DEVELOPMENT OF PREMISES 755, OLYVENHOUTSDRIFT, UPINGTON

BULK SERVICES REPORT FOR CIVIL AND ELECTRICAL ENGINEERING SERVICES

Compiled for:

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EXECUTIVE SUMMARY

The purpose of this investigation is to compile a bulk services report on the availability of bulk civil and electrical services for the development of premises 755, Olyvenhoutsdrift, Upington, Northern Cape. The following summarizes the report:

1. Water provision to the property will be from the existing municipal water pipeline running along the N10, in combination with on-site water storage to mitigate the risks of low pressures and insufficient municipal supply capacity.
2. Insufficient treatment capacity at the Louisvaleweg sewage treatment works necessitates that sewage generated by the development be handled on-site by utilising acceptable package plant technology.
3. Access to the site will be from the existing access road running along the northern boundary of the site to Pioneer Foods from the N10.
4. The bulk electrical connection can be made available on the Municipal network after extensive upgrading and extension of the Dawid Kruiper Municipality's network is completed.

1. INTRODUCTION

Mr Kobus Duvenhage appointed BVi Consulting Engineers to investigate the existing services and compile a due diligence report for the services available on premises 755, Olyvenhoutsdrift, Upington, Northern Cape.

The site falls under the jurisdiction of the Dawid Kruiper Municipality within the ZF Mgcawu District Municipality, which is located in the central part of the Northern Cape Province at Upington. This report will mainly focus on the availability of existing bulk civil and electrical infrastructure at the site or in the near vicinity of the site.

Dawid Kruiper Municipality will act as the primary service provider for both the electrical and civil engineering services where available.

2. LOCATION

The site under investigation is located at the following coordinates, S 28˚28'25.30", E 21˚16'25.02"

The site is situated approximately 5km from the central business area of Upington along the N10 towards Groblershoop. ***Refer to Figure 1 below.***

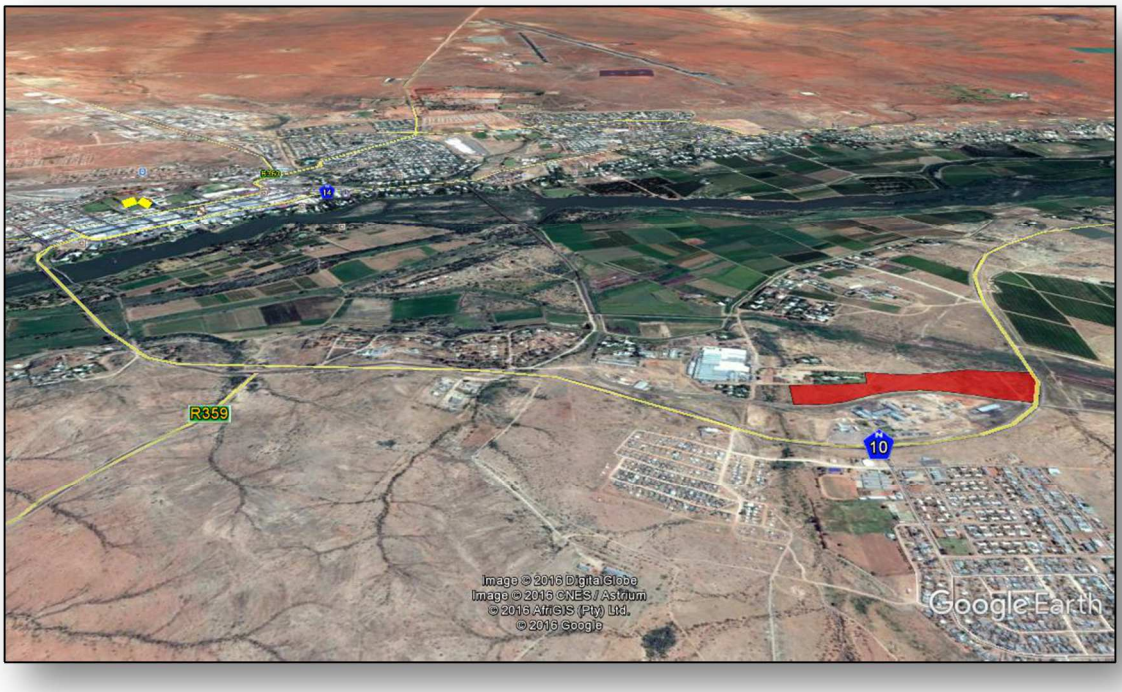

Figure 1: Locality

3. AVAILABLE INFORMATION

The following information were used for the compilation of this report:

DESCRIPTION	SOURCE
Existing water and sanitation services details	Dawid Kruiper Municipality – Mr. PW du Plessis
Existing electrical reticulation network details (medium voltage overhead lines and transformers)	BVi Electrical Department
Layout and position of the site	Macroplan, Upington.
Proposed site development plan	Brink Stokes Mkhize Architects.

