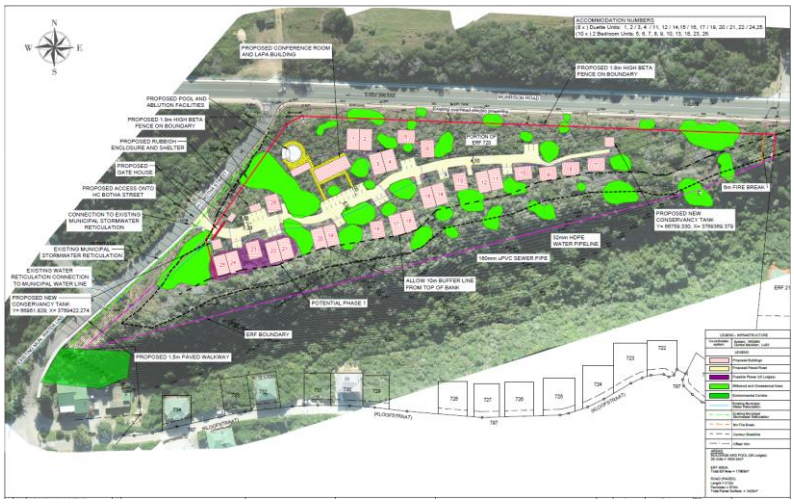
KAAPLANDSE ONDERWYS TRUST

PROPOSED RESIDENTIAL DEVELOPMENT ON ERF 720, DWARSWEGSTRAND, MOSSEL BAY



ENGINEERING SERVICES REPORT

REVISION 3

FEBRUARY 2024

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KAAPLANDSE ONDERWYS TRUST

PROPOSED DEVELOPMENT ON DWARSWEGSTRAND KOT RESORT, DWARSWEG, MOSSEL BAY

ENGINEERING SERVICES REPORT

REVISION 3

CONTENTS

1 INTRODUCTION AND BACKGROUND

Element Consulting Engineers has been appointed by Kaaplandse Onderwys Trust (K.O.T) for the rendering of professional civil engineering services for the proposed development of Erf 720, Dwarsweg, Mossel Bay.

The proposed development envisages 26 self-catering units, 10 single and 8 duette units, as holiday accommodation properties including the provision of open spaces. The proposed development also envisions a gate house with a waste enclosure, a lapa building and conference room next to the swimming pool and ablution facilities.

Several pre-application meetings have been held with officials of various relevant provincial government departments as well as the local municipality to discuss the development as well as the requirements for the application submission. Services approval letters have been received from the municipality.

This report will detail and 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.

2 PROPOSED LAND USE

The proposed development envisages 26 self-catering units, 10 single and 8 duette units, as holiday accommodation properties including the provision of 16,340.76m² open spaces and the proposed cottages covers 1,624.24m² in total area. The 10 single units allow for two bedrooms while the 8 duette units have one bedroom each. The proposed development also envisions a gate house with a waste enclosure, also a conference room and lapa building next to the swimming pool and ablution facilities.

The Site Development Plan (SDP) (Rev R), is presented in the figure below and is attached to the report as addendum.

Figure 1: Site Development Plan (SDP)

3 LOCALITY AND ACCESS

The proposed extension to the Dwarswegstrand KOT Resort, Dwarsweg, Mossel Bay is located south of the N2 freeway and south-east of the T-junction of Morrison Road (MR348) and HC Botha Street.

The proposed access to the development is obtained via HC Botha Street approximately 65m south of Morrison Road, Dwarsweg, Mossel Bay as indicated in Figure 1.

Morrison Road (MR348) is a single, two-way minor arterial with lanes running in an easterly and westerly direction. HC Botha Street is a single, two-way access road providing the only access to residents at Dwarswegstrand as well as access to the beach at Dwarswegstrand.

The locality is indicated on the figure below in relation to Great Brak River in a western direction and Bothastrand in a south-western direction.

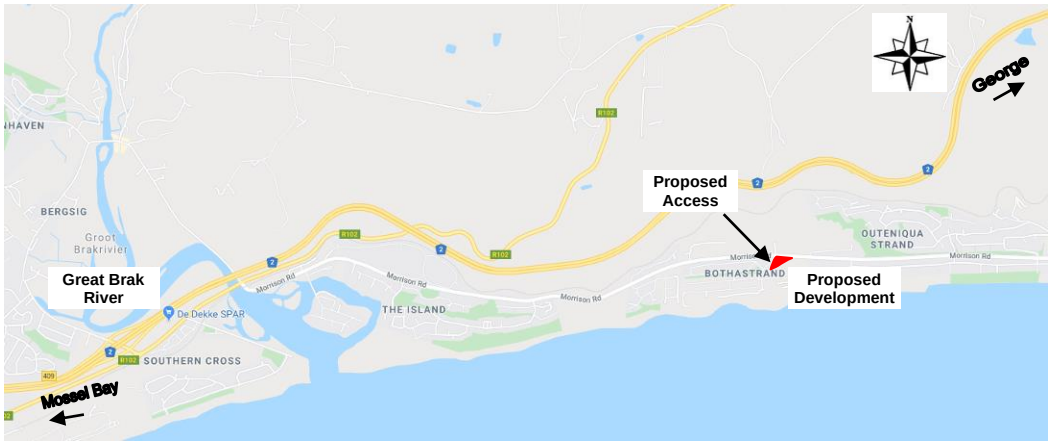

Figure 2: Locality Plan of proposed development on Erf 720, Dwarsweg, Mossel Bay

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 low-level residential and commercial development.

General Soil Profile

Inspection of the site indicated relatively consistent soil horizons throughout with a light brown silty sand of significant depth present. Darker brown silt is evident in the lower lying areas. The materials appear slightly moist and are fairly loose. No perched water table is evident and a low to moderate water retention rate is expected. Flat to undulating gradients are evident.

Slope Stability

Gradients on the site is flat to undulating. No natural slope instability is present.

Ground water and stormwater

No ground water and/or perched water are evident. A low to moderate water retention rate is expected. Lateral movement of stormwater will be moderate due to the flat to undulating gradient. Erosion of the silty sands may occur.

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. Fill areas to be adequately compacted to a minimum specification to be determined from the formal geotechnical investigation and detail design.

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 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. A set of preliminary design drawings is also available for reference and discussion purposes and should be consulted in parallel to the discussions below.

5.1 General

The proposed development is classified from an engineering bulk services perspective as an infill development with infill taking place south-east of the T-junction of Morrison Road (MR348) and HC Botha Street, Dwarsweg, Mosel Bay. 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 Water

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 21.6 kl/day. Peak factors will be considered during the detail design stage of the project. The proposed development will mainly be used as holiday accommodation resulting in negligible demand throughout the year out of season.

Bulk Availability

Preliminary investigations and the necessary discussions with the local municipality indicated that bulk water is available for this development. An approval letter from the municipality is attached to the report as addendum.

Connection Point

The site is serviced a 110mm uPVC line along HC Botha Street along the south-western boundary. The municipal network lines are indicated in yellow on figure 4. The locality of

the existing bulk water lines in relation to the proposed development site is indicated in yellow in the diagram below.

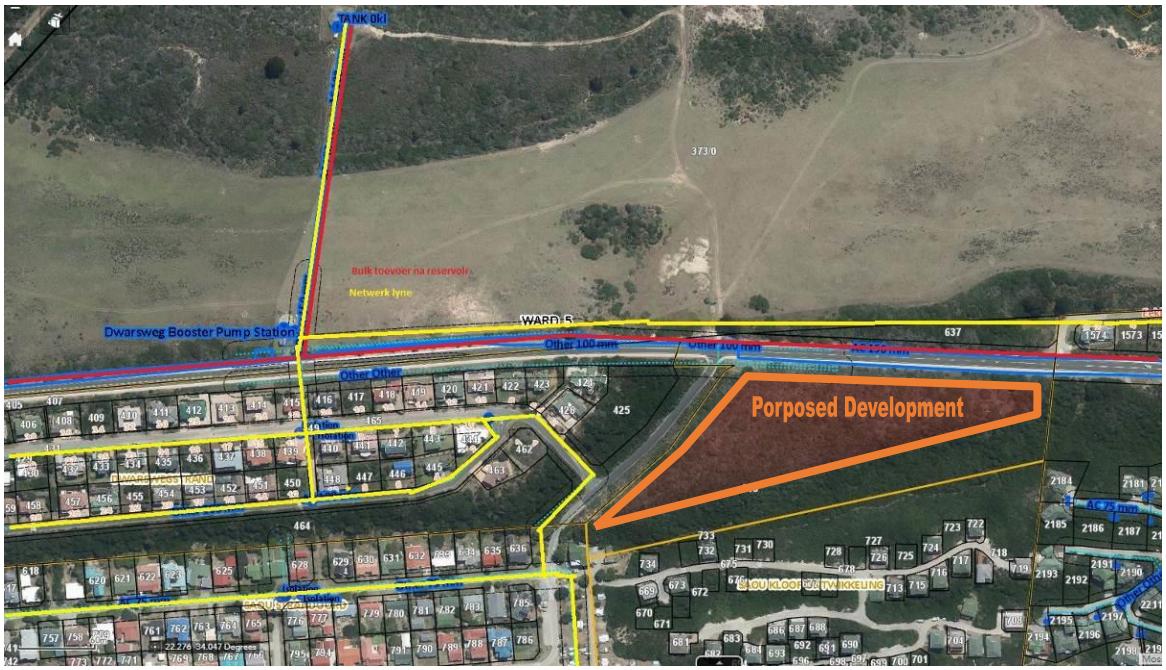

Figure 3: Existing bulk water line layout servicing the site

Design Criteria and Standard of Engineering Services

- Design consumption
    - Single residential erven – 800l/unit/day
- 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 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 63mm and 90mm depending on pressure available and flow required.
- Erf connections to be HDPE Class 10.
- Erven to be serviced with a 20mm connection and Aqua-Loc box and meter.
- Fire hydrants to be provided in accordance to relevant guidelines and legislation.

Preliminary design

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

Figure 4: Internal water layout

Financial sustainability

From a bulk water engineering services perspective, the 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. Capital contributions will strengthen the municipality financially in the short term. The proposed infill development will not trigger unaffordable capital cost burdens to the local municipality but will strengthen the financial sustainability of the municipality in both the short and longer term. From a long-term perspective, the additional Operation and Maintenance (O&M) costs of the municipal network will be covered from the additional rates and taxes.

