CIVIL ENGINEERING SERVICES REPORT: PORTION 40 OTF 711, GANSBAAI

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1. INTRODUCTION

DECA Consulting Engineers were appointed by Danger Point Ecological Company (Pty) Ltd to compile a Civil Engineering Services Report for the provision of engineering services required for the proposed development i.e. Portion 40 OTF 711, Gansbaai. The proposed development will; therefore, for the purpose of this report hereinafter be referred to as “the site”.

2. AVAILABLE INFORMATION

The following information was made available to DECA:

a) 1:10 000 ORTHOPHOTO MAPS of the study area.

b) Existing applications for development in the study area.

c) Proposed layout plans for the proposed development by Plan Active.

d) Existing cadastral information of the study area.

e) Aerial photographs of the study area.

f) Geotechnical information of the area from Cape Farm Mapper.

g) Capacity Analysis Report by messers GLS Consulting Engineers.

3. SITE DESCRIPTION

The site is located on a hill, and the current drainage pattern of the site is accepted to be from south to north, north to south and east to west. The highest and lowest points are approximately 40m MSL and 35m MSL respectively.

The site is mostly covered with grass, together with some various fynbos.

The site is within the existing Romansbaai Estate and the location indicated below.

4. GEOTECHNICAL INFORMATION

4.1 General

No geotechnical investigation was done on the site to date, but it is expected that the site will be overlain by coastal Aeolian sand on lime and sandy soils. According to the geology map of South Africa the following can be expected:

Geology Classification (1:1M)

Code:	N-Qb
Lithostratigraphic:	BREDASDORP GROUP
Lithology:	Calcarenite and calcareous sandstone with gravel, pebble and coquinite layers, calcareous aeolianite, dunes of sand and calcareous sand, calcrete

Land Types

Land Type:	Hb36
Description:	Regic sands and other soils
Class:	GREY REGIC SANDS

Soil Types

Symbol:	ED
Class:	Soils with limited pedological development
Description:	Greyish, sandy excessively drained soils
Depth:	>= 750 mm
Clay:	< 15%

Broad Soils Classification (ENPAT)

Soil Type:	Grey regic sands and other soils
Geology:	Calcareous aeolianite of the Waenhuiskrans Formation, partially covered by sand and coastal dunes of the Strandveld Formation, Bredasdorp Group.

For analysis purposes, the following characteristics of the soil on the site are accepted:

- *Soil Group A with low runoff potential. Soils having high infiltration rates even when thoroughly wetted.*

Green Ampt Soil Characteristics:

- *Conductivity = 120.396 mm/h*
- *Suction Head = 49.022 mm*

5. SERVICES

The extent of the existing services was obtained from Overstrand Municipality, Messers GLS Consulting and through various site investigations.

The design of services will be in accordance with the "Guidelines for the provision of Engineering Services for Residential Townships" (Blue book), the UTG7 publication "Geometric Design of Urban Local Residential Streets", the TRH4, and the specific standards of the Local Authority.

5.1 WATER RETICULATION

The proposed internal water reticulation system will consist of an uPVC water reticulation system and be connected to the existing water reticulation system within the Romansbaai Estate.

5.1.1 Water Demand

The following design criteria will be applicable to the envisaged water reticulation system:

LAND USE	NO OF UNITS	AADD	Total AADD (l/day)
Residential Zone 1	6	750 l/day	4 500
TOTAL AADD			4 500
EU			4.5
Fire Flow Requirement			15 l/s

Table 1 – Water Demand for Proposed Development

5.1.2 Network Conveyance

The existing Kleinbaai reservoir water network has sufficient capacity to accommodate the proposed development on Portion 40 OTH 711 in order to comply with the pressure and fire flow criteria as set out in the water master plan.

5.1.3 Bulk Supply System

The Kleinbaai reservoirs are supplied with bulk water from the Franskraal Water Treatment Plant (WTP) in Franskraal. The existing bulk supply to the Kleinbaai reservoirs has sufficient spare capacity to accommodate thye proposed development.

