



PREPARED BY: Triple 3 Engineering (Pty) Ltd

Contact: G Le Roux Tel.: 021 863 1244
Fax: 086 263 3934 E-mail: gawie@triple3.co.za

Report No.:
323/01 Rev 2

PROPOSED NEW DEVELOPMENT ON ERF 15712 WELLINGTON

PREPARED FOR:

ARUN Holdings (Pty) Ltd

Contact: Mr Hilton Campbell
Tel.: (021) 850 9680
Cell: 082 784 4000
E-mail: hilton@arun.co.za

LOCAL AUTHORITY:

Drakenstein Municipality, Western Cape



RELEVANT INFORMATION:

Report: 323/01 Version: (2)

Version Control:

- (0) = Original Report (Draft)
- (1) = Electrical Services Amendments
- (2) = Geotechnical, external services amendments

Total Area of Investigation Site: 20.40 ha

Engineer: Terence Elliott
Pr Eng. 20130625

Approved: Gawie Le Roux
Pr Eng. (Tech) 200070105

Signature: 

Civil & Electrical
Engineering
Services Outline
Scheme Report

MAY 2018

Table of Contents

Table of Contents	2
1 INTRODUCTION	4
2 RELEVANT INFORMATION.....	4
2.1 LOCATION OF PROPOSED DEVELOPMENT	4
2.2 EXTENT OF THE DEVELOPMENT AND PROPOSED LAND USE	4
2.3 TOPOGRAPHY OF THE SITE.....	4
2.4 GEOTECHNICAL CONDITIONS	4
2.4.1 Geology and Geohydrology	5
2.4.2 Recommendations for design and construction.....	5
2.5 TRANSPORTATION ISSUES AND ACCESS TO THE SITE.....	5
3 EXTERNAL SERVICES.....	6
3.1 PROVISION OF DOMESTIC WATER (EXTERNAL).....	6
3.1.1 Estimated Water Consumption and Demand.....	6
3.1.2 Summary of GLS Bulk Services Report.....	7
3.1.3 Water Supply Connection	7
3.1.4 Servitudes Required.....	8
3.1.5 Existing Water Supply Capacity	8
3.2 PROVISION OF DOMESTIC SEWER (EXTERNAL)	8
3.2.1 Indicative Sewage Flow Calculations.....	8
3.2.2 Summary of GLS Bulk Services Report.....	9
3.2.3 Sewer Drainage Connection	9
3.2.4 Servitudes Required.....	9
3.2.5 Existing Sewer Capacity	9
3.3 STORMWATER DRAINAGE (EXTERNAL).....	9
3.3.1 Stormwater from higher-lying areas bordering the development.....	9
3.3.2 Stormwater upgrades within the R44 Road Reserve Area	10
3.3.3 Internal services to be handed over to City Council on completion of project	10
3.4 ROAD CONSTRUCTION (EXTERNAL)	10
3.5 ELECTRICAL SERVICES (EXTERNAL)	11
3.5.1 Estimated electrical demand	11
3.5.2 Existing electrical infrastructure	11
4 INTERNAL SERVICES.....	11
4.1 WATER RETICULATION (INTERNAL).....	11
4.1.1 Water Reticulation Design.....	11
4.1.2 Servitudes Required.....	11
4.2 SEWER RETICULATION (INTERNAL)	12
4.2.1 Sewer Reticulation Design	12
4.2.2 Design considerations for residential sewers.....	12
4.2.3 Servitudes Required.....	13
4.3 STORMWATER DRAINAGE (INTERNAL).....	13
4.3.1 Design considerations for stormwater systems	13
4.4 ROAD CONSTRUCTION (INTERNAL).....	14

4.5	ELECTRICAL SERVICES (INTERNAL)	14
5	COST ESTIMATES.....	15
5.1	EXTERNAL SERVICES	15
5.2	INTERNAL SERVICES	17
5.3	PROPOSED BULK CONTRIBUTION OFFSETS	17
6	LIST OF ANNEXURES	18
7	CONCLUSION	18

1 INTRODUCTION

Triple 3 Engineering (Pty) Ltd has been appointed as consulting engineers by ARUN Holdings (Pty) Ltd to prepare the Outline Scheme Report envisaged for the proposed development situated on Erf 15712 on the northern outskirts of Wellington.

The purpose of this report is to provide information to the City Council regarding the requirements of the new development in terms of the provision of roads, storm water drainage, sewer drainage, domestic water and electrical reticulation, for approval by the Drakenstein Municipality.