5.3 Sewer

5.3.1 Site layout considerations

One drainage zone was identified for design and report purposes, namely zone A, which is draining in a general southern direction. The sewer drainage zone A is indicated diagrammatically on the figure below:

Figure 5: Sewer drainage zone A

5.3.2 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 20.25kl/day.

The design peak flow, inclusive of a specified peak factor of 3.5 and 15% extraneous flow, will be calculated for the network during detail design stage.

It must be stressed that this design flow will be minimal initially and will only be reached on completion of all phases of the proposed development. This implementation phasing is envisaged over a period of approximately 4 years, i.e. 2024 to 2028.

5.3.3 Design Criteria and Standards of Engineering Services

- The following design flows will be utilized:
  - Single residential – 750 l/erf/day
- Specified peak factor of 3.5
- Allowance for 15% extraneous flow
- A conventional waterborne sewerage system will be provided.
- Minimum flow velocities designed for as 0.7m/s.
- Minimum cover to all pipes to be 800mm.
- Pipe diameters of generally 110mm for all service connections and minor lines and 160mm and above for main lines, as required per the detailed designs.
- 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

- Erf connection depth to be minimum 1.0 m and at least be able to drain 80% of the erf.
- Precast concrete rings manholes with concrete floor and premanufactured concrete lid.
- 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.
- Pipelines to be uPVC class 34 and to be laid on Class C bedding.

Also refer to concept typical detail drawings attached to the report.

5.3.4 Preliminary internal sewer network design

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

Figure 6: Internal sewer layout

5.3.5 Availability of municipal sewer network

A municipal sewer network is not available in the area. The municipal sewer masterplan proposes a bulk sewer network to be provided for this area during the following 5 to 10 years. A pump station at De Dekke, Great Brak River, has recently been completed as a first phase for this network. A pressure line along Morrison Road (MR348) has to be constructed to this pumpstation. A timeframe and phases for the roll-out of the network is not available in the masterplan.

5.3.6 Bulk sewer alternative 1: Holding/conservancy tank

Alternative 1 is the provision of a holding/conservancy tank (not septic tank) design. This holding/conservancy tank shall be designed and located in such a way as for the internal network's flow to easily convert/switch to the municipal system when it becomes available.

A conservancy tank is a low capital cost solution. It has a low initial capital outlay and limited maintenance costs, but a high operational cost, hence only suitable for temporary measure. The conservancy tank will be gravity fed and has no treatment process. Sewer is accumulated in the concrete tank as holding measure only and is emptied on a regular basis by a private contractor or by the KOT. The concrete tank is highly resistant to degradation and remains stable over the long term, resulting in little maintenance costs. The tank has an underground footprint with very limited above-ground infrastructure visible, other than a manhole. The tank is supplied with odor-controlled ventilation and hence has no odor. The tank has no pumps or other mechanical parts and subsequently also has no noise pollution. Scraping or scarifying is not required.

The internal sewer reticulation network for this development is designed to gravitate to the southern-eastern as well as the south-western corner of the development property. These two points are the lowest points on the property. The two conservancy tanks will hence be situated on these points.

Future small pump stations will be commissioned alongside the holding/conservancy tanks once the municipal line becomes available on Morrison Road (MR348). The conservancy tanks will hence be designed simultaneously as pump station sumps for this future role.

The conservancy tank design is briefly presented below.

- Installation type – underground
- Conservancy tank – 11kl concrete
- Tank size – 3m(w) x 2m(l) x 1.8m(d)

Both conservancy tank designs will be similar.

Operation & maintenance of conservancy tank

A conservancy tank has a very low initial capital outlay and limited maintenance costs, but a high operational cost. The conservancy tank will be gravity fed and has no treatment process; sewer is accumulated in the concrete tank as holding measure only. The tank has no pumps or other mechanical parts and hence has no mechanical maintenance requirements. Scraping or scarifying is not required. The only operation required is the regular emptying of the tank by a private contractor or by the KOT. This will be performed by tanker, either on contract, or internally by owned equipment. Inspection of the system will be performed by the supervisor on a daily basis.

The operational methodology shall be incorporated into the service level agreement (SLA) with the municipality.

Preferred option

Option 1, namely the holding/conservancy tank, is the preferred option and will be implemented by the developer.

5.3.7 Bulk sewer alternative 2: Sewer package plant

As a second alternative, the development may consider a sewer package plant, and then switch to the municipal system as soon as this becomes available in the next 5 to 10years. This option is not considered feasible due to the short term use of an expensive solution, only to be abandoned in a few years' time when connection to the municipal system will become a reality. This option is not the preferred option but will be presented here for comprehensiveness.

Sewage treatment solution

After thorough research on package plants available in the market, the package plant identified and specified for this development will be a Maskam Clarus Fusion.

The Maskam Clarus Fusion is a 4-stage, modular, biological, activated sludge, package sewage treatment plant. The Maskam Clarus Fusion has a low capital cost outlay, a low operational & maintenance cost and hence a low lifecycle cost of ownership. The plant is gravity fed and have a low energy requirement for the treatment process lifecycle. The treatment media is highly resistant to degradation and remains stable over the long term resulting in little maintenance requirements. Scraping or scarifying is not required. The plant has a small footprint and is quiet in its operation. Treated effluent will be clear and odorless and will meet the Department of Water and Sanitation (DWS) General Standards.

The package plant reduces environmental risk as no raw sewer is accumulated and pumped from any low points and no environmental spill can subsequently occur.

The treated effluent will be use as irrigation water within the property.

Package plant process description

The Maskam Clarus Fusion is a 4-stage, modular, biological, activated sludge, package sewage treatment plant. The plant consists of four treating chambers internally. A pre-treatment and post-treatment process are also prescribed.

Pre-treatment will firstly entail a stainless-steel screen for retaining non-sewage matter (plastic bags, rags, sanitary products, etc.) and notices will be published regularly in the homeowner's association newsletter that owners should refrain from flushing any of these items into the system. Pre-treatment will secondly entail a concrete buffer-tank with multiple outlets (acting as a splitter box). Each outlet will feed one Maskam Clarus Fusion Unit.

The primary chamber of the Maskam Clarus Fusion package plant will receive sewage from the buffer tank. Here the sludge will settle and digest at the bottom of the tank and the scum will develop on the surface. The solids-free effluent in the middle will be fed by gravity, into the second chamber.

The second chamber is an anaerobic chamber. This chamber contains a spherical-skeleton type of filter media (4.3-inch diameter). Through fixed film processes on the surface of the filter media, biological anaerobic treatment thrives while suspended solids are captured. The microorganisms in this chamber convert nitrates in the recirculated water returning from the aerobic chamber to gaseous nitrogen. The nitrogen then escapes to the atmosphere. The effluent is fed by gravity to the third chamber.

The third chamber is an aerobic filter media chamber. The aerobic floating and circulating filter media chamber consists of an aeration upper section and a filter media lower section. The chamber is filled with hollow, cylindrical filter media (0.6-inch diameter and 0.55 inches long). Biological treatment takes place with the help of the fixed film growth on the filter media surface. Aeration is continuous. Air is introduced with a low-energy air pump. Residual suspended solids are captured by the filter media circulating in this section. The filter media in the aeration chamber are backwashed regularly (10-minute cycle, twice a day) by the backwash system located at the bottom of the chamber. The backwashed water is transferred by an air lift pump back into the sedimentation chamber for further digestion. The effluent is fed by gravity to the fourth chamber.

The fourth chamber is a treated water storage chamber. This chamber is designed to temporarily store treated water coming out of the aerobic filter media chamber. The treated water in the storage chamber is ready for discharge. During normal operation, a

recirculation line transfers a small portion of the treated water back into the sedimentation chamber by way of an air lift pump.

Effluent released from the unit is lastly post-treated by UV disinfection before pumped further into the scheme as treated effluent.

The figures below respectively contain a diagrammatical 3D view of the unit as well as a diagrammatical top and side view of the unit. The diagrams are also contained as addendum to the report.