4. TOPOGRAPHY

No topographical survey or geotechnical investigation was available at the time of this report. A site investigation was carried out to establish surface as well as typically expected soil conditions on the site.

The geological composition of the area forms part of the Gordonia formation, Kalahari group. Calcrete of various thicknesses will be found during the excavations. There is also a chance to find granite type material during construction.

Figure 2: Typical terrain on property

The hardness of the excavated material will vary with depth. On the surface soft material can be expected, however hard calcrete can occur beneath the surface which is sometimes difficult to remove mechanically. Abovementioned description should provide an indication as to what is expected.

The site topography was found to be fairly even. Surface water drainage across the site generally separates in two directions, with the proposed Industrial zoning area mainly draining towards the North West and the proposed Agricultural zoning area draining in a north eastern direction.

Groundwater is not expected to be a problem on the site.

5. ZONING

The current zoning on the property is G.a.1 Unspecified (premises 755). The newly proposed zonings will be E.c.2 Industry (3.2ha) and C.a.2 Agriculture (6.7ha). ***Refer to Figure 1.***

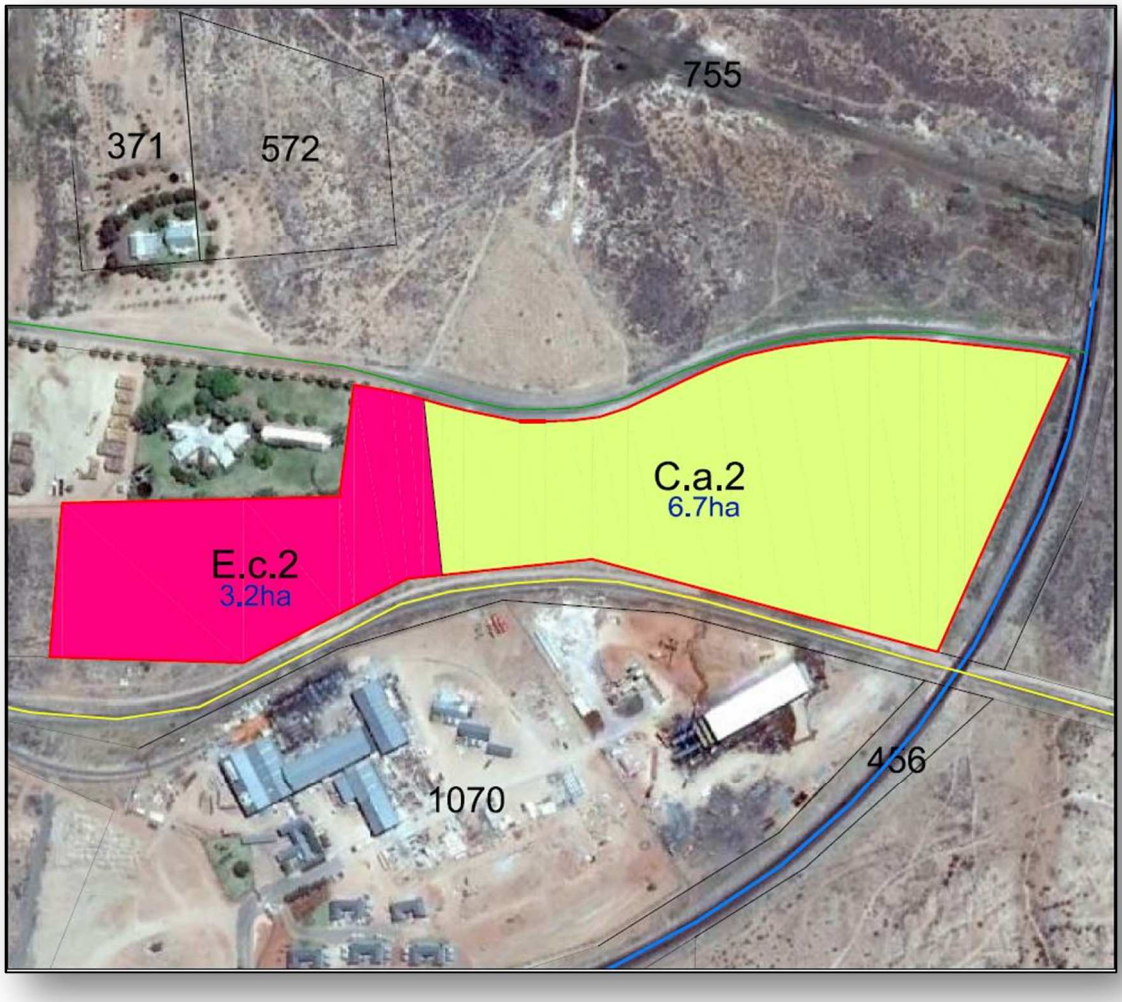

Figure 3: Proposed Zoning