2 RELEVANT INFORMATION

2.1 LOCATION OF PROPOSED DEVELOPMENT

The site for the proposed development is situated east of the R44 (Hermon Road) and west of the Wellington - Hermon railway line just north of Wellington. The site is bordered on the northern side by Farm 193/2, while Erf 15713 forms the southern boundary. Reference is made to Annexure A (Locality Plan), Annexure B (Aerial Photo) and Annexure C (Town Planning Layout).

The site is approximately 20.40 ha in size and falls within the area controlled by the Drakenstein Municipality.

2.2 EXTENT OF THE DEVELOPMENT AND PROPOSED LAND USE

The proposed development will consist mainly of the following:

- Business properties (approx. 6.97 ha)
- Light industrial / commercial properties (approx. 6.54 ha)
- Institutional property (approx. 3 ha)

It is envisaged that the holding will be developed as private erven with municipal infrastructure i.e. electrical, stormwater, water reticulation and sewer drainage networks located within a newly created municipal road reserve area. Controlled access to the individual stands will be provided.

2.3 TOPOGRAPHY OF THE SITE.

The site forms a shallow valley, with highest elevations of 104m amsl on the northern and southern boundaries and the lowest point of 98m amsl in centre of the site along the western boundary, creating an average slope of 1.33% from the centre of the site to the northern and southern boundaries.

A defined drainage system currently exists by means of two 1050mm \emptyset concrete stormwater pipes with an inlet structure at the eastern boundary of the site. These pipes remain underground across the width of the site towards the western boundary at the R44 road, where they surface with an outlet structure. These pipes were installed at some stage when the old Mossop Western Leather Tannery was fully operational to accommodate concentrated stormwater entering the site through a culvert underneath the railway line on the eastern boundary. This would aim keep the stormwater traversing the site and the water from the old tannery evaporation ponds separate. The tannery and evaporation ponds are not operational on a commercial level anymore. The pre-development run-off can be described as fragmented un-concentrated sheet flow. The stormwater emanating from the site will be directed towards the attenuation ponds as shown in Annexure E (Proposed Stormwater Layout)

2.4 GEOTECHNICAL CONDITIONS

A Geotechnical investigation was conducted by Core Geotechnical Consultants CC and their Report No. 075-18 dated May 2018 is available on request. However, an extract from the report is provided below:

2.4.1 Geology and Geohydrology

Medium dense to very dense fill underlie the entire Erf 15712 from ground level. The fill from TP11 - TP16 and TP30 - TP33 comprise angular to rounded cobbles in a matrix of gravelly clayey sandy fill and is essentially disturbed topsoil from farming activities. The fill has a maximum thickness of 0.40m.

The fill across the remainder of Erf 15712 is essentially organic tannery waste and topsoil contaminated with tannery waste. The maximum thickness of fill was encountered in TP17 (1.10m) and contains organic tannery waste in a medium dense to dense matrix of gravelly clayey sand.

Transported soils underlie the fill across the entire Erf 15712. The transported soils vary in thickness and extend to depths of approximately 0.3m below ground level in TP11 and to a depth in excess of 1.50m in TP30. The transported soils comprise angular to rounded cobbles in a matrix of gravelly sand and gravelly clayey sand.

Weathered residual shale and schist (from the Malmesbury Group) underlie the transported soils and essentially comprise fine grained gravelly clayey silts that are closely jointed in some areas. Various degrees of feruginised residual soils were also encountered throughout the area. The residual soils extend to a depth in excess of 2.10m below ground level.

Water was encountered in TP17 and TP20 at a depth of 2.0 m and 0.80m below ground level respectively. The groundwater in this area will flow within the relatively permeable cobble layer and above the relatively impermeable residual layer.

2.4.2 Recommendations for design and construction

The following foundation options are general recommendations and will depend on the type of structure planned and may be considered for Erf 15712:

- Found through the fill and onto either dense to medium dense transported soils or stiff residual soils at approximately 0.5 – 1.0 m bgl using conventional strip or spread foundations and a maximum allowable bearing pressure of 150 kPa. It is also advisable to reinforce strip footings to span possible soft spots that may be encountered. Under these conditions, total settlement should not exceed 10 mm.
- For surface beds, re-compact the upper fill and transported layer to 93 % Mod AASHTO, using a heavy vibratory roller. Some long-term fill settlement may still occur and one may wish to isolate surface beds from walls to accommodate any minor movements. As regards to surface bed design, a balanced layer works design and slab design are required to suit the intended loadings.

2.5 TRANSPORTATION ISSUES AND ACCESS TO THE SITE.

As the development on Erf 15712 will form part of a larger group of developments in this area that will all contribute to an increase in traffic volumes along the R44 Hermon Road, significant upgrades will be required to the existing roads surrounding the site.

Erf 15712 will be accessed from the R44 (Hermon Road) on the western boundary as shown in Annexure C (Town Planning Layout) and Annexure D (Proposed Roads Layout) and from Oakdene Road passing south of the site.

