PROPOSED DEVELOPMENT OF ZANDHOOGTE INDUSTRIAL PARK ON REM FARM 139, TERGNIET, MOSSEL BAY

BULK SERVICES REPORT

REVISION 1

JUNE 2025

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BULK SERVICES REPORT
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CONTENTS

1 INTRODUCTION AND BACKGROUND

Element Consulting Engineers has been appointed to compile the bulk engineering services report for the proposed development of Zandhoogte Industrial Park, Tergniet, Mossel Bay.

The proposed development envisages the development of 183 storage units and 40 light industrial workshops.

This report will detail and discuss the bulk engineering services of the proposed development, touch on the internal engineering designs and comment on the engineering standards and technical design criteria applicable to the project.

2 LOCALITY AND ACCESS

The proposed development of Zandhoogte Industrial Park, is located on remainder of Farm 139, Tergniet, Mossel Bay, approximately 5km west of Great Brak River in the Mossel Bay Municipal area. The property is located inside the urban edge. The site is bound by the N2 freeway to the south, agricultural land to the east and west, Great Brak River WWTW to the south-west and industrial development to the north. The site is intersected east-west by Sandhoogte Rd, a class 4 provincial divisional road, and intersected north-south by Sorgfontein Rd, a class 4 provincial divisional road. Figure 1 below indicates this locality in additional detail.

Figure 1: Locality plan

Access to portions 1&2 of the development is proposed from Sandhoogte Rd, at a point approximately 103m east of the intersection with Sorgfontein Rd. Access to portions 3 and 4 of the development is proposed from Sandhoogte Rd, at a point approximately 117m west of the intersection with Sorgfontein Rd.

Sight distances at both proposed access points are acceptable in both directions in both the horizontal and vertical alignments with the condition that the overgrown bush be trimmed for the complete road reserve width.

3 GEOTECNICAL INVESTIGATION

A formal geotechnical investigation has not been performed. A visual inspection of the site was conducted in order to assess conditions on site. A number of geotechnical reports of nearby sites were also consulted.

A brief summary of the combined results of the above and a discussion of several relevant issues is presented hereunder for discussion purposes only.

Holistically, the conclusion reached is that the residual sands and limited transported materials found on site are adequate for the construction of engineering services for light industrial development. A formal geotechnical investigation will be performed during the detail design stage if required.

General Soil Profile

Inspection of the site indicated relatively consistent soil horizons throughout with a light brown to grayish silty sand of significant depth present. Darker brown transported silty sand is evident in the lower lying areas. The southern portion is sandy aeolian sands. The materials appear dry overall but slightly moist in the lower lying areas. The materials are fairly loose. No perched water table is evident, and a low water retention rate is expected. Moderate gradients are evident.

Ground water

No ground water and/or perched water are evident. A low water retention rate is expected. Due to the moderate gradients on the site, lateral movement of stormwater can be fast and liquification of the silty sands and transported topsoil may occur.

Engineering Services

The following aspects are relevant for engineering services:

- A slope analysis was performed for the site and the following resulted:
    - The average slope of the complete site varies from undulating to moderate.
    - No areas are undevelopable due to slope restrictions, except for minor areas in the northern sections.
- Surface stormwater management needs to be implemented for drainage in the area due to the moderate gradients and high erosive nature of the silty sands.

- This will require a formal stormwater reticulation system comprising of a combination of paved roads, kerbing, lined channels, catchpits and stormwater pipes.
- The design will incorporate Sustainable Drainage Systems (SuDs) principles (refer discussion later in report).
- A TLB will suffice for excavations in all silty sands on site.
- Although the possibility of rock is deemed extremely small, rock may be present at deeper depths. A formal geotechnical investigation will have to be conducted during detail design stage to determine the extent and depth thereof.

Foundations for residential development

The visual investigation indicated that the residual and transported materials are adequate to support light industrial development.

There are some moderate slopes across the site to be developed, which will require cutting and filling for platforms. This will result in some areas being sited on both cut and fill areas. Fill areas to be adequately compacted to a minimum specification to be determined from the formal geotechnical investigation.

Slope Stability

Although moderate slopes exist on portions of the site, no natural slope instability is present. Care should be taken for erosion at cut faces and a formal stormwater system should be provided.

Minerals, mining rights and borrow pits

A number of commercial borrow pits occur in the general vicinity (5 – 10 km radius) of the site.

Construction materials

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

4 PROPOSED LAND USE AND SITE DEVELOPMENT PLAN

The proposed development of Zandhoogte Industrial Park, Tergniet, Mossel Bay, envisages the development of 183 storage units and 40 light industrial workshops. This scenario can be viewed as the ultimate scenario as no additional development will be possible on the site when fully developed. A preliminary Site Development Plan (SDP), as prepared by A Enslin Archi Designs, is presented in the diagram below and attached to the report as addendum.

Figure 2: Site development plan (SDP)

5 BULK ENGINEERING SERVICES

This chapter will discuss the bulk engineering services of the proposed development, touch on the internal engineering designs and comment on the engineering standards and technical design criteria applicable to the project.

5.1 Infill development

The proposed development is classified from an engineering bulk services perspective as an infill development with infill taking place between the existing developed portions. Infill development is desirous from a bulk engineering services perspective as all or most bulk municipal services are normally already available and in place. Such infill development will improve the holistic financial sustainability of the local municipality due to additional rates and taxes being generated without the burden of additional capital outlay. The proposed infill development will subsequently not trigger unaffordable capital cost burdens to the local municipality but will in fact strengthen the financial sustainability of the municipality in both the short- and longer term.

