Our ref: E40
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Milkwood Manor on sea

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PROPOSED ADDITIONS AND ALTERATIONS TO THE MILKWOOD MANOR ON SEA : PLETTENBERG BAY : ENGINEERING SERVICES REPORT : REVISED

Below please find the Engineering Services Report for the proposed additions and alterations to the Milkwood Manor on Sea, Erf 10190, Salmack Road, Plettenberg Bay, based on the latest Site Development Plan as received from Black Sable. Refer to enclosed Site Development plan as well as Ground Floor and First Floor Plans by Black Sable, dated January and February 2025.

1. INTRODUCTION

1.1 Brief

The Bitou Municipal area has seen a period of rapid growth in recent years which has had the effect that the demand for short- and longer-term holiday rental units has dramatically increased.

Black Sable together with Feroqs Consult Quantity Surveyors & Project Managers and More Project Managers are in process of submitting the proposed development for Planning Approval to the Bitou Municipal Council. The internal reticulation for the proposed commercial and residential development will be designed to conform to Municipal standards.

1.2 General

The proposed development is situated adjacent to Lookout Beach on Salmack Road from where the site can be accessed. Refer to locality plan and enclosed Site Development plan.

The climate is moderate, with rainfall occurring throughout the year and the mean annual precipitation being in the order of 647mm. The average midday temperature ranges from 17°C in July to 23°C in February.

Figure 1: Locality Map

The land use for the proposed developed is as follows:

Land Use	No.	Floor Area (m²)	Total (m²)
Guest House (Existing)	1	827	827
Guest House (Proposed Additions)	1	1,102	1,102
TOTAL			**1,929 m²**

- Total Erf Size = 2,852m²
- Total Coverage = 35.91%
- Grounds remaining = 1,828m²
- FAR = 0.67

2. BULK WATER SUPPLY SYSTEM

2.1 Proposed Water Demand for the Development

Our calculations are based on "The Neighbourhood Planning and Design Guide".

Existing network capacity in the vicinity of the site is subject to the confirmation by Bitou Municipality. GLS Consulting (GLS) were appointed by Bitou Municipality to compose a Water Master Plan for the Municipal area and to determine the effect of any form of developments in the Municipal area on the Water Master Plan. If required, this and other reports will be submitted to GLS to determine whether the existing water network system has enough capacity to accommodate the proposed housing development. Normally a development of this size can be accommodated in the existing system without any upgrades by the developer, especially because this is an addition to an existing property being used for its original purpose.

According to Table J2 - J4 for Calculating the Annual Average Daily Demand (AADD) from "The Neighbourhood Planning and Design Guide", the following calculation was done to determine the AADD for the various Land Uses:

The water use for the applicable areas of the proposed development is as follows:

Description	**Calculations**	**AADD**
Guest House (Buildings according to FAR)	(1,929m²) x 900 ℓ/day (100m² x 0.67)	11,632 ℓ/day
Grounds only	12 kℓ/ha x 1,828m²	2,194 ℓ/day
	TOTAL AADD	**13,826 ℓ/day**

The only increase in the Annual Average Daily Demand (AADD) is for the additional rooms, but this can be reduced due to that fact that all outdoor use water will be from on-site sources ie. rainwater harvesting and re-use of grey water.

Therefore, this reduces the AADD is as follows:

13,826 ℓ/day x (1 – 25 / 100) = 10,370 ℓ/day

Furthermore, the AADD can be further reduced to account for all toilet flushing being from on-site sources:

10,370 ℓ/day x (1 – 25 / 100) = 7,777 ℓ/day

According to the enclosed Zoning Map, this development is classified as General Residential Zone III that permits tourist accommodation with certain restrictions applicable and from the design codes, we expect to design for a peak factor of 3.60.

Peak Demand = 7,777 ℓ/d x 3.60

= 27,998 ℓ/d

= 0.32 ℓ/s

Fire flow:

Based on the zoning classification , this development would fall into a Low Risk – Single Residential Housing Category and as such, the following would apply:

- 15 ℓ/second
- 1-hour design fire flow

With the supply spread over a wide area, according to the GLS Water Master Plan the existing reservoirs have enough storage capacity and capacity for fire flow conditions to accommodate this development.

According to the Water Master Plan for the Municipal area, enough capacity exists at the Water Treatment Plants.

A water reticulation system exists within the adjacent neighborhoods to which the proposed development is currently connected (see enclosed GLS Water Master plan). A system of reservoirs, water pump stations and water mains deliver potable water to developed areas.

2.2 **Proposed Services**

As per the Water System Master plan dated June 2016 provided by GLS Consulting for Bitou Municipality, the existing system has enough capacity to accommodate the proposed additions to the current property without bulk supply upgrades as seen in GLS Required works plan (dated June 2016) attached.

The development is currently connected to the existing 63mm diameter water reticulation pipe in Salmack Road. The property currently has their own bulk water meter.

3. BULK SEWAGE SYSTEM

3.1 Wastewater Treatment Works

The development is located within the existing Main Pump Station (Pump Station 2) drainage area. The site is located within the greater Plettenberg Bay Town gravity drainage area. As a result, effluent generated from the site will eventually be pumped and drained towards the existing "Ganse Vallei" Wastewater Treatment Works (WWTW).

Previous investigation of the bulk sewerage infrastructure, by GLS Consulting, found that the WWTW has a capacity of 9 Mℓ/day and has enough capacity to accommodate the effluent from the proposed alterations to the development but is subject to the confirmation by Bitou Municipality.

3.2 Wastewater Reticulation System

A wastewater reticulation system exists adjacent to the proposed development with Pump Station 2 situated within the adjacent parking area. It is proposed that the development will still drain to this Pump Station with no upgrades required due to the limited increase in flow because of the proposed alterations and additions to the existing property. The status quo will therefore remain.

3.3 Wastewater Flow Demand

Our calculations are based on "The Neighbourhood Planning and Design Guide".

According to Table K4 from "The Neighbourhood Planning and Design Guide", for Calculating the expected average daily dry weather (ADF) wastewater flow is as follows:

Land Use	%AADD	AADD	ADF
Residential	55%	7,777 ℓ/day	**4,277 ℓ/day**

The proposed development is classified as Residential Zone III and the Peak Factor to be used ranges between 1.8 and 2.5, therefor a Peak Factor of 2.15 will be used.

This would lead to an expected Peak Dry Weather Flow (PDWF) as follows:

Q = 4,277 x 2.15

= 9,196 ℓ/d

= 9.19 kℓ/d

PDWF = 0.106 ℓ/s

If an infiltration rate of 15% is used for the ingress of stormwater into the system, the Peak Wet Weather Flow (PWWF) is calculated as follows:

Q = 9,196 x 1.15

= 10,575 ℓ/d

= 10,58 kℓ/d

PWWF = 0.122 ℓ/s

3.4 **Proposed Services**

It is proposed that the development on Erf 10190 will remain to drain to the existing Main Pump Station (Pump Station 2) situated within the existing parking area as per the status quo. Therefor no additional services will be required to accommodate the proposed alterations and additions to the existing property.

4. **STORMWATER**

No bulk stormwater systems are required as the stormwater will be dispersed via the existing access road and roof water will be retained for re-use on site.

5. **ACCESS ROADS**

Access to the property will remain from the parking area adjacent to Salmack Road. Refer to the Site Development Plan attached.

6. **SOLID WASTE**

Refuse removal will be dealt with once a week as applicable to all the current residential areas in the Bitou Municipal area and the status quo will remain.

7. **FLOODLINES**

This proposed development is not directly affected by a Flood line, but near the ocean which is subject to tidal changes which should be taken into consideration, however this is an existing property, and the status quo remains.

8. INTERNAL SERVICES

There are no changes required to the existing Civil Engineering Services within the boundaries of Erf 10190 except for additional plumbing to service the additions to the building.

9. STANDARD OF ENGINEERING SERVICES TO BE PROVIDED

Levels of services are as follows:

9.1 Sewer

- The property is currently serviced by a 110mm solid wall connection to Pump Station 2. This will remain in place and does not require upgrading.

9.2 Water

- The property is currently serviced by a 32mm connection to the water main. It is proposed that this be upgraded to a 50mm connection to cater for the additional internal flow requirements.

9.3 Roads and stormwater (Parking Area)

- The access road is from the existing parking area.
- It is proposed that this parking is be upgraded as part of the alterations and additions to Erf 10190.
- All road surfaces will be 60mm interlocking concrete paving.
- Sub-base and base materials will be imported.
- Sub-surface drainage, where applicable, will be installed.
- The underground piped stormwater drainage system will be minimum 450mm diameter if required.
- Barrier kerbs will be installed around bell-mouths. Bellmouth's radius minimum 10m.
- All stormwater drains will be provided with a sand trap of at least 300mm.

9.4 Design Criteria and Standards

9.4.1 Design criteria

The following documents will serve as a base for the detail design criteria and standards:

- The Neighbourhood Planning and Design Guide ("Red Book"); and
- City of Cape Town Management of Urban Stormwater Impacts Policy – Version 1.1, 2009.
- Bitou Municipality Minimum Standards for The Design of Civil Engineering infrastructure- Version.1, April 2017.

9.4.2 Construction specifications

All materials and workmanship shall comply with the specifications as set out in the South African National Standards for Civil Engineering (SANS).

9.4.3 Roads

The road system forms an integral part of the local area plan.

9.4.3.1 *Design Criteria*

The design criterion for roads is as follows:

- Design life – 20 years.
- Subgrade CBR – 15 to 20.
- Subbase CBR – 45 minimum (processed crushed stone)
- Base course CBR – 80 minimum (processed crushed stone)
- Surfacing – 60mm interlocking concrete paving
- Minimum road grade – 0.45 % Longitudinal
- Minimum Crossfall – 2.00 %

9.4.4 Stormwater

The storm water system forms an integral part of the road and urban planning layout. The system rests on three legs, the minor system, the major system and an emergency system. The minor storms are catered for in the pipe system while the major storms are routed through a linked system of roads and public open spaces using attenuation techniques. The emergency system recognizes failure of the minor and major system by storms greater than provided for in major system or in the event of malfunction of the minor system by providing continuous overland flow routes to minimize flooding of residential areas.

9.4.4.1 *Minimum design criteria for storm water system*

The data to be used for the design of the system is as follows:

- Minor system : 2-year return period conveyed in an underground pipe system. Preferably the overland flow shall not exceed 200m.
- Major system : 50-year return period. The difference between the 2 year and 50 year to be conveyed in the road prism with depth not exceeding 150mm within the road reserve width.
- The minimum gradients for pipelines are designed to give a minimum velocity of 0.7m per second with the pipe flowing full.
- The maximum velocity used is 3.5m per second.
- Major storm water overflows are to be provided to convey the excess storm water from the streets into designated public open spaces.
- Storm water flow velocities in road ways will be kept as low as possible and related to the surface finish to prevent scour and erosion.
- Roads are to be graded to ensure free and continuous flow to the main storm water system and to prevent local ponds at intersections.

9.4.4.2 *Pipelines*

- Storm water pipes are generally 50D, 75D or 100D as required by the loading and installation conditions.
- Pipes are generally laid on Class C bed.
- The minimum cover on pipes is 0.80m.
- The minimum pipe diameter is 450mm for longitudinal runs and catch pit connections.

9.4.5 Sewers

The sewer drainage system forms an integral part of the sewage system. The drainage for the site is towards the existing Pump Station which will remain.

9.4.5.1 *Minimum design criteria*

- A conventional waterborne sewerage system is provided with a single connection. The main sewer line will be constructed within open areas on the site, topography dependent.
- Design parameters : Average daily flow – As calculated
  : Peak factor – As calculated
  : Extraneous flow – 15 %
  : Minimum velocity – 0.7m per second
- Minimum cover to pipes : 0.80m
- Minimum pipe size : 110mm diameter for unit connections
  : 160mm diameter for sewer mains
- Minimum gradients : 110mm diameter connection @ 1:60
- Main lines at 80% capacity as follows:

No. of Units	**Grade**
Less than 6	1:80
6 to 10	1:100
11 to 80	1:120
81 to 110	1:150
111 to 130	1:180

- Maximum manhole spacing of 80m.

9.4.5.2 *Pipelines*

- Pipeline material for pipe sizes up to 160mm diameter:
  - uPVC Class 34 or Ultracor Class 400 Heavy Duty (400 kPa) complying with SABS
- Pipes are generally laid on Class C bedding.

9.4.5.3 *Manholes*

- Dolomite aggregate and low alkali sulphate resistant cement to SABS 471 shall be used for all concrete, mortar or screed.
- Manhole cover to be central over main pipe on downstream side.
- Manhole covers and frames to be Polymer Concrete.

9.4.6 Water

The water reticulation network forms an integral part of the water distribution system.

9.4.6.1 *Minimum design criteria*

The design criteria generally as per the "Red Book" guidelines and specifically as follows:

- The average domestic consumption as calculated in item 2.1;
- Peak factors for the development calculated in accordance with the "Red Book".
- Minimum pressures for the network are calculated for the fire flows of 15ℓ per second and peak demand at the point of lowest pressure under peak flow conditions.
- Valves to be placed such that a maximum of 4 valves need to be closed to isolate a section of pipeline.
- Valves to be spaced so that the length of main included in an isolated section does not exceed 600m.
- All valves to be installed at T-pieces where applicable and not within the road surface.
- Minimum cover to pipe to be 0.8m.

9.4.6.2 *Pipeline materials*

- Erf connection – HDPE Class 12, 50mm diameter (JASWIC)

We trust that enough detail has been provided to enable you to decide regarding the way forward. If required, a detailed design of the proposed development's Civil Engineering Infrastructure based on the abovementioned report can be conducted by this office.

However, should any additional information be required, or if you wish to discuss this recommendation with us, please do not hesitate to contact us.

We trust the above information meets your requirements. Please do not hesitate to contact us should you have any queries.

Yours faithfully

Marlo Janse **v**an **R**ensburg

Director - JVR STRUCTURES (PTY) LTD

ECSA 200970119
NHBRC 134780701
SAICE 202537
IPET 3488

Encl.