A Traffic Impact Assessment was conducted by Ms AnneBet Krige (Pr Eng) and the full report will be submitted to the Drakenstein Municipality in due course. Approval of the traffic report will also be obtained from Western Cape Provincial Roads Department. However, an extract from this report is provided below:

Three new entrances will be provided to the site and these will be located within the existing road reserve, upgrading the existing intersections and roads as follows:

- The R44 Hermon Road/Oakdene Road intersection will be upgraded to a four-legged, roundabout intersection with two circulating lanes and approach lanes/exit lanes as follows (see Annexure D drawing no 323-02-02 Sheet 2 for preliminary drawing):
 - Construct an exclusive left turn lane (100 m in length) on the southern approach.
 - Construct an auxiliary through lane (100m in length) on the southern exit.
 - Construct a shared through and left turn lane (100 m in length) on the northern approach.
 - Construct a shared through and left turn lane on the western approach.
 - Construct an exclusive right turn lane on the western approach.
- The Hermon Road/Access to erf 15712 intersection will be upgraded to a three-legged, roundabout intersection with one circulating lane. No additional turning lanes are required. See Annexure D drawing no 323-02-02 Sheet 3 for preliminary drawing.
- The Oakdene Road/Access to Erf 15712 and Erf 15713 (See Annexure D drawing no 323-02-02 Sheet 1):
 - Construct a Left-in, Left-out access along both sides of Oakdene Road.
 - Construct a median island to prohibit any right-turning movements.

Note: Reference is made to the full traffic report for further detail regarding all external road upgrades.

3 EXTERNAL SERVICES

3.1 PROVISION OF DOMESTIC WATER (EXTERNAL)

3.1.1 Estimated Water Consumption and Demand

An investigation regarding the additional water and sewer demand of the proposed development was conducted by GLS Consulting (Pty) Ltd and the complete Bulk Services Report is attached to this document as Annexure L. The area investigated in the GLS report includes a number of erven in three different developments, namely:

Development A: Erven 15712, 15713 and Farm 193/2
 Development B: Erf 15714
 Development C: Erf 15711

Table 1 below provides a summary of the estimated water demand to be generated by the development on Erf 15712, which forms part of Development A in the GLS report. In terms of the land use proposals, the estimated daily water consumption provided in Table 1 were obtained as follows:

- For business and light industrial properties figures as determined by GLS were used.
- For institutional properties figures were obtained from the “Guidelines for Human Settlement Planning and Design”, as published by the CSIR.

TABLE 1: ESTIMATED WATER CONSUMPTION				
Item	Land use	Area	Average Daily Consumption	Total Demand
1	Business	6.97 ha	18.0 kl/d/ha	125.46 kl/day
2	Light industrial	6.54 ha	18.0 kl/d/ha	117.72 kl/day
3	Institutional	30 000 m ²	0.5 kl/100m ² /d	150.00 kl/day

4	Total water demand	393.18 kl/day
5	Peak water consumption at a peak factor of 4	18.20 l/s
Note: According to the GLS report figures the water demand for Erf 15712 is estimated at 13.47 l/s.		

3.1.2 Summary of GLS Bulk Services Report

A summary of the recommendations ensuing from the GLS report regarding the existing water network is provided below:

- a) The proposed development on Erf 15712 forms part of Development A as described in the GLS Bulk Services Report.
- b) Development areas A, B & C of the proposed development on erven 38, 40, 42,52 & 193/2 in Wellington may be liable for the payment of a Development Contribution (as calculated by the Drakenstein Municipality) as per Council Policy.
- c) There is insufficient capacity in the existing water reticulation and bulk supply systems to accommodate the proposed development. The existing Newton, Van Blerk & Con Marine reservoirs have however sufficient reservoir storage capacity available to accommodate the proposed development.
- d) The minimum upgrades required in order to accommodate the domestic water demand of Development B of the proposed development in the existing water system are master plan items DWW9.7 & DWW9.13 (required to accommodate development B of the proposed development area within the existing Newton/Van Blerk reservoir zone). Link services items DWW1.30 & DWW1.31 and master plan item DWW1.4 will however be required to comply with the fire flow criteria as set out in the water master plan.
- e) The minimum upgrades required in order to accommodate development areas A & C of the proposed development in the existing water system are all the link services and master plan items required to accommodate development area B of the development, all the water master plan items associated with Welvanpas rezoning phases 2, 3 & 4, all the water master plan items associated with Newton/Van Blerk network upgrade phase 2 and link services items DWW1.32 & DWW1.33 to connect to the water infrastructure of development area B.
- f) Master plan items DWW.B5, DWWB23b, DWWB24b, DWWB25 and DWWB26 are required to augment bulk water supply to Wellington town in order to accommodate any additional development in Wellington.