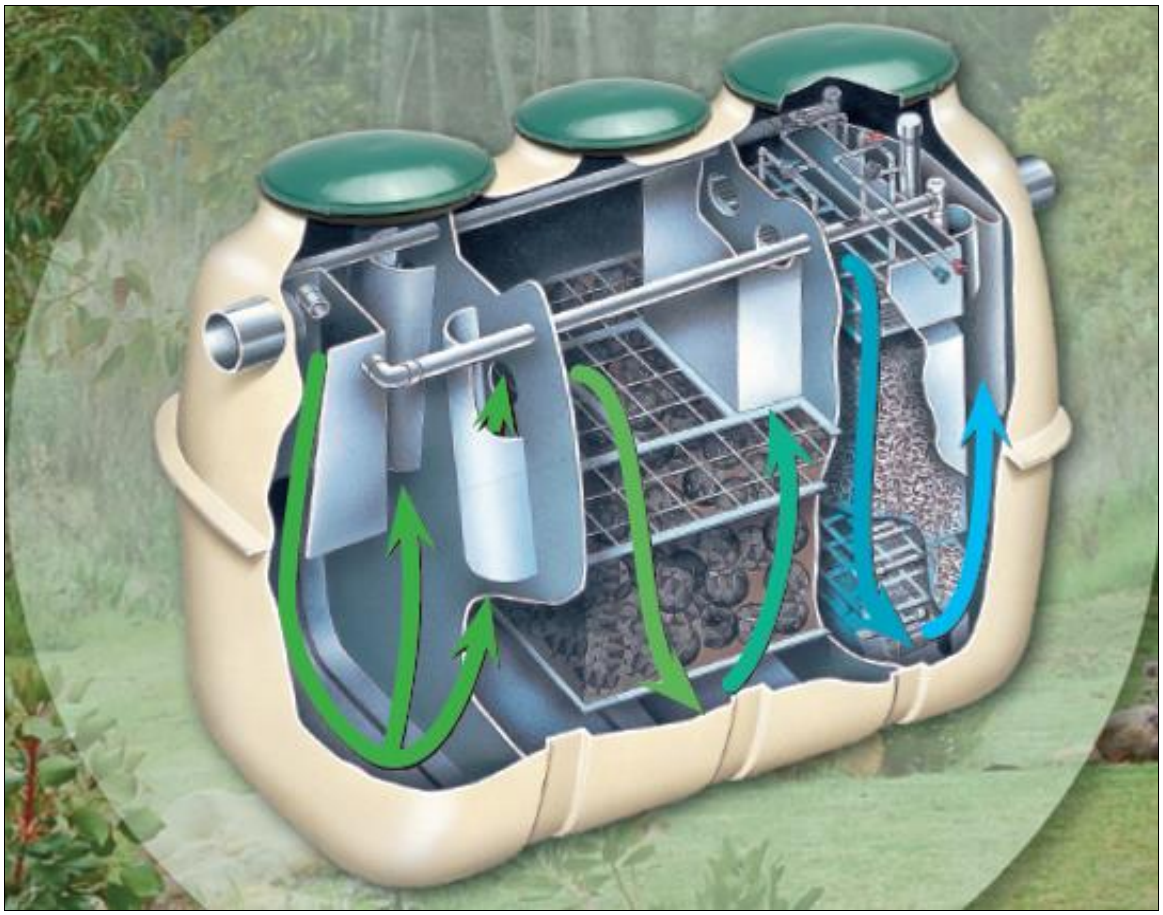

Figure 7: Maskam Clarus Fusion 3D view

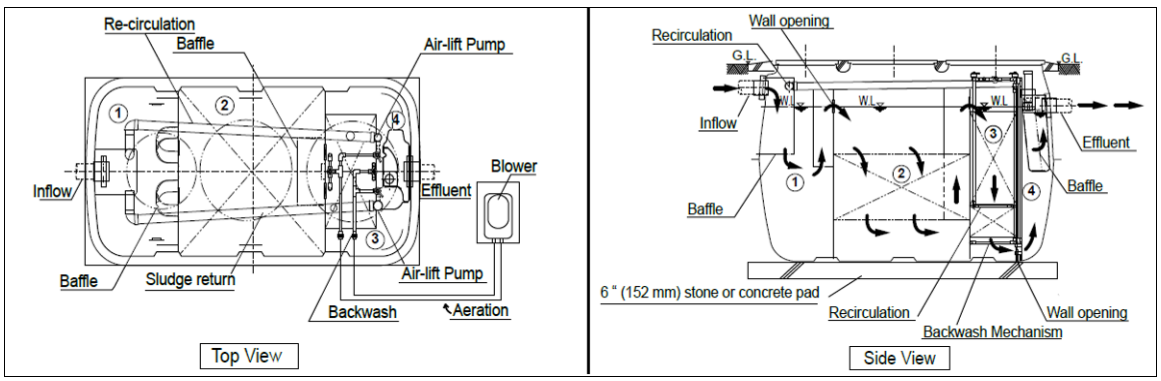

Figure 8: Maskam Clarus Fusion diagrammatic top and side views

Plant design parameter

The drainage zone is identified for the project as discussed earlier in the report, namely Zone A. The plant design for the drainage zone is briefly presented below and will also be presented diagrammatically:

Zone A:

- ADWF 20.25kl/day
- Installation type – underground
- Stainless steel primary screen
- Buffer tank – 20kl concrete
- Buffer tank size – 3m(w) x 6m(l) x 1.2m(d)
- Unit type – Maskam Clarus Fusion ZF4000
- Unit capacity – 20kl/day/unit
- Number of units – 1 units
- Size per unit – 4.66m(l) x 2.44m (w) x 2.54m (h)
- Size of total installation (fenced area) – 14m x 8m
- Post-treatment type – UV
- The treated effluent will be use as irrigation water within the property.

The figure below depicts the schematic flow diagram of inputs and outputs of the zone A installation:

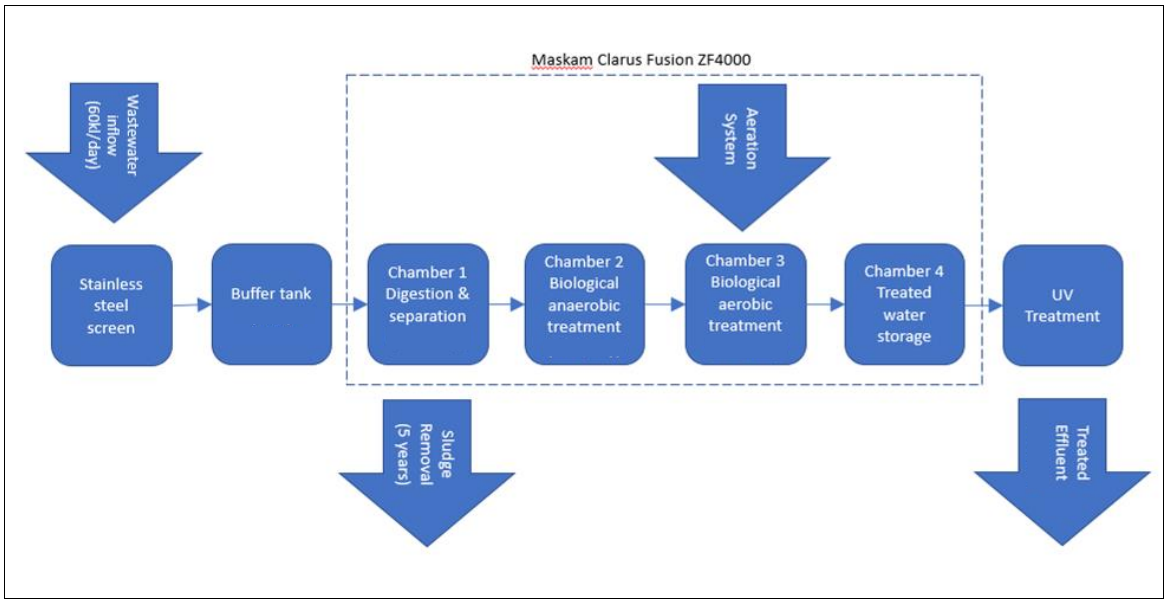

Figure 9: Schematic flow diagram of installation

Operation & Maintenance of package plants

The Maskam Clarus Fusion has a low capital cost outlay, a low operational & maintenance cost and hence a low lifecycle cost of ownership. The plant is gravity fed and have a low energy requirement for the treatment process lifecycle. Energy is only required for a low energy air pump and UV treatment. The treatment media is highly resistant to degradation and remains stable over the long-term resulting in little maintenance requirements. Scraping or scarifying is not required. The plant has a small footprint and is quiet in its operation. Treated effluent will be clear and odorless and will meet the Department of Water and Sanitation (DWS) General Standards

Inspection of the system will be performed by the supervisor on a daily basis.

Monthly samples of treated effluent will be submitted for laboratory analysis as per legislative requirements and responsible custodianship.

The plant will be serviced on a six-monthly basis through a maintenance contract.

Although sludge build-up in the system will be minimal due to its design, sludge that do build up will be removed as and when required, but typically will be approximately 5-year intervals. Sludge will be removed to the Hartenbos regional wastewater treatment works.

5.3.8 Financial sustainability

From a bulk sewer engineering services perspective, the development will be neutral to the holistic financial sustainability of the local municipality as no municipal service will be rendered to-, but also no rates and taxes be generated from this development. Capital contributions will not be applicable as no services are rendered. The proposed infill development will not trigger unaffordable capital cost burdens to the local municipality.

5.4 Roads and access

Access

Proposed access to the development is obtained via HC Botha Street approximately 65m south of Morrison Road, Dwarsweg, Mossel Bay

The access point is indicated in the internal roads' layout diagram under the preliminary design.

Sight distance

Sight distances at both proposed access points are excellent in both the horizontal and

vertical alignments and satisfactory for development purposes. An array of photographs below provides clarity on the sight distances at both access points.

Figure 10: South-western view along HC Botha at the proposed access. Sight distance is excellent in both the horizontal and vertical alignments.

Figure 11: North-eastern view HC Botha at the proposed access. Sight distance is excellent in both the horizontal and vertical alignments.

Traffic Impact Assessment

A Traffic Impact Assessment (TIA) has been performed. The trip generation of the eventual fully developed proposed development is estimated at approximately 5 trips for the morning peak hour and 8 trips for the afternoon peak hour. The traffic impact of the proposed development will be negligible from a traffic engineering perspective. Refer to parallel TIA report. The proposed development will mainly be used as holiday accommodation resulting in negligible traffic generation throughout the year.

Internal Standards and Design Criteria

Internal standards and design criteria are specified as follows:

- Internal road widths of between 5.2m and 3.2m, depending on road class

- Grass blocks paved 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.

Preliminary design

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

Figure 12: Internal roads layout

Financial sustainability

From a roads engineering perspective, the 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. Capital contributions will strengthen the municipality financially in the short term. The proposed infill development will not trigger unaffordable capital cost burdens to the local municipality but will strengthen the financial sustainability of the municipality in both the short- and longer term. From a long-term perspective, the additional O&M of the road network will be covered from the additional rates and taxes.

5.5 Stormwater

Site layout considerations

The proposed development is spanning over a watershed and two drainage zones are identified for design and report purposes. Approximately 5% of the site drains towards a general western direction towards HC Botha street (Zone A). Approximately 95% of the site drains towards a general southern direction towards the southern boundary of the development (Zone B). These zones are indicated diagrammatically on the figure below:

Figure 13: Stormwater drainage zones

Design background, standards and criteria

Stormwater design on this proposed development is notable not only from an engineering perspective. A minor stormwater reticulation system will only be required at the development access next to HC Botha Street, refer to figure 13 - Zone A. This will be provided by a combination of surfaced roadways, kerbs, channels, cut-off drains, strormwater pipes and various minor structures.

For the rest of the development no accumulation was considered due to the natural runoff in a southern direction across the development. All internal roads and parking areas will be constructed using grass block pavers with a high level of infiltration resulting in negligible stormwater runoff.

Energy dissipation will be performed as standard practice with at all outlets as well as rooftop outlets. Litter traps will be provided at all stormwater outlets and will be cleaned on a regular basis by the estate's landscaping and maintenance teams.

The following standards and design criteria are envisaged for drainage Zone A:

- 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.
- 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).
- Energy dissipation to be provided at all outlets.
- Litter traps to be provided at all outlets.
- Outlets to be standard concrete headwalls

Internal design

A minor percentage of stormwater of approximately 5% drains towards a western direction towards HC Botha street. This area is designated as Zone A (refer diagram) and has an area of approximately 0.09ha. Stormwater will be discharged into the existing municipal stormwater network in HB Botha street.