6. BULK SERVICES

6.1 Access and roads

The N10 runs along the eastern boundary of the site. An existing gravel access road running along the northern boundary of the site intersects with the N10 and is the current access road to neighbouring industrial sites. Entrance to the newly proposed development will be from the north, also via the existing gravel access road. SANRAL has indicated that the use of the existing access from the N10 will be allowed. ***(See yellow line in Figure 4 below)***

Figure 4: Access from N10

Internal roads shall vary in width but will generally not be less than 6m in width. Roads will be black top (typically Cape or double seal), brick paving or gravel with the required base, sub base and selected layer works. The specific road wearing course will be dependent on the specific industrial activity on-site, dust control and eventual design vehicle usage of a specific area within the development. ***(See preliminary proposed layout in Figure 5 below)***

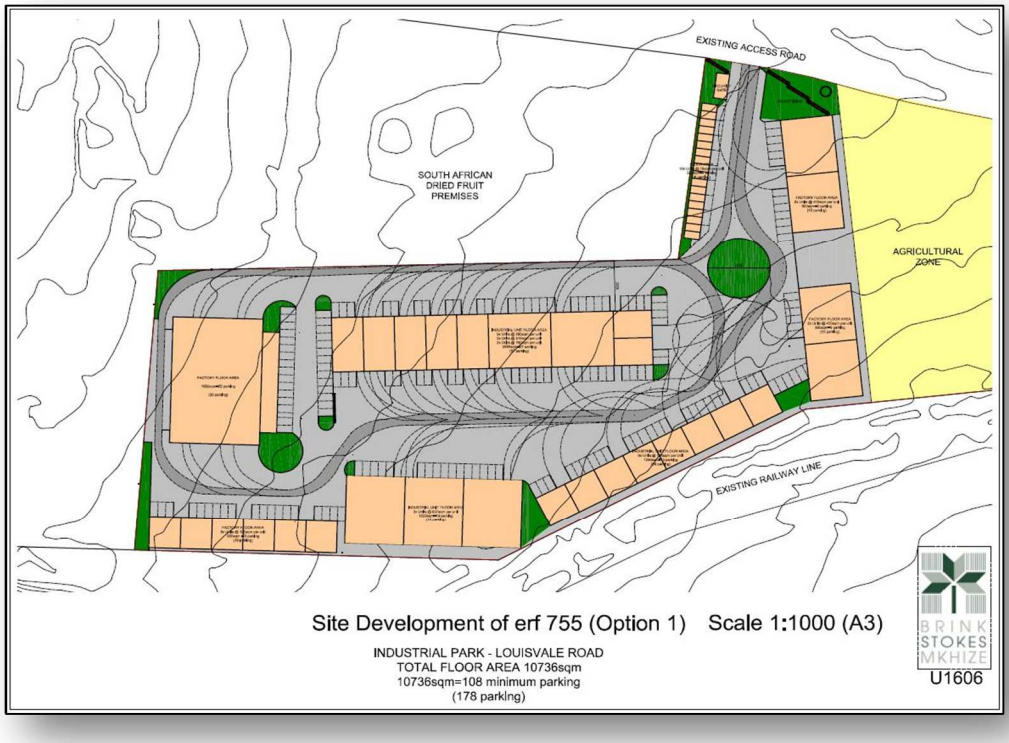

Figure 5: Proposed Internal roads

6.2 Water

Figure 6 below shows the proposed 110 mm diameter uPVC **(dark blue)** bulk water connections to the property from the existing 200mm diameter municipal supply pipeline **(light blue),** running along the N10 towards Louisvaleweg as indicated in **Figure 6** below. A 150mm diameter pipeline **(green)** feeds the existing De Drift Plaza.

