PROPOSED DEVELOPMENT ON REMAINDER OF PORTION 101, ZWARTE JONGERSFONTEIN 486, JONGENSFONTEIN

ENGINEERING SERVICES REPORT

REVISION 6

JULY 2025

ELEMENT Consulting Engineers
A FIFTH DIMENSION TO ENGINEERING

George Office
Western Cape
Tel: +27 44 884 1138
Fax: +27 44 884 1185
82 Victoria Street, George, 6529
PO Box 9962, George, 6530
www.eceng.co.za

PROPOSED DEVELOPMENT ON REMAINDER OF PORTION 101, ZWARTE JONGERSFONTEIN 486, JONGENSFONTEIN

ENGINEERING SERVICES REPORT

REVISION 6

JULY 2025

PREPARED FOR:

PREPARED BY:

Element Consulting Engineers
PO Box 9962
GEORGE
6530
82 Victoria Street
George
6529
Tel: +27 44 884 1138

DOCUMENT CONTROL SHEET

Compiled By:	…….. Hannes Lourens PrEng MEng PrCPM Director	…….. Date
Reviewed By:	…… Hannes Lourens PrEng MEng PrCPM Director	…….. Date

Revision	Description	Date Issued	Revision By:
0	Draft for comments	Feb 2024	HL
1	For submission	Feb 2024	HL
2	Comments added	Feb 2024	HL
3	Comments added	Feb 2024	HL
4	Comments added	Apr 2025	HL
5	Revised layout and comments added	May 2025	HL
6	Revised layout and comments added	Jul 2025	HL

DISTRIBUTION LIST

Name	Company	Email	Tel

PROPOSED DEVELOPMENT ON REMAINDER OF PORTION 101, ZWARTE JONGERSFONTEIN 486, JONGENSFONTEIN

ENGINEERING SERVICES REPORT

REVISION 6

CONTENTS

1 INTRODUCTION AND BACKGROUND

Element Consulting Engineers has been appointed for the rendering of professional engineering services for the proposed development of Remainder of Portion 101, Zwarte Jongersfontein 486, Jongensfontein, Stilbaai.

The proposed development envisages 6 self-catering single room units as holiday accommodation properties.

This report will detail and discuss the engineering services of the proposed development in terms of firstly the bulk engineering services and secondly the internal engineering designs in parallel with the engineering standards and technical design criteria applicable to the project.

2 PROPOSED LAND USE

The proposed development envisages 6 self-catering single room units as holiday accommodation properties.

The Site Development Plan (SDP) is presented in the figure below.

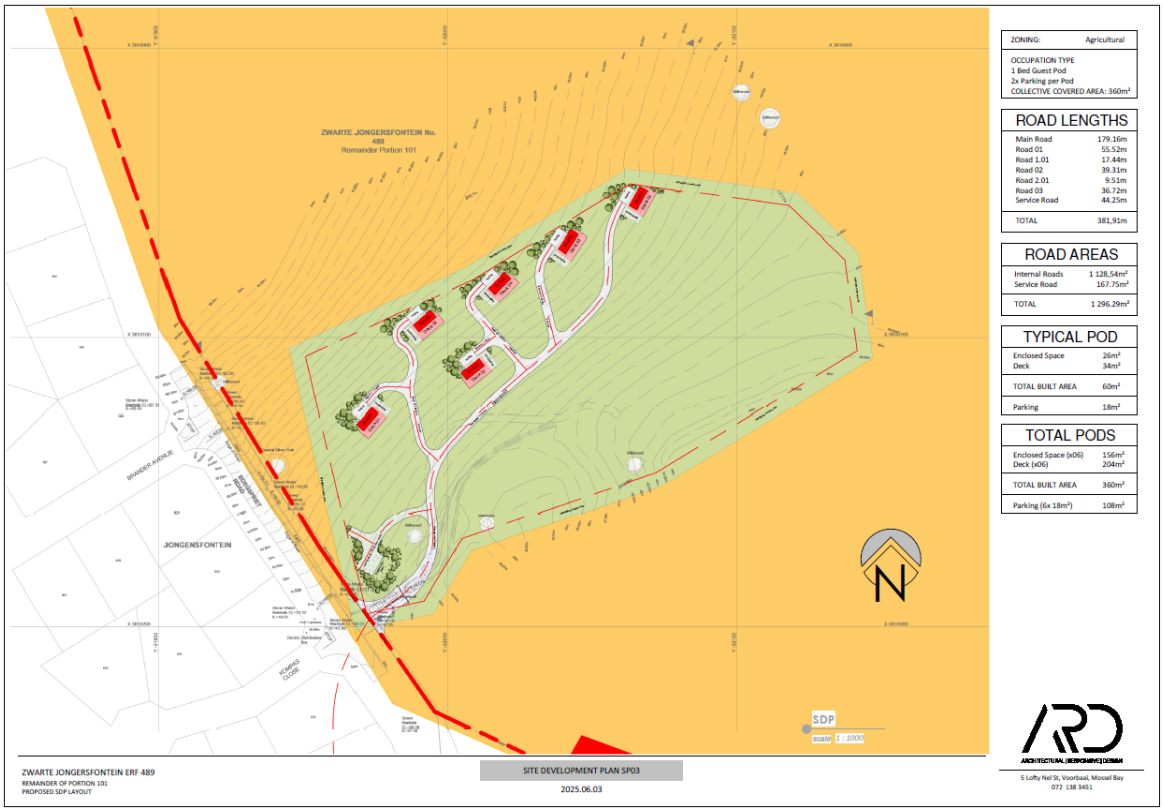

Figure 1: Site Development Plan (SDP)

3 LOCALITY

The proposed development is located directly north-east of- and borders onto Jongensfontein as depicted on the locality plan below.