Notwithstanding the above (item 3.1.2 f)) discussions with Mr Flip du Plessis of GLS pointed to the fact that once master plan item DWW.B5 (currently under construction) had been implemented, sufficient bulk supply will be available to serve this new proposed development. As a result we have excluded the cost of items DWW.B23b to DWW.B26 from the cost estimate later in this report.

Note: Please refer to Annexure L for the complete GLS report and detailed descriptions of items listed above.

3.1.3 Water Supply Connection

The scope of the proposed development will require a water connection by means of a new 200mm Ø supply line which will be located along the western site boundary. This main supply will connect to a new 315mm Ø link services line located within the R44 road reserve. Reference is made to Annexures G and H for external water network layouts.

The required connections will be designed by Triple 3 Engineering and constructed under supervision of the Drakenstein Municipality, whereafter it will be handed over to them or constructed under their supervision. 110mm Ø Connections to the erven within the proposed development will include a bulk water meter, sluice valve and fire hydrant, all to be placed at the entrance to the proposed developments as indicated on Annexure G.

3.1.4 Servitudes Required

Provision should be made for a 3m wide pipeline servitude (in favour of the Drakenstein Municipality) to accommodate the link services as described above. Furthermore a new road reserve area will be provided throughout the township to accommodate all municipal services as mentioned earlier in this report.

3.1.5 Existing Water Supply Capacity

As mentioned in paragraph 3.1.1 above, the existing bulk supply network will require upgrading to accommodate the increased demand resulting from the proposed development. Further details regarding the upgrades are provided in the GLS Bulk Services Report.

3.2 PROVISION OF DOMESTIC SEWER (EXTERNAL)

3.2.1 Indicative Sewage Flow Calculations

A Sewer analysis performed by GLS indicates that the proposed Development A as described in their report is expected to generate an estimated peak day dry weather flow (PDDWF) of 394.8 kl/day.

However, as mentioned in paragraph 3.1.1, Erf 15712 forms part of Development A, which will include sewer flow contributions from erven 15712, 15713 and Farm 193/2. Erf 15712 will consist mainly of business and light industrial sites. According to the "Guidelines for Human Settlement Planning and Design", discharge from business sites typically need not be taken into account, since they generate relatively minor flows that do not peak at the same time as residential flow.

Notwithstanding the above we include the peak sewer flows as these were also addressed in the GLS report. Considering the above-mentioned land use of Erf 15712 we have estimated the sewage flow to be 80% of the water demand given in Table 1.

Table 2 below provides a summary of the estimated additional sewer demand to be generated by Erf 15712.

TABLE 2: ADDITIONAL SEWERAGE FLOW				
Item	Land use	Area	Average Daily Flow	Total Sewer Flow
1	Business	6.97 ha	80% of 18.0 kl/d/ha	100.37 kl/d
2	Light industrial	6.54 ha	80% of 18.0 kl/d/ha	94.18 kl/d
3	Institutional	30 000 m ²	80% of 0.5 kl/100m ² /d	120.00 kl/d
4	Total sewer flow			314.54 kl/day
5	Peak sewer flow at a peak factor of 2.5			9.10 l/s
Note: According to the GLS report the total sewer flow for Development A is estimated at 11.42 l/s.				

3.2.2 Summary of GLS Bulk Services Report

A summary of the recommendations ensuing from the GLS report regarding the external sewer network is provided below:

- a) There is sufficient capacity in the existing bulk collector sewer downstream of the proposed connection point in Stokery Road to accommodate the development.
- b) There is however no sewer infrastructure between the proposed development and the existing sewer network.
- c) The minimum requirements to accommodate development area B of the proposed development in the existing sewer system are link services items DWS6.3, DWS6.4 & DWS6.5 to connect to the existing Wellington sewer system. Link services items 1, 2, 3, DWS6.1 & DWS6.2 will be required to accommodate development areas A & C of the proposed development.

Note: Please refer to Annexure L for the complete GLS report and detailed descriptions of items listed above.

3.2.3 Sewer Drainage Connection

The internal sewerage reticulation will drain towards a new system comprising of 160mm Ø and 200mm Ø Class 34 uPVC pipes which will be constructed within the site boundaries along the western side of the development as indicated in Annexures I and J. This pipe will tie into a new 250mm Ø line that will gravitate towards a new pump station located close to the Krom River along the western boundary of Erf 36. This pump station will be positioned to be outside the 1:100 year flood line and accompanying buffer zone of the river in accordance with relevant legislation. From the pump station a new 250mm Ø rising main will form the link between the proposed development and the existing sewer infrastructure. Further detail regarding the sewer connections is provided in the GLS Bulk Services Report.

