

## Plett Lagoon Estate

Erf 6503, Plettenberg Bay, Western Cape



## Civil Engineering Services Report

Revision: E (July 2024)

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# 1. Executive Summary

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VITA Consulting Engineers has been appointed by Plett Lagoon Estate (Pty) Ltd as the Civil Engineering Consultants for the proposed development on Erf 6503, Plettenberg Bay.

The proposed rezoning is for a split-zoning, consisting of the following:

- Residential Zone I: 2.27ha
- Residential Zone II: 4.07ha
- Open Space Zone II: 0.37ha
- Open Space Zone III: 10.58ha
- Transport Zone III: 1.83ha

The proposed development is classified as a Greenfields Development, consisting of the following amenities:

- Single Residential: 9 Erven
- General Residential: 41 Erven
- Guardhouse, refuse room, etc.

The objective of this report is to address all civil engineering issues generated by the proposed development and to provide sufficient information to the local and provincial authorities in terms of the required roads- and civil engineering infrastructure for the proposed residential development.

The following documents and guidelines have been used in the civil services infrastructure design and management implementation of this development:

- The Topographical Survey compiled by VPM Surveys (*7 February 2023*)
- TIA completed by UDS (*March 2024*)
- The Sub-division plan compiled by Marike Vreken Town Planners (*February 2024*)
- Municipal Services Capacity Analysis Report compiled by GLS Consulting (*27 February 2023*)
- Guidelines for Human Settlement Planning and Design (*CSIR "Red Book"*)
- The South African National Roads Agency Limited: Drainage Manual

## 2. Locality

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The development site is situated on Erf 6503, Plettenberg Bay. The site is approximately 19.11 hectares in extent and is situated on the north-eastern outskirts of Plettenberg Bay, approximately 1.5km from the CBD. The development is located within the Bitou Municipal district.

The site has an irregular polygonal shape and is bordered by Portion 52 of Farm 444 (*northern boundary*), the Keurbooms river estuary (*eastern boundary*), undeveloped Erf 6504 (*southern boundary*) and Plettenberg Bay Primary School (*western boundary*). Access to the site is gained via Beacon Way, off the School/Checkers access road (*Erf 7996*) on the south-western corner of the site.



Figure 2-1: Locality - Portion 38 of Farm 444, Plettenberg Bay (*Cape Farm Mapper*)

### 3. Pre-Development Conditions

The pre-development site is mostly undeveloped, with an existing residential dwelling and outbuildings located near the northern corner of the site.

#### 3.1 Site Topography

The topographical survey indicates that the property has a varying topography with fairly flat slopes along the north-western boundary to steep slopes situated along a north/south axis through the centre of the property. The highest portion of the property is situated near the south-western corner of the site with an approximate level of 18 msl. The lowest portion of the site is situated on the eastern boundary (*estuary*) of the site, with an approximate level of 1 msl.

The residential portion of the development will be situated on the fairly flat portion of the property, along the western boundary up to the north/south ridge. The steep slopes for this portion of the property vary between 6% (*maximum*) and 2.5% (*minimum*).

The Open Space III portion has fairly flat slopes towards the Keurbooms estuary and is situated below the 5m contour.

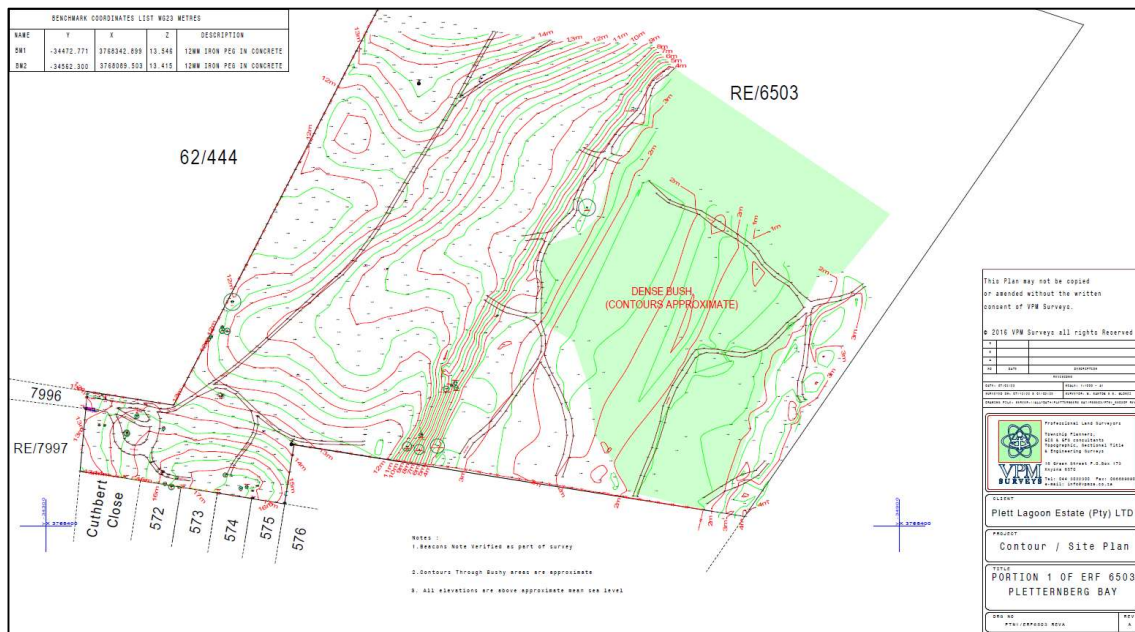


Figure 3-1: Topographical Contours (VPM Surveys - February 2023) - Appendix A

#### 3.2 Site Vegetation

The western portion of the site is covered by short grass and weeds, while the eastern portion of the site is covered by dense vegetation/thicket, including indigenous fynbos, milkwoods and shrubs. A biodiversity investigation was compiled to determine the extent of the environmental sensitive areas on site. The biodiversity sensitivity map was used to determine the proposed cadastral layout to ensure that the erven and roads/civil services infrastructure do not encroach into environmentally sensitive areas.



Figure 2-2: Environmental Sensitive Areas



Figure 3-3: Environmental Sensitive Vegetation towards Keurbooms River

### 3.3 Site Geology

The site is situated on the Kirkwood Formation (*Uitenhage Group*). The insitu materials on site is characterized by a relatively consistent soils profile. The site is underlain by Quaternary aeolian sands of several meters thick. These aeolion sands are overlain by medium dense, fine silty sand. A dense root-bed with organic rich topsoil of approximately 0mm-300mm thickness make up the top portion of the natural soil profile.

The soils on site are classified as "Soft Excavation" in terms of the SABS 1200 DM specifications. The sands are classified as non-plastic, with an estimated friction angle of approximately 30°, with no apparent cohesion.

The sands have an expected bearing capacity of approximately 100-125kPA, which will/must be confirmed by a suitable structural engineer for each individual units' foundations.

The sands have a very high permeability, which is estimated to be  $10^{-3}$  mm/s or 86mm/day.

## 4. Description of the Proposed Development

The proposed development will consist of Residential Zone I (9 x *single residential erven*), Residential Zone II (41 x *single residential erven*), Open Space Zone II (*amenities*), Open Space Zone III (*private nature reserve*) and Transport Zone III (*private streets*).

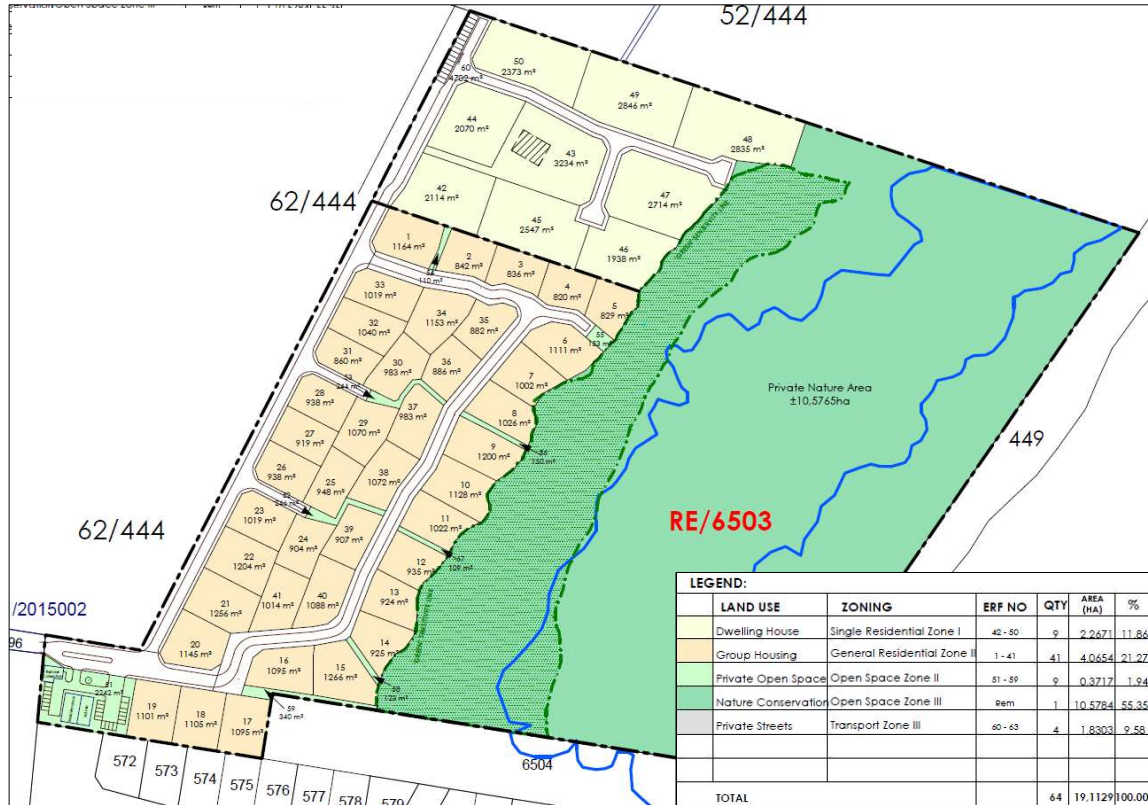


Figure 4-1: Proposed Zoning Layout (Marius Vreken Urban and Environmental Planners) - Appendix B

The "Open Space III" (10.58ha) portion of the development will serve as a "private nature reserve" which will be managed and owned by the development's Body Corporate.



## 5. Site Clearance

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All road reserves and services corridors (*situated outside the environmentally sensitive areas*) will be cleared of vegetation and the top 0 - 300mm of organic rich topsoil will be stripped and stockpiled for re-use as part of the landscaping.

All existing structures which do not form part of the new development (*i.e. residential dwelling and outbuildings*) will be demolished and rubble will be removed from site.

Due to the environmentally sensitive natural vegetation on site, care will/must be taken to not disturb any areas outside of the required civil works footprint.

## 6. Roads and Parking Areas

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### 6.1 External Roads

UDS (Pty) Ltd was commissioned to compile a traffic impact statement for the proposed development and their findings were included in a report (*refer to Appendix B*). The Traffic Statement, along with the findings and recommendations were submitted to- and discussed with Bitou Municipality (*20 June 2023*).

The UDS Traffic Statement originally proposed that the access to the development should be off the existing School & Checkers Yard Access Road (*Erf 7996*).



Figure 6-1: Beacon Way/School & Checkers Yard Access Road Intersection

Bitou municipality stated that although they would consider the findings of the traffic statement, they would prefer that access to the development be provided through the southern boundary onto the Susan Road reserve. The reasoning behind this request was because of the existing congestion caused at the Beacon Way/School road intersection as a result of the peak school traffic.

As part of the public participation process for the Environmental Assessment, the Poortjies Residents stated that the proposed access through Poortjies is not desirable as the increased traffic would be detrimental to the existing suburb.

Subsequent meetings with Bitou Municipal officials concluded that the initial access through Beacon Way/School intersection would be acceptable if the intersection is upgraded to a formal traffic circle. The proposed traffic circle layout (*refer Appendix C.1*) was approved by

Bitou Municipality (refer Appendix C.2) on 14 February 2024. The upgrading of the intersection (and associated costs) will be the responsibility of the development (Erf 6503).

The updated UDS Traffic Statement concluded that the development should be endorsed on the following conditions:

- Sufficient stacking space exceeding 14metres must be provided at the entrance
- A minimum entry lane width of 4 metres must be provided at the entrance.
- Sufficient sight distance must be allowed for in the placement of trees (*internal roads*)
- Sufficient space must be provided for vehicles reversing out of driveways
- Traffic calming measures must be implemented along roads within the development longer than 100-metres.
- A pedestrian gate be considered on the western boundary of the development, providing access to the school and retail areas.
- That access be reverted to the previous proposal via the Poortjies residential area

## 6.2 Internal Roads and Parking Areas

The design philosophy for the proposed internal road network will be similar to that of a typical urban road network, which includes a minimum 2.0% crossfall and 0.5% longitudinal slope. This road network will consist out of 5.5m wide brick paved roads with formal kerbs/edgings, roadside channels and a stormwater drainage network.

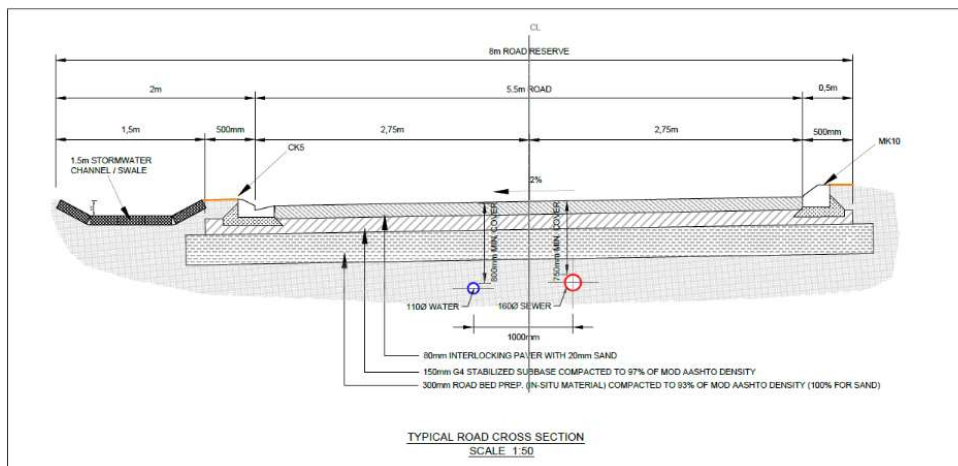


Figure 6-2: Road Cross Section

The internal roads/parking areas have been designed for low heavy vehicle traffic (*construction vehicles, furniture removal and refuse trucks*) and makes allowance for the insitu subgrade conditions.

- Road Category C/D (TRH4) or UC (UTG)
- Pavement Class ES 0.1 (TRH4).
- Structural design period 20 years
- Surface finish: Concrete Paving

Each single residential unit will have a double garage and two additional parking bays in front of the garage.

## 7. Stormwater Drainage

### 7.1 Existing Municipal Stormwater Network

The pre-development site drains from the higher laying western boundary towards the lower laying eastern boundary.



Figure 7-1: Overland drainage patterns

There is no formal bulk municipal stormwater infrastructure in the vicinity of the site. The high permeability of the insitu sands ensures that all stormwater run-off permeates into the subsoil layers and a formalised bulk stormwater connection for the development is not required.

The residential dwellings, roads- and civil infrastructure has been positioned to fall above the pre-scribed 5m contour.

### 7.2 Hydrological Data

The nearest SAWB weather station to the development site is Plettenberg Bay (POL).

|                                      |       |                         |        |        |        |         |
|--------------------------------------|-------|-------------------------|--------|--------|--------|---------|
| Weather Service Station              |       | Plettenberg Bay (POL)   |        |        |        |         |
| Weather Station Number               |       | 0014633W                |        |        |        |         |
| Mean Annual Precipitation            |       | 647mm                   |        |        |        |         |
| Coordinates (Longitude and Latitude) |       | Long: 34°3' Lat: 23°22' |        |        |        |         |
| Return Period                        | 1:2yr | 1:5yr                   | 1:10yr | 1:20yr | 1:50yr | 1:100yr |
| 1 Day                                | 56mm  | 83mm                    | 104mm  | 128mm  | 163mm  | 194mm   |

Table 1: SAWB 0014633W: Plettenberg Bay (Lat: 34° 3' Long: 23° 22')

The hydrological rainfall data of rainfall station, Plettenberg Bay (POL), was used for all stormwater run-off calculations.

### 7.3 Run-off Factors

The pre-development topography, soil conditions and undergrowth were used to calculate the following pre-development run-off factors:

$$C_{pre} = (C_s + C_p + C_v) \times DF \times F_t$$

| Return Period    | 1:2yr | 1:5yr | 1:10yr | 1:20yr | 1:50yr | 1:100yr |
|------------------|-------|-------|--------|--------|--------|---------|
| Run-off factor C | 0.111 | 0.122 | 0.133  | 0.149  | 0.184  | 0.222   |

Table 2: Pre-development Run-off Coefficient

The development will not add substantial hard/impermeable surfaces to the catchment area (*less than 10%*) and will therefore have little impact on the run-off coefficients. The post-development run-off coefficients were calculated to be:

$$C_{post} = (C_{lawn} + C_{Residential} + C_{industry} + C_{business}) \times F_t$$

| Return Period    | 1:2yr | 1:5yr | 1:10yr | 1:20yr | 1:50yr | 1:100yr |
|------------------|-------|-------|--------|--------|--------|---------|
| Run-off factor C | 0.134 | 0.147 | 0.161  | 0.179  | 0.222  | 0.268   |

Table 3: Post-development Run-off Coefficients

### 7.4 Peak Flows

The pre- and post-development peak flows were calculated to be:

$$Q = \frac{C \times I \times A}{3600}$$

| Return Period                 | 1:2yr | 1:5yr | 1:10yr | 1:20yr | 1:50yr | 1:100yr |
|-------------------------------|-------|-------|--------|--------|--------|---------|
| Pre-development<br>(19.11ha)  | 0.284 | 0.528 | 0.753  | 1.039  | 1.611  | 2.236   |
| Post-development<br>(19.11ha) | 0.343 | 0.636 | 0.908  | 1.253  | 1.943  | 2.697   |

Table 4: Peak Flow rates in m<sup>3</sup>/s

## 7.5 Internal Stormwater Network

The standard stormwater design principle, as set out in section 1 will be implemented in the planning and design of the internal stormwater system.

The following minimum design specifications will be implemented:

- Minimum pipe specification: Class 75 D Concrete spigot & socket pipes
- Minimum pipe diameter: 375mm Nominal diameter
- Minimum design flow: 1.0m/s inside a half-full pipe
- Maximum spacing between manholes/inlets: 80m

An open swale stormwater network will be designed to have sufficient capacity to adequately manage and convey up to a 1:5year rainfall event. The open swales network will follow the road network and will have inlet structures and pipe culverts at road crossings. For rainfall events with a return period larger than 1:5 year, the internal roadways will act as overland flow routes which will convey stormwater run-off towards the lower lying eastern portion of the site, where it will follow the existing natural drainage routes and permeate through the insitu soils in to the subsurface water reserves.

The cohesion of the dune sands is very poor and will therefore be very susceptible to erosion. The following erosion preventative measures will be incorporated in the detail stormwater design:

- Concentration of stormwater will be minimised to prevent high volume/flow rates
- Hard surface run-off (*driveways*) will be routed into swales via the internal roadways
- Sheetflow into open swales will be promoted to maximise contact time with permeable dune sands
- All channels with an internal velocity higher than 1m/s will be formalised (*armorflex*)
- All unlined channels will be landscaped with appropriate vegetation
- Energy dissipation structures will be installed at high energy discharge points

Due to the likely occurrence of a seasonal perched ground water table, provision will be made for a subsoil drainage network beneath the roads. The subsoil drainage network will consist of a 110mm diameter perforated pipe network installed 800mm below the final road level.

## 7.6 Energy dissipation structures

Energy dissipation structures will be installed at the swale discharge points, which will fall outside of the 32m bufferzone. The proposed energy dissipation structures will be constructed from gabion baskets which will create two weirs where the velocity/energy of the run-off will be lowered in order to prevent downstream erosion.

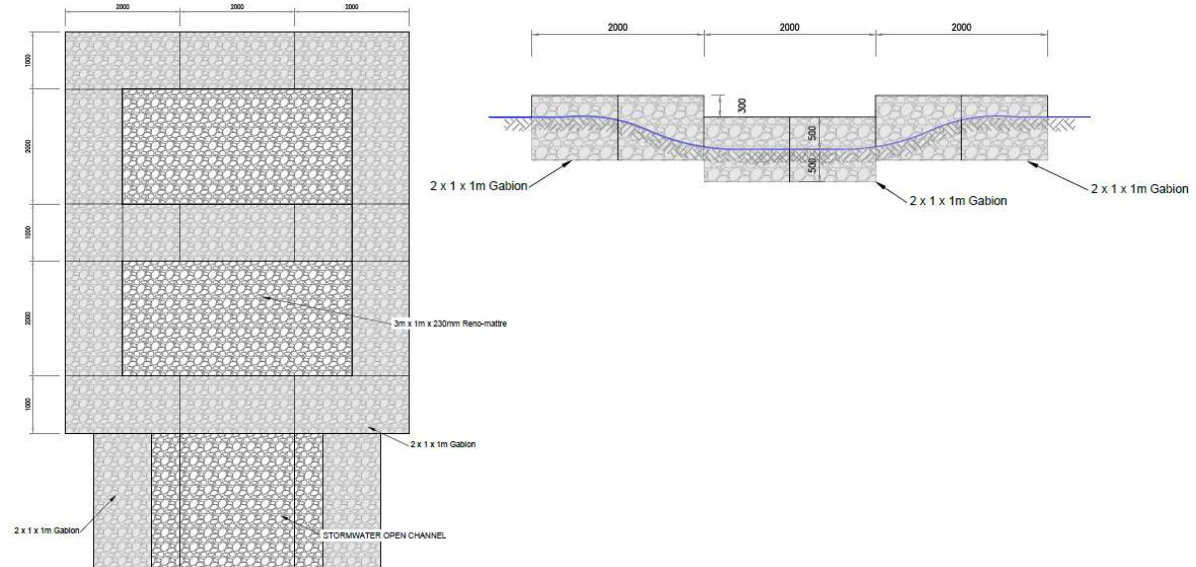


Figure 7-2: Typical gabions energy dissipation structure.

## 7.7 Attenuation and Treatment

The secondary purpose of the open swale network will be to attenuate peak flows to pre-development rates and treat stormwater run-off.

The attenuation requirement, reducing the post-development peak flows to pre-development flow rates, were calculated using the ABT & GRIGG formula:

$$V_{st} = 60 \left( \frac{1+m}{2} \right) q_p a t_{ca} (1-a)^2$$

|                      | 1:2yr | 1:5yr | 1:10yr | 1:20yr | 1:50yr |
|----------------------|-------|-------|--------|--------|--------|
| Attenuation Required | 9.01  | 16.72 | 23.87  | 32.93  | 51.07  |

Table 5: Attenuation Requirement in m<sup>3</sup>

The internal stormwater network makes allowance for the required attenuation volumes through the detention capacity and percolation rate of the stormwater swales. The gradient

inside the swales will be less than the pre-development crossfalls, allowing stormwater runoff to accumulate inside the swales, providing more contact time with the permeable insitu dune sands. The percolation rate of the insitu dune sands is estimated at  $10^{-3}$  mm/s or 86mm/day.

$$A_{fb} = \frac{WQ_v \times d_{fb}}{k \times (h_{fb} + d_{fb})t_{fb}}$$

|                                   | Wetted Perimeter    | Catchment Area       | 1:50yr Attenuation Volume | Drainage Time |
|-----------------------------------|---------------------|----------------------|---------------------------|---------------|
| Western/ Central Roadside Swale   | 1,380m <sup>2</sup> | 31,485m <sup>2</sup> | 8.41m <sup>3</sup>        | 55 minutes    |
| Eastern Swale parallel to estuary | 620m <sup>2</sup>   | 24,530m <sup>2</sup> | 6.56m <sup>3</sup>        | 1h 36min      |
| Swale: Northern Erven             | 410m <sup>2</sup>   | 27,840m <sup>2</sup> | 7.44m <sup>3</sup>        | 2h 45min      |

Table 6: Attenuation and Treatment Potential of Internal Stormwater Swales in m<sup>3</sup>

## 8. Sanitation

### 8.1 Existing Municipal Foul Sewer

GLS Consulting was commissioned to undertake a re-analysis of the bulk municipal sewer infrastructure capacity and the impact of the proposed development in the existing network. GLS formalised their findings in a report (27 February 2023) which was presented to Bitou Municipality for approval.

