

STORMWATER MANAGEMENT PLAN FEATHERBED NATURE RESERVE

PORTION 59 OF 216, UITZICHT, BRENTON, KNYSNA

10th APRIL 2026

CONTRACT:

Name: VAN ZYL
Erf number: PTN 59 OF 216
Our reference: 15/20

CLIENT DETAILS:

TMBArchitects Pty Ltd
Post NetSuite 330
Private Bag X31
Knysna
6570

Contact person: Tracey Mills Brink
E-mail: tracey@traceymillsbrink.com
Tel: 076 922 6775

DOCUMENT HISTORY:

Revision	Date:	Comments
0	23 March 2026	
1	10 April 2026	

STORMWATER MANAGEMENT FOR FEATHERBED NATURE RESERVE PORTION 59 OF 216 UITZICHT, BRENTON, KNYSNA

CONTENTS

1. Introduction	1
2. Current Stormwater Management System	2
2.1 Existing Paved Roads & Parking areas	2
2.2 Existing Buildings & Hard Landscaping Around them	2
2.3 Basic Principles which have been adhered to	2
2.3.1 Frequency of Stormwater Detention Structures	2
2.3.2 No Uncontrolled Runoff	3
3. Stormwater Management Plan for New Buildings	4
3.1 Approach to be adopted	4
3.2 Rainfall figures	4
3.3 Proposed Manager's Cottage	5
3.3.1 Shared Tanks for Roof Water of Managers House & Conference Centre	5
3.3.2 Shared Stormwater Detention Pond for Paved Areas of Managers House & Conference Centre	6
3.4 Proposed Conference Centre & Guest Accommodation	6
3.5 Proposed Garages & Staff Ablution Facilities	6
3.5.1 Shared Tanks for Roof Water from Entertainment Facility & Garage	6
3.5.2 Stormwater Detention Structure for Stormwater from Paved Parking Areas South of The Garages	6
3.6 Proposed Entertainment Facility	7
4. Potable Water Reservoir for Rainwater Storage	8
4.1 Capacity of Reservoir	8
4.2 Position of Reservoir	8
4.3 Operation of this Reservoir	8

ANNEXURE

A. Site development plan

B. Site development plan marked up with services

1. Introduction

Featherbed Nature Reserve is situated on the East facing slopes of the Western Heads. The ground is generally fairly steeply sloping and consists of sandy material with areas of cemented sandstone. The combination of steep slopes and sandy material makes the reserve very susceptible to erosion, if stormwater is concentrated and allowed to flow. Any built structures tend to increase and concentrate the stormwater runoff. These include paved roads, parking areas, buildings and hard land scaping around them. In general, a Stormwater Management Plan involves:

- a) Analysis of catchment areas, water courses and flow;
- b) Maintaining or improving the quality of runoff water from the development;
- c) Slowing and limiting stormwater runoff to prevent erosion.

In this particular case, a) and b) are not relevant as there are no water courses or lower-lying landowners. The quality of runoff into the lagoon is obviously important and item c) is critical to prevent erosion of the dune sand, particularly the banks of the lagoon.

2. Current Stormwater Management System

2.1 Existing Paved Roads & Parking Areas

The approach taken has been to create grassed stormwater detention ponds and level areas alongside roads and parking areas. Each pond must be large enough to accommodate the anticipated stormwater runoff from the area it serves during heavy rainfall. The stormwater must be conveyed to the detention pond without causing erosion. Once in the pond it is allowed to soak away into the sandy soil.

Alternatively, if the road or parking area is close to the lagoon, stormwater can be conveyed directly to the lagoon. Precautions must be put in place to prevent erosion at the discharge point.

The system in place on the property seems to be functioning fairly well as there are very few signs of erosion apart from some erosion of the lagoon bank at the lower end of the concrete road running East of the factory buildings (The site of the proposed conference centre and tourist accommodation). This problem will be addressed in this report.

The owner of the property intends to construct four additional buildings as shown on the attached site development plan.

These buildings are:

- a) A manager's house for accommodation of a manager and his / her family.
- b) A conference centre with bar and restaurant facilities as well as some suites for accommodation of guests.
- c) Garages for storage and maintenance of vehicles, machinery and boats used in the reserve.
- d) An Entertainment facility with lounge, bar, squash court and indoor swimming pool.

As part of the approval process a site development plan has to be submitted for approval together with an Engineering Services Report as well as certain specialist Reports to identify and mitigate against risks associated with the development.

