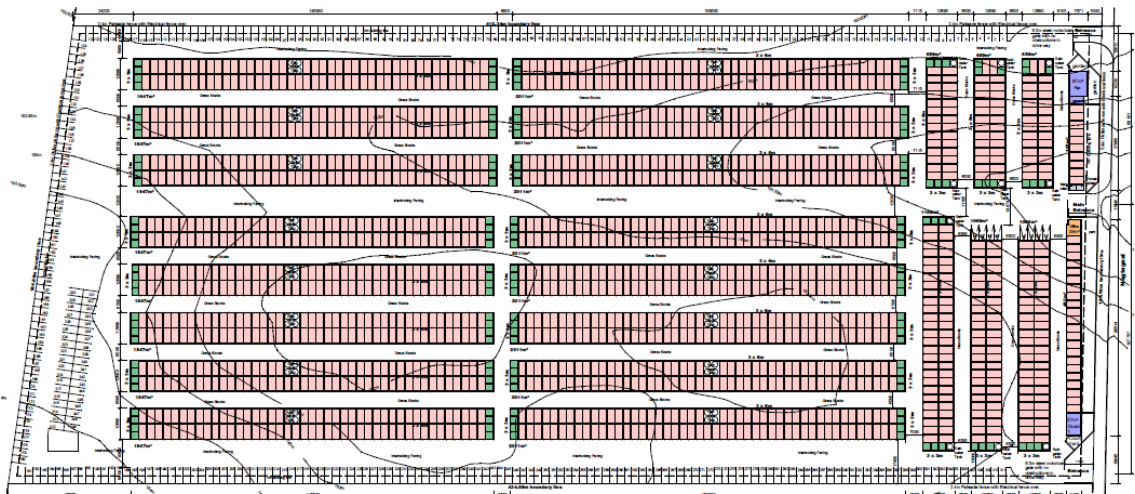


Proposed development of Erf 21275, Aalwyndal, Mossel Bay



Engineering Services Report

September 2021



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

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Engineering Services Report

September 2021



PREPARED FOR:

Storage Mossalbay (Pty) Ltd
P.O. Box 1595
George
6530

Tel: +27 82 346 8840

PREPARED BY:

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

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Engineering Services Report

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1 INTRODUCTION AND BACKGROUND

Element Consulting Engineers has been appointed for the rendering of professional civil engineering services for the proposed development of Erf 21275, Aalwyndal, Mossel Bay.

The extent of the property is 7.75ha. The project's masterplan proposes the development of 1,674 private storage spaces of 6x3m and 158 private storage spaces of 3x3m.

A number of pre-application discussions have been held with officials of the Mossel Bay Municipality to discuss the development as well as the requirements for the application submission.

This report will discuss the engineering services design 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.

The report will serve as input into the development application process.

2 PROPOSED LAND USE

The project's masterplan proposes the development of 1,674 storage spaces of 6x3m and 158 storage spaces of 3x3m. A total floor space of 3.49ha. The extent of the property is 7.75ha.

The Site Development Plan (SDP), as prepared by Belvedere Architects, is shown below and is included as addendum.