Approximately 95% of the site drains towards a southern direction towards the southern boundary of the development. This area is designated as Zone B (refer diagram) and has an area of approximately 1.71ha. Stormwater will flow naturally in a southern direction into an unnamed minor natural stream south of the property.

Figure 14: Existing municipal stormwater infrastructure.

The photograph below indicates the connection point, for Zone A, to the existing municipal stormwater network at the south-western point of the development.

Figure 15: Existing stormwater inlet in HC Botha street south of the entrance to the proposed development.

Financial sustainability

From a stormwater engineering perspective, the development will be neutral to the holistic financial sustainability of the local municipality as no municipal service will be rendered to-, but also no rates and taxes be generated from this development. Capital contributions will not be applicable as no services are rendered. The proposed infill development will not trigger unaffordable capital cost burdens to the local municipality.

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.

From a solid waste engineering perspective, the development will improve the holistic financial sustainability of the local municipality due to additional rates and taxes being generated. From a long-term perspective, the additional O&M of the municipal solid waste collection service will be covered from the additional rates and taxes, rendering of a solid waste collection service to the development will not impact on the existing collection route as the route is already in use up to the proposed development.

5.7 Electrical

A formal electrical services report has been compiled and is attached to the report as addendum.

6 PRELIMINARY ARCHITECTURAL DESIGN

This chapter will discuss the preliminary architectural design of the proposed holiday cottages in terms of firstly the location, secondly the internal layout designs, and thirdly the construction materials in parallel with the engineering standards and technical design criteria applicable to the project. A set of preliminary design drawings is also available for reference and discussion purposes and should be consulted in parallel to the discussions below.

6.1 General

The client requires the development of holiday cottages with ablution facilities and a function hall next to the pool on the site, considering the natural environment, but also matching some features of their existing holiday cottages on the neighbouring sites. At the same time, they want cost effective construction methods and also minimum operational and maintenance costs. The following photos picture some of their existing neighbouring holiday cottages:

Figure 16. Seaside elevation of some existing units

Figure 17. More upmarket units

6.2 Cottage and building locations

The location of each cottage has been determined on site with the environmental specialists in attendance, to place each cottage in an open space allowing for the least impact or damage to any environmental sensitive plants. The idea is to develop the site with minimum disturbance of the natural ecology and having minimum environmental impact, but also allowing the best sea views. A minimum of 6-10 meters between holiday cottages is also desirable. No intensive gardening will be allowed, keeping the areas around cottages as natural as possible within reason, because safety must be considered as to fire precautions.

To this end it is also a requirement to allow for a 10m, from the top of the slope and parallel to it, buffer zone on the site's southern boundary. The buffer zone is recommended because most of the natural environmental sensitive plants are located on the south facing slope of the site. The southern boundary slope is also facing the sea and thus allows for the best views. The Figure following hereafter indicates the proposed location of the cottages relative to the 10m buffer requirement:

At the swimming pool a lapa and function hall as well as ablution facilities are proposed, and a gatehouse will be provided at the access point. The gate house will consist of a rubbish enclosure at the back and space for the main electrical kiosk, as well as a covered area for a gate guard if needed.

Figure 18: Proposed Site layout indicating cottage and building locations

6.3 Cottage and building designs

A contemporary design for the cottages will mostly fit in with the existing holiday cottages in the immediate vicinity. The new cottages will have certain matching features such as the stoep and braai areas.

The proposed development envisages 26 self-catering units, 10 single and 8 duette units, as holiday accommodation properties including the provision of 16,340.76m² open spaces and the proposed cottages covers 1,624.24m² in total area. The 10 single units allow for two bedrooms while the 8 duette units have one bedroom each. The cottages will also finally be positioned to get the best sea views from most rooms. Three cottage layout types are considered.

6.3.1 Cottage type 1

Cottage type 1 is a two-bedroom cottage (area 62.62m² including stoep) and can accommodate two or four adults sleeping in the two bedrooms and two children sleeping in the lounge. Only three of the proposed freestanding units are units of this type and allows for 10x6 = 60 persons. Each cottage also provides a small bathroom and an open kitchen, dining island and lounge. A covered stoep includes a built-in braai area. Refer to the cottage layout in the figure below:

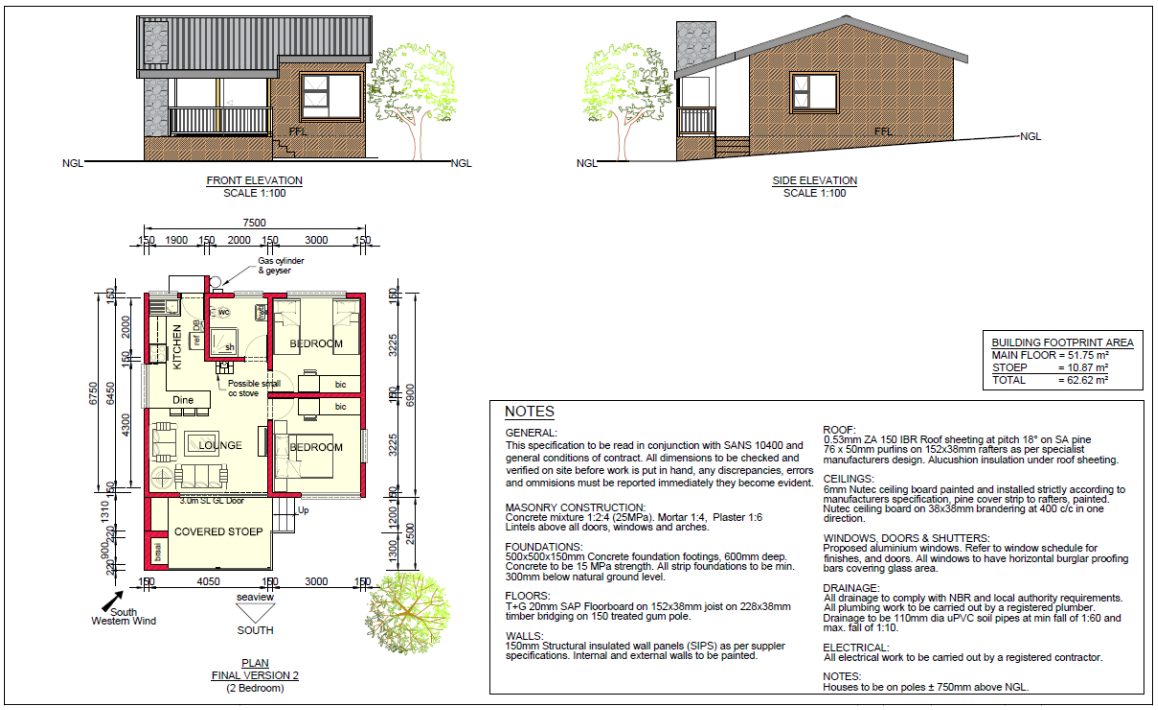

Figure 19: Type 1 Cottage layout

6.3.2 Cottage type 2

Cottage type 2 is basically two one bedroom units, doubled up i.e. sharing one wall. This double cottage (total area 97.82m² including two stoep areas) can accommodate two adults sleeping in the bedroom and two children sleeping in the lounge on both sides. Only eight of the proposed units are units of this type and allows for 8x8 = 64 persons. Each side also provides a small bathroom and an open kitchen, dining island and lounge. A covered stoep on both ends includes a built-in braai area. To provide a bit of privacy the two stoep areas have been placed at opposite ends of the building. Refer to the cottage layout in the figure below:

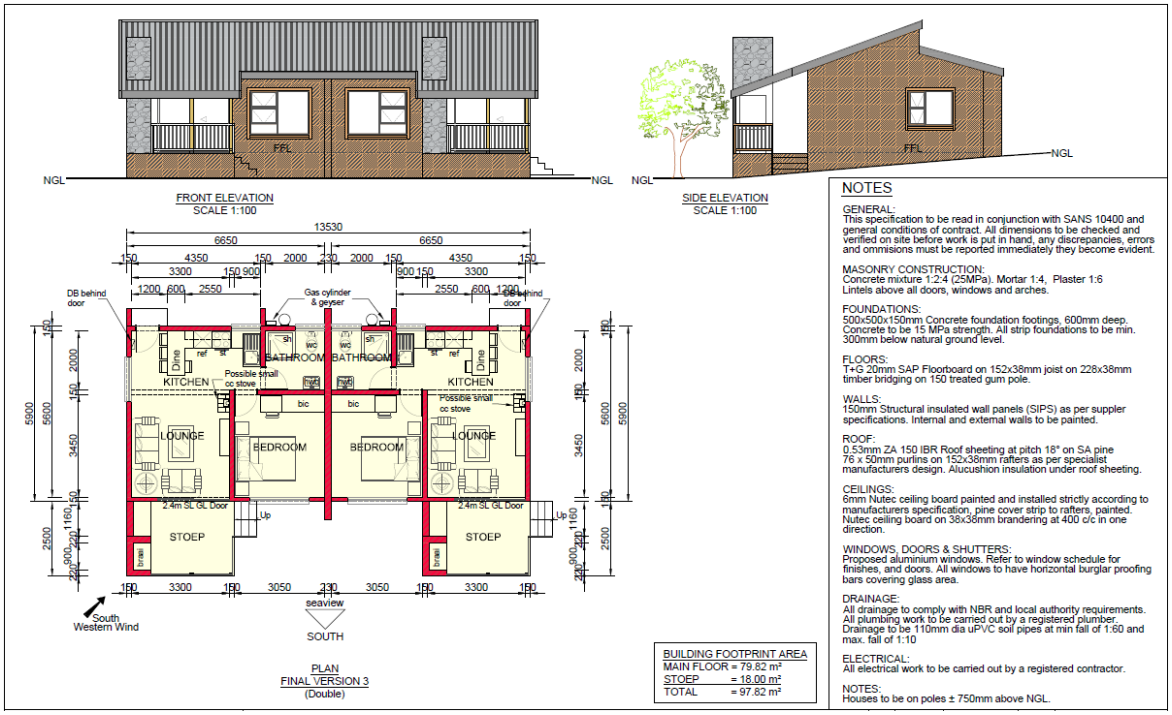

Figure 20: Type 2 Cottage layout

6.3.3 Lapa & Function hall

The lapa and function hall, with an area of 127.50m², can accommodate: 20 people for a meeting, 25 people for a conference, 60 people for a school hall, 50 people for a cocktail function & 16 people in the lapa. Refer to the lapa and function hall layout in the figure below:

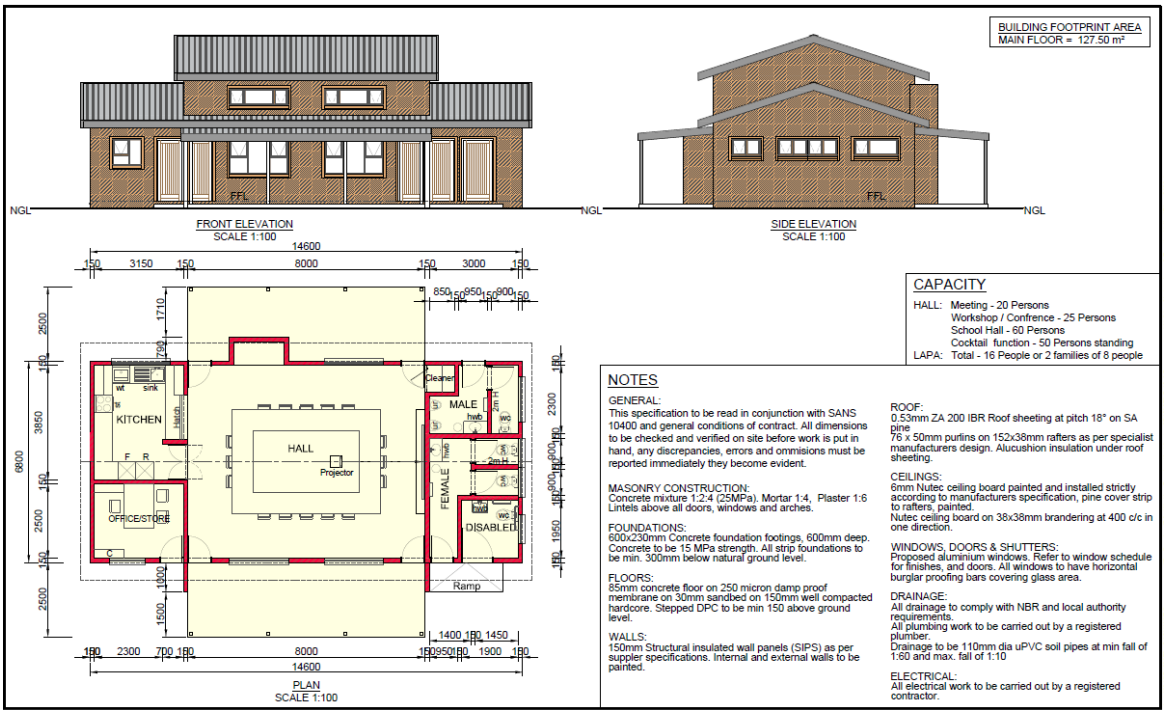

Figure 21: Lapa and function hall layout

6.3.4 Pool Ablutions

The pool ablutions with an area of 41.99m² includes male, female and disabled facilities as well as a cleaner store. Refer to the pool ablutions layout in the figure below:

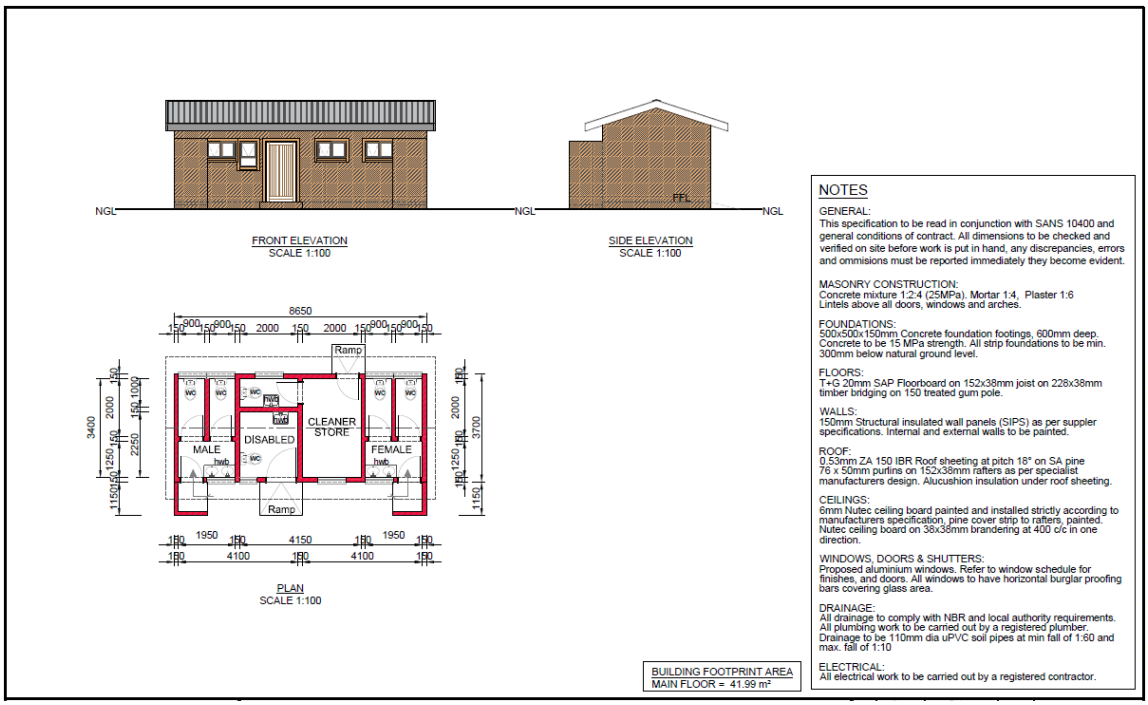

Figure 22: Pool ablution layout

6.3.5 Gate house

The gate house with an area of 41.99m² includes a waste enclosure as well as a shelter for a gate guard. Refer to the gate house layout in the figure below:

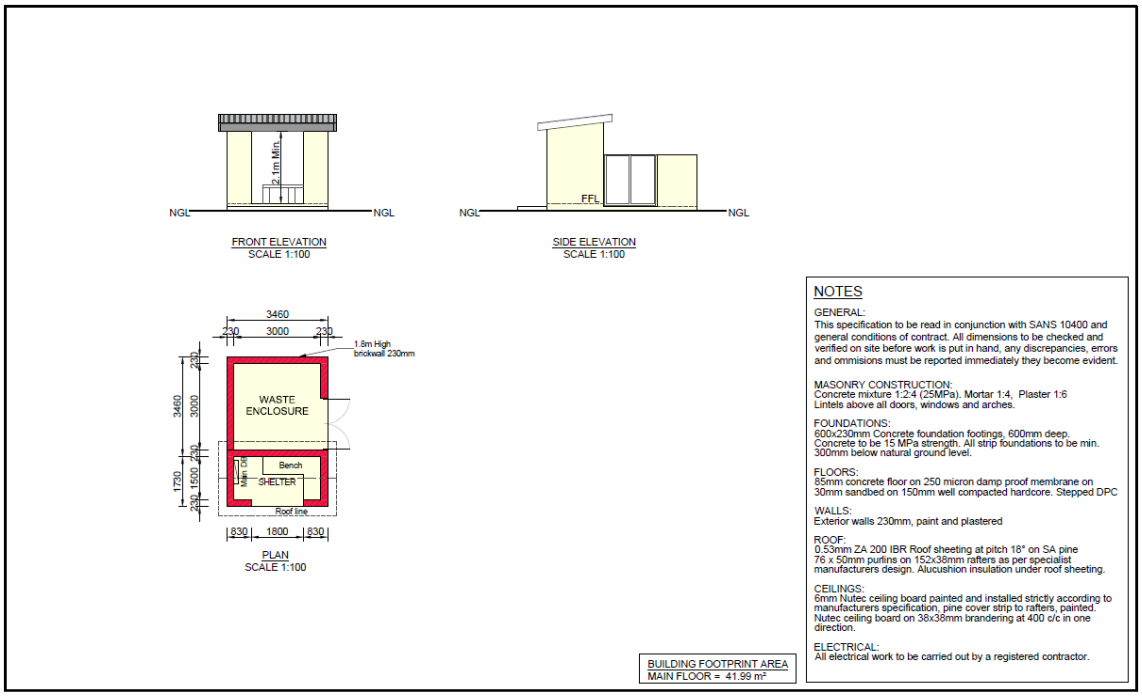

Figure 23: Gate house layout

6.4 Cottage & buildings construction materials

6.4.1 General

The gradient on the site is flat to undulating, with a slight slope to the south, and a steep slope on the south boundary. No natural slope instability is present. Lateral movement of stormwater will be moderate due to the flat to undulating gradient.

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.

6.4.2 Foundations and floor

Reinforced concrete strip footings, and a concrete floor will be adequate for the development. Fill areas to be adequately compacted to a minimum specification to be determined from the formal geotechnical investigation and detail design. The final floor surfacing will be tiles.

6.4.3 Walls and roof panels

While other traditional construction methods were considered it was decided that 150mm Structural Insulated Panels (SIPS) will be used for the construction of the walls and the

roof panels. Walls and roofs constructed in this manner are up to 4 times better insulated than similar brick buildings. Using SIPS roof panels do not require roof trusses making it very cost effective. The use of SIPS panels also allows for a clean building site and quick erection and is very cost effective.

A typical 150mm SIPS panel consists of a high density extruded polystyrene (EPS) core covered with a very strong Calcium silicate board bonded to it on both sides. The external finishing will consist of a 5mm paint plaster like Coprox or similar, which is a skim plaster, waterproofing agent and paint mix all in one.

The roof sheeting will consist of ZA200 grey coloured steel roof sheeting, specifically manufactured for seaside applications.
Some wooden features will be used for feature wall panels, the stoep veranda and balustrades.

6.4.4 Fenestration

Aluminium window frames in a Bronze colour will be used for the windows, and the doors will be natural wooden doors.

6.4.5 General fittings

Gas geysers will be used for hot water for the bathrooms and kitchen.
The stove can be anyone of the gas or induction hob types.
All lights fittings will be of the LED types.

