



## Proposed development of Herolds Bay Estate on Portion 7 of the Farm Buffelsfontein, Herolds Bay



# Engineering Services Report

Revision 4

January 2020



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on a portion of portion 7 of the farm Buffelsfontein, Herolds Bay**

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# 1 INTRODUCTION AND BACKGROUND

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Element Consulting Engineers has been appointed by Long Island Trading 44 (Pty) Ltd for the rendering of professional civil engineering services for the proposed development of Herolds Bay Estate on a portion of portion 7 of the farm Buffelsfontein, Herolds Bay.

The project proposes the development of 102 single residential erven, 68 group housing units, a filling station, 750m<sup>2</sup> convenience centre, 250m<sup>2</sup> restaurant and 300m<sup>2</sup> offices.

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

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

## 2 PROPOSED LAND USE

The proposed development of a portion of portion 7 of the farm Buffelsfontein, Herolds Bay encompasses 102 single residential erven, 68 group housing units, a filling station, 750m<sup>2</sup> convenience centre, 250m<sup>2</sup> restaurant and 300m<sup>2</sup> offices.

The Site Development Plan (SDP), as prepared by Nel & De Kock Town Planners is shown below and is included as addendum.

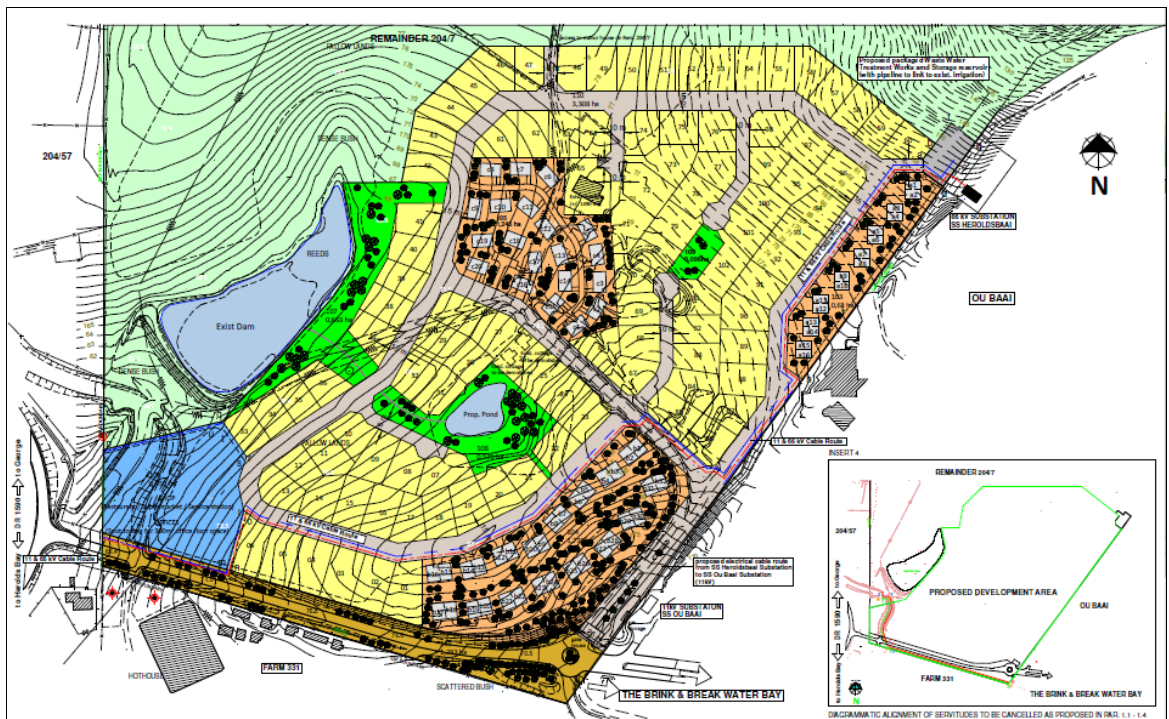


Figure 1: Site Development Plan (SDP)

The Site Development Plan (SDP) of the commercial erf, as prepared by Brink Stokes Mkhize Architects, is shown below and is included as addendum.



Figure 2: Site Development Plan (SDP) of commercial centre



### 3 LOCALITY AND ACCESS

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The proposed development is located on a portion of portion 7 of the farm Buffelsfontein, Herolds Bay. The site is located directly north-east of the existing Herolds Bay township and directly west of the existing Oubaai Golf Estate. The site is bounded to the north and west by farmland.

Current and proposed access to the residential development is obtained via Oubaai Main Road from the existing traffic circle at the entrance to Oubaai Golf Estate.

Proposed access to the filling station and commercial site is proposed directly from Oubaai Main Road at a point approximately 78m east of the intersection with the R404. This point is currently also servicing an access to the private development to the south.



Figure 3: Locality and access

## 4 GEOTECHNICAL INVESTIGATION

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

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

### **General Soil Profile**

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

### **Slope Stability**

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

### **Ground water and stormwater**

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

### **Engineering Services**

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

### **Foundations for residential development**

The visual investigation indicated that the in-situ materials are adequate to support residential development. Reinforced strip footings will be adequate for the development. Fill areas to be adequately compacted to a minimum specification to be determined from the formal geotechnical investigation and detail design.

### **Foundations for filling station development**

The visual investigation indicated that the in-situ materials are adequate to support the development of a filling station. Reinforced strip footings will be adequate for the development. Fill areas to be adequately compacted to a minimum specification to be determined from the formal geotechnical investigation and detail design.

**Foundations for commercial centre**

The visual investigation indicated that the in-situ materials are adequate to support the development of a neighborhood commercial centre (commercial and office space). Reinforced strip footings will be adequate for the development. Fill areas to be adequately compacted to a minimum specification to be determined from the formal geotechnical investigation and detail design.

**Construction materials**

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

## **5 PRELIMINARY ENGINEERING SERVICES DESIGN**

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This chapter will discuss the preliminary engineering services design of the proposed development in terms of firstly the bulk engineering services and secondly the internal engineering designs in parallel with the engineering standards and technical design criteria applicable to the project. A set of preliminary design drawings is also available for reference and discussion purposes and should be consulted in parallel to the discussions below.

### **5.1 General**

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

### **5.2 Water**

#### **Water Demand**

The Average Annual Daily Demand (AADD) for this proposed development in line with accepted design consumptions, assumptions, criteria and standards, is calculated and estimated at approximately 131 kl/day.

Peak factors will be considered during the detail design stage of the project.

#### **Bulk Availability**

Preliminary investigations and the necessary discussions with the local municipality indicated that bulk water is available for this development. A letter to this regard, confirming the allocation and availability of bulk water for this development has been obtained from the George Municipality and is attached to the report as addendum.

#### **Connection Point**

The site is serviced by a municipal 200mm uPVC bulk water line along Oubaai Main Road along the southern boundary of the site. The locality of this existing bulk water line

in relation to the proposed development site is indicated in the diagram below and also in the layout drawing attached as addendum.

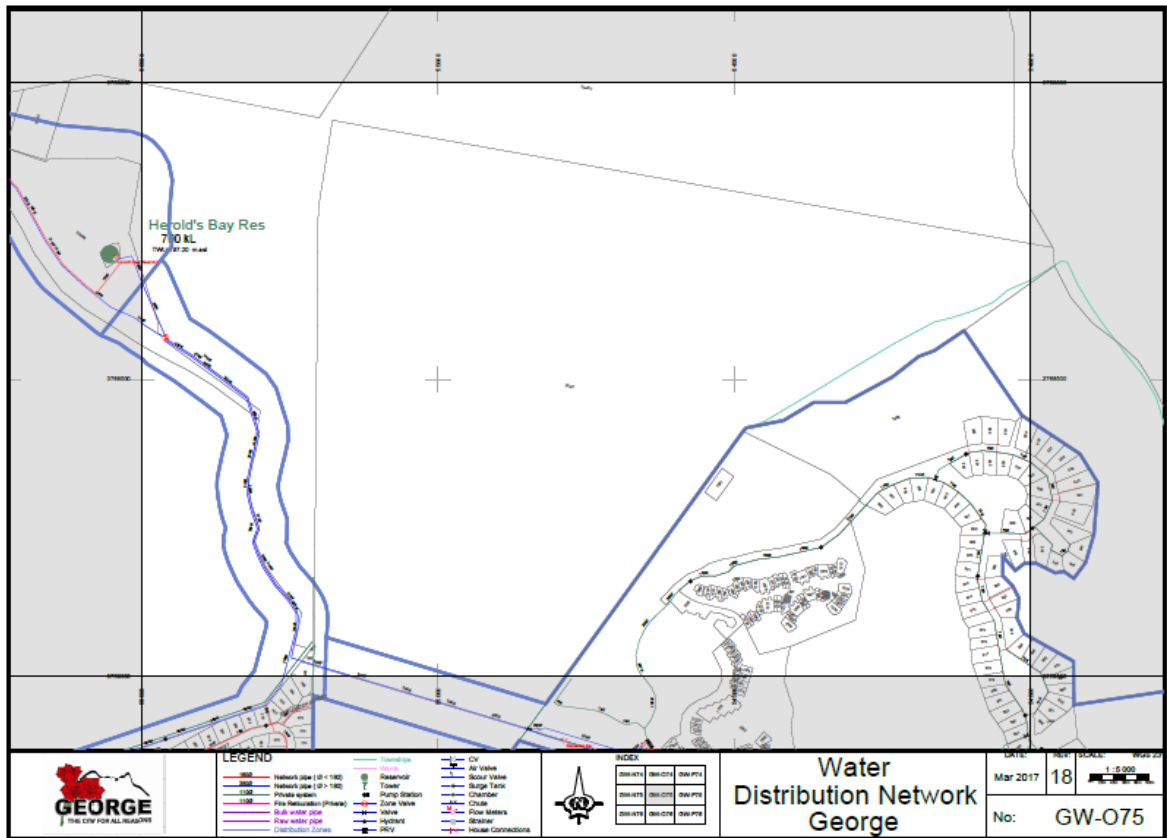


Figure 4: Existing bulk water line layout servicing the site

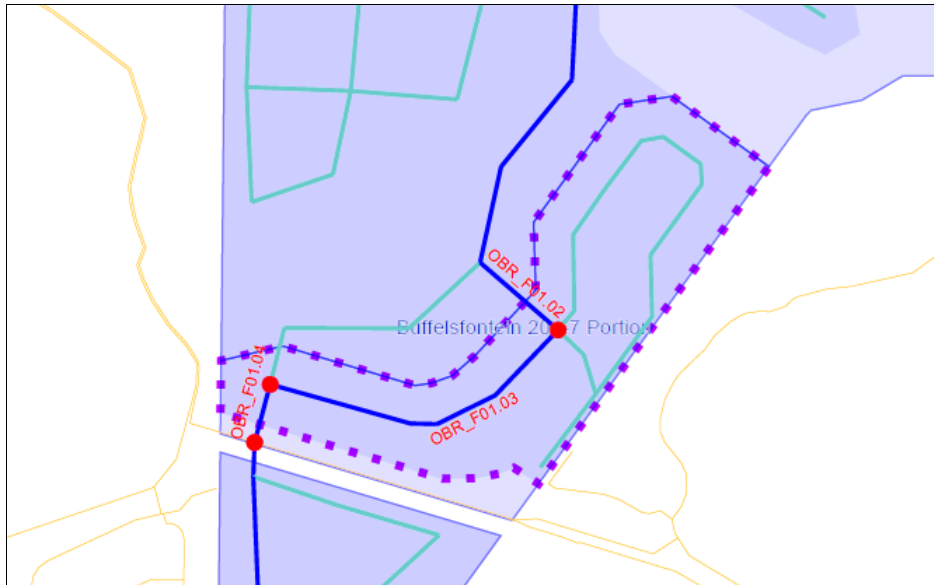
### Design Criteria and Standard of Engineering Services

- Design consumption
  - Single residential erven – 900l/unit/day
  - Group housing units – 500l/unit/day
  - Convenience shop – 400l/100m<sup>2</sup>/day
  - Restaurant – 500l/100m<sup>2</sup>/day
  - Office space – 400l/100m<sup>2</sup>/day
- Peak factors as prescribed
- Minimum pressures for the network are calculated for a fire flow 30l/sec and peak demand at the point of lowest pressure under peak conditions.
- Maximum of 4 valves to isolate a pipe section.
- Maximum length of 600m of main pipe per isolated section.
- Air valves to be provided where applicable.
- Minimum cover to pipes to be 900mm.
- Pipe type and class to be uPVC class 6 to 12, depending on existing network pressure.
- Pipe diameters varying between 63mm and 90mm depending on pressure available and flow required.
- Erf connections to be HDPE Class 10.
- Erven to be serviced with a 20mm connection and Aqua-Loc box and meter.
- Fire hydrants to be provided in accordance to relevant guidelines and legislation.

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

### **Conditional bulk water line**

Approval received from the municipality was conditional upon the provision of a new 160mm dia bulk water line in the western portion of the development. The line doubles as the internal reticulation. The following diagram indicates this internal bulk line and detail is provided in the preliminary design drawing attached as addendum.



*Figure 5: Conditional new 160mm dia bulk water line in western portion of development*

### **Preliminary design**

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



Figure 6: Preliminary design drawing

### Financial sustainability

From a bulk water engineering services perspective, the development will improve the holistic financial sustainability of the local municipality due to additional rates and taxes being generated without the burden of additional capital outlay. Capital contributions will strengthen the municipality financially in the short term. The proposed infill development will not trigger unaffordable capital cost burdens to the local municipality but will strengthen the financial sustainability of the municipality in both the short and longer term. From a long-term perspective, the additional Operation and Maintenance (O&M) costs of the municipal network will be covered from the additional rates and taxes.

## 5.3 Sewer

### Site layout considerations

The proposed development is spanning over a watershed and three drainage zones are identified for design and report purposes. Approximately 50% of the site drains towards a general western direction towards Herolds Bay (Zone A). Approximately 40% of the site drains towards a general north-eastern direction towards Oubaai Golf Estate (Zone B). Approximately 10% of the site drains towards a general south-eastern direction towards the ocean (Zone C).

These zones are indicated diagrammatically on the figure below:



Figure 7: Sewer drainage zones

### Design flow

The Average Dry Weather Flow (ADWF) of the development, in line with accepted design criteria and standards, can be calculated and estimated as 120kl/day. The ADWF of Zone A (western zone) can be calculated and estimated as 60kl/day. The ADWF of zone B (north-eastern zone) can be calculated and estimated as 45kl/day. The ADWF of zone C (south-eastern zone) accounts for approximately 15kl/day.

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

### Capacity at Herolds Bay WWTW and municipal sewer network

Correspondence with the local municipality indicates that the existing Herolds Bay WWTW located to the south-west of this proposed development does not have any surplus capacity to accommodate the additional flow of the proposed development. The discussions also indicated that the existing sewer network servicing Herolds Bay does not have surplus capacity to accommodate the flow from the proposed development.

A letter has been obtained from the municipality confirming the above and is attached to the report as addendum.

The option of connecting into the municipal sewer network was subsequently not pursued further.



## **Sewage treatment solution**

The sewerage treatment solution identified for the proposed development is a package plant at each of the three drainage zones. After thorough research on package plants available in the market, the package plant identified and specified for this development will be a Maskam Clarus Fusion.

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

The package plant reduces environmental risk as no raw sewer is accumulated and pumped from any low points and no environmental spill can subsequently occur. Also, having a package plant in each of three drainage zones, further lowers environmental risk by dividing any remaining risks in three.

The treated effluent will be pumped from each of the three package plants to an internal detention pond, subsequent to which it will trickles down as a minor stream through the estate to the large irrigation dam, where it will be utilized for irrigation on the farm.

## **Package plant process description**

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

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

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

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

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

The fourth chamber is a treated water storage chamber. This chamber is designed to temporarily store treated water coming out of the aerobic filter media chamber. The treated water in the storage chamber is ready for discharge. During normal operation, a recirculation line transfers a small portion of the treated water back into the sedimentation chamber by way of an air lift pump.

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

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

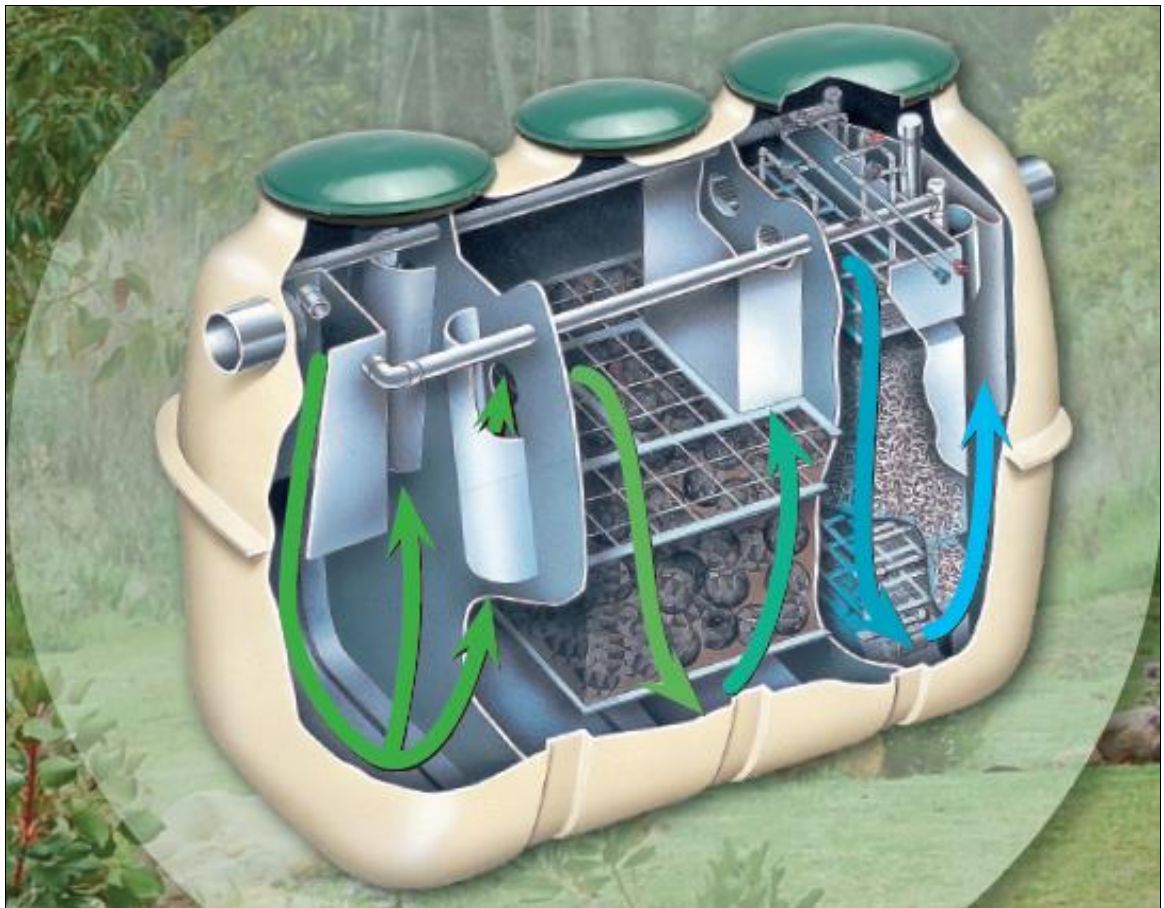


Figure 8: Maskam Clarus Fusion 3D view

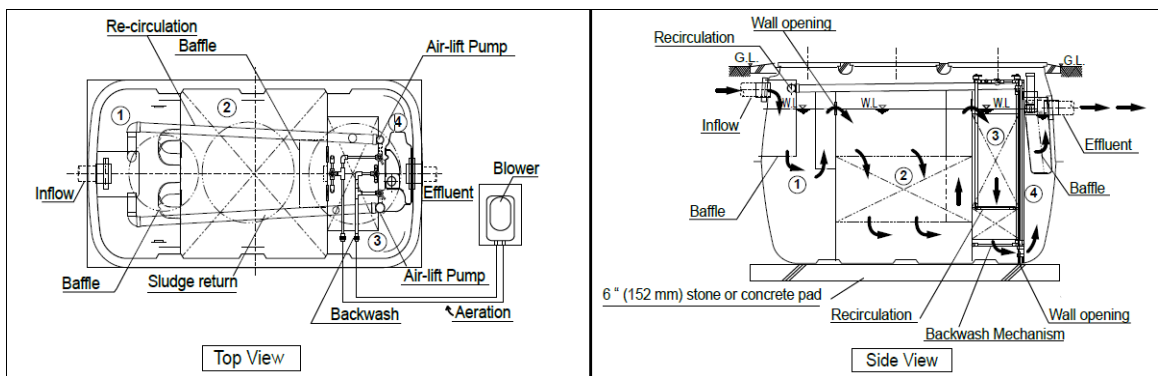


Figure 9: Maskam Clarus Fusion diagrammatic top and side views

### Plant design parameter for zones A, B & C

Three drainage zones are identified for the project as discussed earlier in the report, namely zones A, B & C. The plant design for each drainage zone is briefly presented below. The plant design for zone A is the largest and hence will also be presented diagrammatically:

Zone A (west):

- ADWF 60kl/day
- Installation type – underground

- Stainless steel primary screen
- Buffer tank – 60kl concrete
- Buffer tank size – 5m(w) x 10m(l) x 1.2m(d)
- Unit type – Maskam Clarus Fusion ZF4000
- Unit capacity – 15kl/day/unit
- Number of units – 4 units
- Arrangement of units – parallel
- Size per unit – 4.66m(l) x 2.44m (w) x 2.54m (h)
- Size of parallel unit arrangement (concrete slab area) – 14.76m x 7.16m
- Size of total installation (fenced area) – 20m x 10m
- Post-treatment type – UV
- Treated effluent pumped to detention pond in the middle of the estate (refer SDP) where after it will trickle to the large irrigation dam (refer SDP) on the remainder of the farm for utilization as irrigation water in the farm.

The figures below respectively depict the schematic layout and schematic flow diagrams as well as a tabular summary of inputs and outputs of the zone A installation:

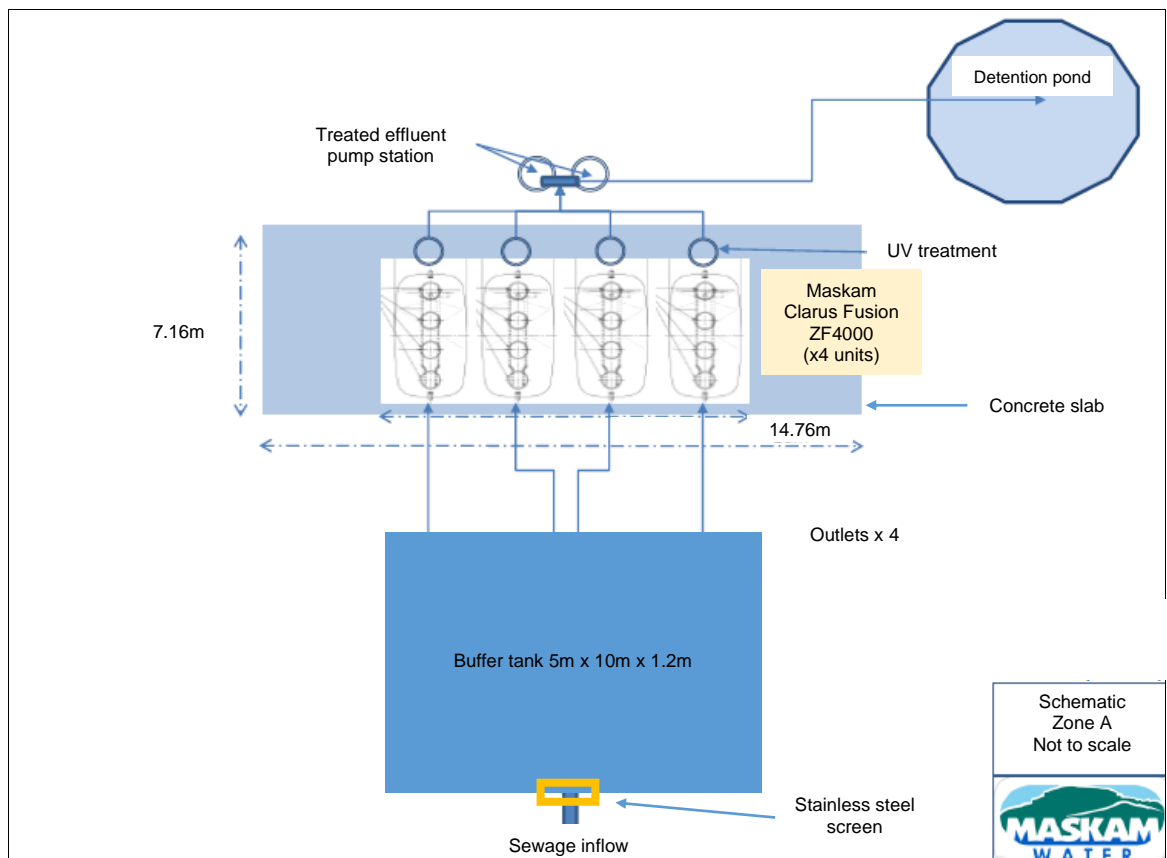


Figure 10: Schematic layout diagram of Zone A installation

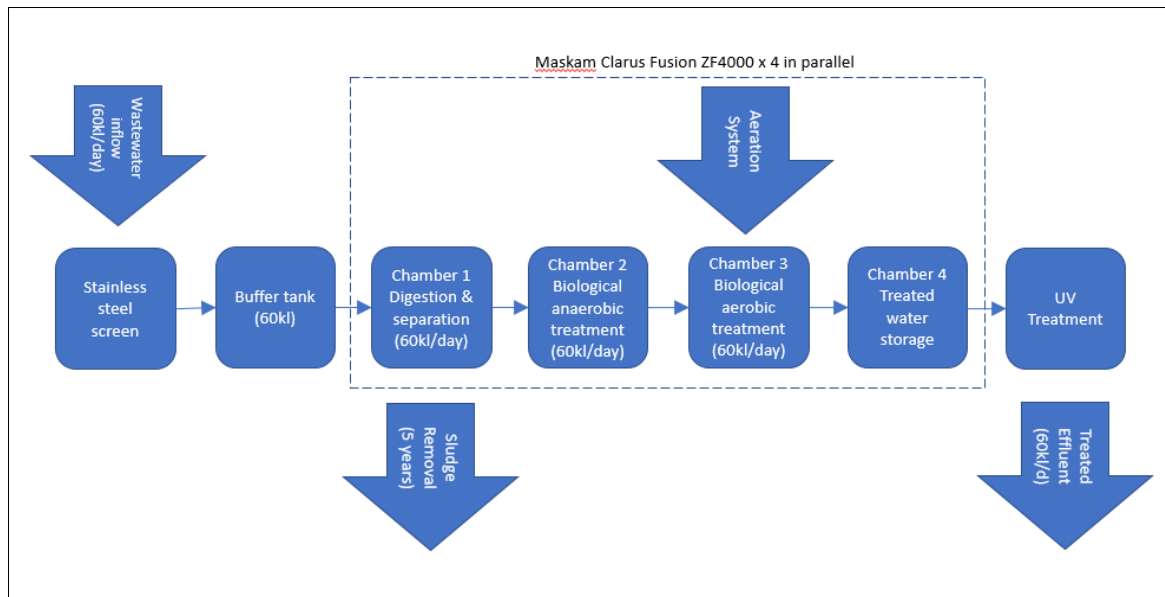


Figure 11: Schematic flow diagram of Zone A installation

Description	Input	Output	Source	Destination	Disposal	Notes
Wastewater inflow	60kl/d		Herolds Bay Estate wastewater	Buffer tank	-	Pre-treatment screening with stainless steel screen
Buffer tank	60kl/d	60kl/d	Wastewater inflow into plant	Chamber 1 (Digestion & separation)	-	Concrete tank 60kl (5m x 10m x 1.2m) (Pre-treatment)
Chamber 1 (Digestion & separation)	60kl/d	60kl/d	Buffer tank	Chamber 2 (Biological anaerobic treatment)	-	
Chamber 2 (Biological anaerobic treatment)			Chamber 1 (Digestion & separation)	Chamber 3 (Biological aerobic treatment)	-	
Chamber 3 (Biological aerobic treatment)			Chamber 2 (Biological anaerobic treatment)	Chamber 4 (Treated effluent storage)	-	
Aeration system			Atmospheric air	Chamber 3 (Biological aerobic treatment)	-	Low energy use
Chamber 4 (Treated effluent storage)			Chamber 3 (Biological aerobic treatment)	Treated effluent	-	UV Treatment at release of chamber 4
Treated effluent	114kl/d	114kl/d	Chamber 4 (Treated effluent storage)	Pumped to detention pond	-	Treated effluent in line with DWS discharge regulations (National Water Act, General Authorisation, General Limits)
Sludge			Wastewater inflow	-	George regional wastewater treatment works (5 year cycles)	Sludge digested in chamber 1, limited remaining sludge

Figure 12: Summary of inputs and outputs of Zone A installation

The plant design for drainage zones B and C are discussed below. These plant designs will not be presented diagrammatically as they are similar albeit smaller than the plant design for zone A.

Zone B (north-east):

- ADWF 45kl/day
- Installation type – underground
- Stainless steel primary screen
- Buffer tank – 45kl concrete
- Buffer tank size – 5m(w) x 9m(l) x 1m(d)
- Unit type – Maskam Clarus Fusion ZF4000
- Unit capacity – 15kl/day/unit
- Number of units – 3 units
- Arrangement of units – parallel
- Size per unit – 4.66m(l) x 2.44m (w) x 2.54m (h)

- Size of parallel unit arrangement (concrete slab area) – 11.32m x 7.16m
- Size of total installation (fenced area) – 20m x 10m
- Post-treatment type – UV
- Treated effluent pumped to detention pond in the middle of the estate (refer SDP) where after it will trickle to the large irrigation dam (refer SDP) on the remainder of the farm for utilization as irrigation water in the farm.

Zone C (south-east):

- ADWF 15kl/day
- Installation type – underground
- Stainless steel primary screen
- Buffer tank – 15kl concrete
- Buffer tank size – 3m(w) x 5m(l) x 1m(d)
- Unit type – Maskam Clarus Fusion ZF4000
- Unit capacity – 15kl/day/unit
- Number of units – 1 unit
- Arrangement of units – single
- Size per unit – 4.66m(l) x 2.44m (w) x 2.54m (h)
- Size of single unit arrangement (concrete slab area) – 5.44m x 7.16m
- Size of total installation (fenced area) – 10m x 10m
- Post-treatment type – UV
- Treated effluent pumped to detention pond in the middle of the estate (refer SDP) where after it will trickle to the large irrigation dam (refer SDP) on the remainder of the farm for utilization as irrigation water in the farm.

### **Operation & Maintenance of package plants**

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

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

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

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

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

### **Fat, Oil & Grease (FOG) trap (restaurant)**

A fat, oil & grease (FOG) trap is specified at the restaurant on the commercial site. The FOG trap retains all fats, oils and grease from the restaurant and prohibits these substances to flow into the sewer network and into the Maskam sewage package plant. Retention time of 6-hours and a plant of 4kl is specified in order to be most effective. FOG trap to be cleaned on a monthly basis by the restaurant personnel and checked monthly by the estate's maintenance management personnel.

### **Alternative connection point (east of development)**

The proposed development is located directly adjacent to the Oubaai Golf Estate. Discussions have been ongoing with Oubaai Golf Estate to accept the sewer generated from this development into their Oubaai WWTW. The Oubaai WWTW is located to the north-east of this proposed development, adjacent to the common boundary with this development. A site visit has been conducted.

A new bulk outfall line may be constructed from the north-eastern extremity of the proposed development, following the contour, to the Oubaai WWTW.

A letter confirming the desirousness of the Oubaai Golf Estate Homeowners Association to receive this effluent is attached to the report as addendum.

The design of the Oubaai WWTW has been studied and a site visit has been conducted. It has been determined that this WWTW has sufficient surplus capacity to accommodate the additional flow generated from this proposed development. Officials from Oubaai have also confirmed that this WWTW has sufficient spare capacity to accommodate the additional flow. A letter confirming the surplus capacity in the Oubaai WWTW has been obtained from the Oubaai Golf Estate Homeowners Association and is attached to the report as addendum.

The developers of the Herolds Bay Estate are desirous to obtain the treated effluent as irrigation water and this alternative has subsequently not been investigated or designed further.

### **Alternative connection point (west of development)**

As discussed earlier in the report, the western portion of the development drains towards Herolds Bay. A 160mm diameter uPVC gravity sewer line is available on the northern extreme of the existing Herolds Bay township. Preliminary discussions with municipal

officials indicated that this existing 160mm diameter sewer gravity line and subsequent network does not have surplus capacity to accommodate the flow from the development. This network drains into the Herolds Bay wastewater treatment works (WWTW) which also does not have any surplus capacity as indicated by the municipality.

A letter confirming the lack of capacity in the network and WWTW, has been obtained from the George Municipality and is attached to the report as addendum.

The option of connecting into the municipal sewer network was subsequently not pursued further.

Another alternative investigated for this western portion of the site was pumping over the watershed to the eastern portion of the new network, if, and only if, the alternative of the connection to the Oubaai WWTW was pursued further. In this scenario, the pump-station will be located on the western extreme of the proposed development. A tertiary alternative, namely a Horizontal Directional Drill (HDD) of approximately 700m, may be investigated when necessary. The HDD option, albeit expensive, will eliminate pumping costs for the lifecycle of the network.

#### **Existing bulk sewer networks (layout plan)**

The diagram below indicates the existing sewer networks servicing the site, both the 160mm municipal line on the south-western corner of the drawing and the private Oubaai WWTW on the north-eastern corner of the drawing.



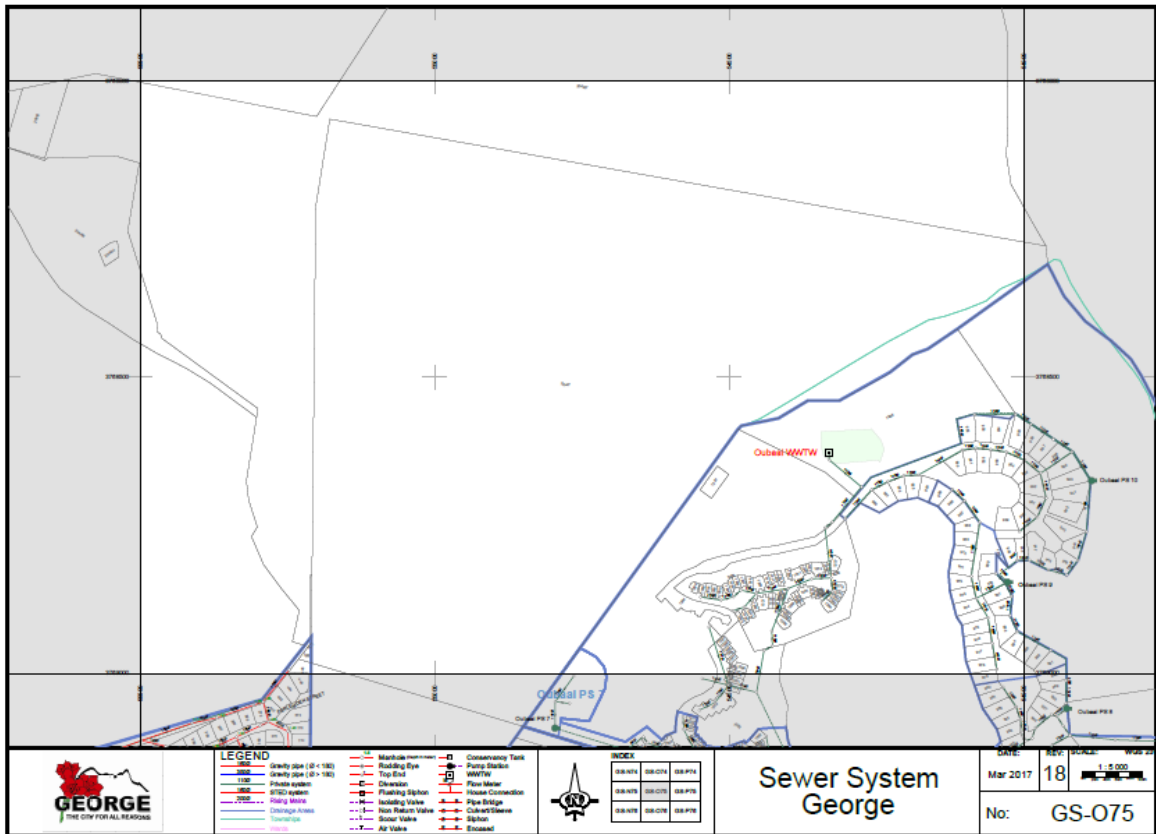


Figure 13: Existing bulk sewer network servicing the site

### Design Criteria and Standards of Engineering Services

- The following design flows will be utilized:
  - Single residential – 800l/erf/day
  - Group housing units – 450l/unit/day
  - Convenience shop – 400l/100m<sup>2</sup>/day
  - Restaurant – 500l/100m<sup>2</sup>/day
  - Office space – 400l/100m<sup>2</sup>/day
- Specified peak factor of 3.5
- Allowance for 15% extraneous flow
- A conventional waterborne sewerage system will be provided.
- Minimum flow velocities designed for as 0.7m/s.
- Minimum cover to all pipes to be 800mm.
- Pipe diameters of generally 110mm for all service connections and minor lines and 160mm and above for main lines, as required per the detailed designs.
- Minimum design gradients to be as follows:

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

- Erf connection depth to be minimum 1.0 m and at least be able to drain 80% of the erf.