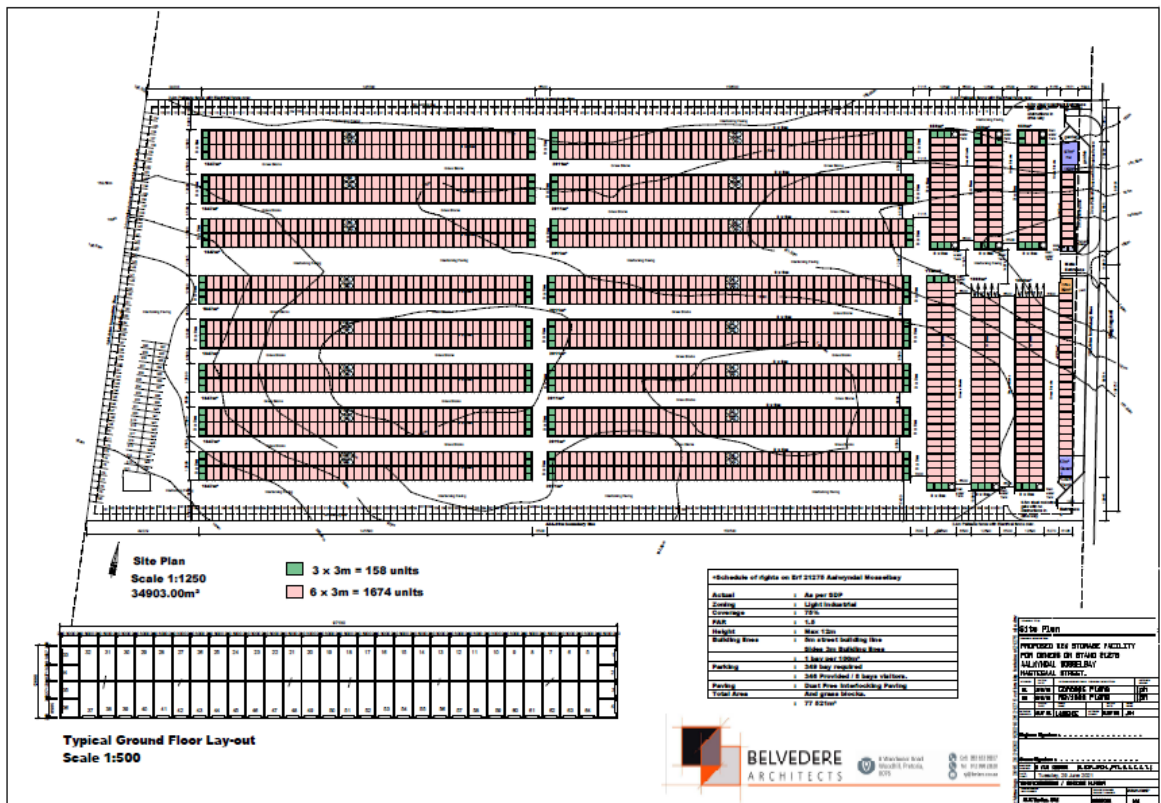


Figure 1: Site Development Plan (SDP)

3 LOCALITY AND ACCESS

The proposed development is located on Erf 21275, Aalwyndal, Mossel Bay. The site is located directly east of the Mossel Bay Airfield and is bounded to the south and north by smallholdings. Current and proposed access to the development is obtained via Nagtegaal Street.



Figure 2: Locality of Erf 21275

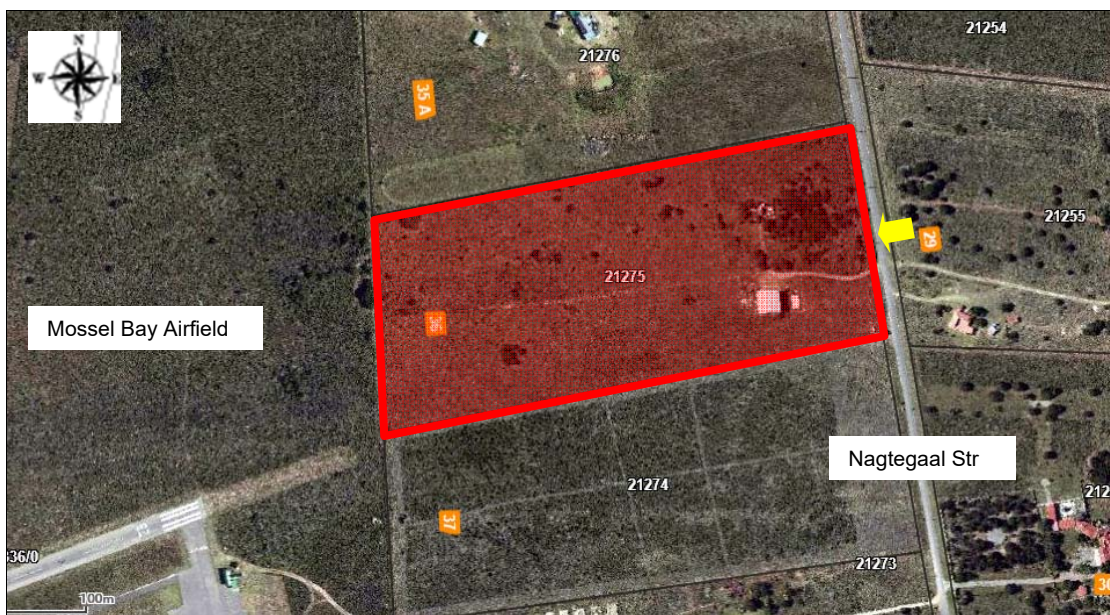


Figure 3: Layout and access

4 GEOTECHNICAL INVESTIGATION

A formal geotechnical investigation has not been performed 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 single level storage development.

General Soil Profile

Visual inspection of the site indicated relatively consistent soil horizons throughout with a light brown to grayish sandy gravel of shallow depth present. The materials appear dry and are fairly dense. No perched water table is evident and a moderate to high water retention rate is expected. Flat gradients are evident throughout.

Ground water and stormwater

No ground water and/or perched water are evident. A moderate to high water retention rate is expected. Flat gradients are evident throughout. Lateral movement of stormwater will be slow.

Engineering Services

The following aspects are relevant for engineering services:

- Surface stormwater movement will be slow due to flat gradients on site.
- No municipal stormwater infrastructure is present in the larger vicinity of the site.
- High surface water infiltration infrastructure, e.g. grassblocks, will be required throughout the site to address stormwater.
- Hard surfaces need to be minimized as far as possible and where not possible, high-permeable paving shall be provided.
- Roof rainwater flow-off shall be accumulated in rainwater tanks of minimum 20kl/large roof and 10kl/smaller roof to attenuate stormwater.
- A TLB will suffice for excavations in the materials in the higher lying areas.
- Bedrock is known to be shallow in the area and sufficient allowance shall be made for this in the design and costing.

Foundations for residential development

The materials are adequate to support low rise development.

Slope Stability

No natural slope instability is present.