The GLS report concluded the following:

- The master plan indicated that the proposed development should be accommodated within the existing Plettenberg Bay Pumping Station (PS1) drainage area.
- There is sufficient capacity in the existing Plettenberg Bay sewer reticulation system to accommodate the proposed development.
- The recommended position for the sewer connection for the proposed development is to the existing 150 mm diameter outfall sewer in Susan Street, as shown on Figure 4.

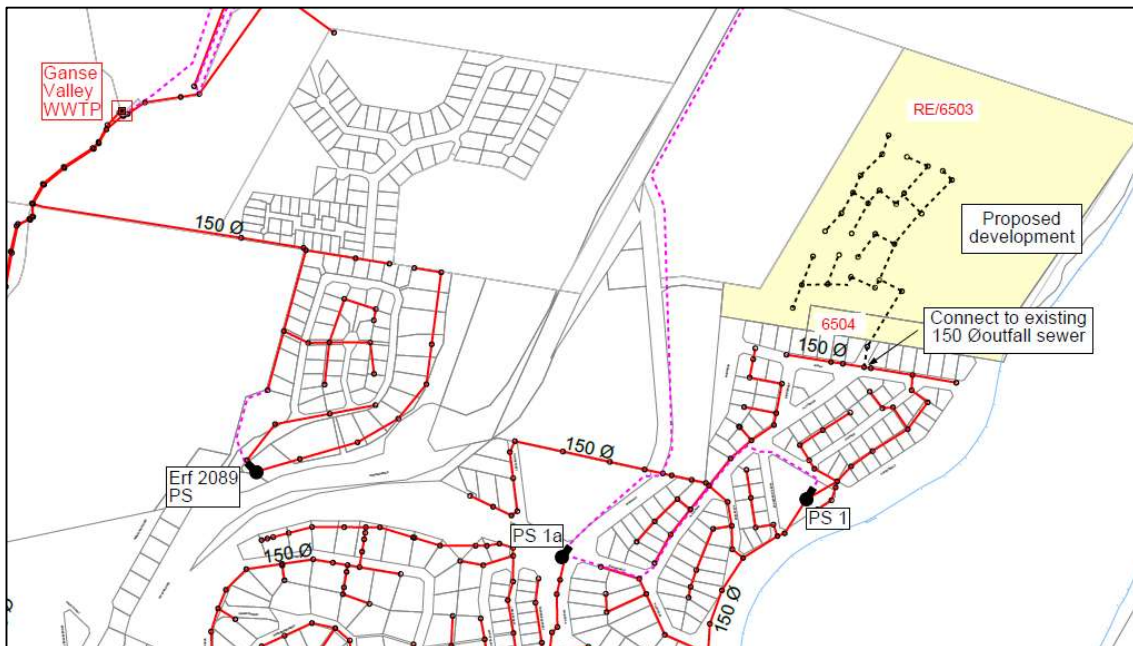


Figure 8-1: Extract from GLS Consulting (Feb 2023) Figure 4: External Sewer Masterplan

### 8.2 Ganzevallei Wastewater Treatment Works

The license conditions for the Ganzevallei WWTW authorize an effluent discharge of 6ML per day. The average daily discharge is currently at approximately 5.8ML per day, with the reserve 0.2ML per day reserved for already approved developments.

The Ganzevallei WWTW will therefore have to be upgraded in order to accommodate further developments. Bitou Municipality has appointed a Professional Service Provider to



commence with the upgrading process (*preliminary design, environmental authorization application, etc.*).

The interim solution for the treatment of wastewater from the development will be the installation of a temporary on-site wastewater treatment plant (*refer to section 8.4*). A permanent connection to the bulk Bitou Municipal network will be activated once the Ganzevallei WWTW upgrades have been completed.

### **8.3 Internal Sewage Network**

The estimated sewage yield generated from the proposed development will be:

- Annual Average Daily Sewage Yield: 40.1m<sup>3</sup> per day
- Peak Daily Wet Weather Sewage Yield (*Peak Factor - 3.5*): 1.62 l/s

The internal sewage infrastructure will consist of a 160mm diameter uPVC Class 34 gravity pipe network and round precast concrete ring manholes inside the road reserves. The internal infrastructure will drain towards a new foul sewer pumpstation. The pumpstation will also be situated inside the road reserve and will not encroach into the environmentally sensitive area.

The pumpstation will convey all sewage from the development via a 75mm rising main towards an existing 160mm underground pipe and manholes network inside the Susan Road reserves (*as per GLS Report*) on the southern boundary of the site (*permanent solution*). The temporary on-site wastewater treatment plant will be situated at the maintenance building (*near the entrance*).

The permanent connection to the Bitou Municipal network will be installed as part of the initial services installation. The minor amendment to the rising main (*once the temporary wastewater treatment plant is removed*) will remain the development's responsibility.

The underground gravity network will adhere to the following requirements:

- Minimum self-cleansing velocity inside a half full pipe - 0.7m/s
- Maximum full-bore velocity - 3.5m/s
- Maximum spacing between manholes - 90m
- The bedding and blanket material for the internal sewage pipe trenches will adhere to SABS 1200 regulations for Class C bedding and blanket.

The underground pumpstation will have the following minimum requirements:

- The pumpstation will be equipped with duty- and standby pumpsets
- The pumpstation will have back-up power (*genset or inverter/batteries*)
- The pumpstation sump will have an emergency back-up volume equal to the 4-hour peak flow

## 8.4 Temporary Wastewater Treatment Plant

A temporary wastewater treatment plant will be installed inside a 12m container next to the maintenance building (*near the entrance*). The proposed WWTP will use a combination of conventional treatment (*natural bacteria*) and membrane technology (*microfiltration*) to treat the sewage effluent to comply with general water limits stipulated by the Department of Water Affairs.

| SUBSTANCE/PARAMETER                                 | GENERAL LIMIT                                 |
|---|---|
| Faecal Coliforms (per 100 ml)                       | 1000  |
| Chemical Oxygen Demand (mg/l)                       | 75 (i)  |
| pH  | 5,5-9,5                                       |
| Ammonia (ionised and un-ionised) as Nitrogen (mg/l) | 6   |
| Nitrate/Nitrite as Nitrogen (mg/l)                  | 15  |
| Chlorine as Free Chlorine (mg/l)                    | 0,25  |
| Suspended Solids (mg/l)                             | 25  |
| Electrical Conductivity (mS/m)                      | 70 mS/m above intake to a maximum of 150 mS/m |
| Ortho-Phosphate as phosphorous (mg/l)               | 10  |
| Fluoride (mg/l)                                     | 1   |
| Scap, oil or grease (mg/l)                          | 2,5   |

Figure 8-2: DWAF Treated Water Limits

All the treated effluent will be used for irrigation purposes, with dedicated irrigation storage tanks ( $4 \times 10$ kilo-liter) installed next to the WWTP container. The WWTP will have the treatment capacity for  $40\text{m}^3$  per day (*refer appendix G for design and financial proposal*).

The efficacy of the WWTP will rely on regular maintenance and a signed service agreement between the developer and a qualified service provider will be submitted as part of the Service Level Agreement with Bitou Municipality (*refer appendix G for a similar agreement proposal*). The WWTP will also be equipped with a back-up generator to cater for electrical downtime.

In addition to regular maintenance, a stringent testing schedule will be required to ensure the treated effluent complies with DWAF limits. A wellpoint/shallow borehole ( $10\text{m}$  deep) will be installed on site for the purposes of monitoring the groundwater quality (*ensuring the irrigation with the treated effluent does not adversely affect the groundwater quality*). It is recommended that a sample of the treated effluent must be tested twice per month and a sample of the groundwater should be tested once per month. The test results must be submitted to DWAF and Bitou Municipality. Failure to comply with the prescribed limits will result in hefty fines and/or prosecution.

The temporary WWTP will be removed from site once the Ganzevallei WWTW has sufficient capacity.

## 9. Water Reticulation

### 9.1 Existing Bulk Municipal Network

The master planning analysis undertaken by GLS Consulting concluded the following:

- The master plan indicated that the proposed development should be accommodated within the existing Goose Valley reservoir zone.
- The proposed connection to the existing water system is to the existing 250 mm diameter supply pipeline from the Goose Valley reservoir in Beacon as shown on Figure 1.
- Link services items BPW14.1 is required to connect the internal reticulation network of the proposed development to the existing municipal water network.
- The bulk water system to the Goose Valley, Wittedrift and Matjiesfontein reservoirs is at capacity and should be upgraded according to the master plan before additional developments within the reservoir supply areas can be accommodated.
- The minimum upgrades required to improve the existing bulk supply system (*in order to accommodate the proposed development in the existing system*), are:
  - Master plan item 2 (3,6 km x 400 mm Ø replace existing 300 mm Ø abandoned AC pipe)
  - Master plan item BPW.B39 (0,9 km x 400 mm Ø replace existing 150 mm Ø bulk pipe).
  - Portion of master plan item BPW.B67 (1,0 km x 355 mm Ø replace existing 150 mm Ø bulk pipe).

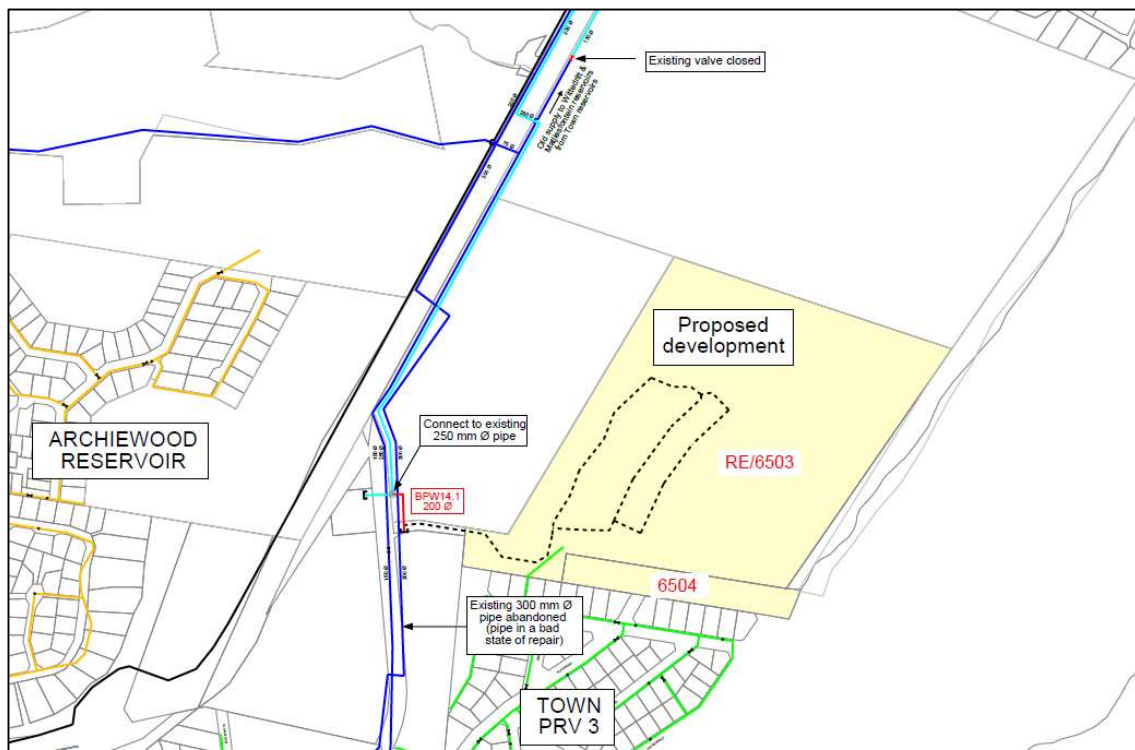


Figure 9-1: Extract from GLS Consulting (February 2023) Figure 1: External Watermain Link Upgrades

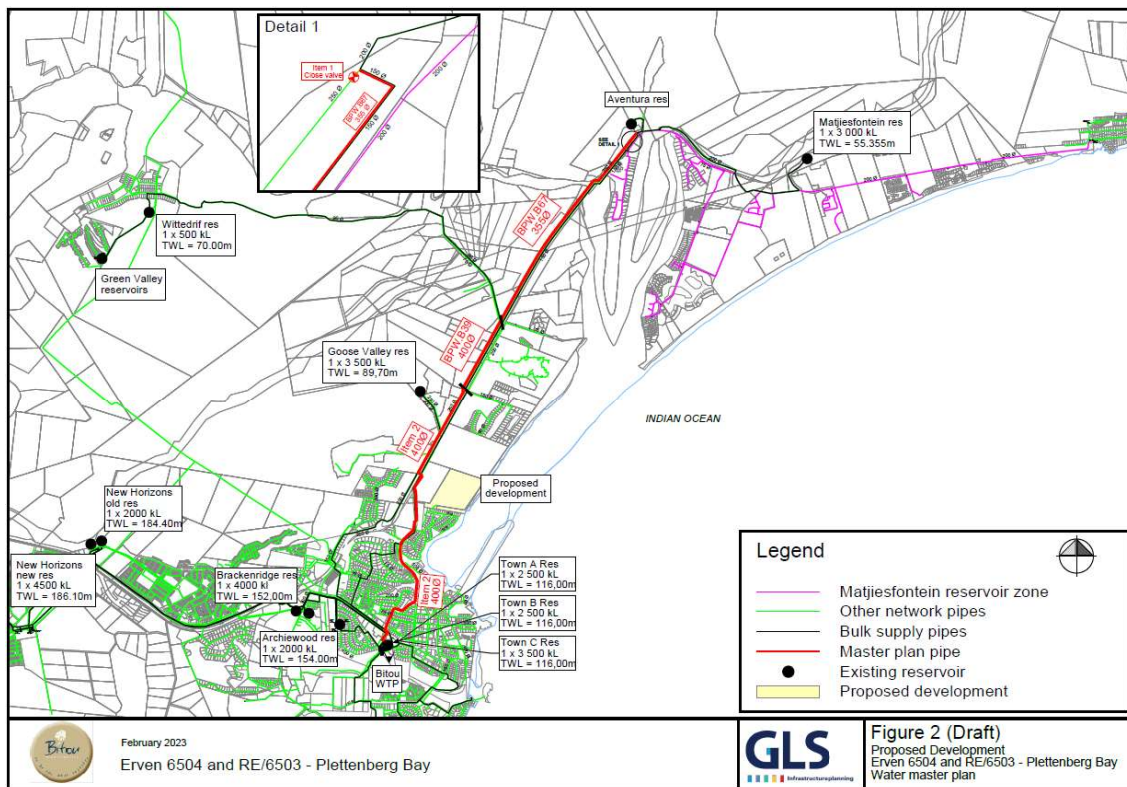


Figure 9-2: External Bulk Supply Upgrades – GLS Consulting (February 2023)

GLS estimated the costs for the design and installation of Item 2, BPW.B39 and BPW.B67 to be R42 million.

Various meetings with GLS and Bitou municipality was held to discuss a proposed interim solution to increase the bulk supply to the Goose Valley Reservoir. GLS provided the following temporary solution:

- Installation of an additional 160mm bulk main off the existing 160mm distribution main in the N2 road reserve (refer figure 5) which will free up an additional 860kl/day.
- There is sufficient capacity in the 860kl/day to accommodate the developments on Farm 444/38, Farm 304/32 and erf 6503.

This temporary solution was discussed with Bitou Municipality on 9 March 2023, who stated that they will except the temporary solution on the following conditions:

- Design, installation, etc. costs for the temporary solution will be the responsibility of the developer/developers and will not be deductible from the Augmentation Levee's
- The temporary solution is not a permanent solution and Augmentation Levee's for Water and Sewage will be used towards the permanent solution.
- The proposed pro-rata contribution towards the temporary solution must be resolved between the developers of the different properties.
- A Service Level Agreement must be drafted for the development.

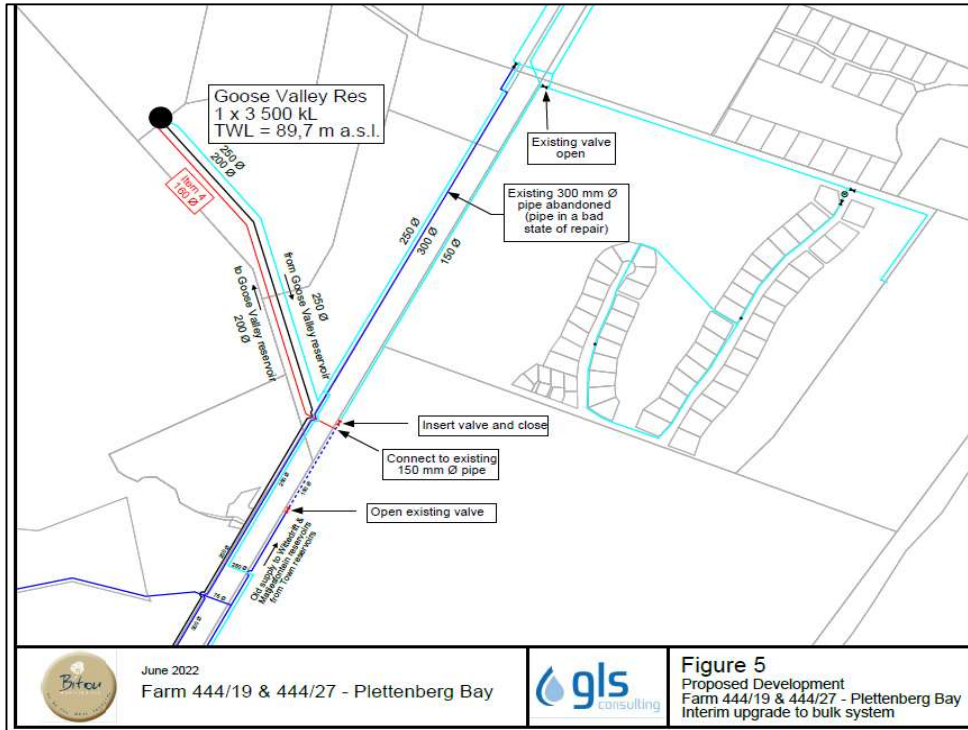


Figure 9-3: External Bulk Supply Interim Solution – GLS Consulting (October 2022)

The route of the 160mm diameter temporary pipeline will follow the existing servitude for the 200mm- and 250mm diameter pipelines and a new temporary servitude will not be required. The installation of the pipeline will not require the disturbance of more than 300m<sup>2</sup> of vegetation and therefore no additional environmental applications will be required.

The implementation of the temporary solution will be done by the developer of Portion 19 and 27 of Farm 444, as this development will be the first to have a civil contractor on site (*estimated construction start for September 2024*). The pro-rata contributions (*Farm 444/38, Farm 304/32 and Erf 6503*) for the installation of the pipe will be paid directly to the developer of Portion 19 and 27 of Farm 444.

## 9.2 Internal Water Reticulation

The potable water demand for the development will be:

- Gross Annual Average Daily Demand: 46m<sup>3</sup> per day
- Instantaneous Peak Demand (*Peak Factor - 10*): 5.32 l/s
- Fire flow criteria (*low risk*): 15l/s @ 10m

The proposed internal metered water reticulation network will consist of a combined domestic and fire water reticulation network consisting of a 75mm diameter uPVC Class 12 potable water main. Allowance will be made for individual water meters to be located 1m inside the erf boundaries for every property.

The water reticulation network will adhere to the following design requirements:

- Minimum pipe size – 75mm diameter

- Minimum pipe class - uPVC Class 12 / HDPE PE100 Class 12.5
- Specials & Fittings - As per Bitou Municipal Engineering Standards
- The bedding and blanket material will comply with SABS 1200 regulations for Class C bedding and blanket
- Fire hydrants will be spaced for low-risk areas

### 9.3 Irrigation Demand

#### 9.3.1 Road Verge and Private Open Space Irrigation

The irrigation for the road verges and private open spaces will be done via an irrigation pumpstation, 4 x 10kilo-liter storage tanks and an underground 110mm diameter uPVC Class 10 pipeline. The irrigation schedule will be managed by the homeowner's association.

The treated effluent, generated from the temporary WWTP, will be collected in the irrigation storage tanks and used for irrigation purposes. The treated effluent will be used for irrigation purposes until the Ganzevallei WWTW upgrades have been completed. After removal of the WWTP from site, a municipal water connection to the irrigation tanks will be commissioned and the irrigation for these areas will be done from rainwater harvesting tanks as well as the potable water supply.

In order to use all the treated effluent available, it is intended to temporarily irrigate the open/undeveloped erven (*refer to appendix H for the irrigation water balance*). The irrigation demand will decrease during the winter months and an irrigation water balance sheet was compiled to ensure that there will be no surplus treated effluent during the months of August/September (*highest precipitation per month*).

#### 9.3.2 Irrigation for individual erven

Each erf will have a dedicated 22mm diameter HDPE PE100 irrigation connection which will be connected to the estate's irrigation network. In addition to the irrigation connection, each property will have a minimum volume of 5,000 litres rainwater harvesting tanks, which will collect stormwater run-off from roofs and hardened surfaces (*prescribed for individual homeowners as part of the estates building guidelines*).

## 10. Solid Waste

The minimum requirements for domestic waste collection (*as per the National Domestic Collection Standards, 2011*) will be applicable to this development. The proposed development will generate approximately 20kg of solid waste per household per week.

The development's homeowner's association will administrate the collection of the domestic waste from each individual property towards a communal refuse storage facility located at the entrance to the proposed development. The refuse storage area will be adequately sized to accommodate the correct amount of 240l refuse bins for organic waste as well as make allowance for waste separation bins for temporary storage of recycling. Recycled waste to be collected by a registered Bitou Municipality service provider. A minimum target of 50% diversion of organic waste to be implemented by the homeowner's association.

Allowance will be made for adequate turning space at the entrance to the proposed development to accommodate the turning movement of a standard refuse truck.

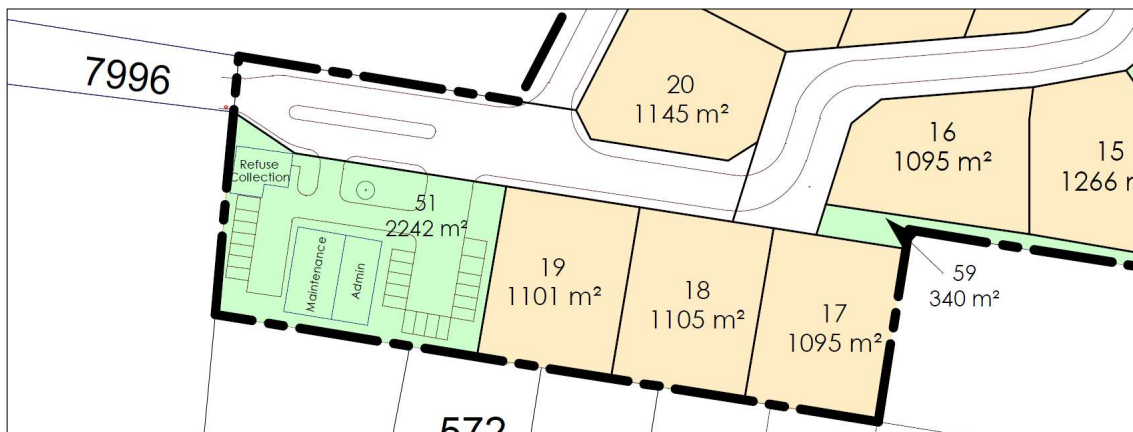


Figure 10-1: Refuse Collection at Entrance Facility

## 11. Maintenance for Roads and Civil Services Infrastructure

---

The completed development will be handed over to a Homeowner's Association/Body Corporate, who will except responsibility for the daily operations and maintenance of all civil infrastructure within the development.

The maintenance of the civil infrastructure will be explained to the HOA and they will be furnished with engineering maintenance manuals (*pumpstation*) and checklists (*weekly and monthly*).

It is advised that a professional engineer inspect and assess the civil services infrastructure on a yearly basis to ensure that the structural integrity and functionality of the civil amenities are intact.