Figure 2: Locality Plan

4 GEOTECNICAL INVESTIGATION

A formal geotechnical investigation has not been performed yet and will be performed during the detail design stage. A visual inspection of the site was conducted in order to assess conditions on site.

Holistically, the conclusion reached is that the in-situ materials found on site are adequate for the construction of engineering services and foundations for residential development.

General Soil Profile

Inspection of the site indicated relatively consistent soil horizons throughout with a light brown silty sand present. The materials appear dry and are fairly loose. No perched water table is evident and a moderate water retention rate is expected. Undulating gradients are evident.

Slope Stability

No natural slope instability is present.

Ground water and stormwater

No ground water and/or perched water are evident. A moderate water retention rate is expected. Lateral movement of stormwater will be moderate due to the undulating gradient. Erosion of the silty sands may occur if not properly managed.

Engineering Services

A TLB will suffice for trenching and excavations of all services and foundations in all materials. Although the possibility of rock is deemed to be small, rock may be present at deeper depths. This will be determined by a formal geotechnical investigation.

Foundations for development

The visual investigation indicated that the in-situ materials are adequate to support residential development. Reinforced strip footings will be adequate for the development.

Construction materials

A number of commercial operators are located in close proximity to the site for the provision of imported construction materials.

5 PRELIMINARY ENGINEERING SERVICES DESIGN

This chapter will discuss the engineering services of the proposed development in terms of firstly the bulk engineering services and secondly the internal engineering designs in parallel with the engineering standards and technical design criteria applicable to the project.

5.1 Water

5.1.1 Water Demand

The Average Annual Daily Demand (AADD) for this proposed development in line with accepted design consumptions, assumptions, criteria and standards, is calculated and estimated at approximately **3.6kl/day**. Peak factors will be considered during the detail design stage of the project.

5.1.2 Bulk Availability and Connection Point

Municipal bulk water is not available for this development, nor is it required.

Bulk water for the development will be obtained from two existing boreholes, namely Jongensbaai Beleggings BH1 and Jongensbaai Beleggings BH2, situated on the property. The long-term sustainable yields of the boreholes are respectively **43.2kl/day** and **86.4kl/day,** with a total of **131kl/day,** and is hence sufficient for the proposed development. The yields of the boreholes were originally tested in 2006. A new study was, however, commissioned in 2025 to confirm the original figures and to inform this application. The 2025 study confirmed the yields.

The quality of the water is acceptable for domestic use in accordance with the report.

The water abstracted will be filtered and stored in a 10kl tank from where it will be gravity fed to the proposed development.

The boreholes will be registered in terms of the Water Act.

The locality of the boreholes is indicated on the following diagram in orange:

Figure 3: Approximate locality of existing BH1 & BH2 (orange dots) which will service the site

5.1.3 Design Criteria and Standard of Engineering Services

- Design consumption.
  - Luxury single room chalet – 600l/unit/day.
- Peak factors as prescribed.
- Minimum pressures for the network to be calculated during design stage.
- Maximum of 3 valves to isolate a pipe section.
- Maximum length of 600m of main pipe per isolated section.
- Air valves to be provided where applicable.
- Minimum cover to pipes to be 900mm.
- Pipe type and class to be uPVC class 6 to 12, depending on existing network pressure.
- Pipe diameters varying between 50mm and 63mm depending on pressure available and flow required.
- Unit connections to be HDPE Class 10.
- Units to be serviced with a 20mm connection and Aqua-Loc box and meter.

5.1.4 Concept design

The concept design of the water layout is presented in the diagram below. Water will be pumped and filtered from BH1 & BH2 (right of drawing) from where it will be pumped (purple line) to the top of the development (left) where it will be stored in a 10kl tank. Water will be gravity fed from here to the development (blue network).

.