Construction materials

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

5 PRELIMINARY ENGINEERING SERVICES DESIGN

This chapter will discuss the preliminary engineering services design 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 Development concept from and engineering services perspective

Although the proposed development footprint is quite large, the development will have a negligible impact on engineering services. This is due to the fact that the development of the private storage spaces will not provide for any engineering services to the storage spaces. Engineering services will only be required for the following infrastructure at the gate:

- 39m² office with male and female toilet and hand wash basin. Inclusive of small kitchenette for office staff.
- 57m² guardhouse with toilet and hand wash basin.
- 97m² caretaker flat.

The above is further underlined by the fact that no activity will be allowed at the stores, i.e., tenants may not work at the storage spaces, ensuring that the stores do not become in fact an industrial area but will remain as intended, namely a private storage space.

5.2 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 a negligible 2 kl/day. Peak factors are negligible.

Availability

Discussions were held with municipal officials in that the proposed development will have a negligible impact on bulk water availability. The development will in fact have a bulk water demand similar to the existing structures on the property. No additional bulk water is hence required.

Connection Point

The site is serviced by a municipal 90mm uPVC water line along Nagtegaal Street. The existing connection to the erf will be utilized and will be sufficient.

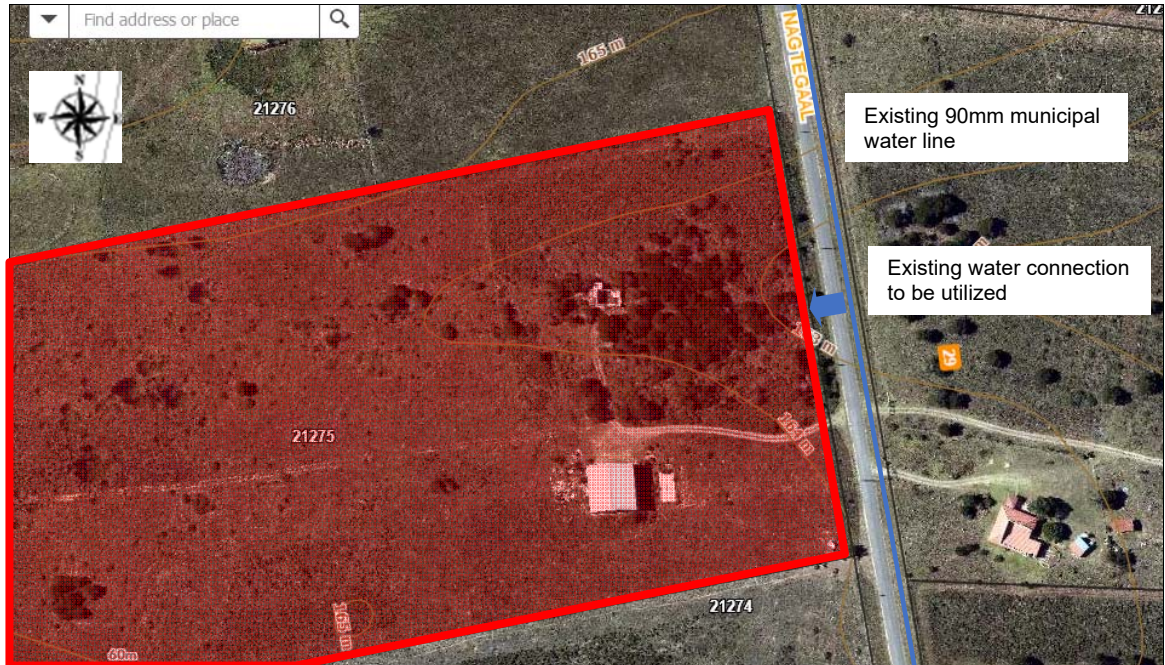


Figure 4: Water connection

5.3 Sewer

Bulk sewer and connection point

A municipal sewer network is not available in the wider area of Aalwyndal and the property is hence not serviced with a municipal sewer connection. The current houses on the property utilize a septic tank and soak-away.

Design flow

The Average Dry Weather Flow (ADWF) of the development, in line with accepted design criteria and standards, can be calculated and estimated as 2kl/day, divided between the three facilities, i.e., the office, guardhouse and caretaker flat.

Sewage treatment solution

A septic tank with soakaway will be provided at each of the three facilities, i.e., the office, guardhouse and caretaker flat.