Provision must be made for at least 2.5% of the total initial capital expenditure for the installation of the civil and roads infrastructure to be allocated for maintenance purposes.

All maintenance works must be carried out in accordance with all provisions of the Occupational Health and Safety Act (*Act 85 of 1993*). Maintenance staff must be well educated on the operation of the civil services network as a whole and potential safety hazards should be identified before any maintenance/remedial works are carried out. All maintenance personnel must always be equipped with the necessary protective gear (*PPE*).



## 12. Conclusion

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The findings of this Civil Engineering Services Report provide sufficient evidence to **support** the application for

*"The rezoning of Erf 6503 Plettenberg Bay to 'Residential Zone I' (2.27 ha) & 'Residential Zone II' (4.07 ha) & 'Open Space Zone II' (0.37 ha) & 'Open Space Zone III' (10.58 ha) & 'Private Road' (1.83 ha) in terms of Section 15(2)(a) of the Bitou Municipality Land Use Planning Bylaw, 2015"*

A Services Level Agreement, between the Developer and Bitou Municipality, must be compiled to address the upgrading of the external engineering infrastructure (*i.e. potable water and sewer networks*) required for this development.

The Service Level Agreement must clearly stipulate the following:

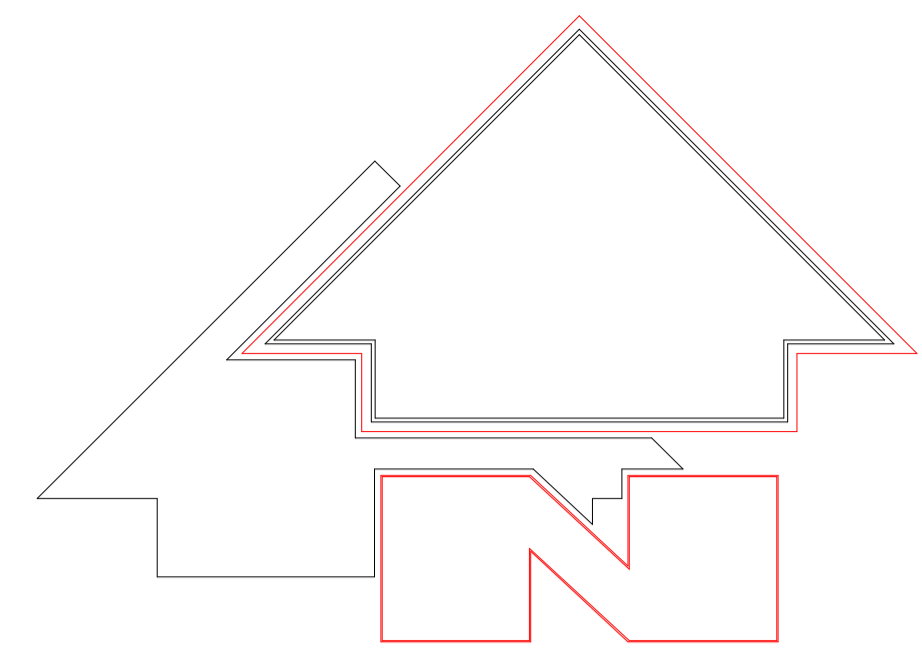
- The phasing of the proposed development
- The extent of the external upgrades required for each phase.
- Augmentation Levee's payable for each phase of the development
- Responsibility for external upgrades
- Application of Augmentation Levee's for external upgrades in lieu of direct payment to Bitou Municipality.



Riaan van Dyk (*Pr Eng 20150503*)  
for Vita Consulting Engineers

Appendix A: Topographical Survey

52/444



WG23  
Scale 1:1000 - A1

| BENCHMARK COORDINATES LIST WG23 METRES |            |             |        |                           |
|--|------------|-------------|--------|---------------------------|
| NAME                                   | Y          | X           | Z      | DESCRIPTION               |
| BM1                                    | -34472.771 | 3768342.899 | 13.546 | 12MM IRON PEG IN CONCRETE |
| BM2                                    | -34562.300 | 3768089.503 | 13.415 | 12MM IRON PEG IN CONCRETE |

62/444

RE/6503

DENSE BUSH  
(CONTOURS APPROXIMATE)

7996

RE/7997

Cuthbert  
Close

572

573

574

575

576

- Notes :
1. Beacons Note Verified as part of survey
  2. Contours Through Bushy areas are approximate
  3. All elevations are above approximate mean sea level

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or amended without the written  
consent of VPM Surveys.

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| NO   | DATE                | DESCRIPTION                     |
|--|---------------------|---------------------------------|
| REVISIONS  |                     |                                 |
| DATE:  | 07/02/23            | SCALE: 1:1000 - A1              |
| SURVEYED ON:   | 07/12/22 & 01/02/23 | SURVEYOR: M. BANTOW & B. MLONZI |
| DRAWING FILE: SERVER://ALLOYDATA/PLETTERNBERG BAY/PR6503/PTN1_6503CP_REV.B |                     |                                 |



Professional Land Surveyors  
Township Planners,  
GIS & GPS consultants  
Topographic, Sectional Title  
& Engineering Surveys

16 Green Street P.O.Box 173  
Knysna 6570  
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e-mail: info@vpm.co.za

CLIENT  
Plett Lagoon Estate (Pty) LTD

PROJECT  
Contour / Site Plan

TITLE  
PORTION 1 OF ERF 6503  
PLETTERNBERG BAY

|                             |          |
|-----------------------------|----------|
| DRG NO<br>PTN1/ERF6503 REVA | REV<br>A |
|-----------------------------|----------|

Appendix B: Sub-Division Layout



Appendix C: Traffic Impact Statement (UDS)

Date: 09 April 2024

Our Ref: UDS627/Reports/

51 Lourensford Estate  
Somerset West  
7130

Attention: Mr. Riaan van Dyk

Dear Sir

**UPDATED TRAFFIC IMPACT STATEMENT FOR THE PROPOSED DEVELOPMENT ON RE 6503,  
PLETTENBERG BAY**

This company was appointed to update the previously prepared Traffic Impact Statement (TIS) dated 26 July 2023 for a proposed development on RE 6503 in Plettenberg Bay based on an amended layout.

**1. LOCALITY AND BACKGROUND**

The subject property is located in Plettenberg Bay east of the N2 (National Route 2) and is currently accessed via Beacon Way as shown in **Diagram 1** below and the attached **Locality Plan**.



**Diagram 1:** Location of Subject Property



**head office**

Unit 8, Time Square Building,  
9 Electron Street, Techno Park,  
Stellenbosch

PO Box 50487  
V&A Waterfront  
8002

T +27 (0)21 880 0443  
F +27 (0)86 523 8227  
[info@udsafrika.co.za](mailto:info@udsafrika.co.za)

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Elmarie Els 021 880 0443

**managing member**

A Khan PrEng

**associates**

JW Wessels PrEng  
P v Blerk PrEng  
JN Louw PrCPM

**offices**

Clanwilliam, Stellenbosch,  
Somerset West

Reg no. 2003/043709/23

**urban development solutions**



## 2. PREVIOUSLY AND CURRENTLY PROPOSED DEVELOPMENT

The development was initially proposed to have 77 residential units. Of the 77 units, 37 units were proposed to be single residential units and 40 units were proposed to be apartments. The initial layout proposed access via Poortjies residential area to the south of the development, however objections were received which led to the investigation of an alternate route. Access is now proposed via the Plettenberg Bay Primary School / Checkers access which intersects with Beacon Way opposite the Engen Filling Station to the north of the shopping centre. In addition to this, the number of units have also been reduced to 50 residential units. Of the 50 residential units, 9 units will be registered as Single Residential Zone I and 41 units will be registered as General Residential Zone II (Group Housing). In both cases, it was proposed that the development be access-controlled.

The access arrangements will be further discussed in **Section 4**. Please see the proposed layout on the attached **Alternative 1 Preferred Proposal** prepared by *Marike Vreken Urban and Environmental Planners*.

## 3. TRAFFIC IMPACT

### 3.1 Existing Traffic

Traffic counts were performed on Monday, the 22<sup>nd</sup> May 2023 during the AM (06:00 – 09:00) and PM (15:30 – 18:30) at the following intersections which were agreed upon with the Bitou Municipality:

1. N2 / Beacon Way intersection
2. Beacon Way / School Access Road intersection
3. Beacon Way / Checkers / Market Square intersection
4. Beacon Way / Zenon Street

The 2023 peak hour traffic volumes are as indicated in the attached **Figure 1**. The peak hours were found to be 07:15 – 08:15 and 16:15 – 17:15, which coincides with the morning and evening commuter peak periods.

### 3.2 Traffic Generated

The South African Trip Data Manual TMH17 was used to estimate the trips expected to be generated by the proposed development. TMH17 suggests a trip generation rate of 1 trip per single residential unit, therefore 50 trips are expected in the AM (12 IN / 38 OUT) and PM (35 IN / 15 OUT) peak hour.



### 3.3 Traffic Distribution and Growth

The South African Trip Data Manual (TMH17) suggests an annual growth rate of 0 – 3% for low growth areas and 3 – 4% for average growth areas. As the area around Beacon Way is mostly built up, low growth is expected, however, to err on the side of caution an annual growth rate of 3% was used. The 2023 traffic was projected to 2029 to evaluate a 5-year future scenario both with and without the proposed development in order to establish whether the road network can accommodate the projected growth. See **Figure 2** for the *Projected 2029 AM/PM Peak Hour Traffic Volumes*.

The expected trip distribution is as indicated in the attached **Figure 3**. As far as possible, the background traffic was used to model the trip distribution. It should be noted that the access from the property was modelled via the new preferred access which intersects with Beacon Way. This will be discussed further in *Section 4*.

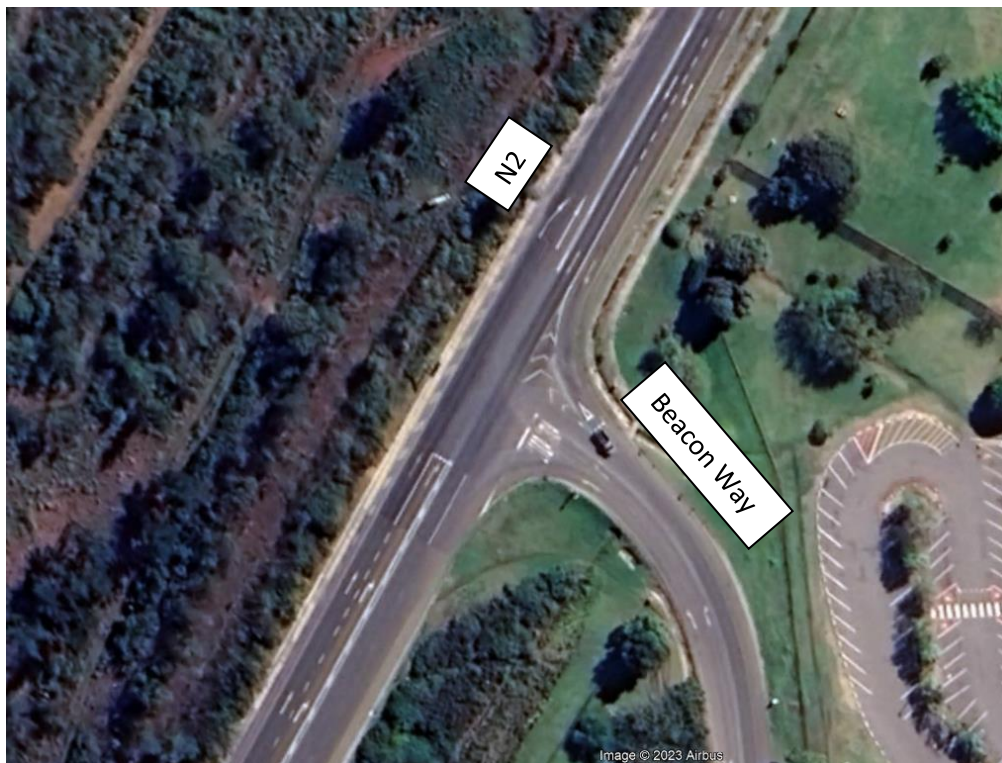
**Figure 4** shows the estimated 2029 AM/PM peak hour traffic volumes, including the traffic generated by the proposed development as well as a 3% annual growth rate.

### 3.3 Traffic Impact

The existing traffic was analysed using SIDRA Intersection Analysis 9.1. Service levels A to D are considered acceptable, where a level of service (LOS) below D and a degree of saturation above 0.85 is considered unacceptable.

## N2 / Beacon Way Intersection

The N2 / Beacon Way intersection is a priority-controlled T-junction with a stop control on Beacon Way. There are turning lanes on each approach as shown in **Diagram 2**. It should be noted that according to information, the intersection will be upgraded to a roundabout with construction beginning in 2024.



**Diagram 2:** N2 / Beacon Way intersection

The existing 2023 traffic volumes along with the existing lane layout was analysed and the intersection is experiencing an overall delay of approximately 7.8 seconds in the AM peak hour and 211.2 seconds in the PM peak hour. The worst delay, in both peak hours, is experienced on the right-turning movement along Beacon Way which experiences a LOS E with a delay of 42.7 seconds in the AM peak hour and a LOS F with delays exceeding 1000 seconds in the PM peak hour.

In 2029, after applying a 3% growth rate p.a., the intersection with its current layout (T-intersection) is expected to experience an average delay of 45.7 seconds in the AM peak hour and 565.5 seconds in the PM peak hour. The worst delay, in both peak hours, is experienced on the right-turning movement along Beacon Way which experiences a LOS F with unacceptable delays in the AM and PM peak hour. If the intersection is analysed as a roundabout, an overall LOS A is expected to be experienced in the AM (5.8 second delay) and PM (6.8 second delay) peak hour. The worst delay is expected to be experienced on the right-turning movement along Beacon Way with 10.3 seconds delay in the AM peak hour and 10.4 seconds delay in the PM peak hour.

After the subject development's traffic is added to the network in 2029, the upgraded intersection (roundabout) is still expected to experience an overall delay of 5.8 seconds in the AM peak hour and 6.8

seconds in the PM peak hour. The worst delay is expected to be maintained with the right-turning movement along Beacon Way, which experiences a LOS B in both the AM (10.3 seconds). The worst delay in the PM peak hour is expected on the right-turning movement along the southern south-western approach of the N2 with a delay of 11.4 seconds.

No further upgrades to this intersection are required to accommodate the development.

### **Beacon Way / School Access Road / Filling Station Intersection**

The Beacon Way / School Access Road / Filling Station intersection is currently priority-controlled with a stop control on the side streets as shown in **Diagram 3** below. There is one lane per direction on all approaches. It has been proposed that the development take access via the eastern leg (School Access Road).



**Diagram 3:** Beacon Way / Filling Station / School Access Road intersection

The existing 2023 traffic volumes along with the existing lane layout were analysed and the intersection is expected to experience an overall average delay of approximately 6.6 seconds in the AM peak hour and 2.2 seconds in the PM peak hour. The worst delay, in both peak hours, is experienced on the right-turning movement along the school access road on the eastern approach which experiences a LOS C with a delay of 16.8 seconds in the AM peak hour and 20.7 seconds in the PM peak hour.

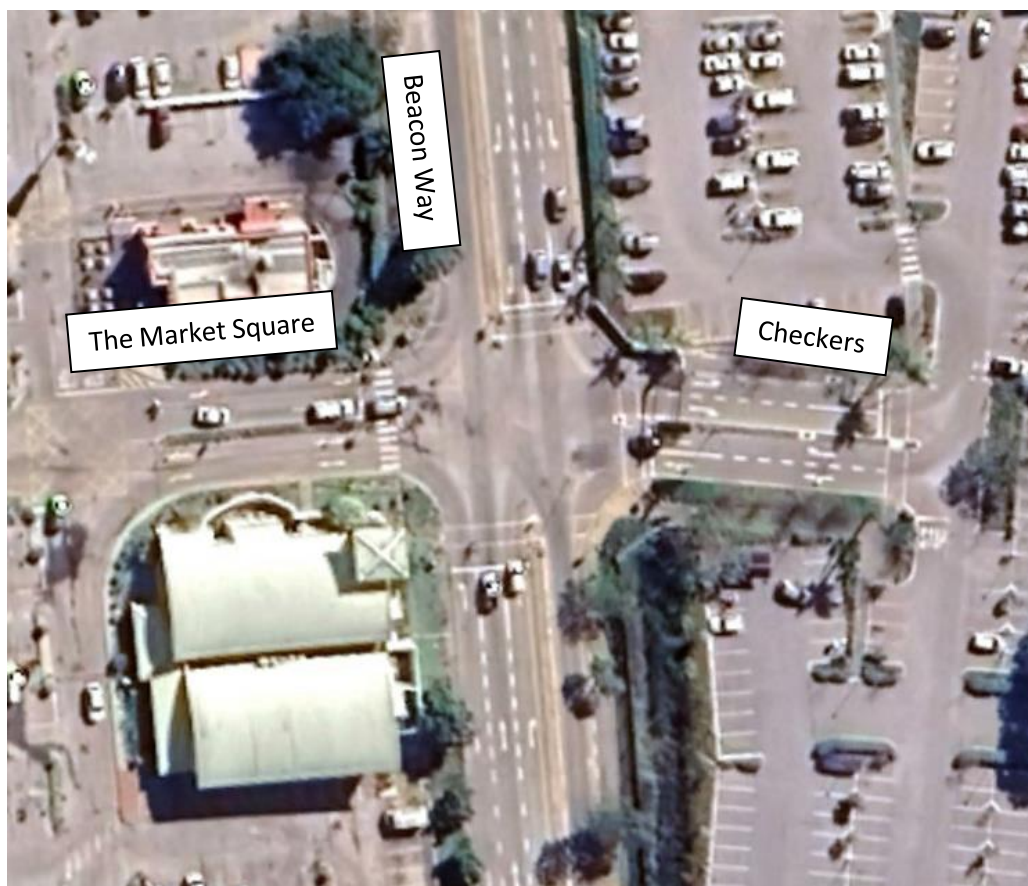
In 2029, after applying a 3% growth rate p.a., the intersection (current layout) is expected to experience an average delay of 8.1 seconds in the AM peak hour and 2.8 seconds in the PM peak hour. The worst delay, in both peak hours, is experienced on the right-turning movement along the school access road on the eastern approach which experiences a LOS C with a delay of 24.5 seconds in the AM peak hour and a LOS D in the PM peak hour with a delay of 28.5 seconds.

After the intersection is upgraded to a roundabout, the subject development's traffic is added to the network in 2029 and the intersection is expected to experience an average delay of 7.6 seconds in the AM peak hour and 5.8 seconds in the PM peak hour. The worst delay is experienced on the right-turning movement from the filling station on the western approach which experiences a LOS B with a delay of 11.2 seconds in the AM peak hour and 11.3 seconds in the PM peak hour. It is expected that in all the scenarios above, the early afternoon peak would experience congestion at the end of the school day.

It should be noted that in SIDRA, the size of the roundabout is not a critical factor in the analysis. This will be further discussed in *Section 4*.

### **Beacon Way / Checkers / The Market Square Intersection**

The Beacon Way / Checkers / The Market Square intersection is a full signalized intersection as shown below in **Diagram 4**. There are turning lanes on each approach.



**Diagram 4:** Beacon Way / Checkers / The Market Square intersection

The existing 2023 traffic volumes along with the existing lane layout was analysed and the intersection is expected to experience an overall average delay of approximately 23.7 seconds in the AM peak hour and 29.3 seconds in the PM peak hour. The worst delay, in both peak hours, is experienced on the right-turning movement along Beacon Way northern approach which experiences a LOS D with a delay of 35.3 seconds in the AM peak hour and 36.1 seconds in the PM peak hour.

In 2029, after applying a 3% growth rate p.a., the intersection is expected to experience an average delay of 28.4 seconds in the AM peak hour and 36.3 seconds in the PM peak hour. The worst delay, in both peak hours, is experienced on the right-turning movement along Beacon Way northern approach which experiences a LOS D with a delay of 45.1 seconds in the AM and 49.3 seconds in the PM peak hour.

After the subject development's traffic is added to the network in 2029, the intersection is expected to experience an overall delay of 28.6 seconds in the AM peak hour and 37.7 seconds in the PM peak hour. The worst delay, in both peak hours, is experienced on the right-turning movement along Beacon Way northern approach which experiences a LOS D with a delay of 45.4 seconds in the AM and 49.3 seconds in the PM peak hour.

No upgrades are required due to the development.

### **Beacon Way / Zenon Street Intersection**

The Beacon Way / Zenon Street intersection is a roundabout with one lane per direction as shown below in *Diagram 5*.



**Diagram 5:** Beacon Way / Zenon Street intersection

The existing 2023 traffic volumes along with the existing lane layout was analysed and the intersection is expected to experience an overall average delay of approximately 5.0 seconds in the AM peak hour and 5.3 seconds in the PM peak hour. All movements experience a LOS A or B.

In 2029, after applying a 3% growth rate p.a., the intersection is expected to experience an average delay of 5.1 seconds in the AM peak hour and 5.4 seconds in the PM peak hour. All movements are still expected to experience a LOS A or B.

After the subject development's traffic is added to the network in 2029, the intersection is expected to experience an overall delay of 5.1 seconds in the AM peak hour and 5.4 seconds in the PM peak hour. As above, the intersection is expected to experience a LOS A or B on all movements.

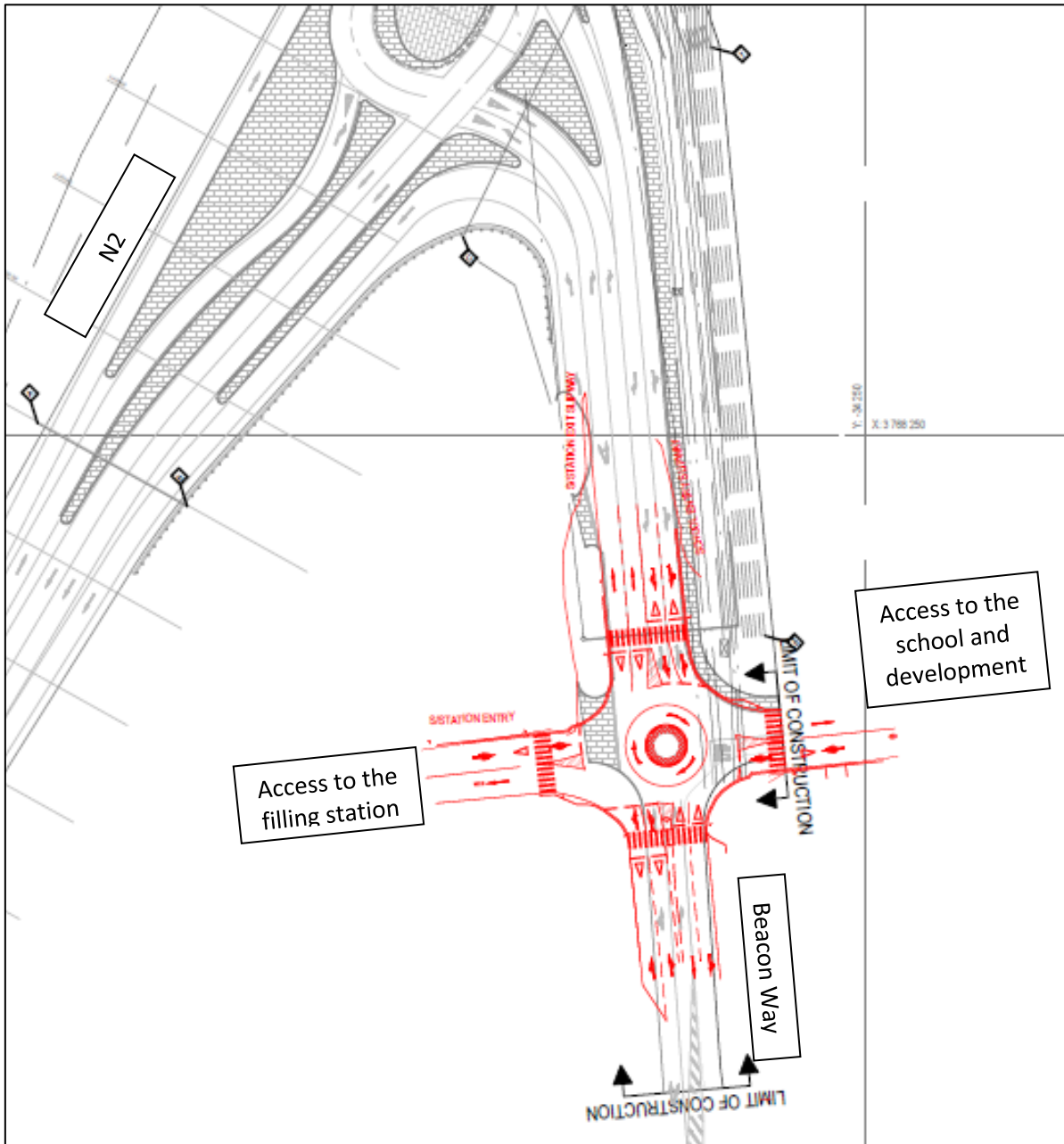
No upgrades are required at this intersection due to the introduction of the development.

