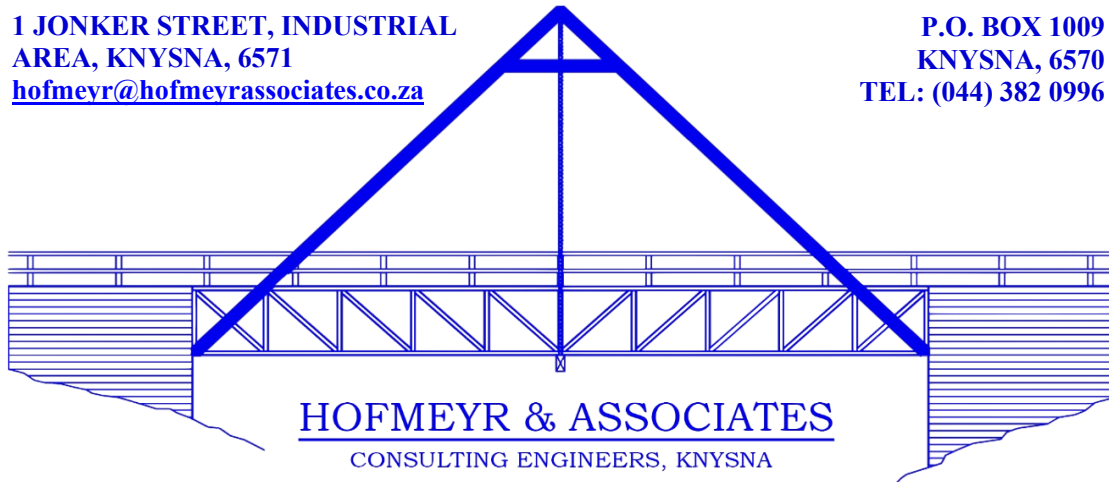


REPORT ON CIVIL ENGINEERING SERVICES

FOR THE PROPOSED RESTAURANT ON ERF 193, OLD CAPE ROAD, KNYSNA

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1. Introduction

1.1. Background

Hofmeyr and Associates (Pty) Ltd was appointed by Nanini 109 (Pty) Ltd to compile a Civil Engineering Services Report for a proposed restaurant on Erf 193, Old Cape Road, Knysna. The proposed development falls within the Knysna Municipality jurisdiction.

There is a dwelling on the property. Current available services include a water and sewer connection and an electrical connection. There is an indication of a septic tank on the property.

1.2. Proposed Development

The erf is approximately 1 235m² in extent and is situated between the Main Road (N2) and Old Cape Road in Knysna. The proposed development is for a 45-seater restaurant.

The proposed Site Development Plan (SDP) prepared Plans R Us is indicated in **Annexure A**.

The Guidelines for Human Settlement Planning and Design, 2004, herein after referred to as the “Red Book 2004” has been used to calculate the demand of the development for the various services.

Matters dealt with within this report include water supply, sewage management, access and internal roads, stormwater management and solid waste management, electrical reticulation and communication ducts.

2. General Information

2.1. Topography and Vegetation

The terrain is characterized by even topography with very little to no slope across the property. A branch of the Knysna Lagoon extends to the South of property, between the N2 and Erf 193. The high-level mark is indicated on the SDP.

There are several medium sized trees on the site on the Northern border of the property.

2.2. Geotechnical Investigation

A geotechnical investigation has not yet been done on this specific property, and we recommend that one be conducted once approval has been given for the proposed Development.

The geotechnical information will be used for the design of the parking area, pipelines, and foundations for buildings.

3. Water Supply

3.1. Water Availability, Existing Reticulation and Storage

The GLS-Element (2014) Water Master Plan for Knysna indicates a water pipeline between 75 and 110mm diameter.

The static pressure in the area, according to the master plan, is greater than 9 bar which should be more than sufficient to supply the proposed development.

3.2. Annual Average Daily Water Demand

The water demands are taken from the Red Book (2004) and are shown in Table 1 below.

Table 1: Total Water Demand

Ref:	Facility Type	Unit of Measurement	no. of units	Peak Daily Demand	Daily Demand
				litres/unit/day	l/day
A	Restaurant	No. of seats	45 seats	80*	3 600
	TOTAL WATER DEMAND (KL/DAY)				3.6 kl/day

* The water demand is between 65 and 90 l/seat/day.

The total water demand, excluding irrigation and firefighting, is estimated at 3.6 kl/day. The fire fighting and irrigation requirements are discussed below.

Firefighting Water

The proposed building is less than 400 m² and will not be more than a 2 storey building. Further, the risk of fire and spread of fire is low. Therefore, the proposed development falls under the low-risk - group 1 fire category.