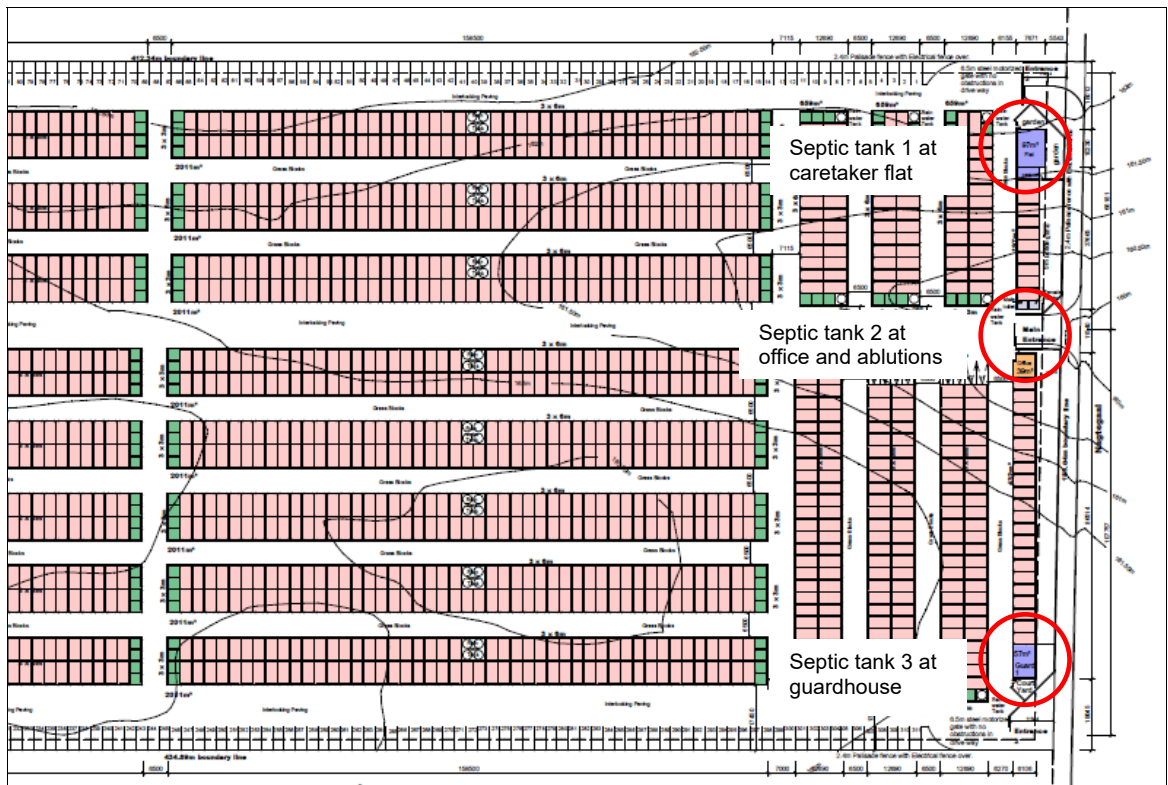


Figure 5: Positioning of septic tanks

Operation & Maintenance of septic tanks

A septic tank has a low capital cost outlay, a low operational & maintenance cost and hence a low lifecycle cost of ownership. The tank is gravity fed and have a zero-energy requirement for the septic treatment process lifecycle.

Inspection of the three septic tanks will be performed by the facility manager on a weekly basis.

Sludge build up will be removed as and when required, but typically will be approximately 3-year intervals. Sludge will be removed to the Hartenbos regional wastewater treatment works.

5.4 Roads and access

Access

Current and proposed access to the development is obtained via Nagtegaal Street. The access point is indicated in the following diagram.

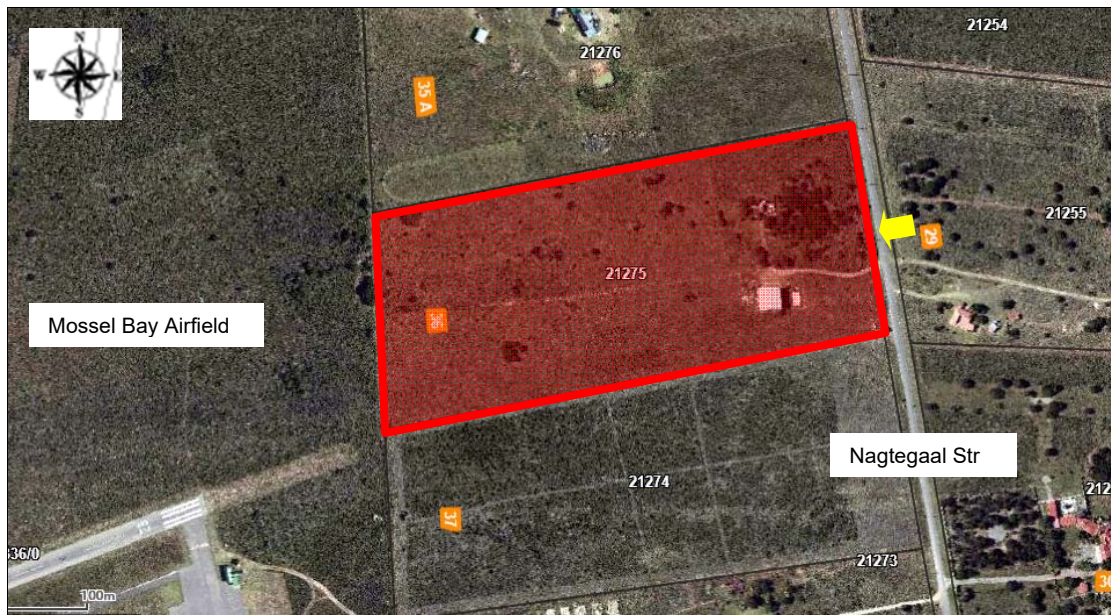


Figure 6: Access

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



Figure 7: Northern view along Nagtegaal Street at the access point. Sight distance is excellent in both the horizontal and vertical alignments.



Figure 8: Southern view along Nagtegaal Street at the access point. Sight distance is excellent in both the horizontal and vertical alignments.