#### **4. GEOMETRY**

The proposed development is in a region accessed via the N2 / Beacon Way intersection. The N2 is a National Route (NR00208) and as previously mentioned, the intersection is planned to be upgraded to a roundabout with construction planned to start in 2024.

As mentioned, access was previously proposed via the Poortjies residential area where vehicles would travel southward along Plato Road, into Zenon Street and access Beacon Way via the Beacon Way / Zenon Street roundabout. However, objections were received from the Poortjies community. The civil engineer on the project and Bitou Municipality then investigated alternatives and agreed to allow access via the Beacon Way / Filling Station / School Access Road intersection provided it is upgraded to a roundabout. A layout of the roundabout is shown in the attached ***Beacon Way Traffic Circle*** as prepared by *VITA Consulting Engineers*.

According to the drawing, there are two lanes per direction along Beacon Way at the proposed roundabout (Beacon Way / Filling Station / School Access). The proposed two lanes per direction, along with the roundabout's internal island diameter of approximately 7.5-metres is considered undesirable as sufficient deviation is not provided for the through traffic. It should also be noted that due to the size of the roundabout (ICD of approximately 26- to 31-metres), it appears the wheel-tracking, as per the civil engineer's drawing, for a truck making a right-turning movement would encroach on the left-turning lane of the same approach and cut into both circulating lanes, this is considered undesirable. It is the opinion that based on the land-use of the proposed development (residential), access will be more desirable via the Poortjies residential development. It is anticipated that the Beacon Way / Zenon Street intersection will be able to accommodate the additional residential traffic generated as the intersection largely serves residential traffic, whereas the Beacon Way / Filling Station / School Access intersection serves the filling station, retail deliveries and school trips.



**Diagram 6:** Beacon Way / Filling Station / School Access Road roundabout (prepared by VITA Consulting Engineers)

The Minimum Standards for Civil Engineering Services in Townships (2007) states that a minimum of 6-metres stacking distance is required for less than 15 residential units and 12-metres stacking distance is required for 40 units. There are no stipulated requirements for developments larger than 40-units, however, based on the data available and assuming a best fit trendline, the recommended stacking for 50 units should be approximately 14-metres. The layout of the gatehouse has not been confirmed, therefore, sufficient stacking distance should be provided during further design stages. In addition to this, it should be ensured that one of the entry lanes are at least 4.0 metres wide to accommodate emergency vehicles.

The internal road reserves are a minimum of 12-metres wide. It should be ensured that vehicles parked in driveways and garages have sufficient space to reverse. It is also recommended that sight-distance be considered in the placement of trees.

Refuse will be collected at the gatehouse. It should be ensured a turning around area is provided.

## **5. NON-MOTORISED AND PUBLIC TRANSPORT**

A sidewalk exists along at least one side of Beacon Way and the School Access Road. It is recommended the sidewalk be continued up to the access of the development. It is also recommended that traffic calming be considered within the development along the north-south road along the western boundary.

It is not expected that additional public transport infrastructure would be required as result of the proposed development.

## **6. PARKING**

The Bitou Municipality Zoning Scheme recommends 2 bays per unit for single residential units. According to the planners, 2 bays per unit will be provided. An additional 22 bays are proposed at the gatehouse for visitors.

Parking spaces should also be provided in accordance with normal parking standards, i.e. 2.5 by 5.0 metre bays and 3.7 by 5.0 metre bays for disabled users with 7.5 metre aisle widths as per the Bitou Municipality Zoning Scheme.



## 7. CONCLUSIONS

It can therefore be concluded that:

- This subject property (RE 6503) is located to the east of the N2, currently accessed via Beacon Way.
- This report serves as an update to the previously submitted report dated 26 July 2023.
- The previous proposal consisted of 77 units, of which 37 are proposed to be single residential units and 40 apartment units. The current proposal consists of 50 residential units. 9 units will be registered as Single Residential Zone I and 41 units will be registered as General Residential Zone II (Group Housing). In both cases, it was proposed the estate be access-controlled.
- Traffic counts were performed on Monday, 22<sup>nd</sup> May 2023 at the N2/Beacon Way intersection, Beacon Way / Filling Station / School Access intersection, Beacon Way / Market Square / Checkers intersection, Beacon Way / Zenon Street.
- Using TMH17, 50 trips are expected in the AM (12 IN / 38 OUT) and PM (35 IN / 15 OUT) peak hour.
- A 3% annual growth rate was used to project the traffic to 2029 to evaluate a 5-year future scenario.
- SIDRA 9.1 results were as follows:
  - N2 / Beacon Way Intersection:
    - Existing (2023 traffic): Average delay of 7.8 seconds (AM peak hour) and 211.2 seconds (PM peak hour). The worst delay is experienced on the right-turning movement along Beacon Way which experiences a LOS F and unacceptable delays.
    - Projected 2029 traffic: Average delay of 45.7 seconds (AM peak hour) and 565.5 seconds (PM peak hour). The worst delay is expected to be experienced on the right-turning movement along Beacon Way which experiences a LOS F and unacceptable delays.
    - The local municipality has confirmed that the N2/Beacon Way intersection will be upgraded to a roundabout with construction starting in 2024. The Projected 2029 traffic was therefore analysed using the approved roundabout. An average delay of 5.8 seconds (AM peak hour) and 6.8 seconds (PM peak hour) is expected with the upgrade. The worst delay is expected to be experienced on the right-turning movement along Beacon Way which experiences a 10.4 second delay in the PM peak hour.
    - Estimated (2029 + Subject Development): Using the upgraded intersection, the average delays were maintained after the development traffic was added.

- No further upgrades above and beyond the aforementioned roundabout is required.
- Beacon Way / Filling Station / School Access Intersection:
  - Existing (2023 traffic): Average delay of 6.6 seconds (AM peak hour) and 2.2 seconds (PM peak hour). The worst delay is expected to be experienced on the right-turning movement along the school access which experiences a 20.7 second delay in the PM peak hour.
  - Projected 2029 traffic: Average delay of 8.1 seconds (AM peak hour) and 2.8 seconds (PM peak hour). The worst delay is expected to be experienced on the right-turning movement along the school access which experiences a 28.5 second delay in the PM peak hour.
  - Projected (2029 + Subject Development): In order to accommodate the development taking access via the School Access Road, it was proposed the intersection be upgraded to a roundabout. The upgraded intersection is therefore expected to experience an average delay of 7.6 seconds (AM peak hour) and 5.8 seconds (PM peak hour). The worst delay is expected to be experienced on the right-turning movement from the filling station which experiences an 11.3 second delay in the PM peak hour.
- Beacon Way / The Market Square / Checkers Intersection
  - Existing (2023 traffic): Average delay of 23.7 seconds (AM peak hour) and 29.3 seconds (PM peak hour). The worst delay is expected to be experienced on the right-turning movement along Beacon Way which experiences a 36.1 second delay in the PM peak hour.
  - Projected 2029 traffic: Average delay of 28.4 seconds (AM peak hour) and 36.3 seconds (PM peak hour). The worst delay is expected to be experienced on the right-turning movement along Beacon Way which experiences a 45.1 second delay in the PM peak hour.
  - Projected (2029 + Subject Development): Average delay of 28.6 seconds (AM peak hour) and 37.7 seconds (PM peak hour). The worst delay is expected to be experienced on the right-turning movement along Beacon Way which experiences a 49.3 second delay in the PM peak hour.
  - No additional lanes are required.
- Beacon Way / Zenon Street
  - Existing (2023 traffic): Average delay of 5.0 seconds (AM peak hour) and 5.3 seconds (PM peak hour). All movements are expected to experience a LOS A or B.

- Projected 2029 traffic: Average delay of 5.1 seconds (AM peak hour) and 5.4 seconds (PM peak hour). All movements are expected to experience a LOS A or B.
  - Projected (2029 + Subject Development): Average delay of 5.1 seconds (AM peak hour) and 5.4 seconds (PM peak hour). All movements are expected to experience a LOS A or B.
  - No upgrades are required.
- As mentioned, the N2 / Beacon Way intersection is planned to be upgraded to a roundabout with construction starting in 2024.
- Access to the development was initially proposed via Poortjies on the southern boundary of the subject erf, however after objections were received, access is now proposed via the School / Checkers delivery yard Access Road which will intersect with Beacon Way. In order to accommodate the development traffic, the civil engineer and municipality agreed to upgrade the intersection to a roundabout. It should be noted that due to the proposed size of the roundabout (ICD of approximately 26- to 31-metres), it appears that the wheel-tracks, as per the civil engineer's drawings, of a truck making a right-turning movement would encroach on the left-turning lane of the same approach and cut into both circulating lanes.
- Access to the subject property is proposed to be gated, however the details for the guard house has not been confirmed. The Minimum Standards for Civil Engineering Services in Townships (2007) only stipulates specifications up to 40 units, however, using the ratios provided, stacking distance should be approximately 14-metres.
- An entry lane of minimum 4.0 metres should be provided for emergency vehicles.
- Internal reserves are a minimum of 12-metres wide. It should be ensured vehicles parked in driveways and garages have sufficient space to reverse.
- Refuse collection will occur at the gatehouse.
- The Bitou Municipality Zoning Scheme recommends 2 bays per unit for single residential units. According to the planners, 2 bays per unit will be provided. An additional 22 bays are proposed at the gatehouse for visitors.

## **8. RECOMMENDATIONS**

The development be recommended on condition that:

- Sufficient stacking space exceeding 14-metres be provided.
- A minimum entry lane of 4.0-metres be provided.
- Sufficient sight distance be ensured in the placement of trees along the internal roads.
- It should be ensured that there is sufficient space for vehicles reversing out of driveways.
- Traffic calming be considered along roads within the development longer than 100-metres.
- A turning area is provided for refuse collection.
- It be considered that access be reverted to the previous proposal via the Poortjies residential area.

Trust the above is sufficient for the purpose of the investigation. More information can be provided upon request.

Yours faithfully,



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**Compiled by: Shameez Patel Papathanasiou (MScEng)**

**Approved by Piet van Blerk (PrEng)**

**UDS AFRICA**



**ATTACHMENTS**

Locality Plan

Alternative 1 Preferred Proposal

Beacon Way Traffic Circle

Figure 1 - Existing AM/PM Peak Hour Traffic Volumes (22 May 2023)

Figure 2 - Projected 2029 AM/PM Peak Hour Traffic Volumes  
(Using a 3% growth rate p.a.)

Figure 3 – Distribution of Traffic Generated by the Development

Figure 4 – Estimated 2029 AM/PM Peak Hour Traffic Volumes (Incl. Proposed Development  
as well as a 3% growth rate p.a.)



Unit 8, Time Square Building,  
9 Electron Street, Techno Park,  
Stellenbosch

PO Box 50487  
V&A Waterfront  
8002

T +27 (0)21 880 0443  
F +27 (0)21 822 8227  
info@udsafrika.co.za

## Locality Plan

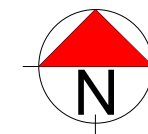
LEGEND:

| LAND USE            | ZONING                      | ERF NO  | QTY | AREA (HA) | %      |
|---------------------|-----------------------------|---------|-----|-----------|--------|
| Dwelling House      | Single Residential Zone I   | 42 - 50 | 9   | 2,2671    | 11.86  |
| Group Housing       | General Residential Zone II | 1 - 41  | 41  | 4,0654    | 21.27  |
| Private Open Space  | Open Space Zone II          | 51 - 59 | 9   | 0,3717    | 1.94   |
| Nature Conservation | Open Space Zone III         | Rem     | 1   | 10,5784   | 55.35  |
| Private Streets     | Transport Zone III          | 60 - 63 | 4   | 1,8303    | 9.58   |
| TOTAL               |                             |         | 64  | 19,1129   | 100.00 |

PLAN 4

PLETTENBERG BAY  
ERF 6503

ALTERNATIVE 1  
PREFERRED PROPOSAL



SCALE 1: 2500



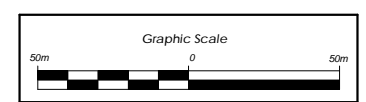
NOTES

- Sizes and dimensions are approximate and subject to final survey
- For Property details, refer to SG 8205/1996
- 0.5m Contour intervals, surveyed by VPM Surveys

|            |                                     |          |    |
|------------|-------------------------------------|----------|----|
| DRAWN:     | MV                                  | CHECKED: | MV |
| PLAN NO:   | Pr2309PB6503L07                     |          |    |
| PLAN DATE: | 8 Feb 2024                          |          |    |
| STORED:    | z:\drawings\App\Pr2309PB6503L07.dwg |          |    |

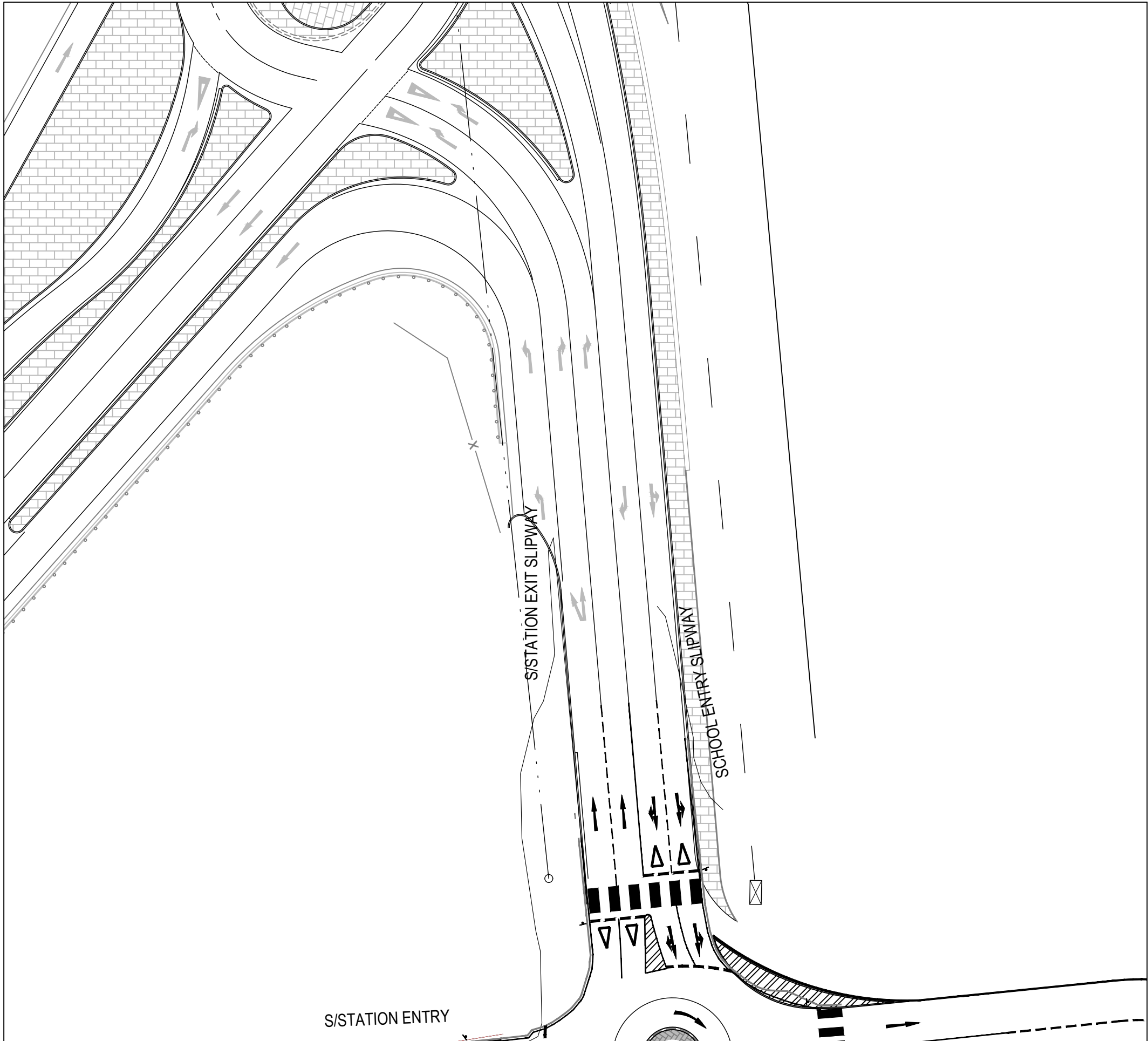
COPY RIGHT:  
This Plan may not be copied or amended without the written consent of M Vreken

MUNICIPAL MANAGER  
DATE: \_\_\_\_\_



21 Trotter Street, PO Box 2180  
KNYSNA 6570

(044) 382 0420  
086 459 2987  
e-mail: marike@vreken.co.za  
www.vreken.co.za



CONSULTING ENGINEER:  
**VITA CONSULTING ENGINEERS**  
 House 51, Lourensford Estate, Somerset West, 7130  
 Tel: +27 84 207 3223, E-mail: riaan@vitaeng.co.za

| REV | DATE       | DESCRIPTION            | CHECKED |
|-----|------------|------------------------|---------|
| A   | 24/01/2024 | ISSUED FOR INFORMATION | GS      |
| B   | 01/02/2024 | ISSUED FOR INFORMATION | GS      |
|     |            |                        |         |
|     |            |                        |         |

PROJECT NAME  
**PLETT LAGOON, PORTION 1 of ERF 6503 , PLETTENBERG BAY**

DRAWING TITLE  
**BEACON WAY TRAFFIC CIRCLE**

APPROVAL  
 SIGNATURE: R van Dyk NAME: DATE: 01/09/2022

|            |        |      |
|------------|--------|------|
| DATE       | SCALE  | SIZE |
| 22/06/2023 | 1:1000 | A0   |

|               |     |
|---------------|-----|
| DRAWING NO.   | REV |
| 22051_TURN_01 | B   |

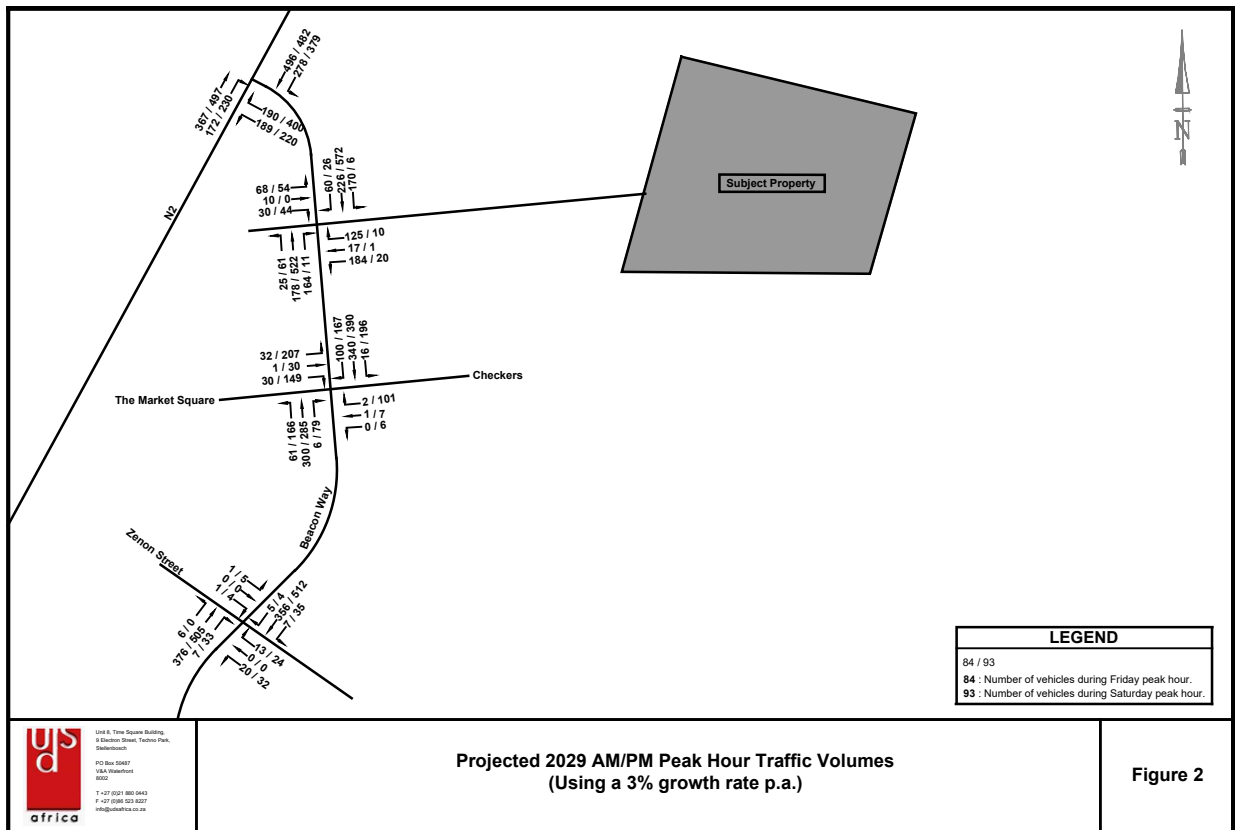
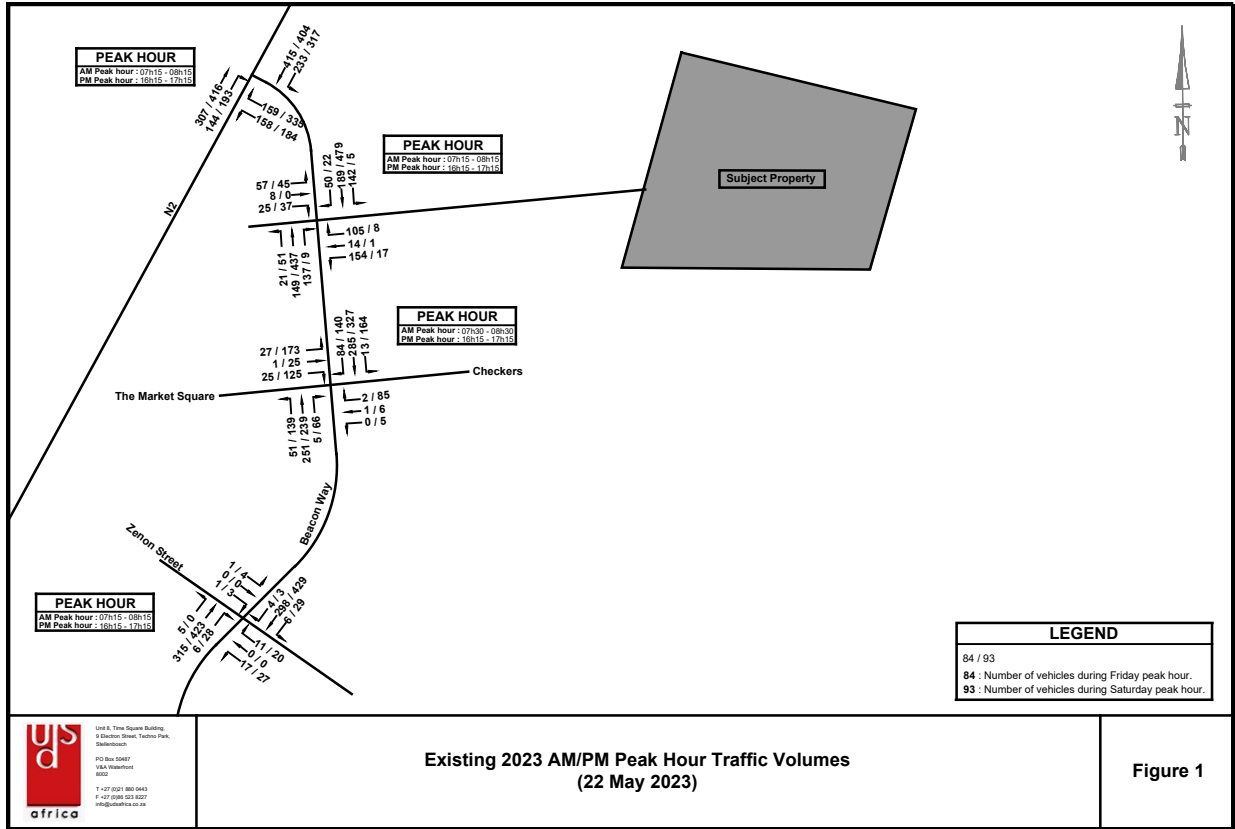
SISTATION ENTRY