One of these Reports is a basic Stormwater Management Plan to manage the additional stormwater generated by these four buildings and their associated paved areas. In the process, it would obviously be prudent to identify and deal with any problems currently being created as a result of poor stormwater management anywhere else on the estate as per the above situation of erosion to the lagoon bank Southeast of the proposed Managers' house.

2.2 Existing Buildings & Hard Landscaping Around Them

The main house has landscaped gardens around it. In this case a detention pond takes the form of lower lying lawn areas surrounded by berms. The resultant "pond" is very shallow with a large surface area to allow rainwater to soak away into the sandy soil. In the case of the Restaurant building which is very close to the lagoon, stormwater can be piped directly to the lagoon. Precautions have been put in place to prevent erosion at the discharge points.

2.3 Basic Principles Which Have Been Adhered To

2.3.1 Frequency of Stormwater Detention Structures

It is much better to construct many small detention ponds rather than fewer larger ponds. It is critical not to allow stormwater to build up in volume and speed, as these

are what causes serious erosion. This approach seems to have worked well on the property to date.

2.3.2 No Uncontrolled Runoff

No uncontrolled concentrated runoff has been allowed to occur as this would cause serious erosion.

As mentioned, there is an erosion problem at the bottom end of the concrete road East of the existing factory building which is the site of the proposed conference centre and tourist accommodation.

3. Stormwater Management Plan for New Buildings

3.1 Approach to be Adopted

Of the new proposed buildings only the Garages and Managers' house have relatively level areas where detention ponds and areas can be created. The proposed entertainment facility and conference centre will both be constructed on small level platforms with steep slopes down to the platform and steep slopes from the platform down to the lagoon.

Rainwater runoff from roofs will be the main contributors to stormwater runoff. Because this water is clean and can be used to supplement the potable water supply for the property, we intend to harvest all the rainwater runoff from roofs for reuse, thereby preventing it from running off into the lagoon over the lagoon banks and causing erosion.

As rainfall intensity can vary greatly during a storm, careful analysis will need to be done to balance intensity, storage tank size and pumping rate from storage tank to reservoir, at each of the four proposed new buildings, to make sure that there is no overflow from the tanks.

3.2 Rainfall Figures

The rainfall figures used for runoff calculations are those from gauge No.14063, Knysna.

Table No. 1

Depths (mm) of Rainfall for Various RI's and Durations: Gauge 14063 Knysna

Duration	Type 2	Type 2	Type 2	Type 2	Type 2	Type 2	Type 2	Type 2
(h)	Rainfall	2 year	5 year	10 year	20 year	50 year	100 year	200 year
D hour	prop. ®	one day depths (mm)						
	®							
	1.000	56	83	104	127	163	194	229
0.083	0.134	7.5	11.2	14.0	17.1	21.9	26.1	30.8
0.25	0.249	13.9	20.7	25.9	31.6	40.6	48.3	57.0
1	0.422	23.6	35.0	43.9	53.6	68.8	81.9	96.6
2	0.520	29.1	43.1	54.0	66.0	84.7	100.8	119.0
3	0.582	32.6	48.3	60.5	73.9	94.9	112.9	133.3
6	0.701	39.2	58.1	72.9	89.0	114.2	135.9	160.4
12	0.838	46.9	69.6	87.2	106.5	136.6	162.6	192.0
24	1.000	56.0	83.0	104.0	127.0	163.0	194.0	229.0

For the purpose of this exercise the 20-year return period figures are deemed appropriate.

Based on the 20-year return period rainfall figures from the table above, the following are the runoff figures from the roofs of the four buildings for storms of varying duration, as shown in table 2.

Table No. 2

Rainwater Runoff from Roof Structures. 20yr Return Interval								
Building	Roof Area	Duration						
		0.25hr	1hr	2hr	3hr	6hr	12hr	24hr
Managers House	285m ²	9.01kl	15.27kl	18.81kl	21.06kl	25.37kl	30.35kl	36.20kl
Conference Centre	615m ²	19.63kl	32.96kl	40.59kl	45.45kl	54.74kl	65.50kl	78.11kl
Garages	714m ²	22.56kl	38.27kl	47.12kl	52.76kl	63.55kl	76.04kl	90.68kl
Entertainment Centre	902m ²	28.50kl	48.35kl	59.53kl	66.66kl	80.28kl	96.06kl	114.55kl
Manager + Conference Centre Combined	900m ²	28.44kl	48.24kl	59.40kl	66.61kl	80.10kl	95.85kl	114.30kl
Garages + Entertainment Centre Combined	1616m ²	51.07kl	86.62kl	106.66kl	119.42kl	143.82kl	172.10kl	205.23kl

The plan is to pump water from the roof rainwater tanks to a potable water reservoir during the rainfall event. Assuming water is pumped from the tanks at a rate of 20 000litres per hour, the adjusted figures after deducting 20 000litres per hour from the tanks are shown in table 3 below.