Internal Standards and Design Criteria

Internal standards and design criteria are specified as follows:

- Main internal road (isle) width of 12m
- Internal road (isle) widths of 6.5m
- Main internal road surface to be high permeability paving
- Internal roads to be grass blocks
- Pavement structural materials to be imported from commercial sources.

Traffic Impact Statement

A Traffic Impact Statement (TIS) has been performed in a separate report. The trip generation of the eventual fully developed proposed development is estimated at less than 50 trips per peak hour. The traffic impact of the proposed development will be negligible from a traffic engineering perspective.

Preliminary design

The preliminary design is presented in the following diagram.

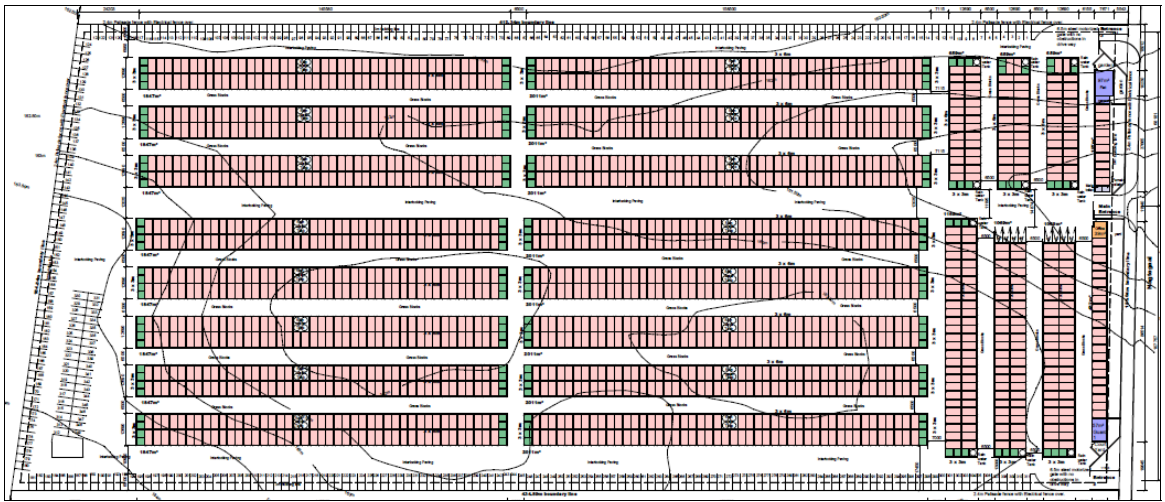


Figure 9: Internal roads layout

5.5 Stormwater

No municipal stormwater infrastructure is present in the larger vicinity of the site and a formal stormwater system can thus not be designed to connect to a municipal system. Similarly, a natural drainage line is not available to design to. This is problematic from an engineering perspective as attenuation will have to be facilitated on site. Attenuation will be achieved firstly through high surface water infiltration infrastructure, e.g., grassblocks, that will be provided throughout the site to address stormwater ingress. Secondly, hard surfaces need to be minimized as far as possible and where not possible, i.e on the main ring road, high-permeable paving shall be provided. Thirdly, roof rainwater flow-off shall be accumulated in rainwater tanks of minimum 20kl per large roof (1,847m²) and 10kl per smaller roof (avg 900m²) to attenuate stormwater roof run-off.

Notwithstanding all of the above, surface stormwater movement will be slow due to flat gradients on site.

Energy dissipation will be performed as standard practice with grassblocks as discussed above. No stormwater will be concentrated and piped, other than from roof run-off which will be attenuated in rainwater tanks.

The integrated stormwater and road system form an integral part of layout planning. The system rests on three legs, namely the minor system, the major system and the emergency system. Minor storms and normal flowoff are catered for in the normal road prism. Major storms are routed through a linked system of road prisms and public open spaces, using attenuation techniques. The emergency system recognizes failure of the minor and major systems and provides for emergency runoff by providing continuous overland flow routes to minimize flooding of residential areas.

The following standards and design criteria are envisaged:

- Minor system designed for 2-year return period and conveyed in a combination of maximum 20mm aboveground in the road prism.
- Major system designed for 50-year return period. Difference between the 50 year and 2-year flood to be conveyed in the road prism with depths not exceeding 150mm and into designated public open spaces, using attenuation techniques.
- No stormwater will be concentrated or piped.

All designs will be confirmed with the municipality during the detail design stage and submitted for approval prior to construction.

The proposed development site has only one drainage route. The site drains to a general eastern direction. Gradients are flat.

