduces to 54.0 MVA if loading should not exceed 80% of the rated capacity)

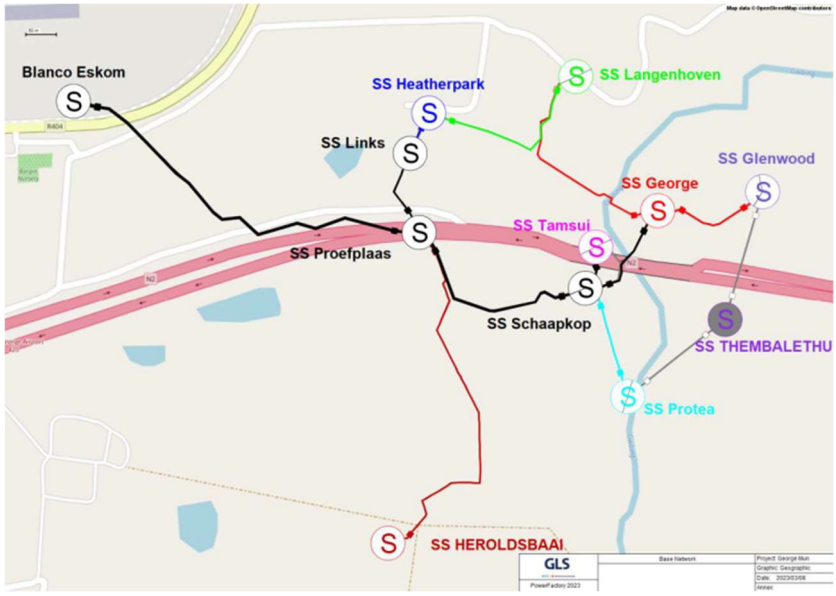

Figure 3: Master Plan Electrical

Note: Proefplaas switching station is planned to be converted into a HV/MV substation by the addition of a 10MVA transformer. The timeline for this project is unknown. Furthermore, the amount of additional load to be transferred to Proefplaas when converted to a substation is unknown. Therefore, the effect on the Schaapkop-Proefplaas line loading is not known at present when Proefplaas switching station is converted into a substation.

4 Conclusion

The bulk services investigation can be summarised as follows:

1. The proposed development will be serviced in a phased approach depending on category demand, via existing adjacent medium voltage (11kV) networks.
2. This development requires prioritization from a demand perspective that will unfold how the power requirements will be applied as described in section 2.3.
3. Provision needs to be made for a new 66/11kV Substation (100m x 80m, 30MVA Footprint) close as possible to the major load centre area (Industrial area). This will include 66kV Overhead Line servitudes from the Loop In / Loop Out 66kV Overhead Line
4. The new 66/11kV substation (In Figure 2 a Proposed Substation site position is indicated) need to cater for two incomer bays, two transformer bays and two spare future bays. The 11kV feeder breakers will be housed in a brick substation with indoor switchgear.
5. The 66kV Overhead line servitudes need a building restriction of at least 11 meters on each side of the centre line and separated at least 14meters from any other parallel running overhead lines.
6. The medium voltage networks will consist of 185mm² PILC cable ring networks with 315/500/800kVA miniature substations providing power to each stand. The street light control and power supply will also be from these miniature substations.

In diversity there is beauty and there is strength.

MAYA ANGELOU

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