5.1.4 Connection to Existing Water Reticulation

Taking the above into consideration, it is proposed that the water reticulation of the proposed development be connected to the existing water reticulation system within the existing road reserve of the existing road in Romansbaai Estate.

5.2 SEWERAGE RETICULATION

The proposed internal sewerage reticulation system will consist of a gravity uPVC piped system

5.2.1 Sewer Flow from Proposed Development

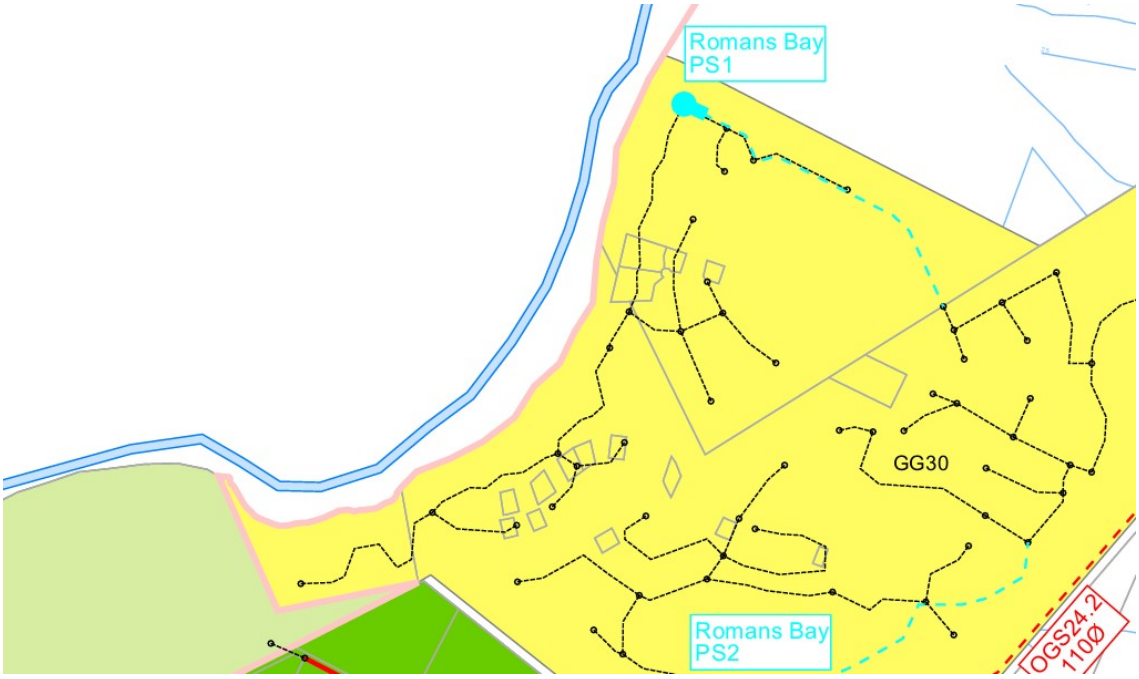
The following design criteria will be applicable to the envisaged sewerage reticulation system requirements for the proposed development:

ESTABLISHMENT	NO OF UNITS	ADDWF	ADDWF (l/day)
Residential Zone1	6	600 l/day	3 600
TOTAL ADDWF			3 600
Peak Factor			2.5
Peak Dry Weather Flow			9 000
Peak Wet Weather Flow (+15%)			10 350

Table 2 – Sewage Flow from Proposed Development

5.2.2 Capacity of Existing Sewerage Reticulation System

There is sufficient capacity in the existing Romansbaai sewerage reticulation system to accommodate the proposed development. The proposed development has already been included in the sewerage reticulation master plan of Overstrand Municipality as indicated on the following sewerage reticulation master plan of Overstrand Municipality.