The required connections to the existing network will be designed by Triple 3 Engineering and constructed under supervision of the Drakenstein Municipality, whereafter it will be handed over to them.

3.2.4 Servitudes Required

A new 10m wide right of way servitude will be provided along the borders of Erf 36 to the west of the proposed development. This servitude will provide access to the new pump station. The new 250mm Ø rising main will also require a 10m wide servitude along the eastern boundary of Erf 36, back towards the R44 road reserve.

3.2.5 Existing Sewer Capacity

As mentioned in paragraph 3.2.1 above, the existing bulk sewer network has sufficient capacity to accommodate the increased demand resulting from the proposed development. However, certain link services will be required to connect the proposed development with the existing sewer infrastructure. Details regarding these link services are provided in the GLS Bulk Services Report.

3.3 STORMWATER DRAINAGE (EXTERNAL)

3.3.1 Stormwater from higher-lying areas bordering the development

The site of the proposed development will have to accommodate surface run-off from the neighbouring northern and eastern properties as these are slightly more elevated than Erf 15712. This inflow onto the site will be managed as follows:

- From a northerly direction the site will receive run-off from Farm 193/2. Although this area is currently undeveloped, a combined town planning layout is available indicating the proposed land use of the adjacent properties. Provision will be made on Erf 15712 to collect and accommodate the surface run-off generated by developments within Farm 193/2. The water will then traverse the site from north to south where it will flow into the stormwater attenuation ponds located in the centre of the site.
- From an easterly direction the site will receive run-off through a 1900mm x 3700mm concrete culvert under the railway line along the eastern site boundary. This culvert allows surface run-off from Erf 15711 to enter onto Erf 15712, from where it follows the natural ground contours in a shallow valley towards the western site boundary. The new attenuation ponds of Erf 15712 will be situated in this valley area, where provision will be made to allow flow from the culvert to traverse the site downwards towards the western boundary without risking damage to the properties bordering the attenuation ponds.

Reference is made to Annexure E for the Proposed Stormwater Layout.

3.3.2 Stormwater upgrades within the R44 Road Reserve Area

On completion of the anticipated road widening of the R44 as mentioned in item 3.4 below, the existing grassed v-drains will be replaced by new concrete lined v-drains within the limited space available in the R44 road reserve area. On completion these v-drains will be handed over to the Western Cape Provincial Roads Department.

3.3.3 Internal services to be handed over to City Council on completion of project

Internal surface run-off generated by the proposed development will be managed by means of underground pipe systems for minor storm scenarios and overland systems for major storm scenarios. The increase in surface run-off resulting from the proposed development will be absorbed in the attenuation ponds situated in the central area of the site.

Outflow from the attenuation ponds will be designed to enter controlled into the current stormwater system through an existing culvert under the R44 on the western boundary of the site. The water then enters an existing channel/v-drain from where it is guided towards the Krom River.

On completion of the project the Drakenstein Municipality will take over of the external stormwater system. Safety & Security measures as well as maintenance of the attenuation ponds are to be provided by the Property Owners.

Note: Further detail regarding the stormwater management will be provided in a comprehensive Stormwater Management Report, which will be submitted to the Drakenstein Municipality in due course.

3.4 ROAD CONSTRUCTION (EXTERNAL)

Access to the site will be from the R44 Hermon Road on the western boundary of the development, as well as from Oakdene Road passing south of the site. Both Hermon Road and Oakdene Road are existing surfaced roads. Two entrances from Hermon Road and one from Oakdene Road into the proposed development will be constructed within the road reserves as indicated in Annexure D.

A Traffic Impact Assessment was conducted by Ms AnneBet Krige (Pr Eng) and the full report will be submitted to the Drakenstein Municipality in due course. Approval of the traffic report will also be obtained from Western Cape Provincial Roads Department. Subject to approval of the above-mentioned TIA, it is envisaged that the R44 will be upgraded as described in paragraph 2.5 above.

On completion of the project the external upgrades will be handed over to the Western Cape Government and the Drakenstein Municipality.

3.5 ELECTRICAL SERVICES (EXTERNAL)

3.5.1 Estimated electrical demand

The developer will be required to enter into a self-build agreement with Eskom. This will allow the developer to be exempted from possible medium voltage shared network contribution costs and install the infrastructure himself.

Discussions were held with Eskom and the latest estimate indicate that a supply of 6 MVA would be required based on the current floor area ratios, erven coverage and town planning layouts of the proposed development. Eskom has a firm supply of 5 MVA currently available at the Wellington Substation and indicated that negotiations for a portion of non-firm supply would be possible. The Wellington substation is 3 km away from the site.