GLS Fig 2.1a Existing Water System
GLS Fig 6.5a Required Works
GLS Fig 2.1a Existing Sewer System
GLS Fig 6.4a Required Works
Zoning Map
Site Development Plan
Ground Floor Plan
First Floor Plan

Legend
Pipe diameters

- Existing <= 65
- Existing > 65<= 75
- Existing > 75 <= 110
- Existing > 110 <= 160
- Existing > 160 <= 200
- Existing > 200 <= 250
- Existing > 250
- Existing reservoirs / towers
- Existing pumping station
- Existing zone valve
- Existing non-return valve
- Existing Water Treatment Plant (WTP)
- Existing pressure reducing valve
- Railway line
- River
- Coastline

Green Valley Tank
1 x 11.0 kl
TWL = 113,53m

Green Valley New Res
1 x 500 kl
TWL = 108,4m

Green Valley Old Res
1 x 500 kl
TWL = 108,4m

Wittedrift Res
1 x 500 kl
TWL = 70,0m

Aventura Res
1 x 0000 kl
TWL = 00,0m

KEURBOOMS RIVER

KEURBOOMS RIVER

To Kuiland

Matjiesfontein Res
1 x 3000 kl
TWL = 55,4m

Keurboomstrand Res
1 x 1000 kl
TWL = 79,00m

Keurview Res
1 x 115 kl
TWL = 128,00m

Goose Valley Res
1 x 3500 kl
TWL = 89,70m

To Knysna

New Horizons New Res
1 x 4500 kl
TWL = 186,10m

New Horizons Old Res
1 x 2000 kl
TWL = 184,4m

Town Tower High Res
1 x 250 kl
TWL = 160,0m

Town Tower Low Res
1 x 500 kl
TWL = 149,0m

Kwanokuthula 2 Tower
1 x 500 kl
TWL = 215,00m

Borehole

Borehole

Archiewood Res
1 x 2000 kl
TWL = 154,00m

Town A Res
1 x 2500 kl
TWL = 116,0m

Town B Res
1 x 2500 kl
TWL = 116,0m

Kwanokuthula Res 2
1 x 1500 kl
TWL = 192,1m

Kwanokuthula Res 1
1 x 1500 kl
TWL = 192,1m

Brackenridge Res
1 x 4000 kl
TWL = 152,00m

Town Towers
1 x 1200 kl
TWL = 143,9m

Town C Res
1 x 3500 kl
TWL = 116,0m

Kwanokuthula Tower 1
1 x 430 kl
TWL = 201,00m

Bitou Water Treatment Plant

INDIAN OCEAN

PESANG RIVER

PESANG RIVER

Whale Rock Res
1 x 2000 kl
TWL = 80,7m

Brakkloof Res
1 x 5600 kl
TWL = 107,5m

Kranshoek Res
1 x 1357 kl
TWL = 174,8m

Kranshoek Tower
1 x 628 kl
TWL = 191,20m

Kranshoek Steel Tower
1 x 500 kl
TWL = 191,20m

Borehole

Quarry Res
1 x 3000 kl
TWL = 129,9m

BE
80,00m

June 2016

Water Master Plan Bitou

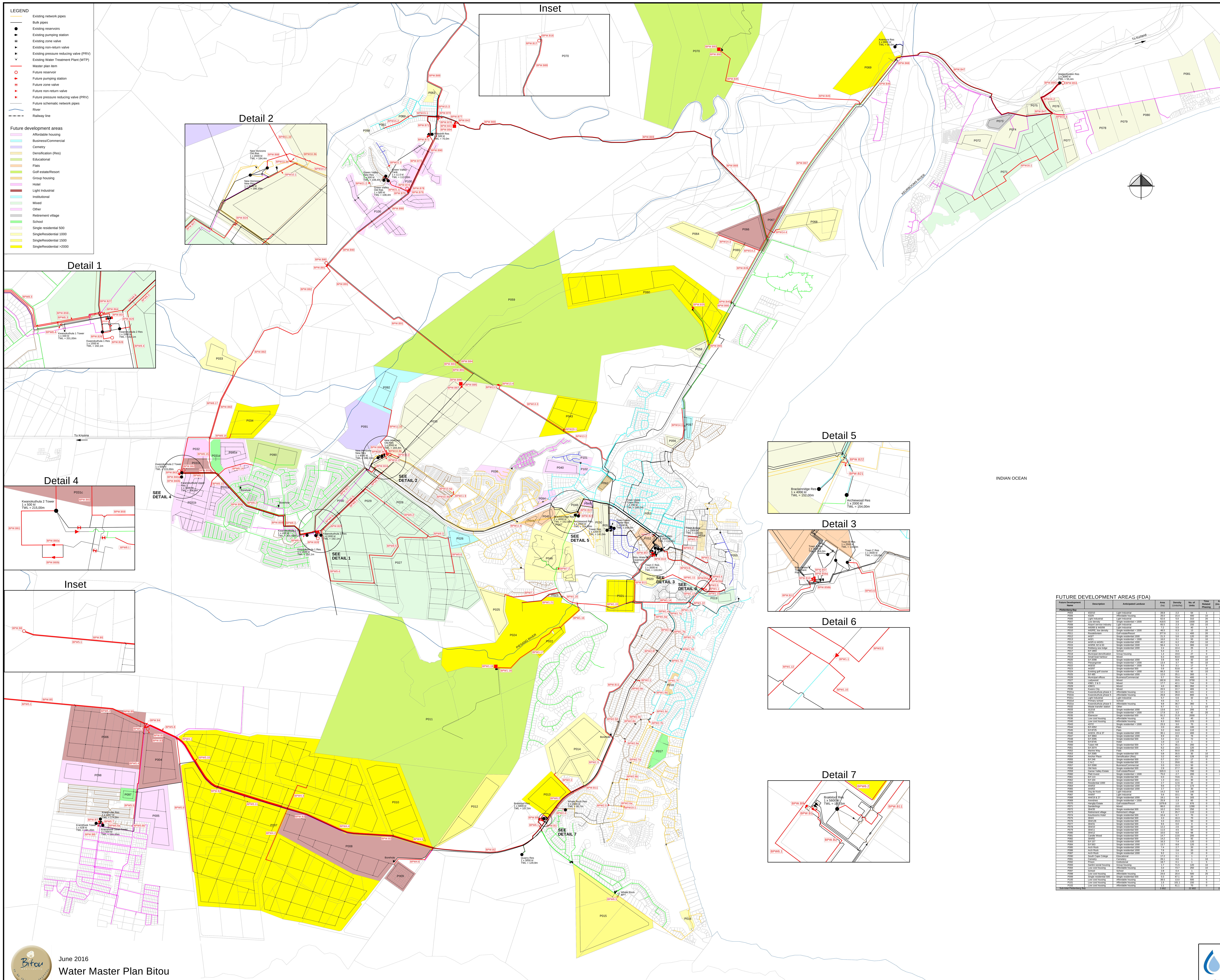
Scale 1:50000

0 625 1250 1875 2500 m

gls consulting
an EQH company

Figure BMW 2.1a

Existing water system layout - Plettenberg Bay



PROPOSED WORKS, COST ESTIMATES & PHASING - FUTURE SYSTEM

Item No.	Description	Estimated cost * (R-yr 2015/16 value)	Time Related Phasing	Comments	Project no.
Plettenberg Bay					
Distribution System Items					
BPW1.10	288.5 m x 160 mm l Pipe to install	272 440	2025	When future area P19 develops	PRJ-BPW-039
BPW1.11	537 m x 160 mm l Pipe to install	485 380	2025	When future area P20 develops	PRJ-BPW-039
BPW1.12	226.4 m x 250 mm l Pipe to install	379 540	2025	When future area P11, P21 - P24 develops	PRJ-BPW-039
BPW1.13	73.4 m x 200 mm l Pipe to install	114 380	2030	To improve network conveyance	PRJ-BPW-021
BPW1.14	688.5 m x 250 mm l Pipe to install	1 074 500	2025	When future area P11 & P21 - P24 develops	PRJ-BPW-039
BPW1.15	688 m x 250 mm l Pipe to install	1 073 660	2025	When future area P11 & P21 - P24 develops	PRJ-BPW-039
BPW1.16	396.4 m x 200 mm l Pipe to install	470 400	2025	When future area P11 & P22 develops	PRJ-BPW-039
BPW1.17	958.6 m x 200 mm l Pipe to install	1 089 760	2025	When future area P11 develops	PRJ-BPW-039
BPW1.18	25 L/s 100 mm l Flow Control Valve to install	159 600	2025	Required to sustain pressure in network when Roodefontein Golf Estate sump is constructed	PRJ-BPW-039
BPW1.19	25 mℓ @ 33 m TWL Pumping Sump to install	-	2025	When future area P11 develops (Cost of sump to the developer)	PRJ-BPW-039
BPW1.20	206.5 m x 160 mm l Pipe to install	202 160	2025	When future area P23 & P24 develops	PRJ-BPW-039
BPW1.21	541.3 m x 160 mm l Pipe to install	489 020	2025	When future area P24 develops	PRJ-BPW-039
BPW1.22	22.2 m x 160 mm l Pipe to install	44 240	2018	To improve network conveyance	PRJ-BPW-007
BPW2.2	330.3 m x 160 mm l Pipe to install	308 280	2025	When lower lying areas of future area P14 develops	PRJ-BPW-032
BPW2.3	71.9 m x 160 mm l Pipe to install	86 800	2025	When lower lying areas of future area P14 develops	PRJ-BPW-032
BPW3.1	168.5 m x 200 mm l Pipe to install	219 240	2018	To improve network conveyance when the new PRV zone is commissioned	PRJ-BPW-007
BPW3.2	64.5 m x 200 mm l Pipe to install	104 720	2018	To improve network conveyance when future area P54 develops	PRJ-BPW-007
BPW3.3	114.3 m x 160 mm l Pipe to install	123 200	2018	To improve network conveyance when future area P54 develops	PRJ-BPW-007
BPW3.4	32.9 m x 200 mm l Pipe to install	69 860	2018	To improve network conveyance	PRJ-BPW-007
BPW3.5	188.6 m x 250 mm l Pipe to install	322 700	2030	When supply problems to nev PRV zone occurs	PRJ-BPW-021
BPW3.6	756.3 m x 250 mm l Pipe to install	1 176 280	2030	When supply problems to nev PRV zone occurs	PRJ-BPW-021
BPW4.1	2075.2 m x 355 mm l Pipe to install	5 241 880	2025	New supply pipe for future Roodefontein Lower zone	PRJ-BPW-038
BPW4.2	742.4 m x 200 mm l Pipe to install	851 620	2035	When Northen area of FDA P7 develops	PRJ-BPW-038
BPW4.3	445.2 m x 200 mm l Pipe to install	524 160	2035	When Southern area of FDA P7 develops	PRJ-BPW-038
BPW4.4	1329.3 m x 315 mm l Pipe to install	2 812 040	2035	When future area P8 - P10 & P12 develops	PRJ-BPW-038
BPW4.5	506.3 m x 200 mm l Pipe to install	591 500	2035	When future area P8, P9 & P12 develops	PRJ-BPW-038
BPW4.6	584.4 m x 200 mm l Pipe to install	677 460	2035	When future area P8 & P9 develops	PRJ-BPW-038
BPW5.1	1220.4 m x 450 mm l Pipe to install	4 787 440	2020	New supply pipe for future Roodefontein Upper zone	PRJ-BPW-013
BPW5.2	874.1 m x 400 mm l Pipe to install	2 827 440	2020	When future area P6 develops	PRJ-BPW-013
BPW5.3	115.6 m x 250 mm l Pipe to install	212 940	2020	When future areas P4, P5, P97 & P98 develop	PRJ-BPW-013
BPW5.4	718.9 m x 250 mm l Pipe to install	1 120 140	2020	When future areas P4, P5, P97 & P98 develop	PRJ-BPW-013
BPW5.5	324.7 m x 200 mm l Pipe to install	391 300	2020	To rezone network when Roodefontein Upper zone is implemented	PRJ-BPW-013
BPW5.6a	1 x 110 mm l Valve to insert and close	81 200	2020	To rezone network when Roodefontein Upper zone is implemented	PRJ-BPW-013
BPW5.6b	1 x 110 mm l Valve to insert and close	81 200	2020	To rezone network when Roodefontein Upper zone is implemented	PRJ-BPW-013
BPW5.7	1 x 145 mm l Check Valve to install	110 600	2020	Required when Roodefontein Upper zone is implemented	PRJ-BPW-013
BPW5.8	433.6 m x 315 mm l Pipe to install	943 600	2025	When future area P7 develops	PRJ-BPW-038
BPW5.9	1621.8 m x 250 mm l Pipe to install	2 477 720	2030	When future area P7 develops	PRJ-BPW-038
BPW5.10	781 m x 315 mm l Pipe to install	1 668 240	2025	When future area P7 develops	PRJ-BPW-038
BPW5.11	802.3 m x 250 mm l Pipe to install	1 245 580	2030	When future area P7 develops	PRJ-BPW-038
BPW6.1	254.6 m x 160 mm l Pipe to install	243 460	2025	When future areas P13 & P14 develop	PRJ-BPW-037
BPW6.2	658.2 m x 160 mm l Pipe to install	589 120	2025	When high lying areas of future area P14 develops	PRJ-BPW-037
BPW6.3	10 L/s 100 mm l Flow Control Valve to install	159 600	2018	Required to sustain pressure in upstream network when Whale Rock BPT is recommissioned	PRJ-BPW-007
BPW7.1	668.5 m x 160 mm l Pipe to install	598 080	2035	When future area P25 develops	PRJ-BPW-031
BPW7.2	90 m EGL 100 mm l Pressure Reducing Valve to install	159 600	2035	To reduce static pressures when the low lying areas of future area P46 develops	PRJ-BPW-031
BPW8.1	441.6 m x 400 mm l Pipe to install	1 464 400	2030	To improve network conveyance	PRJ-BPW-021
BPW8.2	979.5 m x 355 mm l Pipe to install	2 502 220	2030	To improve network conveyance	PRJ-BPW-021
BPW8.3	441.9 m x 315 mm l Pipe to install	960 960	2025	When supply problems occur	PRJ-BPW-020
BPW8.8	504.5 m x 315 mm l Pipe to install	1 091 580	2018	When future area P27 - P30 & P35 develops	PRJ-BPW-010
BPW8.9	463.1 m x 250 mm l Pipe to install	735 560	2018	When future area P28 - P30 & P35 develops	PRJ-BPW-010
BPW8.10	275.8 m x 250 mm l Pipe to install	453 880	2018	When future area P35 develops	PRJ-BPW-010
BPW8.13	183.5 m x 200 mm l Pipe to install	235 760	2018	When future areas P31a & P31b develop	PRJ-BPW-010
BPW8.14	455.9 m x 200 mm l Pipe to install	535 920	2018	When future areas P31a, P31e & P90 develop	PRJ-BPW-010
BPW8.15	444.1 m x 250 mm l Pipe to install	707 000	2018	When future areas P32 - P34 develop	PRJ-BPW-010
BPW8.16	293.4 m x 160 mm l Pipe to install	276 640	2025	When future area P34 develops	PRJ-BPW-020
BPW8.17	858.7 m x 160 mm l Pipe to install	760 900	2035	When future area P33 develops	PRJ-BPW-035
BPW9.1	1091 m x 250 mm l Pipe to install	1 679 580	2018	When future area P26 - P28 develops	PRJ-BPW-010
BPW9.2	654.3 m x 250 mm l Pipe to install	1 022 980	2025	When future area P26 - P28 develops	PRJ-BPW-020
BPW9.3	253.7 m x 200 mm l Pipe to install	313 180	2025	When future area P26 develops	PRJ-BPW-020
BPW9.4	1098.2 m x 200 mm l Pipe to install	1 690 500	2030	When low lying areas of future area P27 develops	PRJ-BPW-035
BPW9.5	1244.8 m x 250 mm l Pipe to install	1 911 000	2030	When low lying areas of future area P27 develops	PRJ-BPW-035
BPW9.6	539.5 m x 200 mm l Pipe to install	628 040	2030	When low lying areas of future area P27 develops	PRJ-BPW-035
BPW11.6	7.8 m x 200 mm l Pipe to install	42 280	2018	Remove existing non-return valve	PRJ-BPW-007
BPW11.10	694.7 m x 160 mm l Pipe to install	620 480	2025	When future area P92 develops	PRJ-BPW-035
BPW13.1	42.3 m x 160 mm l Pipe to install	61 460	2025	When future area P52 develops	PRJ-BPW-031
BPW13.2	676.1 m x 250 mm l Pipe to install	1 055 740	2025	When future area P43 & P59 develop	PRJ-BPW-031
BPW13.3	972.8 m x 200 mm l Pipe to install	1 105 440	2035	When future area P59 develops	PRJ-BPW-031
BPW13.4	40 L/s 150 mm l Flow Control Valve to install	177 800	2035	When future area P59 develops	PRJ-BPW-031
BPW13.5	25 mℓ @ 34 m TWL Pumping Sump to install	-	2035	When future area P59 develops. New sump for Ganse Valley Estate (Cost of sump to the developer)	PRJ-BPW-031
BPW14.1	389.3 m x 200 mm l Pipe to install	462 560	2020	When future areas P56 & P57 develop	PRJ-BPW-033
BPW14.2	205.7 m x 200 mm l Pipe to install	260 260	2035	When future areas P64 - P66 develop	PRJ-BPW-033
BPW14.3	337.4 m x 200 mm l Pipe to install	405 440	2035	When future area P64 develops	PRJ-BPW-033
BPW14.4	125.9 m x 160 mm l Pipe to install	133 700	2025	When future area P68 develops	PRJ-BPW-033
BPW15.1	367.6 m x 160 mm l Pipe to install	340 200	2025	When future areas P61, P2 & P99 develop	PRJ-BPW-040
BPW15.2	326 m x 110 mm l Pipe to install	219 940	2025	When future areas P61 & P99 develop	PRJ-BPW-040
BPW15.3	254.9 m x 160 mm l Pipe to install	243 600	2025	When future area P63 develops	PRJ-BPW-040
BPW16.1	1826.8 m x 200 mm l Pipe to install	2 046 380	2030	When future area P71 develops	PRJ-BPW-036
BPW16.2	525.9 m x 200 mm l Pipe to install	613 060	2030	When supply problems to Keurboomstrand occur	PRJ-BPW-036
BPW16.3	148.3 m x 200 mm l Pipe to install	196 980	2030	When supply problems to Keurboomstrand occur	PRJ-BPW-036
BPW17.1	256.3 m x 110 mm l Pipe to install	177 240	2035	When future areas P85 - P87 develop	PRJ-BPW-034
BPW19.1	18.9 m x 200 mm l Pipe to install	54 460	2018	Required to improve network conveyance	PRJ-BPW-007
BPW20.1	105 m EGL 100 mm l Pressure Reducing Valve to install	159 600	2025	To reduce high static pressures when future area P43 develops	PRJ-BPW-031
BPW21.1	391.3 m x 160 mm l Pipe to install	360 500	2018	When new Green Valley reservoir is constructed	PRJ-BPW-006
BPW21.2	75 m EGL 90 mm l Pressure Reducing Valve to install	159 600	2018	To reduce high static pressures when new Green Valley reservoir is commissioned	PRJ-BPW-006
BPW21.3	90 m EGL 90 mm l Pressure Reducing Valve to install	159 600	2018	To reduce high static pressures when new Green Valley reservoir is commissioned	PRJ-BPW-006
Sub-totals Distribution System Items		62 688 500			
Bulk Supply Items (From old WTP)					
BPW.B1	120 L/s @ 120 m Pump Station to construct	2 410 940	2017	When Roodefontein Lower Reservoir is constructed	PRJ-BPW-001
BPW.B2	5435.1 m x 355 mm l Pipe to install	13 643 140	2017	New dedicated supply to Roodefontein Lower reservoir	PRJ-BPW-001
BPW.B3	3500 mℓ @ 175 m TWL Tank/Reservoir to install	8 844 640	2017	New reservoir for Roodefontein Lower zone	PRJ-BPW-001
BPW.B4	75 L/s @ 50 m Pump Station to construct	1 527 120	2020	When Roodefontein Upper reservoir is constructed	PRJ-BPW-013
BPW.B5	2179.1 m x 315 mm l Pipe to install	4 584 860	2020	New dedicated supply to Roodefonteon Upper reservoir	PRJ-BPW-013
BPW.B6	6500 mℓ @ 215 m TWL Tank/Reservoir to install	13 650 000	2020	New reservoir for Roodefontein Upper zone (can be phased)	PRJ-BPW-013