5.3 STORMWATER RETICULATION

5.3.1 Calculations

Hydrological calculations are executed according to various approved methods (Rational, SCS and Time Area Methods), with each based on its own set of data. The results of each method can only be assumed as an approximation of actual events and a relatively large variation between these methods could occur. Since the catchment area of the study area is less than 8.0 km², the Rational Method / Alternative Rational method can be used in the investigation.

5.3.2 Risks cost estimate and design flood frequencies

Although run-off calculations are performed with great care, it is still possible that the capacity of a system could be exceeded because of non-hydrological reasons. There has to be a limit to the elimination of probabilities as costs could become unrealistically high in comparison with the benefit of lower risks.

Although the relationship between function, risk, original cost and maintenance cost plays a major role in determining the design flood frequency, it is assumed in general that the flood frequencies as discussed in ***Table 3*** below should be provided for under normal circumstances.

The applicable analysis; assessment and design standard will be those given in table 6.1 and 6.2 of the "Red Book" and are as follows:

Land Use	Design Storm Return Period (Major storm events)
Residential	50 years
Institutional (e.g.) schools	50 years
General Commercial and Industrial	50 years
High Value Central Business Districts	50 - 100 years

Land Use	Design Storm Return Period (Minor storm events)
Residential	1 - 5 years
Institutional (e.g.) schools	2 - 5 years
General Commercial and Industrial	5 years
High Value Central Business Districts	5 - 10 years

Table 3 – Typical Stormwater analysis requirements based on land-uses

In the light of the general application and support of the above-mentioned guidelines, it is accepted as minimum acceptable standards for stormwater drainage. Any deviation from these standards should be justified on the basis of economical and risk analysis.

For the purpose of this report these guidelines will thus apply throughout as reference and any deviation from that will be motivated.

5.3.3 Hydrology

5.3.3.1 Climate

The study area is situated in the winter rainfall region of the Western Cape. No extreme rainfall intensities occur. A representative mean annual rainfall (MAP) of **626mm** has been obtained from the Cape Town International Airport's Weather Office.

5.3.3.2 Storm Rainfall

The "Design Rainfall Estimation in South Africa" computer programme which accompanies the Water Research Commission Report titled "Design Rainfall and Flood Estimation in South Africa" by JC Smithers and RE Schiltze, was used to complete a rainfall station search and to obtain storm rainfall depth data.

A summary of the rainfall station search and related storm rainfall data is given in the table below:

	Station Name	Gansbaai	Danger Point	Uilenkraal	ACCEPTED
	SAWA Station No.	0001605_W	0001517W	0001726_W	
Location	**Latitude**	34°35'	34°37'	34°36'	
	Longitude	19°21'	19°18'	19°25'	
	Mean annual Precipitation (mm)	543	463	530	540
	Altitude (m)	17	46	9	
	Distance from Catchment Centroid (km)	0	6.5	7.5	
	Length of Record (years)	72	93	32	
	1 in 2 year	38	38	38	38
	1 in 5 year	54	53	53	54
	1 in 10 year	66	65	65	66
	1 in 20 year	79	78	78	79
	1 in 50 year	98	97	97	98
	1 in 100 year	115	113	113	115

Table 4 – Rainfall records from nearby weather stations

5.3.3.3 Characteristics of Catchment Area

The current drainage pattern of the site for development generally drains from north to south towards the existing natural channel along Swart Street. The gradient of the site currently varies with a mean gradient of approximately 0.5%. The highest and lowest points are approximately 30m MSL and 25m MSL respectively.

The site is mostly covered with grass, together with some various fynbos and alien vegetation.

5.3.4 Stormwater Drainage

5.3.4.1 Analysis of Existing Drainage Systems

Because the catchment area is situated on a hill, stormwater runoff discharge into various directions and contribute very little to the larger catchment area.