SISTATION EXIT SLIPWAY

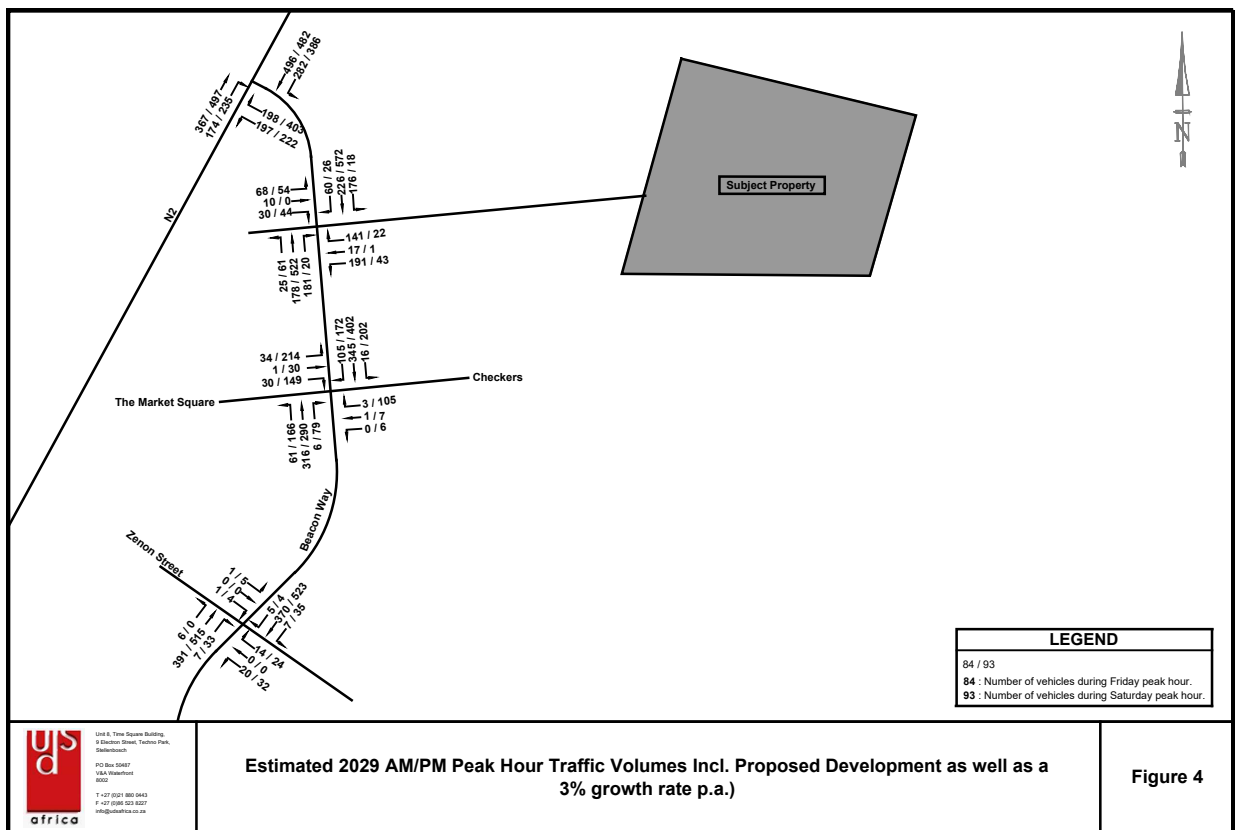
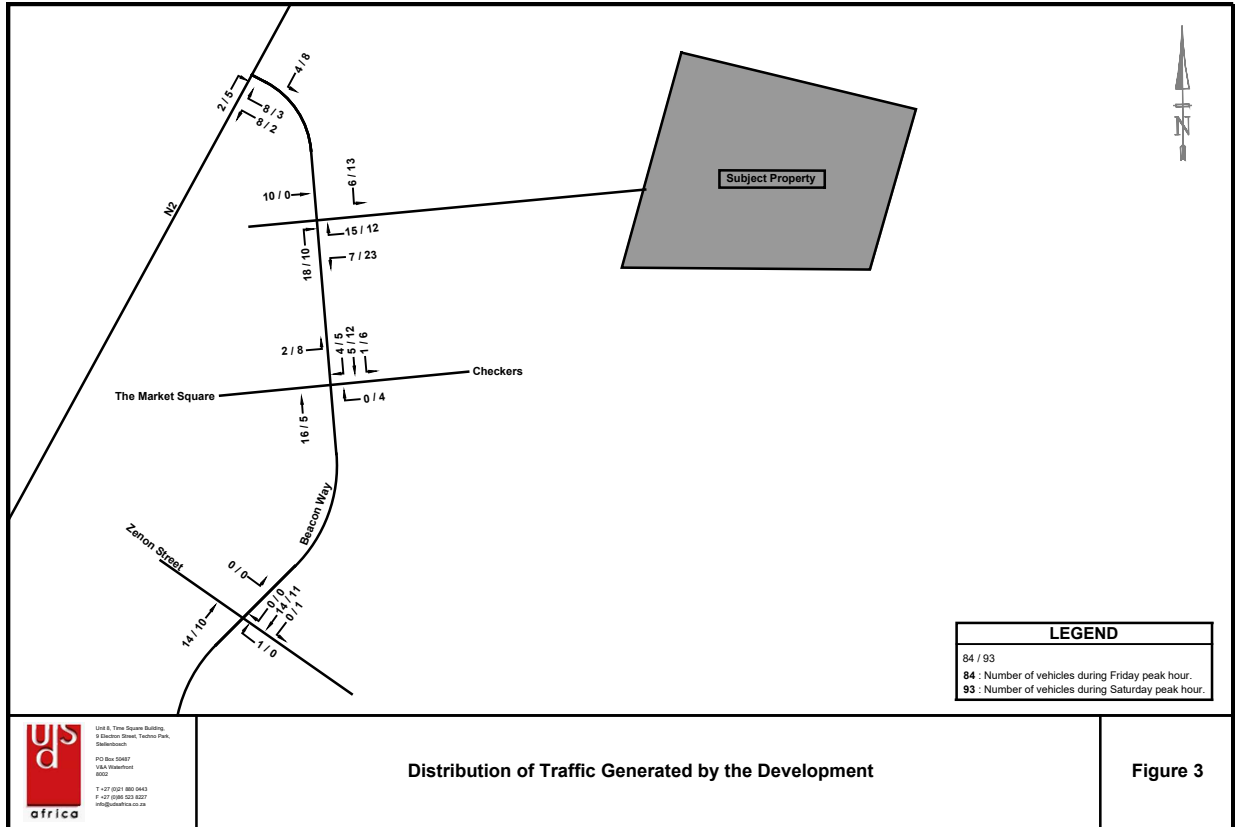
SCHOOL ENTRY SLIPWAY

NEW LANE 70m MINIMUM LENGTH

LIMIT OF CONSTRUCTION









Ref: 9/1/3

Enquiries: Z Mputa

Contact Details: 044 501 3266

Email: [zmputa@plett.gov.za](mailto:zmputa@plett.gov.za)

14 February 2024

The Director  
VITA Consulting Engineers  
House 51 Lourensford Estate,  
Somerset West  
7130

**For the attention of Mr. R Van Dyk**

Dear Sir

**PLETT LAGOON PORTION 1 OF ERF 6503: APPROVAL FOR BEACON WAY TRAFFIC CIRCLE CONCEPTUAL LAYOUT PLAN**

We hereby approve the drawing No. 22051\_TURN\_01 revision B for the abovementioned development in condition that:

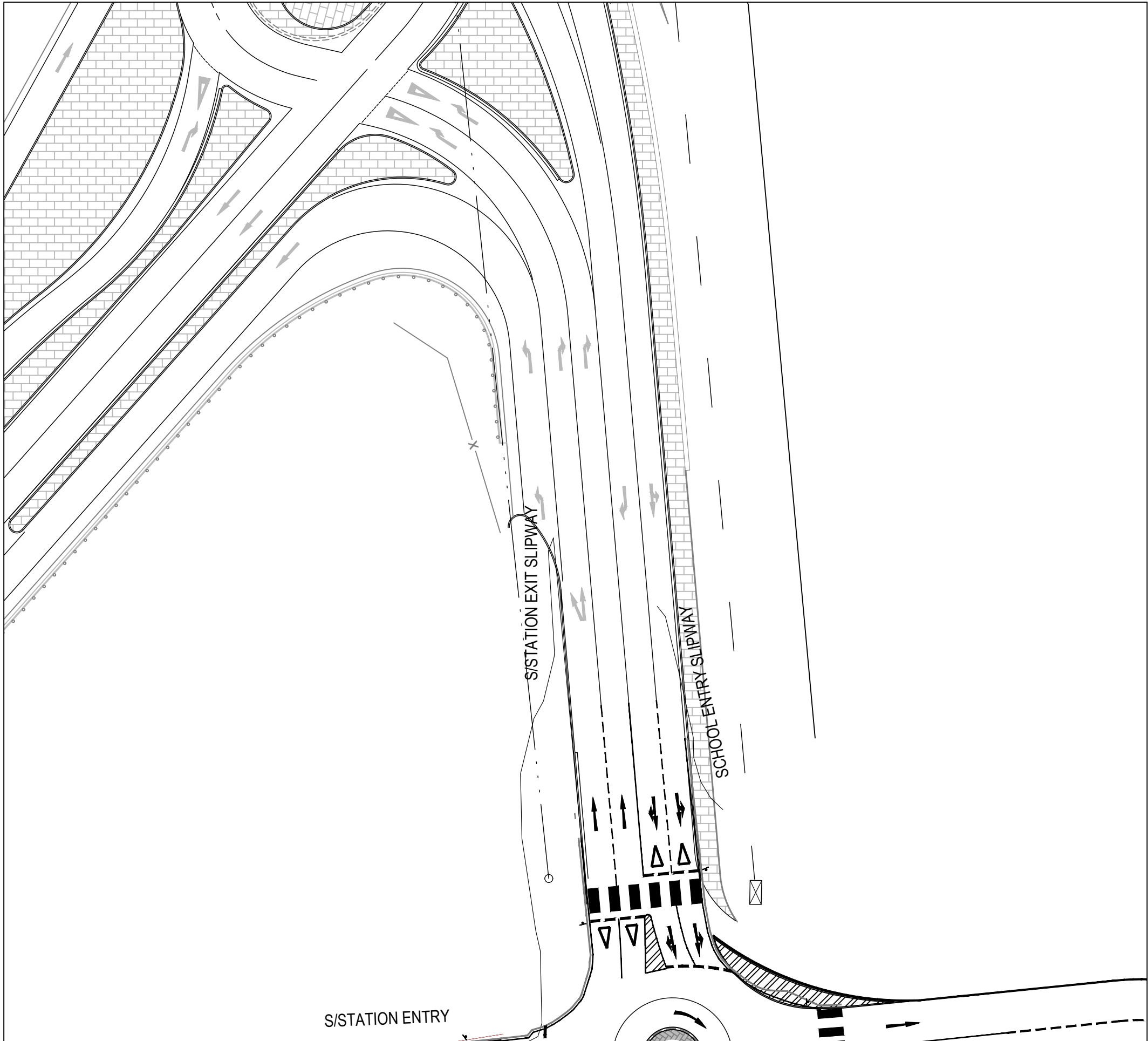
1. All Roads and Stormwater must be designed as per Guidelines for Human Settlement Planning and Design.
2. The design should be approved by municipality prior to implementation of works, .
3. The Engineer must ensure that they obtain the wayleaves from the municipality before construction.
4. The Engineer must inform the municipality during construction for monitoring and must be invited to the site meetings.
5. The Municipality must be invited on completion for final inspection and approval.
6. As build drawing PDF and sharefiles must be submitted to the municipality.
7. The Engineer must ensure that the developer covers all the cost towards this upgrade, with no contribution from the Municipality

Should there be any clarity required or information requested our division is willing to cooperate and assist where applicable.

Yours Faithful

**Z MPUA**

Manager: Transport, Roads and Stormwater



CONSULTING ENGINEER:  
**VITA CONSULTING ENGINEERS**  
 House 51, Lourensford Estate, Somerset West, 7130  
 Tel: +27 84 207 3223, E-mail: riaan@vitaeng.co.za

| REV | DATE       | DESCRIPTION            | CHECKED |
|-----|------------|------------------------|---------|
| A   | 24/01/2024 | ISSUED FOR INFORMATION | GS      |
| B   | 01/02/2024 | ISSUED FOR INFORMATION | GS      |
|     |            |                        |         |
|     |            |                        |         |

PROJECT NAME  
**PLETT LAGOON, PORTION 1 of ERF 6503 , PLETTENBERG BAY**

DRAWING TITLE  
**BEACON WAY TRAFFIC CIRCLE**

APPROVAL  
 SIGNATURE: R van Dyk NAME: DATE: 01/09/2022

|                           |                        |                   |
|---------------------------|------------------------|-------------------|
| DATE<br><b>22/06/2023</b> | SCALE<br><b>1:1000</b> | SIZE<br><b>A0</b> |
|---------------------------|------------------------|-------------------|

|                                     |                 |
|-------------------------------------|-----------------|
| DRAWING NO.<br><b>22051_TURN_01</b> | REV<br><b>B</b> |
|-------------------------------------|-----------------|

SISTATION ENTRY

SISTATION EXIT SLIPWAY

SCHOOL ENTRY SLIPWAY

NEW LANE 70m MINIMUM LENGTH

LIMIT OF CONSTRUCTION

Appendix D: Municipal Services Capacity Analysis (GLS Consulting)

## Draft report

27 February 2023

The Director: Engineering Services  
Bitou Municipality  
Private Bag X1002  
Plettenberg Bay  
6600

**Attention: Ms Asiphe Mgoqi**

Dear Madam,

### **PROPOSED RESIDENTIAL DEVELOPMENT ON ERF 6504 AND THE REMAINDER OF ERF 6503, PLETTENBERG BAY: CAPACITY ANALYSIS OF THE BULK WATER & SEWER SERVICES**

The request by Mr Riaan van Dyk of Vita Consulting Engineers for GLS Consulting to investigate and comment on the bulk water supply and sewer discharge of the proposed development (retirement village development on portion 53 of Farm 444, Plettenberg Bay), refers.

This document should inter alia be read in conjunction with the Water Master Plan (performed for the Bitou Municipality) dated June 2020 and the Sewer Master Plan dated June 2020.

The proposed development was not taken into consideration for the master plans for the water and sewer networks.

## **1 WATER DISTRIBUTION SYSTEM**

### *1.1 Distribution zone*

For this re-analysis of the water master plan it is proposed that the development area should be accommodated in the existing Goose Valley reservoir zone. The proposed connection to the existing water system is to the existing 250 mm diameter supply pipeline from the Goose Valley reservoir in Beacon Way, as shown on Figure 1 attached.

The proposed development is situated inside the water priority area.

### *1.2 Water demand*

No provision was made in the original water analysis for the master plan for development on Erf 6504 and the remainder of Erf 6503 in Plettenberg Bay .

For this re-analysis, the total annual average daily demand (AADD) and fire flow for the proposed development were calculated and classified as follows:

- 40 x retirement units @ 0,6 kL/d/unit = 24,0 kL/d
- 31 x Single residential units @ 1,0 kL/d/unit = 31,0 kL/d
- TOTAL = 55,0 kL/d \*

\* As per Table J.2 from Section J – Water Supply of “The Neighbourhood Planning and Design Guide” (so called “Red book”).

- Fire flow criteria (Low risk) = 15 L/s @ 10 m

### 1.3 Present situation

#### 1.3.1 Reticulation network

It is recommended that the proposed development is accommodated within the existing Goose Valley reservoir water distribution zone and not within the Town PRV no. 3 zone.

The Goose Valley water distribution zone is supplied with water from the Goose Valley reservoir (Top Water Level (TWL) of 89.7 m above mean sea level (m a.s.l.)) through a 250 mm Ø main supply pipe under gravity. The existing water reticulation system also supplies bulk water to the Wittedrift and Matjiesfontein reservoirs (through the reticulation network, see section 1.3.3 further on in the report) and has consequently insufficient capacity to accommodate the domestic water demand of the proposed development in order to comply with the pressure and fire flow criteria as set out in the master plan.

Link services items BPW14.1 will be required to connect the internal reticulation network of the proposed development to the existing municipal water network.

#### Link services

- BPW14.1 : 70 m x 200 mm Ø new pipe = R 284 000 \*

(\* Including P & G, Contingencies and Fees, but excluding VAT - Year 2022/23 Rand Value. This is a rough estimate, which does not include major unforeseen costs).

The route of link services item BPW14.1 is schematically shown on Figure 1, but has to be finalised subsequent to a detailed pipeline route investigation.

#### 1.3.2 Reservoir capacity

Bulk water is currently supplied from the Goose Valley reservoir to the Matjiesfontein and Wittedrift reservoirs, which has a negative effect on the available reservoir storage capacity available for the Goose Valley reservoir supply area (this is discussed in section 1.3.3 of this report further on).

The Matjiesfontein reservoir is the main supply reservoir for the areas east of the Keurbooms River and the Wittedrift reservoir is the main supply reservoir for Wittedrift and Green Valley.

The Goose Valley reservoir has consequently insufficient spare capacity to accommodate any additional developments.

Note: The Goose Valley reservoir will have sufficient spare capacity available to accommodate the development if the Wittedrift and Matjiesfontein reservoirs are supplied with water directly from the Town reservoirs through a dedicated bulk system, as discussed in paragraph 1.4.1 further on in the report.

### 1.3.3 Bulk supply

The Plettenberg Bay bulk water system was designed to supply the Wittedrift and Matjiesfontein reservoirs with bulk water from the Town reservoirs, located on the Plettenberg Bay Water Treatment Plant (WTP) site, and the Goose Valley reservoir with bulk water through the Goose Valley PS, also located at the Plettenberg Bay WTP site.

The Matjiesfontein reservoir was supplied with water through a 150 mm diameter dedicated pipeline between the Town reservoirs and the Matjiesfontein reservoir, and the Wittedrift reservoir through a 90 mm diameter pipe that connects to the Town/Matjiesfontein pipeline.

The 150 mm supply pipe to the Matjiesfontein and Wittedrift reservoirs is however at capacity (capacity of pipeline is  $\pm 1,0$  ML/d and peak demand of the supply system is currently  $\pm 2,3$  ML/d) and bulk supply to the Matjiesfontein and Wittedrift reservoirs is therefore currently supplied from the Goose Valley reservoir through the network of the Goose Valley water distribution zone. The Goose Valley reticulation network connects to the Matjiesfontein bulk pipeline before the bridge over the Keurbooms River.

The system is therefore currently not operated as it was designed for. The current operation consequently puts pressure on the available spare capacity of the Goose Valley system and is also not economically the best solution for the longer term (water that could have gravitated to the Matjiesfontein reservoir is currently pumped via the Goose Valley system).

The Goose Valley reservoir is supplied with water through a 200 mm diameter dedicated pipe between the Goose Valley PS and reservoir.

The capacity of the existing Goose Valley PS and accompanying 200 mm supply pipeline is 40 L/s (3,4 ML/d if pumped 24 hours a day). Peak demand from the Plettenberg Bay WTP to the Goose Valley reservoir is calculated at 2,7 ML/d (based on bulk water readings of the Goose Valley PS supplied by Bitou Municipality from July 2020 to March 2022). This implies that during peak demand conditions (December holiday) the Goose Valley PS should be operational 19 hours a day in order to supply the demand.

Bitou Municipality has indicated that their Goose Valley bulk system is under pressure during peak demand conditions and that the larger bulk system (supply to Matjiesfontein reservoir) should be upgraded according to the master plan before additional developments can be accommodated within the existing Goose Valley reservoir supply area.

## 1.4 Implementation of the master plan

### 1.4.1 Bulk supply

In the water master plan the following upgrades are proposed in order to augment the existing bulk supply system between the Town reservoirs at the WTP site and the Matjiesfontein reservoir on the eastern side of the Keurbooms River:

#### Bulk supply augmentation

|           |   |           |              |
|-----------|---|-----------|--------------|
| • BPW.B39 | : 930 m x 400 mm Ø new bulk pipe (replace 150 mm Ø)   | = R       | 6 108 000 *  |
| • BPW.B67 | : 2 670 m x 355 mm Ø new bulk pipe (replace 150 mm Ø) | = R       | 13 813 000 * |
| • Item 1  | : Close existing isolating valve                      | = R       | No cost      |
|           |   | Total = R | 19 921 000 * |

In the Water Master Plan item DPW.B40 was proposed to connect an existing 300 mm Ø pipeline from the Town reservoir zone to the existing 150 mm Ø Matjiesfontein bulk pipeline (at the intersection of the N2 National Road and the service road towards the Goose Valley reservoir), in order to augment bulk water supply to the Matjiesfontein and Wittedrift reservoirs.

Bitou Municipality has however indicated that this 300 mm Ø pipeline (3,6 km asbestos cement pipeline from the Town reservoirs) is in a poor condition, has been abandoned and can not be utilised to augment the bulk water supply system. The master plan should therefore be amended to reflect this.

It is therefore proposed that the following master plan item is included in the water master plan in the place of the existing 300 mm Ø AC pipeline.

- Item 2 : 3 600 m x 400 mm Ø new bulk pipe (replace 300 mm Ø) = R 22 631 000 \*

These upgrades will solve the existing backlog of bulk supply to the Matjiesfontein reservoir as well as provide spare capacity for potential future development areas, as documented in the water master plan.

(\* Including P & G, Contingencies and Fees, but excluding VAT - Year 2022/23 Rand Value. This is a rough estimate, which does not include major unforeseen costs).

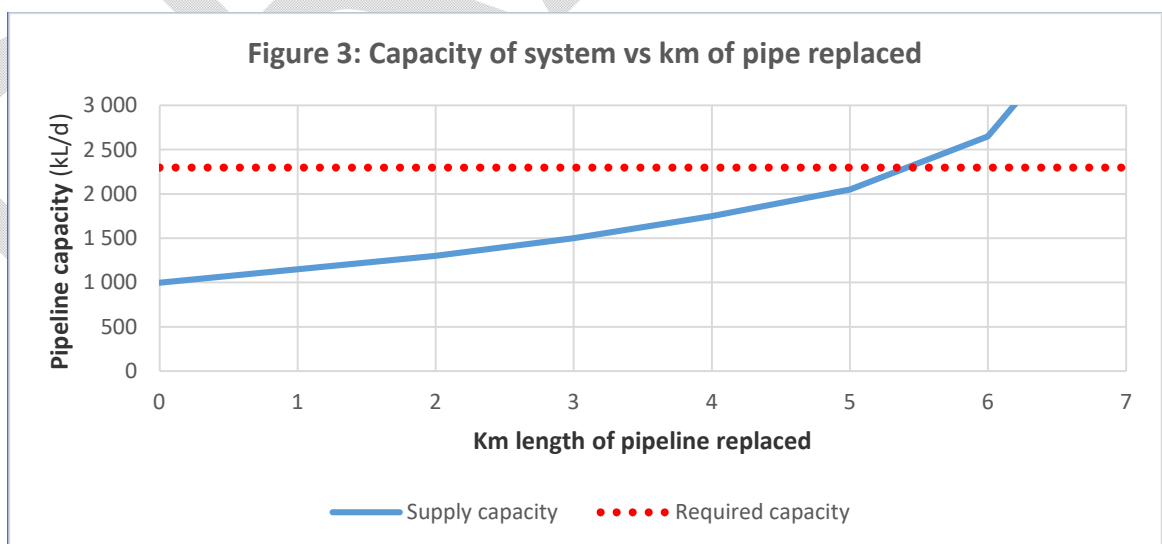
Take note that the routes of the proposed pipelines are schematically shown on Figure 2 attached, but have to be finalised subsequent to detail pipeline route investigations.