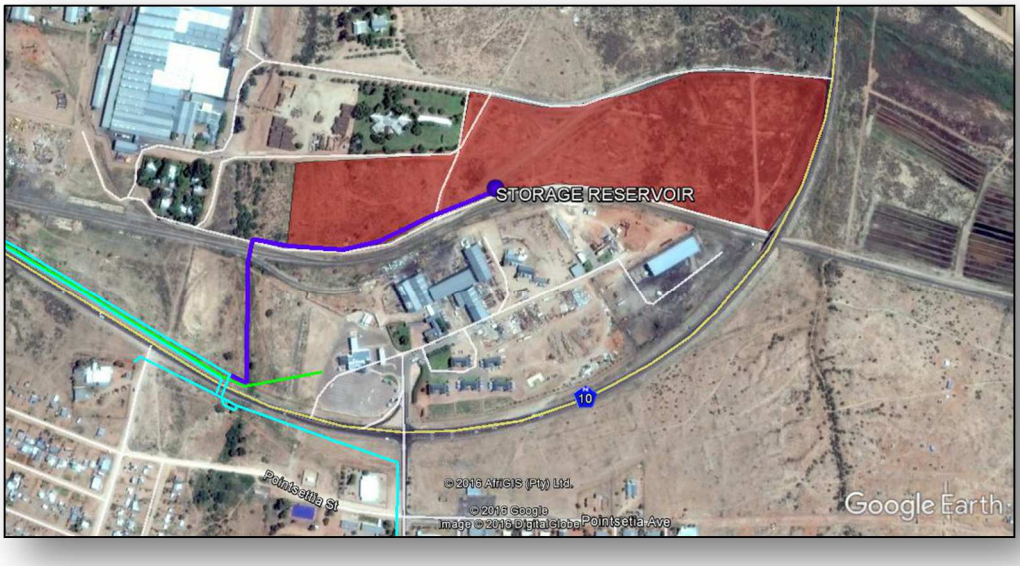

Figure 6: Bulk Water supply pipeline

The supply pipeline from the N10 National Road and the railway runs in a northerly direction along a sewer pump line serving the SAD raison factory.

Water demand/consumption was estimated as follows:

AREA DISCRIPTION	DEMAND ($l/m^2/day$)
Factories	3
Industrial	2.5

The development is expected to demand an average flow of 0.35 l/s with an instantaneous peak flow of 2.1 l/s. The estimated average daily demand would be 30,000 l/day.

Concerns have been raised regarding the limited capacity of the existing municipal supply mains. To mitigate possible water shortages and low water pressures, it is suggested that an on-site water storage system be implemented. Therefore on-site water storage for 48 hours would require a capacity of 60,000 litres. The incoming pipeline and anticipated position on this storage reservoir can be seen on the image on **Figure 7** below.