BPW.B7	30 L/s @ 17 m Pump Station to upgrade	17 640	2017	To augment bulk water supply to the Kranshoek towers	PRJ-BPW-005
BPW.B8	30.6 m x 160 mm l Pipe to install	51 380	2017	To augment bulk water supply to the Kranshoek towers	PRJ-BPW-005
BPW.B9	35 L/s @ 34 m Pump Station to upgrade	37 240	2025	When existing bulk supply to Quarry reservoir nears capacity	PRJ-BPW-037
BPW.B10	120 L/s @ 30 m Pump Station to construct	1 795 920	2025	When existing bulk supply to Brakkloof reservoir nears capacity	PRJ-BPW-016
BPW.B11	4101.9 m x 355 mm l Pipe to install	10 309 600	2025	When existing bulk supply to Brakkloof reservoir nears capacity	PRJ-BPW-016
BPW.B21	10.1 m x 250 mm l Pipe to install	54 460	2019	To inter-connect supply of Archiewood and Brackenridge reservoirs	PRJ-BPW-011
BPW.B22	67 L/s 100 mm l Flow Control Valve to install	159 600	2019	Required to sustain pressure in upstream bulk pipelines to New Horison	PRJ-BPW-011
BPW.B24	3 x 315 mm l Valve to insert and close	357 000	2017	Connections between bulk supply pipes to New Horizon & Kwanokuthula (keep closed)	PRJ-BPW-002
BPW.B27	1228.6 m x 400 mm l Pipe to install	3 592 400	2017	To augment bulk water supply to Kwanokuthula (including N2-crossing)	PRJ-BPW-002
BPW.B28	4000 mℓ @ 192.13 m TWL Tank/Reservoir to install	9 744 000	2025	Required when existing storage nears capacity (can be phased)	PRJ-BPW-017
BPW.B29	56.1 m x 400 mm l Pipe to install	249 480	2025	New feeder main for Kwanokuthula booster pump station	PRJ-BPW-019
BPW.B30	70 L/s @ 15 m Pump Station to upgrade	49 000	2025	When existing supply to lower tower reaches capacity	PRJ-BPW-019
BPW.B31	85 L/s @ 25 m Pump Station to upgrade	114 800	2025	When supply problems to Upper reservoir occur	PRJ-BPW-019
BPW.B35	18 L/s @ 45 m Pump Station to construct	1 007 300	2035	When higher lying erven of future area P60 develops	PRJ-BPW-033
BPW.B39	929.4 m x 315 mm l Pipe to install	1 977 920	2019	To augment bulk water supply to Keurboomstrand	PRJ-BPW-009
BPW.B40	50.8 m x 315 mm l Pipe to install	145 180	2019	Inter-connection pipe to improve bulk water supply to Keurboomstrand	PRJ-BPW-009
BPW.B41	6 L/s @ 80 m Pump Station to construct	911 260	2018	To augment bulk water supply to Wittedrift & Green Valley	PRJ-BPW-006
BPW.B42	1 x 90 mm l Check Valve to install	103 600	2018	When master plan item BPW.B41 is implemented	PRJ-BPW-006
BPW.B45	2082.8 m x 200 mm l Pipe to install	2 328 480	2035	When future area P70 develops	PRJ-BPW-041
BPW.B46	693 m x 315 mm l Pipe to install	1 484 840	2035	When existing bulk supply to Matjiesfontein reservoir nears capacity	PRJ-BPW-015
BPW.B47	2812.7 m x 315 mm l Pipe to install	5 906 460	2030	When existing bulk supply to Matjiesfontein reservoir nears capacity	PRJ-BPW-022
BPW.B48	10 L/s @ 55 m Pump Station to upgrade	20 300	2025	When existing bulk supply to Keurboomstrand reservoir nears capacity	PRJ-BPW-034
BPW.B49	7 L/s @ 88 m Pump Station to construct	927 920	2025	When new Keurboomstrand Upper reservoir is constructed	PRJ-BPW-034
BPW.B50	930 m x 110 mm l Pipe to install	591 220	2025	New dedicated supply to new Keurboomstrand Upper Reservoir	PRJ-BPW-034
BPW.B51	600 mℓ @ 159 m TWL Tank/Reservoir to install	2 741 200	2025	When future area P83 - P87 develops	PRJ-BPW-034
BPW.B52	13 L/s @ 30 m Pump Station to construct	947 940	2025	When future area P83 & P84 develops	PRJ-BPW-034
BPW.B53	2000 mℓ @ 55.35 m TWL Tank/Reservoir to install	5 964 000	2030	Required when existing storage nears capacity	PRJ-BPW-023
BPW.B57	40 L/s @ 20 m Pump Station to upgrade	35 840	2030	When existing bulk supply to Goose Valley reservoir nears capacity	PRJ-BPW-033
BPW.B58a	65 L/s @ 130 m Pump Station to upgrade	485 520	2017	Required to augment bulk water supply to Kwanokuthula (first phase upgrade)	PRJ-BPW-002
BPW.B58b	90 L/s @ 135 m Pump Station to upgrade	209 160	2025	When supply problems to Kwanokuthula occur (second phase upgrade)	PRJ-BPW-019
BPW.B59	1982.5 m x 355 mm l Pipe to install	5 010 040	2017	Dedicated bulk supply pipeline to Kwanokuthula Upper reservoir	PRJ-BPW-002
BPW.B60a	90 L/s @ 10 m Pump Station to construct	1 449 280	2017	Required to implement tower zone	PRJ-BPW-002
BPW.B60b	185 L/s @ 10 m Pump Station to upgrade	58 940	2025	When supply to Upper tower reaches capacity	PRJ-BPW-019
BPW.B61	21.7 m x 355 mm l Pipe to install	107 240	2017	When tower PS is constructed	PRJ-BPW-002
BPW.B62	4500 mℓ @ 206.6 m TWL Reservoir to install	10 552 640	2025	When existing reservoir storage volume nears capacity	PRJ-BPW-018
BPW.B63	500 mℓ @ 215 m TWL Water Tower to install	5 978 000	2025	When existing tower storage volume nears capacity	PRJ-BPW-018
BPW.B64	41.6 m x 355 mm l Pipe to install	157 080	2025	Connection to Kwanokuthula Upper bulk pipeline when master plan item BPW.B31 is implemented	PRJ-BPW-019
BPW.B65	1 x 315 mm l Valve to insert and close	119 000	2030	Connection between bulk supply pipes to Matjiesfontein & Goose Valley	PRJ-BPW-025
BPW.B66	1 x 315 mm l Valve to insert and close	-	2019	Check that valve is closed	PRJ-BPW-009
BPW.B67	1975.4 m x 315 mm l Pipe to install	4 159 820	2025	When existing bulk supply to Matjiesfontein reservoir nears capacity	PRJ-BPW-015
BPW.B68	1 x 250 mm l Valve to insert and close	105 000	2019	Required to isolate network and bulk systems	PRJ-BPW-009
BPW.B69	4895.9 m x 355 mm l Pipe to install	12 294 940	2020	When bulk supply to Wittedrift & Green Valley reaches capacity (in future required to supply bulk water to Matjiesfontein & Goose Valley reservoirs)	PRJ-BPW-014
BPW.B70	1 x 160 mm l Valve to insert and close	85 400	2030	Close valve when new WTP is commissioned	PRJ-BPW-025
BPW.B71	361.4 m x 160 mm l Pipe to install	334 880	2020	When bulk supply to Wittedrift & Green Valley reaches capacity	PRJ-BPW-014
BPW.B72	10 L/s @ 70 m Pump Station to construct	951 860	2018	When future area P100 develops	PRJ-BPW-006
BPW.B73	765.6 m x 160 mm l Pipe to install	681 100	2018	When future area P100 develops	PRJ-BPW-006
BPW.B74	1000 mℓ @ 138 m TWL Reservoir to install	3 766 000	2018	New reservoir storage capacity for when future area P100 develops	PRJ-BPW-006
BPW.B75	7.5 L/s @ 25 m Pump Station to construct	906 640	2019	When future area P100 develops	PRJ-BPW-012
BPW.B89	1 L/s 182 mm l Flow Control Valve to install	200 200	2035	When future area P70 develops (required to sustain pressure in upstream bulk system)	PRJ-BPW-041
BPW.B93	25 mℓ Pumping Sump to install	-	2035	New sump for Hanglip Estate (Cost of sump to the developer)	PRJ-BPW-041
BPW.B94	25 mℓ Pumping Sump to install	-	2018	When master plan item BPW.B41 is implemented(Cost of sump to the developer)	PRJ-BPW-006
BPW.B95	48 L/s 200 mm l Flow Control Valve to install	200 200	2030	Required to sustain pressure in upstream bulk system when reservoir is supplied from the new WTP	PRJ-BPW-025
Sub-totals Distribution System Items		144 099 620			
Bulk Supply Items (From new WTP)					
BPW.B16	55000 mℓ/d @ 215 m EGL Water Treatment Facility to install	-	2030	When existing WTP nears capacity (cost estimate not included in master plan)	PRJ-BPW-024
BPW.B17	5000 mℓ @ 215 m TWL Reservoir to install	-	2030	When new WTP is constructed (cost estimate not included in the master plan)	PRJ-BPW-024
BPW.B76	33.1 m x 355 mm l Pipe to install	133 420	2030	New supply to Matjiesfontein & Goose Valley reservoirs	PRJ-BPW-025
BPW.B77	140 m EGL 355 mm l Pressure Reducing Valve to install	933 800	2030	To reduce high static pressures in bulk pipeline to Matjiesfontein & Goose Valley reservoirs	PRJ-BPW-025
BPW.B78	30.1 m x 160 mm l Pipe to install	50 960	2030	New supply point to Wittedrift & Green Valley	PRJ-BPW-025
BPW.B79	11.5 L/s 100 mm l Flow Control Valve to install	159 600	2030	To sustain pressure in upstream bulk system	PRJ-BPW-025
BPW.B80	5000 mℓ @ 165 m TWL Reservoir to install	11 270 000	2035	When new WTP is commissioned	PRJ-BPW-026
BPW.B81	155 L/s @ 55 m Pump Station to construct	2 302 580	2035	When new WTP is commissioned	PRJ-BPW-026
BPW.B82	3545.3 m x 450 mm l Pipe to install	12 497 520	2035	New bulk supply pipe to Kwanokuthula when new WTP is commissioned	PRJ-BPW-026
BPW.B83	24.8 m x 200 mm l Pipe to install	58 940	2030	New supply point for Goose Valley Estate	PRJ-BPW-025
BPW.B84	40 L/s 200 mm l Flow Control Valve to install	200 200	2030	To sustain pressure in upstream bulk system	PRJ-BPW-025
BPW.B85	98 L/s 300 mm l Flow Control Valve to install	319 200	2040	To sustain pressure in upstream bulk system	PRJ-BPW-027
BPW.B86	50 mℓ TWL Pumping Sump to install	200 000	2040	New bulk supply to New Horizon reservoirs	PRJ-BPW-027
BPW.B87	100 L/s @ 75 m Pump Station to construct	1 901 480	2040	New bulk supply to New Horizon reservoirs	PRJ-BPW-027
BPW.B88	237.2 m x 315 mm l Pipe to install	533 960	2040	New bulk supply to New Horizon reservoirs	PRJ-BPW-027
BPW.B89	4196 m x 600 mm l Pipe to install	20 475 980	2035	When existing bulk supply reaches capacity	PRJ-BPW-028
BPW.B90	2286.7 m x 500 mm l Pipe to install	8 995 560	2040	When existing bulk supply reaches capacity	PRJ-BPW-029
BPW.B91	2218.8 m x 400 mm l Pipe to install	6 428 240	2040	When existing bulk supply reaches capacity	PRJ-BPW-030
Sub-totals Bulk Supply Items		66 461 440			
Water Demand Management					
BPW1.1	60 m EGL 150 mm l Pressure Reducing Valve to install	177 800	2017	New PRV to Implement Town PRV 4 zone	PRJ-BPW-003
BPW1.4	6.2 m x 160 mm l Pipe to install	30 520	2017	Required to implement rezoning	PRJ-BPW-003
BPW1.6a	1 x 110 mm l Valve to insert and close	81 200	2017	Insert new valve to rezone network	PRJ-BPW-003
BPW1.6b	1 x 110 mm l Valve to insert and close	81 200	2017	Insert new valve to rezone network	PRJ-BPW-003
BPW1.6c	1 x 110 mm l Valve to insert and close	81 200	2017	Insert new valve to rezone network	PRJ-BPW-003
BPW1.7a	1 x 110 mm l Valve to close	2 240	2017	Close existing valve to rezone network	PRJ-BPW-003
BPW1.7b	1 x 160 mm l Valve to close	2 240	2017	Close existing valve to rezone network	PRJ-BPW-003
BPW1.7c	1 x 110 mm l Valve to close	2 240	2017	Close existing valve to rezone network	PRJ-BPW-003
BPW1.7d	1 x 110 mm l Valve to close	2 240	2017	Close existing valve to rezone network	PRJ-BPW-003
BPW1.7e	1 x 110 mm l Valve to close	2 240	2017	Close existing valve to rezone network	PRJ-BPW-003
BPW1.7f	1 x 110 mm l Valve to close	2 240	2017	Close existing valve to rezone network	PRJ-BPW-003
BPW2.1	10.1 m x 110 mm l Pipe to install	25 760	2017	Inter-connection pipe	PRJ-BPW-004
BPW2.4	25 L/s 100 mm l Flow Control Valve to install	159 600	2017	Required to control inflow into Whale Rock reservoir	PRJ-BPW-004
BPW2.5	1 x 160 mm l Valve to open	2 240	2017	Open Valve	PRJ-BPW-004
BPW2.6a	1 x 110 mm l Valve to insert and close	81 200	2017	Insert new valve to rezone network	PRJ-BPW-004
BPW2.6b	1 x 75 mm l Valve to insert and close	77 000	2017	New Valve (Insert new valve to rezone network)	PRJ-BPW-004
BPW2.7a	1 x 75 mm l Valve to close	2 240	2017	Verify if existing valve is closed	PRJ-BPW-004
BPW2.7b	1 x 110 mm l Valve to close	2 240	2017	Close Valve	PRJ-BPW-004
BPW2.8a	1 x 160 mm l Valve to open	2 240	2017	Open Valve	PRJ-BPW-004
BPW2.8b	1 x 75 mm l Valve to open	2 240	2017	Open Valve	PRJ-BPW-004
BPW2.8c	1 x 75 mm l Valve to open	2 240	2017	Open Valve	PRJ-BPW-004
BPW2.8d	1 x 160 mm l Valve to open	2 240	2017	Open Valve	PRJ-BPW-004
BPW2.8e	1 x 75 mm l Valve to open	2 240	2017	Open Valve	PRJ-BPW-004
BPW2.8f	1 x 75 mm l Valve to open	2 240	2017	Open Valve	PRJ-BPW-004
BPW2.9	10 m x 160 mm l Pipe to install	33 880	2017	Inter-connection pipe to rezone network	PRJ-BPW-004
BPW3.7a	1 x 160 mm l Valve to open	2 240	2017	Required to implement Town PRV 4 zone	PRJ-BPW-003
BPW3.7b	1 x 160 mm l Valve to open	2 240	2017	Required to implement Town PRV 4 zone	PRJ-BPW-003
BPW8.4	1 x 286 mm l Check Valve to install	184 800	2018	Required to sustain pressure in network	PRJ-BPW-008
BPW10.1	86.1 m x 200 mm l Pipe to install	128 520	2018	Required to rezone network	PRJ-BPW-008
BPW10.2	2.4 m x 200 mm l Pipe to install	36 260	2018	Inter-connection pipe required to rezone network	PRJ-BPW-008
BPW10.3a	1 x 182 mm l Check Valve to install	121 800	2018	Required to rezone network	PRJ-BPW-008
BPW10.3b	1 x 160 mm l Valve to insert and close	85 400	2018	Required to rezone network	PRJ-BPW-008
BPW10.4a	1 x 160 mm l Valve to insert and close	85 400	2018	Close pipe to rezone network	PRJ-BPW-008
BPW10.4b	1 x 200 mm l Valve to insert and close	91 000	2018	Close pipe to rezone network	PRJ-BPW-008
BPW11.9	16.9 m x 110 mm l Pipe to install	30 100	2018	Required to rezone network	PRJ-BPW-008
BPW.M1	Telemetry at reservoirs, pumping stations and bulk water meters	500 000			
Sub-totals Water Demand Management		2 130 720			
TOTALS		275 381 000			