For a supply of the above-mentioned size a new brick build medium voltage substation will be required. An area has been identified for the substation. Eskom requires that the substation be situated on site and an 18m x 18m area of land will be required for it.

3.5.2 Existing electrical infrastructure

There is an existing 11kV rural line running across the property. This line has insufficient capacity to cater for the proposed development, hence the required upgrades as mentioned in 3.5.1 above.

4 INTERNAL SERVICES

The design of the internal services for the proposed development will be based on the design principals contained in the Guidelines for the “Provision of Engineering Services in Residential Townships” as published by the Department of Community Development and in accordance with the Drakenstein Municipality’s requirements for engineering services where applicable.

All services will be installed by the developer. The General Conditions of Contract for work of Civil Engineering Construction, standard specifications SANS 1200 and relevant particular specifications will pertain to the contract.

4.1 WATER RETICULATION (INTERNAL)

4.1.1 Water Reticulation Design

The internal water reticulation system will tie into the new 200mm Ø supply line in the R44 road reserve as discussed earlier in this report. The internal water will comprise of a network of 110mm Ø to 200mm Ø Class 12 uPVC Z-Lok or similar approved water pipes extending into the development with 110mm Ø class 12 uPVC connections to the individual stands as indicated in Annexure G.

Fire and domestic water demand will be calculated in accordance with the requirements of the Local Authority. It is expected that a separate rational fire design will be commissioned during SDP approval stage of each individual property. This service will be handed over to the Drakenstein Municipality on completion.

4.1.2 Servitudes Required

Provision should be made for a 3m wide pipeline servitude (in favour of the Drakenstein Municipality) to accommodate the link services as described above. Furthermore a new road reserve area will be provided throughout the township to accommodate all municipal services as mentioned earlier in this report.

4.2 SEWER RETICULATION (INTERNAL)

4.2.1 Sewer Reticulation Design

The internal sewer reticulation will connect to a new 200mm Ø line on the western boundary of the site as discussed earlier in this report. The internal lines will consist of a network of 160mm Ø and 200mm Ø Class 34 uPVC pipes as indicated in Annexure I. Materials, slopes and construction methods will conform to the requirements of the Local Authority. This service will be handed over to the property owners upon completion.

4.2.2 Design considerations for residential sewers

Table 3 below provides guidance in terms of generally accepted minimum standards for normal residential and internal sewer networks as described in the "Guidelines for Human Settlement Planning and Design". Where no minimum requirements or specific standards are provided by the Local Authority the design for this development will aim to follow these recommendations for internal services.

Item	TABLE 3: GENERAL INFORMATION – RESIDENTIAL/INTERNAL SEWER NETWORKS	
1	Minimum internal diameter (mm)	160
2	Minimum full-bore velocity (m/s)	0.7
3	Maximum full-bore velocity (m/s)	2.5
4	Minimum cover in servitudes (mm)	600
5	Minimum cover in sidewalks (mm)	1400 below final kerb level
6	Minimum cover in road carriageways (mm)	1400 below final constructed road level
MINIMUM SEWER GRADIENTS		
Item	Sewer diameter (mm)	Minimum gradient
8	100	1 : 120
9	150	1 : 200
10	200	1 : 300
11	225	1 : 350
12	250	1 : 400
13	300	1 : 500

4.2.3 Servitudes Required

Provision should be made for a 3m wide pipeline servitude (in favour of the Drakenstein Municipality) to accommodate the link services as described above. Furthermore a new road reserve area will be provided throughout the township to accommodate all municipal services as mentioned earlier in this report.

4.3 STORMWATER DRAINAGE (INTERNAL)

Stormwater drainage will be managed on surface as well as through and underground piped drainage system, which will be installed for the 1:5 year return period storm. Allowance had been made for the run-off of a typical 1:100 year storm to traverse the site in defined channels (which includes the internal road system) without causing any damages to buildings.

Both the piped (for minor storm) and overland (for major storm) systems from the northern and southern areas of the development will discharge into the attenuation ponds in the centre of the site where after it will be conveyed to the natural system as previously described. Please refer to Annexure E for further details of the stormwater system.

The attenuation ponds will be of adequate size to retain the additional flow resulting from the development for the 1:5 and 1:25 year return period scenarios, whilst allowing the 1:100 year to pass safely through it. On completion, the Drakenstein Municipality will take over the maintenance of the internal storm water system and associated attenuation ponds.

Note: A detailed Stormwater Management Report will be submitted to the Drakenstein Municipality in due course.

4.3.1 Design considerations for stormwater systems

Table 4 below provides guidance in terms of generally accepted minimum standards for typical stormwater pipe networks as described in the "Guidelines for Human Settlement Planning and Design". Where no minimum requirements or specific standards are provided by the Local Authority the design for this development will aim to follow these recommendations for internal services.