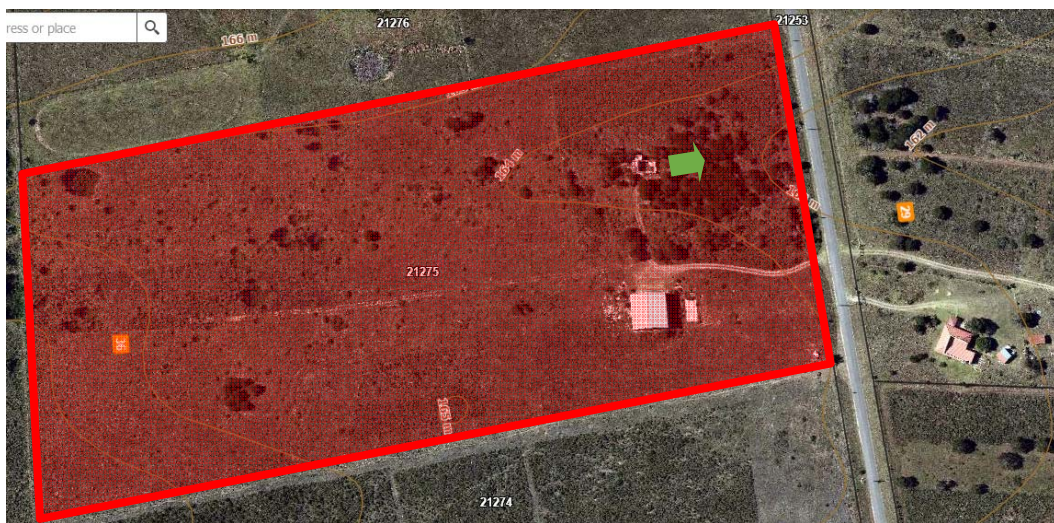


Figure 10: Stormwater drainage

5.6 Solid Waste

A formal solid waste collection area will be provided. A formal arrangement for the removal of solid waste needs to be entered into with the Mossel Bay Municipality.

6 CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

The following conclusions can be reached from the Engineering Services Report on the proposed development of Erf 21275, Aalwyndal, Mossel Bay:

1. The project's masterplan proposes the development of 1,674 private storage spaces of 6x3m and 158 private storage spaces of 3x3m.
2. Current and proposed access to the development is obtained via Nagtegaal Street
3. The in-situ materials found on site are adequate for the construction of engineering services and foundations for single level storage development.
4. Although the proposed development footprint is quite large, the development will have a negligible impact on engineering services due to the fact that the development of the private storage spaces will not provide for any engineering services to the storage spaces. Engineering services will only be required for the following infrastructure at the gate: 39m² office with male and female toilet and hand wash basin; 57m² guardhouse with toilet and hand wash basin; 97m² caretaker flat. The above is further underlined by the fact that no activity will be allowed at the stores, i.e., tenants may not work at the storage spaces, ensuring that the stores do not become in fact an industrial area but will remain as intended, namely a private storage space.
5. Water:
 - a. The site is serviced by a municipal 90mm uPVC water line along Nagtegaal Street. The existing connection to the erf will be utilized and will be sufficient.
 - b. The Average Annual Daily Demand (AADD) for this proposed development is calculated at approximately 2kl/day. Peak factors are negligible.
 - c. Discussions were held with municipal officials in that the proposed development will have a negligible impact on bulk water availability. The development will have a bulk water demand similar to the existing structures on the property. No additional bulk water is hence required.
6. Sewer:
 - a. A municipal sewer network is not available in the wider area of Aalwyndal and the property is hence not serviced with a municipal sewer connection.
 - b. The current houses on the property utilize a septic tank and soak-away.
 - c. A septic tank with soakaway will be provided at each of the three facilities, i.e., the office, guardhouse, and caretaker flat.

- d. The Average Dry Weather Flow (ADWF) of the development is estimated as 2kl/day, divided between the three facilities, i.e., the office, guardhouse and caretaker flat.
7. Roads & access
 - a. Current and proposed access to the development is obtained via Nagtegaal Street.
 - b. Sight distances at the access point are excellent and satisfactory for development purposes in both the vertical and horizontal alignments.
 8. A Traffic Impact Statement (TIS) has been performed in a separate report. The trip generation of the eventual fully developed proposed development is estimated at less than 50 trips per peak hour. The traffic impact of the proposed development will be negligible from a traffic engineering perspective.
 9. Stormwater:
 - a. No municipal stormwater infrastructure is present in the larger vicinity of the site and a formal stormwater system can thus not be designed to connect to a municipal system. Similarly, a natural drainage line is not available to design to. This is problematic from an engineering perspective as attenuation will have to be facilitated on site.
 - b. Attenuation will be achieved firstly through high surface water infiltration infrastructure, e.g., grassblocks, that will be provided throughout the site to address stormwater ingress. Secondly, hard surfaces need to be minimized as far as possible and where not possible, i.e on the main ring road, high-permeable paving shall be provided. Thirdly, roof rainwater flow-off shall be accumulated in rainwater tanks of minimum 20kl per large roof (1,847m²) and 10kl per smaller roof (avg 900m²) to attenuate stormwater roof run-off.
 - c. Notwithstanding all of the above, surface stormwater movement will be slow due to flat gradients on site.
 - d. No stormwater will be concentrated and piped, other than from roof run-off which will be attenuated in rainwater tanks.
 - e. The proposed development site has only one drainage route. The site drains to a general eastern direction. Gradients are flat.
 10. A formal solid waste collection area will be provided. A formal arrangement for the removal of solid waste needs to be entered into with the Mossel Bay Municipality

With reference to all of 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 is recommended:

1. That all conceptual and preliminary design specifications and standards be accepted and approved.
2. That all detail designs be performed to the satisfaction of the local municipality, in line with the proposals contained in the report.