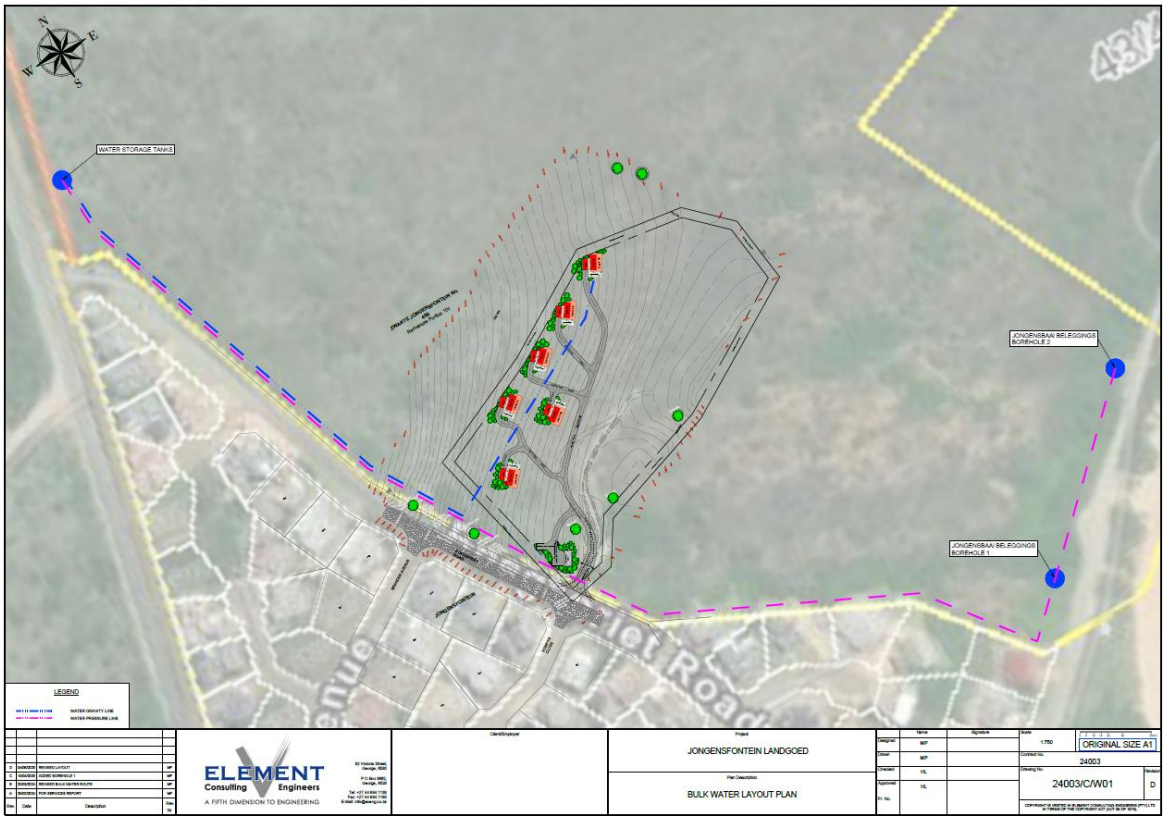

Figure 4: Internal water layout

5.2 Sewer

5.2.1 Bulk availability and connection point

The property is not serviced with a municipal sewer connection and a municipal sewer network is not available in the area. Municipal bulk sewer is hence not available for this development, nor is it required.

5.2.2 Sewer solution

To facilitate the proposed development, the construction of a central conservancy tank is specified. The conservancy tank will be placed close to the main access gate where sewer will be removed by vacuum truck.

5.2.3 Site layout considerations

One sewer drainage zone is identified. The proposed development property drains towards a general south-western direction (Zone A). This drainage zone is indicated diagrammatically in the figure below.

