ICON Consulting Engineers

HELEMIKA NUMBER 1 (Pty) Ltd

SPOOKDRAAI ESTATE
SUBDIVISION AND REZONING OF
ERF 281, STRUISBAAI, WESTERN CAPE

CIVIL ENGINEERING REPORT
ROADS AND SERVICES
Revision 3

October 2024

Civil and Structural Engineers, Project Managers

Icon Consulting Engineers (Pty) Ltd, Reg. No. 2009/015534/07

Phone: 086 117 2774 **Fax:** 086 504 1050 **Email:** info@iconeng.co.za **Web:** www.iconeng.co.za

Address: 8 Cassatt Place, Century City, Cape Town 7441

Directors | Brennan Rutherford (Pr Eng, MBA, MSAICE, SACPCMP) | Nichol Jordaan (BTech Civil)

HELEMIKA NUMBER 1 (Pty) Ltd
SPOOKDRAAI ESTATE
SUBDIVISION AND REZONING OF
ERF 281, STRUISBAAI, WESTERN CAPE

CIVIL ENGINEERING REPORT
ROADS AND SERVICES, REVISION 3
OCTOBER 2024

CONTENTS:

HELEMIKA NUMBER 1 (Pty) Ltd
SPOOKDRAAI ESTATE
SUBDIVISION AND REZONING OF
ERF 281, STRUISBAAI, WESTERN CAPE

CIVIL ENGINEERING REPORT
ROADS AND SERVICES, REVISION 3
OCTOBER 2024

1. Introduction:

Brennan Rutherford, a Professionally Registered Engineer (PrEng), and a Director with Icon Consulting Engineers (Pty) Ltd was instructed by Helemika Number 1 (Pty) Ltd, to prepare a civil engineering roads and services report for the subdivision and rezoning of Erf 281 in Struisbaai, in the Western Cape.

The purpose of the civil engineering report is to determine what existing civil engineering roads and services are available, what capacity these roads and services have, and what roads and services would need to be provided or upgraded for the proposed development.

It is hereby confirmed that the directors and staff of Icon Consulting Engineers (Pty) Ltd, and the company itself has no connection with Helemika Number 1 (Pty) Ltd, whether privately or personally, except for the purposes of preparing this civil engineering roads and services report.

2. Professional Team:

Function:	Company:	Contact Person:
Developer	Helemika Number 1 (Pty) Ltd	Michael Wurbach
Town Planner	Umsize Planning	Anna-Christa Redelinghuys
Civil Engineer	Icon Consulting Engineers	Brennan Rutherford
Electrical Engineer	Converge Consulting	Dominic Bright
Environmental	Lornay Environmental Consulting	Michelle Naylor
Traffic Engineer	ITS	Pieter Arangie
Landscape Architect	JDV Landscape Studio	Ignis Goosen

3. Terms of Reference:

The terms of reference for the Civil Engineering Report can be summarized as follows:

- Obtain all roads and services information relating to the proposed development.
- Liaise with the Cape Agulhas Municipality on the availability of roads and services.
- Provide a Civil Engineering Roads and Services Report.

4. Level of Service:

The design parameters used to determine the level of service for the Civil Engineering Roads and Services Report are in accordance with the following:

- The requirements of the Cape Agulhas Municipality.
- The guidelines for Human Settlement Planning and Design, Volume 1 and 2 (known as the Red Book), compiled under the patronage of the Department of Housing by the CSIR Building and Construction Technology.

5. Location of the Planned Development:

Erf 281 Struisbaai is situated on the Cape South Coast of South Africa, and is approximately 3km north of Cape Agulhas (southern point of Africa) and 4km south of Struisbaai (town central). Erf 281 is bound by Marine Drive (Provincial Main Road MR261) and residential development to the north and coastal sea area to the south.

6. Topographical:

A topographical survey of the proposed development has been undertaken by Geomatics Africa Consulting Land Surveyors. 1:50 000 Topographical Survey Maps and 1:10 000 Orthophotos of the area are also available. The available contours are 20m and 5m respectively.

7. Geotechnical Information:

A detailed geotechnical investigation of the proposed development has not been undertaken. Geotechnical information is however available on the 1:250000 Geological Survey Mapping.

8. Traffic Impact Assessment:

A detailed Traffic Impact Assessment has been undertaken by ITS under separate cover.

9. Land Use:

The envisaged land use rights for the proposed development, includes approximately the following land uses, areas and units:

Land Use:	Area/Units:
Single residential (No)	3132 m^2
Street	688 m^2
Open space (private)	3204 m^2
Open space (public)	89 m^2

The area and unit numbers mentioned above are approximate and are subject to change.

10. Bulk Services:

Bulk services investigations have been undertaken with the Cape Agulhas Municipality. The following services are available for the proposed development.

10.1 Water:

There is an existing 100mm municipal watermain located on the northern side of Marine Drive (MR261). The proposed development would be required to link to this existing watermain and to provide a bulk water meter for the Cape Agulhas Municipalities metering purposes.