* Costs include P&G's, Contingencies & Fees, but exclude EIA studies, registration of servitudes and/or land acquisition and VAT.

FUTURE DEVELOPMENT AREAS (FDA)

Future Development Name	Description	Anticipated Landuse	Area (ha)	Density (Units/ha)	No. of Units	Time Related Phasing	AADD (inc. UAW) (kl/d)
Plettenberg Bay							
P004	432/10	Light Industrial	28.8	2.2	64	1	128
P005	432/9	Affordable housing	26.0	15.4	400	10	180
P006	Light Industrial	Light Industrial	62.6	5.0	310	20	620
P007	Low density	Single residential > 1500	418.5	3.6	1500	20	2250
P008	Airport service industry	Light Industrial	65.5	2.3	150	10	300
P009	440/89 & 440/99	Light Industrial	7.2	5.5	40	5	80
P010	440/RE, low density	Single residential > 1500	46.5	0.3	13	20	26
P011	Roodefontein	Golf estate/Resort	377.9	1.1	400	20	800
P012	443/7	Single residential 1500	21.3	5.6	120	20	180
P013	443/1	Single residential > 1500	16.0	3.1	50	10	100
P014	443/5 & 443/51	Single residential 1000	40.2	6.2	250	10	250
P015	443/59, 62 & 63	Single residential 1500	56.4	5.3	300	10	450
P016	Robberg sea lodge	Single residential 1000	2.4	10.4	25	0	25
P017	Erf 1893	School	5.3	0.4	2	0	25
P018	Municipal dencification	Group housing	1.4	19.0	27	0	11
P019	Small boat harbour	Mixed	6.3	63.0	400	10	160
P020	Erf 2098	Single residential 1000	3.6	8.9	32	10	32
P021	Piesangrivier	Single residential > 1500	13.4	3.7	50	10	100
P022	443/33	Single residential > 1500	5.5	3.1	17	0	34
P023	443/97	Single residential 500	0.9	53.8	47	10	19
P024	Existing golf course	Single residential > 1500	66.3	0.8	50	10	100
P025	Erf 485	Single residential 1000	12.0	25.1	300	0	300
P026	Municipal offices	Business/Commercial	5.7	70.4	400	5	140
P027	Ladywood	Mixed	182.8	20.5	3750	0	2250
P028	438/1, 2 & 3	Mixed	17.7	42.1	744	0	335
P029	438/21	Mixed	4.0	88.3	350	0	123
P030	Kwano City	Mixed	20.5	22.7	465	0	279
P031a	Kwanokuthula phase 4	Affordable housing	12.1	36.3	441	2	198
P031b	Kwanokuthula phase 5	Affordable housing	26.8	29.8	800	5	360
P031c	Light Industrial	Light Industrial	5.7	5.6	32	10	64
P031d	Primary school	School	4.5	0.2	1	5	50
P031e	Kwanokuthula phase 5	Affordable housing	9.8	36.7	360	5	162
P032	Waste transfer station	Other	6.7	0.1	1	10	5
P033	312/16	Single residential 1000	13.6	14.7	200	0	200
P034	437/9	Single residential > 1500	17.9	3.3	60	20	120
P035	Ebenezer	Single residential 500	91.2	21.9	2000	2	1200
P036	Low cost housing	Affordable housing	4.0	9.9	40	0	18
P040	Low cost housing	Affordable housing	6.3	59.0	370	0	130
P043	437/2	Single residential > 1500	23.3	3.0	70	0	140
P044	Erf 4352	Flats	2.0	49.6	100	0	40
P045	Erf 8725	Flats	3.2	34.8	110	0	44
P046	443/24, 29 & 37	Single residential 1000	30.1	13.3	400	0	400
P047	Erf 3884	Single residential 1000	8.9	8.6	76	0	76
P048	Erf 2095	Single residential 500	3.4	21.1	72	0	43
P049	Erf 8745	Hotel	1.0	1.0	1	0	8
P050	Tulani Hill	Single residential 500	5.7	35.1	200	0	80
P051	Erf 2074	Single residential 500	6.2	19.3	120	0	48
P052	Marine Way	Flats	4.7	50.0	235	0	94
P053	Erf 2085	Single residential 500	0.8	35.5	30	10	18
P054	Anchor Place	Densification (Res)	3.2	40.3	128	10	64
P055	Erf 246	Single residential 500	0.7	23.7	17	0	10
P056	C.N.C	Single residential 500	2.1	29.6	63	0	38
P057	Erf 2090	Business/Commercial	3.3	15.3	50	0	25
P058	Old Nick	Single residential 500	2.9	27.7	80	5	48
P059	Ganse Valley Estate	Golf estate/Resort	520.3	1.3	700	0	1400
P060	Plett Invest	Single residential > 1500	75.0	2.7	200	0	400
P061	Erf 113	Single residential 500	0.3	74.6	21	0	9
P062	Erf 104	Single residential 500	1.3	23.1	30	0	14
P063	Residential 1000	Single residential 1000	2.7	12.6	34	0	34
P064	444/53	Single residential 1000	9.6	17.9	173	0	173
P065	444/63	Single residential 1000	2.7	11.3	30	0	30
P066	Org de Kock	Light Industrial	14.2	9.8	140	0	210
P067	444/97	Light Industrial	5.6	10.1	56	0	84
P068	444/19 & 27	Single residential 1000	19.1	9.6	183	0	183
P069	Arendnes	Single residential > 1500	25.9	2.3	60	0	120
P070	Hanglip Estate	Golf estate/Resort	1079.8	1.0	676	0	1352
P071	Sanderlings	Mixed	86.0	15.0	1290	0	774
P072	304/35	Single residential 500	10.2	24.5	250	0	150
P073	Retirement village	Retirement village	4.3	25.7	110	0	66
P074	Keurbooms Hotel	Single residential 500	10.4	6.7	70	0	42
P075	304/4	Single residential 500	4.3	16.3	70	0	42
P076	304/126	Single residential 500	3.3	15.3	50	0	30
P077	304/31	Single residential 500	9.5	0.0	0	0	42
P078	304/10	Single residential 500	12.2	2.6	32	0	19
P079	304/11	Single residential 500	11.0	4.5	50	0	30
P080	304/12	Single residential 500	10.0	6.8	68	0	41
P081	Candle Wood	Single residential 500	14.7	13.6	200	0	120
P082	304/92	Single residential 500	14.2	6.5	92	0	55
P083	Erf 157	Single residential 1000	16.3	7.4	120	0	120
P084	Erf 563	Single residential 1000	13.7	8.8	120	0	120
P085	Arch Rock	Single residential 1000	7.4	2.7	20	0	20
P086	Arch Rock	Single residential 1000	7.6	2.6	20	0	20
P087	Arch Rock	Single residential 1000	9.2	1.1	10	0	10
P090	South Cape College	Educational	17.2	0.1	1	2	100
P091	Cemetry	Cemetery	26.1	0.0	1	10	5
P092	Prison	Institutional	18.7	0.1	1	5	75
P093	Sanlini social housing	Group housing	1.7	71.5	120	10	60
P094	Low cost housing	Affordable housing	3.4	73.7	250	10	88
P097	School	School	2.8	0.4	1	5	35
P098	Low cost housing	Affordable housing	24.6	20.4	500	20	225
P099	Single residential 500	Single residential 500	0.3	67.1	20	2	9
P100	Low cost housing	Affordable housing	38.5	13.0	500	5	225
P101	Low cost housing	Affordable housing	1.5	101.1	150	0	53
P102	Low cost housing	Affordable housing	1.1	61.1	70	0	32
Sub-total Plettenberg Bay			3 952		22 802		19 595