- Precast concrete rings manholes with concrete floor and premanufactured concrete lid.
- Manhole covers and frames to be Polymer Concrete.
- Manholes to be central over main pipe on downstream side.
- Manhole spacing to be maximum 80m
- All concrete, mortar or screed used with manholes to be from dolomite aggregate and low alkali sulphate resistant cement to SABS 471.
- Pipelines to be uPVC class 34 and to be laid on Class C bedding.

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

### **Preliminary internal sewer network design**

Three drainage zones are identified for the project as discussed earlier in the report, namely zones A, B & C. The internal network design for each drainage zone is briefly presented below:

#### Zone A (west):

- ADWF 60kl/day
- Gravity network draining south-west
- Package plant in south-western corner of development (refer SDP)
- Treated effluent pumped to detention pond in the middle of the estate (refer SDP) where after it will trickle to the large irrigation dam (refer SDP) on the remainder of the farm for utilization as irrigation water in the farm.

#### Zone B (north-east):

- ADWF 45kl/day
- Gravity network draining north-east
- Package plant in north-eastern corner of development (refer SDP)
- Treated effluent pumped to detention pond in the middle of the estate (refer SDP) where after it will trickle to the large irrigation dam (refer SDP) on the remainder of the farm for utilization as irrigation water in the farm.

#### Zone C (south-east):

- ADWF 15kl/day
- Gravity network draining south-east
- Package plant in south-eastern corner of development (refer SDP)
- Treated effluent pumped to detention pond in the middle of the estate (refer SDP) where after it will trickle to the large irrigation dam (refer SDP) on the remainder of the farm for utilization as irrigation water in the farm.

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



Figure 14: Internal sewer network design with drainage zones indicated



Figure 15: Internal sewer network design

## Financial sustainability

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

## 5.4 Roads and access

### Access

Current and proposed access to the residential development is obtained via Oubaai Main Road from the existing traffic circle at the entrance to Oubaai Golf Estate.

Proposed access to the filling station is obtained directly from Oubaai Main Road at a point approximately 78m east of the intersection with the R404, opposite an existing intersection servicing an access to the private development to the south.

The access points are indicated in the following diagram.



Figure 16: Proposed access points to the development.

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

An array of photographs below indicates sight distances at both of the access.



*Figure 17: North-western view along Oubaa Main Road at the existing traffic circle with the existing and proposed access (gravel road). Sight distance is excellent in both the horizontal and vertical alignments.*



*Figure 18: South-eastern view along Oubaa Main Road at the existing traffic circle with the existing and proposed access (gravel road) to the left and the existing accesses to Oubaa Golf Estate and Breakwater Bay Eco Estate in the centre and right respectively. Sight distance is excellent in both the horizontal and vertical alignments.*



*Figure 19: Western view along Oubaa Main Road at the proposed access to the filling station (on the right). Sight distance is excellent in both the horizontal and vertical alignments.*



*Figure 20: Eastern view along Oubaai Main Road at the proposed access to the filling station (on the left). Sight distance is excellent in both the horizontal and vertical alignments.*

### **Traffic Impact Assessment**

A Traffic Impact Assessment (TIA) has been performed. The trip generation of the eventual fully developed proposed residential and commercial development is estimated at approximately 251 trips in the morning peak hour. The traffic impact of the proposed development will be negligible from a traffic engineering perspective. Refer to parallel TIA report.

### **Internal Standards and Design Criteria**

Internal standards and design criteria are specified as follows:

- Internal road widths of between 5.2m and 7.4m, depending on road class
- Asphalt surfacing 30mm.
- Pavement structural materials to be imported from commercial sources.
- All minimum radii at bellmouths to be 8m.
- Minimum road grade of 0.4% and camber of 2%.
- Road design life of 20 years.

### **Preliminary design**

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



Figure 21: Preliminary design drawing

## Financial sustainability

From a roads engineering perspective, the development will improve the holistic financial sustainability of the local municipality due to additional rates and taxes being generated without the burden of additional capital outlay. Capital contributions will strengthen the municipality financially in the short term. The proposed infill development will not trigger unaffordable capital cost burdens to the local municipality but will strengthen the financial sustainability of the municipality in both the short- and longer term. From a long-term perspective, the additional O&M of the road network will be covered from the additional rates and taxes.

## 5.5 Stormwater

### Design background, standards and criteria

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

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

The following standards and design criteria are envisaged:

- Minor system designed for 2-year return period and conveyed in a combination of maximum 200m aboveground in the road prism and underground piped system.
- Major system designed for 50-year return period. Difference between the 50 year and 2-year flood to be conveyed in the road prism with depths not exceeding 150mm and into designated public open spaces, using attenuation techniques.
- Minimum gradients for pipelines to allow minimum flow speeds of 0.7m/s at full flow.
- Maximum pipeline flow velocities to be 3.5m/s.
- Stormwater pipes to be 100D as required by specific loadings or installation conditions.
- Bedding to be Class C.
- Minimum cover on pipes to be 800mm.
- Minimum pipe diameter to be 450mm.
- Gravel traps to be provided in manholes (where required on steeper slopes).
- Gabion mattresses to be provided at all outlets for energy dissipation.
- Litter traps to be provided at all outlets.
- Outlets to be standard concrete headwalls

All designs will be confirmed with the municipality during the detail design stage. Also refer to concept typical detail drawings attached to the report as addendum.

### **Site layout considerations**

The proposed development is spanning over a watershed and three drainage zones are identified for design and report purposes. Approximately 50% of the site drains towards a general western direction towards Herolds Bay (Zone A). Approximately 40% of the site drains towards a general north-eastern direction towards Oubaai Golf Estate (Zone B). Approximately 10% of the site drains towards a general south-eastern direction towards the ocean (Zone C). These zones are indicated diagrammatically on the figure below:





Figure 22: Stormwater drainage zones

### Internal design

Approximately 50% of the site drains towards a general western direction towards Herolds Bay. This area is designated as Zone A (refer diagram) and is divided into three sub-drainage zones, namely Zones A1, A2 and A3. The first zone, Zone A1 has an area of approximately 2.36ha with an estimated 1:2 year peak flow of 0.258m<sup>3</sup>/s and 1:50 year peak flow of 0.729m<sup>3</sup>/s and will be routed via the formal stormwater system into a proposed internal detention pond of approximately 1,360m<sup>3</sup> in volume (refer diagram). The detention pond will be a focus point in the development with ample landscaping and beautification. Zone A2 has an area of approximately 5.33ha with an estimated 1:2 year peak flow of 0.582m<sup>3</sup>/s and 1:50 year peak flow of 1.646m<sup>3</sup>/s and will be routed through the formal stormwater system into the existing main irrigation dam of approximately 29,000m<sup>3</sup> in volume (refer diagram). The outlet from the internal detention pond (Zone A1) will trickle as a minor stream into the existing irrigation dam. This stream will also be a focus point with ample landscaping and beautification. A last minor portion of Zone A, namely Zone A3 has an area of approximately 1.44ha with an estimated 1:2 year peak flow of 0.157m<sup>3</sup>/s and 1:50 year peak flow of 0.445m<sup>3</sup>/s and will discharge directly into the unnamed drainage line to the west of the development crossing underneath the R404 in an existing culvert. Energy dissipation will be performed at this outlet with a gabion mattress design. The existing overflow from the existing main irrigation dam, is also into this drainage line underneath the R404.

Approximately 40% of the site drains towards a north-eastern direction towards Oubaai Golf Estate. This area is designated as Zone B (refer diagram) and has an area of approximately 6.1ha with an estimated 1:2 year peak flow of 0.667m<sup>3</sup>/s and 1:50 year peak flow of 1.883m<sup>3</sup>/s. Stormwater will be discharged at this point into an unnamed minor natural stream flowing in a north-eastern direction into the Gwaing River. Energy dissipation will be performed at this outlet with a gabion mattress design. A detention

pond is not required at this point as drainage is released into a natural stream with no other development possible downstream into the Gwaing River.

A minor percentage of stormwater of approximately 10% drains towards a south-eastern direction towards the ocean. This area is designated as Zone C (refer diagram) and has an area of approximately 2.19ha with an estimated 1:2 year peak flow of 0.239m<sup>3</sup>/s and 1:50 year peak flow of 0.676m<sup>3</sup>/s. Stormwater will be discharged into the existing municipal stormwater network at the existing traffic circle at the access to the development.

The diagrams below respectively indicate the stormwater design zones, stormwater design drawing and the external drainage routes on the proposed development as discussed above.



Figure 23: Internal stormwater design zones.



Figure 24: Internal stormwater design drawing.



Figure 25: External stormwater drainage routes

The photograph below indicates the connection point to the existing municipal stormwater network in the south-east of the development:



*Figure 26: Existing stormwater inlet at the existing traffic circle at the entrance to the proposed development.*

### **Financial sustainability**

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

## **5.6 Filling station**

The filling station will be a prime attractor on the commercial property, in association with the restaurant and convenience shop. A brief discussion is presented here on selected topics of the filling station concept design.

### **Conceptual Site Development Plan (SDP)**

The conceptual Site Development Plan (SDP) of the commercial erf, as prepared by Brink Stokes Mkhize Architects, is presented in the diagram below and is attached as addendum to the report.



Figure 27: Site Development Plan (SDP) of commercial centre

### Conceptual engineering layout plan

The conceptual layout of the filling station is provided below from a purely engineering perspective for discussion purposes.

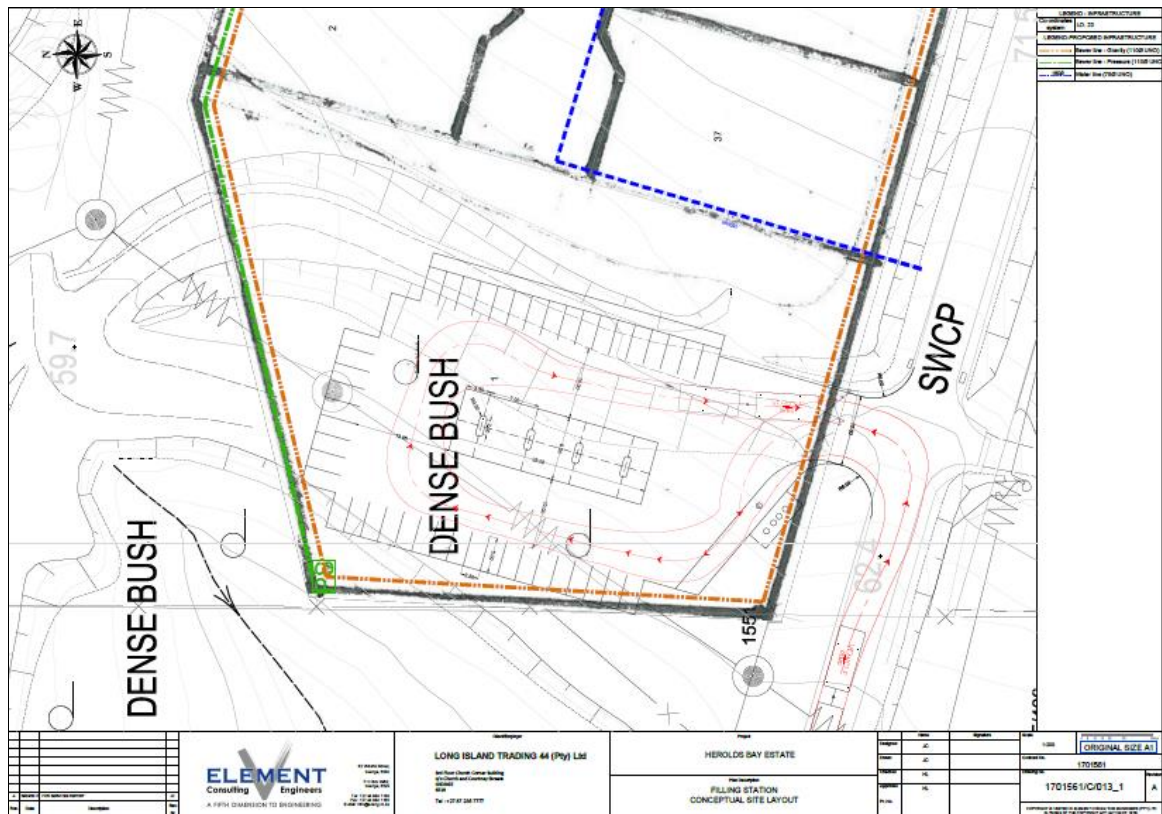


Fig 28: Conceptual layout of filling station with delivery truck movements indicated

The design will be finalized during the design stage. Of note is the following conceptual design criteria:

- Fuel delivery truck manoeuvres accommodated on site and indicated on concept layout.
- Allowance in layout for fuel loading bay of 22m.
- Fuel tank configuration will be 3 x 23kl (2 x diesel and 1 x ulp), thus total of 69kl storage
- Fuel tanks will be double walled
- Access width of 7.4m, with 1m additional surfaced shoulders on both sides, total surfaced access of 9.4m.
- Access bellmouth radius 15m.
- Asphalt surfacing 30mm.
- Concrete forecourt.
- 3 pump islands (design for 4, i.e. future expansion)
- Drizit fuel & oil trap for forecourt
- Pavement structural materials to be imported from commercial sources.
- Site crossfall of minimum 0.5%.

The conceptual layout is attached as addendum to the report.

### Filling station feasibility (extract)

An extract from the traffic impact assessment for the development, indicates a 24-hour background traffic volume of 2,711 trips currently passing the filling station site while

anticipated development traffic may entail an approximate 24-hour traffic volume of 781 trips. A subsequent total 24-hour traffic volume of 3,492 trips will pass the site.

An above-average draw off of 3% may be applied as no competing filling stations are located in close vicinity as well as taking into consideration the synergetic traffic pattern and draw-off for the convenience shop, restaurant and offices. An average purchase of 30l is assumed. A further assumption is that traffic will not subside significantly over weekends due to additional weekend-only trips to the beach, golf course and other attractions in the vicinity.

Based on these assumptions, a pumping volume of 73,000 litres per month is estimated with background traffic only. With development traffic added, this figure is estimated to rise to 94,000 litres per month.

## **5.7 Remote parking-, shuttle service & non-motorized transport facilities**

It is recognized that a filling station and limited neighbourhood centre with commercial and office space are much-needed in Herolds Bay. It is further recognized that remote parking are required to facilitate the provision of a shuttle service during peak seasons in order to alleviate seasonal traffic congestion into the Herolds Bay beach area.

It is proposed, as part of the development of the neighbourhood centre, to provide limited safe and convenient seasonal dedicated remote parking to enable a shuttle service to operate to the Herolds Bay beach area. This will bring some relief to the traffic pressure and parking congestion experienced at the beach during peak season. The provision of this dedicated remote parking during peak season has been conceptually discussed with officials of the local municipality. The determination of the number of parking bays, the geometric design and implementation will be discussed with the local municipality.

In addition to the above, safe and dedicated non-motorized transport improvements will be designed and implemented surrounding the proposed development. These will include a.o. pedestrian and cycling facilities. These facilities will serve the larger Herolds Bay community and will link up with similar municipal non-motorized infrastructure into the Herolds Bay township.

Lastly, it is also proposed to engage with the local municipality to provide a future bus stop for the George Integrated Public Transport Network (GIPTN) bus service, at the proposed neighbourhood centre. This proposal has also been conceptually discussed with officials of the local municipality and will be designed to the GIPTN engineering standards.

The diagram below indicates the schematic layout of proposed non-motorized transport facilities (pedestrian walkways) and GIPTN bus stops to be provided at the neighbourhood centre.



Figure 29: Schematic layout of proposed non-motorized transport facilities (pedestrian walkways) and GIPTN bus stops to be provided at the neighbourhood centre.



## **5.8 Solid Waste**

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

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

## 6 CONCLUSIONS AND RECOMMENDATIONS

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### 6.1 Conclusions

The following conclusions can be reached from the Engineering Services Report on the proposed development of Herolds Bay Estate on a portion of portion 7 of the farm Buffelsfontein, Herolds Bay:

1. The proposed development envisages 102 single residential erven, 68 group housing units, a filling station, 750m<sup>2</sup> convenience centre, 250m<sup>2</sup> restaurant and 300m<sup>2</sup> offices.
2. Current and proposed access to the residential development is obtained via Oubaai Main Road from the existing traffic circle at the entrance to Oubaai Golf Estate. Proposed access to the filling station is proposed directly from Oubaai Main Road at a point approximately 78m east of the intersection with the R404.
3. The in-situ materials found on site are adequate for the construction of engineering services and foundations for residential development, filling station and neighbourhood centre.
4. The proposed development is classified from an engineering bulk services perspective as an infill development with infill taking place between the existing Herolds Bay township and Oubaai Golf Estate. Infill development is desirable from a bulk engineering services perspective as all or most bulk municipal services are normally already available and in place. Such infill development will improve the holistic financial sustainability of the local municipality due to additional rates and taxes being generated without the burden of additional capital outlay. The proposed infill development will subsequently not trigger unaffordable capital cost burdens to the local municipality but will in fact strengthen the financial sustainability of the municipality in both the short- and longer term.
5. Water:
  - a. The site is serviced by a municipal 200mm uPVC bulk water line along Oubaai Main Road along the southern boundary of the site.
  - b. The Average Annual Daily Demand (AADD) for this proposed development is calculated at approximately 131kl/day. Peak factors will be considered during detail design stage.
  - c. Bulk water is available for the development and a letter to this regard, confirming the allocation and availability of bulk water for this development has been obtained from the George Municipality.
6. Sewer:
  - a. The proposed development is spanning over a watershed and three drainage zones are identified. Approximately 50% of the site drains towards a general western direction towards Herolds Bay (Zone A).

Approximately 40% of the site drains towards a general north-eastern direction towards Oubaa Golf Estate (Zone B). Approximately 10% of the site drains towards a general south-eastern direction towards the ocean (Zone C).

- b. The Average Dry Weather Flow (ADWF) of the development is estimated as 120kl/day. The ADWF of Zone A (western zone) is estimated as 60kl/day. The ADWF of zone B (north-eastern zone) is estimated as 45kl/day. The ADWF of zone C (south-eastern zone) accounts for approximately 15kl/day.
- c. No capacity is available in the existing Herolds Bay network or at the Herolds Bay WWTW. The option of connecting into the municipal sewer network was subsequently not pursued further.
- d. The sewerage treatment solution identified for the proposed development is a package plant at each of the three drainage zones. The package plant identified and specified for this development will be a Maskam Clarus Fusion. Treated effluent will be clear and odorless and will meet the Department of Water and Sanitation (DWS) General Standards. The treated effluent will be utilized for irrigation on the farm. Monthly samples of treated effluent will be submitted for laboratory analysis. The package plant reduces environmental risk as no raw sewer is accumulated and pumped from any low points and no environmental spill can subsequently occur. Inspection of the system will be performed by the estate supervisor on a daily basis. The plant will be serviced on a six-monthly basis through a maintenance contract.
- e. A fat, oil & grease (FOG) trap is specified at the restaurant.
- f. An alternative connection is available to the existing Oubaa WWTW with a new bulk outfall line. The design of the Oubaa WWTW has been studied and a site visit has been conducted. It has been determined that this WWTW has sufficient surplus capacity to accommodate the additional flow. A letter confirming the surplus capacity of the Oubaa WWTW as well as the desirousness of the Oubaa Golf Estate Homeowners Association to receive this effluent has been obtained from the Oubaa Golf Estate Homeowners Association. The developers of the Herolds Bay Estate are desirous to obtain the treated effluent as irrigation water and this alternative has subsequently not been investigated or designed further.