The ground level heights of the proposed development will not provide any low water pressure problems, as it is situated directly below the Struisbaai municipal water reservoirs, and the existing level difference is approximately 54m.

With the water shortages previously experienced in the Western Cape and the possibility of this shortage occurring again in the future, water saving and harvesting measures must be investigated and implemented for the proposed development.

The maximum water pipe size for the proposed development will be 110mm diameter.

10.2 Sewer:

The existing municipal sewer infrastructure along Marine Drive (MR261) currently comprises of septic tanks and conservancy tanks. No municipal gravity pipeline system currently exists.

The proposed development will be required to operate off conservancy tanks that are linked to a central system for the municipality to extract the sewerage with a tanker system. If the municipality installs a gravity sewer system, the central conservancy tank could be converted to a sewer pump station and the sewerage could be pumped to the municipal gravity sewer system.

The maximum sewer pipe size will be 160mm diameter.

10.3 Roads:

The proposed development is adequately serviced by Marine Drive (Provincial Main Road MR261). The access to the proposed development will be taken from an access road off Marine Drive (Provincial Main Road MR261). The new road access will be designed to allow sufficient entry and exit lanes to the various areas of the proposed development. All roads and turning circles will be of a suitable width and radius to allow the comfortable movement of passenger, municipal, refuse and emergency vehicles and all roads will be designed to provide access to the proposed erven.

10.4 Stormwater:

No municipal stormwater management system exists on Marine Drive (MR261) but an existing municipal stormwater outlet exists at the eastern boundary of the proposed development. This municipal stormwater system is an outlet for the residential developments to the north of Marine Drive, and exits between erven 1995 and 1003. It must be noted that this stormwater system drains onto the proposed development and would need to be redirected around the proposed development as it is currently causing erosion across the proposed SR Erf 1.

The stormwater flow from the proposed development will be accommodated on the proposed development. The major system will be accommodated within the road reserve area and will be based on the 100 year storm event and the piped underground stormwater system will be designed to accommodate the 2 year storm event. The attenuation volume will be based on the post-development flow less the pre-development flow. In this manner, erosion and stormwater damage can be minimised and the existing ground water system can be recharged. All erf and road levels within the proposed development will be shaped to create the necessary falls towards the proposed stormwater system.

The stormwater system from the proposed development will exit to the sea, but will be managed through a stormwater dissipation, silt and debris trap to prevent any contamination at the coast.

The maximum pipe size to be provided at the proposed development will be 375mm diameter.

10.5 Solid Waste:

The refuse from the development will be collected by the Cape Agulhas Municipality. There will be refuse bins provided at each proposed residential unit, which will be taken weekly to the proposed refuse room, which is situated close to the entrance of the proposed development. An adequate turning facility will be provided at the refuse room for the municipal refuse trucks.

10.6 Electrical:

The evaluation of the developments electrical requirements has been undertaken by Converge Consulting under separate cover.

11.0 Internal Services:

The normal services will be provided for the proposed development and will include surfaced roads with kerbs and channels and underground water, sewer and stormwater reticulation systems. The sewer and stormwater pipelines will be installed under the road surfaced area, but the water and ducting services will be installed behind the road edge. Where possible services will share trenches. These services will connect to the bulk services infrastructure as detailed in Section 10 of this report.

11.1 Water:

The internal water pipes will be sized to cater for the proposed development's peak water demand and fire requirements and will be constructed to the Cape Agulhas Municipalities minimum acceptable standards. The developer will provide the entire water network including all pipes, valves, hydrants and bends.

The water pipelines will be installed behind the road edge and will follow the existing roads as far as possible. The water pipelines will be installed in trenches up to 1m deep and 700mm wide.

11.1.1 Design Standards:

The water reticulation will consist of 110mmØ uPVC Class 16 pipes.

11.1.2 Water Demand:

The water required for the proposed development is based on the following water demand, units and areas;

Land Use	Areas/ Units	Water Demand	Annual Average Daily Demand (AADD)	Peak Flow (PF=4)
Single residential (6 No)	3132 m^2	850 ℓ/unit	0.0590 ℓ/s	0.2360 ℓ/s
Street	688 m^2	0 ℓ/m^2	0.0000 ℓ/s	0.0000 ℓ/s
Open space (private)	3204 m^2	0 ℓ/m^2	0.0000 ℓ/s	0.0000 ℓ/s
Open space (public)	89 m^2	0 ℓ/m^2	0.0000 ℓ/s	0.0000 ℓ/s
		Total	**0.0590 ℓ/s**	**0.2360 ℓ/s**

The Annual Average Daily Demand (AADD) for the proposed development has been calculated at 0.0590 ℓ/s with a Peak Flow of 0.2360 ℓ/s. Together with the fire fighting requirement of 15 ℓ/s, a fire flow duration of 4 hours, a minimum residual head of 15m and hydrants spaced at 120m, the main supply pipe will be sized to cater for 15.2360 ℓ/s.

Although a water supply can be provided by the Cape Agulhas Municipality to provide these water flows, it is the intention to develop alternative water resources, which would include rainwater harvesting and installing water saving devices within the proposed development.