Scale 1:15000

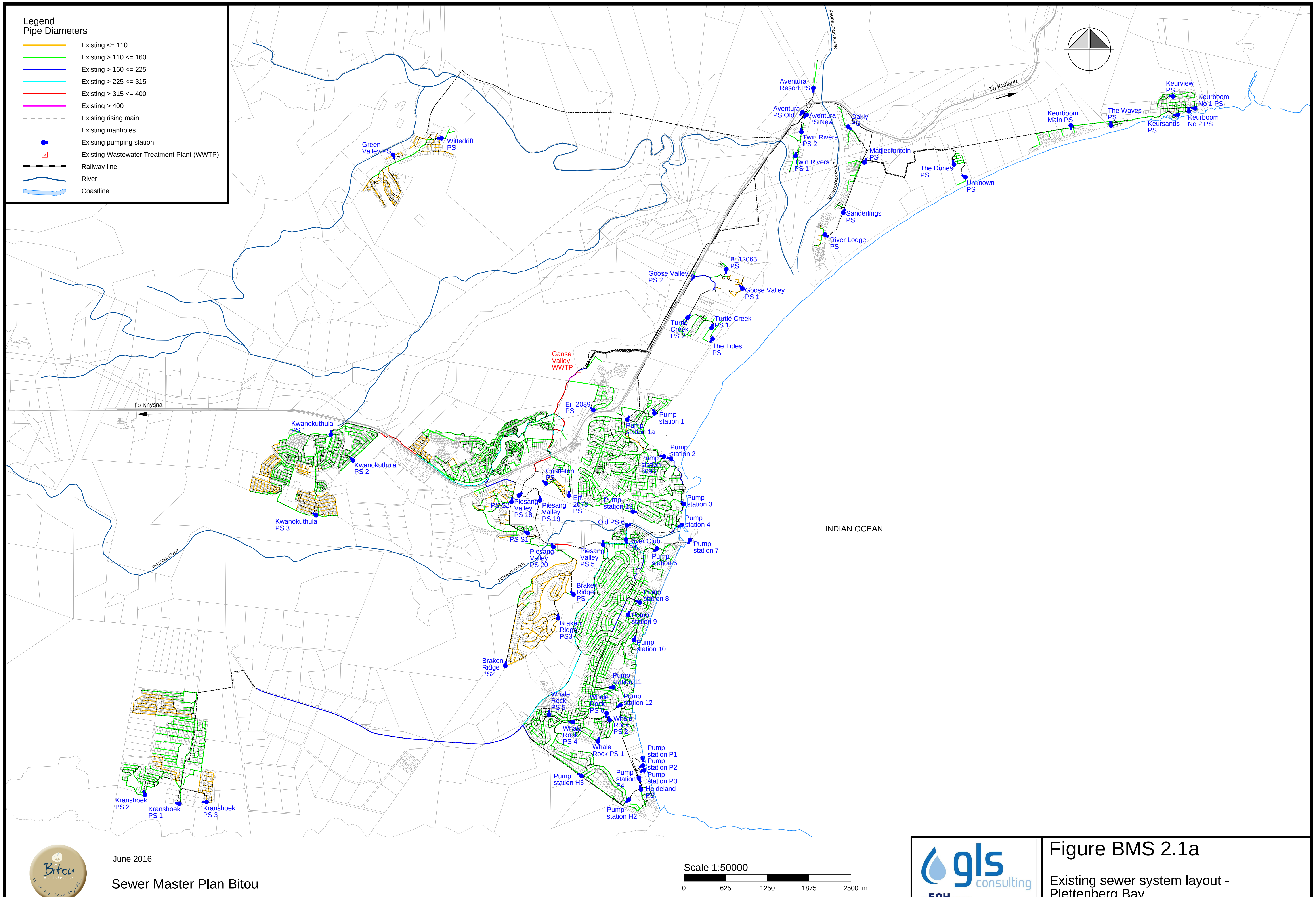
June 2016

Water Master Plan Bitou

gls consulting — an EOH company

Figure BMW 6.5a

Required works
- Plettenberg Bay



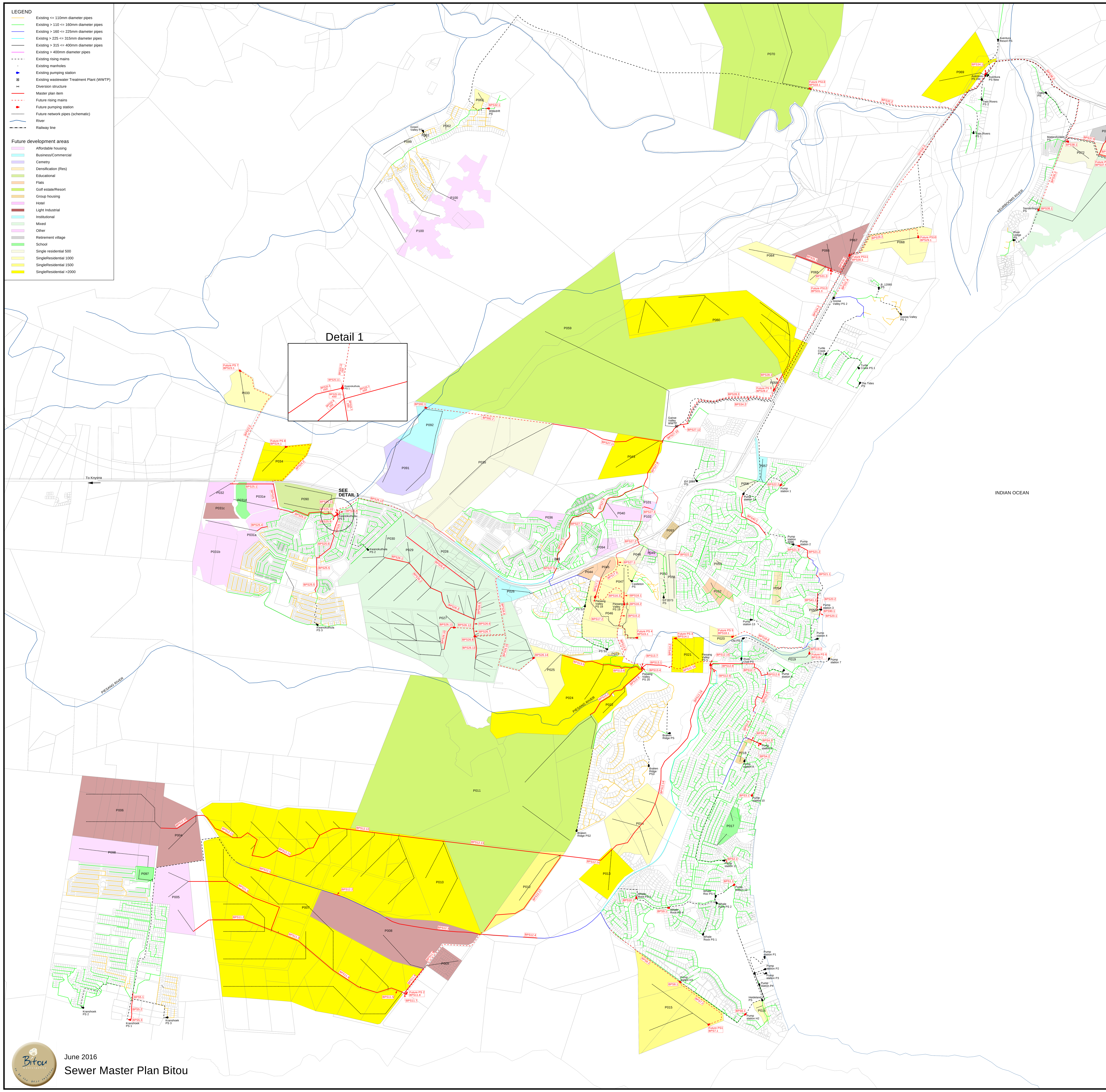
June 2016

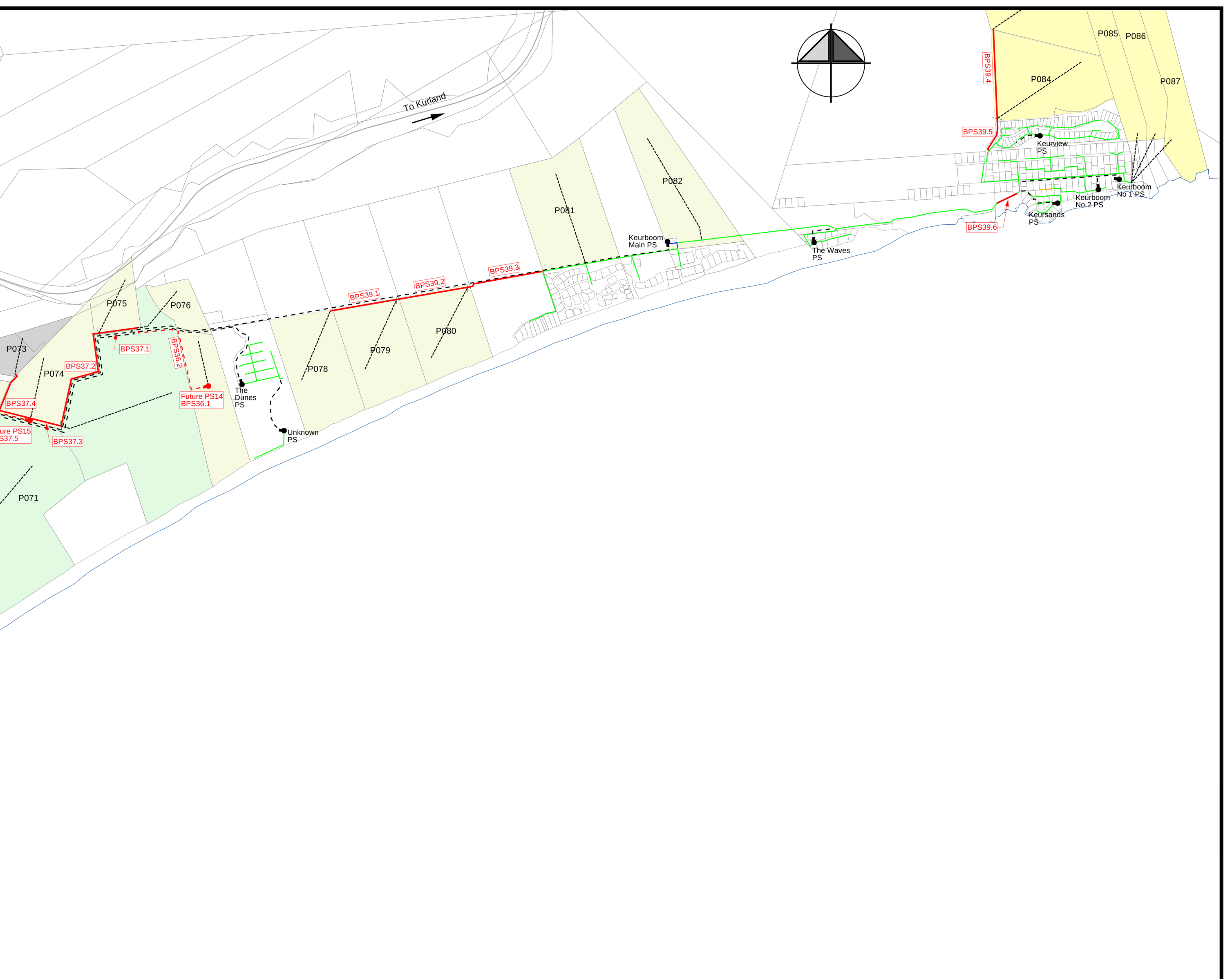
Sewer Master Plan Bitou

gls consulting
an EOH company

Figure BMS 2.1a

Existing sewer system layout - Plettenberg Bay





FUTURE DEVELOPMENT AREAS (FDA)

Future Development Name	Anticipated Landuse	Area (ha)	Density (Units/ha)	No. of Units	Coverage (m^2 floor area)	AADD (inc. UAW) (kl/d)	PDDWF (kl/d)
Plettenberg Bay							
P004	Light Industrial	28.8			6 400	128	78
P005	Affordable housing	26.0	15	400		180	110
P006	Light Industrial	62.6			31 000	620	380
P007	Single residential > 1500	418.5	4	1500		2250	939
P008	Light Industrial	65.5			15 000	300	184
P009	Light Industrial	7.2			4 000	80	49
P010	Single residential > 1500	46.5	0	13		26	11
P011	Golf estate/Resort	377.9	1	400		800	330
P012	Single residential 1500	21.3	6	120		180	83
P013	Single residential > 1500	16.0	3	50		100	41
P014	Single residential 1000	40.2	6	250		250	128
P015	Single residential 1500	56.4	5	300		450	208
P016	Single residential 1000	2.4	10	25		25	13
P017	School	5.3	0	2		25	14
P018	Group housing	1.4	19	27		11	7
P019	Mixed	6.3	63	400		160	98
P020	Single residential 1000	3.6	9	32		32	16
P021	Single residential > 1500	13.4	4	50		100	41
P022	Single residential > 1500	5.5	3	17		34	14
P023	Single residential 500	0.9	54	47		19	12
P024	Single residential > 1500	66.3	1	50		100	41
P025	Single residential 1000	12.0	25	300		300	154
P026	Business/Commercial	5.7			40 000	140	100
P027	Mixed	182.8	21	3750		2250	1366
P028	Mixed	17.7	42	744		335	204
P029	Mixed	4.0	88	350		123	75
P030	Mixed	20.5	23	465		279	169
P031a	Affordable housing	12.1	36	441		198	121
P031b	Affordable housing	26.8	30	800		360	220
P031c	Light Industrial	5.7			3 200	64	39
P031d	School	4.5	0	1		50	28
P031e	Affordable housing	9.8	37	360		162	99
P032	Other	6.7	0	1		5	3
P033	Single residential 1000	13.6	15	200		200	103
P034	Single residential > 1500	17.9	3	60		120	50
P035	Single residential 500	91.2	22	2000		1200	734
P036	Affordable housing	4.0	10	40		18	11
P040	Affordable housing	6.3	59	370		130	80
P043	Single residential > 1500	23.3	3	70		140	58
P044	Flats	2.0	50	100		40	30
P045	Flats	3.2	35	110		44	33
P046	Single residential 1000	30.1	13	400		400	205
P047	Single residential 1000	8.9	9	76		76	39
P048	Single residential 500	3.4	21	72		43	26
P049	Hotel	1.0	1	1		8	4
P050	Single residential 500	5.7	35	200		80	49
P051	Single residential 500	6.2	19	120		48	30
P052	Flats	4.7	50	235		94	71
P053	Single residential 500	0.8	36	30		18	11
P054	Densification (Res)	3.2	40	128		64	42
P055	Single residential 500	0.7	24	17		10	6
P056	Single residential 500	2.1	30	63		38	23
P057	Business/Commercial	3.3			5 000	25	18
P058	Single residential 500	2.9	28	80		48	29
P059	Golf estate/Resort	520.3	1	700		1400	578
P060	Single residential > 1500	75.0	3	200		400	165
P061	Single residential 500	0.3	75	21		9	6
P062	Single residential 500	1.3	23	30		14	8
P063	Single residential 1000	2.7	13	34		34	17
P064	Single residential 1000	9.6	18	173		173	89
P065	Single residential 1000	2.7	11	30		30	15
P066	Light Industrial	14.2			14 000	210	130
P067	Light Industrial	5.6			5 600	84	52
P068	Single residential 1000	19.1	10	183		183	94
P069	Single residential > 1500	25.9	2	60		120	50
P070	Golf estate/Resort	1079.8	1	676		1352	558
P071	Mixed	86.0	15	1290		774	470
P072	Single residential 500	10.2	25	250		150	92
P073	Retirement village	4.3	26	110		66	40
P074	Single residential 500	10.4	7	70		42	26
P075	Single residential 500	4.3	16	70		42	26
P076	Single residential 500	3.3	15	50		30	18
P077	Single residential 500	9.5	7	70		42	26
P078	Single residential 500	12.2	3	32		19	12
P079	Single residential 500	11.0	5	50		30	18
P080	Single residential 500	10.0	7	68		41	25
P081	Single residential 500	14.7	14	200		120	73
P082	Single residential 500	14.2	6	92		55	34
P083	Single residential 1000	16.3	7	120		120	62
P084	Single residential 1000	13.7	9	120		120	62
P085	Single residential 1000	7.4	3	20		20	10
P086	Single residential 1000	7.6	3	20		20	10
P087	Single residential 1000	9.2	1	10		10	5
P090	Educational	17.2	0	1		100	55
P091	Cemetery	26.1	0	1		5	3
P092	Institutional	18.7	0	1		75	41
P093	Group housing	1.7	72	120		60	40
P094	Affordable housing	3.4	74	250		88	54
P097	School	2.8	0	1		35	19
P098	Affordable housing	24.6	20	500		225	138
P099	Single residential 500	0.3	67	20		9	6
P100	Affordable housing	38.5	13	500		225	138
P101	Affordable housing	1.5	101	150		53	32
P102	Affordable housing	1.1	61	70		32	19
Existing unserviced erven:Plettenberg bay				-		-	-
Additional infiltration due to Master Plan items				-		-	0
Sub-total Plettenberg Bay		3 952		21 630	124 200	19 595	10 344

