



### 4.3 Stormwater

The stormwater catchment area consists of a section of the existing Hemel & Aarde Village development, which is fully developed and the proposed development, which is currently undeveloped. The catchment area was therefore sub-divided into two separate sub-catchment areas, indicated as Catchment Area A and Catchment Area B on the attached Annexure B, Figure 4.

The catchment area receives stormwater run-off from a section of the currently developed Hemel & Aarde Village development, as mentioned above. The stormwater run-off from this catchment area is currently discharged through a 2 x 900mm x 450mm box culvert through the R43 Trunk Road and in turn discharge onto the proposed development site. The stormwater run-off flows through the site as overland flow in a southerly direction towards an existing 5254mm dia. pipe culvert in Bergsig Street. The existing stormwater infrastructure is attached herewith as .....

The characteristics of the two sub-catchment areas can be described as follows:

#### Catchment Area A:

Catchment Area	=	0.045 km <sup>2</sup>
Longest Length	=	0.300 km
Height Difference	=	3.000 m
C (Pre-development)	=	0.800
C (Post-development)	=	0.800

#### Catchment Area B:

Catchment Area	=	0.408 km <sup>2</sup>
Longest Length	=	0.490 km
Height difference	=	5.000 m
C (Pre-development)	=	0.325
C (Post-development)	=	0.800

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

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 compile a rainfall station search and to obtain a storm rainfall depth data. A summary of the rainfall station search and related storm rainfall data is given in the table below:



Station Name	Hermanus (Mun)	Lakeview	Fisherman's Haven	Tussenbeide
SWA Station No.	0006415_W	0006534_W	0006232_W	0006527_W
Latitude	34°25'	34°24'	34°22'	34°17'
Longitude	19°14'	19°18'	19°8'	19°18'
Mean Annual Precipitation (mm)	626	662	556	519
Altitude	24	518	18	183
Distance from Catchment Centroid (km)	5	13	17	21
Length of Records (years)	64	48	27	81
<b>1 Day Storm Rainfall Depths</b>				
1 in 2 year	48.2	42.6	50.1	45.5
1 in 5 year	67.8	62.5	70.6	64.1
1 in 10 year	83.0	78.1	86.4	78.4
1 in 20 year	99.3	95.0	103.4	93.8
1 in 50 year	123.6	120.4	128.6	116.7
1 in 100 year	144.3	142.3	150.1	136.3

The 24 hour rainfall data from the "Design Rainfall Estimation in South Africa" programme is known to contain some disparity with regard to areas along the South Western Cape Coastline in close proximity to mountains. The data obtained from the programme was therefore checked against other available data sources as described below and given in the following table to verify the suitability of its use:

Data Source	Recurrence Period					
	1:2	1:5	1:10	1:20	1:50	1:100
Op Ten Noort	26	34	42	51	68	166
TR 102	24	32	43	55	70	140
Smithers/Schultze	48	68	83	99	124	144
Average	33	45	56	68	87	150

The stormwater run-off from the catchment area during the 1:2 and 1:50 year recurrence interval storm event, during the pre-and post development conditions are as follows:

Pre-development	:	Q2	=	0.212 m <sup>3</sup> /s
		Q50	=	0.702 m <sup>3</sup> /s
Post-development	:	Q2	=	0.368 m <sup>3</sup> /s
		Q50	=	1.220 m <sup>3</sup> /s

Two alternatives for stormwater management are available and are as follows:

Alternative 1:

Alternative 1 entails the following:

- Discharge the runoff from Catchment Area A into the existing 900mm dia. stormwater pipe culvert situated within the R43 road reserve between the Hemel & Aarde Estate and the Onrust River;
- Discharge the stormwater runoff from Catchment Area B into the proposed attenuation facility.



The above proposed attenuation facility entails the as follows:

Size	=	2 000m <sup>3</sup>
Height	=	1.20m
Inlet Pipe	=	750mm dia.
Outlet Pipe	=	300mm dia.
Connect to	=	525mm dia.

The result of the reservoir analysis during the 1:2 and 1:50 year recurrence interval storm events are indicated on the tables and graphs attached hereto as Annexure C and can be summarized as follows:

*1:2 year recurrence interval:*

Inflow	=	0.256 m <sup>3</sup> /s
Outflow	=	0.087 m <sup>3</sup> /s
Max. Depth	=	0.238 m
Storage	=	322 m <sup>3</sup>

*1:50 year recurrence interval:*

Inflow	=	0.851 m <sup>3</sup> /s
Outflow	=	0.158 m <sup>3</sup> /s
Max. Depth	=	0.890 m
Storage	=	1 381 m <sup>3</sup>

Alternative 2 entails the following:

- Discharge the runoff from Catchment Area A through the existing box culvert underneath the R43 to Catchment Area B (the site);
- Discharge the runoff from the existing box culvert into a 825mm dia pipe culvert along the western boundary of the site into a southerly direction;
- Discharge the stormwater runoff from the entire Catchment Area into the proposed attenuation facility.