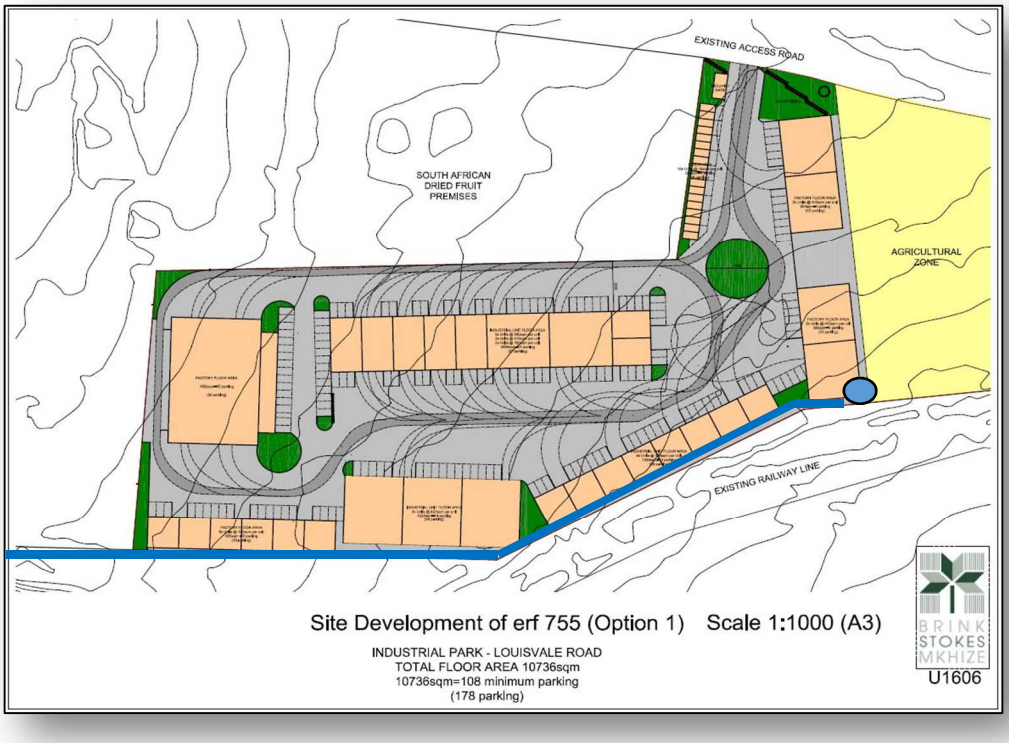

Figure 7: Proposed bulk Water supply pipeline and reservoir position

Sectional steel tanks would be used as an on-site water reservoir. Water storage can be elevated or kept under pressure via a pump system to ensure sufficient pressure to the development at all times.

Although the typical industrial water use will be 'off-peak' and is generally not expected to place additional strain on the water supply lines during peak residential usage, an on-site water storage strategy would allow the on-site reservoir to be supplied during off- peak periods for use under peak conditions, should it then be required.

Internal water pipes shall be Ø 63mm to Ø 110mm uPVC Class 6 minimum.

6.3 Sewer

The development is expected to discharge an estimated average sewage flow of 0.3 l/s with an expected peak flow of 1.21 l/s. The average daily sewage run-off is therefore expected to be 25 500 l/d.

As indicated by Dawid Kruiper Municipality, the Louisvaleweg Sewage Treatment Works is currently unable to accommodate additional sewage flow as it is already operating at capacity.

It is consequently required that the developer be responsible for the sewage generated by the development, at least until the sewage works in question is upgraded.

It is therefore recommended that the sewage be treated by a Bio- Filter Rotating Biological Contactor Sewage Purification Plant or similar approved packaged sewage treatment system to comply with the relevant water quality standards. The drawing in **Figure 8**, as well as the photos in **Figure 9** shows a typical installation:

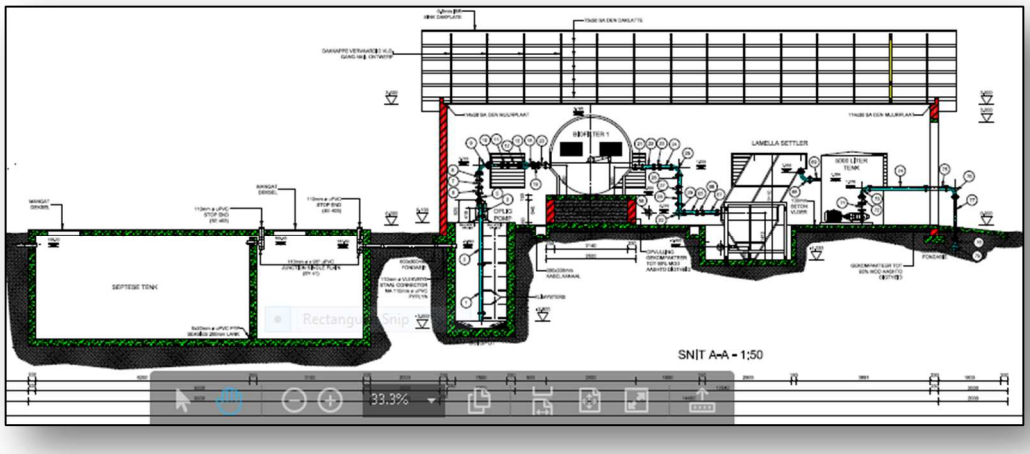

Figure 8: Section through typical on-site Sewerage Purification plant

Figure 9: Photo of typical Sewerage Purification Plant

The position of the Sewerage Purification plant is indicated on the layout drawing **(Figure 10)** below.