5.2 Services agreement

A services agreement will be signed with the Mossel Bay Municipality. The development will not be implemented without a signed services agreement. The services agreement will contain all aspects and conditions from the engineering reports, EIA approvals, Water Use Licenses (WUL's) and townplanning approvals.

5.3 Water

5.3.1 Bulk Availability

Bulk water is available for this proposed development.

5.3.2 Connection Point

The bulk connection point for the western two portions will be from the existing 150mm municipal line along Sandhoogte Road (west).

The bulk connection point for the eastern two portions will be from the existing 200mm municipal line along Sandhoogte Road (east).

The locality of these bulk water lines and connection points in relation to the proposed development site are indicated in the preliminary design drawings attached to the report as addendum and depicted in the diagram below.

5.3.3 Design Criteria and Standard of Internal Engineering Services

- Pipe diameters varying between 90mm and 110mm depending on pressure available and flow required.
- Pipe type and class to be uPVC class 9 or 12, depending on pressure.
- Erven to be serviced with a 20mm connection and Aqua-Loc box and meter.
- Fire hydrants to be provided according to the “Guidelines for engineering services and amenities”.
- The following design consumption is used:
    - Workshops – 300l/100m2 GLA/day
    - Storage units – no water connections
- Peak factors as prescribed.
- Minimum pressures for the network are calculated for a fire flow 30l/sec and peak demand at the point of lowest pressure under peak conditions.
- Maximum of 4 valves to isolate a pipe section.
- Maximum length of 600m of main pipe per isolated section.
- Air valves to be provided at T-pieces where applicable.
- Minimum cover to pipes of 800mm.
- Erf connections to be polycop class 16.

5.3.4 Demand

The bulk water Average Annual Daily Demand (AADD) for this proposed development, in line with the above discussions, design consumptions, assumptions, criteria and standards, is calculated at approximately 56kl/day.

5.3.5 Preliminary Design Drawing

The preliminary bulk water design is presented in the following diagram and is attached as addendum to the report.

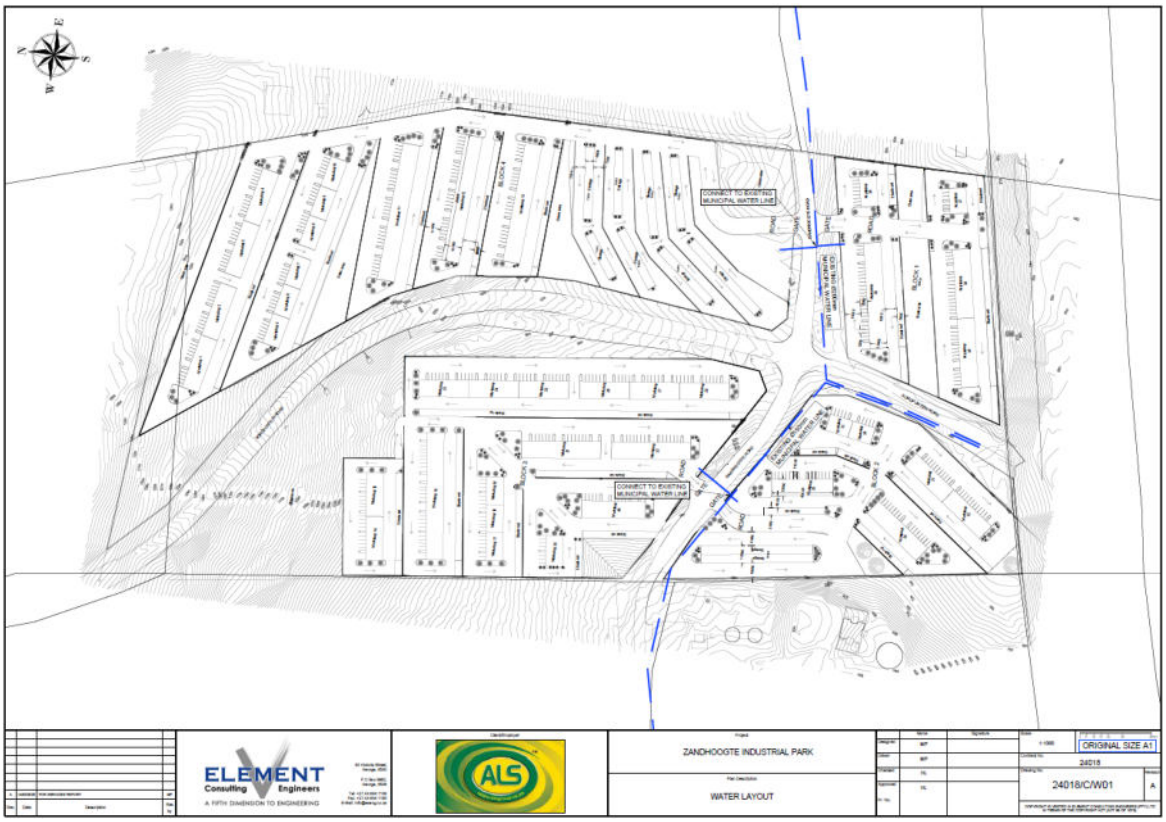

Figure 3: Preliminary bulk water design

5.4 Sewer

5.4.1 Municipal sewer network and bulk connection point

Sewer from the development will drain to the south-western boundary where it will connect into the main municipal sewer line flowing into the Great Brak River WWTW. This is depicted on the preliminary design drawing below and attached to the report as addendum.