The above proposed attenuation facility entails the as follows:

Size	=	1 000m <sup>3</sup>
Height	=	1.00m
Inlet Pipe	=	825mm dia.
Outlet Pipe	=	450mm dia.
Connect to	=	525mm dia.

The result of the reservoir analysis during the 1:2 and 1:50 year recurrence interval storm events are indicated on the tables and graphs attached hereto as Annexure C and can be summarized as follows:

1:2 year recurrence interval:

Inflow	=	0.368 m <sup>3</sup> /s
Outflow	=	0.154 m <sup>3</sup> /s
Max. Depth	=	0.194 m
Storage	=	193 m <sup>3</sup>



1:50 year recurrence interval:

Inflow	=	1.220 m <sup>3</sup> /s
Outflow	=	0.308 m <sup>3</sup> /s
Max. Depth	=	0.842 m
Storage	=	842 m <sup>3</sup>

It is our proposal that Alternative 1 be implemented.

#### 4.4 Roads

The proposed development will gain access from Sandbaai main road as well as from The R43 with a left in and left out. Both the Sandbaai Main Road and the R43 intersections will be upgraded according to the proposals of the Traffic Impact Assessment prepared by iCE Group.

All internal roads and parking areas will be surfaced with 30mm Asphalt and the following road sub-structure will be provided (according to the TRH 4):

- 150mm G4 Base course compacted to 98% Mod AASHTO density
- 150mm G5 Sub-base compacted to 97% Mod AASHTO density
- 150mm G7 Upper selected sub-grade compacted to 95% Mod-AASHTO density (100% for sand)
- 150mm G9 Lower selected sub-grade compacted to 93% Mod AASHTO density (100% for sand)

The delivery road will be surfaced with 40mm Asphalt and the following road sub-structure will be provided (according to the TRH 4):

- 150mm G2 Base course compacted to 98% Mod AASHTO density
- 150mm C4 Sub-base compacted to 97% Mod AASHTO density
- 200mm G7 Upper selected sub-grade compacted to 95% Mod-AASHTO density (100% for sand)
- 100mm G9 Lower selected sub-grade compacted to 93% Mod AASHTO density (100% for sand)

#### 4.5 Telkom

Telkom reticulation is available adjacent to the site. The Telkom network will be installed and be connected to the existing external system.

Telkom uPVC service ducts will be installed with regular inspection chamber/draw boxes, according to the required specifications and connected to the existing network.

#### 4.6 Electricity

The reticulation system will be installed underground in accordance with the provisions of the relevant supply authority.

According to experience from the developer, approximately 850 KVA is required for the proposed shopping centre.

According to Overstrand Municipality, the existing electricity supply is under pressure but a project is registered for upgrading.



Due to the above, the Municipality made 500 KVA available for the proposed shopping centre. The remainder of approximately 350 KVA is planned to be supplied via alternative energy supply methods, which will include standby generators, solar panels, energy saving lighting systems and sufficient airflow systems through architecture.

**5. CONCLUSION**

All the required services are available for the proposed development.

We trust that the report will be to your satisfaction and will gladly provide any further information required upon request.

A handwritten signature in black ink, appearing to read 'Pieter Engelbrecht', written over a horizontal line.

**Pieter Engelbrecht**  
**For**  
**iCE Group (Boland)**



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**ERF 1447, SANDBAAI  
LOCALITY PLAN**

**ANNEXURE A**



Erf 1291  
(Sandbaai Commonage)

Erf 1447  
Proposed Shopping  
Centre

Proposed Ø100mm  
sewer (Open 1)

Proposed Ø100mm  
sewer (Open 2)

Existing Ø110mm

Existing Ø110mm

Existing Ø110mm

Existing Ø160mm

Existing Ø160mm

Existing Ø160mm

Existing Ø110mm

Main Road

Bengsig Street

R42 (Trunk Road)

Project / PO No. 1273  
 18/04/2008  
 Project/Drawn / Sheet /  
 7200  
 Title : 028 - 312 2325  
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ENGENI GROUP (PTY) LTD

**ERF 1447, SANDBAAL  
PROPOSED EXTERNAL SEWERAGE RETICULATION**

**FIGURE 1**



ERF 1291  
(Sandbaai Commonage)

ERF 1447  
Proposed Shopping Centre

**ERF 1447, SANDBAAL**  
**PROPOSED EXTERNAL WATER RETICULATION**

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 Paarl  
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**FIGURE 2**