7 CONCLUSIONS AND RECOMMENDATIONS

7.1 Conclusions

The following conclusions can be reached from the Engineering Services Report on the proposed development on erf 720, Dwarsweg, Mossel Bay:

1. The proposed development envisages 26 self-catering units, 10 single and 8 duette units, as holiday accommodation properties including the provision of open spaces. The proposed development also envisions a gate house with a waste enclosure, a lapa building and conference room next to the swimming pool and ablution facilities.
2. Current and proposed access to the development is obtained via HC Botha Street approximately 65m south of Morrison Road, Dwarsweg, Mossel Bay.
3. The in-situ materials found on site are adequate for the construction of engineering services and foundations for the development.
4. The proposed development is classified from an engineering bulk services perspective as an infill development with infill taking place via HC Botha Street south of Morrison Road, Dwarsweg, Mossel Bay. 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. Water:
    a. The site is serviced a 110mm uPVC line along HC Botha Street along the south-western boundary of the development.
    b. The Average Annual Daily Demand (AADD) for this proposed development is calculated at approximately 21.6kl/day. Peak factors will be considered during detail design stage.
6. Sewer:
    a. One drainage zone was identified for design and report purposes, namely zone A, which is draining in a general southern direction.
    b. The Average Dry Weather Flow (ADWF) of the development is estimated as 20.25kl/day.
    c. A municipal sewer network is not available in the area. The municipal sewer masterplan proposes a bulk sewer network to be provided for this area during the following 5 to 10 years. A pump station at De Dekke, Great Brak River, has recently been completed as a first phase for this network.

A pressure line along Morrison Road (MR348) has to be constructed to this pumpstation. A timeframe and phases for the roll-out of the network is not available in the masterplan.

d. Bulk sewer alternative 1, the preferred option, is the provision of a holding/conservancy tank (not septic tank) design. This holding/conservancy tank shall be designed and located in such a way as for the internal network's flow to easily convert/switch to the municipal system when it becomes available. A conservancy tank is a low capital cost solution. It has a low initial capital outlay and limited maintenance costs, but a high operational cost, hence only suitable for temporary measure. The conservancy tank will be gravity fed and has no treatment process. Sewer is accumulated in the concrete tank as holding measure only and is emptied on a regular basis. The concrete tank is highly resistant to degradation and remains stable over the long term, resulting in little maintenance costs. The tank has an underground footprint with very limited above-ground infrastructure visible, other than a manhole. The tank is supplied with odor-controlled ventilation and hence has no odor. The tank has no pumps or other mechanical parts and subsequently also has no noise pollution. Scraping or scarifying is not required. The internal sewer reticulation network for this development is designed to gravitate to the southern-eastern as well as the south western corner of the development property. These points are the lowest points on the property. The conservancy tanks will hence be situated on these points. Future small pump stations will be commissioned alongside the holding/conservancy tanks once the municipal line becomes available on Morrison Road (MR348). The conservancy tanks will hence be designed simultaneously as pump station sumps for this future role.

e. As a second alternative, the development may consider a sewer package plant, and then switch to the municipal system as soon as this becomes available in the next 5 to 10years. This option is not considered feasible due to the short term use of an expensive solution, only to be abandoned in a few years' time when connection to the municipal system will become a reality. This option is not the preferred option but has been presented for comprehensiveness. The package plant identified and specified for this development will be a Maskam Clarus Fusion. Treated effluent will be clear and odorless and will meet the Department of Water and Sanitation (DWS) General Standards. The treated effluent will be use as irrigation water within the property. The package plant reduces environmental risk as no raw sewer is accumulated and pumped from any low points and no environmental spill can subsequently occur. Inspection of the system will be performed by the estate supervisor daily. The plant will be serviced on a six-monthly basis through a maintenance contract.

7. Roads & access
    a. Current and proposed access to the development is obtained via HC Botha Street approximately 65m south of Morrison Road, Dwarsweg, Mossel Bay
    b. Sight distances at the proposed access point is excellent and satisfactory for development purposes in both the vertical and horizontal alignments.
8. A Traffic Impact Assessment (TIA) has been performed. The trip generation of the eventual fully developed proposed residential and commercial development is estimated at approximately 5 trips in the morning peak hour and 8 trips in the evening peak hour. The traffic impact of the proposed development will be negligible from a traffic engineering perspective. Refer to parallel TIA report.
9. Stormwater:
    a. Stormwater design on this proposed development is notable not only from an engineering perspective. A minor stormwater reticulation system will only be required at the development access next to HC Botha Street, provided by a combination of surfaced roadways, kerbs, channels, cut-off drains, stormwater pipes and various minor structures.
    b. Energy dissipation will be performed as standard practice with at all outlets as well as rooftop outlets.
    c. The proposed development is spanning over a watershed and two drainage zones are identified. The areas of the drainage zones are as follows:
        i. Zone A: 0.01ha
        ii. Zone B: 1.80ha;
    d. Stormwater for Zone A will be discharged into the existing municipal stormwater network in HB Botha street. Stormwater for Zone B will flow naturally in a southern direction into an unnamed minor natural stream south of the property.
10. A formal arrangement for the removal of solid waste needs to be entered into with the Mossel Bay Municipality

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.

7.2 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, relevant provincial government departments and other authorities, 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.

8 ADDENDA

8.1 Addendum 1 – Site Development Plans

8.2 Addendum 2 – Municipal approval letters

8.3 Addendum 3 – Preliminary design drawings

8.4 Addendum 4 – Electrical services report

ADDENDUM 1

SITE DEVELOPMENT PLANS

Rev.	Date	Description	Rev. by
R	02/02/2024	MOVED CONSERVANCY TANK ON EASTERN SIDE	MP
Q	24/01/2024	AMMENDMENTS AS PER ENVIRONMENTAL AFFAIRS' COMMENTS	MP
P	21/08/2023	CONSERVANCY TANKS ADDED	MP
N	16/11/2022	ENVIRONMENTAL CORRIDOR ADDED	MP
M	24/03/2022	FIRE BREAK ADDED	TS
L	16/11/2021	PARKING ADDED AND UNITS MOVED	TS
K	14/09/2021	CADASTRAL DATA ADDED	TS
J	16/08/2021	FOR APPROVAL	TS

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Tel. (044) 874 5207 | Cell. 082 569 2488 | E-pos/E-mail: se klerk@mweb.co.za

Client/Employer
KAAPLAND ONDERWYS TRUST

Project
PROPOSED DWARSWEGSTRAND DEVELOPMENT

Plan Description
FINAL VERSION
SITE DEVELOPMENT PLAN & SERVICES LAYOUT

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

Scale: 1:500
ORIGINAL SIZE A1
Contract No.: 1903141
Drawing No.: 1903141/C/100
Revision: R

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ADDENDUM 2

MUNICIPAL APPROVAL LETTERS

www.mosselbay.gov.za
admin@mosselbay.gov.za
Fax, ifeksi: +27 (44) 606 5062
Tel, Imfononfono: +27 (44) 606 5000

Mossel Bay
MUNICIPALITY
MOSSEL BAY | HARTENBOS | GREAT BRAK RIVER | HERBERTSDALE

In antwoord verwys na nommer
In reply quote number 15/1/2 J Cox
Xa Uphendula chaza Le Nombolo

14 November 2022

Element Consulting Engineers
PO Box 9962
GEORGE
6530

Attention: Mr Hannes Lourens

Dear Sir

PROPOSED DEVELOPMENT OF ERF720 KOT DWARSWEGSTRAND: APPROVAL IN PRINCIPLE OF ENGINEERING SERVICES REPORT

Our discussions with regards to the abovementioned proposed development as well as your report titled "PROPOSED RESIDENTIAL DEVELOPMENT ON ERF 720, DWARSWEGSTRAND, MOSSEL BAY – ENGINEERING SERVICES REPORT – NOVEMBER 2021" hereby refer.

We confirm our approval in principle of the report and detail contained therein. The approval is subject to the submission of detailed design drawings to the office of the Director: Infrastructure Services for consideration as well as the compilation, approval and signing of a services agreement between the Developer and the Municipality.

Yours faithfully

pp **S. NAIDOO**
DIRECTOR: INFRASTRUCTURE SERVICES

MOSSEL BAY MUNICIPALITY
MOSSELBAAI MUNISIPALITEIT
UMASIPALA MOSSEL BAYI

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2007 Rapport Dorp van die Jaar
2016 National Greenest Town
2017 Kwêla Town of the Year!

11 February 2020

Element Consulting Engineers
P.O. Box 9962
GEORGE
6530

Attention: Mr. J. Fourie

Dear Sir

APPLICATION FOR ELECTRICAL SUPPLY POINT: DWARSWEG DEVELOPMENT (PORTION OF ERF 720, GLENTANA

I hereby approve your application for a 100kVA electrical supply point at erf 720, Dwarsweg, Glentana.

All medium/ low voltage reticulation streetlights and metering will be for the account of the developer. Capital Contribution is payable at the ruling rate.