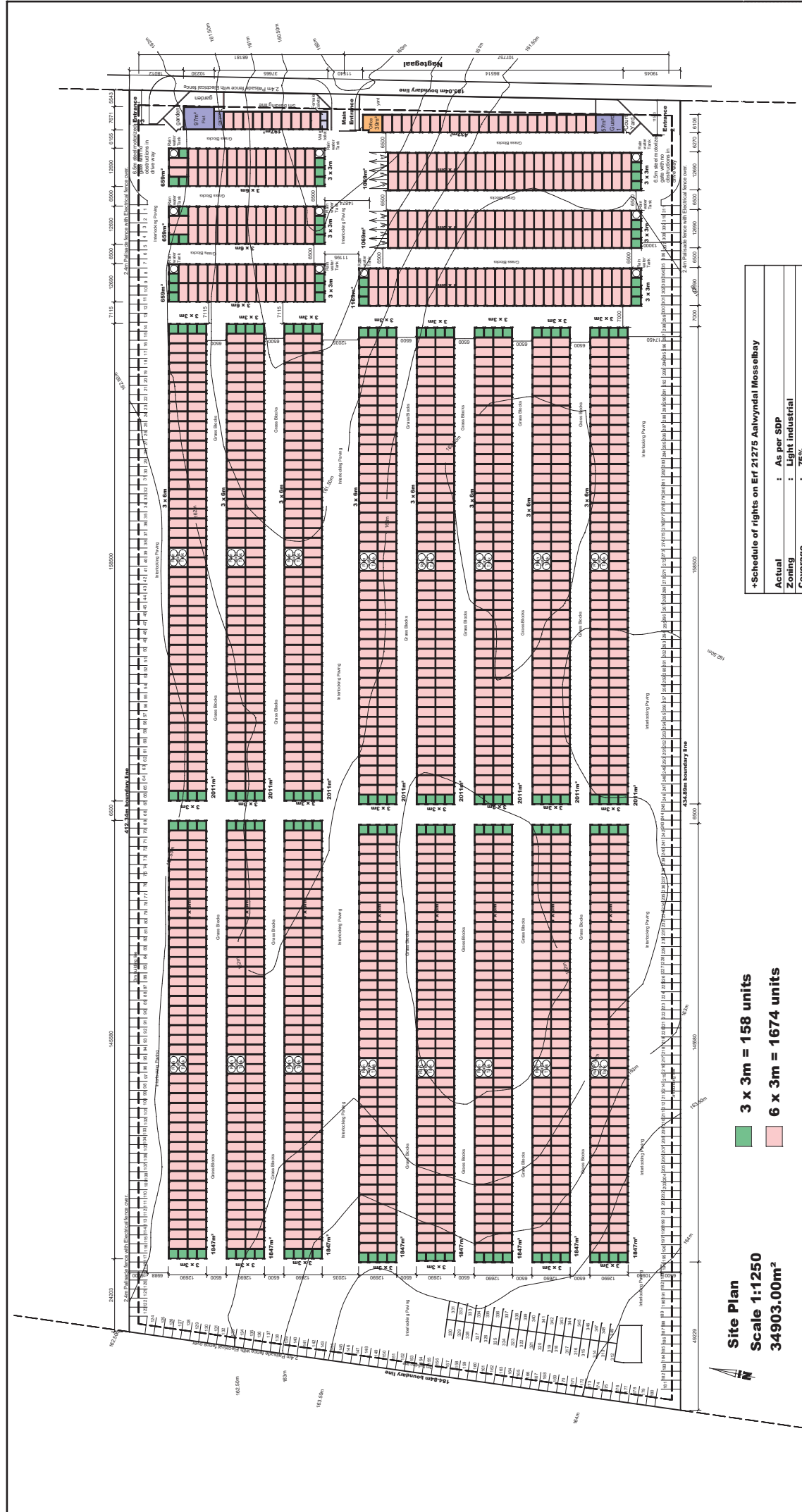
It is the holistic recommendation that the proposed development be approved from an engineering design perspective.

7 ADDENDA

7.1 Addendum 1 – Site Development Plan (SDP)

7.2 Addendum 2 – Preliminary design drawings with typical details

ADDENDUM 1
SITE DEVELOPMENT PLAN



-Schedule of rights on Erf 21275 Aanlyndal Mosselbay

Actual	: As per SDP
Zoning	: Light Industrial
Coverage	: 79%
FAR	: 1.5
Building lines	: Max 12m
Parking	: 5m street building line Sides 3m Building lines : 4 bay per 400m ²
Paving	: 346 bays required : Dust Free Interlocking Paving And grass blocks.
Total Area	: 77 521m ²

PROPOSED NEW STORAGE FACILITY FOR OWNERS ON STAND 21275 ANALYNDAL MOSSELBAY

CLIENT: B. VAN TOUREN
 PROJECT: B. VAN TOUREN
 DRAWING NUMBER: 7
 DATE: 2018
 REVISION: 1
 DRAWN: JPH
 CHECKED: JPH
 APPROVED: JPH