TABLE 4: GENERAL STORMWATER INFORMATION			
SUGGESTED MINIMUM GRADES FOR PIPES			
Item	Pipe diameter (mm)	Desirable minimum gradient (1 in ...)	Absolute minimum gradient (1 in ...)
1	300	80	230
	375	110	300
	450	140	400
	525	170	500
	600	200	600
	675	240	700
	750	280	800
	825	320	900
	900	350	1000
	1050	440	1250
	1200	520	1500
SUGGESTED SPACING FOR ANCHOR BLOCKS			

Item	Gradient (1 in...)	Spacing for 2.44m pipe lengths
2	2 2 – 3.33 5 10	every joint alternate joint every 4 th joint every 8 th joint

4.4 ROAD CONSTRUCTION (INTERNAL)

The internal roads will be municipal roads and will be maintained by the Drakenstein Municipality. Reference is made to Annexure D for the proposed road layout.

The General Conditions of Contract for work of Civil Engineering Construction, standard specifications SANS 1200 and relevant particular specifications will pertain to the contract. All internal roads will be designed and constructed to acceptable industry standards and to the satisfaction of the Drakensberg Municipality.

4.5 ELECTRICAL SERVICES (INTERNAL)

For a supply of 6 MVA as mentioned in 3.5.1 above a new brick build medium voltage substation will be required. An area has been identified for the substation.

From the new brick build substation two MV ring networks would be required within the development to provide a supply to each of the 27 opportunities. No low voltage supplies are required. When each individual stand is developed, the developer will be required to apply for a connection from Eskom. This application will require each individual stand to pay proportionally for its shared network contribution costs.

We are currently engaged with Eskom to negotiate the infrastructure costs for the development and to determine what the Eskom requirements and timeline for the installation of the infrastructure would be. This report will be further updated as soon as we receive feedback from the relevant parties.

5 COST ESTIMATES

Below is a summary of estimated cost to provide Bulk Civil Municipal Services for the proposed development. Apportionment of costs required for the upgrading of external roads and stormwater infrastructure will be done along the lines of estimated trip generations for each section of the development as set out in the Traffic Impact Assessment.

5.1 EXTERNAL SERVICES

The table below provides estimated costs for the external services required to facilitate the proposed development as set out in the GLS Bulk Services Report. Please note the following:

- The figures for water, sewer, roads and stormwater include P & G, contingencies and fees, but exclude VAT.
- The figures for electricity exclude fees, disbursements, foreign exchange fluctuations, contingencies, escalation, VAT, main contractor's mark-ups/profit, communication network & electronic systems, temporary electrical builder's supply, electrical account deposit, electrical gates and fencing.

Item	Description	Unit	Quantity	Rate	Amount	Section Total
5.1.1	Water Reticulation					R 33 498 500.00
	Link services					R 4 912 000.00
.a	250mm Ø pipe - DWW1.30	m	75	3 693.33	277 000.00	
.b	315mm Ø pipe - DWW1.31	m	815	2 839.26	2 314 000.00	
.c	200mm Ø pipe - DWW1.32	m	284	2 433.10	691 000.00	
.d	200mm Ø pipe - DWW1.33	m	550	2 963.64	1 630 000.00	
	Rezoning - Phase 1					100 000.00
.e	110mm Ø valve - DWW9.7	Rate	1	100 000.00	100 000.00	
.f	Open valve - DWW9.13			-	-	
	Upgrade - Phase 1					4 140 000.00
.g	355mm Ø pipe - DWW1.4	m	925	4 475.68	4 140 000.00	
	Rezoning - Phase 2					1 034 000.00
.h	110mm Ø pipe - DWW1.49	m	20	2 750.00	55 000.00	
.i	200mm Ø pipe - DWW1.7a	m	20	4 050.00	81 000.00	
.j	Open valve - DWW9.1			-	-	
.k	250mm Ø valve - DWW9.4	Rate	1	109 000.00	109 000.00	
.l	300mm Ø valve - DWW9.5	Rate	1	450 000.00	450 000.00	
.m	315mm Ø pipe - DWW9.10	m	110	3 081.82	339 000.00	
.n	Open valve - DWW1.44d			-	-	
	Rezoning - Phase 3					10 292 000.00
.o	500mm Ø pipe - DWW.B27	m	240	4 745.83	1 139 000.00	
.p	355mm Ø pipe - DWW9.2	m	1205	3 969.29	4 783 000.00	
.q	315mm Ø pipe - DWW9.3	m	360	4 130.56	1 487 000.00	
.r	160mm Ø pipe - DWW1.9	m	930	3 100.00	2 883 000.00	
	Rezoning - Phase 4					5 051 000.00
.s	315mm Ø pipe - DWW1.12	m	1200	4 130.00	4 956 000.00	
.t	Open valve - DWW1.44a	-		-	-	
.u	Open valve - DWW1.44b	-		-	-	
.v	Open valve - DWW1.44c	-		-	-	
.w	150mm Ø valves - DWW9.6	-	2	47 500.00	95 000.00	
	Upgrade - Phase 2					7 969 500.00
.x	250mm Ø pipe - DWW1.36	m	620	3 450.00	2 139 000.00	
.y	250mm Ø pipe - DWW9.11	m	320	3 450.00	1 104 000.00	
.z	250mm Ø pipe - DWW9.12	m	1370	3 450.00	4 726 500.00	

