



CIVIL ENGINEERING SERVICES REPORT

LOW-RISE MULTI-STOREY DEVELOPMENT –
ERVEN 292, 293, 294 AND 311 SEDGEFIELD

30 April 2014

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PRELIMINARY DESIGN REPORT

PROPOSED DEVELOPMENT – ERVEN 292, 293, 294 AND 311 SEDGEFIELD

INTRODUCTION:

Sintec Engineering Consultants was appointed by Montagu Property Investment (Pty) Ltd to carry out a preliminary civil engineering services design report for the proposed low-rise Multi-storey group housing development in Sedgefield. On erven 292, 293, 294 and 311.

This development would consist of multi level building units of two (2) or three (3) bedroom apartments. Based on the Site Development Plan (SDP), a total of 14 residential units will be constructed on the 3500m² property.

Please refer to Addendum 1 for drawings of the proposed layouts of the various units – S70, L90 FC and L 90 RC. The units vary in size, 70.6 m², 89.8 m² and 91.6 m² respectively.

Based on our initial discussion with the Knysna Municipality: Technical Department, there is sufficient bulk service capacity to cater for the developments' demands as set out in "Guidelines for Human Settlement Planning & Design".

The objective of this investigation is to provide both the Municipality and the Developer with a general overview of the design constraints and the availability and options for the provision of civil engineering services for the proposed development.

GENERAL INFORMATION:

TOPOGRAPHY AND VEGETATION:

The terrain is characterized by even topography with a gradual to slight slopes. This is ideal for development. The actual topography will only be known once the property has been surveyed.

The vegetation present on the property is mainly light bush with grass, there are a number of large trees on the property. However the trees are all situated on the edge of the property and therefore do not pose a problem to the development. No indigenous plants have been identified on the property.

GEOTECHNICAL INFORMATION:

A geotechnical investigation has not yet been done on this specific property and we recommend that one be conducted.

CIVIL ENGINEERING SERVICES:

Please refer to addendum 2 for the following drawings:

- The existing Municipal Services in and around the property,
- Preliminary designs of the civil engineering services namely, sewer, water and the cable ducts layouts for the development.

SEWER RETICULATION:

The Municipal sewer main line runs directly through the centre of the development – parallel to stands 292, 293 and 294 of the development. The gravity line starts erf 291 and slopes down towards the manhole found in Swallow Street. It should be noted that the depths of the sewer manholes are not known. This will be determined once the land surveyor has been appointed.

Due to the position of the existing sewer line passing through stand 294 and the proposed development, a section of the existing sewer will need to be realigned and made redundant.

- Redundant Sewer line - Between the proposed manhole (MH1) and the existing manhole in Swallow Street,
- New Proposed Mainline –160 mm Ø sewer main to connect to the existing Municipal line between MH1 and MH2 (Sysie Avenue).

All new manholes will be 1.05 m diameter (Ø).

Due to the relatively small size of the development an effluent of 1.03 l/s (litres per second) will be generated by the development. We proposed to use rodding eyes at all the bends to limit the use of manholes which are costly and not required in terms of the guidelines.

The proposed system will consist of the following:

- 160 mm Ø PVCu Solid Wall SABS 791 Class 34 400 kPa or similar spigot & socket pipes for mainline,
- 110 mm Ø PVCu Solid Wall SABS 791 Class 34 400 kPa or similar spigot & socket pipes for residential connections,
- All sewer mains will have a minimum grade of 1 in 100,
- Internal drainage will have a minimum grade of 1 in 60,
- Sewer manholes will be 1.05 m Ø ROCLA or similar approved precast concrete rings with concrete covers and frames. Medium duty covers for roadside verges and non trafficked

areas and heavy duty concrete covers and frames will be specified for trafficked areas. It is recommended that all the joints on the precast rings be sealed for water ingress with a 100 x 1 mm wide Polyurethane Bandage (combiflex or similar),

- All pipe lines will be bedded on a selected granular material. These materials shall comply to Class B bedding and SABS 1200 LB and be non-cohesive and be free-draining. Initial tests have shown that the on-site material would be suitable for selected fill,
- All internal drainage to structures and units shall comply with the provisions of SANS 0252 Part 2: Drainage installations for buildings.

WATER RETICULATION:

Water for this development can be supplied from the Municipal water line running parallel Parrot Street on the western border of the development. The proposed connection point into the existing water line will be at the western entrance road. The existing Municipal water line is a 75mm ø uPVC pipe.

Based on the "Guidelines" the recommended average daily consumption per unit of 400 kilolitres per unit per annum (kl/unit/annum) is used. This water demand would include common areas outside the limits of the buildings.

The fire risk of the development is classified as Low Risk –group 3 and a fire flow allowance of 1 hydrant at 350 l/min and no potable water storage is required.

The following summarizes the impact/demand on the Municipal water resources:

- | | | |
|---|---|-------------------------------|
| • Proposed units: | - | 14 |
| • Consumption (per unit): | - | 1000 l/day/unit |
| • Average Annual Daily Demand (AADD) | - | 0.16 l/s |
| • Estimated Peak Flow: | - | 0.58 l/s |
| • Fire Flow: Category: Low-Risk – Group 3 | - | 350 l/min (equal to 5.83 l/s) |
| • Total Peak flow: | - | 6.48 l/s |

One bulk water meter which will be installed by the Knysna Municipality and a valve is envisaged for the proposed development at the western entrance of the development. The cost of this meter will be borne by the Client / Developer. Isolating valves and fittings would be carefully located and designed to facilitate the operation of the system.