11.1.3 Residual Pressures:

The minimum residual pressure designed for, under instantaneous peak demand, will be 25m. The maximum residual pressure designed for under zero flow conditions will be 90m.

11.1.4 Fire Flow:

The fire fighting requirement is based on a design flow of 15 ℓ/s at 15m residual head.

11.1.5 Proposed Water Connection to the Bulk Services:

The water connection to the proposed development will be taken from the existing municipal watermain at Marine Drive (Provincial Main Road MR261).

11.2 Sewer:

The sewer pipes for the proposed development will be sized to cater for the proposed development's peak flow conditions. The sewer system will comprise of a waterborne gravity sewer system and a conservancy tank system, and all areas of the proposed development will be served with sewer connections.

The sewer pipelines will be installed under the surfaced road area and will follow the existing roads as far as possible. The main pipelines will be installed in trenches up to 2.5m deep and 800mm wide. The erf sewer connections will be 1.2m deep.

11.2.1 Design Standards:

The sewer reticulation will consist of 110mmØ and 160mmØ class 34 heavy duty uPVC solid wall pipes.

11.2.2 Estimated Sewerage Flow:

The sewer that will be generated from the proposed development is based on the following flows, units and areas;

Land Use	Areas/ Units	Sewer Generated	Daily Dry Weather Flow (DDWF)	Instantaneous Peak Wet Weather Flow (IPWWF)
Single residential (6 No)	3132 m^2	595 ℓ/unit	0.0413 ℓ/s	0.1239 ℓ/s
Street	688 m^2	0 ℓ/m^2	0,0000 ℓ/s	0.0000 ℓ/s
Open space (private)	3204 m^2	0 ℓ/m^2	0,0000 ℓ/s	0.0000 ℓ/s
Open space (public)	89 m^2	0 ℓ/m^2	0,0000 ℓ/s	0.0000 ℓ/s
		Total	**0.0413 ℓ/s**	**0.1239 ℓ/s**

The daily dry weather flow (DDWF) for the proposed development has been calculated at 0.0413 ℓ/s, with an instantaneous peak wet weather flow (IPWWF) of 0.1239 ℓ/s. This peak design flow rate makes allowance for 70% water usage, 20% extraneous flow and a peak factor of 2,50.

11.2.3 Proposed Connection to Bulk Services:

The sewer from the proposed development will connect to a conservancy tank system that will be serviced by the Cape Agulhas Municipality.

11.3 Roads:

The new roads for the proposed development will be surfaced and will be in accordance with the theme of the development.

11.3.1 Road Widths:

The road widths will be a maximum of 5.5m.

11.3.2 Pavement Design:

The proposed pavement design for the proposed development will be as follows;

Type	Surfacing	Bedding	Subbase	Sub Grade
Roads	70mm Block Paving	20mm Sand Material	150mm G5 Material	150mm G7 in-situ Material

The surfacing option mentioned above is preliminary and is subject to change.

11.3.3 Road Design:

The proposed roads will have a typical cross-fall cross section with mountable kerbing on the lower side to channel the stormwater runoff towards the stormwater outlets.

11.4 Stormwater:

The proposed development consists of a number of open spaces and a road reserve that can be used as stormwater facilities for the 100 year storm event. All stormwater generated on the proposed development will be managed and discharged into this system.

11.4.1 Design Standards:

The stormwater reticulation will consist of 300mmØ and 375mmØ class 100D stormwater pipes.

11.4.2 Stormwater Volumes:

The proposed stormwater system will be designed to accommodate the increased surface water runoff. The sizing of the underground piped stormwater system will be designed to accommodate the 2-year storm event and the increased 100 year run-off will be accommodated in the open spaces and a road reserve.

11.4.3 Proposed Connection to Bulk Services:

The stormwater system from the proposed development will exit to the sea, but will be managed through a stormwater dissipation, silt and debris trap to prevent any contamination at the coast.

11.5 Electrical:

The evaluation of the developments electrical requirements has been undertaken by Converge Consulting under separate cover.

11.6 Telkom and Fibre:

A Telkom and fibre pipe network will be installed as a duct system. The developer will install the entire underground pipe network according to the required specifications and designs. Telkom and a selected fibre company will install and commission their own cable network upon application by the developer and/or homeowner for a telephone and fibre service.

11.6 Bulk Contribution Levies:

The Cape Agulhas Municipality has confirmed that bulk contribution levies and bulk connection fees will be payable by the developer. The payment of this bulk contribution levy amount, per unit/area, falls due as each individual unit/area is transferred.

If bulk services have been installed by the developer on behalf of the Cape Agulhas Municipality, then the bulk contribution levy would be reduced in line with the cost of the bulk services installed. The deduction permitted would have to be discussed and agreed with the Cape Agulhas Municipality.

12.0 Conclusion:

This civil services report for the proposed development at Erf 281 in Struisbaai, confirms that the proposed development can be adequately serviced with external and internal services.

7 October 2024

Brennan Rutherford
Icon Consulting Engineers

Date