#### 7. Roads & access

- a. Current and proposed access to the residential development is obtained via Oubaa Main Road from the existing traffic circle at the entrance to Oubaa Golf Estate.
- b. Proposed access to the filling station is obtained directly from Oubaa Main Road at a point approximately 78m east of the intersection with the R404.
- c. Sight distances at both of the proposed access points are excellent and satisfactory for development purposes in both the vertical and horizontal alignments.

8. A Traffic Impact Assessment (TIA) has been performed. The trip generation of the eventual fully developed proposed residential and commercial development is estimated at approximately 251 trips in the morning peak hour. The traffic impact of the proposed development will be negligible from a traffic engineering perspective. Refer to parallel TIA report.
9. Stormwater:
  - a. Stormwater design on this proposed development is notable not only from an engineering perspective but also from an environmental perspective. A formal stormwater reticulation system will be provided by a combination of surfaced roadways, kerbs, channels, cut-off drains, stormwater pipes and various minor structures. Energy dissipation will be performed as standard practice with gabion mattresses at all outlets. All pipe outlets will be standard concrete headwalls. Litter traps will be provided at all stormwater outlets and will be cleaned on a regular basis by the estate's landscaping and maintenance teams
  - b. The proposed development is spanning over a watershed and three drainage zones and a further three sub-drainage zones are identified. The areas and peak flows of the drainage zones are as follows:
    - i. Zone A1: 2.36ha; 1:2 peak 0.258m<sup>3</sup>/s; 1:50 peak 0.729m<sup>3</sup>/s.
    - ii. Zone A2: 5.33ha; 1:2 peak 0.582m<sup>3</sup>/s; 1:50 peak 1.646m<sup>3</sup>/s.
    - iii. Zone A3: 1.44ha; 1:2 peak 0.157m<sup>3</sup>/s; 1:50 peak 0.445m<sup>3</sup>/s.
    - iv. Zone B: 6.1ha; 1:2 peak 0.667m<sup>3</sup>/s; 1:50 peak 1.883m<sup>3</sup>/s.
    - v. Zone C: 2.19ha; 1:2 peak 0.239m<sup>3</sup>/s; 1:50 peak 0.676m<sup>3</sup>/s.
  - c. A proposed internal detention pond of approximately 1,360m<sup>3</sup> in volume is provided in conjunction with the existing main irrigation dam of approximately 29,000m<sup>3</sup> in volume.
10. Filling station:
  - a. Fuel delivery truck maneuvers accommodated on site.
  - b. Allowance in layout for fuel loading bay of 22m.
  - c. Fuel tank configuration of 3 x 23kl, total of 69kl.
  - d. Total access width 9.4m.
  - e. 3 pump islands (design for 4, i.e. future expansion)
11. Remote parking-, shuttle service & non-motorized transport facilities:
  - a. It is recognized that a filling station and limited neighbourhood centre with commercial and office space are much-needed in Herolds Bay. It is further recognized that remote parking are required to facilitate the provision of a shuttle service during peak seasons in order to alleviate seasonal traffic congestion into the Herolds Bay beach area.
  - b. It is proposed, as part of the development of the neighbourhood centre, to provide limited safe and convenient seasonal dedicated remote parking to enable a shuttle service to operate to the Herolds Bay beach area. This will bring some relief to the traffic pressure and parking congestion experienced at the beach during peak season. The determination of the

number of parking bays, the geometric design and implementation will be discussed with the local municipality.

- c. Safe and dedicated non-motorized transport improvements will be designed and implemented surrounding the proposed development. These will include a.o. pedestrian and cycling facilities. These facilities will serve the larger Herolds Bay community and will link up with similar municipal non-motorized infrastructure into the Herolds Bay township.
- d. It is also proposed to engage with the local municipality to provide a future bus stop for the George Integrated Public Transport Network (GIPTN) bus service, at the proposed neighborhood centre.

- 12. A formal arrangement for the removal of solid waste need to be entered into with the George Municipality

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

## **6.2 Recommendations**

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

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

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

## **7 ADDENDA**

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- 7.1 Addendum 1 – Site Development Plans (Town planning & architectural)**
- 7.2 Addendum 2 – Letter of confirmation: George Municipality**
- 7.3 Addendum 3 – Letter of confirmation: Oubaai HOA**
- 7.4 Addendum 4 – Existing bulk water and sewer layout**
- 7.5 Addendum 5 – Preliminary design drawings with typical details**
- 7.6 Addendum 6 – Maskam Clarus Fusion sewer package plant detail**

**ADDENDUM 1**

**SITE DEVELOPMENT PLANS**

**RESIDENTIAL DEVELOPMENT – NEL & DE KOCK TOWN PLANNERS  
COMMERCIAL DEVELOPMENT – BRINK STOKES MKHIZE ARCHITECTS**



**APPLICATION FOR THE CANCELLATION AND REGISTRATION OF SERVITUDES, SUBDIVISIONS, ZONING AND CONSISTENT USES IN TERMS OF THE RELEVANT SECTIONS OF THE BY-LAW ON LAND USE PLANNING APPLICATION IS BEING MADE FOR:**

1. Cancellation in terms of Section 15.2 (1) of the following title, conditions applicable to servitudes as per Deed of Transfer: T0306/2017 (as shown on sheet 4):
- 1.1. Par. E: A servitude right of way, 5.87 m wide, marked XYZ, on SD Diagram 2823/45;
  - 1.2. Par. C: Right of way, 5.07 m wide, marked KWVA on SD Diagram 1827/22;
  - 1.3. Par. D: Servitude, 5.45 m wide, marked XY & YB on SD Diagram 916/05; and
  - 1.4. Par. E: Right of way, 9.45 m wide, marked XY and line YB on SD Diagram 572/58.
2. Subdivision in terms of Section 15.2 (1) of Portion 7 of Farm Buffelsfontein No. 204 as follows (INSERT 2):
- 2.1. Portion A: +/- 19,264 ha; and
  - 2.2. Remainder Buffelsfontein 204/7: +/- 46,14 ha.
3. Rezoning in terms of Section 15.2 (2) of the above mentioned PFN, A from Agricultural Zone 1 to Subdivisional Area; and
4. Subdivision of the above mentioned Subdivisional Area in terms of Section 15.2 (4) as shown on plan and Table A.
5. Consent use in terms of Section 15.2 (3) for Restaurants/Supermarket/Service Station on Portion 106;
6. Registration of the following servitudes in terms of Section 15.2 (6)
- 6.1. Servitude over area, marked Figure 1 b,c,d,e,f,g,h,i,j,k,l,m,n,o,p,q,r,s,t,u,v,w,x,y,z, for package waste treatment works and storage reservoir marked Figure 1 g on Remainder 204/7;
  - 6.2. Servitude over area 3m wide marked Figure 1 h,k,d on proposed Portion 101;
  - 6.3. Servitude over area 3m wide marked Figure 1 m to o on Pts 119 and 106;
  - 6.4. Servitude over area 3m wide marked Figure 1 p,q,r for package waste water treatment works and pump station on Pts 106;
  - 6.5. Line 1 (uv & x) represents the centre line of a servitude 10-w, 6m wide, on Pts 108 in favour of Pts 112, Pts 119 and Farm 204/7;
  - 6.6. Line 2 (y) represents the centre line of a servitude 10-w, 6m wide, on Pts 112 in favour of Pts 106, Pts 110 and Farm 204/7;
  - 6.7. Line 3 (z) represents the centre line of a servitude 10-w, 6m wide, on Pts 108 in favour of Pts 110 and Farm 204/7;
  - 6.8. Access to the treatment plant on Figure 1 q,r,s will be registered in general terms on Pts 106 in favour of the O.A. (Pts 109) will be registered when note is filled.
  - 6.9. A servitude for pipelines from treatment works to retention pond on Pts 108 for private road and P.C.S. (Pts 109) will be registered when note is filled.
  - 6.10. Notarial Deed to be registered on Pts 107 in favour of Farm Buffelsfontein 204/7.

**SITUATED AT HEROLDS BAY IN THE MUNICIPALITY AND ADMINISTRATIVE DISTRICT OF GEORGE.**

Table A				
Zoning	Ph Nos	Land Use	Number	Area (ha)
Residential Zone 1	1-100	Single Dwelling	502	4 109.17
General Residential Zone 1	101, 104, 106	Group Housing	3	3 393.19
Business Zone B	105	Shop	1	4 508.88
Business Zone 1	102, 103	Office (200 m floor space)	1	6 511.01
Other Areas 1	107, 108 & 110	Private Open Space	3	4 524.77
Transport Zone III	110	Private Road	1	4 320.16
Transport Zone II	111	Public Street	6	1 120.26
<b>Total</b>			<b>111</b>	<b>41 924.44</b>

Remarks:

- 1. Area covered includes outdoor Urban Edge in terms of S.O.S.D.P. on the abutting Oubai will be accommodated within a 3m wide servitude to be registered along the southern boundary of Portion 103.
- 2. The 3m wide servitude to be registered along the southern boundary of Portion 103 will be accommodated in the proposed 10m wide road reserve as well as a 3m wide servitude.
- 3. The Oubai (the breakaway) if approved road was surveyed, but diagram was not registered.
- 4. Dimensions of Divisoria Servitudo Servitudo Line on Pts 103 - 42 are shown on plan where more restrictive than shown on the site plan.
- 5. Shearwater 2.0 m building line.
- 6. Dimensions of Divisoria Servitudo Servitudo Line on Pts 103 - 42 are shown on plan where more restrictive than shown on the site plan.
- 7. Contour interval 1.0m.

**HEROLDS BAY COUNTRYESTATE**

**PTN 7 (A PORTION OF PORTION 6)  
FARM BUFFELSFONTEIN NO. 204  
SITUATED IN MUNICIPALITY AND  
ADMIN. DIST. OF GEORGE**

SKAAL 1: 1500 (A1) 1: 2000 (A2) 1: 3000 (A3) SCALE

**del & lock**

Town and Regional Planners  
Stads-en Streekplanners

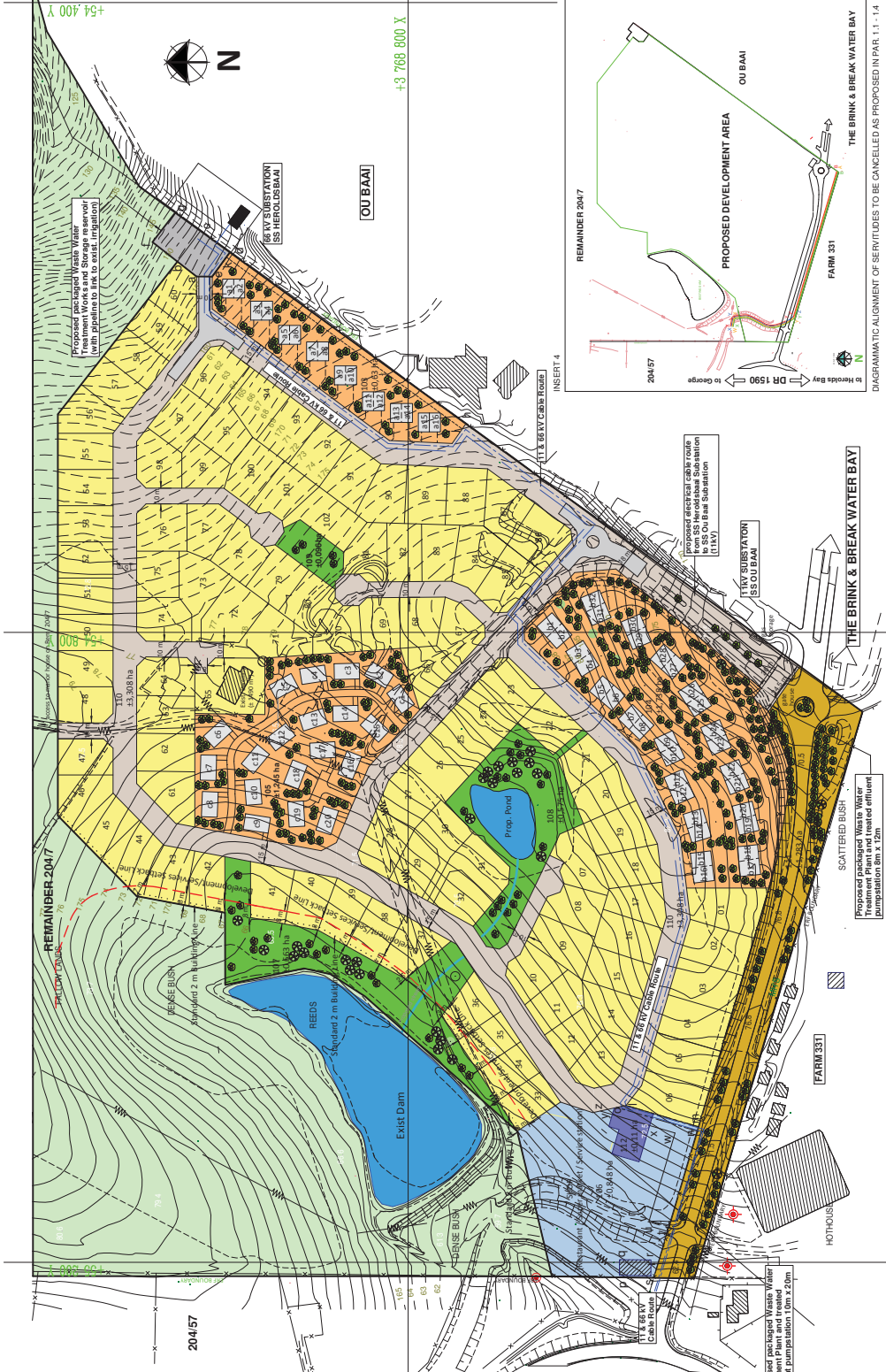
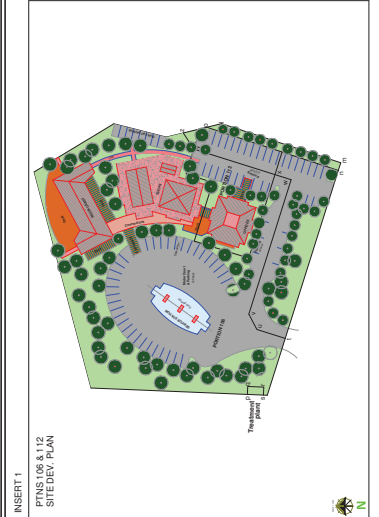
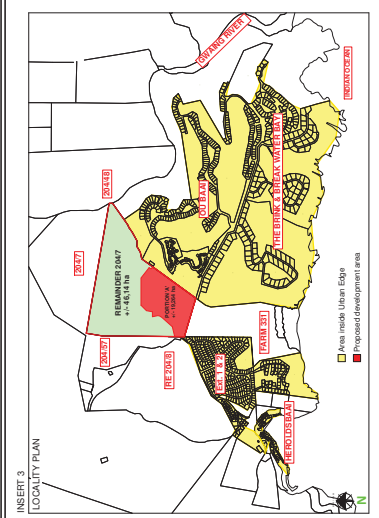
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Yonkstraat 56 York Street  
P.O. Box 1186 P.O. Box 1186  
George 6530

Client: P/01/2017  
Plan No: **HDB/C/204-2**

Drawn: [Blank]  
Checked: [Blank]  
D.N.: [Blank]  
REL: [Blank]  
Date: DECEMBER 2019

KOPIEREG VOORBEHOU / COPYRIGHT RESERVED





Parking bays provided = 74 x 4 = 1850m<sup>2</sup> GLA  
 • Offices 300m<sup>2</sup>  
 • Restaurant 250m<sup>2</sup>  
 • Shops 250m<sup>2</sup>  
 Total GLA = 1300m<sup>2</sup> (102,000 sq ft)  
 Additional bays: therefore 22

**HEROLDS BAY COUNTRY ESTATE**  
**COMMERCIAL CENTRE**  
 SCALE 1:500

**ADDENDUM 2**

**LETTER OF CONFIRMATION: GEORGE MUNICIPALITY**



**G E O R G E**

MUNISIPALITEIT  
Wes Kaap

UMASIPALA WASE  
Imshona - Koloni

MUNICIPALITY  
Western Cape

Posbus / P.O. Box 19 George 6530 Tel: 044 8019111 Fax: 044 8733776

*VERW/REF:*

*NAVRAE:* **Marius Swart**

*ENQUIRIES:*

*TEL:* **(044) 801 9267**

Element Consulting Engineers  
P.O. Box 9962  
George  
6530

3 October 2017

Attention: Mr Hannes Lourens

Dear Sir

**PROPOSED DEVELOPMENT OF HEROLDS BAY ESTATE ON PORTION 7  
OF THE FARM BUFFELSFONTEIN, HEROLDS BAY:  
ALLOCATION OF BULK WATER AND CONFIRMATION OF BULK SEWER  
CAPACITY**

Your letter dated 14 September 2017 refers.

**Bulk sewer**

There is no spare capacity at the Herolds Bay WWTW. Waste water from the proposed development will have to be pumped across the watershed to gravitate to the Oubaai WWTW.

**Bulk water**

The developer must install the 160mmØ pipes OBR\_F01.04 and OBR\_F01.03 and install OBR\_F01.02 up to the boundary of the development.

Please contact me if you require more information.

Yours faithfully



**RR WESSO**  
**DIRECTOR: CIVIL ENGINEERING SERVICES**

## Lu-Anne Venter

---

**From:** Jacobus Fivaz <Jmfivaz@george.gov.za>  
**Sent:** Wednesday, 27 September 2017 4:08 PM  
**To:** Hannes Lourens  
**Subject:** FW: GeogelMQS – Voorgestelde ontwikkeling op Ged 204/7 van Buffelsfontein  
**Attachments:** Figure 2 (Buffelsfontein 204-7 Portion).pdf; Figure 1 (Buffelsfontein 204-7 Portion).pdf

**Follow Up Flag:** Follow up  
**Flag Status:** Flagged

---

**From:** Jurie van der Merwe [mailto:jurie@gls.co.za]  
**Sent:** 26 September 2017 07:43 AM  
**To:** Marius Swart <Mswart@george.gov.za>  
**Cc:** Jacobus Fivaz <Jmfivaz@george.gov.za>  
**Subject:** GeogelMQS – Voorgestelde ontwikkeling op Ged 204/7 van Buffelsfontein

Marius

### GeogelMQS – Voorgestelde ontwikkeling op Ged 204/7 van Buffelsfontein

Insake jou navraag rakende die aansluiting van die voorgestelde ontwikkeling op Ged. 204/7 van die plaas Buffelsfontein by die bestaande water en riool stelsels.