5.4.2 Internal sewer network

The internal sewer network for this development is divided into four drainage zones by Sandhoogte Road and Sorgfontein Road, both cutting through the development.

Drainage zone A (north-east depicted in orange) drains to the south-west to the Sandhoogte/Sorgfontein intersection.

Drainage zone B (south-east and depicted in green) drains to the north-west to the Sandhoogte/Sorgfontein intersection.

Drainage zone C (south-west and depicted in purple) drains to the north-western corner of zone C, where it will connect into the main municipal sewer line flowing into the

WWTW. Drainage zones A and B flow into drainage zone C at the Sandhoogte/Sorgfontein intersection.

Drainage zone D (north-west and depicted in blue) drains to the south-west, underneath Sandhoogte Road and into the corner of drainage zone C.

A small section of zone A, designated zone A2, situated on the southern portion of zone A, can not gravitate to the WWTW and storage units will be developed here with no sewer infrastructure.

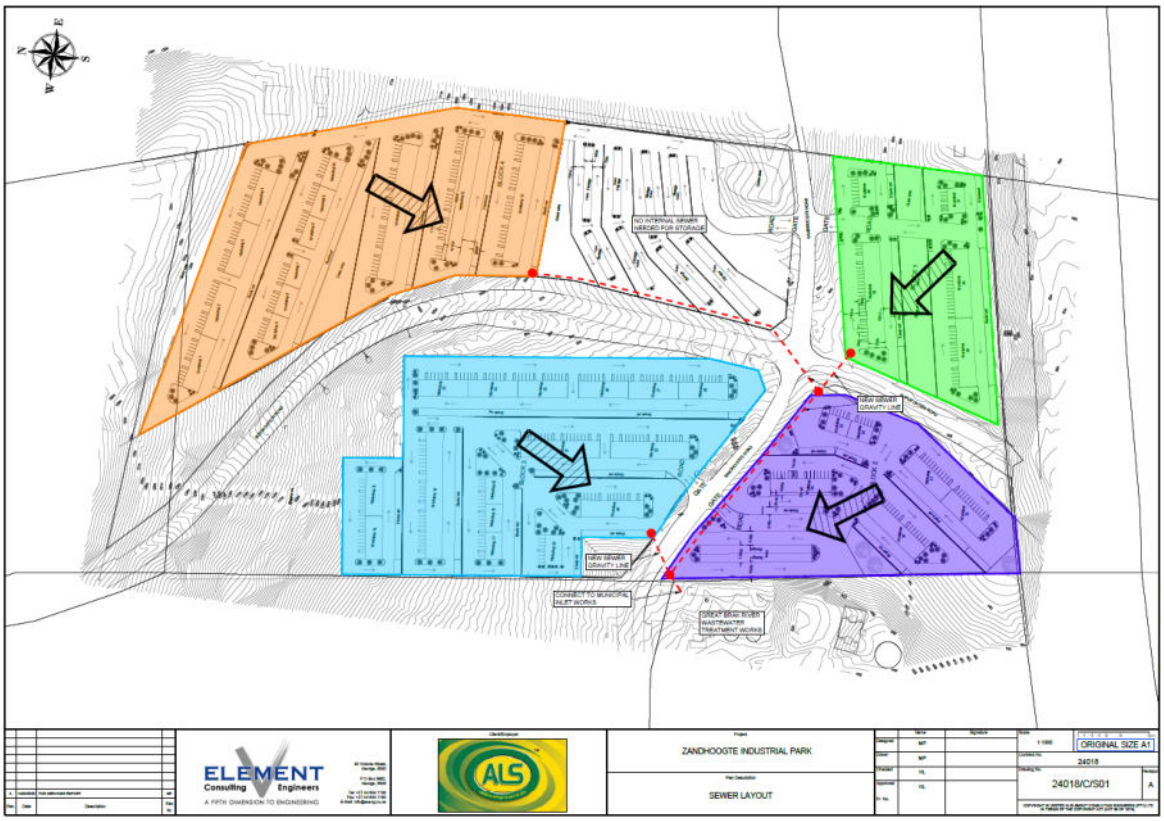

Figure 4: Preliminary bulk sewer connection and design zones

5.4.3 Design Criteria and Standard of Internal Engineering Services

- A conventional waterborne sewerage system will be provided.
- Pipe diameters of generally 110mm for all unit connections and 160mm and above for main lines, as required per the detailed designs.
- Pipe type and class to be uPVC class 34 and laid on class C bedding.
- Precast concrete rings manholes with concrete floor and premanufactured concrete lid.
- The following design flows will be utilized:
  - Workshops – 270l/100m2 GLA/day
  - Storage units – no sewer connections
- 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:

Units	Grade
1	1:60
1-5	1:80
6-10	1:100
11-80	1:120
81-110	1:150
>110	1:180

- Connection depth to be minimum 1.0m and at least be able to drain 80% of the erf.
- Manhole covers and frames to be Polymer Concrete.
- 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.

5.4.4 Design Flow

The Average Dry Weather Flow (ADWF) created by the proposed development, in line with the above discussions, criteria and standards, is calculated at approximately 51kl/day.

The design peak flow, inclusive of a specified peak factor of 3.5, as well as extraneous flow, will be calculated during the detail design stage.