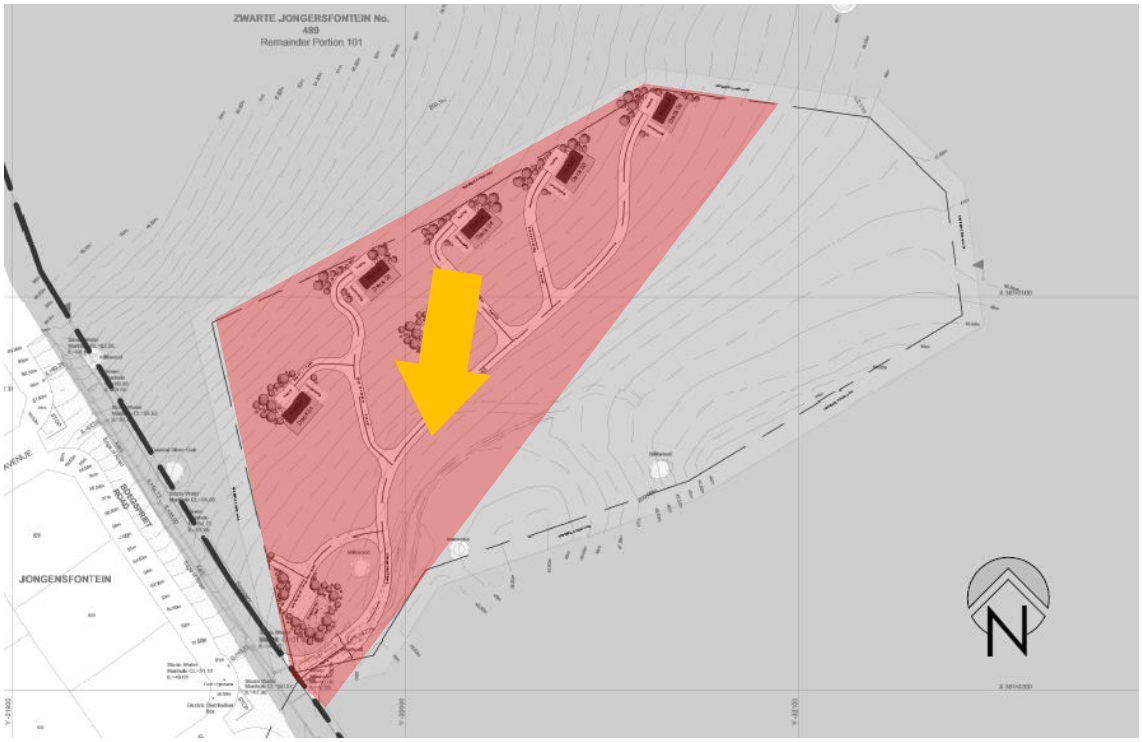

Figure 5: Internal sewer drainage

5.2.4 Internal Design Criteria and Standards

The following internal design criteria and

- A conventional waterborne sewerage system will be provided.
- Pipe diameters of generally 110mm for all house connections and minor lines and 160mm and above for main lines, as required per the detailed designs.
- Precast concrete rings manholes with concrete floor and premanufactured polymer concrete lid.
- The following design flows will be utilized:
    - Single erven - 500 l/day/unit
- Specified peak factor of 3.5.
- Allowance for 15% extraneous flow
- Minimum flow velocities designed for as 0.7m/s.
- Minimum cover to all pipes to be 800mm.
- Minimum design gradients to be as follows:

Dwelling Units	**Grade**
1 (House connection)	1:60
1-5	1:80
6-10	1:100
11-80	1:120
81-110	1:150
>110	1:180

- House connection depth to be minimum 1.0m and at least be able to drain 80% of the erf.
- Manholes to be central over main pipe on downstream side.
- Manhole spacing to be maximum 80m.

- All concrete, mortar or screed used with manholes to be from dolomite aggregate and low alkali sulphate resistant cement to SABS 471.
- Pipelines to be uPVC class 34 and to be laid on Class C bedding.

5.2.5 Design Flow

The Average Dry Weather Flow (ADWF) created by the proposed land use, in line with the abovementioned criteria and standards, exclusive of allowance for extraneous flow, is calculated at approximately 3.0kl/day. The design peak flow, inclusive of a peak factor of 3.5 and 15% extraneous flow, will be calculated during the detail design stage.

5.2.6 Operation & Maintenance of conservancy tank

The conservancy tank will have a low capital cost outlay, a low operational & maintenance cost and hence a low lifecycle cost of ownership.

The conservancy tank will be emptied during peak-season on a twice-weekly basis and during off-season on an ad-hoc basis.

Visual inspection of the tanks will be performed by the supervisor on a daily basis during peak season and on a weekly basis during low season.

5.2.7 Internal sewer drainage and design drawing

The preliminary sewer design for the internal network reticulation is presented in the following diagram and is attached as addendum to the report.