Hierdie area is ingesluit by ons meesterbeplanning m2017-06 en toon alle items waarby die voorgestelde ontwikkeling 'n bydrae het.

### Grondgebruik

Die voorgestelde Buffelsfontein 204-7 Portion ontwikkeling is wel in ag geneem in die meesterplan as 'n gedeelte van Dultons Cove (2).

Die analise is gedoen gebaseer op die volgende grondgebruik;

- 77 Medium Density Residential units
- 1 Filling Station
- 1 Business/Commercial

### Water

Die beplande waterverbruik is 71 kL/d met 'n spitsverbruik van 4 L/s (@ PHF = 4,0).

Die voorgestelde ontwikkeling val binne die bestaande Heroldsbaai / Oubaai Reservoir sone.

Die gebied sluit aan by die bestaande 200 mmØ toevoerpyp na die Oubaai / Breakwater Bay ontwikkelings met Item OBR\_F01.04 met 'n 160mmØ soos getoon.

Voorsiening moet ook gemaak word vir 'n toekomstige 160mmØ aansluitings, Item OBR\_F01.02 na toekomstige aanliggende Dultons Cove (2) soos getoon.

Die volgende opgraderings / nuwe items binne die konteks van die meesterplan word benodig vir die voorgestelde ontwikkeling om aan te sluit by die bestaande stelsel vir die volopgeboude area (verwys na Figuur 1, aangeheg); Items in rooi is die items wat benodig word vir die ontwikkeling om aan te sluit by die bestaande netwerk.

### Nuwe water netwerk (hoof netwerkpype)

- **OBR\_F01.04** Nuwe 160 mmØ x 74 m netwerk @ R 151 200
- **OBR\_F01.03** Nuwe 160 mmØ x 405 m netwerk @ R 694 400
- **OBR\_F01.02** Nuwe toekomstige 160 mmØ aansluiting

### Opgradering van die bestaande Oubaai Reservoir

- OBR\_B01.00 Nuwe 250 mmØ FCV ( Stelling = 26 L/s ) @ R 329 000
- OBR\_B02.01 Nuwe 250 mmØ x 17 m toevoerpyp @ R 105 000
- OBR\_B02.02 Nuwe 1 300 kL/d reservoir @ R 5 114 200

### George Main sone, opgradering van hoof toevoer na Heroldsbaai / Oubaai Reservoir sones

- GMR\_05.04 Nuwe 800 mmØ x 722 toevoerpyp @ R 9 877 000
- GMR\_F23.00 Nuwe 400 mmØ x 1 181 toevoerpyp @ R 6 574 400
- GMR\_F25.01 Nuwe 450 mmØ x 96 toevoerpyp @ R 718 200
- GMR\_F25.02 Nuwe 400 mmØ x 87 toevoerpyp @ R 575 400
- GMR\_F25.03 Nuwe 400 mmØ x 691 toevoerpyp @ R 3 889 200
- GMR\_F25.04 Nuwe 400 mmØ x 68 toevoerpyp @ R 469 000
- GMR\_05.09 Nuwe 400 mmØ x 343 toevoerpyp @ R 2 945 600
- GMR\_05.10 Nuwe 250 mmØ PRV @ R 491 400
- GMR\_05.11 Nuwe 250 mmØ PRV afsluitklep @ R 102 200
- GMR\_05.12 Nuwe 400 mmØ x 82 toevoerpyp @ R 548 800
- GMR\_05.13 Nuwe 400 mmØ x 325 toevoerpyp @ R 1 877 400
- GMR\_05.14 Nuwe 400 mmØ x 150 toevoerpyp @ R 917 000
- GMR\_05.15 Nuwe 400 mmØ x 334 toevoerpyp @ R 1 930 600
- GMR\_05.16 Nuwe 355 mmØ x 843 toevoerpyp @ R 3 987 200
- GMR\_05.17 Nuwe 355 mmØ x 618 toevoerpyp @ R 2 938 600
- GMR\_05.18 Nuwe 315 mmØ x 397 toevoerpyp @ R 1 640 800
- GMR\_05.19 Nuwe 315 mmØ x 734 toevoerpyp @ R 2 987 600
- GMR\_05.20 Nuwe 315 mmØ x 1 374 toevoerpyp @ R 5 548 200
- GMR\_05.21 Nuwe 250 mmØ x 502 toevoerpyp @ R 1 680 000
- GMR\_05.22 Nuwe 250 mmØ x 287 toevoerpyp @ R 2 837 800
- GMR\_05.23 Nuwe 250 mmØ x 1 522 toevoerpyp @ R 4 986 800
- GMR\_05.24 Nuwe 250 mmØ x 22 toevoerpyp @ R 267 400
- GMR\_05.25 Nuwe 250 mmØ x 1 699 toevoerpyp @ R 5 559 400
- GMR\_05.27 Nuwe afsluitklep @ R 30 800
- GMR\_05.28 Nuwe afsluitklep @ R 95 200
- GMR\_05.29 Nuwe 250 mmØ verbinding @ R 53 200

### Opgradering van die bestaande "New" water werke

- GMR\_B01.06 Nuwe 500 mmØ x 13 m hoofpyp @ R 239 400
- GMR\_B01.07 Nuwe 160 L/s x 50 m pomp opgradering vir New WTP PS @ R 1 020 600
- GMR\_B01.01 Nuwe 10 000 kL/d module vir New WTP @ R 99 120 000

Nota: Koste sluit V&A, Onvoorsiene en Fooie in

## **Riool**

Die beplande rioolafloop is 54 kL/d met 'n ontwerpvloei van 2 L/s.

Die ontwikkeling val binne die bestaande Heroldsbaai oksidasiedamme afloopgebied en sluit aan by die voorgestelde Dultons Cove PS F1 en bestaande Herold's Bay PS 1 soos getoon.

Voorsiening moet gemaak word vir toekomstige aanliggende areas soos getoon.

Die volgende opgraderings / nuwe items binne die konteks van die meesterplan word benodig vir die voorgestelde ontwikkeling om aan te sluit by die bestaande stelsel vir die volopgeboude area (verwys na Figuur 2, aangeheg); Items in rooi is die items wat benodig word vir die ontwikkeling om aan te sluit by die bestaande netwerk. In die meesterplan stel ons voor dat die oksidasiedamme vervang word met 'n nuwe rioolwerke, tans is daar reeds geen spaar kapasiteit beskikbaar nie.

Die "Soos Gebou" inligting van items HB\_01.01 tot HB\_01.05 moet ook bevestig word op terrein waarna ons die model sal opdateer om te bevestig of die opgraderings voorgestel wel benodig word.

Alternatiewe:

1. 'n interim interne pompstasie kan ook gebou word wat die installering van items HB\_F12.01-02, HB\_F01-02 en HB\_F04.01-02 oorbodig sal maak. Sodra die toekomstige Dultons Cove (2) area ontwikkel kan die pompstasie dan uitgeskakel word.
2. Die ontwikkeling kan ook aansluit by die bestaande Breakwater Bay rioolwerke, die werke het egter geen spaarkapasiteit vir die bestaande volopgeboude afloopgebied nie en is derhalwe nie ondersoek nie.

#### Nuwe rioolnetwerk (ingesluit hoof interne netwerk)

- **HB\_F12.01** Nuwe 160 mmØ x 691 m uitvalriool ( ontwerpvloei = 2 L/s ) @ R 961 000
- **HB\_F12.02** Nuwe 160 mmØ x 39 m uitvalriool ( ontwerpvloei = 3 L/s ) @ R 95 000
  
- **HB\_F01.01** Nuwe 5 L/s Dultons Cove PS F1 ( ontwerpvloei = 5 L/s ) @ R 1 629 600
- **HB\_F01.02** Nuwe 110 mmØ x 1174 m pomplyn ( ontwerpvloei = 5 L/s ) @ R 857 100
  
- **HB\_F04.01** Nuwe 160 mmØ x 174 m uitvalriool ( ontwerpvloei = 5 L/s ) @ R 275 200
- **HB\_F04.02** Nuwe 160 mmØ x 280m uitvalriool ( ontwerpvloei = 6 L/s ) @ R 415 800
- **HB\_F04.03** Nuwe 160 mmØ x 70 m uitvalriool ( ontwerpvloei = 7 L/s ) @ R 137 000

#### Opgradering van bestaande rioolnetwerk

- **HB\_01.01** Opgradeer bestaande uitvalriool van 149 na 200 mmØ x 69 m ( ontwerpvloei = 12 L/s ) @ R 222 400 #
- **HB\_01.02** Opgradeer bestaande uitvalriool van 160 na 200 mmØ x 885 m ( ontwerpvloei = 18 L/s ) @ R 1 756 200 #
- **HB\_01.03** Opgradeer bestaande uitvalriool van 160 na 250 mmØ x 111 m ( ontwerpvloei = 27 L/s ) @ R 343 500 #
- **HB\_01.04** Opgradeer bestaande uitvalriool van 160 na 200 mmØ x 18 m ( ontwerpvloei = 27 L/s ) @ R 124 300
- **HB\_01.05** Opgradeer bestaande uitvalriool van 160 na 315 mmØ x 4 m ( ontwerpvloei = 59 L/s ) @ R 117 700 #
  
- **HB\_04.01** Opgradeer Herold's Bay PS 1 van 19 L/s na 60 L/s ( ontwerpvloei = 60 L/s ) @ R 1 271 700
- **HB\_04.02** Opgradeer bestaande pomplyn van 125 na 250 mmØ x 1008 m ( ontwerpvloei = 60 L/s ) @ R 1 890 800

#### Opgradering van Herold's Bay WWTW

- **HB\_05.01a** Nuwe inlaatwerke ( ontwerpvloei = 60 L/s ) @ R 1 134 000
- **HB\_05.01b** Nuwe inlaatwerke Fase 1/2 ( ontwerpvloei = 30 L/s ) @ R 82 500
- **HB\_05.01c** Nuwe Herold's Bay WWTW Fase 1/2 ( ontwerpvloei = 500 kL/d ) @ R 11 650 800
- **HB\_05.01d** Sloop bestaande Herold's Bay oksidasiedamme inlaatwerke @ R 6 100
- **HB\_05.01e** Sloop bestaande Herold's Bay oksidasiedamme @ R 31 100

Nota: Koste sluit V&A, Onvoorsiene en Fooie in



# - Ontbrekende "Soos Gebou" inligting

Groete

Jurie van der Merwe



13 Elektron Street, Techno Park  
PO Box 814, Stellenbosch 7599  
South Africa

Phone +27 21 880 0388  
Fax +27 21 880 0389  
Email [jurie@gls.co.za](mailto:jurie@gls.co.za)

This email is subject to our terms and conditions found on the GLS website: [www.gls.co.za](http://www.gls.co.za)

---

**From:** Marius Swart [<mailto:Mswart@george.gov.za>]  
**Sent:** 20 September 2017 11:44 AM  
**To:** Jurie van der Merwe <[jurie@gls.co.za](mailto:jurie@gls.co.za)>  
**Cc:** Jacobus Fivaz <[Jmfivaz@george.gov.za](mailto:Jmfivaz@george.gov.za)>  
**Subject:** Voorgestelde Ontwikkeling op Ged 7 van Buffelsfontein

Môre Jurie,

Sien aangehegte brief van Element .

Kan jy asseblief bevestig of daar voldoende kapasiteit bestaan vir die ontwikkeling.

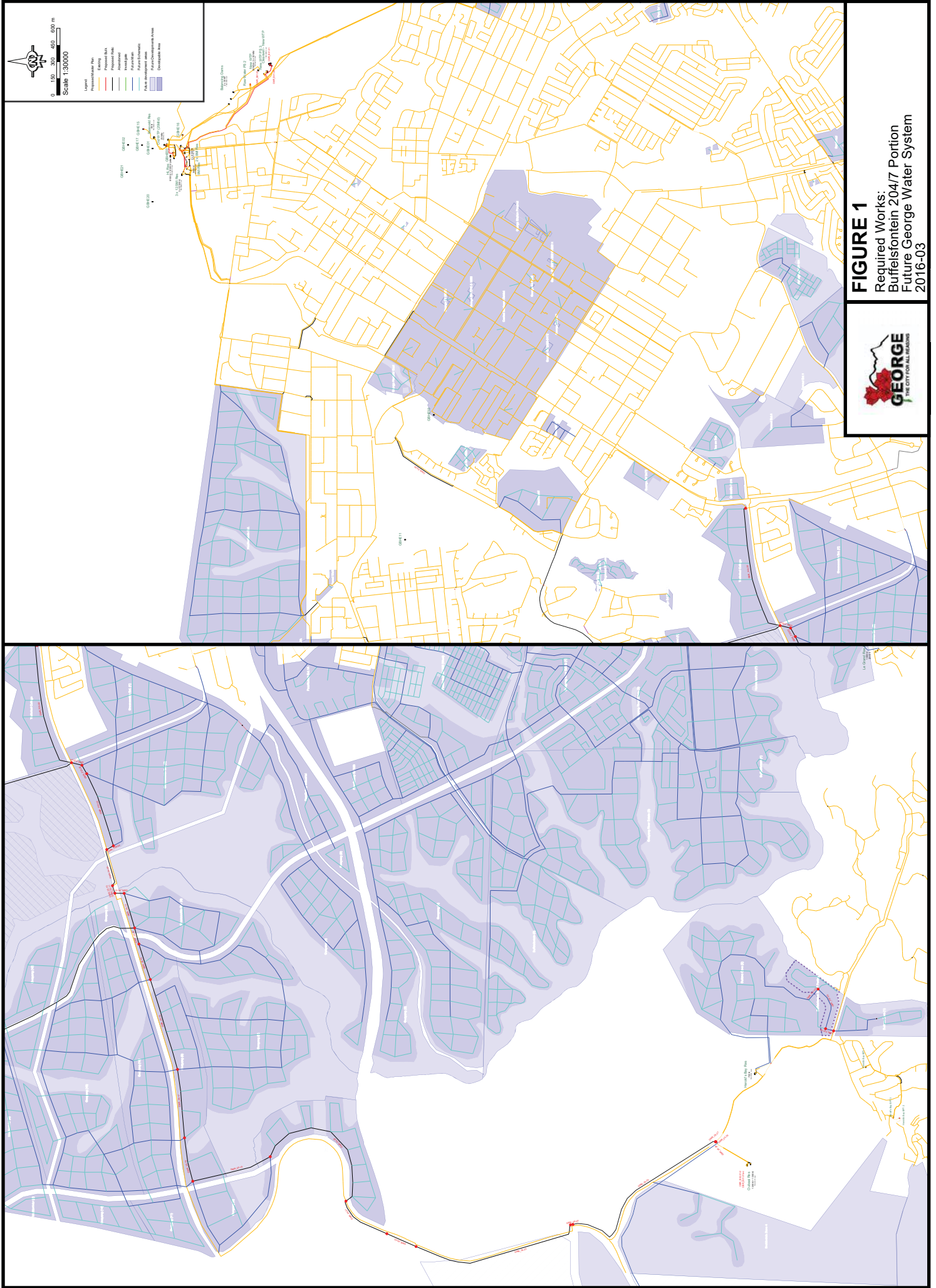
Dankie

Marius

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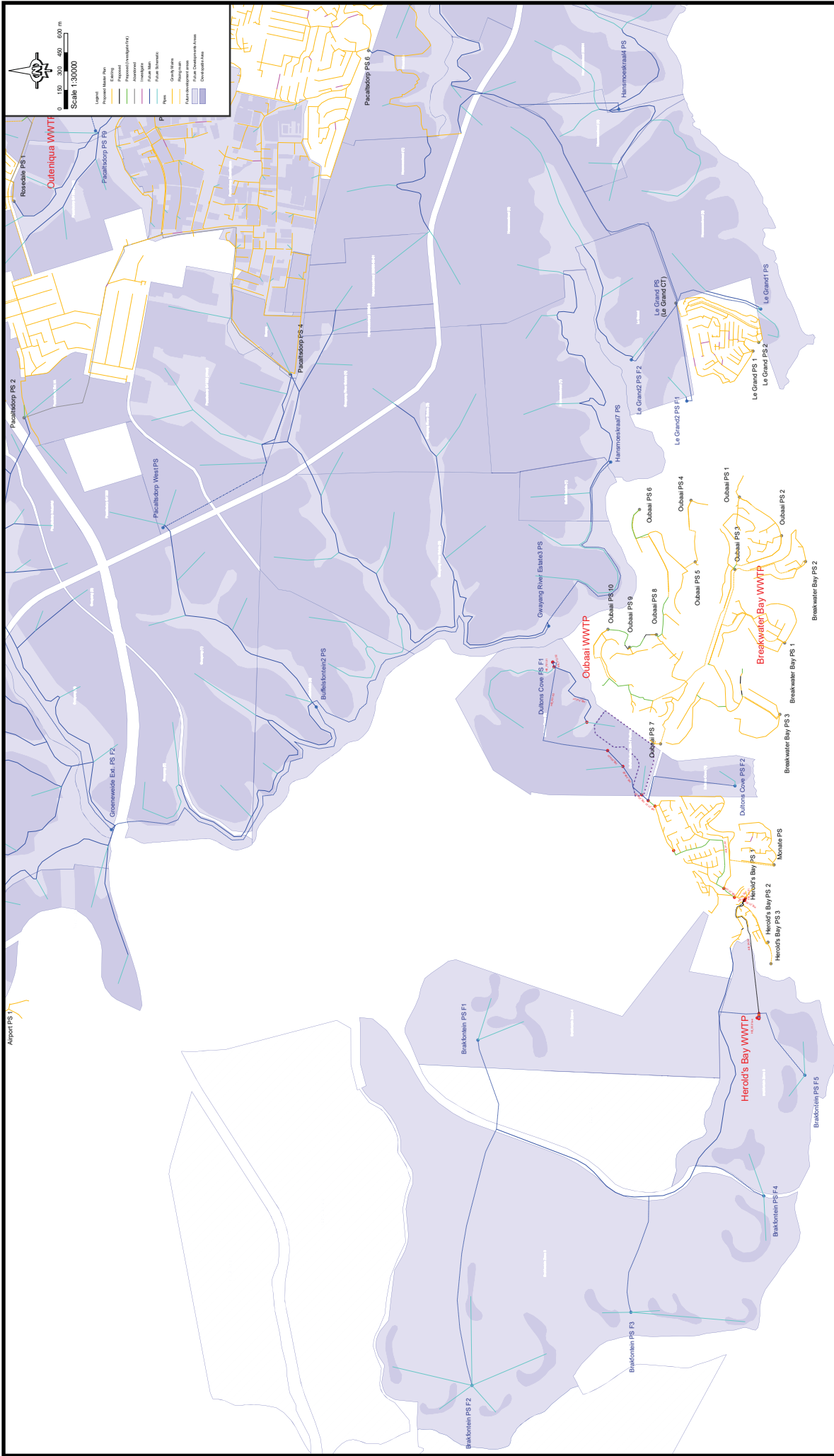
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**FIGURE 1**  
 Required Works:  
 Buffelsfontein 204/7 Portion  
 Future George Water System  
 2016-03





**FIGURE 2**  
 Required Works:  
 Buffelsfontein 204/7 Portion  
 Future George Sewer System  
 2016-03

**ADDENDUM 3**

**LETTER OF CONFIRMATION: OUBAAI HOA**



September 19, 2017

Oubaai Home Owners Association  
406 Heroldsbay Road  
Herold's Bay  
George

**PRINCIPAL DECISION TO ACCEPT 45KL EFFLUENT WATER**

---

Dear Hannes,

The Oubaai Homeowners Association confirms that in principle we would be able to receive the inflow of an additional 45KL of effluent water per day. It is conditional on acceptable terms from all parties involved to be discussed after approval of the proposed development on the property adjacent to the Estate.