Table No. 3

Rainwater runoff from roofs after deducting water pumped to reservoir at 20 000litres per hour						
Building	Roof Area	1hr	2hr	3hr	6hr	12hr
Managers House	285m ²	-	-	-	-	-
Conference Centre	615m ²	12.96kl	0.59kl	-	-	-
Garages	714m ²	18.27kl	7.12kl	-	-	-
Entertainment Centre	902m ²	28.35kl	19.53kl	6.66kl	-	-
Managers + Conference Centre Combined	900m ²	28.24kl	19.40kl	6.51kl	-	-
Garages + Entertainment Centres Combined	1616m ²	66.62kl	66.66kl	59.42kl	23.82kl	-

3.3 Proposed Manager's Cottage

This cottage has a roof area of 285m², very little paved area and has some level area for construction of detention ponds for stormwater from paved areas, as well as tanks for roof water. The conference centre adjacent to the house has no level area for construction of detention ponds or water tanks for roof water. We propose to provide these facilities for both buildings on the level area around the house.

3.3.1 Shared Tanks for Roof Water of Managers House & Conference Centre

Based on the combined roof runoff figures after deduction of water pumped to potable water reservoir TABLE No. 3 we propose to provide four 10 000litre water tanks. A pump will be fitted to the tanks to pump 20 000litres per hour to the potable water reservoir. An emergency overflow pipe from these tanks will be connected to the stormwater discharge system, although we anticipate all water being pumped to the potable water reservoir.

3.3.2 Shared Stormwater Detention Pond for Paved Areas of Managers House & Conference Centre

A 20 000litre stormwater detention pond will be constructed on the level area close to the Manager's House. This structure will accommodate runoff water from the paved areas around the Conference Centre and the Manager's House. We anticipate that most of this water will soak away into the permeable sandy soil. An overflow pipe will be provided to discharge to the lagoon at the adjacent slipway. Concrete kerbing will be constructed along both edges of the concrete slipway below this discharge point, to ensure that stormwater from this outlet flows down the slipway into the lagoon and does not flow off the edge of the slipway & undermine the concrete.

3.4 Proposed conference Centre & Guest Accommodation

This building to be constructed on the site of the existing shed adjacent to the Manager's House, will have a roof area of 615m². Rainwater from this roof will be piped to the four 10 000litre rainwater tanks to be positioned at the Manager's House site. From there water will be pumped to the potable water reservoir at a rate of 20 000litres per hour until the tanks are empty.

Rainwater from the paved areas around the Conference Centre will be piped to the 20 000litre stormwater detention structure to be constructed on the level area North of the Manager's House. An overflow pipe will be provided to discharge to the lagoon at the adjacent slipway. Concrete kerbing will be constructed along both edges of the concrete slipway below this discharge point, to ensure that stormwater from this outlet flows down the slipway into the lagoon and does not flow off the edge of the slipway & undermine the concrete.

3.5 Proposed Garages & Staff Ablution Facilities

The proposed garage building will have a roof area of 714m² and the terrain is suitable for the construction of level areas Northeast and Northwest of the Garage buildings. These level areas will be used to construct a tank yard for roof water from the entertainment facility and garages as well as a detention structure for water from the paved parking area Southeast of the garages. There is very little level ground at the entertainment facility which is why roof water from this building will be piped to the shared tank yard.

3.5.1 Shared Tanks for Roof Water from the Entertainment Facility & The Garage

Buildings

Based on the combined roof runoff figures after deduction of water pumped to the potable water reservoir TABLE No.3, we propose to provide ten 10 000litre water tanks adjacent to the Garage building. A pump will be fitted to the tanks to pump 20 000litres per hour to the potable water reservoir. An emergency overflow pipe from these tanks will discharge to the stormwater detention structure although we anticipate that all the water from the tanks will be pumped to the potable water reservoir.

3.5.2 Stormwater Detention Structure for Stormwater from Paved Parking Area Southeast of the Garages

A 30 000litre stormwater detention structure will be constructed on the area Northeast of the Garage building. An overflow pipe will be laid from the stormwater detention structure to discharge at the slipway.