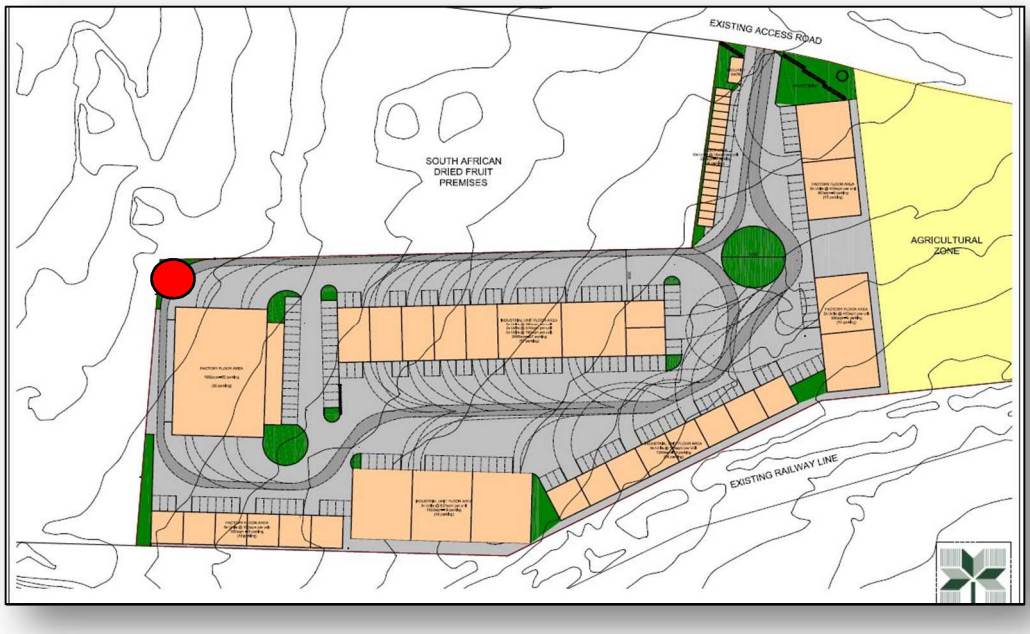

Figure 10: Position of Sewer Purification Plant

Municipal services will be required for the disposal of the sludge as required once the plant is operational.

The internal sewer system will consist of Ø 160mm uPVC Class 34 sewer pipes for general distribution with Ø 110mm uPVC Class 34 building connections. Minimum slopes will be 1:60 for building connections.

Purified waste water will be used on site to augment potable water for irrigation.

6.4 Storm Water

The area's storm water drainage is shown in **Figure 11** below. The area is relative small and flat and no problems are foreseen in this regard.

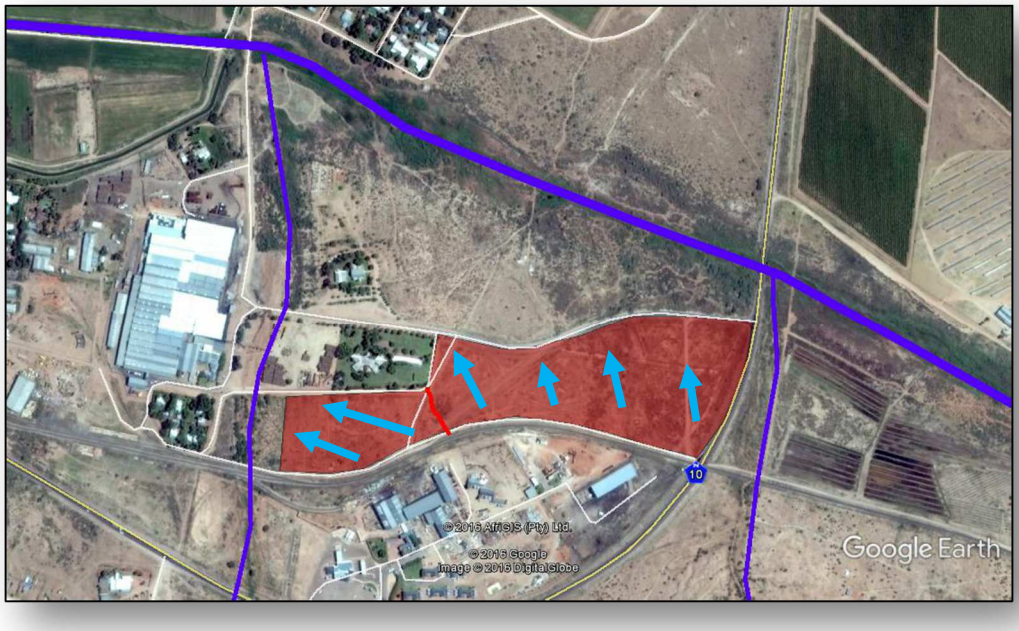

Figure 11: Drainage of the targeted area

Drainage through the site generally occurs in two directions over the property. The proposed industrial development mainly drains towards the north western corner of the property and will contribute to an existing watercourse running north along the western edge of the proposed development. The agricultural zoning will generally drain towards the north of the property, as is currently the case naturally and is therefore expected to be unaffected by the development in question. The catchment areas contributing to the storm water run-offs are however relatively small and result in easily manageable flows across the site.