For any additional information, please do not hesitate to contact me.

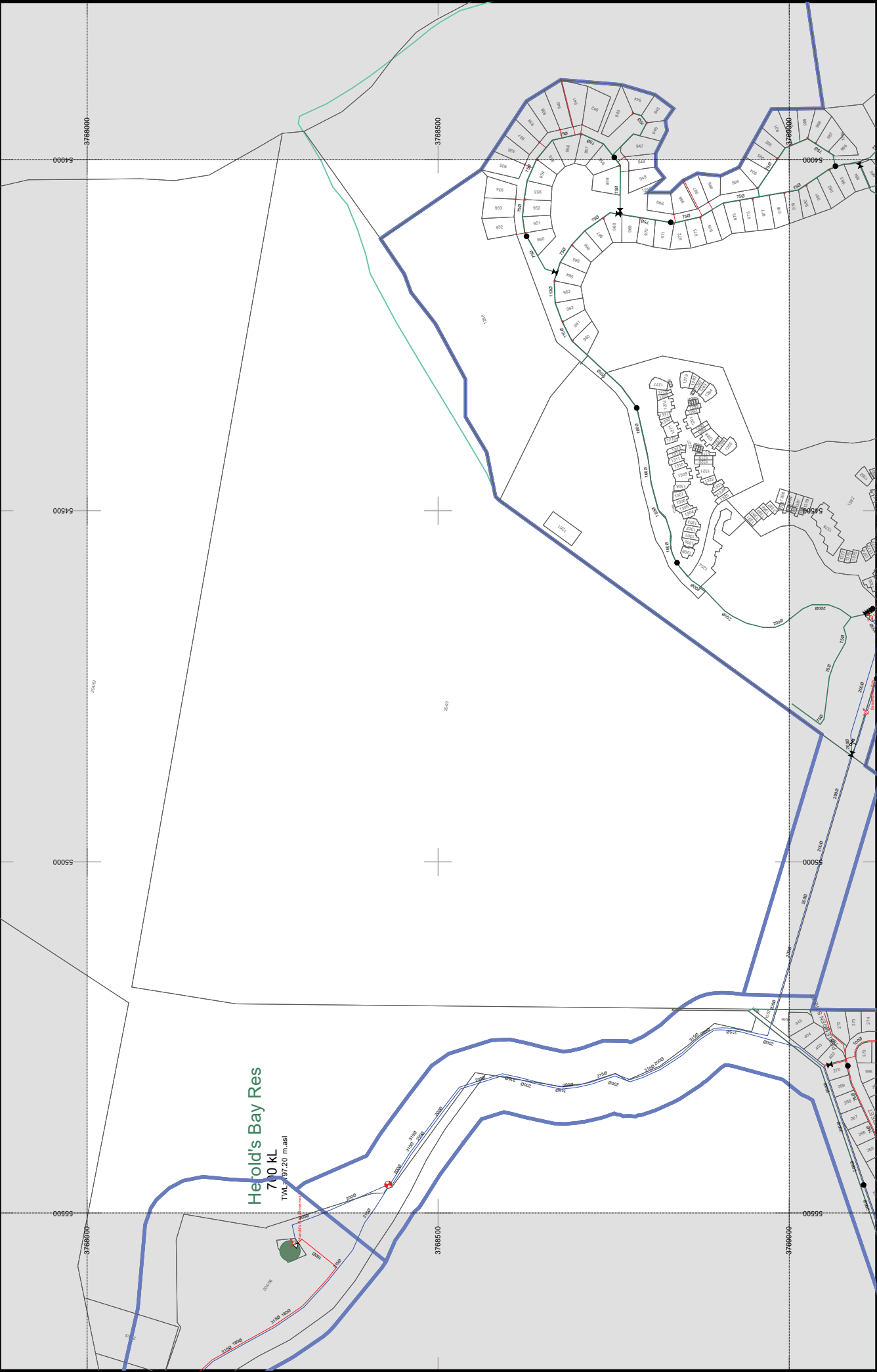
Kind regard,

A handwritten signature in black ink, appearing to read "Willem Marx", is written over a light blue horizontal line.

Willem Marx  
Estate Manager

## **ADDENDUM 4**

### **EXISTING BULK WATER AND SEWER LAYOUT**



DATE: Mar 2017  
 REV: 18  
 SCALE: 1:5,000  
 WGS 23

# Water Distribution Network George

INDEX

GW-N74	GW-O74	GW-P74
GW-N75	GW-O75	GW-P75
GW-N76	GW-O76	GW-P76

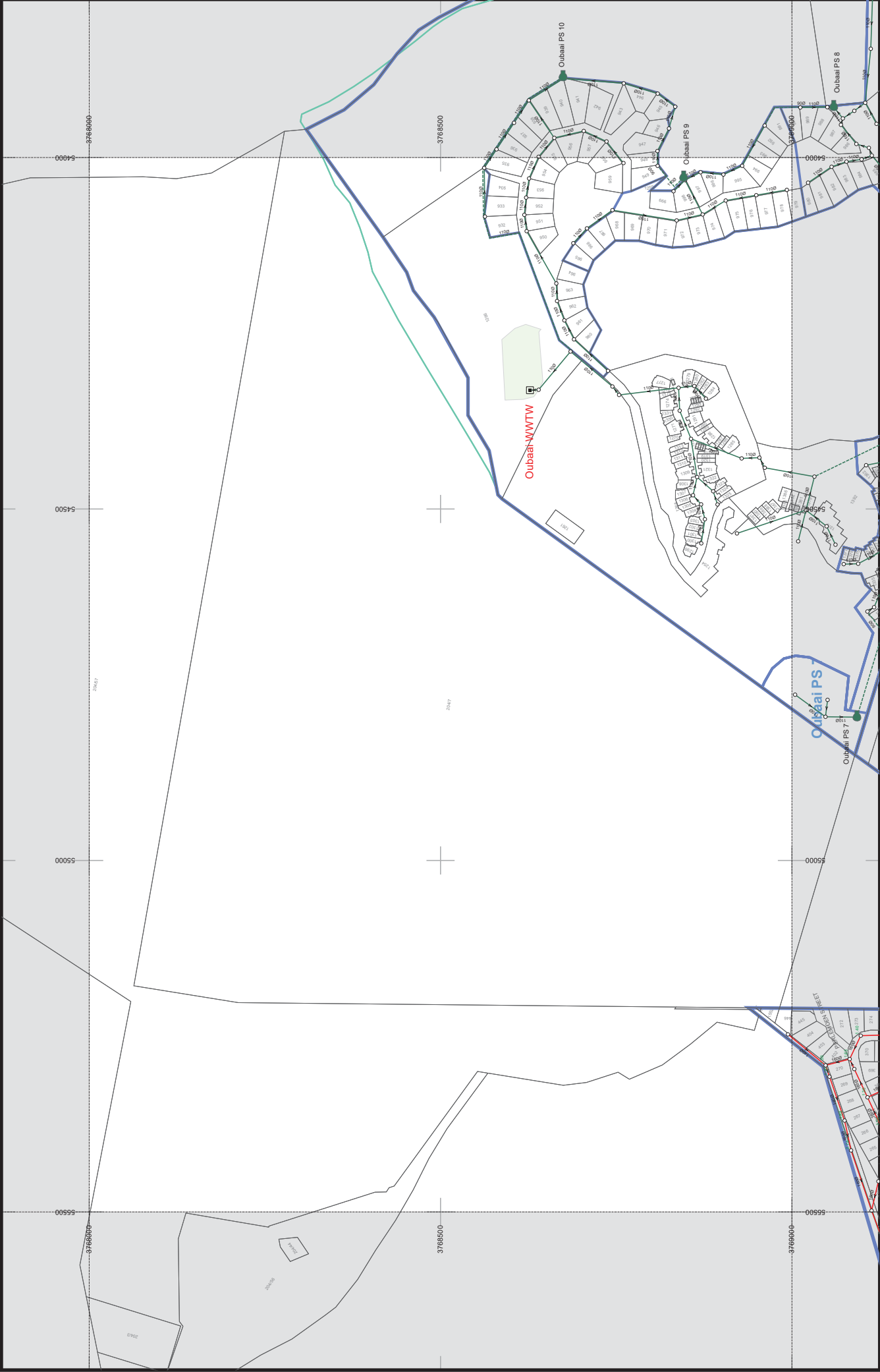


- CV
- Air Valve
  - Scour Valve
  - Surge Tank
  - Chamber
  - Chute
  - Flow Meters
  - Valve
  - Strainer
  - House Connections

- Townships
- Wards
  - Reservoir
  - Tower
  - Pump Station
  - Zone Valve
  - Hydrant
  - PRV

- LEGEND
- Network pipe (Ø < 180)
  - Network pipe (Ø > 180)
  - Private system
  - Fire Reticulation (Private)
  - Bulk water pipe
  - Raw water pipe
  - Distribution Zones



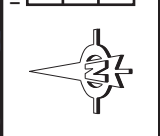


DATE: Mar 2017  
 REV: 18  
 SCALE: 1:5,000  
 WGS 23

# Sewer System George

INDEX

GS-N74	GS-O74	GS-P74
GS-N75	GS-O75	GS-P75
GS-N76	GS-O76	GS-P76



- LEGEND
- Manhole (Depth in meters)
  - Rodding Eye
  - Top End
  - Diversions
  - Flushing Siphon
  - Isolating Valve
  - Non Return Valve
  - Scour Valve
  - Air Valve
  - Conservancy Tank
  - Pump Station
  - WWTW
  - Flow Meter
  - House Connection
  - Pipe Bridge
  - Culvert/Sleeve
  - Siphon
  - Encased

- Gravily pipe ( $\phi < 180$ )
- Gravily pipe ( $\phi > 180$ )
- Private system
- STED system
- Rising Mains
- Drainage Areas
- Townships
- Wards





## **ADDENDUM 5**

### **PRELIMINARY DESIGN DRAWINGS WITH TYPICAL DETAILS**



**LEGEND - INFRASTRUCTURE**

Coordinates system: L.O. 23

**LEGEND - PROPOSED INFRASTRUCTURE**

- Sewer line - Gravity (1100 UNO)
- Water line (630 UNO)
- Treated effluent - Pressure
- Stormwater line
- Development setback Line

**SETTING OUT DATA (MIDDLE OF INFRASTRUCTURE)**

Y-COORDINATE	X-COORDINATE
PP1	5207.382
PP2	5205.360
PP3	54843.699
PP4	54555.626
PP5	54559.806
PP6	54559.806

**HEROLDS BAY ESTATE**  
**SITE LAYOUT & SERVICES PLAN**

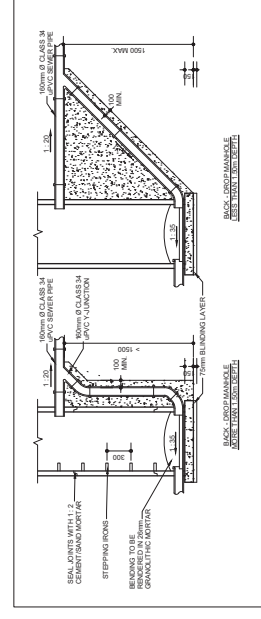
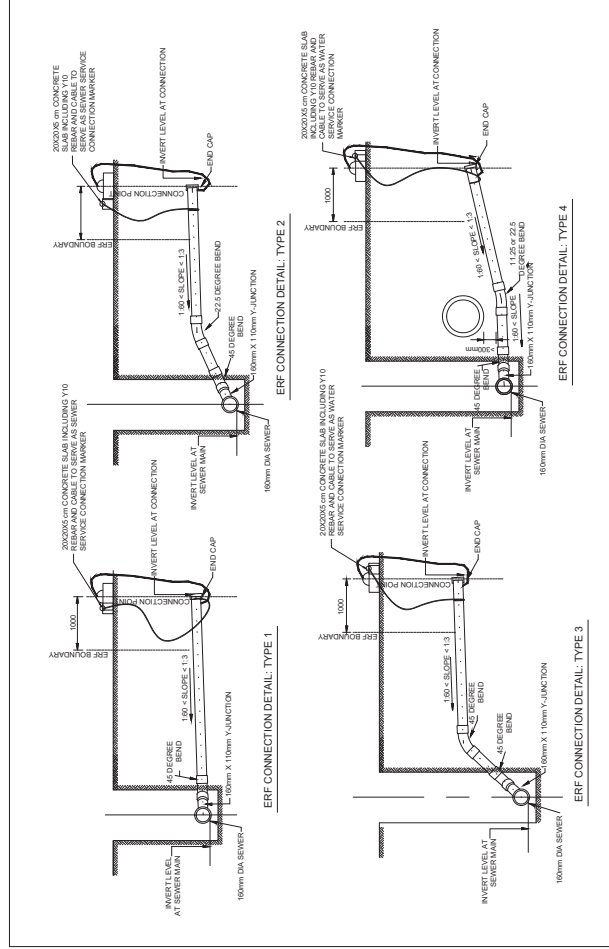
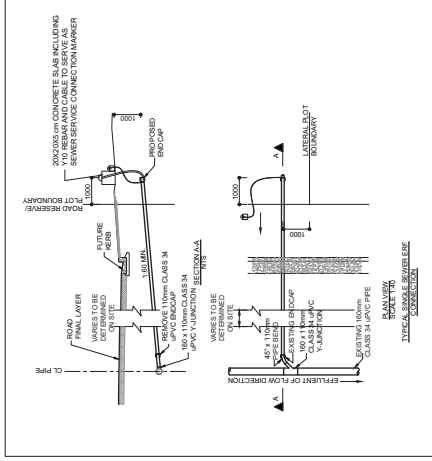
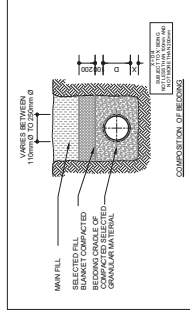
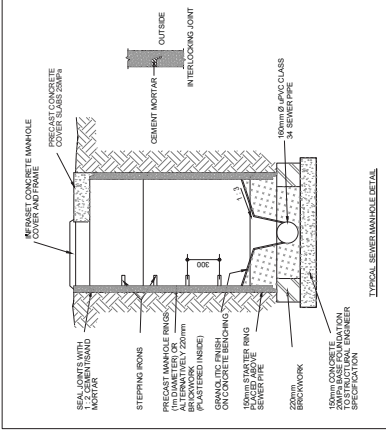
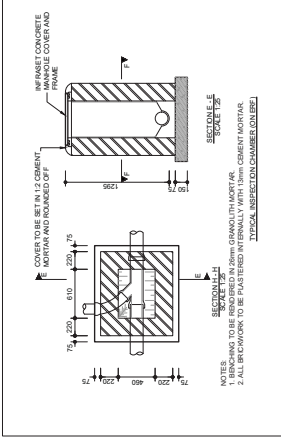
Project: HEROLDS BAY ESTATE  
 Plan designation: SITE LAYOUT & SERVICES PLAN

Scale: 1:1000  
 Contract No.: 1701561  
 Drawing No.: 1701561/C/003  
 P. No.: E

Client: LONG ISLAND TRADING 44 (Pty) Ltd  
 3rd Floor Church Corner Building  
 68 Victoria Street and Courtney Street  
 GEORGE TOWN  
 6529  
 Tel: +2781 7235 7777

Author: R. MONTGOMERY  
 Date: 2018/05/24  
 Rev: 01

Revised for environmental requirements	Rev: 01
Finalized for environmental requirements	Rev: 02
Finalized for environmental design	Rev: 03
Finalized for infrastructure design	Rev: 04
Finalized for infrastructure design	Rev: 05
Discussion	Rev: 06



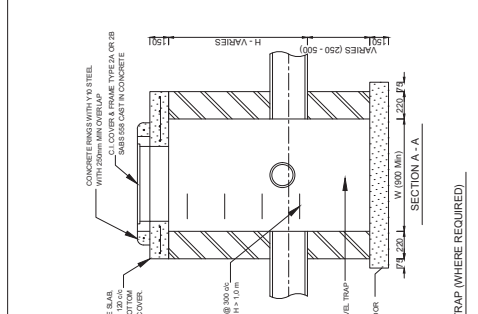
Rev	Date	Description	H/G	Rev	by	Client/Employee	HEROLDS BAY ESTATE		Name	Signature	Scale	NTS	Contract No.	ORIGINAL SIZE A1	
							1701561							Drawing No.	1701561/C/S20
FOR INFORMATION						Project HEROLDS BAY ESTATE	Designed			Checked	Approved				
1 OCT19							HLG			HLG	PS	HL			
1 OCT19						HLG			HLG	PS	HL			Revision	0
1 OCT19						HLG			HLG	PS	HL			COPYRIGHT & INTELLECTUAL PROPERTY RIGHTS RESERVED IN TERMS OF THE COPYRIGHT ACT (14) OF 1994	

**LONG ISLAND TRADING 44 (Pty) Ltd**  
 3rd Floor Church Corner Building  
 7/6 Church and Courtney Streets  
 GLENHOLDEN  
 1694  
 Tel: +27 71 735 7777

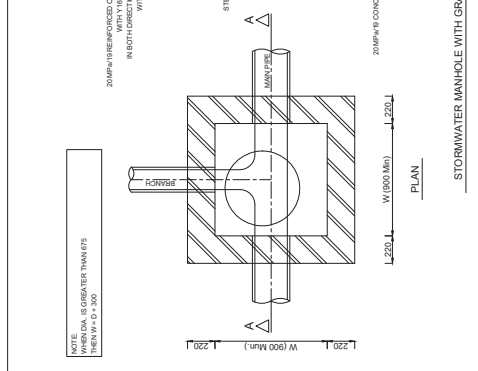
**ELEMENT**  
 Consulting Engineers  
 A FIFTH DIMENSION TO ENGINEERING