Concrete kerbing will be constructed along both edges of the concrete slipway below this discharge point, to ensure that stormwater from this outlet flows down the slipway into the lagoon and does not flow off the edge of the slipway & undermine the concrete.

3.6 Proposed Entertainment Facility

This building has a roof area of 902m² and very little paving around the building. Roof water will be discharged from the roof into two 10 000litre storage tanks from which it will be piped along the West side of the access road down to the ten 10 000litre water tanks at the Garages from where it will be pumped to the potable water reservoir at a rate of 20 000 litres per hour.

4. Potable Water Reservoir for Rainwater Storage

4.1 Capacity of Reservoir

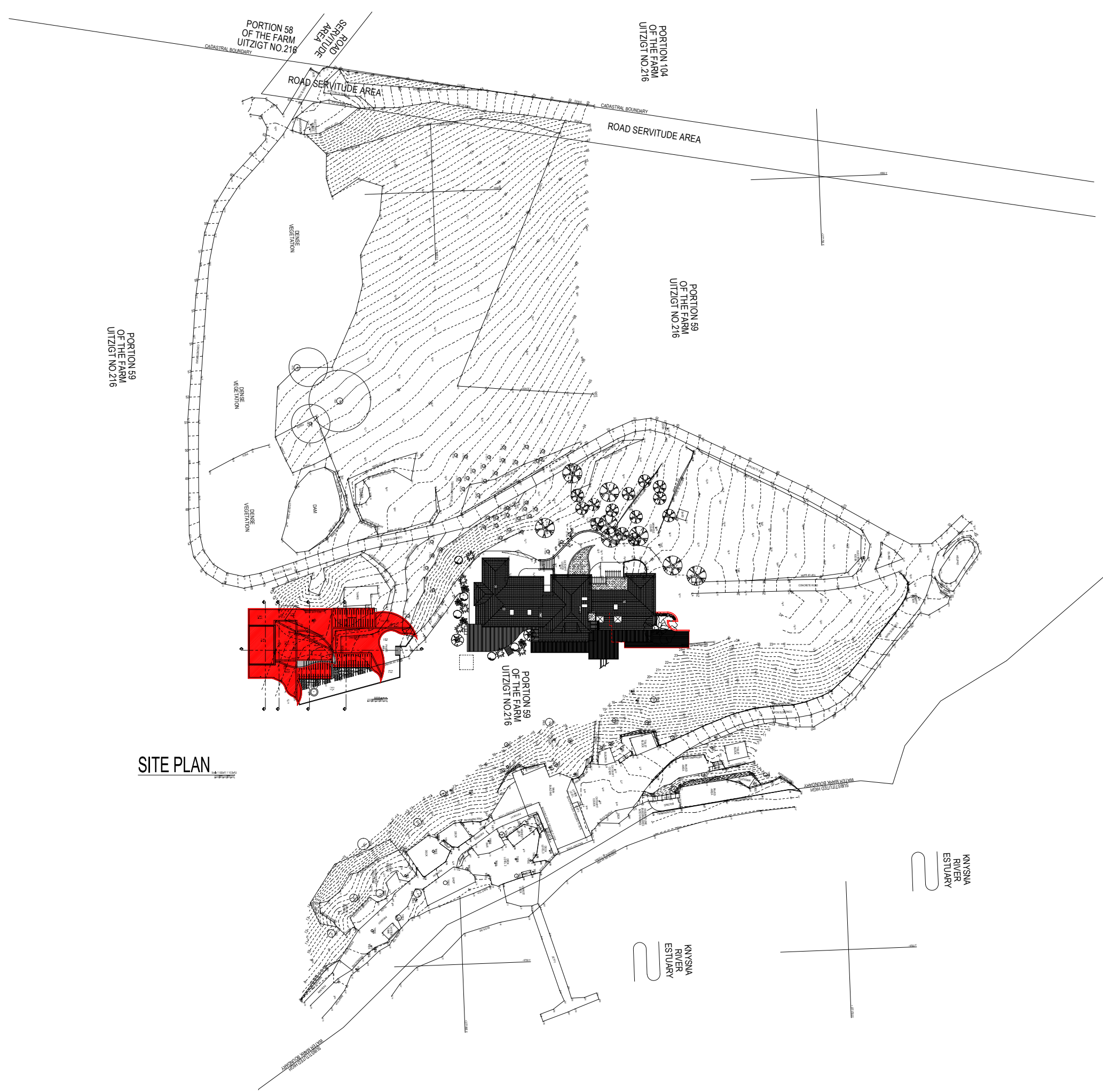
Based on the combined 24hr runoff (20yr return period) from the roofs of the four new buildings, we propose the construction of a 320-kilolitre reservoir. See table 2.