Yours faithfully

pp.
S. NAIDOO
DIRECTOR: INFRASTRUCTURE SERVICES

/wf

ADDENDUM 3

PRELIMINARY DESIGN DRAWINGS

Rev.	Date	Description	Rev. by
R	02/02/2024	MOVED CONSERVANCY TANK ON EASTERN SIDE	MP
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Tel. (044) 874 5207 | Cell. 082 569 2488 | E-pos/E-mail: se klerk@mweb.co.za

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Drawing No.: 1903141/C/100
Revision: R

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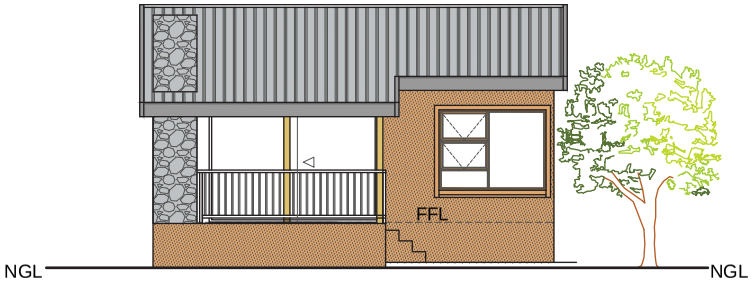

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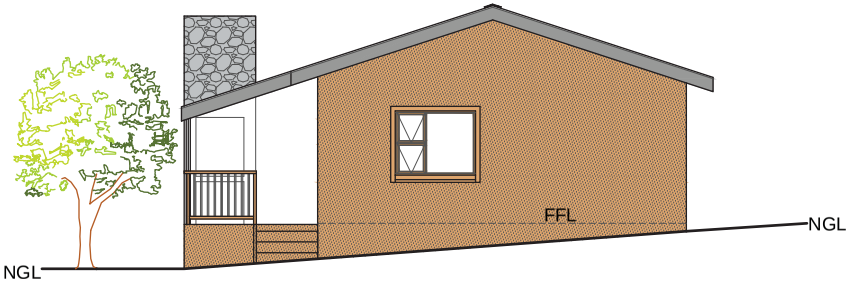

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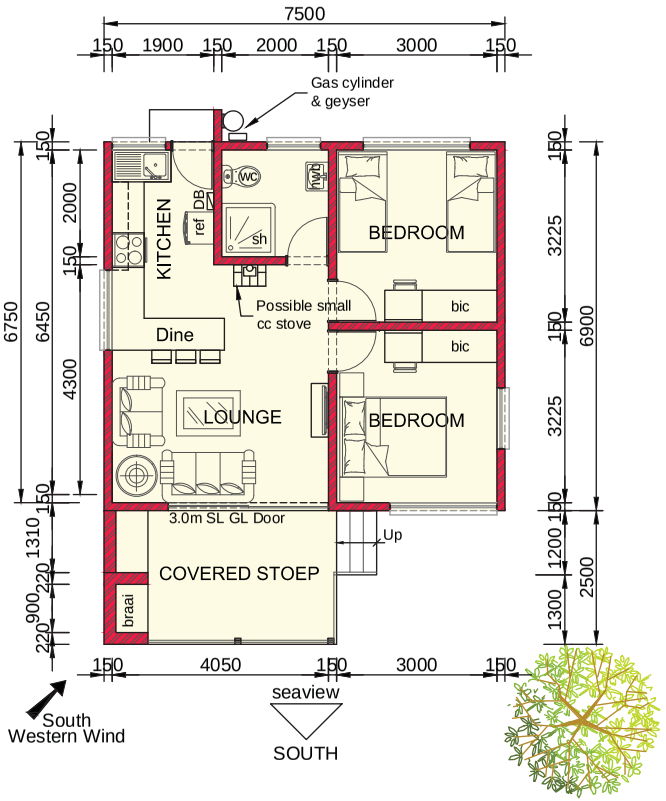

PLAN
FINAL VERSION 2
(2 Bedroom)

BUILDING FOOTPRINT AREA	
MAIN FLOOR	= 51.75 m²
STOEP	= 10.87 m²
TOTAL	= 62.62 m²

NOTES

GENERAL:
This specification to be read in conjunction with SANS 10400 and general conditions of contract. All dimensions to be checked and verified on site before work is put in hand, any discrepancies, errors and ommisions must be reported immediately they become evident.

MASONRY CONSTRUCTION:
Concrete mixture 1:2:4 (25MPa). Mortar 1:4, Plaster 1:6
Lintels above all doors, windows and arches.

FOUNDATIONS:
500x500x150mm Concrete foundation footings, 600mm deep.
Concrete to be 15 MPa strength. All strip foundations to be min. 300mm below natural ground level.

FLOORS:
T+G 20mm SAP Floorboard on 152x38mm joist on 228x38mm timber bridging on 150 treated gum pole.

WALLS:
150mm Structural insulated wall panels (SIPS) as per suppler specifications. Internal and external walls to be painted.

ROOF:
0.53mm ZA 150 IBR Roof sheeting at pitch 18° on SA pine
76 x 50mm purlins on 152x38mm rafters as per specialist manufacturers design. Alucushion insulation under roof sheeting.

CEILINGS:
6mm Nutec ceiling board painted and installed strictly according to manufacturers specification, pine cover strip to rafters, painted. Nutec ceiling board on 38x38mm brandering at 400 c/c in one direction.

WINDOWS, DOORS & SHUTTERS:
Proposed aluminium windows. Refer to window schedule for finishes, and doors. All windows to have horizontal burglar proofing bars covering glass area.

DRAINAGE:
All drainage to comply with NBR and local authority requirements. All plumbing work to be carried out by a registered plumber. Drainage to be 110mm dia uPVC soil pipes at min fall of 1:60 and max. fall of 1:10.

ELECTRICAL:
All electrical work to be carried out by a registered contractor.

NOTES:
Houses to be on poles ± 750mm above NGL.

ELEMENT Consulting Engineers
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P O Box 9962, George, 6529
Tel: +27 44 884 1138
Fax: +27 44 884 1185
E-Mail: info@eceng.co.za

Client / Employer: K.O.T.
Project: PROPOSED DWARSWEGSRAND DEVELOPMENT
Plan Description: DWARSWEGSTRAND HOLIDAY CHALETS - FINAL VERSION 2 (2 Bedroom)

	Name	Signature
Designed	JS	
Drawn	TS	
Checked	JS	
Approved	HL	
Pr. No.		

Scale: 1:100
0 5 10 15 20mm
ORIGINAL SIZE A3
Contract No.: P190070
Drawing No.: P190070/C/11
Revision: A

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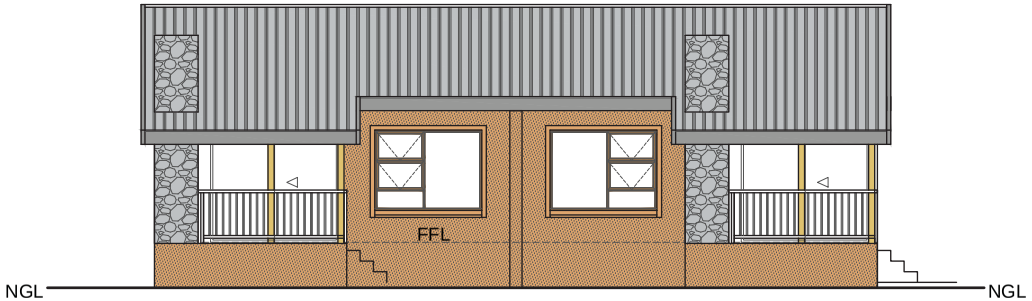

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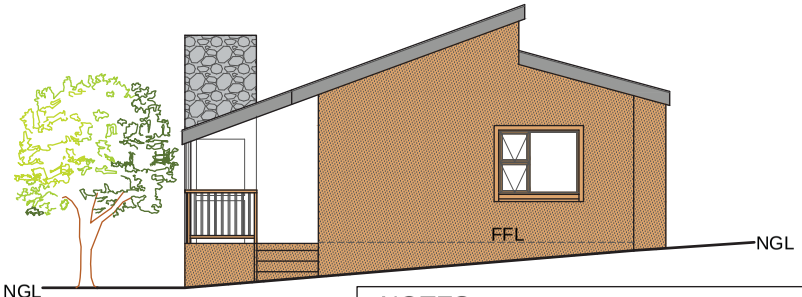

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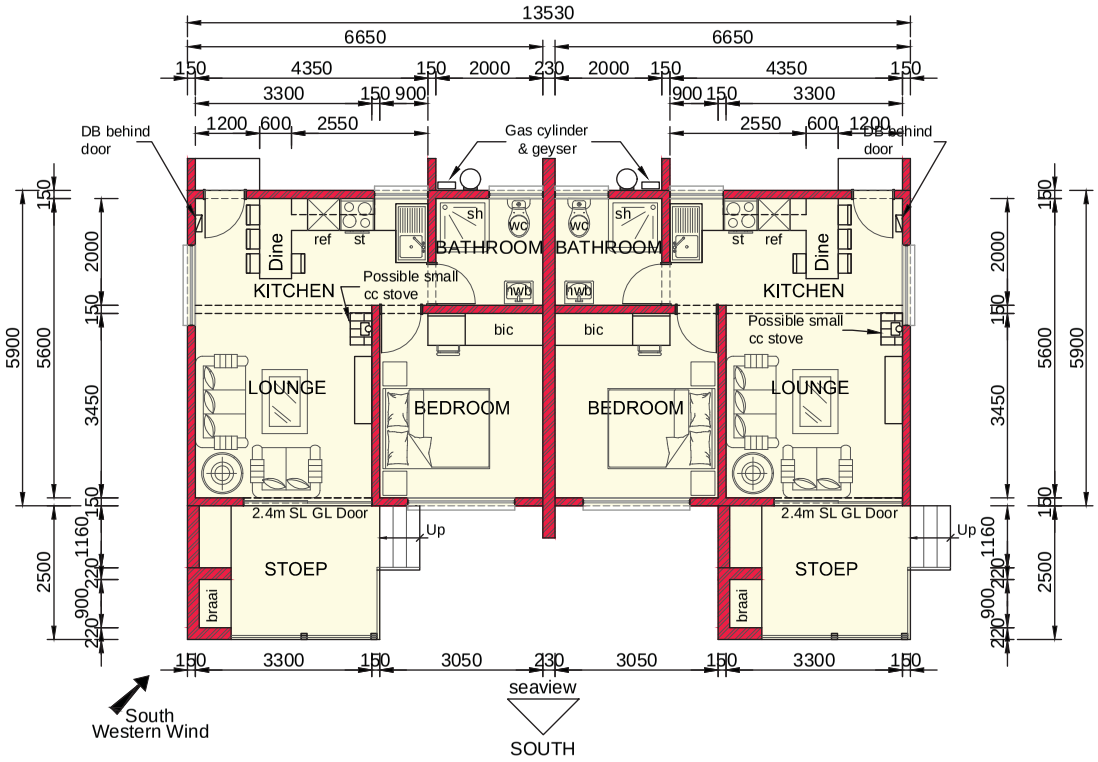

PLAN
FINAL VERSION 3
(Double)

BUILDING FOOTPRINT AREA	
MAIN FLOOR	= 79.82 m²
STOEP	= 18.00 m²
TOTAL	= 97.82 m²

NOTES

GENERAL:
This specification to be read in conjunction with SANS 10400 and general conditions of contract. All dimensions to be checked and verified on site before work is put in hand, any discrepancies, errors and ommisions must be reported immediately they become evident.

MASONRY CONSTRUCTION:
Concrete mixture 1:2:4 (25MPa). Mortar 1:4, Plaster 1:6
Lintels above all doors, windows and arches.