PROPOSED WORKS, COST ESTIMATES & PHASING - FUTURE SYSTEM

Item No.	MP item Type	Description	Estimated cost * (R-yr 2015/16 value)	Time Related Phasing	Comments	Project no.
Plettenberg Bay WWTP drainage areas						
Distribution system items						
BPS2.1	MP	60 m x 200 mm l Upgrade existing Gravity	203 200	2016	60 m x 200 mm l Upgrade existing outfall sewer.	PRJ-BPS-008
BPS4.1	MP	85 m x 315 mm l Upgrade existing Gravity	332 900	2016	85 m x 200 mm l Upgrade existing outfall sewer.	PRJ-BPS-008
BPS4.2	MPi	48 m x 400 mm l Upgrade existing Gravity (Investigate first)	271 000	2016	48 m x 200 mm l Upgrade existing outfall sewer.	PRJ-BPS-008
BPS5.1	MPi	91 m x 200 mm l Upgrade existing Gravity (Investigate first)	272 400	2016	91 m x 200 mm l Upgrade existing outfall sewer.	PRJ-BPS-013
BPS5.2	MPi	213 m x 250 mm l Upgrade existing Gravity (Investigate first)	605 200	2016	213 m x 250 mm l Upgrade existing outfall sewer.	PRJ-BPS-013
BPS11.1	MP	1333 m x 160 mm l New Gravity	1 478 800	2016	1333 m x 160 mm l New outfall sewer.	PRJ-BPS-014
BPS11.2	MP	918 m x 160 mm l New Gravity	1 030 000	2016	918 m x 160 mm l New outfall sewer.	PRJ-BPS-014
BPS11.3	MP	422 m x 200 mm l New Gravity	560 200	2016	422 m x 200 mm l New outfall sewer.	PRJ-BPS-014
BPS11.4	MP	1062 m x 250 mm l New Gravity	1 617 900	2016	1062 m x 250 mm l New outfall sewer.	PRJ-BPS-014
BPS11.5	MP	190 m x 315 mm l New Gravity	390 500	2016	191 m x 300 mm l New outfall sewer.	PRJ-BPS-014
BPS11.6	MP	348 m x 200 mm l New Gravity	468 400	2016	348 m x 200 mm l New outfall sewer.	PRJ-BPS-014
BPS11.7	MP	20 m x 400 mm l New Gravity	95 800	2016	20 m x 375 mm l New outfall sewer.	PRJ-BPS-014
BPS12.1	MP	320 m x 250 mm l Upgrade existing Gravity	868 000	2016	320 m x 250 mm l Upgrade existing outfall sewer.	PRJ-BPS-001
BPS12.2	MP	80 m x 250 mm l Upgrade existing Gravity	275 000	2016	80 m x 250 mm l Upgrade existing outfall sewer.	PRJ-BPS-001
BPS12.3	MP	1360 m x 250 mm l Upgrade existing Gravity	3 432 000	2016	1360 m x 250 mm l Upgrade existing outfall sewer.	PRJ-BPS-001
BPS12.4	MP	157 m x 250 mm l Upgrade existing Gravity	465 700	2016	157 m x 250 mm l Upgrade existing outfall sewer.	PRJ-BPS-001
BPS12.5	MP	502 m x 355 mm l Upgrade existing Gravity	1 694 600	2016	501 m x 315 mm l Upgrade existing outfall sewer.	PRJ-BPS-008
BPS12.6	MP	51 m x 200 mm l Upgrade existing Gravity	183 600	2016	51 m x 200 mm l Upgrade existing outfall sewer.	PRJ-BPS-008
BPS12.7	MPi	344 m x 400 mm l Upgrade existing Gravity (Investigate first)	1 328 000	2016	344 m x 355 mm l Upgrade existing outfall sewer.	PRJ-BPS-008
BPS12.8	MPi	360 m x 525 mm l Upgrade existing Gravity (Investigate first)	1 652 400	2016	361 m x 450 mm l Upgrade existing outfall sewer.	PRJ-BPS-008
BPS12.9	MPi	114 m x 450 mm l Upgrade existing Gravity (Investigate first)	535 700	2016	114 m x 450 mm l Upgrade existing outfall sewer.	PRJ-BPS-002
BPS12.10	MP	429 m x 200 mm l New Gravity	569 300	2016	429 m x 200 mm l New outfall sewer.	PRJ-BPS-002
BPS12.11	MP	1869 m x 250 mm l New Gravity	2 818 000	2016	5150 m x 250 mm l New outfall sewer.	PRJ-BPS-002
BPS12.12	MP	1374 m x 315 mm l New Gravity	2 547 600	2016	5150 m x 272 mm l New outfall sewer.	PRJ-BPS-002
BPS12.13	MP	1289 m x 400 mm l New Gravity	3 059 000	2016	5150 m x 343 mm l New outfall sewer.	PRJ-BPS-002
BPS12.14	MP	3036 m x 600 mm l New Gravity	9 558 100	2016	2420 m x 550 mm l New outfall sewer.	PRJ-BPS-002
BPS12.17	MP	1244 m x 400 mm l New Gravity	2 953 100	2016	1244 m x 375 mm l New outfall sewer.	PRJ-BPS-014
BPS13.1	MPi	289 m x 825 mm l Upgrade existing Gravity (Investigate first)	2 346 200	2016	289 m x 750 mm l New outfall sewer.	PRJ-BPS-003
BPS13.2	MP	499 m x 250 mm l New Gravity	780 700	2016	499 m x 250 mm l New outfall sewer.	PRJ-BPS-012
BPS13.3	MP	290 m x 250 mm l New Gravity	470 200	2016	290 m x 250 mm l New outfall sewer.	PRJ-BPS-012
BPS13.4	MP	14 m x 250 mm l New Gravity	60 400	2016	14 m x 250 mm l New outfall sewer.	PRJ-BPS-012
BPS13.5	MP	455 m x 160 mm l New Gravity	528 600	2016	455 m x 160 mm l New outfall sewer.	PRJ-BPS-012
BPS13.6	MP	446 m x 160 mm l New Gravity	519 300	2016	446 m x 160 mm l New outfall sewer.	PRJ-BPS-012
BPS16.1	MP	130 m x 160 mm l New Gravity	176 900	2016	130 m x 160 mm l New outfall sewer.	PRJ-BPS-012
BPS17.1	MP	242 m x 160 mm l New Gravity	297 900	2016	242 m x 160 mm l New outfall sewer.	PRJ-BPS-012
BPS20.1	MP	68 m x 200 mm l Upgrade existing Gravity	221 700	2016	68 m x 200 mm l Upgrade existing outfall sewer.	PRJ-BPS-009
BPS20.2	MPi	8 m x 400 mm l Upgrade existing Gravity (Investigate first)	129 300	2016	8 m x 400 mm l Upgrade existing outfall sewer.	PRJ-BPS-009
BPS21.1	MP	33 m x 315 mm l Upgrade existing Gravity	182 300	2016	33 m x 300 mm l Upgrade existing outfall sewer.	PRJ-BPS-009
BPS21.2	MPi	210 m x 400 mm l Upgrade existing Gravity (Investigate first)	849 200	2016	210 m x 375 mm l Upgrade existing outfall sewer.	PRJ-BPS-009
BPS22.1	MP	91 m x 160 mm l New Gravity	134 900	2016	91 m x 160 mm l New outfall sewer.	PRJ-BPS-009
BPS25.1	MP	436 m x 160 mm l New Gravity	508 700	2016	471 m x 160 mm l New outfall sewer.	PRJ-BPS-010
BPS25.2	MP	267 m x 200 mm l New Gravity	368 300	2016	275 m x 200 mm l New outfall sewer.	PRJ-BPS-010
BPS25.3	MP	698 m x 250 mm l New Gravity	1 076 500	2016	769 m x 250 mm l New outfall sewer.	PRJ-BPS-010
BPS25.4	MP	332 m x 160 mm l Upgrade existing Gravity	710 900	2016	127 m x 160 mm l Upgrade existing outfall sewer.	PRJ-BPS-010
BPS25.5	MPi	343 m x 200 mm l Upgrade existing Gravity (Investigate first)	811 000	2016	383 m x 160 mm l Upgrade existing outfall sewer.	PRJ-BPS-010
BPS25.6	MPi	373 m x 200 mm l Upgrade existing Gravity (Investigate first)	874 100	2016	373 m x 160 mm l Upgrade existing outfall sewer.	PRJ-BPS-010
BPS25.7	MPi	245 m x 200 mm l Upgrade existing Gravity (Investigate first)	601 800	2016	266 m x 160 mm l Upgrade existing outfall sewer.	PRJ-BPS-010
BPS25.8	MPi	35 m x 250 mm l Upgrade existing Gravity (Investigate first)	167 800	2016	22 m x 250 mm l Upgrade existing outfall sewer.	PRJ-BPS-010
BPS25.9	MPi	50 m x 250 mm l Upgrade existing Gravity (Investigate first)	203 200	2016	104 m x 250 mm l Upgrade existing outfall sewer.	PRJ-BPS-010
BPS25.10	MPi	3 m x 400 mm l Upgrade existing Gravity (Investigate first)	109 900	2016	7 m x 375 mm l Upgrade existing outfall sewer.	PRJ-BPS-010
BPS26.1	MP	270 m x 160 mm l New Gravity	328 200	2016	270 m x 160 mm l New outfall sewer.	PRJ-BPS-017
BPS26.2	MP	357 m x 200 mm l New Gravity	480 200	2016	357 m x 200 mm l New outfall sewer.	PRJ-BPS-017
BPS26.3	MP	633 m x 250 mm l New Gravity	981 000	2016	634 m x 250 mm l New outfall sewer.	PRJ-BPS-017
BPS26.4	MP	950 m x 160 mm l New Gravity	1 064 200	2016	950 m x 160 mm l New outfall sewer.	PRJ-BPS-017
BPS26.5	MP	336 m x 200 mm l New Gravity	454 700	2016	335 m x 200 mm l New outfall sewer.	PRJ-BPS-017
BPS26.6	MP	104 m x 315 mm l New Gravity	232 700	2016	104 m x 300 mm l New outfall sewer.	PRJ-BPS-017
BPS26.7	MP	86 m x 400 mm l New Gravity	248 800	2016	86 m x 375 mm l New outfall sewer.	PRJ-BPS-017
BPS26.10	MP	289 m x 200 mm l New Gravity	396 100	2016	289 m x 200 mm l New outfall sewer.	PRJ-BPS-017
BPS26.13	MP	247 m x 160 mm l New Gravity	303 700	2016	247 m x 160 mm l New outfall sewer.	PRJ-BPS-017
BPS27.1	MPi	51 m x 900 mm l Upgrade existing Gravity (Investigate first)	716 300	2016	51 m x 825 mm l Upgrade existing outfall sewer.	PRJ-BPS-003
BPS27.2	MP	135 m x 400 mm l Upgrade existing Gravity	581 400	2016	135 m x 375 mm l Upgrade existing sewer & N2-crossing	PRJ-BPS-003
BPS27.3	MP	67 m x 600 mm l Upgrade existing Gravity	466 600	2016	67 m x 525 mm l Upgrade existing outfall sewer	PRJ-BPS-003
BPS27.5	MPi	261 m x 600 mm l Upgrade existing Gravity (Investigate first)	1 407 500	2016	261 m x 550 mm l Upgrade existing outfall sewer	PRJ-BPS-005
BPS27.7	MPi	566 m x 600 mm l Upgrade existing Gravity (Investigate first)	2 874 500	2016	565 m x 550 mm l Upgrade existing outfall sewer	PRJ-BPS-005
BPS27.8	MPi	896 m x 600 mm l Upgrade existing Gravity (Investigate first)	4 465 500	2016	892 m x 550 mm l Upgrade existing outfall sewer	PRJ-BPS-005
BPS27.9	MP	522 m x 600 mm l Upgrade existing Gravity	2 662 700	2016	459 m x 611 mm l Upgrade existing outfall sewer	PRJ-BPS-005
BPS27.10	MP	248 m x 675 mm l Upgrade existing Gravity	1 647 900	2016	205 m x 611 mm l Upgrade existing outfall sewer	PRJ-BPS-005
BPS27.11	MP	1259 m x 250 mm l New Gravity	1 911 700	2016	1260 m x 250 mm l New outfall sewer.	PRJ-BPS-016
BPS27.12	MP	142 m x 675 mm l Upgrade existing Gravity	1 017 500	2016	142 m x 600 mm l Upgrade existing outfall sewer	PRJ-BPS-006
BPS28.1	MP	194 m x 160 mm l New Gravity	246 400	2016	194 m x 160 mm l New outfall sewer.	PRJ-BPS-016
BPS31.1	MP	371 m x 160 mm l New Gravity	438 400	2016	371 m x 160 mm l New outfall sewer.	PRJ-BPS-016
BPS31.2	MP	71 m x 160 mm l New Gravity	112 900	2016	71 m x 160 mm l New outfall sewer.	PRJ-BPS-016
BPS37.1	MP	162 m x 160 mm l New Gravity	211 400	2016	162 m x 160 mm l New outfall sewer.	PRJ-BPS-015
BPS37.2	MP	492 m x 160 mm l New Gravity	569 200	2016	492 m x 160 mm l New outfall sewer.	PRJ-BPS-015
BPS37.3	MP	129 m x 200 mm l New Gravity	197 800	2016	129 m x 200 mm l New outfall sewer.	PRJ-BPS-015
BPS37.4	MP	307 m x 160 mm l New Gravity	368 800	2016	307 m x 160 mm l New outfall sewer.	PRJ-BPS-015
BPS39.1	MP	276 m x 160 mm l New Gravity	335 600	2016	276 m x 160 mm l New outfall sewer.	PRJ-BPS-015
BPS39.2	MP	296 m x 160 mm l New Gravity	356 700	2016	296 m x 160 mm l New outfall sewer.	PRJ-BPS-015