5.4.5 Capacity in Great Brak River WWTW

The Great Brak River WWTW has recently been upgraded and has sufficient capacity to accommodate this development.

5.5 Roads and access

5.5.1 Access

Access to portions 1&2 of the development is proposed from Sandhoogte Rd (East), at a point approximately 103m east of the intersection with Sorgfontein Rd. Access to portions 3 and 4 of the development is proposed from Sandhoogte Rd (West), at a point approximately 117m west of the intersection with Sorgfontein Rd.

Sight distances at both proposed access points are acceptable in both directions in both the horizontal and vertical alignments with the condition that the overgrown bush be trimmed for the complete road reserve width.

5.5.2 Traffic Impact Assessment

A Traffic Impact Assessment has been performed in a separate report by Element Consulting Engineers.

5.5.3 Internal Standards and Design Criteria

Internal standards and design criteria are specified as follows:

- Road width to be 6.0m on main access streets and 5.2m on minor internal streets.
- Pavement structural materials to be imported from commercial sources.
- All minimum radii at bellmouths to be 7m.
- Road design life of 20 years.
- Subgrade material CBR of 15-20.
- Subbase material CBR of minimum 45 – obtained from commercial sources.
- 25mm Asphalt surfacing, alternatively 80mm concrete block paving.
- Minimum road grade of 0.45% and crossfall of 2%.
- Design speed of 30km/h on all roads except main access road with design speed of 40km/h.

5.5.4 Preliminary Site Development Plan

The preliminary site development plan (SDP), depicting the four accesses (two intersections) onto Sandhoogte Road as well as the internal streets layout, is presented in the following diagram and is attached to the report as addendum.

Figure 5: Site development plan (SDP) depicting access and internal streets layout

5.6 Stormwater

5.6.1 Design background, standards and criteria

Stormwater design on this proposed development is notable, not only from an engineering perspective, but also from an environmental perspective, due to the moderate gradients present. A formal stormwater reticulation system will be provided by a combination of surfaced roadways, kerbs, channels, cut-off drains, inlet structures, outlet structures, concrete stormwater pipes, detention ponds and various minor structures. Energy dissipation will be performed as standard practice with gabion mattresses at all outlets. All pipe outlets will be standard concrete headwalls. Litter traps will be provided at all stormwater outlets and will be cleaned on a regular basis by the landscaping and maintenance teams.

Stormwater design will make use of Sustainable Drainage Systems (SuDS) to manage stormwater from the proposed development and eventually into the natural drainage lines. SuDs will assist in preventing significant impact on the hydrological functioning of the drainage lines, reduce the risk of flooding and reduce the risk of erosion. SuDs vegetated with indigenous wetland species can assist with water polishing, trapping hydrocarbons from the development runoff before this is released into the drainage lines.

Permeable infrastructure will be considered where practical. This may include items such as permeable concrete block pavers, permeable brick pavers, stone and gravel. Soft and porous infiltration channels or -basins will be provided where necessary and will contribute to slowing surface flows. This may include a.o. swales and gabion mattresses. Gradients of swales and gabion mattress channels to be designed as flat as possible. This will provide filtration, removal of urban pollutants (e.g. hydrocarbons), provide attenuation, and dissipate energy of storm water flows through increased roughness (compared to pipes and concrete V-drains). Erosion protection measures (e.g. gabion-mattresses) will be established to reflect the natural slope of the surface and located at the natural ground level.

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 and piped system. 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 200m aboveground in the road prism and underground piped system.
- 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.
- Minimum gradients for pipelines to allow minimum flow speeds of 0.7m/s at full flow.
- Maximum pipeline flow velocities to be 3.5m/s.
- Stormwater pipes to be 100D as required by specific loadings or installation conditions.
- Bedding to be Class C.
- Minimum cover on pipes to be 800mm.
- Minimum pipe diameter to be 450mm.
- Gravel traps to be provided in manholes (where required on steeper slopes).
- Gabion mattresses to be provided at all outlets for energy dissipation.
- Litter traps to be provided at all outlets.
- Outlets to be standard concrete headwalls.
- Rainwater tanks to be provided at each unit.
- All stormwater structures on the project to be non-erosive, structurally stable and will not induce any flooding or safety hazard.
- All stormwater systems and structures to be designed by a professional engineer.
- All stormwater infrastructure and structures to be inspected and cleaned on a regular basis by the landscaping and maintenance teams.
- All stormwater infrastructure to be designed on SuDs principles.
- Soft and porous infiltration channels or -basins to be provided where possible.

All designs will be confirmed with the municipality during the detail design stage.

5.6.2 Site layout considerations

The proposed development spans over four stormwater drainage zones which are designated as follows:

Portion 1 (north-east) – Zone A
Portion 2 (south-east) – Zone B
Portion 3 (south-west) – Zone C
Portion 4 (north-west) – Zone D

The drainage zones are indicated diagrammatically in the figure below:

Figure 6: Preliminary stormwater drainage zones

5.6.3 Stormwater design

Zone A has an area of approximately 6.3ha with an estimated 1:2 year peak flow of 0.454m3/s and 1:50 year peak flow of 1.284m3/s. The internal stormwater network for Zone A will be designed to gravitate to the south-eastern boundary, the lowest point on Zone A. The formal internal stormwater reticulation system for Zone A will discharge into a proposed internal detention pond on the south-eastern corner of Zone A. This is an existing farm dam that will be refurbished for this purpose. This internal detention pond will have a volume of approximately 750m3. The detention pond will be a focus point in the development with ample landscaping and beautification. Water from the detention pond will leach into the sand bed which has a very high seepage rate. The flood outlet from the internal detention pond will drain east into the existing stormwater v-drain along Sandhoogte Road.