FOUNDATIONS:
500x500x150mm Concrete foundation footings, 600mm deep.
Concrete to be 15 MPa strength. All strip foundations to be min. 300mm below natural ground level.

FLOORS:
T+G 20mm SAP Floorboard on 152x38mm joist on 228x38mm timber bridging on 150 treated gum pole.

WALLS:
150mm Structural insulated wall panels (SIPS) as per suppler specifications. Internal and external walls to be painted.

ROOF:
0.53mm ZA 150 IBR Roof sheeting at pitch 18° on SA pine
76 x 50mm purlins on 152x38mm rafters as per specialist manufacturers design. Alucushion insulation under roof sheeting.

CEILINGS:
6mm Nutec ceiling board painted and installed strictly according to manufacturers specification, pine cover strip to rafters, painted. Nutec ceiling board on 38x38mm brandering at 400 c/c in one direction.

WINDOWS, DOORS & SHUTTERS:
Proposed aluminium windows. Refer to window schedule for finishes, and doors. All windows to have horizontal burglar proofing bars covering glass area.

DRAINAGE:
All drainage to comply with NBR and local authority requirements. All plumbing work to be carried out by a registered plumber. Drainage to be 110mm dia uPVC soil pipes at min fall of 1:60 and max. fall of 1:10

ELECTRICAL:
All electrical work to be carried out by a registered contractor.

NOTES:
Houses to be on poles ± 750mm above NGL.

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Client / Employer
K.O.T.

Project
PROPOSED DWARSWEGSRAND DEVELOPMENT

Plan Description
DWARSWEGSTRAND HOLIDAY CHALETS -
FINAL VERSION 3 (Double)

	Name	Signature
Designed	JS	
Drawn	TS	
Checked	JS	
Approved	HL	
Pr. No.		

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Contract No. P190070
Drawing No. P190070/C/12
Revision A

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ADDENDUM 4

ELECTRICAL SERVICES REPORT

ELEMENT
Consulting Engineers
A FIFTH DIMENSION TO ENGINEERING

KAAPLANDSE ONDERWYS TRUST

PROPOSED RESIDENTIAL DEVELOPMENT ON ERF 720, DWARSWEGSTRAND, MOSSEL BAY

ELECTRICAL SERVICES INVESTIGATION REPORT

March 2020

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George, Western Cape
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George, 6530
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DOCUMENT CONTROL SHEET

Compiled By:	…….. Jako Fourie	…….. Date
Reviewed By:	…… Hannes Lourens	…….. Date

Revision	Description	Date Issued	Revision By:
00	First Submission	13 Mar 2020	SJF

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ELECTRICAL SERVICES INVESTIGATION REPORT

CONTENTS

1 INTRODUCTION

Element Consulting Engineers have been appointed by Kaaplandse Onderwys Trust (K.O.T) for the rendering of professional electrical engineering services for the proposed development of Erf 720, Dwarsweg, Mossel Bay.

The project proposes the development of 25 self-catering units as holiday accommodation properties, including the provision of 9,470m^2 open spaces.

A number of pre-application meetings have been held with officials from the local municipality to discuss the development as well as the requirements for the application submission.

This report covers the results from the investigation and the discussions held with the Local Supply Authorities in this regard. The report also considers preliminary design philosophies with regard to the medium voltage (MV) and low voltage (LV) reticulation requirements for the overall development for the purpose of compiling a Budget Cost Estimate.

All of the solutions provided are based on preliminary discussions and are subject to final approval by the Mossel Bay Municipality's Electrical Department.

The aim of this Report is the following:

i. Investigate alternatives for providing bulk electrical services to the development site;
ii. High level calculation of electrical load requirements;
iii. Determine available capacity on the supply network for this development;
iv. Identify limitations with regard to capacity available;
v. Identify specific requirements from the Municipality (Supply Authority);
vi. Compilation of a cost estimate;
vii. Conclusions and recommendations on options investigated;

2 BULK ELECTRICAL SUPPLY

The diagram below depicts an extract from the municipality's master plan drawing for the MV reticulation in the area of the proposed development.

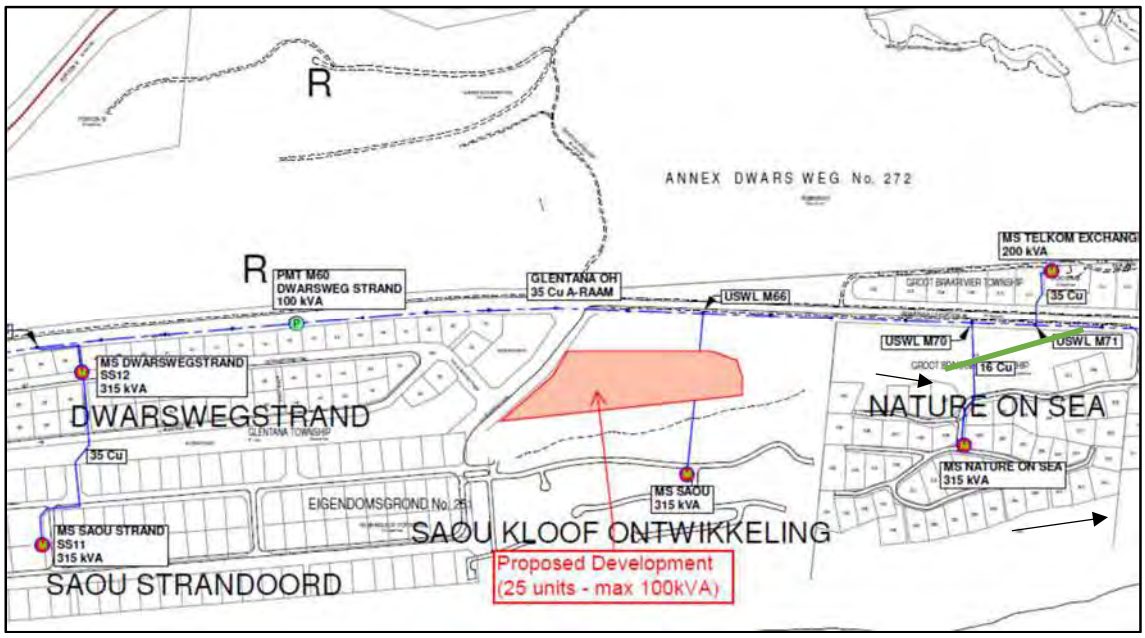

Figure 1: Existing Electrical MV Infrastructure

Investigations on site and discussions with the Mossel Bay Municipality indicated that the best possible solution for the supply to the proposed development, would be from the existing 11kV, 35mm^2 copper overhead line, which runs along the northern side of the development in Morrison Road. Figure 2 indicates the position of the existing overhead line on the corner of Morrison and HC Botha street.

Figure 2: Exiting 11kV Overhead Line

Due to the fact that only 100kVA will be required for the proposed development, it was agreed with the Mossel Bay Municipality that the most cost-effective solution would be the installation of a pole-mounted transformer (11kV/400, 100kVA) on the closest, existing wooden pole structure to the entrance to the development. The specific structure identified is shown in Figure 3 below. This structure is approximately 50m away from the turn-off into HC Botha street from Morrison road.

Figure 3: Proposed Pole-mounted Transformer Position

A bulk LV metering point will be supplied via a pole-mounted metering box on the same structure, below the 100kVA pole-mounted transformer, which will provide easy and direct access to the Municipality for meter-reading and maintenance access.

A new LV supply cable (underground) will be installed from the bottom of the metering kiosk to the entrance of the new development, from where the rest of the reticulation to the holiday units and area lighting will be facilitated.

3 SPECIFIC ELECTRICAL REQUIREMENTS

3.1 Load Forecast

The following design criteria is used for calculation of consumption for the development:

- Load criteria:
  - Holiday Units (<120 m^2 each) – 3.5 kVA

- Diversity factor – 0.9

The calculation of the diversified load for the development, based on 25 holiday accommodation units, is calculated to be approximately 80kVA.

3.2 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.

3.3 Internal Low Voltage Electrical Reticulation

An internal low voltage reticulation network will be provided from the new pole-mounted transformer to standard street-front kiosks (9-way) for the units and all cabling will be installed underground.

Metering will be in the form of a bulk LV meter, to be installed in the pole-mounted metering kiosk, below the transformer and will comply with the specifications of the Mossel Bay Municipality.

Decorative and energy saving area lighting will be provided for the development and will be supplied from the LV kiosks.

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

4 PRELIMINARY COST ESTIMATES

Table 4-1: Preliminary Cost Estimate: Bulk Electrical Infrastructure

Preliminary Cost Estimate: Bulk Electrical Infrastructure	
Description	**Amount**
Supply & Installation of 100kVA Pole-mounted Transformer	R 65 000
Supply and Installation of MV Fuse/Cut-out Unit	R 5 000
Supply and Installation of Metering Kiosk (complete with Bulk LV Meter)	R 15 000
Sub Total	**R 85 000**
P&G's, contingencies & escalation	R 10 000
Sub-total	**R 95 000**
VAT (15%)	R 14 250
Total (Incl. VAT)	**R 109 250**

Table 4-2: Preliminary Cost Estimate: Internal Electrical Infrastructure

Preliminary Cost Estimate: Internal Electrical Infrastructure	
Description	**Amount**
LV Reticulation	R 304 930
Service Connections	R 169 495
Area Lighting	R 175 915
Sub Total	**R 650 340**
P&G's, contingencies & escalation	R 65 000
Sub-total	**R 715 340**
VAT (15%)	R 107 301
Total	**R 822 641**

5 CONCLUSIONS AND RECOMMENDATIONS

Sufficient capacity is available on the existing 11kV reticulation network (from the existing 11kV, 35mm^2 copper overhead line (which runs along the northern side of the development in Morrison Road), to supply the estimated load of 80kVA to the proposed new development.

A pole-mounted transformer (11kV/400, 100kVA) will be installed on the closest, existing wooden pole structure to the entrance to the development. A bulk LV metering point will be provided at the transformer, from where the reticulation of an 400V network into the development will be supplied.

The cost of these bulk infrastructure upgrades will be discussed with the municipality in terms of deductions from capital contributions.

The entire design of the electrical network will be such that it complies with the standards and specifications of the Mossel Bay Municipality.