BPS39.3	MP	318 m x 160 mm l New Gravity	381 000	2016	318 m x 160 mm l New outfall sewer.	PRJ-BPS-015
BPS39.4	MP	370 m x 160 mm l New Gravity	436 600	2016	370 m x 160 mm l New outfall sewer.	PRJ-BPS-015
BPS39.5	MP	146 m x 160 mm l New Gravity	194 200	2016	146 m x 160 mm l New outfall sewer.	PRJ-BPS-015
BPS39.6	MP	93 m x 200 mm l Upgrade existing Gravity	273 500	2016	93 m x 200 mm l Upgrade existing outfall sewer.	PRJ-BPS-015
BPS41.1	MP	194 m x 315 mm l Upgrade existing Gravity	652 800	2016	Upgrade existing Gravity main	PRJ-BPS-009
Pumping stations & rising mains						
BPS3.1	MP	Upgrade existing Pump Station	31 100	2016	Downgrade Pump station 10 to 7 l/s	PRJ-BPS-008
BPS4.3	MPi	Upgrade existing Pump Station (Investigate first)	225 200	2016	Upgrade Pump station 8 to 43 l/s	PRJ-BPS-008
BPS4.4	MP	490 m x 200 mm l Upgrade existing Rising	872 000	2016	490 m x 200 mm l Upgrade existing rising main	PRJ-BPS-008
BPS5.4	MPi	Upgrade existing Pump Station (Investigate first)	206 600	2016	Upgrade Kranshoek pump station 4 to 35 l/s	PRJ-BPS-013
BPS6.1	MPi	Upgrade existing Pump Station (Investigate first)	161 000	2016	Upgrade Pump station H2 to 15 l/s	PRJ-BPS-007
BPS7.1	FM	New Pump Station	-	2016	New 8 l/s pump station at FDA-P15 (cost of pump station to the developer)	PRJ-BPS-007
BPS7.2	MP	804 m x 160 mm l New Rising	-	2016	804 m x 160 mm l New rising main (cost to the developer)	PRJ-BPS-007
BPS8.1	MPi	Upgrade existing Pump Station (Investigate first)	184 200	2016	Upgrade Pump station H3 to 25 l/s	PRJ-BPS-007
BPS8.2	MP	976 m x 200 mm l Upgrade existing Rising	1 705 000	2016	976 m x 200 mm l Upgrade existing rising main	PRJ-BPS-007
BPS9.1	MPi	Upgrade existing Pump Station (Investigate first)	184 200	2016	Upgrade Whale Rock PS4 to 25 l/s	PRJ-BPS-007
BPS10.1	MPi	Upgrade existing Pump Station (Investigate first)	174 600	2016	Upgrade Whale Rock PS6 to 21 l/s	PRJ-BPS-007
BPS10.2	MPi	Upgrade existing Pump Station (Investigate first)	184 200	2016	Upgrade Whale Rock PS5 to 25 l/s	PRJ-BPS-007
BPS11.8	FM	New Pump Station	218 200	2016	New 48 l/s Future pump station 2	PRJ-BPS-014
BPS11.9	MP	1230 m x 250 mm l New Rising	1 869 400	2016	1168 m x 250 mm l New rising main	PRJ-BPS-014
BPS12.15	MPi	Upgrade existing Pump Station (Investigate first)	754 600	2016	Upgrade Piesang Valley PS 5 to 250 l/s	PRJ-BPS-003
BPS12.16	MP	547 m x 355 mm l Upgrade existing Rising	1 429 200	2016	545 m x 355 mm l New parallel rising main	PRJ-BPS-003
BPS13.7	MPi	Upgrade existing Pump Station (Investigate first)	831 600	2016	Upgrade Piesang Valley PS 20 to 288 l/s	PRJ-BPS-003
BPS13.8	MPi	859 m x 355 mm l Upgrade existing Rising	2 209 500	2016	870 m x 355 mm l New parallel rising main	PRJ-BPS-003
BPS14.1	FM	New Pump Station	-	2016	New 4 l/s pump station at FDA-P21 (cost of pump station to the developer)	PRJ-BPS-012
BPS14.2	MP	416 m x 90 mm l New Rising	-	2016	416 m x 90 mm l New rising main (cost to the developer)	PRJ-BPS-012
BPS15.1	FM	New Pump Station	-	2016	New 7 l/s pump station at FDA-P46 (cost of pump station to the developer)	PRJ-BPS-012
BPS15.2	MP	570 m x 110 mm l New Rising	-	2016	570 m x 110 mm l New rising main (cost to the developer)	PRJ-BPS-012
BPS16.2	MPi	Upgrade existing Pump Station (Investigate first)	831 600	2016	Upgrade Piesang Valley PS 19 to 300 l/s	PRJ-BPS-003
BPS16.3	MP	561 m x 400 mm l Upgrade existing Rising	1 839 300	2016	552 m x 400 mm l New parallel rising main	PRJ-BPS-003
BPS17.2	MPi	Upgrade existing Pump Station (Investigate first)	831 600	2016	Upgrade Piesang Valley PS 18 to 305 l/s	PRJ-BPS-003
BPS17.3	MP	468 m x 400 mm l Upgrade existing Rising	1 548 200	2016	469 m x 400 mm l New parallel rising main	PRJ-BPS-003
BPS18.1	FM	New Pump Station	-	2016	New 4 l/s pump station at FDA-P20 (cost of pump station to the developer)	PRJ-BPS-012
BPS18.2	MP	842 m x 90 mm l New Rising	-	2016	842 m x 90 mm l New rising main (cost to the developer)	PRJ-BPS-012
BPS19.1	FM	New Pump Station	-	2016	New 4 l/s pump station at FDA-P19 (cost of pump station to the developer)	PRJ-BPS-012
BPS19.2	MP	106 m x 90 mm l New Rising	-	2016	106 m x 90 mm l New rising main (cost to the developer)	PRJ-BPS-012
BPS21.3	MPi	Upgrade existing Pump Station (Investigate first)	240 800	2016	Upgrade Pump station 2 to 50 l/s	PRJ-BPS-009
BPS22.2	MPi	Upgrade existing Pump Station (Investigate first)	153 900	2016	Upgrade Pump station 1 to 12 l/s	PRJ-BPS-009
BPS23.1	FM	New Pump Station	-	2016	New 4 l/s pump station at FDA-P33 (cost of pump station to the developer)	PRJ-BPS-011
BPS23.2	MP	1544 m x 90 mm l New Rising	-	2016	1565 m x 90 mm l New rising main (cost to the developer)	PRJ-BPS-011
BPS24.1	FM	New Pump Station	-	2016	New 4 l/s pump station at FDA-P34 (cost of pump station to the developer)	PRJ-BPS-011
BPS24.2	MP	927 m x 90 mm l New Rising	-	2016	920 m x 90 mm l New rising main (cost to the developer)	PRJ-BPS-011
BPS25.11	MPi	Upgrade existing Pump Station (Investigate first)	254 300	2016	Upgrade Kwanokuthula PS 1 station 1 to 56 l/s	PRJ-BPS-010
BPS25.12	MP	862 m x 250 mm l Upgrade existing Rising	1 896 200	2016	827 m x 250 mm l Upgrade existing rising main	PRJ-BPS-010
BPS26.11	FM	New Pump Station	140 500	2016	New 14 l/s Future Ladywood PS 2	PRJ-BPS-017
BPS26.12	MP	213 m x 160 mm l New Rising	196 800	2016	213 m x 160 mm l New rising main	PRJ-BPS-017
BPS26.14	FM	New Pump Station	3 909 000	2016	New 6 l/s Future Ladywood PS 3	PRJ-BPS-017
BPS26.15	MP	1124 m x 110 mm l New Rising	701 800	2016	1124 m x 110 mm l New rising main	PRJ-BPS-017
BPS26.8	FM	New Pump Station	251 800	2016	New 63 l/s Future Ladywood PS 1	PRJ-BPS-017
BPS26.9	MP	1011 m x 250 mm l New Rising	1 540 300	2016	1016 m x 250 mm l New rising main & N2-crossing	PRJ-BPS-017
BPS28.2	FM	New Pump Station	133 300	2016	New 11 l/s Future PS 9	PRJ-BPS-016
BPS28.3	MP	1197 m x 110 mm l New Rising	746 900	2016	1197 m x 110 mm l New rising main	PRJ-BPS-016
BPS29.1	FM	New Pump Station	-	2016	New 5 l/s pump station at FDA-P68 (cost of pump station to the developer)	PRJ-BPS-016
BPS29.2	MP	949 m x 90 mm l New Rising	-	2016	949 m x 90 mm l New rising main (cost to the developer)	PRJ-BPS-016
BPS30.1	FM	New Pump Station	3 911 200	2016	New 7 l/s Future PS 11	PRJ-BPS-016
BPS30.2	MP	315 m x 90 mm l New Rising	188 100	2016	315 m x 90 mm l New rising main	PRJ-BPS-016
BPS31.3	FM	New Pump Station	138 100	2016	New 13 l/s Future PS 12	PRJ-BPS-016
BPS31.4	MP	470 m x 160 mm l New Rising	416 900	2016	470 m x 160 mm l New rising main & N2-crossing	PRJ-BPS-016
BPS32.1	MPi	Upgrade existing Pump Station (Investigate first)	161 000	2016	Upgrade Wittedrift pump station to 15 l/s	PRJ-BPS-006
BPS33.1	FM	New Pump Station	-	2016	New 35 l/s pump station at FDA-P70 (cost of pump station to the developer)	PRJ-BPS-006
BPS33.2	MP	2119 m x 200 mm l New Rising	-	2016	2119 m x 200 mm l New rising main (cost to the developer)	PRJ-BPS-006
BPS34.1	MPi	Upgrade existing Pump Station (Investigate first)	460 600	2016	Upgrade Aventura Old pump station to 135 l/s	PRJ-BPS-004
BPS34.2	MP	5408 m x 355 mm l Upgrade existing Rising	17 519 900	2016	5409 m x 315 mm l Upgrade existing 140 mm l rising main	PRJ-BPS-006
BPS35.1	MPi	Upgrade existing Pump Station (Investigate first)	158 700	2016	Upgrade Sanderlings Pump station to 14 l/s	PRJ-BPS-015
BPS35.2	MP	829 m x 160 mm l Upgrade existing Rising	1 218 400	2016	832 m x 160 mm l Upgrade existing rising main	PRJ-BPS-015
BPS35.3	MPi	Upgrade existing Pump Station (Investigate first)	140 200	2016	Upgrade The Waves Pump station to 6 l/s	PRJ-BPS-015
BPS36.1	FM	New Pump Station	-	2016	New 4 l/s pump station at FDA-P77 (cost of pump station to the developer)	PRJ-BPS-015
BPS36.2	MP	503 m x 160 mm l New Rising	-	2016	503 m x 90 mm l New rising main (cost to the developer)	PRJ-BPS-015
BPS37.5	FM	New Pump Station	142 800	2016	New 15 l/s Future PS 15	PRJ-BPS-015
BPS37.6	MP	636 m x 160 mm l New Rising	559 100	2016	636 m x 110 mm l New rising main	PRJ-BPS-015
BPS38.1	MPi	Upgrade existing Pump Station (Investigate first)	285 600	2016	Upgrade Matjiesfontein pump station to 70 l/s	PRJ-BPS-004
BPS38.2	MP	1790 m x 200 mm l New Rising	1 988 600	2016	1781 m x 200 mm l New rising main & river-crossing	PRJ-BPS-004
BPS90.1	MPi	Upgrade existing Pump Station (Investigate first)	206 600	2016	Upgrade Pump station 3 to 35 l/s	PRJ-BPS-009
BPS91.1	MPi	Upgrade existing Pump Station (Investigate first)	285 600	2016	Upgrade Pump station 2a to 70 l/s	PRJ-BPS-009
BPS92.1	MPi	New Pump Station (Investigate First)	-	2016	New _ l/s pump station at FDA-P92 (cost of pump station to the developer)	PRJ-BPS-016
BPS92.2	MP	1401 m x 160 mm l New Rising	-	2016	1400 m x 150 mm l New rising main (cost to the developer)	PRJ-BPS-016
Other						
BMS.T1	MP	Verify the capacities of the existing pumping stations in Plettenberg Bay	210 000			
BMS.T2	MP	Upgrade/install telemetry system	100 000			
TOTALS			132 961 000			

*** Costs include P&G's, Contingencies & Fees, but exclude EIA studies, registration of servitudes and/or land acquisition and VAT.**

Note :

- FM = Future main - New gravity outfall sewer, rising main, pump station, diversion structure or WWTP
- MP = Master Plan Items which reinforce the existing system
- MPa = Master Plan Items which are eliminated
- MPi = Master Plan investigate - Upgrades for existing facilities, where there is uncertainty over e.g. actual diameters, actual slopes or actual pump capacities. The existing facilities must be
- MPs = Master Plan Items of which the existing full flow velocity < 0,6 m/s (investigate)