To summarize tables 9.18, 9.19 and 9.20 of the Red Book, the flow rate, fire flow duration, pressure requirements and the required storage are provided in the table below.

Table 2: Requirements of Fire Risk Categories

Fire Risk Category	Min. Flow Rate	Duration of Fire Flow	Pressure	Storage
Low-Risk – Group 1	15 l/s	2 hrs	7 m	108 kl

We recommend that the Fire Risk Category be confirmed with the Knysna Municipality Fire Department and/or with a fire engineer before commencement of the project.

We propose the installation of fire hose reels and fire extinguishers. The fire engineer to specify the required numbers to ensure compliance.

Irrigation water:

The total stand area is 1 235m² of which approximately 90% is hard surface (1 100m²). Thus, the open area or landscaping area is approximately 135m².

The area of landscaping is small compared to the hard surfaces. Thus, very little water is needed for irrigation.

3.3. Water Storage

In terms of the Red Book, a storage capacity of 48 hours of the annual daily average demand is required. Therefore, the estimated water storage demand is 2 days at 3.6 kl/day which is equal to 7.2 kl.

Therefore, the total storage requirement, including the fire storage, is:

$$7.2 \text{ kl} + 108 \text{ kl} = 115.2 \text{ kl}$$

There should be sufficient capacity in the Municipal system to meet the demand of the development.

3.4. Proposed Water Supply

The nearest water supply is the Municipal water pipeline in Old Cape Road. We propose that the current water erf connection be upgraded to suit the proposed development.

The infrastructure required to connect into the Municipal supply is:

- A valved offtake from the existing Municipal system (75 to 110) mm dia.
- A new 32-50 mm HDPE pipe c12 to bring the Municipal water to the property boundary. Length of the 32 - 50 mm dia. water pipeline depends on which side of the road the Municipal pipeline is located on.
- The proposed fire hose reels to feed of the same line.
- New bulk water meter for the restaurant to be supplied by the Municipality. The water meter must be one size smaller than the pipe diameter of the new line installed.

The Infrastructure Department of the Knysna Municipality should confirm whether they can supply the development with water.

3.5. Other Water Supply Options

Other supply options, should the Municipality not be able to provide water as a primary or secondary source are:

- Rainwater storage tanks.

3.5.1. Rainwater Tanks

The Mean Annual Precipitation (MAP) for Knysna (gauge 14063) according to Schmidt, Schulze and Dent (1987) is 712mm/year.

Based on the Red Book (2004) the rainwater that can be harvested from the roofs can be calculated at 80% efficiency. *Table 3* below gives a breakdown of the possible rainwater harvesting for the buildings.

Table 3: Possible Rainwater Harvesting Volumes

Description:	Roof Area:	Harvested Rainwater:
Restaurant	350 m ²	199.36 m ³ /year
TOTAL:	350 m²	200 m³/year (0.55 kl/day)

Applying the calculation set out by the Red Book, the runoff generated by the roofs is calculated as approx. 199.36 kl/year. Therefore, approx. 200 kl/year of rainwater can be harvested on average annually or 0.55 kl/day

The rainwater infrastructure would include roof guttering and tanks with a separate pipe system and pumps. If it is decided to use the rainwater, then a “first foul flush” arrangement (or similar) as shown in Figure 1 below is recommended.

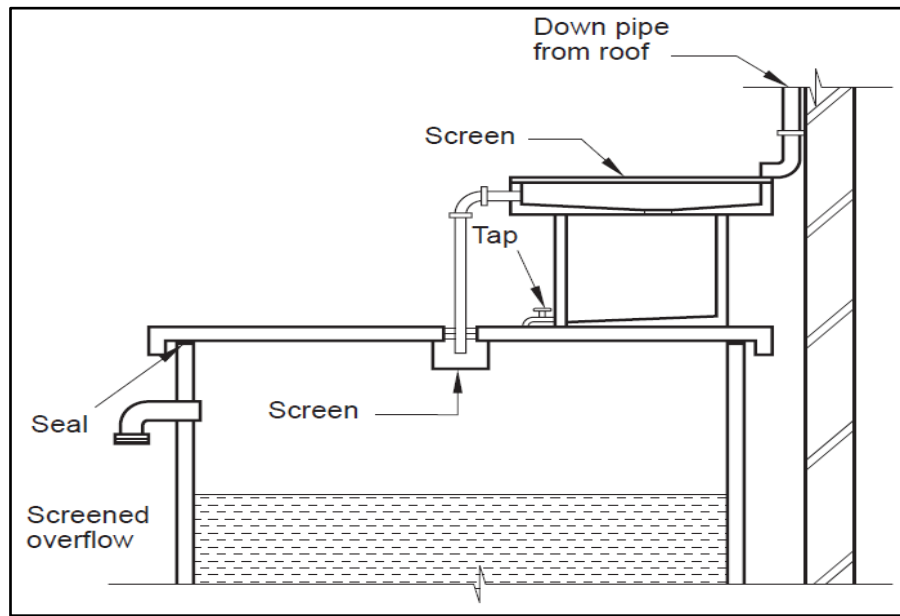


Figure 1: “First Foul Flush” Arrangement

The preferred source of water supply is the Municipal supply for domestic water and the rainwater harvested can be used for irrigation purposes.

