6 STORMWATER MANAGEMENT

6.1 PROPOSED STORMWATER DRAINAGE PLAN

Provision of stormwater infrastructure will adhere to the DoHS minimum design and construction standards and will include relevant guidelines as specified in the drainage manual and red book.

Stormwater for the development will generally be managed on a catchment-wide basis and will take into account the surrounding built and natural environment. Stormwater infrastructure proposed for the sites will comprise of combined surface drainage on surfaced roads and underground pipe systems.

All streets in the development will be designed to act as stormwater collectors and conveyors. To achieve this, the low side of the streets will be placed below the natural ground level to receive stormwater runoff from the tributary areas. The roads will have catch pits incorporated on the lower edges for stormwater to drain into pipe systems. Stormwater conveyed in the pipes will run through the site and will discharge into acceptable receiving bodies such as open fields, rivers or existing stormwater networks.

Minor storm events will be catered for in the buried pipe networks. The network will be sized to accommodate a 2 year flood recurrence interval. In this scheme road networks will not be allowed to flood.

For Major storms events, the road networks together with the underground stormwater pipes will be designed to accommodate a 50 year flood recurrence interval. Further to this, excess runoff from a major storm event, which will be conveyed within the roadway will not exceed a depth of 150mm above the highest point. Under such conditions, inconvenience to residents is acceptable but access by emergency vehicles should not be completely hindered.

Design criteria recommend for the stormwater pipe network is specified in Table 6.1. A concept stormwater design for the development is given in Annexure C. The design takes into account the stormwater master planning that was previously conducted for this area. Hence pipe routing, sizing and discharge points were influence by the master plan.

Table 6.1: Typical stormwater design guideline

Element	Design Criteria
Mannings coefficient of friction (n)	0.012
Minimum diameter (incl catchpit connections)	450 mm (nominal dia.)
Pipe Diameters – Main lines	Standard diameters of 450, 600, 750, 900, 1050 and 1200 mm to be used, thereafter box culverts
Pipe / culvert material	Reinforced concrete (Bearing SANS mark)
Pipe joint type	Spigot and socket (including rubber ring)
Pipe class: (all diameters)	Generally 100D inside road reserve, 75D outside of road reserve
Culvert Class	Generally 100S (Loading conditions for each application to be confirmed)
Bedding type	Class C (SANS 1200 LB)
Position in road reserve	Offset behind kerb (see BM-R1-series)
Minimum slope for catchpit connections	1:100
450mm dia. and larger	Minimum velocity criteria applies
Minimum velocity (80% full flow)	0.9m/s
Maximum velocity (Without checking for hydraulic jump)	3.5m/s
Maximum velocity (Checking for hydraulic jump)	5.0m/s (Minimum pipe class 100D)
Anchor blocks	450mm dia and larger pipes steeper than 1:8
Minimum cover (road intersections)	1000mm
Minimum cover (general)	750mm
Maximum distance between manholes	90m

6.2 STORMWATER MANAGEMENT POST DEVELOPMENT

It is known that developing a piece of land for housing purposes ultimately results in an increase in both, the overall peak flow rate and quantity of stormwater runoff. Where a high level of service is required, buried piped systems with above ground kerb inlets are commonly installed to manage the surface runoff generated during minor storm events.

As a consequence of collecting the stormwater, flow at the discharge points become concentrated and often results in erosion and scouring of the surrounding environment. In addition to this, hydraulic routing for stormwater runoff during the major storm event is an important aspect to ensure that the risks associated with flooding are mitigated or minimised.

Ten piped discharge points were identified for the proposed development. They are illustrated in the stormwater catchment drawings given in Annexure C. The discharge for the major and minor flood events at each discharge point was computed using the rational method. The results are shown in Table 6.2.

A stormwater masterplan for the development has been carried out previously. It is an intricate scheme, which utilises attenuation ponds, concrete lined channels and piped networks. The proposed conceptual stormwater management designs, given in Annexure C, adopts the overall master planning for this site, however, various alterations were necessary due to changes of the cadastral.

Table 6.2: Discharge quantities for minor and major floods

Catchment No/ Discharge point	Area (km^2)	Q_2 (m^3/s)	Q_{50} (m^3/s)
1	0.01	0.26	1.25
2	0.009	0.23	1.10
3	0.012	0.33	1.60
4	0.023	0.61	2.91
5	0.011	0.30	1.45
6	0.011	0.28	1.35
7	0.014	0.38	1.82
8	0.002	0.06	0.30
9	0.013	0.34	1.62
10	0.09	0.24	1.17

7 WATER

7.1 BULK WATER SERVICES

According to a bulk water analysis of the existing infrastructure, by GLS (Annexure E), it was proposed that the development be accommodated in a new reservoir and booster zone. Hence, a new reservoir and booster pump is required.

Water will be supplied from the central Water Treatment Works (WTW) in Plettenberg Bay. The WTW has a treatment capacity of 27 Ml/d and has sufficient capacity to accommodate the overall demand from the proposed developments. However, the existing bulk water supply pipes does not have sufficient capacity. Figure 1 in annexure E illustrates the proposed upgrades to the bulk supply network.

Implementation of the master plan items shown in Table 7.1 were recommended to accommodate the proposed development. There were split into two phases.