82 Victoria Road  
 George 6300  
 P O Box 6902  
 George 6300  
 Tel: +27 44 884 1338  
 Email: info@element.co.za

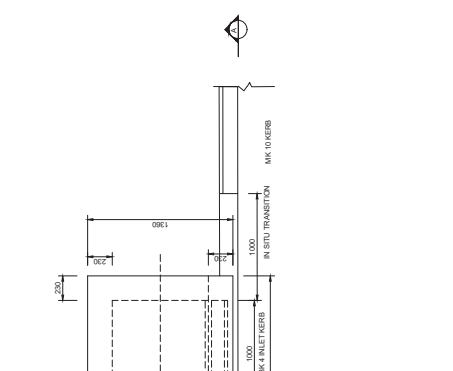
- NOTES:**
- ALL DIMENSIONS AND LEVELS TO BE CHECKED AGAINST THE RELEVANT STANDARDS AND DISCREPANCIES TO BE REFERRED TO ENGINEER.
  - GENERAL CONCRETE TO BE CLASS 25/19.
  - STRUCTURE TO BE CLASS 20/19.
  - CONCRETE TO BE CAST BY CLASS 3/19.
  - CONCRETE TO BE CAST BY CLASS 3/19.
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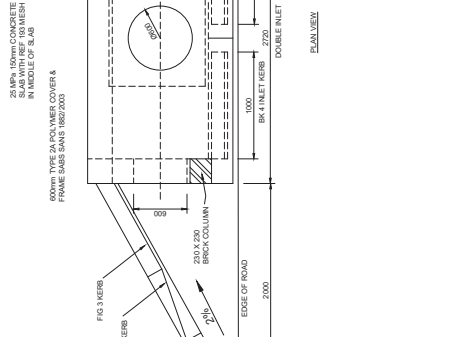
STORMWATER MANHOLE WITH GRAVEL TRAP (WHERE REQUIRED)



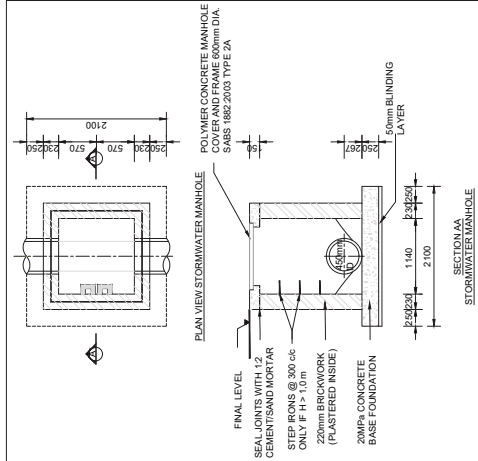
STORMWATER MANHOLE WITH POLYMER CONCRETE MANHOLE COVER AND FRAME 600mm DIA



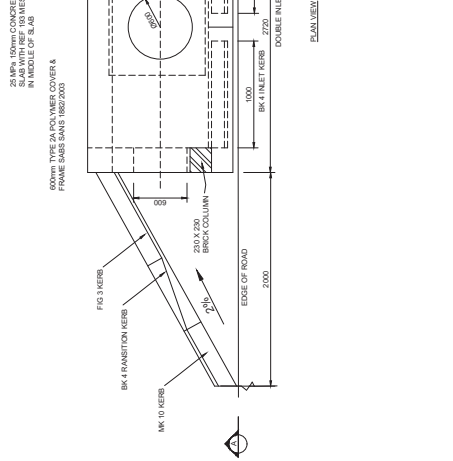
DOUBLE KERB INLET STRUCTURE WITH SPRAY



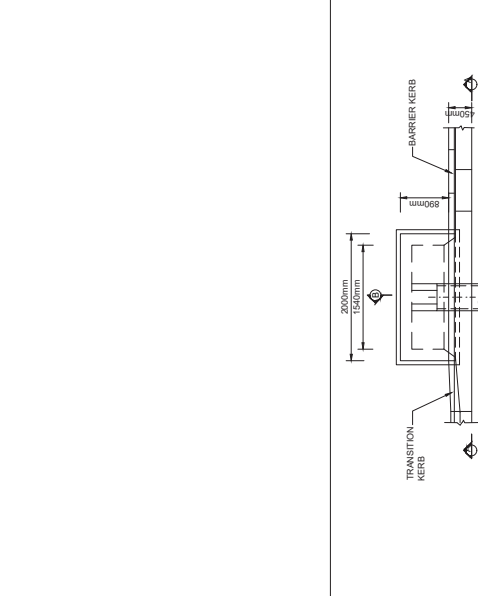
DOUBLE KERB INLET STRUCTURE WITH SPRAY



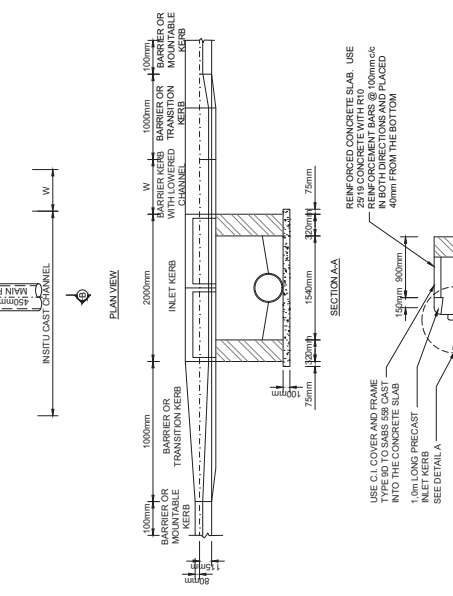
STORMWATER MANHOLE WITH POLYMER CONCRETE MANHOLE COVER AND FRAME 600mm DIA



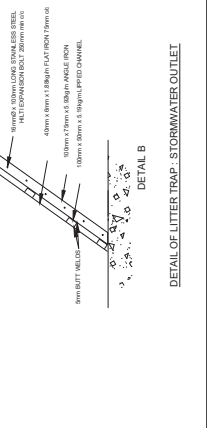
DOUBLE KERB INLET STRUCTURE WITH SPRAY



STORMWATER MANHOLE WITH POLYMER CONCRETE MANHOLE COVER AND FRAME 600mm DIA



DOUBLE KERB INLET STRUCTURE WITH SPRAY



DETAIL OF LITTER TRAP - STORMWATER OUTLET

Rev	Date	Description	Drawn	Checked	Approved	Scale	Signature	Name	Project
0	OCT 19	FOR INFORMATION	HLG	PS	HL	1:1		HEROLDS BAY ESTATE	HEROLDS BAY ESTATE
0									LONG ISLAND TRADING 44 (Pty) Ltd
0									3rd Floor Church Corner Building 7/6 Church and Country Streets George 6030 Tel: +27 44 884 1138 E-MAIL: info@longisland.co.za
0									STORMWATER TYPICAL DETAILS
0									LONG ISLAND TRADING 44 (Pty) Ltd
0									3rd Floor Church Corner Building 7/6 Church and Country Streets George 6030 Tel: +27 44 884 1138 E-MAIL: info@longisland.co.za
0									STORMWATER TYPICAL DETAILS
0									LONG ISLAND TRADING 44 (Pty) Ltd
0									3rd Floor Church Corner Building 7/6 Church and Country Streets George 6030 Tel: +27 44 884 1138 E-MAIL: info@longisland.co.za
0									STORMWATER TYPICAL DETAILS



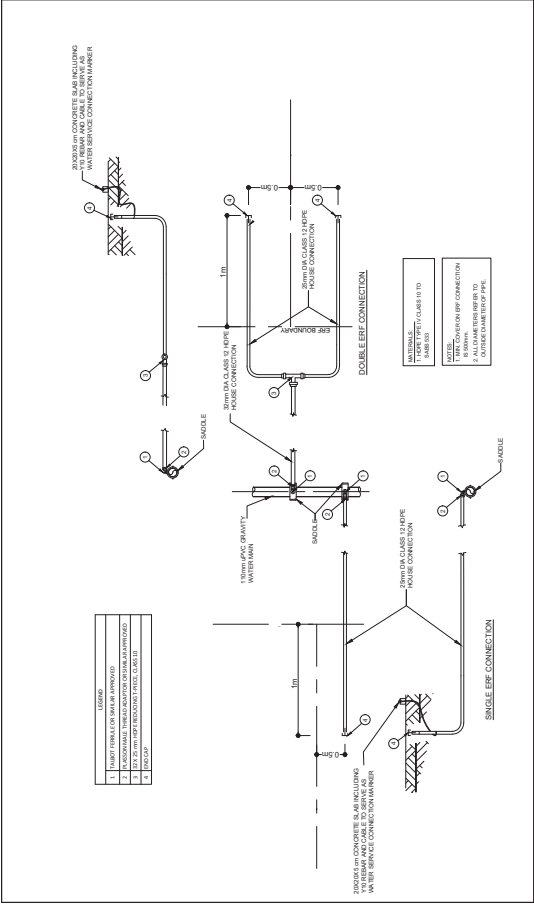
Rev	Date	Description	Drawn	Checked	Approved	Scale	Signature	Name	Project
0	OCT 19	FOR INFORMATION	HLG	PS	HL	1:1		HEROLDS BAY ESTATE	HEROLDS BAY ESTATE
0									LONG ISLAND TRADING 44 (Pty) Ltd
0									3rd Floor Church Corner Building 7/6 Church and Country Streets George 6030 Tel: +27 44 884 1138 E-MAIL: info@longisland.co.za
0									STORMWATER TYPICAL DETAILS
0									LONG ISLAND TRADING 44 (Pty) Ltd
0									3rd Floor Church Corner Building 7/6 Church and Country Streets George 6030 Tel: +27 44 884 1138 E-MAIL: info@longisland.co.za
0									STORMWATER TYPICAL DETAILS
0									LONG ISLAND TRADING 44 (Pty) Ltd
0									3rd Floor Church Corner Building 7/6 Church and Country Streets George 6030 Tel: +27 44 884 1138 E-MAIL: info@longisland.co.za
0									STORMWATER TYPICAL DETAILS

LONG ISLAND TRADING 44 (Pty) Ltd  
3rd Floor Church Corner Building  
7/6 Church and Country Streets  
George 6030  
Tel: +27 44 884 1138  
E-MAIL: info@longisland.co.za

HEROLDS BAY ESTATE  
STORMWATER TYPICAL DETAILS

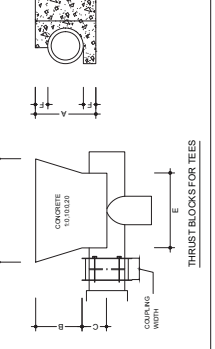
ORIGINAL SIZE A1  
1701561  
1701561/C/SW20  
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IN TERMS OF THE COPYRIGHT ACT (84 OF 1978)



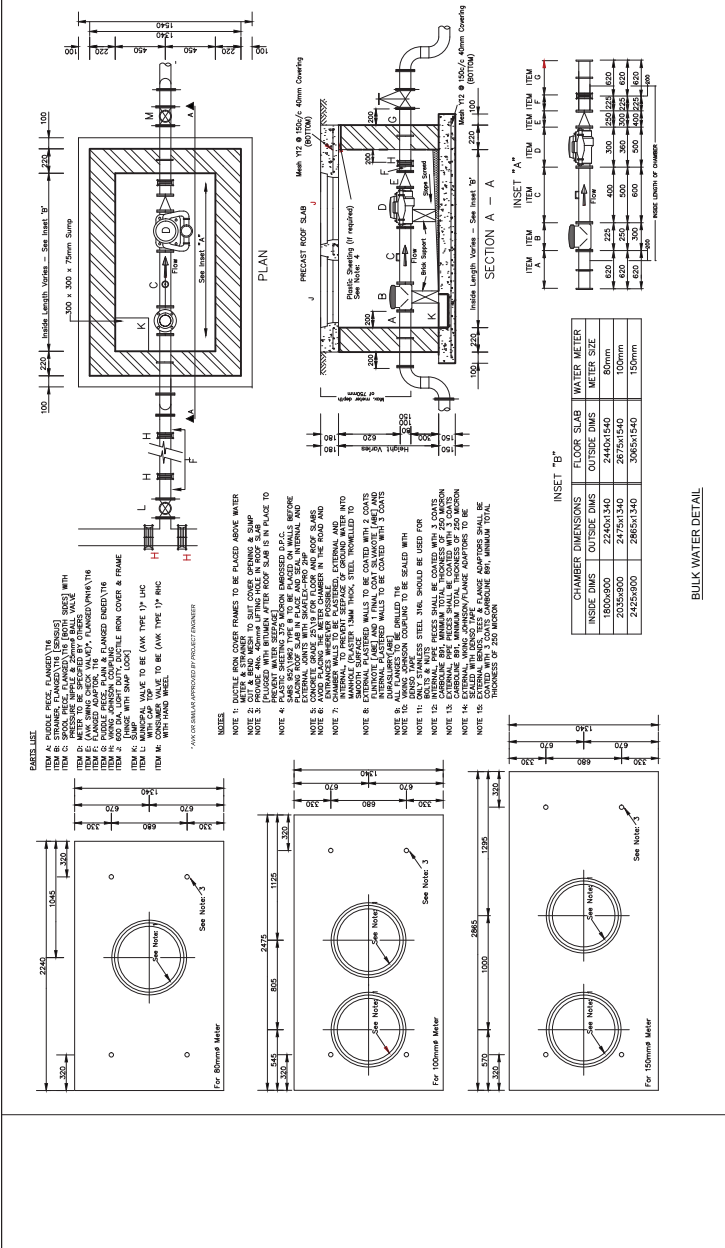
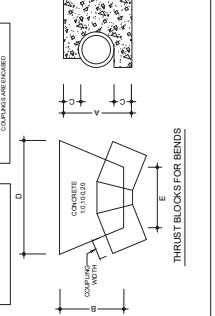
ITEM NO.	DESCRIPTION	QUANTITY	UNIT
1	CONCRETE	1.00	m <sup>3</sup>
2	STEEL	1.00	kg
3	PIPE	1.00	m
4	VALVE	1.00	each
5	CONNECTION	1.00	each

**DESIGN CRITERIA**  
 SOIL BEHIND PIPES - 100kPa (CLAY)  
 SOIL BEHIND PIPES - 100kPa (SAND)  
 TEST PRESSURE - 1.5 MPa  
 COMPRESSIVE STRENGTH - 30 MPa



ITEM NO.	DESCRIPTION	QUANTITY	UNIT
1	CONCRETE	1.00	m <sup>3</sup>
2	STEEL	1.00	kg
3	PIPE	1.00	m
4	VALVE	1.00	each
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**DESIGN CRITERIA**  
 SOIL BEHIND PIPES - 100kPa (CLAY)  
 SOIL BEHIND PIPES - 100kPa (SAND)  
 TEST PRESSURE - 1.5 MPa  
 COMPRESSIVE STRENGTH - 30 MPa



**CHAMBER DIMENSIONS**

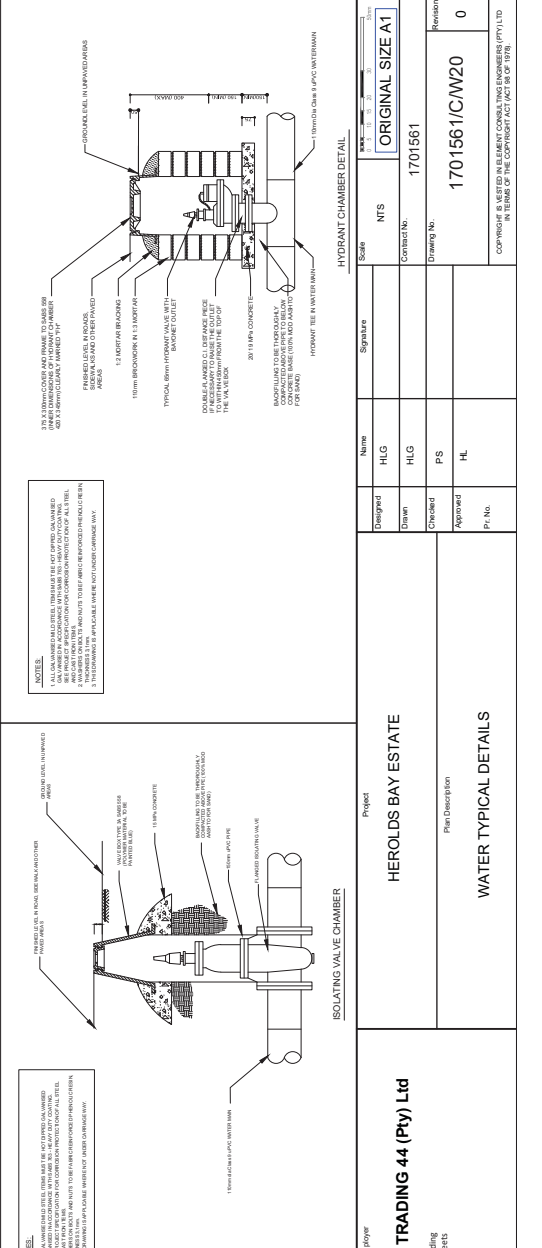
CHAMBER DIMENSIONS	FLOOR SLAB DIMENSIONS	WATER METER DIMENSIONS
INSIDE DIMS	INSIDE DIMS	METER SIZE
2425x1500	2425x1500	50mm
2425x1500	2425x1500	75mm
2425x1500	2425x1500	100mm

**INSET "A"**

ITEM NO.	DESCRIPTION	QUANTITY	UNIT
1	CONCRETE	1.00	m <sup>3</sup>
2	STEEL	1.00	kg
3	PIPE	1.00	m
4	VALVE	1.00	each
5	CONNECTION	1.00	each

**INSET "B"**

ITEM NO.	DESCRIPTION	QUANTITY	UNIT
1	CONCRETE	1.00	m <sup>3</sup>
2	STEEL	1.00	kg
3	PIPE	1.00	m
4	VALVE	1.00	each
5	CONNECTION	1.00	each



**Client/Employee**

**Project**  
 HEROLDS BAY ESTATE

**LONG ISLAND TRADING 44 (Pty) Ltd**  
 3rd Floor Church Corner Building  
 7/6 Church and Courtney Streets  
 GEORGE TOWN  
 6529  
 Tel: +27 73 735 7777

**82 Victoria Road  
 George 6002  
 P O Box 9902  
 George 6030  
 Tel: +27 44 884 1138  
 EMail: info@long.co.za**

**ELEMENT Engineers**  
 Consulting  
 A FIFTH DIMENSION TO ENGINEERING

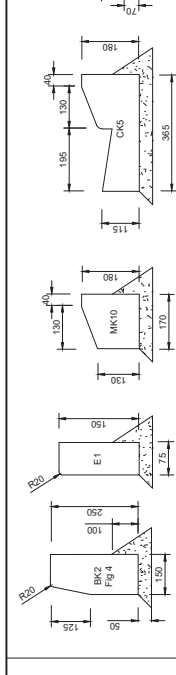
Rev	Date	Description
0	02/11/19	FOR INFORMATION

Drawn	Checked	Approved	Scale
HLG	PS	HL	Scale

Name	Signature	Date
HLG		

**Original Size A1**  
 Drawing No: 1701561  
 Project No: 1701561/C/W20  
 Revision: 0

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### NOTES:

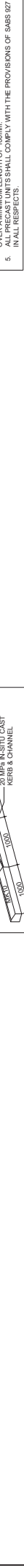
1. ALL DIMENSIONS AND LEVELS TO BE CHECKED ON SITE PRIOR TO INSTALLATION.
2. DISCREPANCIES TO BE REFERRED TO ENGINEER.
3. GENERAL CONCRETE TO BE CLASS 25/19.
4. FINISH TO CONCRETE TO BE TO BS 1187.
5. CONTRACTOR SHALL VERIFY ALL DIMENSIONS, AND A WORKSHOP DRAWING SHALL BE SUBMITTED TO ENGINEER FOR APPROVAL.
6. ALL DIMENSIONS IN mm.
7. 125 kg/m<sup>3</sup> OF REINFORCEMENT TO BE ALLOWED PER m<sup>3</sup> OF CONCRETE.