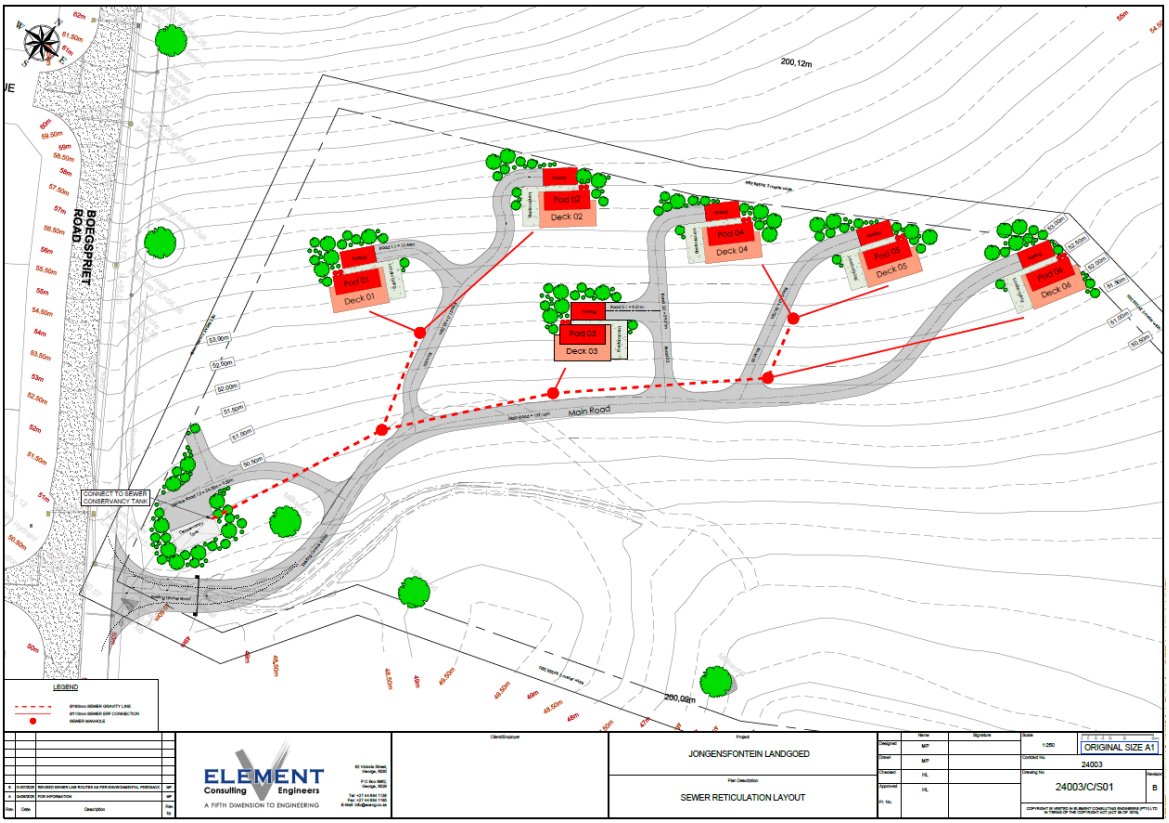

Figure 11: Internal sewer design

5.3 Roads and access

5.3.1 Access

Proposed access to the development is obtained via Boegspriet Road at the intersection with Kompas Close. Access onto Boegspriet Road will be side road stop controlled from the development.

Access will be controlled by remote-controlled sliding gate. Stacking distance of two vehicles will be provided in front of the gate.

The access point is indicated in the diagram below.

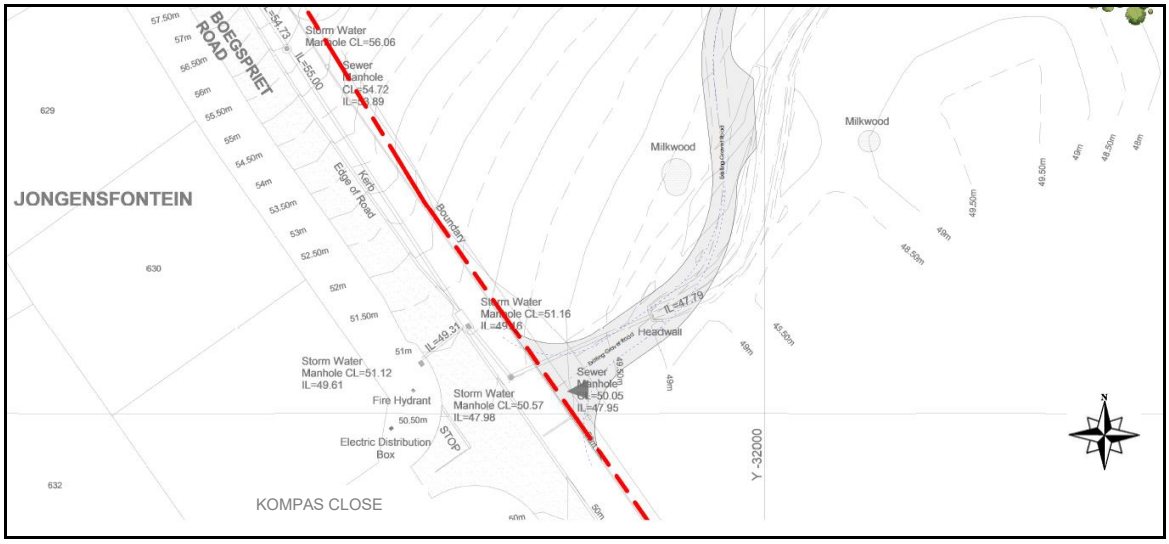

Figure 5: Proposed access to the development

5.3.2 Sight distance

Sight distances at the proposed access point are excellent in both the horizontal and vertical alignments and satisfactory for development purposes.

5.3.3 Traffic Impact Statement

A Traffic Impact Statement (TISt) is not required due to the insignificant number of trips generated by this proposed development. The trip generation of the eventual fully developed proposed development is estimated at approximately 4 trips for the peak hour of the adjacent road network. The traffic impact of the proposed development will be negligible from a traffic engineering perspective. The proposed development will be used as holiday accommodation, further reducing the impact during the peak hour.

5.3.4 Traffic Calming

During discussions with the Hessequa Municipality, it was requested that the developer construct traffic calming speed humps in Boegspriet Road on the northern approach to the intersection with Kompas Close and the development access in order to improve road safety in the stretch of road. Detail designs of the speed humps will be submitted to the municipality for approval during the detail design stage.

5.3.5 Internal Standards and Design Criteria

Internal standards and design criteria are specified as follows:

- Internal road widths of 3.0m
- Passing zones of 5.2m.
- Gravel surfacing.
- Pavement structural materials to be imported from commercial sources.
- All minimum radii at bellmouths to be 8m.
- Minimum road grade of 0.4% and camber of 2%.

- Road design life of 20 years.

5.3.6 Preliminary design

The preliminary design is presented in the following diagram.