PROJECT SIGNATURE: _____

DATE: 2018

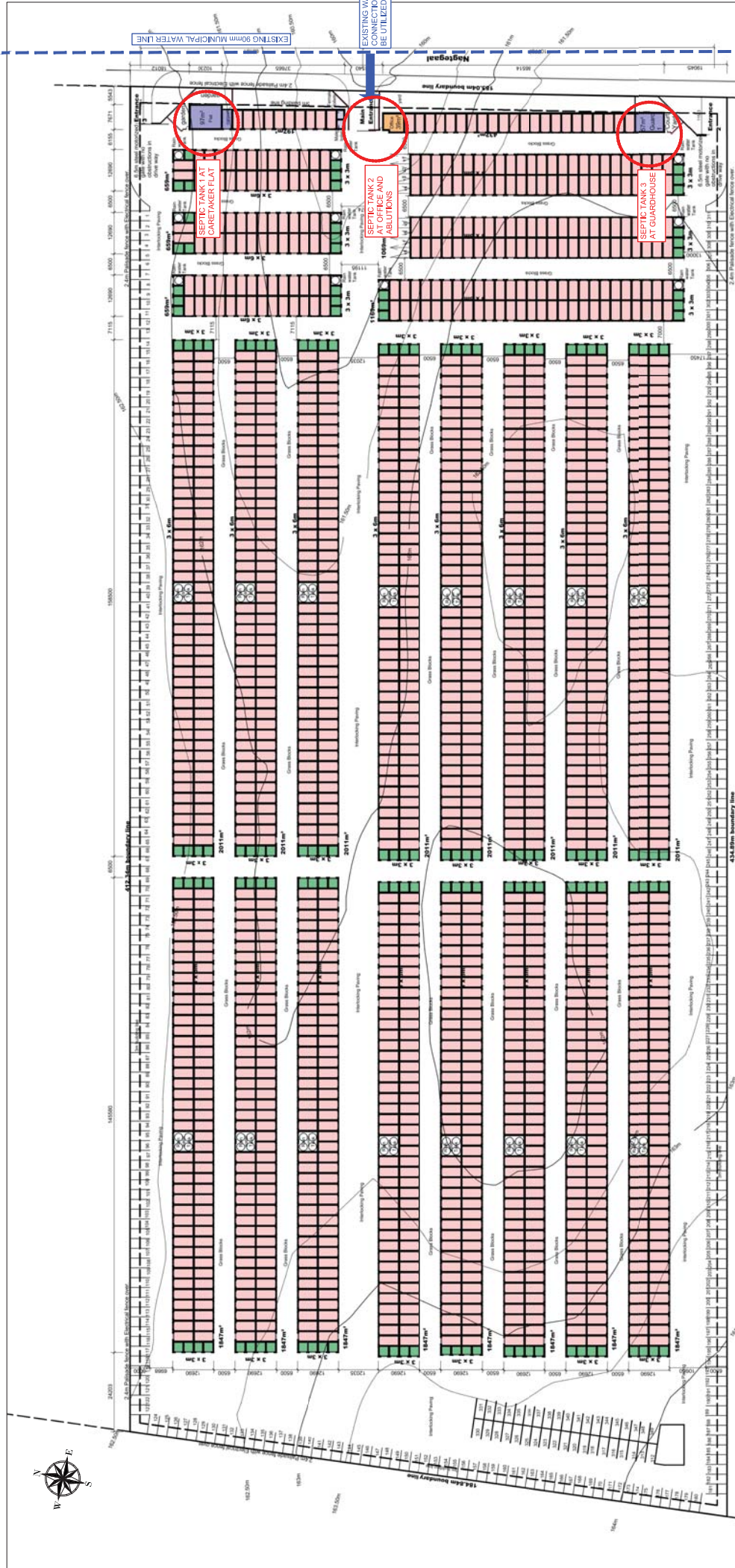


BELVEDERE ARCHITECTS
 8 Warden Road
 Midrand, Pretoria
 0076


06 863 6302
 011 998 3338
 info@bvd.co.za

ADDENDUM 2

PRELIMINARY DESIGN DRAWINGS WITH TYPICAL DETAILS



Rev.	Date	Description
A	02/21/2024	FOR SERVICE REPORT

 <p>ELEMENT Consulting Engineers A FIFTH DIMENSION TO ENGINEERING</p>	<p>Client/Employer STORAGE MOSSELBAY (Pty) Ltd</p>	<p>Project PROPOSED DEVELOPMENT OF NEW STORAGE FACILITY ON STAND 21275, AALWYNDAL, MOSSEL BAY</p>	<p>Name HLG</p> <p>Designed HLG</p> <p>Checked HL</p> <p>Approved HL</p>	<p>Scale NTS</p> <p>Original Size A1</p>
<p>82 Victoria Street George 6002 P O Box 6002 George 6002 Tel: +27 44 884 1188 E-Mail: info@element.co.za</p>	<p>Contract No. P210322</p> <p>Drawing No. P210322/C/G001</p>	<p>Revision A</p>	<p>Copyright reserved in element consulting engineers (pty) ltd in terms of the copyright act (96 of 1978)</p>	