The stormwater runoff from the site currently drain from the site as indicated on the photo hereunder with blue arrows:

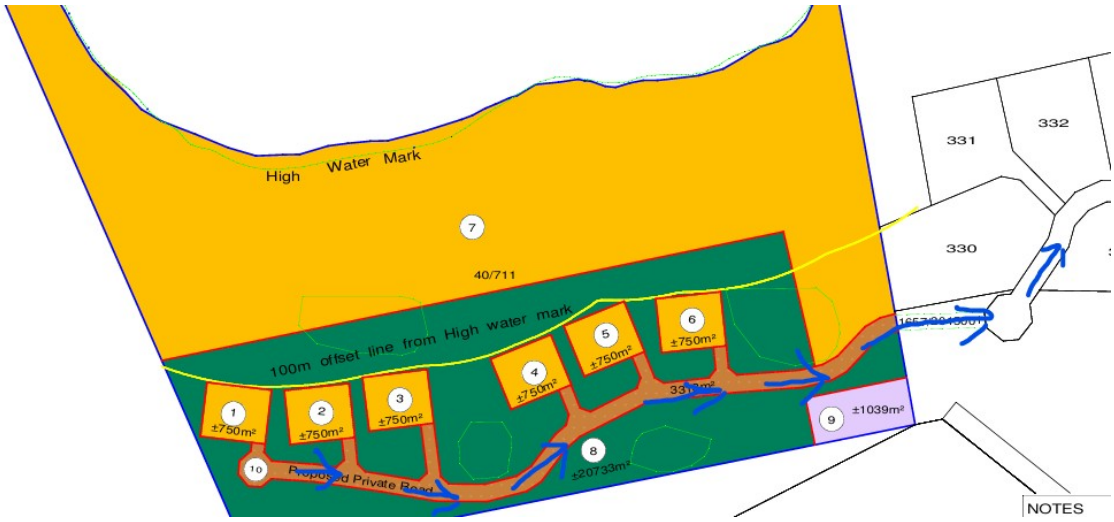
The pre-development runoff from the site is estimated to be as follows:

A	=	25 000m²
L	=	150m (longest)
H1	=	40m
H2	=	35m
H	=	5.0m
S	=	3.333%

Q2	=	0.036 m³/s
Q5	=	0.056 m³/s
Q10	=	0.075 m³/s
Q20	=	0.097 m³/s
Q50	=	0.130 m³/s
Q100	=	0.162 m³/s

5.3.4.2 Post Development Stormwater Runoff

Due to the topography of the site, it is proposed that the stormwater runoff that is collected in the new access road is discharged into the existing stormwater drainage system in the existing roads, as indicated with the blue arrows hereunder.



The post development runoff from the catchment area is estimated to be as follows:

Q2	=	0.061 m³/s
Q5	=	0.096 m³/s
Q10	=	0.128 m³/s
Q20	=	0.166 m³/s
Q50	=	0.222 m³/s
Q100	=	0.277 m³/s

5.4 ROADS

The site consists of one access road which extends from the existing internal streets in the Romansbaai Estate.

5.4.1 Structural Design

The access road be designed according to UC road category standards and is proposed to be as follows:

Material Depth	=	600mm
Subgrade CBR	=	7 - 15
Surfacing	=	80mm Interlocking Paving
Base Course	=	150mm G5
Sub-grade	=	150mm G7 if required

6. CONCLUSION/SUMMARY

From the above, the following can be concluded:

- That the existing water reticulation system has adequate capacity to accommodate the proposed development and be connected to the existing reticulation system.
- That the existing sewage reticulation system has adequate capacity to accommodate the proposed development and be connected to the existing reticulation system;
- That the stormwater runoff from the proposed access road be connected to the existing stormwater system in the existing road in Romansbaai Estate;
  That because of the very low density of the development (2.4 Units/ha), the very permeable soil of the area and the topography of the site the proposed development will have very little effect on the post-development stormwater runoff;
- That the access road be provided according to Paragraph 5.4;

COMPILED BY:

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