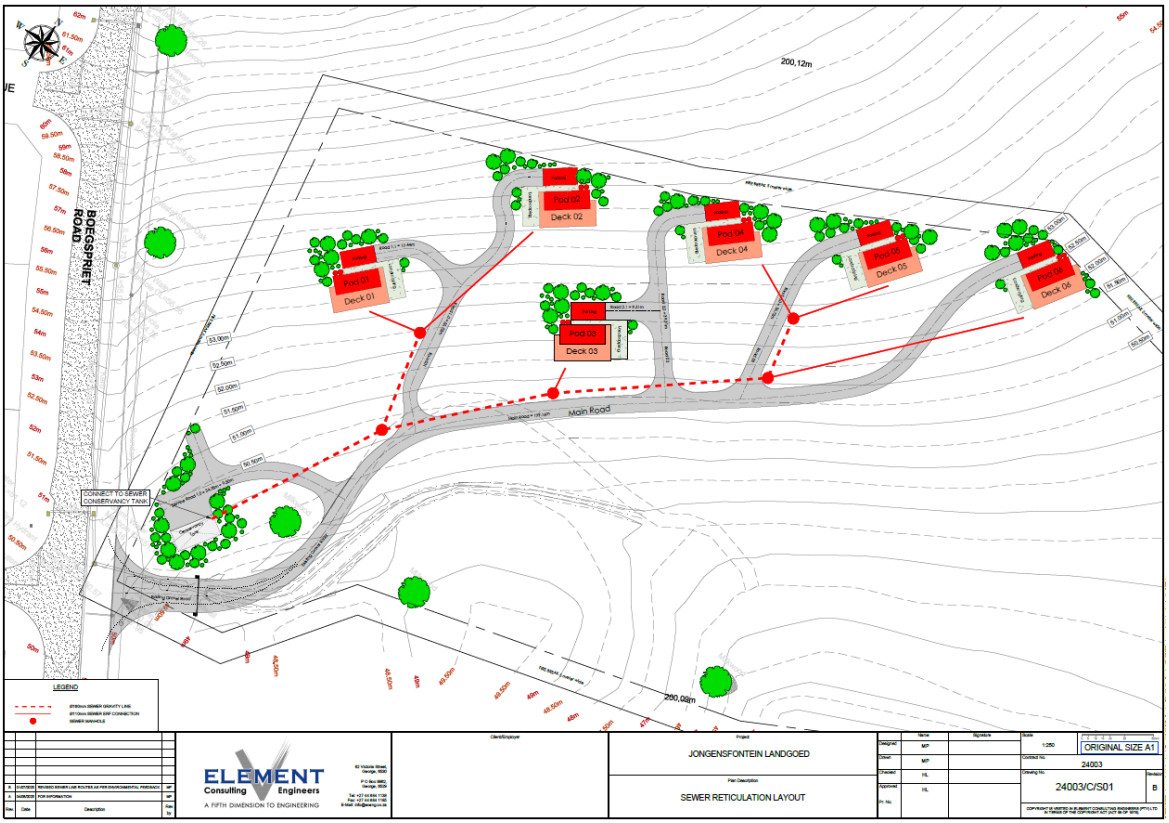

Figure 6: Internal roads layout

5.4 Stormwater

5.4.1 Site layout considerations

The proposed development drains in a south-easterly direction. The drainage direction is indicated in the figure below:

Figure 7: Stormwater drainage direction

5.4.2 Design background, standards and criteria

Stormwater design on this proposed development will utilize the zero concentration methodology. No concentration or accumulation of stormwater will hence be allowed. All internal roads and parking areas will be constructed in line with the gradient, using well compacted gravel surfaces. Stormwater will hence run over the roads as part of the landscape.

Energy dissipation will be performed at all gutter outlets to further limit concentration.

All the above will result in negligible increased stormwater runoff from the site.

5.4.3 Existing municipal stormwater outlet

An existing municipal stormwater outlet is situated at the proposed access point under the proposed access road. This municipal stormwater pipe will be extended to daylight adjacent to the access road. The existing stormwater channel outlet will be protected with gabion mattresses as erosion protection. The following diagram depicts this extended existing municipal stormwater system:

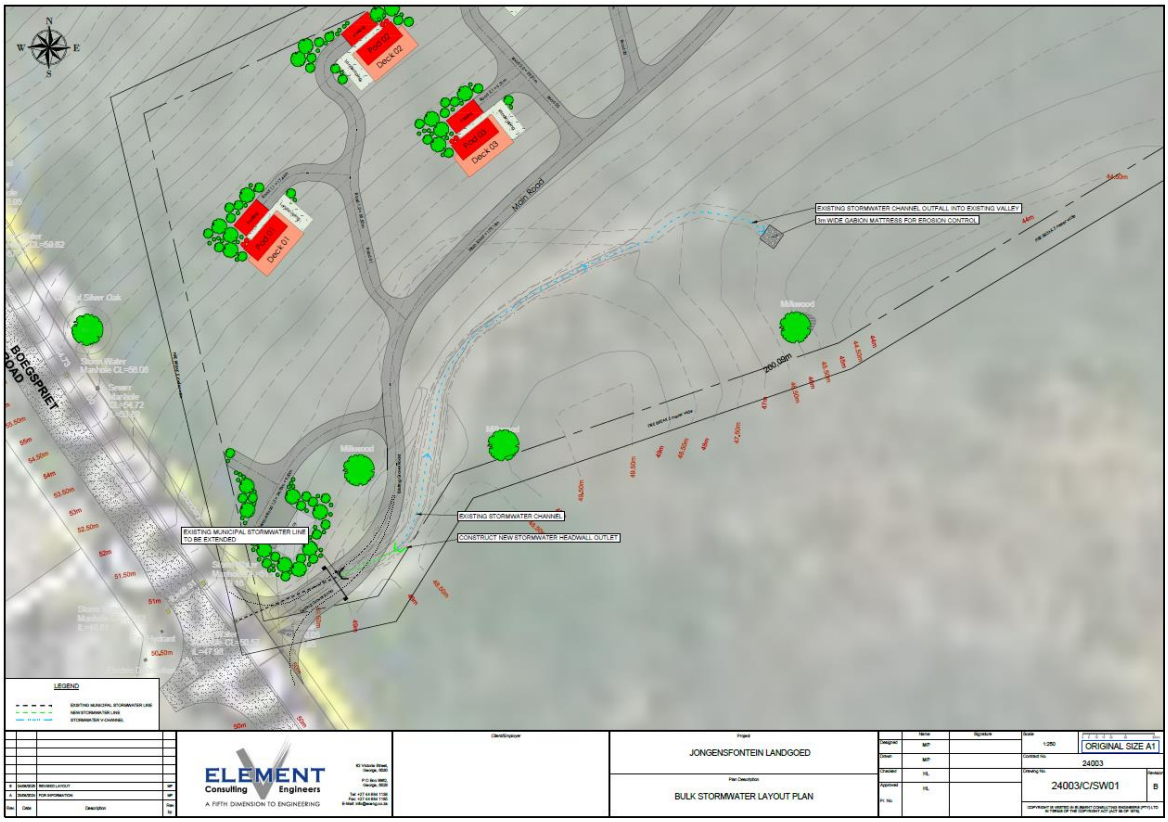

Figure 8: Extended existing municipal stormwater system

5.5 Solid Waste

Solid waste will be removed from units by the caretaker on a daily basis. A formal solid waste collection area will be provided adjacent to the main access gate. The facility will be enclosed to avoid attracting vermin. A formal arrangement for the removal of solid waste needs to be entered into with the Hessequa Municipality.

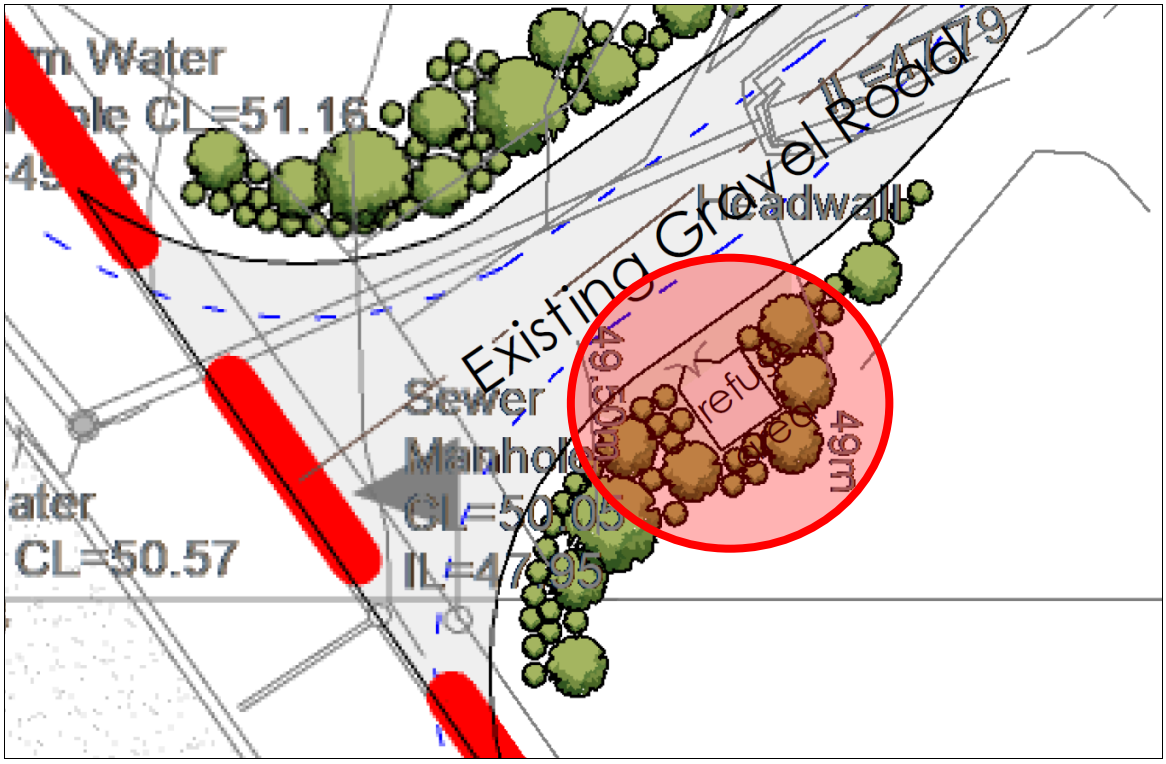

Figure 9: Solid waste collection area adjacent to access gate

5.6 Electrical

A Bulk electrical supply to the proposed development is not available from the municipality and is not required. Each unit will be supplied with an individual roof mounted PV Solar and battery system. Units will be equipped with gas stoves and gas geysers in order to limit the design requirements of the PV Solar system.