Storm water run-off will be handled overland and accommodated within the proposed roads while complimenting the existing natural drainage scenario within and around the property. Storm water will therefore generally still follow current drainage paths to existing natural features. Areas at risk of erosion due to storm water run-off within the site will be suitably stabilised to prevent any erosion damage that might occur, although the gentle gradient across the site should not present major challenges in terms of storm water management. Storm water run-off will be handled overland and accommodated within roads where required, within the boundaries of the development. (See **Figure 12**)

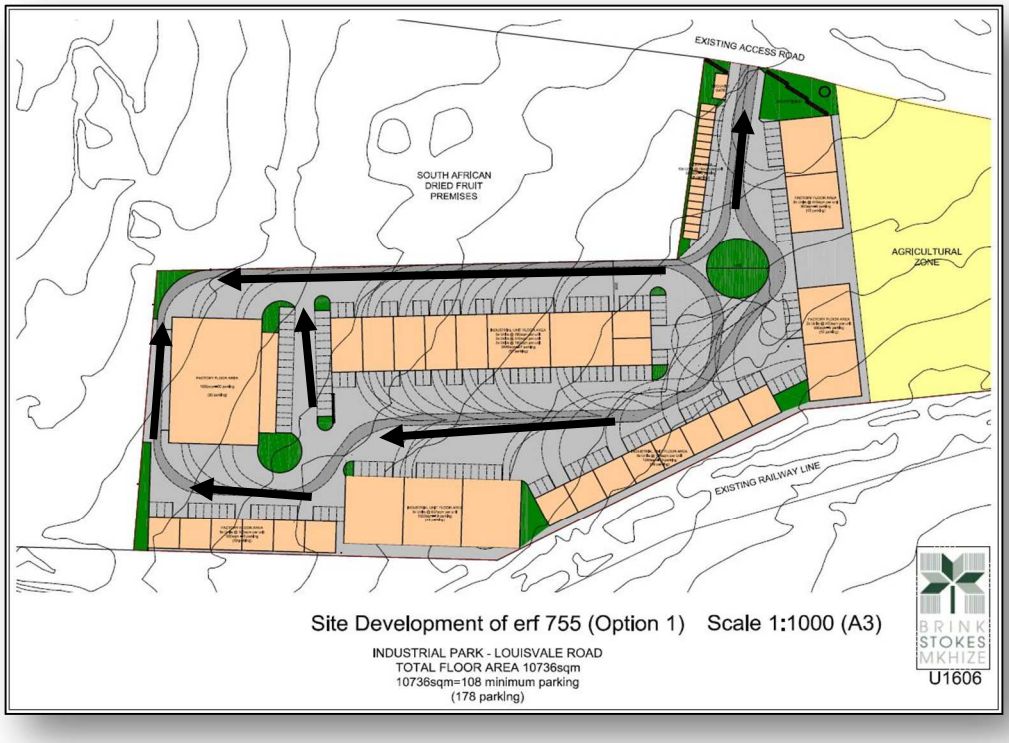

Figure 12: Surface drainage in the proposed development

6.5 Solid Waste

Solid waste will be collected and handled by the municipality as this development falls within the urban edge and the general area of service by the municipality. The image below (**Figure 13**) shows the development area (Red) in relation to the Upington Solid Waste Disposal Site

Figure 13 : Upington Solid Waste Disposal Site

6.6 Electrical Reticulation and Bulk Electrical Supply

6.6.1 Introduction and Problem Statement

This property was sold to the developer with the following proviso regarding a connection to the municipal electrical network:

"*Aangesien die Raad se elektrisiteitsnetwerk nie oor voldoende kapasiteit beskik nie, die Koper alternatiewe reëlings vir die voorsiening van krag aan die perseel, voorsiening moet maak*"

Discussions with Mr Marius Lensing of the Developer have revealed that the expected load of the proposed development will eventually approach 1.0MVA and the accommodation of this load will form the basis of this report.