4.2 Position of Reservoir

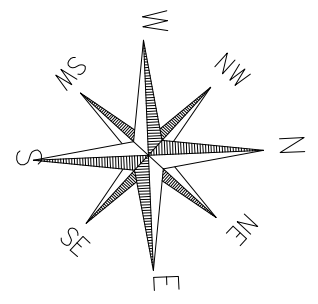
In order to provide water pressure of 3 Bars at the proposed entertainment facility (the highest lying of the four new buildings, with an FFL of approximately 37.3m above MSL), we propose that this reservoir be sited with the other reservoir at a level of 65 to 70m above MSL. Close to the sewage treatment plant.

4.3 Operation of this Reservoir

This reservoir will be empty most of the time and will only fill up during rainfall periods. With a capacity of 320 kilolitres the reservoir can supply approximately 5 days AADD. The reservoir will receive rainwater from the roofs of the 4 proposed new buildings. It will be pumped up from the roof water tanks at the buildings, through filters and into the reservoir. This reservoir will be used to supply water to the development, whenever it contains water, to ensure that it is empty when the next round of rainfall occurs.



SITE PLAN



Copyright and Standards
 Copyright in all drawings produced by this firm of Architects.
 Any reproduction of the drawings without the written consent of the firm of Architects is prohibited.
 It is the Contractor's responsibility to ensure that the building is not in conflict with any other buildings or structures.
 All work to be measured as per the dimensions shown - NO scaling off the drawings.
 All measurements shown on the plans must be used as indicated.
 All dimensions and heights to be checked on site prior to construction - in the case of alterations or additions heights should match that of the existing work unless otherwise shown.
 Profile drawings of items can be used for all masonry work.
 Discuss any discrepancies with the Architect immediately.
 All external ground works surrounding the building to be reinstated after construction.
 All products and materials specified must be applied and used to the Manufacturer's specifications.
 All work as per the National Building Regulations, SANS 10400 and other applicable SANS Codes.
 All electrical work is to be undertaken in accordance with the OHS Act Electrical Installation Regulations - (EIR) (2001).
 Particular attention must be given to Reg. 3(1), which requires, in private estates, town case complexes and sectional title apartments, for the user (i.e. the owner) to appoint an AB or "competent person" to ensure compliance with the OHS Act then commence construction.
 The Electrical Certificate of Compliance will not be valid if this process is not followed.

No./Revision Made	Date

PROJECT POOL HOUSE & RECREATIONAL AREA	
PROJECT SITE PORTION 59 OF THE FARM UITZIGT NO.216 Knysna	
PROJECT NUMBER 15.07	
PROJECT STAGE COUNCIL SUBMISSION (Stage 4.1)	
DRAWING TITLE SITE PLAN	
DRAWING NUMBER 15.07.S4-1.1-1	REVISION
SCALE 1:500 @ A1 1:1000 @ A3	
DATE 19.04.2017	
CLIENT JOHN BENN	
AUTHOR Liphelolo Matlisa	
CHECKED Tracey Mills-Brink	
ENGINEER Hofmeyr & Associates (Rein Hofmeyr)	
FLOOR AREAS New Area enclosed within walls: New Pool House: 613,50m ² New Foot Print New Pool House: 656,90m ² New Total Coverage: 656,90m ² Site Area: 135 580,00m ² Coverage %: 0,485%	