Zone B has an area of approximately 1.8ha with an estimated 1:2 year peak flow of 0.130m3/s and 1:50 year peak flow of 0.367m3/s. The internal stormwater network for Zone B will be designed to gravitate to the north-eastern boundary of Zone B. This point (the north eastern corner) is the lowest point on Zone B. The formal internal stormwater reticulation system for Zone B will discharge into the proposed internal detention pond on Zone A.

Zone C has an area of approximately 2.1ha with an estimated 1:2 year peak flow of 0.151m3/s and 1:50 year peak flow of 0.428m3/s. The internal stormwater network for Zone C will be designed to gravitate to the north-western boundary of Zone C. This point (the north-western corner) is the lowest point on Zone C. The formal internal stormwater reticulation system for Zone C will discharge into the proposed internal detention pond on Zone D.

Zone D has an area of approximately 4.7ha with an estimated 1:2 year peak flow of 0.339m3/s and 1:50 year peak flow of 0.958m3/s. The internal stormwater network for Zone D will be designed to gravitate to the south-western boundary, the lowest point on Zone D. The formal internal stormwater reticulation system for Zone D will discharge into a proposed internal detention pond on the south-western corner of Zone D. This internal detention pond will have a volume of approximately 700m3. The detention pond will be a focus point in the development with ample landscaping and beautification. Water from the detention pond will leach into the sand bed which has a very high seepage rate. The flood outlet from the internal detention pond will drain west into the existing stormwater v-drain along Sandhoogte Road.

The preliminary site development plan (SDP), also depicting the detention ponds, is presented in the diagram above and attached to the report as addendum.

5.7 Solid Waste

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

5.8 Electricity

5.8.1 Bulk Electrical Supply

The bulk electrical supply will be supplied from the Mossel Bay Municipality's (MBM) Midbrak 11/11kV Substation, via the existing 11kV, 120mm^2 copper underground cable. This cable is currently installed along the Sandhoogte Road, between the Grootbrak WWTW's minisub and the Sandhoogte Booster Pump Station. The cable has a current-carrying capacity of 4.75 MVA (@11kV).

Furthermore, it has been confirmed with the MBM's Electrical Personnel that this feeder is currently very lightly loaded and does have spare capacity of at least 1 MVA available, which could be utilized for the planned development.

The position of the planned development, relative to the position of the Midbrak Substation and the 11kV supply cable route, is indicated in the figure below.