Item	Description	Unit	Quantity	Rate	Amount	Section Total
TOTAL BROUGHT FORWARD FROM PREVIOUS PAGE						R 33 498 500.00
5.1.2	Sewer Reticulation					R 14 087 000.00
	Phase 1 Link services					R 9 265 000.00
.a	160mm Ø pipe - DWS6.2	m	365	2 200.00	803 000.00	
.b	315mm Ø pipe - DWS6.3	m	340	5 102.94	1 735 000.00	
.c	Pump Station - DWS6.4	-	1	3 094 000.00	3 094 000.00	
.d	250mm Ø pipe - DWS6.5	m	1230	2 953.66	3 633 000.00	
	Phase 2 Link services					4 822 000.00
.e	160mm Ø pipe - DWS6.1	m	180	4 288.89	772 000.00	
.f	250mm Ø pipe - Item 1	m	660	3 356.06	2 215 000.00	
.g	New pump station - Item 2	-	1	1 477 000.00	1 477 000.00	
.h	90mm Ø rising main	m	420	852.38	358 000.00	
5.1.3	Stormwater Drainage					R 1 500 600.00
.a	1500mm concrete v-drain	m	2050	732.00	1 500 600.00	
5.1.4	Road Construction					R 15 566 425.00
.a	Earthworks & Subgrade Layers	m ²	11900	480.00	5 712 000.00	
.b	Subbase Layer	m ³	3570	560.00	1 999 200.00	
.c	G3 Base Coarse	m ³	1485	865.00	1 284 525.00	
.d	Asphalt Surfacing	m ²	9900	250.00	2 475 000.00	
.e	Kerbing & Chanelling	m	2900	433.00	1 255 700.00	
.f	Sidewalk Area	m ²	3400	600.00	2 040 000.00	
.g	Ancilliary Roadworks	Sum	1	800 000.00	800 000.00	
5.1.5	Electrical Installations					23 365 947.90
.a	Medium Voltage Installation	Sum	1	23 365 947.90	23 365 947.90	
5.1.6	TOTAL CONSTRUCTION COST FOR EXTERNAL SERVICES					R 88 018 472.90

5.2 INTERNAL SERVICES

The internal costs include the services that are within the boundaries of the entire proposed development (the surveyed boundary) as seen on the annexures. This includes the entrance roads to the development. Reference is made to Annexure M for the internal services cost estimate.

5.3 PROPOSED BULK CONTRIBUTION OFFSETS

Please note that the developer intends to apply for an offset against these figures for bringing some of the external services to the development boundary in accordance with item 8 of Appendix A of the GLS Report.

Furthermore the developer will enter into a service level agreement with Drakenstein Municipality to have the balance of the external upgrades reimbursed in accordance with item 9 of Appendix A.

Due to the fact that the external upgrades also cater for Erven 15711, 15713, and 15714 as well as Farm 193/2, it is understood that the bulk contributions for these developments will also be made available towards the required upgrades.

6 LIST OF ANNEXURES

Annexure A	-	Locality Plan
Annexure B	-	Aerial Photo
Annexure C	-	Town Planning Layout
Annexure D	-	Proposed Roads Layout
Annexure E	-	Proposed Stormwater Layout
Annexure F	-	Proposed Water Layout
Annexure G	-	Existing External Water Infrastructure
Annexure H	-	Proposed External Water Infrastructure
Annexure I	-	Proposed Sewer Layout
Annexure J	-	Existing Sewer Infrastructure
Annexure K	-	Proposed Internal Electrical Layout
Annexure L	-	GLS Bulk Services Report
Annexure M	-	Internal Services Cost Estimate
Annexure N	-	Internal Services Cost Estimate

7 CONCLUSION

The developer of the above property requires the support from the Drakenstein Municipality to establish the development. A bulk services Outline Scheme Report for the roads, storm water, sewerage and water was therefore prepared by Triple 3 Engineering, to facilitate the process. It shall be appreciated if this services report is approved at your earliest convenience.