Individual solar and battery operated terrain lighting will be provided along the access road and at the access gate.

The access gate will be operated by solar and battery backup gate motor.

6 CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

The following conclusions can be reached:

1. The proposed development envisages 6 self-catering single room units as holiday accommodation properties.
2. The proposed development is located directly north-east of- and borders onto Jongensfontein.
3. The in-situ materials found on site are adequate for the construction of engineering services and foundations for the development.
4. Water:
    a. The Average Annual Daily Demand (AADD) for this proposed development is calculated at approximately 3.6kl/day.
    b. Bulk water for the development will be obtained from two existing boreholes BH1 & BH2, situated on the property.
    c. The yield (131kl/day) and quality of the borehole are acceptable for the proposed development; this has been confirmed with a new 2025 report.
    d. The water abstracted will be filtered and stored in a 10kl tank from where it will be gravity fed to the proposed development.
5. Sewer:
    a. The property is not serviced with a municipal sewer connection and a municipal sewer network is not available in the area.
    b. The construction of a central conservancy tank is specified.
    c. The conservancy tank will be placed close to the main access gate where sewer will be removed by vacuum truck.
    d. The Average Dry Weather Flow (ADWF) created by the proposed land use is calculated at approximately 3.0kl/day
    e. The conservancy tank will be emptied during peak-season on a twice-weekly basis and during off-season on an ad-hoc basis.
    f. Visual inspection of the tank will be performed by the supervisor on a daily basis during peak season and on a weekly basis during low season.
6. Roads & access
    a. Proposed access to the development is obtained via Boegspriet Road at the intersection with Kompas Close.
    b. Access onto Boegspriet Road will be side road stop controlled from the development’s access road.
    c. Access will be controlled by remote controlled sliding gate. Stacking distance of two vehicles will be provided in front of the gate.

d. Sight distances at the proposed access point are excellent in both the horizontal and vertical alignments and satisfactory for development purposes.

7. Traffic Impact Statement:
    a. A Traffic Impact Statement (TISt) is not required due to the insignificant number of trips generated by this proposed development.
    b. The trip generation of the eventual fully developed proposed development is estimated at approximately 4 trips for the peak hour of the adjacent road network.
    c. The traffic impact of the proposed development will be negligible from a traffic engineering perspective.
    d. The proposed development will be used as holiday accommodation further reducing the impact during the peak hour.
8. Traffic Calming:
    a. During discussions with the Hessequa Municipality, it was requested that the developer construct traffic calming speed humps in Boegspriet Road on the northern approach to the intersection with Kompas Close and the development access in order to improve road safety in the stretch of road.
    b. Detail designs of the speed humps will be submitted to the municipality for approval during the detail design stage.
9. Stormwater:
    a. The proposed development drains in a south-easterly direction.
    b. Stormwater design on this proposed development will utilize the zero concentration methodology. No concentration or accumulation of stormwater will hence be allowed. All internal roads and parking areas will be constructed in line with the gradient, using well compacted gravel surfaces. Stormwater will hence run over the roads as part of the landscape.
    c. Energy dissipation will be performed at all gutter outlets in order to further limit concentration.
    d. All the above will result in negligible increased stormwater runoff from the site.
    e. An existing municipal stormwater outlet is situated at the proposed access point under the proposed access road. This municipal stormwater pipe will be extended to daylight adjacent to the access road. The existing stormwater channel outlet will be protected with gabion mattresses as erosion protection.
10. Solid waste will be removed from units by the caretaker on a daily basis. A formal solid waste collection area will be provided adjacent to the access gate. A formal arrangement for the removal of solid waste needs to be entered into with the Hessequa Municipality.
11. Electricity
    a. A Bulk electrical supply to the proposed development is not available from the municipality and is not required.

b. Each unit will be supplied with an individual roof mounted PV Solar and battery system. Units will be equipped with gas stoves and gas geysers in order to limit the design requirements of the PV Solar system.
c. Individual solar and battery operated terrain lighting will be provided along the access road and at the access gate.
d. The access gate will be operated by solar and battery backup gate motor.

With reference to all the conclusions above, it can holistically be concluded that the proposed development can be designed and constructed to acceptable specifications and standards from an engineering design perspective.

6.2 Recommendations

With reference to the conclusions above, the following are recommended:

1. That the proposed development be approved from an engineering design perspective.
2. That all conceptual design specifications and standards be accepted and approved.
3. That all detail designs be performed to the satisfaction of the local municipality and other authorities, in line with the proposals contained in the report.