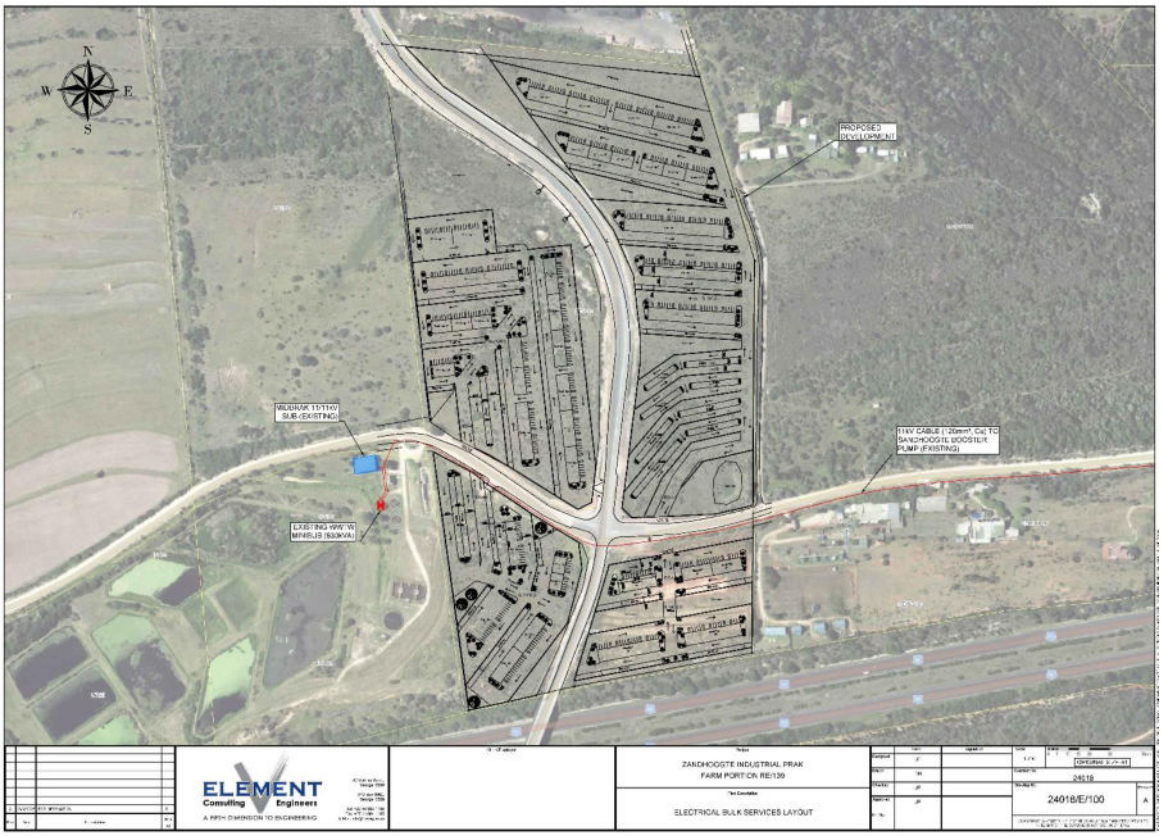

Figure 7: Bulk Electrical Services Layout

A Bulk MV connection (rated at 630 kVA) will be provided to the development by means of a new 11kV Ring Main Unit (3-way) which will have to be provided to accommodate the reticulation into the development. This RMU will be positioned outside the boundary of the planned development (in a position to be determined during the detail design development phase of the project) and will be handed over to MBM to become part of the municipal infrastructure for operation and maintenance purposes.

The 3-way Ring Main Unit (CCMV configuration) will be as follows:

- Isolator 1: 11kV Cable from Midbrak Sub (GBR WWTW Minisub)
- Isolator 2: 11kV Cable to Sandhoogte Booster Pump Station
- Metering Unit: 11kV Bulk Metering Unit
- Breaker 1: 11kV Feeder to development minisub (630kVA)

A bulk MV connection and metering point will be provided within the RMU for revenue metering purposes.

The new RMU will be cut into the existing 11kV, 120mm^2, PILC, copper underground cables which runs along the Sandhoogte Road towards the Sandhoogte Booster Pump Station, as indicated in the figure above.

One (1) additional 11kV, 35mm^2, PILC, copper cable will be terminated onto the outgoing supply breaker of the 3-way Ring Main Unit to supply the new 11kV/400V, 630kVA Mini-Substation which will be dedicated for the development.

5.8.2 Load Forecast

The proposed Site Development Plan provided by the architects includes the following:

1. Block 1:
    a. 5x workshops
2. Block 2:
    a. 6x workshops
    b. 52x storage units
3. Block 3:
    a. 15x workshops
    b. 21x storage units
4. Block 4:
    a. 13x workshops
    b. 131x storage units
5. TOTAL:
    a. 39x workshops
    b. 204x storage units

Due to the fact that the exact nature (and electrical demand) of the light industries' occupants was not known at the time of the development of this report, some assumptions had to be made. The following design criteria were used for the estimation of After Diversification Maximum Demand (ADMD) for the overall development:

Description	No. of Units	Load/unit (kVA)	Total Load (kVA)
Light Industry (Large consumer) – 45A, 3Ph	13	30	390
Light Industry (Small consumer) – 20A, 3Ph	26	14	364
Storage units (lights only, no plugs)	204	0.01	2
Open Space / Security Lighting	1	5	5
Streetlights & Other Auxilliaries	1	5	5
Sub-Total			**766**
Diversity Factor			**0.8**
TOTAL			**613**

Figure 8: Estimated Load per Category

As can be seen from the table above, the estimated diversified load of the total development, in line with the above design criteria, is estimated to be 613 kVA. For this reason, it is recommended that 630kVA minisub be supplied for development.

5.8.3 Energy Efficient Designs

A number of energy saving, and green building design measures are proposed to be incorporated into this development. These measures are being investigated and will be finalized during the detail design phase and will be communicated to the Client and the Mossel Bay Municipality for final approval.

5.8.4 Rooftop PV Solar

Rooftop PV Solar will be investigated during the detail design stage. The large roof areas will be ideal for the installation of rooftop PV Solar.

5.8.5 Internal Low Voltage Electrical Reticulation

An internal low voltage reticulation network will be provided from the 630kVA minisub to standard street-front kiosks (6/9-way) for individual loads and all cabling will be installed underground.

Decorative and energy saving street lighting will be provided for the development and will be supplied from the minisub's street lighting compartment via dedicated streetlight circuit breakers, controlled by day-night switches.

All design parameters for internal reticulation will be in accordance with the standard specifications of the Mossel Bay Municipality.

5.8.6 Revenue Metering

Bulk MV revenue metering will be provided via the Automated Metering Reading (AMR) system of the Mossel Bay Municipality and billed monthly to the development as a single account.

The development will be responsible for its own internal revenue sub -metering and billing system to recover costs from the individual customers and tenants.

5.8.7 Infrastructure Responsibility

The Mossel Bay Municipality's area of responsibility will end at the bulk MV metering point provided within the new RMU, supplying the development. All other MV and LV infrastructure below this metering point will be the property of the development and will be their responsibility in terms of operation and maintenance.

6 CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

The following conclusions can be reached from the bulk engineering services report for the proposed development of Zandhoogte Industrial Park, Tergniet, Mossel Bay.