### KERB NOTES:

1. 10mm EXPANDED POLYSTYRENE FILLED JOINTS SHALL BE PLACED IN KERB AND CHANNEL UNITS AT INTERVALS NOT EXCEEDING 10.0m.
2. REINFORCEMENT TO BE PLACED AT 100mm SPACING TO THE THICKNESS AND ALL UPON WHICH REINFORCEMENT IS PLACED. REFER TO TYPICAL CROSS SECTION FOR DETAILS. BEDDING THICKNESS SHALL NOT BE LESS THAN 50mm.
3. THE TRANSITION FROM IN-FALL TO OUTFALL CHANNELS SHALL BE MADE OVER A MINIMUM LENGTH OF 10.0m.
4. ALL PROFILES SHALL COMPLY WITH THE PROVISIONS OF SBAS 927 IN ALL RESPECTS.

### DIMENSIONS

A	B	C	D	E	F	G	H	I	J	AREA (m <sup>2</sup> )
1500	150	200	260	320	380	440	500	560	620	1.796
2000	150	230	290	350	410	470	530	590	650	3.11
2500	150	270	330	390	450	510	570	630	690	5.00
3000	150	300	360	420	480	540	600	660	720	6.46



### NOTE:

1. A SCALE COPY OF THIS DRAWING ARE APPLICABLE TO REGULATORY AND WARNING SIGNS REQUIRING A SINGLE SUPPORT.
2. ROAD SIGNS CONSTRUCTED FROM 4mm CHROMEPLATE.
3. ALUMINIUM RIVETS 4.8mm DIAMETER, 8mm LONG AT 20mm MAXIMUM CENTRES MINIMUM 3 No. PER REINFORCEMENT PROFILE.
4. RIVET HEADS ON THE SIGN FACE SHALL BE PAINTED TO SUIT SIGN FACE COLOUR.
5. ALL HORIZONTAL REINFORCING PROFILES SHALL BE SIZE 4.13 x 208 x 1.6mm.

STOP DETAIL N.T.S.

Scale: 1:50

Original Size A1

Contract No: 1701561

Drawing No: 1701561/C/R20

Revision: 0

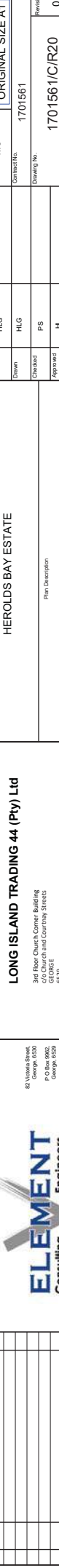
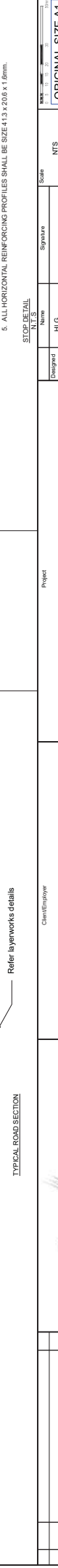
Project: HEROLDS BAY ESTATE

Plan Description: ROADS TYPICAL DETAILS

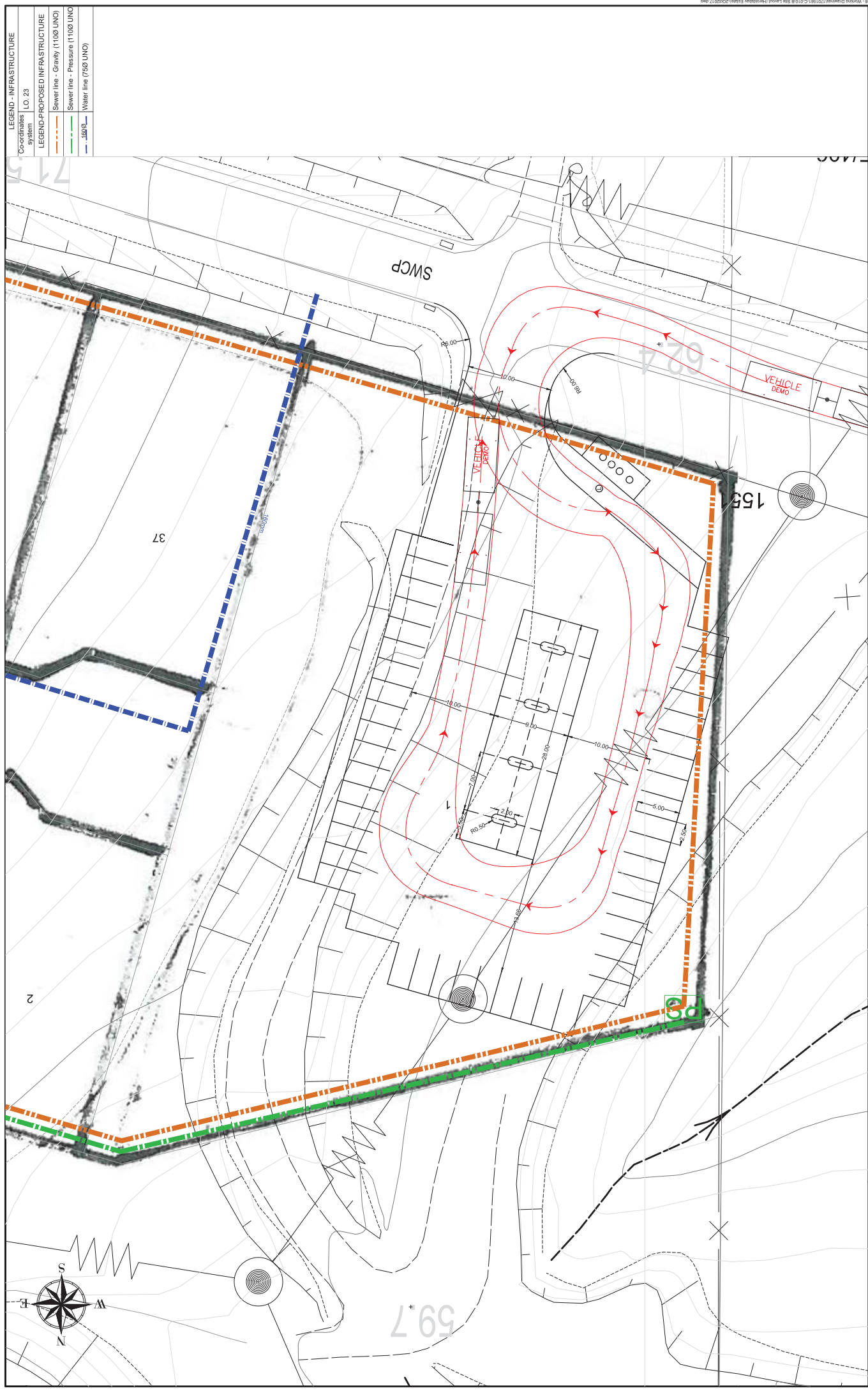
Client/Engineer: LONG ISLAND TRADING 44 (Pty) Ltd

3rd Floor Church Corner Building  
6522 Church and Courtney Streets  
GEORGETOWN  
6529  
Tel: +27 87 235 7777

150mm G5 MATERIAL COMPACTED TO 98% MOD ASHTO DENSITY (FROM COMMERCIAL SOURCES)  
100mm G5 MATERIAL COMPACTED TO 98% MOD ASHTO DENSITY (FROM COMMERCIAL SOURCES)  
100mm TREATMENT OF ROADBED IN SITU MATERIAL, RIP AND RE-COMPACT TO 91% MOD ASHTO DENSITY ONLY FOR ROAD 1 (CH 130 - 485)  
CONCRETE BEDDING CLASS 25/19  
PRIME COAT MC 30  
150mm G2 BASE COURSE COMPACTED TO 86% ARD DENSITY (FROM COMMERCIAL SOURCES)  
150mm G4 SUBBASE COMPACTED TO 85% MOD ASHTO DENSITY (FROM COMMERCIAL SOURCES)  
150mm G5 SELECTED LAYER COMPACTED TO 86% MOD ASHTO DENSITY (FROM COMMERCIAL SOURCES)  
150mm TREATMENT OF ROADBED IN SITU MATERIAL, RIP AND RE-COMPACT TO 91% MOD ASHTO DENSITY



Element Consulting Engineers  
A FIFTH DIMENSION TO ENGINEERING



**LEGEND - INFRASTRUCTURE**

Coordinates LO 23

**LEGEND-PROPOSED INFRASTRUCTURE**

— Sewer line - Gravity (1100 UNO)

— Sewer line - Pressure (1100 UNO)

— Water line (750 UNO)

Scale	1:200	
Contract No.	1701561	
Drawing No.	1701561/C/013_1	
Revision	A	
Author	JC	
Checked	JC	
Approved	HL	
Project	HEROLDS BAY ESTATE	
Plan Description	FILLING STATION CONCEPTUAL SITE LAYOUT	
Client/Referrer	LONG ISLAND TRADING 44 (Pty) Ltd 3rd Floor Church Corner Building 1000 Main Road and Courtial Streets GEORGE TOWN 6529 Tel: +27 81 7335 7777	
Consulting Engineer	82 Victoria Street George 6530 P.O. Box 9000 George 6529 Tel: +27 44 884 1185 Fax: +27 44 884 1185 E-Mail: info@element.co.za	
Consulting Engineer Logo	<b>ELEMENT</b> Consulting Engineers A FIFTH DIMENSION TO ENGINEERING	
Rev	Date	Description
JC		

02/11/2017 15:41 - Herolds Bay Estate - Consulting - Working Drawing 1701561-C/013-B Site Layout (Herolds Bay Estate) 20/03/17.dwg  
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## **ADDENDUM 6**

### **MASKAM CLARUS FUSION SEWER PACKAGE PLANT DETAIL**



# SAVE WATER: Treat and re-use all your BLACK and GREY water on-site

## Fusion Series Waste Water Treatment



- Odourless
- Installed underground
- Lowest cost of ownership
- Quiet
- Small Footprint
- Effluent meets South African DWS General Standard
- Nitrification & De-nitrification cycles
- Developed for urban and rural use

Save money – treating your waste water on-site for re-use is cheaper than buying municipal water

**Applications:**

- Households and grouped housing
- Schools
- Hotels
- Office blocks
- Lodges & guest houses
- Farms
- Factories
- Informal settlements
- Commercial wastewater secondary treatment
  - Waste strength reduction:
  - <75 mg/l COD
  - <25 mg/l TSS
- Commercial wastewater pre-treatment before discharging to municipal sewer network (COD reduction)

**Easy to install or retrofit:**

- Save water - Treat your waste water on-site and re-use for:
- Toilet flushing
  - Irrigation
  - Cleaning of hard landscaping
  - Water features
  - Other non-potable uses (potable use is possible through further treatment)

**Maintenance:**

- System will be provided with maintenance contract.
- Maintenance provider is dependent upon geographical location.
- 6 Monthly service required.
- No check-ups needed between service intervals.

**Disinfection:**

- Chlorine / UV / Ozone

**Material:**

- All materials are noncorrosive in the septic environment.



**Electrical Panel**

- Monitors the system 24/7
- Warning light and siren will notify user if a problem occurs
- IP65 enclosure
- Power supply to Blower and UV (disinfection)
- Indicator lights on front of panel for each alarm condition
- Optional: GSM module



**Air Pump**

- Feeds oxygen to aeration chamber and powers recirculation/sludge return



ZF800 (3000 lit/d)



ZF2400 (9000 lit/d)

**Available models**

Clarus Model	Daily Treatment Capacity * (litres per day)	Length (mm)	Width (mm)	Height (mm)	Power consumption (Watts) Excluding disinfection
ZF 450	1500	2160	1120	1580	58
ZF 800	3000	2500	1450	1880	58
ZF 1120	4000	3020	1750	2000	95
ZF 1440	5000	3380	1840	12150	115
ZF 2000	7500	3960	1990	2270	125
ZF 2400	9000	4670	1990	2270	210
ZF 3200	12000	4560	2260	2420	340
ZF 4000	15000	4660	2440	2540	340

\* Daily treatment capacity is based on influent values equal to or less than domestic sewage (grey and black water combined). The influent values below is the maximum organic loading for the above treatment capacities. For influent with heavier loadings, please contact our office or your nearest Maskam Water Dealer to assist with sizing the correct plant for your application.

COD	400	BOD	250	Ammonia	20
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**Financing available**

The saving in your water bill can cover the instalment

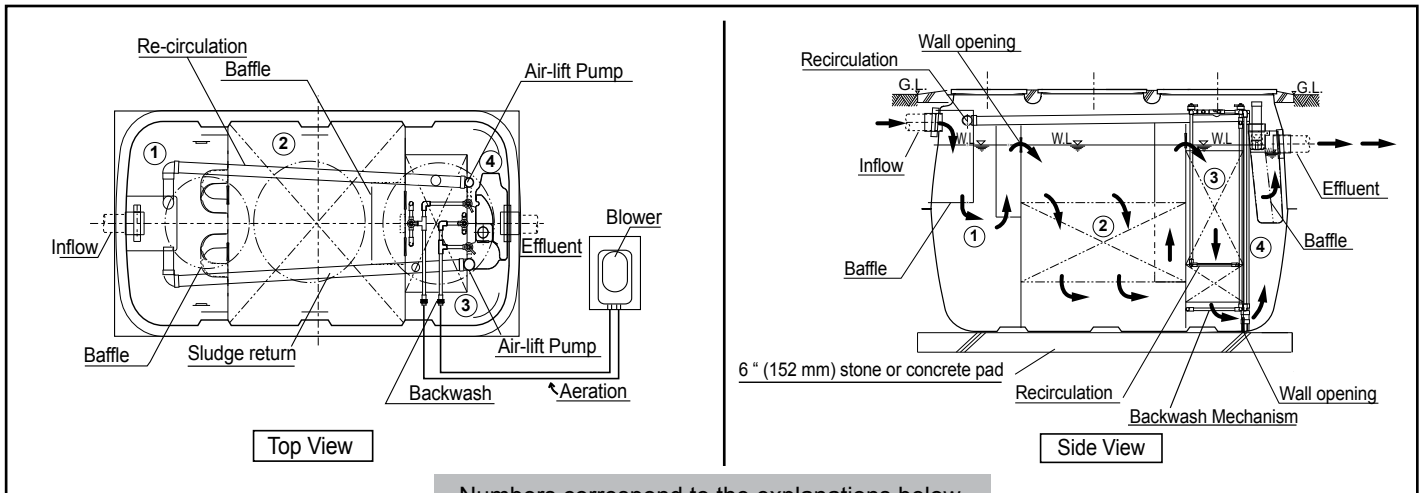
# Fusion® Series Treatment Systems

## PROCESS DESCRIPTION

### How the Fusion® system works



Certified to  
NSF/ANSI  
Standard 40  
Class 1  
Performance  
Designation



Numbers correspond to the explanations below.

#### 1. Sedimentation Chamber

This chamber is designed to physically separate solids (sludge) and fat/grease (scum) from the incoming water.

#### 2. Anaerobic Chamber

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

#### 3. Aerobic Filter Media Chamber

The aerobic floating and circulating filter media chamber consists of an aeration upper section and a filter media lower section. The chamber is filled with hollow, cylindrical filter media (0.6 inch diameter and 0.55 inches long). Biological treatment takes place with the help of the fixed film growth on the

filter media surface. Aeration is continuous. Residual suspended solids are captured by the filter media circulating in this section.

The filter media in the Aeration chamber are backwashed regularly (5 or 10 minute cycle, twice a day) by the backwash system located at the bottom of the chamber. The backwashed water is transferred by an air lift pump back into the sedimentation chamber for further digestion.

#### 4. Treated Water Storage Chamber

During normal operation, a recirculation line transfers a portion of the treated water back into the sedimentation chamber by way of an air lift pump. This chamber is designed to temporarily store treated water coming out of the aerobic filter media chamber. The treated water in the storage chamber is ready for discharge.

All Clarus Environmental products must be installed and maintained in accordance with all applicable codes. Product information presented here reflects conditions at time of publication. Consult factory regarding discrepancies or inconsistencies.

Herolds Bay Estate  
Maskam Clarus Fusion Wastewater Package Plant  
Summary of process inputs and outputs  
Zone A (60kl/day)  
November 2019

<u>Item</u>	<u>Description</u>	<u>Input</u>	<u>Output</u>	<u>Source</u>	<u>Destination</u>	<u>Disposal</u>	<u>Notes</u>
1	Wastewater inflow	60kl/d		Herolds Bay Estate wastewater	Buffer tank	-	Pre-treatment screening with stainless steel screen
2	Buffer tank	60kl/d	60kl/d	Wastewater inflow into plant	Chamber 1 (Digestion & separation)	-	Concrete tank 60kl (5m x 10m x 1.2m) (Pre-treatment)
3	Chamber 1 (Digestion & separation)	60kl/d	60kl/d	Buffer tank	Chamber 2 (Biological anaerobic treatment)	-	
	Chamber 2 (Biological anaerobic treatment)			Chamber 1 (Digestion & separation)	Chamber 3 (Biological aerobic treatment)	-	
	Chamber 3 (Biological aerobic treatment)			Chamber 2 (Biological anaerobic treatment)	Chamber 4 (Treated effluent storage)	-	
	Aeration system			Atmospheric air	Chamber 3 (Biological aerobic treatment)	-	Low energy use
	Chamber 4 (Treated effluent storage)			Chamber 3 (Biological aerobic treatment)	Treated effluent		UV Treatment at release of chamber 4
	Treated effluent	114kl/d	114kl/d	Chamber 4 (Treated effluent storage)	Pumped to detention pond	-	Treated effluent in line with DWS discharge regulations (National Water Act, General Authorisation, General Limits)
	Sludge			Wastewater inflow	-	George regional wastewater treatment works (5 year cycles)	Sludge digested in chamber 1, limited remaining sludge

Herolds Bay Estate  
Maskam Clarus Fusion Wastewater Package Plant  
Schematic flow diagram

Zone A (60kl/day)

November 2019

Maskam Clarus Fusion ZF4000 x 4 in parallel