OWNERS SIGNATURE

ARCHITECT'S SIGNATURE
 Tracey Mills-Brink
 PR.ARCH 5765









FOR OFFICE USE
 C:\2017\TMB\07 POOL HOUSE\190419 JOHN BENN

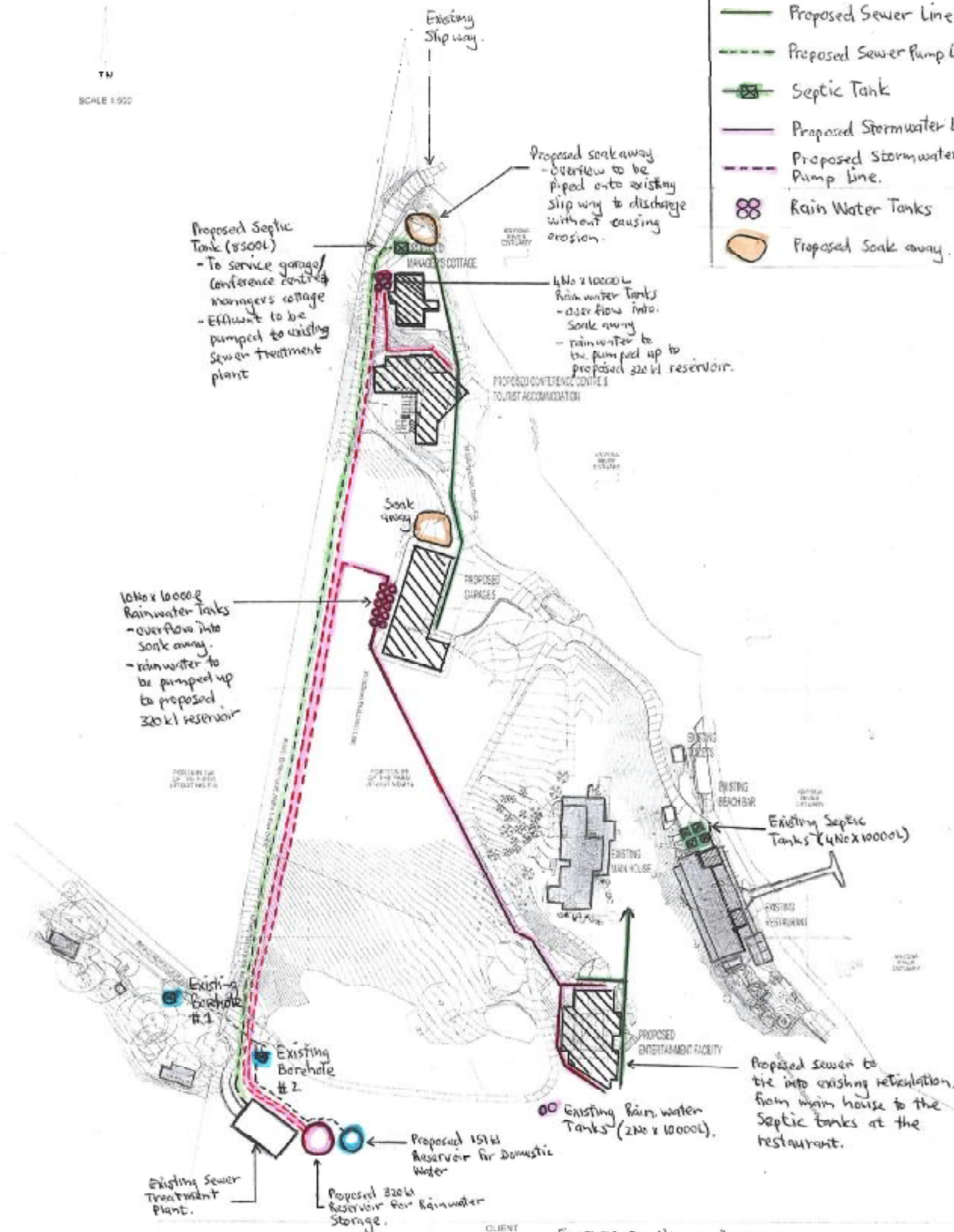


Plot No. 59 of Farm Uitzigt No. 216, Knysna. 190419 JOHN BENN. Email: tracey@tmba.co.za

TN
SCALE 1:500

LEGEND:

-  Existing Borehole
-  Proposed Sewer Line
-  Proposed Sewer Pump Line
-  Septic Tank
-  Proposed Stormwater Line
-  Proposed Stormwater Pump Line
-  Rain Water Tanks
-  Proposed Soak away



CLIENT	FEATHERBED NATURE RESERVE.		
PROJECT	FEATHERBED NATURE RESERVE		
TITLE	PROPOSED CIVIL SERVICES		
SCALE	NTS	PAPER SIZE	A3
DRAWING NO	16-20-001		
<p>HOFMEYR & ASSOCIATES</p> <p>1 JOHNNY STREET, KNYMERSBURG, 6570</p> <p>TEL: 044-352 0900</p> <p>FAX: 044-352 0901</p> <p>WWW.HOFMEYR.CO.ZA</p>			
DATE	DESIGNED	BY	REVISIONS
APRIL 2020	RH	JV	0
CHECKED	RH		

ID	DESCRIPTION	DATE	SIGNED
01	PROPOSED CIVIL SERVICES	2020/02/26	RH
02	REVISIONS DETAILS		