1. The proposed development is located on remainder of Farm 139, Tergniet, Mossel Bay, approximately 5km west of Great Brak River in the Mossel Bay Municipal area. The property is located inside the urban edge.
2. The proposed development envisages the development of 183 storage units and 40 light industrial workshops.
3. Geotechnical: A formal geotechnical investigation has not been performed. A visual inspection of the site was conducted. Holistically, the conclusion reached is that the residual sands and limited transported materials found on site are adequate for the construction of engineering services for light industrial development. A formal geotechnical investigation will be performed during the detail design stage if required.
    a. General soil profile indicated relatively consistent soil horizons throughout with a light brown to grayish silty sand of significant depth present. Darker brown transported silty sand is evident in the lower lying areas. The southern portion is sandy aeolian sands.
    b. The materials appear slightly moist to dry and are fairly loose.
    c. No perched water table is evident and a low to moderate water retention rate is expected.
    d. Moderate gradients are evident.
    e. No ground water and/or perched water are evident.
    f. A low water retention rate is expected.
    g. Due to the moderate gradients on the site, lateral movement of stormwater can be fast and liquification of the silty sands and transported topsoil may occur.
    h. The average slope of the complete site varies from undulating to moderate.
    i. No areas are undevelopable due to slope restrictions, except for minor areas in the northern sections.
    j. Surface stormwater management needs to be implemented for drainage in the area due to the moderate gradients and high erosive nature of the silty sands.
    k. This will require a formal stormwater reticulation system comprising of a combination of paved roads, kerbing, lined channels, catchpits and stormwater pipes.

l. The design will incorporate Sustainable Drainage Systems (SuDs) principles (refer discussion elsewhere).
m. No natural slope instability is present.

4. Infill development:
    a. The proposed development is classified from an engineering bulk services perspective as an infill development with infill taking place between the existing developed portions. Infill development is desirous from a bulk engineering services perspective as all or most bulk municipal services are normally already available and in place. Such infill development will improve the holistic financial sustainability of the local municipality due to additional rates and taxes being generated without the burden of additional capital outlay. The proposed infill development will subsequently not trigger unaffordable capital cost burdens to the local municipality but will in fact strengthen the financial sustainability of the municipality in both the short- and longer term.
5. Services agreement:
    a. A services agreement will be signed with the Mossel Bay Municipality. The development will not be implemented without a signed services agreement. The services agreement will contain all aspects and conditions from the engineering reports, EIA approvals, Water Use Licenses (WUL's) and townplanning approvals.
6. Water reticulation:
    a. Bulk water is available for this proposed development.
    b. The bulk connection point for the western two portions will be from the existing 150mm municipal line along Sandhoogte Road (west).
    c. The bulk connection point for the eastern two portions will be from the existing 200mm municipal line along Sandhoogte Road (east).
    c. The demand for this proposed development is calculated at approximately 56kl/day.
7. Sewer reticulation:
    a. Sewer from the development will drain to the south-western boundary where it will connect into the main municipal sewer line flowing into the Great Brak River WWTW.
    b. The internal sewer network for this development is divided into four drainage zones by Sandhoogte Road and Sorgfontein Road, both cutting through the development.
    c. Drainage zone A (north-east) drains to the south-west to the Sandhoogte/Sorgfontein intersection.
    d. Drainage zone B (south-east) drains to the north-west to the Sandhoogte/Sorgfontein intersection.
    e. Drainage zone C (south-west) drains to the north-western corner of zone C, where it will connect into the main municipal sewer line flowing into the

WWTW. Drainage zones A and B flow into drainage zone C at the Sandhoogte/Sorgfontein intersection.

f. Drainage zone D (north-west) drains to the south-west, underneath Sandhoogte Road and into the corner of drainage zone C.
g. A small section of zone A, designated zone A2, situated on the southern portion of zone A, can not gravitate to the WWTW and storage units will be developed here with no sewer infrastructure.
h. The Average Dry Weather Flow (ADWF) created by the proposed development is calculated at 51kl/day.
i. The Great Brak River WWTW has recently been upgraded and has sufficient capacity to accommodate this development.

8. Roads and access:
    a. Access to portions 1&2 of the development is proposed from Sandhoogte Rd (East), at a point approximately 103m east of the intersection with Sorgfontein Rd. Access to portions 3 and 4 of the development is proposed from Sandhoogte Rd (West), at a point approximately 117m west of the intersection with Sorgfontein Rd.
    b. Sight distances at both proposed access points are acceptable in both directions in both the horizontal and vertical alignments with the condition that the overgrown bush be trimmed for the complete road reserve width.
    c. A Traffic Impact Assessment has been performed in a separate report by Element Consulting Engineers.
9. Stormwater reticulation:
    a. Stormwater design on the proposed development is notable not only from an engineering perspective but also from an environmental perspective.
    b. A formal stormwater reticulation system will be provided by a combination of surfaced roadways, kerbs, channels, cut-off drains, inlet structures, outlet structures, concrete stormwater pipes, detention ponds and various minor structures. Energy dissipation will be performed as standard practice with gabion mattresses at all outlets. Litter traps will be provided at all stormwater outlets and will be cleaned on a regular basis by the landscaping and maintenance teams.
    c. Stormwater design will make use of Sustainable Drainage Systems (SuDS) to manage stormwater from the proposed development and eventually into the natural drainage lines. SuDs will assist in preventing significant impact on the hydrological functioning of the drainage lines, reduce the risk of flooding and reduce the risk of erosion. SuDs vegetated with indigenous wetland species can assist with water polishing, trapping hydrocarbons from the development runoff before this is released into the drainage lines.
    d. Permeable infrastructure will be considered where practical. This may include items such as permeable concrete block pavers, permeable brick

pavers, stone and gravel. Soft and porous infiltration channels or -basins will be provided where necessary and will contribute to slowing surface flows. This may include a.o. swales and gabion mattresses. Gradients of swales and gabion mattress channels to be designed as flat as possible. This will provide filtration, removal of urban pollutants (e.g. hydrocarbons), provide attenuation, and dissipate energy of storm water flows through increased roughness (compared to pipes and concrete V-drains). Erosion protection measures (e.g. gabion-mattresses) will be established to reflect the natural slope of the surface and located at the natural ground level.

e. Four drainage zones are identified. The areas and peak flows of the drainage zones are as follows:
    i. Zone A: 6.3ha; 1:2 peak 0.454m3/s; 1:50 peak 1.284m3/s.
    ii. Zone B: 1.8ha; 1:2 peak 0.130m3/s; 1:50 peak 0.367m3/s.
    iii. Zone C: 2.1ha; 1:2 peak 0.151m3/s; 1:50 peak 0.428m3/s.
    iv. Zone D: 4.7ha; 1:2 peak 0.339m3/s; 1:50 peak 0.958m3/s.
f. Two internal detention ponds will be provided, one serving Zones A and B and one serving Zones C and D.