### 1.5 Minimum upgrades required to bulk system

The capacity of the existing bulk supply system from the Town reservoirs to the Matjiesfontein reservoir is calculated at 1,0 ML/d. The required supply to the Matjiesfontein reservoir during peak holiday periods is calculated at 2,3 ML/d (refer to paragraph 1.3.3).

It is therefore proposed that the existing 150 mm Ø pipeline between the Town reservoirs and the bridge over the Keurbooms River is replaced and isolated from the existing Goose Valley network as proposed in the water master plan in order to augment supply to the Matjiesfontein reservoir. This will then alleviate pressure that currently exist on the supply to the Goose Valley reservoir in order to accommodate future developments within the reservoir supply area.

Figure 3 below shows how supply to the Matjiesfontein reservoir will improve as sections of master plan items 2, BPW.B39 and BPW.B67 are implemented (from the Town reservoir towards the Keurbooms River):





Roughly 5,5 km of the existing 7,7 km x 150 mm Ø bulk pipeline between the Town reservoirs and the Keurbooms River should be upgraded in order to supply the Matjiesfontein reservoir from the Town reservoirs under gravity (no augmentation of bulk supply from the Goose Valley reservoir will then be required).

The minimum upgrades required to improve the existing bulk supply system in order to accommodate the proposed development in the existing system are:

- Master plan item 2 (3,6 km x 400 mm Ø replace existing 300 mm Ø abandoned AC pipe).
- Master plan item BPW.B39 (0,9 km x 400 mm Ø replace existing 150 mm Ø bulk pipe).
- Portion of master plan item BPW.B67 (1,0 km x 355 mm Ø replace existing 150 mm Ø bulk pipe).

#### 1.6 *Additional development planned in the short-term for Goose Valley reservoir zone*

Although GLS Consulting cannot comment on the implementation timeframes of proposed developments, it should be noted that capacity analyses for the following developments (that should be supplied with water from the Goose Valley/Matjiesfontein/Wittedrift bulk supply system) have been performed in the last 3 years:

- Portion 32 of Farm 304 (Final report dated 15 September 2022, estimated water demand of 9,6 kL/d).
- Portion 38 of Farm 444 (Final report dated 3 October 2022, estimated water demand of 10,2 kL/d).
- Erf 155, Keurboomstrand (Final report dated 7 December 2022, estimated water demand of 3,0 kL/d).
- Portions 19 & 27 of Farm 444 (Final report dated 7 December 2022, estimated water demand of 234,9 kL/d).
- Portion 53 of Farm 444 (Final report dated 7 December 2022, estimated water demand of 101,9 kL/d).
- Portion 7 of Farm 306, Wittedrift (Final report dated 9 December 2022, estimated water demand of 60,0 kL/d).
- Erven 103 & 104, Wittedrift (Final report dated 9 December 2022, estimated water demand of 36,0 kL/d).
- Erf 342, Wittedrift (Final report dated 9 December 2022, estimated water demand of 4,7 kL/d).
- Portion 91 of Farm 304 (Draft report dated 27 February 2023, estimated water demand of 43,8 kL/d).

The scope of the report does not cover the cumulative effect of the proposed developments. However, it should be noted that the simultaneous development of the proposed developments will accelerate the need for the master plan to be implemented.

## **2 SEWER NETWORK**

### *2.1 Drainage area*

It is proposed that sewage from the proposed development is accommodated within the existing Plettenberg Bay Pumping Station (PS) 1 drainage area.

The proposed connection point for the internal sewer reticulation network of the development to the existing municipal sewer system is to the existing 150 mm diameter outfall sewer in Susan Street, as shown on Figure 4 attached.

From PS no. 1 sewage is pumped through a 160 mm diameter rising main directly towards the Plettenberg Bay PS no. 1a.

Sewage is pumped from the Plettenberg Bay PS 1a through a 355 mm diameter dedicated rising main to the Ganse Valley Wastewater Treatment Plant (WWTP).

The proposed development is situated inside the sewer priority area.

### *2.2 Sewer flow*

No provision was made in the original sewer master plan for development on Erf 6504 and the remainder of Erf 6503.

For this re-analysis, the peak daily dry weather flow (PDDWF) for the proposed development was calculated at 38,5 kL/d.

### *2.3 Present situation*

The existing gravity sewer system between the proposed development gravitating towards the Plettenberg Bay PS 1 and the pumping system from the Plettenberg PS 1 to Plettenberg Bay PS1a have sufficient capacity to accommodate the proposed development.

The Plettenberg Bay PS 1a and accompanying 355 mm diameter rising main also have sufficient spare capacity to accommodate the proposed development.

### 3 CONCLUSION

The developer of Erf 6504 and the remainder of Erf 6503 in Plettenberg Bay may be liable for the payment of a Development Contribution (as calculated by Bitou Municipality) for bulk water and sewer infrastructure as per Council Policy.

The master plan indicated that the proposed development area should be accommodated in the existing Goose Valley reservoir zone. The proposed connection to the existing water system is to the existing 250 mm diameter supply pipeline from the Goose Valley reservoir in Beacon Way, as shown on Figure 1. Link services items BPW14.1 is required to connect the internal reticulation network of the proposed development to the existing municipal water network.

The bulk water system to the Goose Valley, Wittedrift and Matjiesfontein reservoirs is at capacity and should be upgraded according to the master plan before additional developments within the reservoir supply areas can be accommodated.

The minimum upgrades required to improve the existing bulk supply system (in order to accommodate the proposed development together with other potential development areas within the existing supply areas of the Goose Valley, Wittedrift and Matjiesfontein reservoirs), are:

- Master plan item 2 (3,6 km x 400 mm Ø replace existing 300 mm Ø abandoned AC pipe).
- Master plan item BPW.B39 (0,9 km x 400 mm Ø replace existing 150 mm Ø bulk pipe).
- Portion of master plan item BPW.B67 (1,0 km x 355 mm Ø replace existing 150 mm Ø bulk pipe).

There is sufficient capacity in the existing Plettenberg Bay sewer reticulation system to accommodate the proposed development. The recommended position for the sewer connection for the proposed development is to the existing 150 mm diameter outfall sewer in Susan Street, as shown on Figure 4 attached.

Also, find attached hereto Appendix A which includes general notes from Bitou Local Municipality regarding development approvals and conditions.

We trust that you find this of value.

Yours sincerely,

GLS CONSULTING (PTY) LTD  
REG. NO.: 2007/003039/07



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Per: PC DU PLESSIS

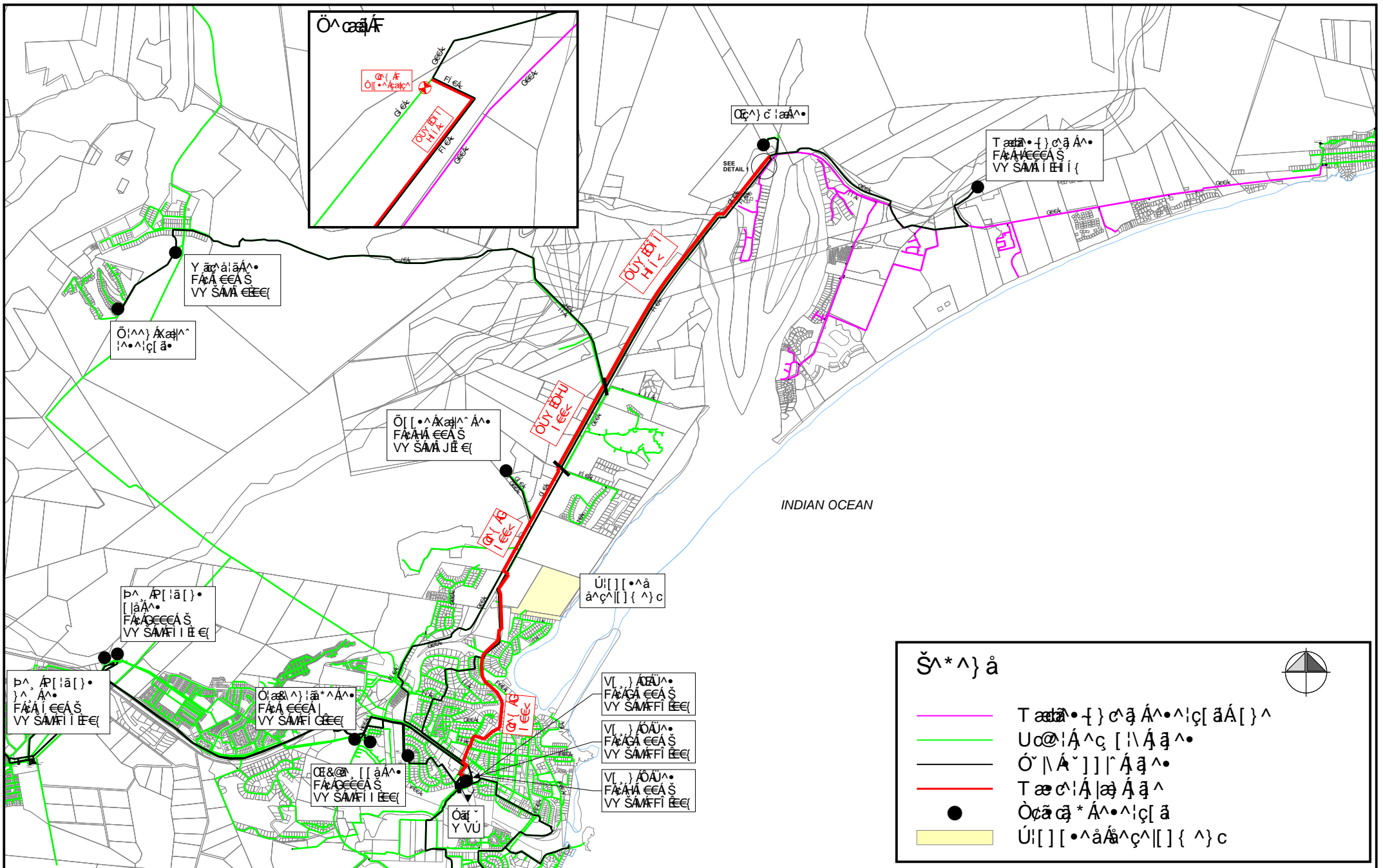
cc. Vita Consulting Engineers  
51 Lourensford Estate  
Somerset West  
7130

Attention: Mr Riaan van Dyk

**GENERAL NOTES FROM BITOU LOCAL MUNICIPALITY ATTACHED TO GLS BULK WATER AND SEWER SERVICES CAPACITY REPORT**

1. The GLS report is a services capacity report and the costs estimated in this report are only approximate values applicable at the time of the study.
2. Should the development be approved by Council the approval will be linked to certain development conditions. These conditions will be the official conditions applicable to the project and will take precedence over this report. Once approval is granted, Council will enter into a formal services agreement with the developer.
3. Costs for network upgrades, etc. As mentioned in the GLS report could change from time to time due to escalation, new tariff structures, additional requirements etc.
4. The Developer may be liable to pay a Development Contribution as per Council policy. The value payable will be calculated using Bitou Local Municipality's Development Contribution Calculator.
5. The Development Contribution monies are calculated according to the approved Council Policy at the time of payment.
6. The Development Contribution monies are payable before the approval of the building plan certificate or final approval of the subdivision for the transfer of units will be issued, as applicable for the type of development.
7. Where servitudes are required, all the costs and arrangements therefore will be for the developer's account.
8. The developer will be solely responsible for the cost of the link services as identified in the GLS report. The developer will also be responsible for the costs of upgrading to the minimum requirements of the services as identified in the GLS report. These costs may however be offset against the Development Contribution monies payable.
9. The above conditions are subject to any approved Council policies, which may be amended from time to time.





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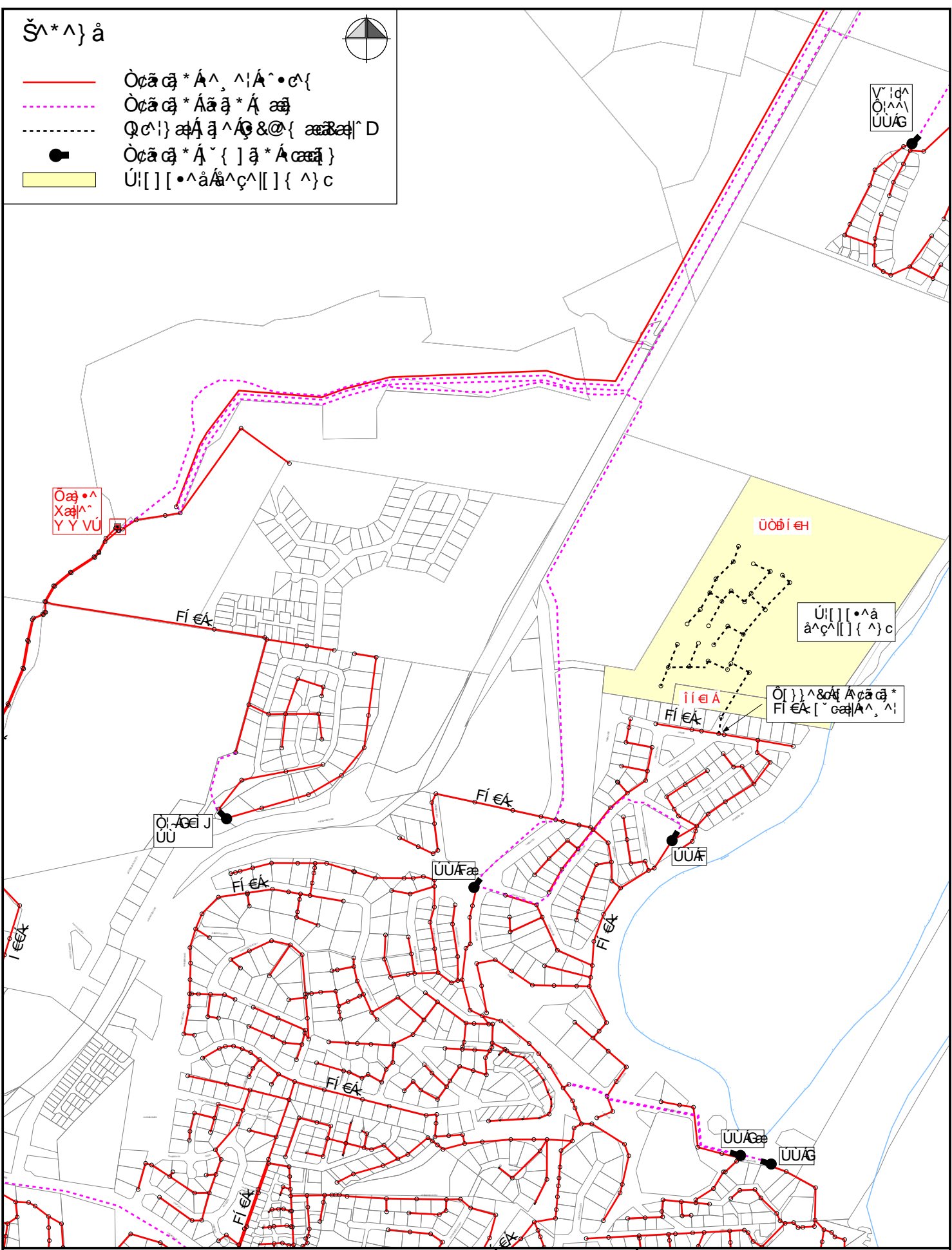


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Appendix E: Civil Engineering Services Layouts (VITA Consulting)



**CIVIL ENGINEERING SERVICES LEGEND**

- 160mm Ø PVC-U 25.42m@1:49.2 Foul Sewer (pPVC Heavy Duty class 34) SLOPE AND LENGTH SHOWN
- FOUL SEWER MANHOLE COVER AND INVERT LEVEL SHOWN
- FOUL SEWER RISING MAIN
- POTABLE WATER SIZES AS SHOWN (PVC CLASS 12)
- GATE VALVE AND FIRE HYDRANT (TYPE 4)
- DOUBLE AND SINGLE ERF CONNECTIONS
- WATER SETTING OUT NODES
- 1500mm WIDE STORMWATER CHANNEL
- STORMWATER LINE (SPIGOT & SOCKET CLASS 750) 375mm Ø (UNLESS OTHERWISE SHOWN)
- SW 1
- SW MANHOLE
- STORMWATER IN/OUTLET STRUCTURE
- GENERAL SLEEVES (PVC CLASS 6) SIZE AND NUMBER SHOWN



621444

- GENERAL NOTES:**
1. ALL WORK MUST BE DONE IN ACCORDANCE WITH THE STANDARD SPECIFICATION SABS 1000 AND THE GENERAL CONDITIONS OF CONTRACT FOR THE CONSTRUCTION OF CIVIL ENGINEERING WORKS.
  2. CO-ORDINATES ARE BASED ON THE W.G.S. 84 SYSTEM.
  3. THE CONTRACTOR HAS TO CHECK ALL SETTING OUT INFORMATION ON SITE AND NOTIFY THE ENGINEER OF ANY IRREGULARITIES PRIOR TO CONSTRUCTION.
  4. ALL MODIFICATIONS TO EXISTING SERVICES AND DEVIATIONS FROM THE DESIGN TO BE AS PER INSTRUCTION FROM THE ENGINEER ONLY.
  5. THE ENGINEER'S DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS, CONSULTANTS AND SPECIALISTS' DRAWINGS - ANY DISCREPANCIES SHALL BE REFERRED TO THE ENGINEER PRIOR TO CONSTRUCTION.
  6. COVER LEVELS TO CONFORM TO THE FOLLOWING:
    - 6.1. TOP OF ROAD LEVELS INSIDE ROAD RESERVES
    - 6.2. 750mm ABOVE NATURAL GROUND LEVEL IN NON-DEVELOPED AREAS
    - 6.3. THE CONTRACTOR HAS TO ENSURE THAT THE COVER LEVELS TIES IN WITH THE SURROUNDING LEVELS AND NOTIFY THE ENGINEER OF ANY IRREGULARITIES
  7. ERF CONNECTIONS:
    - 7.1. POTABLE WATER AND ELECTRICAL CONNECTIONS MAY BE BEND TO AVOID HORIZONTAL CLASHES WITH SHALLOW SERVICES
    - 7.2. FOUL SEWER MUST BE VERTICALLY RE-ALIGNED TO AVOID HORIZONTAL CLASHES
    - 7.3. CONNECTIONS MAY BE SHIFTED TO AVOID VERTICAL CLASHES

CONSULTING ENGINEER

**VITA CONSULTING ENGINEERS**

House 11, Loveland Estate, Somerset Road, 7330  
Tel: 011 37 253 211, Fax: 011 37 253 212

| REV. | DATE       | DESCRIPTION            | CHECKED |
|------|------------|------------------------|---------|
| A    | 23/06/2023 | ISSUED FOR INFORMATION | GS      |
| B    | 28/06/2023 | ISSUED FOR INFORMATION | GS      |
| C    | 28/06/2023 | ISSUED FOR INFORMATION | GS      |
| D    | 28/06/2023 | ISSUED FOR INFORMATION | GS      |
| E    | 28/06/2023 | ISSUED FOR INFORMATION | GS      |
| F    | 10/07/2023 | ISSUED FOR INFORMATION | GS      |

PROJECT NAME  
**PLETT LAGOON, PORTION 1 of ERF 6503 - PLETTENBERG BAY**

DRAWING TITLE  
**COMBINED SERVICES LAYOUT**

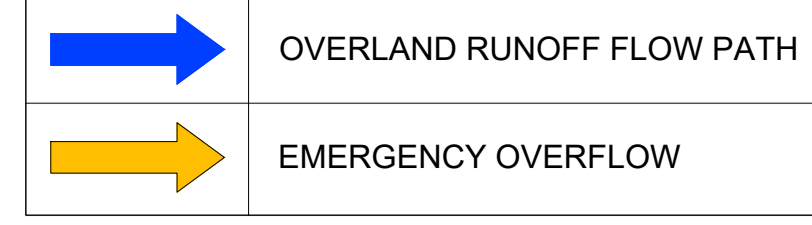
APPROVAL

| SIGNATURE | DATE       | SCALE | DATE | SCALE |
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|           | 22/06/2023 | 1:500 |      |       |

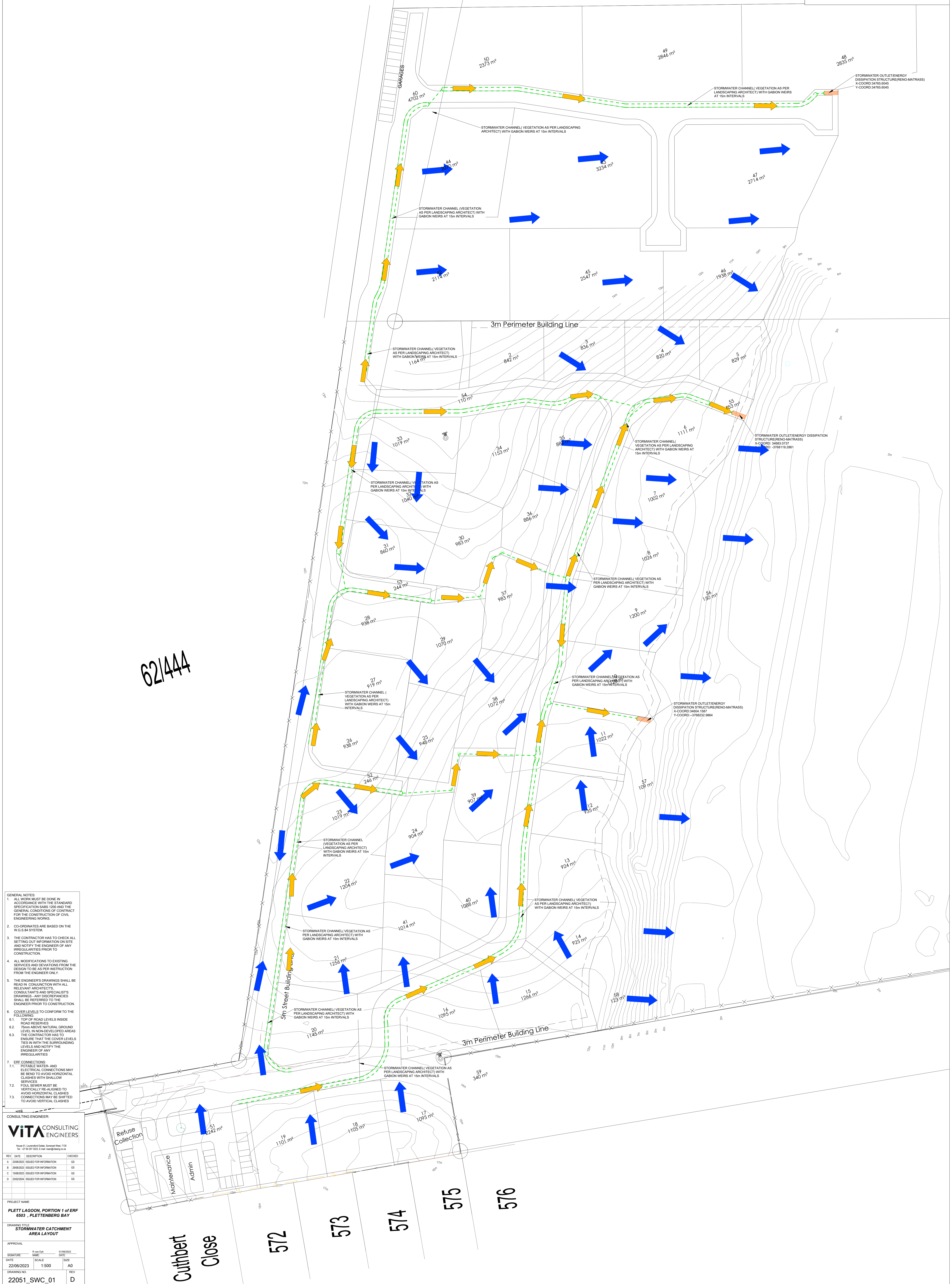
DRAWING NO. **22051\_CIV\_01** REV. **F**

Cuthbert  
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| CATCHMENT AREAS |            |
|-----------------|------------|
| Catchment A     | = 8.549 Ha |
| TOTAL           | = 8.549 Ha |



621444

- GENERAL NOTES**
1. ALL WORK MUST BE DONE IN ACCORDANCE WITH THE STANDARD SPECIFICATION SANS 100 AND THE GENERAL CONDITIONS OF CONTRACT FOR THE CONSTRUCTION OF CIVIL ENGINEERING WORKS.
  2. CO-ORDINATES ARE BASED ON THE W.G.S.84 SYSTEM.
  3. THE CONTRACTOR HAS TO CHECK ALL SETTING OUT INFORMATION ON SITE AND NOTIFY THE ENGINEER OF ANY IRREGULARITIES PRIOR TO CONSTRUCTION.
  4. ALL MODIFICATIONS TO EXISTING SERVICES AND DEVIATIONS FROM THE DESIGN TO BE AS PER INSTRUCTION FROM THE ENGINEER ONLY.
  5. THE ENGINEER'S DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTURAL CONSULTANTS AND SPECIALISTS DRAWINGS. ANY DISCREPANCIES SHALL BE REFERRED TO THE ENGINEER PRIOR TO CONSTRUCTION.
  6. COVER LEVELS TO CONFORM TO THE FOLLOWING:
    - 6.1. TOP OF ROAD LEVELS INSIDE ROAD RESERVES.
    - 6.2. 75mm ABOVE NATURAL GROUND LEVEL IN UNDEVELOPED AREAS.
    - 6.3. THE CONTRACTOR HAS TO ENSURE THAT THE COVER LEVELS TIES IN WITH THE SURROUNDING LEVELS AND NOTIFY THE ENGINEER OF ANY IRREGULARITIES.
  7. ERE CONNECTIONS:
    - 7.1. POTABLE WATER AND ELECTRICAL CONNECTIONS MAY BE MADE TO AVOID HORIZONTAL CLASHES WITH SHALLOW SERVICES.
    - 7.2. FOUL SEWER MUST BE VERTICALLY REALIGNED TO AVOID HORIZONTAL CLASHES. CONNECTIONS MAY BE SHIFTED TO AVOID VERTICAL CLASHES.