The rainwater could be used for domestic water in instances when the Municipality cannot supply. However, the estimated rainwater harvesting capability is not sufficient to supply the restaurant daily.

Augmentation fees will be applicable for the connection to the Municipal system.

4. Sewage Disposal / Treatment

4.1. Existing Municipal Sewer Reticulation

The nearest Municipal gravity sewer main runs in roadway in front of properties 193-195 and along Old Cape Road. There is a Sewer Pump Station (Salt River PS1) situated less than 50m away from Erf 193 in the gravel island between Old Cape Road and the side road.

There is an existing septic tank on Erf 193. The condition of the septic tank is not known. The septic tank has not been in use in recent years as there is an existing Municipal connection.

4.2. Requirements of the Development

The calculated water demand is 3.6 kl/day. Generally, 80% of the water demand will enter the sewage system in the case for residential use. However, the proposed development is a restaurant and thus we recommend that 100% of the water demand is used to calculate the sewer demand for the proposed restaurant. Therefore, we estimate that the volume of sewage generated by the development is approx. 3.6 kl/day.

A new 110 mm diameter internal line to be laid for the proposed development to tie into the existing Municipal junction box situated on the Northeastern corner of the property.

The existing junction box and erf connection into the Municipal line to be inspected before the connection is placed to ensure that the Municipal connection is still in a satisfactory condition.

A grease trap must be sized and installed for the restaurant. The grease trap will remove the oils, fats and solid foods that enter the sewage system. Removal of oils and fats will limit the potential of pipe blockages in the sewer system.

Augmentation fees will be applicable for the connection to the Municipal system.

4.3. Proposed Sewage Disposal System

The proposed system will consist of the following:

- 110 mm ø PVCu Solid Wall SABS 791 Class 34 400 kPa or similar spigot & socket pipes for internal connections and should be in accordance with SANS 1200 LD.
- 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 pipelines will be bedded on a selected granular material. These materials shall comply to Class B bedding and SANS 1200 LB and be non-cohesive and be free draining. Initial tests have shown that the on-site material would be suitable for selected filling.
- All internal drainage to structures and units shall comply with the provisions of SANS 0252 Part 2: Drainage installations for buildings.

5. Road Network

5.1. Access Road

Access will be from a side road that tees off Old Cape Road to the left approximately 150m from the intersection to the N2. The side road only feeds five (5) properties, erven 193 -195, 2860 and 8758. The proposed new access is 10m wide and at 90 degrees to this road. The entrance is approximately 50m from the intersection to Old Cape Road.

The roadway is asphalt covered and runs parallel to the N2. There is no indication of a speed limit on this short section of road. The road is approx. 4.0 m wide.

Sight distances should not play a role as entering / existing the parking area is off the main road (Old Cape Road) and the number of vehicles using the side road is limited. However, sight distance exiting the parking area is minimum 50m to the left and to the right. Further, there are two (2) potential exit points from the side road into Old Cape Road. The first exit, closest to the N2 intersection, has a sight distance of 65m to the right and 185m to the left. At the second exit, the sight distance is 135m to the right and 135m to the left.

It is our opinion that the proposed development will not have significant impact on the access road, or surrounding road networks. The intersection, N2 / Old Cape Road is regulated by traffic lights. Further, the N2 has double lanes in both directions. Old Cape Road has a single entrance lane with a double exit lane, one (1) lane dedicated for left and right turn.

Thus, we do not see the need for a traffic impact statement (TIS).

5.2. Internal Roads

There are no internal roads, only the proposed parking area. Provision has been made for 13 parking bays with a separate loading bay access for deliveries etc.

Soil tests must be conducted to determine the final design of the layer works. However, it is our opinion that a conventional road design and construction will suffice. All materials for the road construction will most likely have to be sourced from commercial sources

It is recommended that the in-situ material be ripped for at least 150mm and recompacted to a density of 93% MOD AASHTO density to create a suitable SSG layer.