10. Solid waste:
    a. A formal solid waste collection area will be provided.
11. Electricity:
    a. Sufficient capacity is available on the existing 11kV reticulation network to supply the estimated load of 607kVA to the development from the existing Midbrak (11/11kV) switching station.
    b. A new 3-way, 11kV Ring Main Unit will have to be provided on the boundary of the development for the reticulation of an 11kV network into the development.
    c. The design of the internal electrical reticulation network will allow for one (1) 630kVA (11/0.4kV) minisub, as well as an internal LV network supplying the development.
    d. The entire design of the electrical network will be such that it complies with the standards and specifications of 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 are recommended:

1. That all conceptual and preliminary bulk services design specifications and standards, as set out in this report, be accepted and approved.
2. That the proposed infrastructure be designed according to the satisfaction and approval of the Mossel Bay Municipality.
3. That a services agreement be entered into between the developer and the Mossel Bay Municipality for the rendering of bulk services in accordance with this report.

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

7 ADDENDA

7.1 Addendum 1 – Site Development Plan (SDP)

7.2 Addendum 2 – Preliminary bulk services designs

7.3 Addendum 3 – Municipal confirmation letters

ADDENDUM 1

SITE DEVELOPMENT PLAN

SITE LAYOUT

SCALE 1:1000

PROJECT DESCRIPTION:-

PROPOSED MIXED DEVELOPMENT ON ERF 139 ZANDHOOGTE

A Enslin Archi Designs

DRAWING DESCRIPTION:-

SITE LAYOUT

date drawn:-

13/2/25

ADDENDUM 2

PRELIMINARY BULK SERVICES DESIGNS

Rev.	Date	Description	Rev. by
A	14/02/2020	FOR SERVICES REPORT	MP

ELEMENT Consulting Engineers
A FIFTH DIMENSION TO ENGINEERING

82 Victoria Street, George, 6530
P O Box 9962, George, 6529
Tel: +27 44 884 1138
Fax: +27 44 884 1185
E-Mail: info@eceng.co.za

Client/Employer: ALS (www.alsgroup.co.za)

Project: ZANDHOOGTE INDUSTRIAL PARK

Plan Description: WATER LAYOUT

	Name	Signature
Designed	MP	
Drawn	MP	
Checked	HL	
Approved	HL	
Pr. No.		

Scale: 1:1000
ORIGINAL SIZE A1
Contract No.: 24018
Drawing No.: 24018/C/W01
Revision: A

Rev.	Date	Description	Rev. by
A	14/02/2025	FOR SERVICES REPORT	MP

ELEMENT Consulting Engineers
A FIFTH DIMENSION TO ENGINEERING

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P O Box 9962, George, 6529
Tel: +27 44 884 1138
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E-Mail: info@eceng.co.za

Client/Employer

Project
ZANDHOOGTE INDUSTRIAL PARK

Plan Description
ACCESS ONTO SANDHOOGTE ROAD

	Name	Signature
Designed	MP	
Drawn	MP	
Checked	HL	
Approved	HL	
Pr. No.		

Scale: 1:1000
ORIGINAL SIZE A1
Contract No.: 24018
Drawing No.: 24018/C/R01
Revision: A

Rev.	Date	Description	Rev. by
A	14/02/2025	FOR SERVICES REPORT	MP

ELEMENT Consulting Engineers
A FIFTH DIMENSION TO ENGINEERING

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P O Box 9062, George, 6529
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Fax: +27 44 884 1185
E-Mail: info@eceng.co.za

Client/Employer: ALS

Project: ZANDHOOGTE INDUSTRIAL PARK

Plan Description: SEWER LAYOUT

	Name	Signature
Designed	MP	
Drawn	MP	
Checked	HL	
Approved	HL	
Pr. No.		

Scale: 1:1000
ORIGINAL SIZE A1
Contract No.: 24018
Drawing No.: 24018/C/S01
Revision: A

Rev.	Date	Description	Rev. by
A	14/02/2025	FOR SERVICES REPORT	MP

ELEMENT Consulting Engineers
A FIFTH DIMENSION TO ENGINEERING

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P O Box 9962,
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Tel: +27 44 884 1138
Fax: +27 44 884 1185
E-Mail: info@eceng.co.za

Client/Employer: ALS

Project: ZANDHOOGTE INDUSTRIAL PARK

Plan Description: STORMWATER LAYOUT

	Name	Signature
Designed	MP	
Drawn	MP	
Checked	HL	
Approved	HL	
Pr. No.		

Scale: 1:1000
ORIGINAL SIZE A1
Contract No.: 24018
Drawing No.: 24018/C/SW01
Revision: A

ADDENDUM 3

MUNICIPAL CONFIRMATION LETTERS