CONSULTING ENGINEER

**VITA CONSULTING ENGINEERS**

Plot 11, Sparrow Estate, Strand Road, 7120  
Tel: +27 22 323 1000 Email: info@vita.co.za

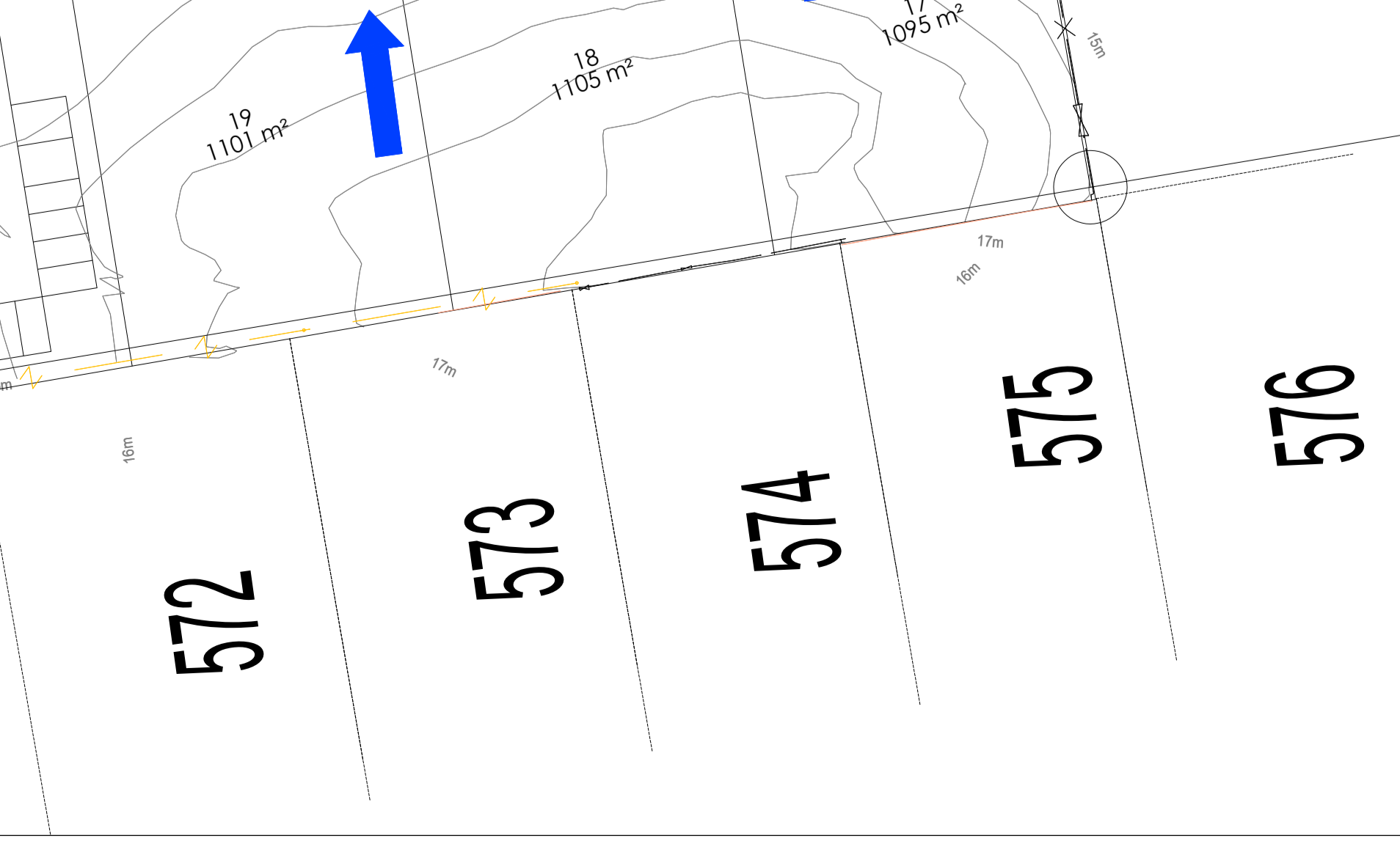
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|-----|------------|------------------------|---------|
| A   | 20/06/2023 | ISSUED FOR INFORMATION | GS      |
| B   | 20/06/2023 | ISSUED FOR INFORMATION | GS      |
| C   | 19/06/2023 | ISSUED FOR INFORMATION | GS      |
| D   | 22/06/2023 | ISSUED FOR INFORMATION | GS      |

PROJECT NAME  
**PLETT LAGOON, PORTION 1 of ERF 6503, PLETTENBERG BAY**

DRAWING TITLE  
**STORMWATER CATCHMENT AREA LAYOUT**

| APPROVAL  | DATE       | SCALE | SIZE |
|-----------|------------|-------|------|
| SIGNATURE | 01/09/2022 | 1:500 | A0   |
| DATE      | 22/06/2023 | 1:500 | A0   |

DRAWING NO. 22051\_SWC\_01



Appendix F: Minutes of Bitou Engineering Department Meeting - 9  
March 2023

## Riaan van Dyk

---

**From:** Riaan van Dyk <riaan@vitaeng.co.za>  
**Sent:** Monday, March 13, 2023 8:10 AM  
**To:** 'Asiphe Masivuye Mgoqi'; 'Edward Charles Oosthuizen'  
**Cc:** 'Lwamkelo Mapasa'  
**Subject:** Plettenberg Bay Developments  
**Attachments:** Portions 19 & 27 of Farm 444 - Figure 5(Draft).pdf; Portions 19 & 27 of Farm 444 - Figure 2(Draft).pdf

Good morning Asiphe/Eddie,

Thank you very much for taking time to meet on Thursday

I hereby wish to confirm the following items discussed during our meeting:

1) Appointment letters

- a. Bitou stated that they have had previous discussions with other consulting engineers regarding the developments on Farm 444/38 and Farm 304/32. RvD will submit appointment letters to Bitou to confirm his appointment as civil engineering consultant on the aforementioned developments.

2) Temporary water solution (refer figure 5)

- a. GLS provided a temporary solution (*installation of an additional 160mm bulk main off the existing 160mm distribution main in the N2 road reserve – refer figure 5*) which will free up an additional 860kl/day.
- b. This temporary solution formed the basis for the approval of the development on Farm 444/19 & 27, with specific conditions incorporated in the Service Level Agreement for the permanent solution.
- c. There is sufficient capacity in the 860kl/day to accommodate the developments on Farm 444/38, Farm 304/32 and erf 6503.
- d. The temporary solution should form the basis for the approval of the aforementioned developments, with the similar conditions to be included in the SLA:
  - i. Design, installation, etc. costs for the temporary solution will be the responsibility of the developer/developers and will not be deductible from the Augmentation Levee's
  - ii. The temporary solution is not a permanent solution and Augmentation Levee's for Water and Sewage will be used towards the permanent solution.
  - iii. The proposed pro-rata contribution towards the temporary solution must be resolved between the developers of the different properties.

3) Permanent water solution (refer figure 2)

- a. The permanent water solution entails the construction of a new 400mm/355mm watermain from the Bitou WTP to the Aventura Reservoir, with the costs estimated by GLS to be approximately R36m.
- b. The route, design, application and approval process for the pipeline will take approximately 18months.
- c. Bitou will liaise with their designated appointed consulting engineers to start the process as soon as possible.
- d. Augmentation Levees (*water and sewerage*) from each development will be used for the installation of a portion of the pipeline.
- e. A Service Level Agreement must be drafted for each development.
- f. Bitou's designated appointed consulting engineers will be responsible for professional services for phases 1-3 (*feasibility, approval and detail design*) of the pipeline and consulting engineers from each development will be responsible for phases 4-6 (*procurement, construction and close-out*)

- g. The Augmentation Levee's for each development (*and/or phase of the development*) will be re-calculated according to the specific year in which the levee's are paid.
- 4) Confirm capacity and connections with GLS
- a. Vita must set up a meeting with GLS to confirm the position and capacity of each development's connection into the bulk municipal network.
- 5) Possible off-grid solutions
- a. Bitou stated that they are willing to approve off-grid water and sewage solutions, on condition that specific requirements are met, with special conditions included in the SLA
    - i. The developer is responsible to obtain all the necessary environmental and regulatory approvals (*including GA or WULA*)
    - ii. All electrical equipment (*borehole, booster pumps, etc.*) must have a back-up electrical supply (*generator, inverter and battery pack or solar*)
    - iii. Potable water must adhere to SANS 241 Class 1 water parameters.
    - iv. Wastewater must be treated to Department of Water Affairs (DWA) General Limits parameters.
    - v. Water and treated effluent samples must be collected, analyzed by an independent laboratory and submitted to Bitou council on a monthly basis for the first year and quarterly basis for the second year.
    - vi. Should the water samples not adhere to the required standards, the developer/homeowners association will be liable for the costs to install the required potable water and foul sewer connections (*as proposed in the GLS capacity reports*).
    - vii. Augmentation levee's for potable water will not be applicable if the development adheres to the off grid requirements, but foul sewer levee's will still be applicable

I trust that you find the above a fair reflection of our meeting – I will forward the relevant documents (*appointments letters, draft Services Reports, proposed SLA wording, etc.*) as soon as possible.

Regards,

Riaan van Dyk *Pr. Eng*

Director

M 084 207 3223

E [riaan@vitaeng.co.za](mailto:riaan@vitaeng.co.za)

**VITA** CONSULTING  
ENGINEERS

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51 Lourensford Estate, Somerset West, 7130

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Appendix G: Temporary on-site Wastewater Treatment Plant Proposal  
and Proposed Maintenance Agreement

# Membrane Bioreactor Wastewater Treatment Plant

*For*

## PLETTENBERG BAY RESIDENTIAL DEVELOPMENT



April 2024

| APPROVALS |               |               |                 |                   |
|-----------|---------------|---------------|-----------------|-------------------|
| Revision  | Date          | Issued to     | Prepared by     | Checked by        |
| 0         | 30 April 2024 | Riaan van Dyk | Benita Aspeling | Meyer de Villiers |
| 1         | 13 May 2024   | Riaan van Dyk | Benita Aspeling | Meyer de Villiers |

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# 1 Introduction

We thank you for the opportunity to resubmit our proposal for the wastewater treatment plant (WWTP) and lifting stations for the Plettenberg Bay Residential Development. This proposal serves to provide a temporary technical and commercial solution in lieu of a sewer connection until the Bitou Municipality relevant wastewater treatment plants have been upgraded.

The Plettenberg Bay Residential Development comprises 50 units. At 800ℓ of effluent per unit per day that equates to a total of 40kℓ/day.

Alveo has sized for 12 hour buffer in order to ensure that the containerised portion itself does not need to be designed for peak flows. The proposed project also includes a containerised wastewater treatment plant (WWTP) and a sludge removal solution. It is noted that the emergency overflow is not in Alveo’s scope. Alveo has priced for the civil cost of designing and constructing the conservancy tank and sludge handling solution such that the client can choose to include it from the total price or not. Alveo Water will supply and install the Mechanical and Electrical (M&E) elements of the conservancy tank.

Alveo Water will further design, manufacture, deliver, install and commission the complete WWTP. Our civil subcontractor will construct the WWTP platform. The treated water must be stored and irrigated or released into the stormwater network by the client as per the services report.

The wastewater will be treated to Department of Water and Sanitation (DWS) General Limits Standards as detailed in table 1.

*Table 1: Treated Water Quality Objectives*

| SUBSTANCE/PARAMETER                                 | GENERAL LIMIT                                 |
|---|---|
| Faecal Coliforms (per 100 ml)                       | 1000  |
| Chemical Oxygen Demand (mg/l)                       | 75 (i)  |
| pH  | 5,5-9,5                                       |
| Ammonia (ionised and un-ionised) as Nitrogen (mg/l) | 6   |
| Nitrate/Nitrite as Nitrogen (mg/l)                  | 15  |
| Chlorine as Free Chlorine (mg/l)                    | 0,25  |
| Suspended Solids (mg/l)                             | 25  |
| Electrical Conductivity (mS/m)                      | 70 mS/m above intake to a maximum of 150 mS/m |
| Ortho-Phosphate as phosphorous (mg/l)               | 10  |
| Fluoride (mg/l)                                     | 1   |
| Soap, oil or grease (mg/l)                          | 2,5   |

Client initial upon proposal acceptance

## 2 Technical Description

The scope of works of the projects includes the civil design of the conservancy tank, WWTP platform and drying beds or underground sludge storage tank, as well as the process, mechanical & electrical (P,M&E) design of the aforementioned pumps and package wastewater treatment plant. The civil design will be done to SANS 1200. A detailed Process and M&E design will be completed for the packaged wastewater treatment plant. The Process and M&E design deliverables will be used to manufacture, install and commission the packaged wastewater treatment plant.

### 2.1 WWTW process design

#### 2.1.1 Raw Water Quality

No raw samples of the effluent have been taken. The preliminary design used for this proposal was based on **typical medium strength** wastewater as detailed in table 2. If the water quality analyses of the samples taken during the operational phase of the project show an average deviation of more than 10% above the values provided in table 2, then subsequent infrastructure changes may be required, which will result in additional costs.

*Table 2: Raw Water Quality Parameters Used for Design*

| PARAMETER  | Average |
|------------|---------|
| pH         | 6-9     |
| COD (mg/L) | 800     |
| BOD (mg/L) | 400     |
| FOG (mg/L) | 5       |
| TSS mg/L   | 350     |
| N Total    | 60      |
| Ammonia-N  | 45      |
| P Total    | 15      |
| Ortho-P    | 10      |

#### 2.1.2 Wastewater production

No water meter data was available for the wastewater production values. The Vitae Consulting Engineers' Services report stated that the expected effluent yield from the development will be 40kℓ/day for 50 units.

#### 2.1.3 Description of Technology

The proposed packaged wastewater treatment plant is a membrane bioreactor (MBR). Membrane Bioreactor (MBR) technology combines microfiltration with bio-digestion to reap the benefits of combined physical separation and biological removal. The dependency of effluent quality on influent quality is partially removed with an MBR system and thus MBR systems consistently provide quality effluent water. Furthermore, the minimal transfer of suspended solids through the MBR system allows the concentration of active bacteria to increase as much as four (4) times that possible in a CAS plant. This ensures that superior bio-digestion occurs with the use of an MBR at a fraction of the area required when using CAS alone.



## 2.2 Block Flow Diagram

A block flow diagram of a typical MBR process is provided in figure 1.

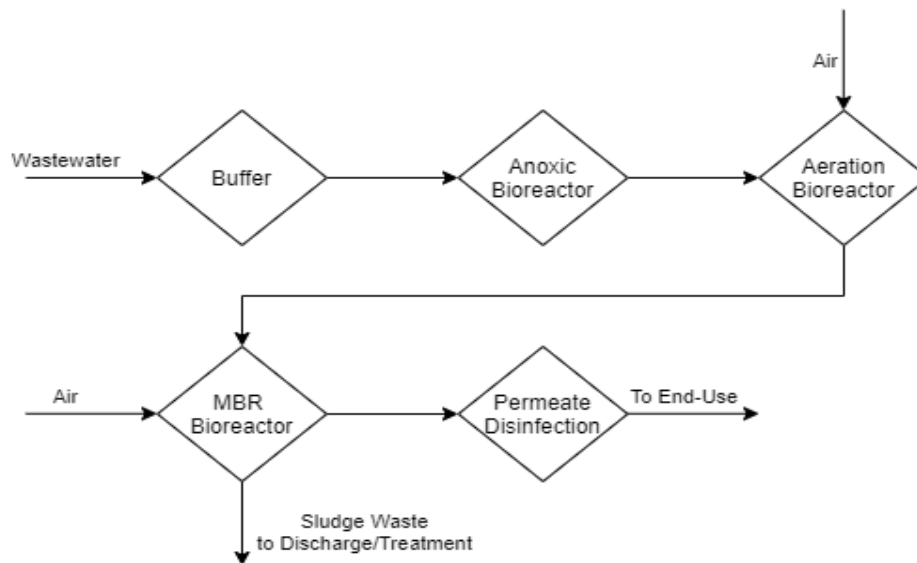


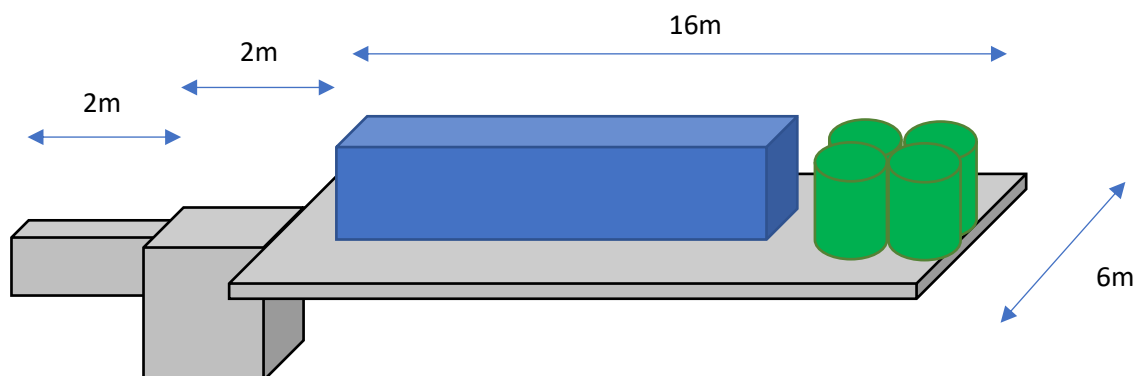
Figure 1: Block Flow Diagram of Proposed Treatment Process

## 2.3 Treatment Plant Description

The containerised WWTP will be constructed in one 12m container which will house the following:

- 3mm fine screen
- Anoxic Tank Mixer
- Aerobic section diffuser disks and pipework
- MBR membranes
- Blowers for aeration and membrane scouring
- Permeate pumps to remove water from MBR chamber
- UV disinfection
- CIP tank and skid to clean membranes periodically
- All electrical MCC, cabling and instrumentation required for a fully functional plant
- Generator

The treatment plant footprint will be 20m x 6m as illustrated below:



It may be preferable to move the buffer tank to downstream of the container (away from the residents), to allow the drying beds to be built on top of the buffer tank and thus significantly reducing civil costs. The civil costs in this report assume that the drying beds will be built on top of the buffer/conservancy tank.



Figure 2: Image of a similar containerized package plant

## 2.4 Electrical Requirements

Table 3: Estimated Power Usage of the proposed 45kℓ/day wastewater treatment plant

| Description                     | kW           | kWh/day       |
|---------------------------------|--------------|---------------|
| Buffer Pump in conservancy tank | 0,55         | 4,4           |
| Anoxic Mixer                    | 0,75         | 17,6          |
| RAS Pump                        | 0,55         | 6,6           |
| Permeate Pump                   | 0,75         | 16,5          |
| Aeration Blower                 | 3            | 64,8          |
| Scour Blower                    | 4            | 58            |
| UV Light                        | 0,06         | 1,32          |
| NaOCl Dosing Pump               | 0,28         | 6,05          |
| Irrigation pump                 | 3            | 0,5           |
| <b>Total Power Requirement</b>  | <b>12,86</b> | <b>175,77</b> |

Sufficient 3 phase + Earth + Neutral power must be provided by the client to meet the power demands as detailed in table 4.

It is believed that a 25KVA generator will be sufficient for this plant on the condition that the irrigation pump does not run when the generator is on.

### 3 Costing

#### 3.1 Capital Costs

Table 4 below illustrates the civil, mechanical and electrical costs associated with 1 x 45m<sup>3</sup>/day containerised MBR plant.

*Table 4: Capex Cost Summary for 45kℓ/day WWTP*

| Section                    | Description                                       |                       |
|----------------------------|---|-----------------------|
|                            | <b>CIVIL WORK FOR STRUCTURE</b>                   |                       |
| 1                          | Civil Work  | R 331 100.00          |
| <b>Sub-Total</b>           |   | <b>R 331 100.00</b>   |
|                            | <b>PLETTENBERG BAY WASTEWATER TREATMENT PLANT</b> |                       |
| 2                          | EC&I  | R 382 553.00          |
| 3                          | Container conversion                              | R 339 000.00          |
| 4                          | Buffer tank equipment                             | R 49 500.00           |
| 5                          | Screens   | R 139 500.00          |
| 6                          | Anoxic equipment                                  | R 19 400.00           |
| 7                          | Aeration system                                   | R 108 300.00          |
| 8                          | A recycle and WAS pumps and piping                | R 33 100.00           |
| 9                          | MBR system and permeate pumps                     | R 443 400.00          |
| 10                         | Treated water disinfection                        | R 21 925.00           |
| 11                         | Treated water storage tanks and irrigation system | R 126 775.00          |
| 12                         | Sludge thickening and drying beds                 | R 42 300.00           |
| 13                         | Generator   | R 179 700.00          |
| 14                         | Commissioning spares                              | R 2 200.00            |
| 14                         | Design & Overheads                                | R 145 170.00          |
| <b>Sub-Total</b>           |   | <b>R 2 092 823.00</b> |
|                            | <b>Transport, Installation and Commissioning</b>  |                       |
| 15                         | Transport equipment to site                       | R 40 000.00           |
| 16                         | Installation & Commissioning Travel costs         | R 32 700.00           |
| 17                         | Installation & Commissioning Labour               | R 54 400.00           |
| 18                         | O&M Manuals and training                          | R 5 000.00            |
| 19                         | 1 x Water Sample for Testing                      | R 2 500.00            |
| <b>Sub-Total</b>           |   | <b>R 134 600.00</b>   |
| <b>TOTAL EXCLUDING VAT</b> |   | <b>R 2 558 523.00</b> |

#### 3.2 Pricing Notes

The following additional items were requested by Vitae Consulting Engineers and are included in our price above:

- Irrigation pump and tanks (4 x 10kL).
- Standby generator and panel.
- Sludge drying beds OR underground sludge storage compartment.