0 155 310 620 1240 m
Scale 1:15000

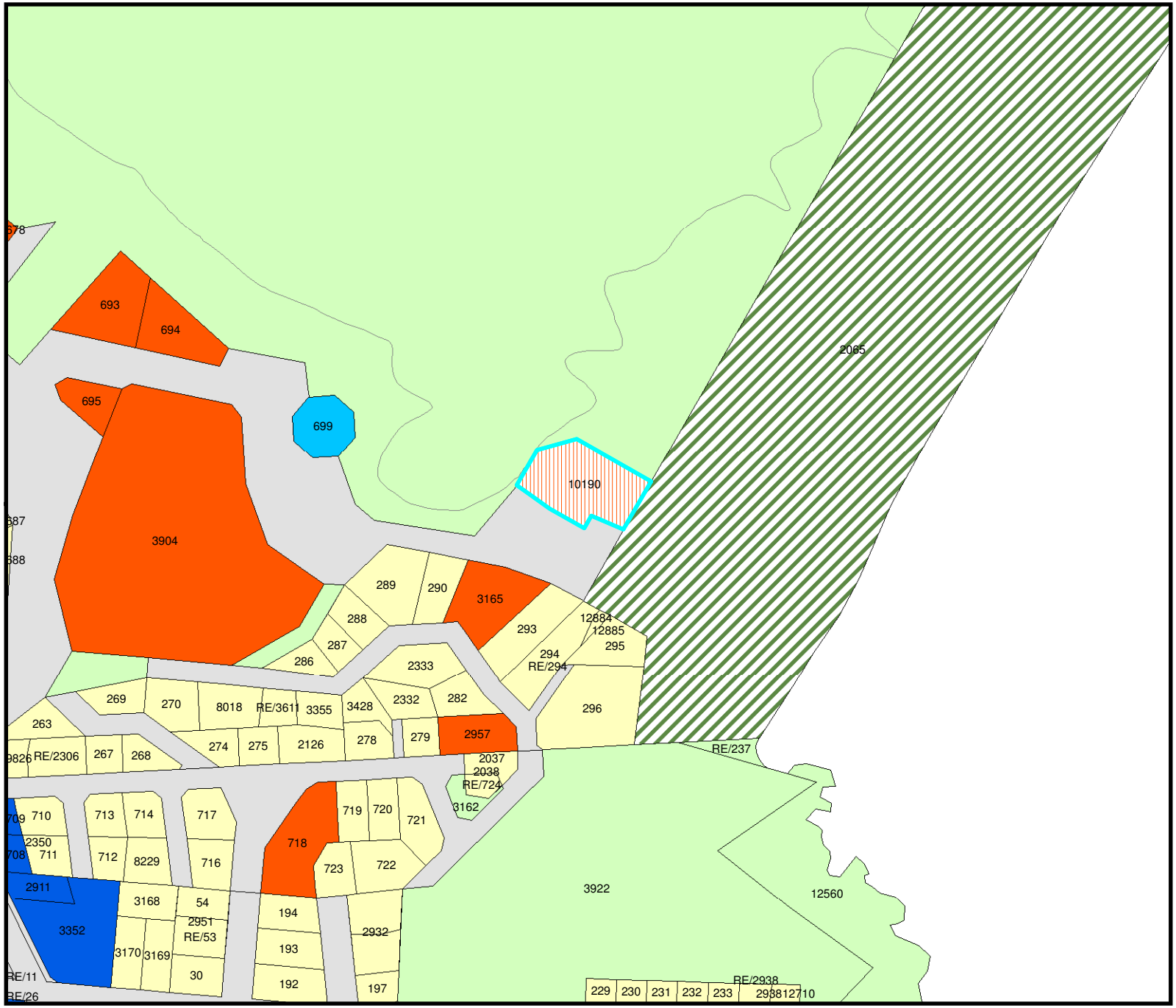
June 2016
Sewer Master Plan Bitou

Figure BMS 6.4a

Required works
- Plettenberg Bay

DIAGRAM 3: ZONING MAP

ERF 10190 PLETT



Legend

ZONING_MAP_16042020

Zoning

- Single Residential Zone I
- General Residential Zone II
- General Residential Zone III
- Business Zone I
- Business Zone II
- Open Space Zone I
- Open Space Zone III
- Transport Zone II

N

0 20 40 80 120 160 Meters

Planning Space
Town and Regional Planners

Schedule of Rights

Township Name	Plettenberg Bay	
Erf No	10190	
Address	Salmack Rd, Plettenberg Bay, 6600	
Zoning	CURRENT	PROPOSED
	General Residential Zone (Guest House)	As per ex.
Site Area	2852.51 m²	
Building Lines	4m building line on all street boundaries, 2m all other boundaries	
Site Area	2852.51 m²	
Parking	REQUIRED	PROPOSED
	1.25 bays/bedrooms 21 rooms = 27 bays 1 bay/100m2 restaurant 150m2 restaurant = 2 bays TOTAL = 31 bays	6 bays on site 27 off site TOTAL = 33 bays
Height Zone	REQUIRED	PROPOSED
	8.5m	8.5m

Schedule of Areas

Township Name	Ex Ground Floor: New Ground Floor: SUBTOTAL Ground Floor:	480m² 439m² 939m²
	Ex. First Floor: New First Floor: SUBTOTAL First Floor:	347m² 825m² 972m²
TOTALS	TOTAL OF ALL FLOOR AREAS:	1 910m²
	TOTAL OF POOL AREA:	19m2
	TOTAL OUTLINE OF ALL COVERED AREAS:	**1929 m²**
	ALLOWED	ACTUAL
Coverage	60%	35.91%
FAR	1	0.67

Parking

	REQUIRED	PROPOSED
Parking	1.25 bays/bedrooms 21 rooms = 27 bays 1 bay/100m2 restaurant 150m2 restaurant = 2 bays	6 bays on site 27 off site
	TOTAL = 31 bays	**TOTAL = 33 bays**

Public Parking

Public Parking	Existing Public Parking = 55 bays NEW Public Parking = 27 bays New Hotel Parking = 6 bays
	TOTAL = 87 bays (33 New Bays)

KEY

- New Parking Bays
- New Infrastructure

N

0_Site Development Plan

1 : 200

General Notes:

All requirements of municipal and other authorities concerned must be adhered to. Contractors and subcontractors are to check all dimensions and levels on the building site before commencing with any work. Figured dimensions to be taken in preference to scaled measurements and large-scale details supersede small scale drawings. The design and content of this drawing is the property of Black Sable Designs (PTY) Ltd and the copyright thereof is reserved by it.

Plumbing and drainage:

1. All plumbing in accordance with NBR/ SANS 10400
2. All drainage runs to be accessible along their entire length.
3. Rodding eyes (RE's) to be provided at any windows or door opening in the building or any other location where a change of direction.
4. Inspection eyes (IE's) to be provided at all ends & junctions of soil & waste pipes.
5. Rodding eyes (RE's) to be provided at heads of drains & at a maximum 25m spacing along runs of drains.
6. Marked covers to be provided at ground level for all IE's.
7. Gully traps to be provided at ground level.
8. Soil drains under buildings to be protected from all vertical settlement loads with RE's as close as possible to the building at both ends.
9. Wastewater pipes having a vertical drop exceeding 1200mm to the main drain to be anti-syphoned.
10. All branch drains exceeding 6m in length to be vented.
11. All materials used are to be in accordance with the manufacturer's technical specifications.
12. Wastewater pipes to be min 50ϕ.
13. Drainpipes to be min 100ϕ.
14. Pipe sizes:

wc's	50mm ϕ	PVC wastepipe
baths	50mm ϕ	PVC wastepipe
showers	50mm ϕ	PVC wastepipe
wc's	100mm ϕ	PVC soil pipe
urinals	50mm ϕ	PVC soil pipe

15. All drainpipes to min. fall of 1:40.

Compliance certificate to be provided at the end of the installation.

Brickwork notes:

1. Foundation brickwork to have brickforce every course. Other brickwork generally to have brickforce every 5 courses unless indicated/specified otherwise on drawings.
2. Parapets to have roller course/toe copings unless otherwise indicated/specified.
3. 300 micron dpc (brick/grip) stepped down at floor level.

Structural notes:

1. All structural work and sizing of members by engineer and/or design and supply manufacturer.
2. All cast concrete lintels over door and window openings as necessary to engineers specifications with 4 courses of brickforce over. Lintols to have end bearing of min 150mm on each side.

Fire notes:

All building to be in accordance with n.b.r/ sans 10400 for the relevant class of occupancy.

Glazing notes:

All glazing in windows and doors to comply with n.b.r/ sans 10400

Electrical notes:

All work to comply with n.b.r/ sans 10400, and be carried out by registered professional. Compliance certificate to be provided at end of the installation.

General notes:

All materials to comply with the 'model preambles for trades (ASAQS 1995) and contract documents (incl. Brickwork, reinforcement, pc lintels, etc.) Termite proofing beneath floor slabs to comply with N.b.r/ sans 10400

No.	Description	Date
1	Issued For Information	06.05.2024
2	Issued For Information	26.07.2024
3	Issued For Information	02.08.2024
4	Issued For Information	11.11.2024
5	Issued For Information	10.01.2025
6	Issued For Information	18.02.2025

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Jacobus J. Uys Principal Pr Arch 417591?7

MORE family Collection

Milkwood Manor

Site Development Plan

Project number	073_Milkwood Manor
Date	18-Feb-25 9:30:49 PM
Drawn by	JR
Checked by	JU
Drawing No.	073_SDP_A-02
Scale	As indicated
Revision No:	6

1_Ground Floor
1 : 50

General Notes:

All requirements of municipal and other authorities concerned must be adhered to. Contractors and subcontractors are to check all dimensions and levels on the building site before commencing with any work. Figured dimensions to be taken in preference to scaled measurements and large-scale details supersede small scale drawings. The design and content of this drawing is the property of Black Sable Designs (PTY) Ltd and the copyright thereof is reserved by it.

Plumbing and drainage:

1. All plumbing in accordance with NBR/ SANS 10400.
2. All drainage runs to be accessible along their entire length.
3. VP's to be carried up to 2m above any window or door opening in the building or any other building within a distance of 6m.
4. Inspection eyes (IE's) to be provided at all ends & junctions of soil & waste pipes.
5. Rodding eyes (RE's) to be provided at heads of drains & at a maximum 25m spacing along runs of drains.
6. Marked covers to be provided at ground level for all IE's.
7. Reseal traps to be fitted to all waste fittings.
8. Soil drains under buildings to be protected from all vertical settlement loads with RE's as close as possible to the building at both ends.
9. Wastewater pipes having a vertical drop exceeding 1200mm to the main drain to be anti-syphoned.
10. All branch drains exceeding 6m in length to be vented.
11. All materials used are to be in accordance with the manufacturer's technical specifications.
12. Wastewater pipes to be min 50∅.
13. Drainpipes to be min 100∅.
14. Pipe sizes:

whb's	50mm∅	PVC wastepipe
baths	50mm∅	PVC wastepipe
showers	50mm∅	PVC wastepipe
wc's	100mm∅	PVC soil pipe
urinals	50mm∅	PVC soil pipe

15. All drainpipes to min. fall of 1:40.

Compliance certificate to be provided at the end of the installation.

Brickwork notes:

1. Foundation brickwork to have brickforce every course. Other brickwork generally to have brickforce every 5 courses unless otherwise indicated/specified by engineer.
2. Parapets to have roller course/boe copings unless otherwise indicated/specified.
3. 300 micron dpc (brickgrip) stepped down at floor level.

Structural notes:

1. All structural work and sizing of members by engineer and/or design and supply manufacturer.
2. Precast concrete lintels over door and window openings as necessary to engineers specifications with 4 courses of brickforce over. Lintols to have end bearing of min 150mm on each side.

Fire notes:

All building to be in accordance with n.b.r/ sans 10400 for the relevant class of occupancy.

Glazing notes:

All glazing of windows and doors to comply with n.b.r/ sans 10400

Electrical notes:

All work to comply with n.b.r/ sans 10400, and be carried out by registered professional. Compliance certificate to be provided at end of the installation.

General notes:

All materials to comply with the 'model preambles for trades (ASAQS 1995) and contract documents (incl. Brickwork, reinforcement, pc lintels, etc.) Termite proofing beneath floor slabs to comply with N.b.r/ sans 10400

No.	Description	Date
A	Issued for Coordination	23.01.2025
B	Issued for Coordinations	30.01.2025

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Jacobus J. Uys Principal Pr Arch 41759177

MORE family Collection

Milkwood Manor

Ground Floor Plan

Project number: 073_Milkwood Manor
Date: 2025/01/30 14:31:12
Drawn by: JR
Checked by: JU
Drawing No.: 073_01_A02_III
Scale: 1 : 50
Revision No: B

General Notes:

All requirements of municipal and other authorities concerned must be adhered to. Contractors and subcontractors are to check all dimensions and levels on the building site before commencing with any work. Figured dimensions to be taken in preference to scaled measurements and large-scale details supersede small scale drawings. The design and content of this drawing is the property of Black Sable Designs (PTY) Ltd and the copyright thereof is reserved by it.

Plumbing and drainage:

1. All plumbing in accordance with NBR/ SANS 10400.
2. All drainage runs to be accessible along their entire length.
3. VP's to be carried up to 2m above any window or door opening in the building or any other building within a distance of 6m.
4. Inspection eyes (IE's) to be provided at all ends & junctions of soil & waste pipes.
5. Rodding eyes (RE's) to be provided at heads of drains & at a maximum 25m spacing along runs of drains.
6. Marked covers to be provided at ground level for all IE's.
7. Reseal traps to be fitted to all waste fittings.
8. Soil drains under buildings to be protected from all vertical settlement loads with RE's as close as possible to the building at both ends.
9. Wastewater pipes having a vertical drop exceeding 1200mm to the main drain to be anti-syphoned.
10. All branch drains exceeding 6m in length to be vented.
11. All materials used are to be in accordance with the manufacture's technical specifications.
12. Wastewater pipes to be min 50∅.
13. Drainpipes to be min 100∅.
14. Pipe sizes:

whb's	50mm∅	PVC wastepipe
baths	50mm∅	PVC wastepipe
showers	50mm∅	PVC wastepipe
wc's	100mm∅	PVC soil pipe
urinals	50mm∅	PVC soil pipe

15. All drainpipes to min. fall of 1:40.

Compliance certificate to be provided at the end of the installation.

Brickwork notes:

1. Foundation brickwork to have brickforce every course. Other brickwork generally to have brickforce every 5 courses unless otherwise indicated/specified by engineer.
2. Parapets to have roller course/boe copings unless otherwise indicated/specified.
3. 300 micron dpc (brickgrip) stepped down at floor level.

Structural notes:

1. All structural work and sizing of members by engineer and/or design and supply manufacturer.
2. Precast concrete lintels over door and window openings as necessary to engineers specifications with 4 courses of brickforce over. Lintols to have end bearing of min 150mm on each side.

Fire notes:
All building to be in accordance with n.b.r/ sans 10400 for the relevant class of occupancy.

Glazing notes:
All glazing of windows and doors to comply with n.b.r/ sans 10400

Electrical notes:
All work to comply with n.b.r/ sans 10400, and be carried out by registered professional. Compliance certificate to be provided at end of the installation.

General notes:
All materials to comply with the 'model preambles for trades (ASAQS 1995) and contract documents (incl. Brickwork, reinforcement, pc lintels, etc.) Termite proofing beneath floor slabs to comply with N.b.r/ sans 10400

No.	Description	Date
A	Issued for Coordination	23.01.2025

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Jacobus J. Uys Principal Pr Arch 41759177

MORE family Collection

Milkwood Manor

First Floor Plan

Project number	073_Milkwood Manor
Date	2025/01/30 14:31:10
Drawn by	JR
Checked by	JU
Drawing No.	073_01_A01_III
Scale 1 : 50	Revision No. A