The proposed design is as follows:

- Subbase Layer: 150mm thick G7 material compacted to 95% MOD AASHTO.
- Base Layer: 150mm thick G5 material compacted to 97% MOD AASHTO.
- 80mm interlocking pavers placed on 20mm sand or crusher dust bedding.
- Edges to be constructed with a header course.
- Kerbs to be an edge or mountable kerb and a combination kerb to manage runoff water into stormwater reticulation.
- Min. cross fall of roads at 3.0%.
- Min. longitudinal fall at 0.5% with Max. fall at 15% (this may not be achievable with slope of existing terrain).

The parking area will be owned and maintained by the developer.

6. Stormwater Network

The purpose of this report is to deal with the internal stormwater reticulation to manage all stormwater runoff effectively to limit the effect on the surrounding areas once the development has been completed.

It is assumed that the primary consideration for the proposed stormwater system is that the system shall comply with the draft National Guidelines for Sustainable Drainage Systems (SuDS). The principles of SuDS are that the developed system mimics the natural or undeveloped state.

There is no nearby Municipal stormwater system within the roadways that the development can tie into.

Further, rainwater from the roofs can be collected in rainwater storage tanks. The overflow from the tanks will discharge into dissipating structures. Storage at 2500 litres per 100 m² of roof area, thus 10 000l, should be provided on site to collect the rainwater. The collected rainwater can be used for irrigation, or to supplement the domestic supply to either reduce the demand on the Municipal supply or to supply water when the Municipality is unable. The overflow, 80mm dia. HDPE pipe, from these tanks to discharge into a dissipating structure.

Measures to be implemented to ensure no runoff from the surrounding areas can enter the property adding to the stormwater demand of the proposed development.

The available open space on site is limited, thus there is no space to create soak aways on site to manage the runoff water.

ALL concentrated stormwaters will be discharged into a dissipating structure to break all the energy before it is allowed to flow safely into the branch of the Knysna Lagoon on the Southern border of the property.

7. Solid Waste Management

Based on the Guidelines for Human Settlement Planning and Design (Red Book -2004), solid waste consists mainly of packaging material such as glass, paper and plastics, cans etc. with limited quantity of foodstuff. However, in the case of the restaurant, the volume of foodstuff increases drastically.

The quantity of solid waste generated by the proposed development greatly depends on the waste management practices such as recycling and compaction. Other forms of waste management, in the case of the restaurant, is to place excess food in drums which can be collected or distributed to pig farmers. Alternatively, compostable material can be composted on site for use in gardens etc.

Refuse generated within the development will be separated into food waste, compostable material, recycling material and material for land fill disposal.

Quantities estimated based on a restaurant of a similar size are:

Excess food waste (to be collected by pig farmer):	1 drum/day
Recyclable material (to be collected by Municipality):	2 bags/day = 0.5 m ³ /day
General waste (to be collected by Municipality):	1 bag/day = 0.25 m ³ /day

Therefore, excluding the excess food waste, the restaurant produces approx. 0.75 m³/day of waste or 5.25 m³/week of waste.

Note, the volumes above are based on the assumption that cardboard boxes are folded flat which implies that there will be some form of waste management / compaction on site.

The quantities of solid waste generated will greatly depend on the waste management practices such as recycling and compaction. For instance, cardboard boxes and glass bottles can be collected by a recycling company. The used packaging volumes will greatly decrease if there is some form of compaction.

There shall be a waste transfer station for collection by the local Municipality. It shall be sized to handle the above quantities, and for the waste management practices such as pig fodder containers, compaction and recyclable containers. The waste station design shall ensure that baboons, monkeys, birds and other animals cannot enter the station.

8. Electrical Supply

The Electrical supply is not dealt with in this report.

The electrical supply and reticulation will be in accordance with the design by the appointed Engineers. An electrical services report, design, plans etc. will be submitted separate to this report for approval by the Electrical Department – Knysna Municipality.

9. Communication Ducts

There is a fibre connection outside the property on the Northern border. A sleeve to be placed from the connection box to the building must be placed before the parking area is started.

10. Conclusion

- Domestic water will be supplied by the Municipal water supply. A new 32-50mm dia. erf connection is proposed to serve the restaurant.
- The existing sewer erf connection is to be used. The internal sewer to be re-done to suite the new development.
- Access will be from the existing side road that runs in front of erven 193 - 195. This road tees off Old Cape Road.
- Stormwater management will comply with the principles of Sustainable Drainage Systems (SuDS).
- It is proposed that the solid waste is collected by the Knysna Municipality. Provision to be made on the site for one collection point.
- Electrical design will be completed by the Electrical Engineer appointed by the client. The Electrical Engineer will submit their reports to the Electrical Department for comment and approval.
- Provision (if necessary) will be made for communication ducts.