The following spares are recommended to be purchased and kept on site for emergencies:

*Table 5: Recommended 2-year spares*

| Description         | Recommended Quantity | Cost per spare unit |
|---------------------|----------------------|---------------------|
| Spare Air Blower    | 1                    | R 23 000.00         |
| UV light and quartz | 2                    | R 3 500.00          |
| Buffer lifting pump | 1                    | R 8 900.00          |
| RAS pump            | 1                    | R 8 900.00          |
| Membrane module     | 1                    | R 21 500.00         |

The spares referenced in Table 5 above are additional and it is the client's responsibility to indicate which spares and the quantity of such spares to be included in the final proposal price. Ordering of spares after delivery of the wastewater treatment equipment may result in price differences and subsequently a Variation Order (VO). Alveo Water therefore suggests that all spares are ordered along with overall acceptance of the proposal.

### 3.3 Operational Costs

5 270kWh @ R1.90 of electricity will be consumed by the plant per month at maximum design flow. The chemical cost as stated below will be an estimated R2 640.00/month.

Our standard bi-weekly inspection service and maintenance visits will be charged at R16 120.00 per month. A wastewater sample analyses costs R1 100.00 and must be taken every month. The total monthly expense will thus be an estimated R19 860 excluding electricity and VAT. An operational service level agreement can be drawn up upon request by the client.

*Table 6: Expected monthly chemicals required to operate the plant.*

| Description             | Expected monthly consumption (kg/m) | Cost per spare kg | Expected monthly cost (R/m) |
|-------------------------|-------------------------------------|-------------------|-----------------------------|
| Poly-Aluminium Chloride | 60                                  | R 14.00           | R 840.00                    |
| Sodium Hypo             | 150                                 | R 12.00           | R 1 800.00                  |
| <b>TOTAL</b>            |                                     |                   | <b>R 2 640.00</b>           |

Client initial upon proposal acceptance

### 3.4 Delivery

The expected project timeline is as follows:

- Design and Drawings: 3 weeks
- Ordering of materials and equipment: 5 weeks
- M&E manufacturing: 6 weeks (can run concurrently with the civils).
- M&E installation and commissioning: 2 weeks

A total project duration of 16 weeks is anticipated. This timeline may also be impacted by import clearance times and port congestion. It is also noted that the project can only commence upon receipt of upfront deposit payment.

### 3.5 Conditions

- All prices are quoted in South African Rand (ZAR).
- Prices exclude Value Added Taxes (VAT) and money transfer commission.
- All prices are valid for 60 days.
- This quote/tender price is subject to change if substantial exchange rate fluctuations of over 10% occur during the validity or contract periods should the value of the imported goods amount to more than 10% of the total materials value.
- The country of origin of the proposed wastewater treatment plant is South Africa.

### 3.6 Assumptions, Exclusions and Battery Limits

The following exclusions and assumptions have been made to generate this proposal:

- Costs exclude main power supply to control panel located in container.
- Excludes a remote monitoring system for the treatment plant.
- Excludes DWA WULA for General Authorisation.



*Client initial upon  
proposal acceptance*

## 4 Terms and Conditions

### 1. General Assumptions

- Electricity will be available during installation for power tools and for commissioning.
- Bulk electricity supply and connection to the MCC panel is the responsibility of the client.
- Potable water will be available during construction and commissioning.
- Access will be provided for the delivery and assembly of the wastewater treatment equipment.
- Alveo Water's Proposal assumptions, terms and conditions will be take priority over any other agreements or contracts signed, unless otherwise agree upon by both Alveo Water and the Client.
- The default form of contract for Alveo Water's proposals is the General Conditions of Contract for Construction Works (GCC) 2015 edition.

### 2. Risk and Ownership

Notwithstanding delivery of any goods to the client, ownership of the wastewater treatment plant shall not pass to the client until Alveo Water has received payment in full for all goods and services associated with the manufacture, installation and commissioning of the wastewater treatment plant. If final settlement has not been received within six months after practical completion of the plant, Alveo Water reserves the right to recover and sell the plant or any part thereof to recover costs. The client will forfeit their deposit and/or any amounts paid to date.

### 3. Completion

Alveo Water adheres to the General Conditions of Contract (GCC) for Construction Work (2015) requirements for project completion as outlined in section 5.14 of the said contract. The GCC defines three completion milestones with associated completion certificates in order to formalize the completions procedures on a project, namely Practical Completion,

Completion and Final Approval. Alveo Water prescribe to these projects milestone and the employer/employer's agent is advised to familiarize themselves with the contractual terms associated with these milestones highlighted in section 5.14 of the GCC.

In addition to the three milestones described in the preceding paragraph, Alveo Water further defines an additional milestone relevant to the packaged Mechanical and Electrical works generally provided by Alveo Water. This additional milestone is named Factory Acceptance Testing (FAT) and is defined as follows:

Simulated testing performed on the designed equipment following assembly of the equipment, where the simulated testing is required to verify that the assembled equipment is capable of operating at its design capacity and produce the required design products. Factory Acceptance Testing can be performed in the production factory or on a site as deemed suitable by the design engineer. The FAT must be performed according to the FAT checklists and documentation and signed off by Alveo Water's responsible engineer. The Employer/Employers Agent is also required to witness and sign-off the FAT certificate in order to confirm acceptance of the FAT.

In such cases where Alveo Water cannot reach completion as a results of circumstances and delays outside of Alveo Water's control and during which a FAT has been completed, Alveo Water will allow for a 6 month period from the completion of the FAT after which the warranty and defects liability period will be deemed to have taken effect from the date of the factory acceptance test as recorded on the factory acceptance test certificate.

### 4. Warranty, Liability and Indemnity

Alveo Water warrants the equipment against defective materials and workmanship for a period of one year from the date of completion, fair wear and tear excluded. The warranty is subject to the following conditions:

- The purchase price and all other due fees associated with the treatment plant have been fully paid.
- The equipment has been correctly operated in accordance with the Operation and Maintenance manual.
- The equipment has not been subjected to undue climatic conditions beyond its design capacity. This includes rain, spray, wind, heat and dust.
- The warranty specifically excludes any damage caused by the client or client's representative or that beyond the control of Alveo Water.
- The warranty does not apply to our electrical panels and equipment connected to poor quality temporary electricity generators. These generators provide unbalanced phases with varying voltages. If electrical instruments and motors are damaged while connected to temporary power generators, we will not be able to honour our guarantees.
- If the electrical panel is opened or tampered with, the warranty is null and void.
- It is the client's responsibility to protect the equipment against power surges, which could damage equipment.
- Programming software is the Intellectual Property of Alveo Water and shall not be distributed or communicated to third parties in any way.
- The starting date of the warranty is when completion is reached (as per Section 3).

Alveo Water's liability to the client shall in any event and under all circumstances be limited to the costs of remedying any defective workmanship, repairing any defective goods, or replacing any defective goods not capable of repair.

Alveo Water shall under no circumstance whatsoever be liable for any loss of profit or any damages of whatsoever nature, direct or indirect, consequential or otherwise, suffered by the client or any other person or entity, whether or not caused by the negligence of Alveo Water, its agents or employees.

Alveo Water's professional liability shall be limited to twice (2) the amount of the Design and Overheads fee.



*Client initial upon proposal acceptance*





#### 5. Variations

Additional work, equipment or features requested by the client or consultant will be treated as Variation Orders (VO). Alveo Water will price the VO for approval and will only proceed once the financial and time implications of the VO have been approved.

#### 6. Payment Terms

Our payment terms are as follows:

- 50% on acceptance of this proposal
- 20% after successful factory acceptance testing (FAT) of plant
- 20% after delivery to site
- 10% after commissioning
- Variation Orders will be invoiced on their signed acceptance

Alveo Water will only commence with the project once the client signs the proposal where required and the deposit is reflected on the bank statement. Note that no allowance for an Advanced Payment Guarantee (APG) has been made. All costs involved in obtaining an APG will be treated as a VO. Payment is required into a South African bank account belonging to Alveo Water. Interest at SA prime plus 2% per annum will be charged on late payments (calculated pro rata per day).

#### 7. Delays

If long lead times are experienced on certain mechanical and electrical equipment, the client will be informed of expected delays or given an option to change the equipment to a similar approved product. Export or import, shipping and transport delays are not under the control of Alveo Water and thus Alveo Water will not be held responsible for such delays. Severe weather, strikes, coups, terrorism, war, epidemics, etc. (considered Force Majeure) or any such events that result in

delays are out of the control of Alveo Water and thus Alveo Water will not be held responsible for such delays.

If work on site is held up due to the client having to complete work required for environmental compliance, such as obtain a WULA or an EIA, Alveo Water will be allowed to continue with commissioning work as to invoice the client in full.

*Client initial upon proposal acceptance*



## 5 Acceptance of Offer

---

You are requested to indicate your acceptance of the Terms and Conditions of this appointment by initialling each page of this proposal document, providing a full signature on this page of the proposal document, and returning it to Alveo Water.



.....  
For Alveo Water

Meyer de Villiers

**Managing Director**

Date:

.....  
For Client

Print Name:

Print Position:

Date:



*Client initial upon  
proposal acceptance*

## TECHNICAL & FINANCIAL PROPOSAL

Project Client: Vita Consulting Engineers

Project Title: Plettenberg Bay Service Level Agreement

Proposal Number:

Electronic File Ref.:

| APPROVALS |      |           |             |             |
|-----------|------|-----------|-------------|-------------|
| Revision  | Date | Issued to | Prepared by | Approved by |
|           |      |           |             |             |

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## 1. Introduction

---

We thank you for the opportunity to submit our proposal for servicing of the Plettenberg Bay Wastewater Treatment Plant (WWTP) treating wastewater in an MBR WWTP.

The objective of this proposal is to effectively operate and maintain critical aspects of the WWTP to achieve the treated water specifications. Plettenberg Bay needs to have a person on site to be able to do daily tasks such as cleaning screenings, general site maintenance and WAS wasting as per Operating Manual. Alveo Water will be responsible for weekly/monthly duties of the WWTP as indicated in the table below. Successful operation is a joint effort between the Plettenberg Bay and Alveo Water.

The SLA is proposed for a period of 12 months from the date that the agreement is signed. The SLA will be renewed annually after agreeing on increased rates.

## 2. Scope

---

- Maintenance of treatment works equipment.
- Maintenance of buffer tank.
- Periodic checks and services of the treatment works equipment.

It is proposed to start the SLA initially with a service every 2 weeks, which can then be adjusted to more often or less often depending on need. The SLA includes labour hours and travel costs only. Chemical and equipment replacement / repair costs are additional and are for the client's account.



*Client initial upon  
proposal acceptance*

### 3. Alveo Water Service Duties

The daily/routine checks and duties of the Alveo Water Operation and Maintenance team are tabulated below:

Table 1: Alveo Water service duties

| Procedure  | Daily | Weekly | Monthly | Quarterly | Annual |
|--|-------|--------|---------|-----------|--------|
| Remotely check plant operation   |       | ✓      |         |           |        |
| Check mechanical screen on operation & discard screenings as needed                |       |        | ✓       |           |        |
| Inspect buffer pump operation  |       |        | ✓       |           |        |
| Inspect aeration and MBR blower operation  |       |        | ✓       |           |        |
| Check RAS pump operation   |       |        | ✓       |           |        |
| Check all dosing operation & refill chemical tank as needed                        |       |        | ✓       |           |        |
| Check permeate system operation  |       |        | ✓       |           |        |
| Check control panel operation & alarms/warnings                                    |       |        | ✓       |           |        |
| Check sensors operation & Take instrument/sensor readings                          |       |        | ✓       |           |        |
| Take water meter readings  |       |        | ✓       |           |        |
| Check UV light operation   |       |        | ✓       |           |        |
| General housekeeping   |       |        | ✓       |           |        |
| Complete a Sludge Volume Index (SVI) tests & evaluate sludge health for desludging |       |        | ✓       |           |        |
| Evaluate membrane fouling  |       |        | ✓       |           |        |
| Take sample for analysis   |       |        | ✓       |           |        |
| Report on plant operation & performance  |       |        | ✓       |           |        |
| CIP (Clean-in-place) of membranes  |       |        |         | ✓         |        |
| Clean drying beds  |       |        |         | ✓         |        |
| Inspect control panel and all electrical equipment                                 |       |        |         | ✓         |        |
| Replace UV bulb (as needed)  |       |        |         |           | ✓      |
| Replace blower air filter  |       |        |         |           | ✓      |
| Service dosing pumps   |       |        |         |           | ✓      |



## 4. Availability

Alveo Water will be available 5 days a week during normal business hours to attend to breakdowns.

Alveo Water will be available after hours and on weekends for emergencies after ascertaining the urgency and establishing the availability of personnel. This requires a person on site to relay information via telephone/email.

## 5. Service Proposal Conditions

Alveo Water commits to achieve the effluent water quality that is compliant with the discharge limits. The commitment above will become void if the circumstances described below are not maintained or adhered to:

1. No other water source is introduced into the feed water supply.
2. The water reuse treatment plant, or any part thereof, is operated according to sound practices, as outlined in the O & M Manual.
3. Routine maintenance is performed as outlined in Table 1 and the O & M Manual.
4. Alveo Water is notified within 2 hours of any breakdown or faulty equipment.
5. The raw water quality does not deviate from the design water quality by more than 10% for 3 consecutive samples.

The financial implications for the servicing work are tabulated below in Table 2.

*Table 2: Service Agreement costs for routine service of the treatment plant*

| Description                          | UOM | Qty | Unit Cost | Total Cost    |
|--------------------------------------|-----|-----|-----------|---------------|
| Technical labour (Day Visit)         | h   | 4   | 575       | 2300          |
| Travel cost (flight & driving costs) | km  | -   | -         | 5760          |
| <b>Total cost (Ex VAT)</b>           |     |     |           | <b>R8 060</b> |

*Table 3: Service Agreement costs for quarterly CIP of membranes*

| Description                                      | UOM | Qty | Unit Cost | Total Cost    |
|--|-----|-----|-----------|---------------|
| Perform CIP (Quarterly membrane, Clean-In-Place) | Sum | 1   | 5200      | 5200          |
| <b>Total cost (Ex VAT)</b>                       |     |     |           | <b>R5 200</b> |

Client initial upon  
proposal acceptance



Table 4: Adhoc/call out costs

| Description          | UOM | Qty | Unit Cost                     |
|----------------------|-----|-----|-------------------------------|
| Technician labour    | hr  | -   | R575 per hour or part thereof |
| Engineer labour rate | hr  | -   | R850 per hour or part thereof |
| Travel to site       | km  | 1   | R5 760                        |

ADDITIONAL NOTES:

- Additional callouts apart from the daily & weekly services will be charged at additional cost according to the same rates as above.
- The above costs for servicing are payable within 30 days following the receiving of the monthly invoice.
- The above costs are subject to escalation at the start of the new financial year per the CPI of the previous year.
- This Service Level Agreement does not propose any additional warranties or guarantees on the equipment of the WWTP.
- Any equipment that requires replacement outside of the warranty will be invoiced separately.

## 6. Acceptance of Offer

---

You are requested to indicate your acceptance of the terms and conditions of this appointment by initialling each page of this proposal document, providing a full signature on this page of the proposal document, and returning it to Alveo Water.

.....

For Alveo Water  
Meyer de Villiers  
**Managing Director**

.....

For Client  
Print Name:  
Print Position:  
Date:

Client initial upon  
proposal acceptance



Appendix H: Irrigation Water Balance

**ERF 6503 PLETTENBERG BAY: PLETT LAGOON ESTATE**

Irrigation Water Balance Calculations  
Revision C - 16 May 2024

**1 Average Precipitation Depth per Month**

|           | Precipitation Depth | Days    |
|-----------|---------------------|---------|
| January   | 43 mm               | 31 days |
| February  | 35 mm               | 28 days |
| March     | 48 mm               | 31 days |
| April     | 42 mm               | 30 days |
| May       | 34 mm               | 31 days |
| June      | 48 mm               | 30 days |
| July      | 66 mm               | 31 days |
| August    | 92 mm               | 31 days |
| September | 89 mm               | 30 days |
| October   | 49 mm               | 31 days |
| November  | 57 mm               | 30 days |
| December  | 48 mm               | 31 days |

**2.1 Landscaping Water Demand**

|                        | Daily Demand        |
|------------------------|---------------------|
| Road verges/open erven | 3 mm/m <sup>2</sup> |
| Occupied Erven         | 3 mm/m <sup>2</sup> |
| Trees                  | 5 liter/tree        |
| Hedges and SUDS areas  | 3 mm/m <sup>2</sup> |
| Other                  | 3 mm/m <sup>2</sup> |

**2.2 Seasonal adjustment**

|                 |      |
|-----------------|------|
| October - April | 100% |
| May - September | 25%  |

**\*Note:** Seasonal adjustment will not be applicable to open erven and trees

**3 Landscaped Areas**

|                          | Area in m <sup>2</sup>   |
|--------------------------|--------------------------|
| Road verges              | 4500 m <sup>2</sup>      |
| Swales                   | 1150 m <sup>2</sup>      |
| General landscaped areas | 3717 m <sup>2</sup>      |
| Trees                    | 150 No                   |
| Occupied erven           | 1000 m <sup>2</sup> /erf |
| *Open erven              | 63325 m <sup>2</sup>     |

**\*Note:** Open erven area will change as the development progresses.

**4 Treated Effluent Volume**

|       | No | Avg Sewage Yield (l/day) | Total Sewage Yield (m <sup>3</sup> /day) |
|-------|----|--------------------------|--|
| Erven | 50 | 800                      | 40                                       |
| GH    | 1  | 100                      | 0.1                                      |
|       |    |                          | 40.1                                     |

**\*Note:** Available treated effluent will change as the development progresses.

**6 Monthly Irrigation Water Balance**

| Month     | Development Status - 25% Occupancy<br>25%<br>13 erven |                                 |                               | Development Status - 50% Occupancy<br>50%<br>25 erven |                                 |                               | Development Status - 75% Occupancy<br>75%<br>38 erven |                                 |                               | Development Status - 100% Occupancy<br>100%<br>50 erven |                                 |                               |
|-----------|---|---------------------------------|-------------------------------|---|---------------------------------|-------------------------------|---|---------------------------------|-------------------------------|---|---------------------------------|-------------------------------|
|           | Water Demand m <sup>3</sup>                           | Treated Effluent m <sup>3</sup> | Irri Shortfall m <sup>3</sup> | Water Demand m <sup>3</sup>                           | Treated Effluent m <sup>3</sup> | Irri Shortfall m <sup>3</sup> | Water Demand m <sup>3</sup>                           | Treated Effluent m <sup>3</sup> | Irri Shortfall m <sup>3</sup> | Water Demand m <sup>3</sup>                             | Treated Effluent m <sup>3</sup> | Irri Shortfall m <sup>3</sup> |
| January   | 6520.3  | 322.5                           | 6197.80                       | 6164.0  | 620.1                           | 5543.89                       | 5900.69   | 942.5                           | 4958.19                       | 5544.38   | 1240.1                          | 4304.28                       |
| February  | 5889.3  | 291.3                           | 5598.00                       | 5567.5  | 560.1                           | 5007.38                       | 5329.65   | 851.3                           | 4478.35                       | 5007.83   | 1120.1                          | 3887.73                       |
| March     | 6520.3  | 322.5                           | 6197.80                       | 6164.0  | 620.1                           | 5543.89                       | 5900.69   | 942.5                           | 4958.19                       | 5544.38   | 1240.1                          | 4304.28                       |
| April     | 6310.0  | 312.1                           | 5997.87                       | 5965.2  | 600.1                           | 5365.06                       | 5710.34   | 912.1                           | 4798.24                       | 5365.53   | 1200.1                          | 4165.43                       |
| May       | 4960.2  | 322.5                           | 4637.70                       | 3766.9  | 620.1                           | 3146.80                       | 2596.84   | 942.5                           | 1654.34                       | 1403.53   | 1240.1                          | 163.43                        |
| June      | 4800.2  | 312.1                           | 4488.10                       | 3645.4  | 600.1                           | 3045.28                       | 2513.07   | 912.1                           | 1600.97                       | 1358.26   | 1200.1                          | 158.16                        |
| July      | 4960.2  | 322.5                           | 4637.70                       | 3766.9  | 620.1                           | 3146.80                       | 2596.84   | 942.5                           | 1654.34                       | 1403.53   | 1240.1                          | 163.43                        |
| August    | 4960.2  | 322.5                           | 4637.70                       | 3766.9  | 620.1                           | 3146.80                       | 2596.84   | 942.5                           | 1654.34                       | 1403.53   | 1240.1                          | 163.43                        |
| September | 4800.2  | 312.1                           | 4488.10                       | 3645.4  | 600.1                           | 3045.28                       | 2513.07   | 912.1                           | 1600.97                       | 1358.26   | 1200.1                          | 158.16                        |
| October   | 6520.3  | 322.5                           | 6197.80                       | 6164.0  | 620.1                           | 5543.89                       | 5900.69   | 942.5                           | 4958.19                       | 5544.38   | 1240.1                          | 4304.28                       |
| November  | 6310.0  | 312.1                           | 5997.87                       | 5965.2  | 600.1                           | 5365.06                       | 5710.34   | 912.1                           | 4798.24                       | 5365.53   | 1200.1                          | 4165.43                       |
| December  | 6520.3  | 322.5                           | 6197.80                       | 6164.0  | 620.1                           | 5543.89                       | 5900.69   | 942.5                           | 4958.19                       | 5544.38   | 1240.1                          | 4304.28                       |

Appendix I: Confirmation of Services and Refuse Capacity – Bitou  
Municipality



munisipaliteit umasipala municipality

to be the best together

Private Bag X1002 Plettenberg Bay 6600  
Tel+27 (0)44 501 3000 Fax +27(0)44 533 3485

**Our Ref.**

Erven 6504 &RE/6503

**Enquiries**

A. Mgoqi

**Tel**

044- 501 3264

**email address**

[amgoqi@plett.gov.za](mailto:amgoqi@plett.gov.za)

**VITA CONSULTING ENGINEERS**  
**51 Lourensford Estate**  
**Somerset West**  
**7130**

**02 JULY 2024**

**Attention: Riaan van Dyk**

Dear Sir

**CONFIRMATION OF BULK SERVICES: ERVEN 6504 & RE/6503**

We confirm that Bitou Municipality has bulk infrastructure capacity in its networks and can accommodate the proposed development, subject to the following conditions.

1. That the developer enters and sign a Service Level Agreement with Bitou Municipality,
2. That the developer makes payment of the prescribed Augmentation contributions in order for the municipality to implement the bulk upgrade of services as detailed and required in the GLS network analysis report, dated 3 October 2022.
3. That the developer implements and maintain a temporary wastewater treatment plant until the upgrades to the Ganzevallei WWTW has been completed. The temporary wastewater treatment plant must be approved by the relevant authorities as part of the civil engineering services for the development. A bulk connection to the Bitou sewer network must be commissioned once the Ganzevallei WWTW has been upgraded and the temporary WWTP must be decommissioned and removed from site. All costs will be for the account of the developer
4. That the developer duly communicate point 3 above with all future owners/Homeowners Associates and or Body corporate.

Please contact the official dealing with this project for any further information in this regard.

Yours faithfully

**MR. VW. FELTON**  
**HEAD OF DEPARTMENT: ENGINEERING SERVICES**

Official dealing with this;

Miss Asiphe Mgoqi: Engineering Services: Project Manager: Planning & Development



municipaliteit umasipala municipality

to be the best together

Private Bag X1002 Plettenberg Bay 6600  
Tel+27 (0)44 501 3000 Fax +27(0)44 533 3485

| Our Ref.             | Enquires    | Tel          | Email address          |
|----------------------|-------------|--------------|------------------------|
| Erven 6504 & RE/6503 | D. Baartman | 044 501 3462 | dbaartman@plett.gov.za |

**03/06/2024**

**VITA CONSULTING ENGINEERS**

**51 Lourensford Estate**

**Sommerset West**

**7130**

**Attention: Riaan Van Dyk**

Dear Sir

CONFIRMATION OF WASTE DISPOSAL CAPACITY: ERVEN 6503

We confirm that Bitou Local Municipality has sufficient capacity for waste disposal for proposed development.

The approved tariffs by council for waste collection will be applicable.

Yours faithfully

MS. MA. PAULSEN

DIRECTOR: COMMUNITY SERVICES