The water reticulation system will consist of the following:

- 75 mm \varnothing Class 9 uPVC mainline,
- All water lines will comply with the requirements of SABS 1200 L: Medium Pressure Pipe lines,
- Flanges and accessories shall be drilled to comply with BS 4504, table 16/11 for working pressure of 1600 kPa,
- All cast iron fittings shall be Rilsan coated and after installation all fittings, specials, valves and the appurtenant nuts and bolts shall be covered with a protective paste (Densopaste or similar) and thereafter the smeared surfaces shall be wrapped in an impregnated tape (Densotape or similar). All bolts and nuts shall be stainless steel as per SABS,
- Isolating valves shall be class 10 resilient seal valves, epoxy coated, double Socketed, anti-clockwise closing, with capped top and non-rising spindle,
- Fire hydrant will be the London Round Thread Type,
- All uPVC pipes shall comply with SABS 966,
- All pipe lines will be bedded on a selected granular material. These materials shall comply to Class B bedding and SABS 1200 LB and be non-cohesive and be free-draining. Initial tests have shown that the on-site material would be suitable for selected fill,
- Internal supply to buildings and structures will comply with the provisions of SANS 0252: Part 1: Water supply installations for buildings.

The monitoring of the internal consumption will be according to the Service Agreement between the Knysna Municipality and the Body Corporate / Home Owners. This agreement must still be completed.

STORMWATER DRAINAGE AND ROAD NETWORK:

STORMWATER:

Property 311 currently only has a small garage situated on the property, and thus making it covered with $\pm 90\%$ vegetation and $\pm 10\%$ hard surfaces. The limited extent of the catchment area, no significant natural watercourses are visible.

Construction of the proposed development will result in half of the property being covered by hard surfaces (buildings and roads) and the remaining area (50%) will be left has vegetation - public open space and lawns for the individual 14 properties.

The runoff generated by the property:

- Before the proposed development - $Q = 0.02 \text{ m}^3/\text{s}$
- After the proposed development - $Q = 0.31 \text{ m}^3/\text{s}$
 - Difference between developed and undeveloped property - $Q = 0.29 \text{ m}^3/\text{s}$
 - Thus each unit generates approximately - $Q = 0.02 \text{ m}^3/\text{s}$
 - Runoff generated per unit for the duration of "Time of Concentration" is approximately - $Q = 4250.0 \text{ l}$

The Knysna Municipality requires that the runoff water generated by the proposed development be equal or less to the runoff generated prior the developed property. In order to meet this criteria the additional runoff will be detained through the implementation of detaining structures within the development.

In order to manage the additional stormwater runoff water the following methods would be applied:

- Permeable surfaces,
- Detention Tanks / Rain Water Tanks,
- Detention Ponds (public open space).

The management of this detained water should be addressed within the Service Level Agreement and Home Owners Agreement.

ROADS:

This information is based on visual appraisal of the site and our experience on developments with very similar soil conditions in the area.

Based on these observations, it is our opinion that conventional road design and construction will suffice. Materials for road construction will most likely have to be sourced from commercial sources.

The subgrade beneath the access road and paved parking areas shall comprise of in-situ sands which when compacted will provide an excellent subgrade for paved areas.

It is recommended that the surface of the sands should be ripped for at least 150 mm and compacted to a density of 95% mod AASHTO maximum dry density.

- Roads will be constructed in a 2 layer format as follows:
 - Bottom layer: 150 mm thick in-situ layer compacted to 95% MOD ASSHTO,
 - Base layer: 150 mm thick G5 layer imported from commercial sources and compacted to 98% MOD AASHTO.
- The wearing surface of all the roads will consist of segmented paving blocks, 60 mm thick and placed on 20mm thick river sand bedding. Edges will be constructed with a header course of a different colour (to be confirmed with the client),
- The minimum road crossfall will be 2.5% and be sloping against the natural gradient of the site. A minimum longitudinal fall of 0.5% shall be adhered too.

Based on the guidelines for Human Settlement Planning and Design we summarise the solid waste to be as follows:

- The developer should provide a common collection point at the entrance to the property for collection by the Municipality.

- All (2 x) cable ducts will be 110 mm ø uPVC Class 4 pipes, with 450 x 450 mm junction boxes. 50 mm ø HDPE pipe ducts will serve each individual structure units,
- All manholes/draw boxes will be brick built chambers with polymer or similar heavy duty covers and lids.

ADDENDUM 1:

LIST OF DRAWINGS:

<i>DRAWING No.:</i>	<i>S70</i>	-	<i>TWO BED UNIT (70.6 m²)</i>
<i>DRAWING No.:</i>	<i>L90 FC</i>	-	<i>THREE BED UNIT (89.8 m²)</i>
<i>DRAWING No.:</i>	<i>L90 RC</i>	-	<i>THREE BED UNIT (91.6 m²)</i>

ADDENDUM 2:

LIST OF DRAWINGS:

- 051-P-01 - EXISTING SERVICES*
- 051-P-02(B) - PROPOSED SEWER RETICULATION*
- 051-P-03 - PROPOSED WATER RETICULATION*
- 051-P-04 - PROPOSED CABLE DUCT LAYOUT*