6.6.2 The Existing Electrical Network

The existing electrical network in the Louisvale Road area is connected to Load Centre ES2 situated in Louisvale and is connected via a dedicated radial 120mm^2 XLPE feeder to Alpha Substation. This feeder can transfer a maximum of 5.0MVA to provide in the existing load which is approaching 4.0 MVA and should also allow for natural load growth in future. (See **Figure 14** below)

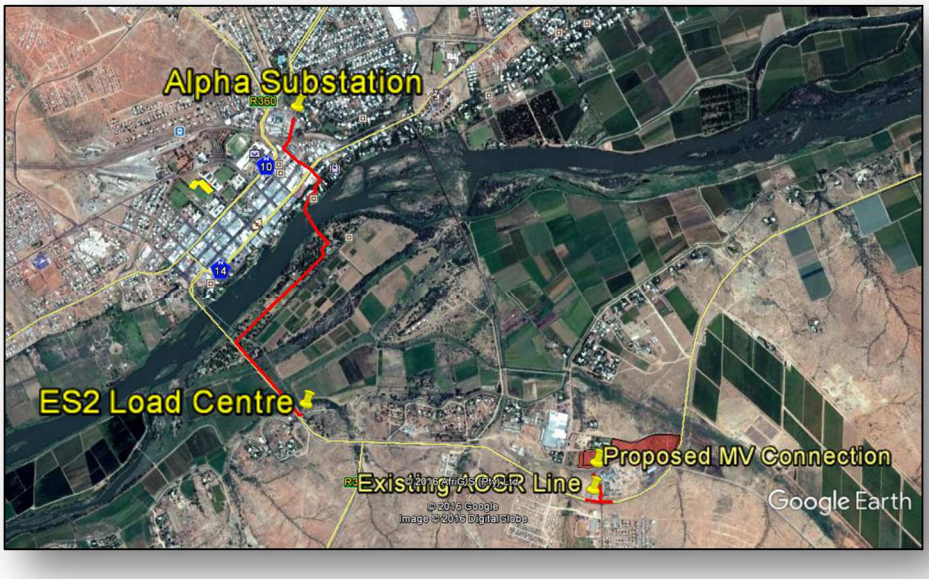

Figure 14 : Electrical Infrastructure

It is therefore clear that the expected load due to the proposed development cannot be accommodated on the existing network and extensive strengthening of the network is required.

6.6.3 Proposed Extension to the Electrical Network

It is normal and good practise to connect Load Centres through ring feeders to the main substation in order to have a firm supply and to facilitate isolation of faulty cable sections in order to maintain a firm supply to all sections of the network.

As this is not the case with the Louisvale Load Centre it is therefore necessary to consider the following upgrading of the network in order to connect the proposed load:

- Provision of a dedicated cable feeder of similar size to the existing feeder to create a ring feeder between Alpha Substation and Louisvale Road Load Centre, (See **Figure 15** below)

Figure 15 : Bulk Electrical line to be upgraded

- Install suitable MV circuit breakers at both ends of the cable feeder, and
- Consider the loading and if necessary the upgrading of the secondary 11kV network connecting the proposed development to the Louisvale Road Load Centre.

Figure 16 : Proposed Bulk Electrical Connection Point

For the purpose of this report we will only consider the magnitude of the cost implications at this point without taking any load flow studies and detail simulations into consideration.

6.6.4 Cost Estimate

The cost estimate (In R x million, excl. VAT, 2016 Rand) for the proposed activities are as provided below. The costs include the costs of supply and installation of all material but exclude the actual service connection, transformation and Low Voltage switchgear. The level of accuracy is commensurate with a concept level design.

Cable Feeder, 5MVA	2 713m @ R1 032/m	= R2 800 000
Circuit breaker (11kV, Alpha S/S)		= R850 000
Horizontal Drilling		= R250 000
River Crossing complete		= R200 000
O/H ACSR Line to POC		= R150 000
Total Cost		= R4 250 000

6.6.5 Electrical bulk services discussion

It is normal practise for a Local Authority to request a network contribution based on the pro rata loading on either the MV Network or distribution transformer when a new development needs to be connected.

In this instance, however, the Municipality indicated that the financial contribution by the developer for this upgrading exercise should equal the full cost.

7. CONCLUSION

The following conclusion, related to the provision of bulk services, can be reached:

- Municipal services directly to the site of the development are limited, but connection to bulk municipal infrastructure is possible in terms of water supply.
- Sewerage would require on-site treatment due to insufficient capacity at the Louisvaleweg sewage treatment works.
- Electricity supply from David Kruiper Municipal network connection will only be possible after extensive extensions to the electrical network are undertaken.
- Through management of the on-site services, the effect of municipal services, where connection is plausible, should be kept to a minimum.