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Our ref. : 210708
Your ref. : STONEWOOD ENG REPORT
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P-J LE ROUX TOWN AND REGIONAL PLANNERS
262 Main Road
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Attention: Mr. P-J Le Roux

Sir

**APPLICATION FOR THE DEVELOPMENT OF ADDITIONAL BLOCKS OF FLATS,
STONEWOOD DEVELOPMENT, ERF 38791 KRAAIFONTEIN
SERVICES REPORT ON THE PROVISION OF CIVIL ENGINEERING SERVICES**

Introduction:

The previous development parameters on erf 38791 was influenced by the position of the 1:50 yr and 1:100 yr flood lines and therefore, resulting in a limited area available for construction, only allowing the development of 90 flats on the property.

It was determined that the later construction of the Stonewood Drive bridge will cause stormwater to overtop the Stonewood Drive road, resulting in increased flood levels within in the Stonewood Estate and specifically on erf 38791 during a major flood event. After a long negotiation process which included updated stormwater specialist's reports, an agreement was reached between the City and other stakeholders that I & C Developers may proceed with a development application however, with specific conditions. The main condition is that the developer will have to construct a flood berm as mitigation of the said flood risk and possible damage to private and municipal infrastructure. The construction of the berm which will result in the adjustment of the previous flood line positions, will result in land becoming available for further development of erf 38791. Annexure A attached to this report provides the full history of the above-mentioned negotiation process and agreement.

The above-mentioned agreement and approvals by the City's Catchment, Stormwater and River Management Branch and Roads Infrastructure Management Branch does not constitute the approval of any development application and the normal Town Planning process must follow.

This report is required in support of the Town Planning application by P-J Le Roux Town and Regional Planners to allow I & C Developers to develop **96 additional flats** as indicated on the proposed Site Development Plan (SDP) No. 01 – Project 01274 by Danie de Wet Building Designs.

The design of roads and other civil services will be in accordance with the “Guidelines for the provision of engineering services and amenities in residential township developments” (Red book). These guidelines will be used in conjunction with the relevant Municipal standards and requirements.

Implementation of the said bulk upgrades, funding and maintenance responsibilities must be formalized between I & C Developers and the City by means of a Service Level Agreement (SLA).

This report covers the engineering services aspects for the development as indicated on the proposed civil service layout plan no. 240710-CS01 Rev A attached as Annexure B.

1. Roads and Access

The existing access to the Stonewood flats development is from within the greater Stonewood development. A second left-in, left-out access point directly off Stonewood Drive is proposed (Refer to ITS Engineer’s TIA report).

Four existing parking bays will be lost were the new proposed road will join with the existing internal private road. These parking bays will be relocated by incorporation within the new proposed parking layout. Refer to the SDP for the numbering of the parking bays.

The new roadways will have a minimum width of 7,50 m and will be incorporated into the existing private road network. The new roads will have precast concrete barrier kerbs with asphalt surfaces and permeable paving on the parking bays located on the lower end of the parking area. The design criteria for the road will be as follow :

Layout :

- Minimum longitudinal grade of 0,5%.
- Minimum cross grade of 2%.

Materials :

- 80 mm permeable concrete brick paving on stone drainage bedding layers
- 30 mm Asphalt surface on
- 125 mm thick G4 basecourse layer compacted to 98% Mod Aashto density on
- 150 mm G5 sub-base compacted to 95% Mod Aashto density on
- 200 mm G7 selected material compacted to 100% Mod Aashto density

2. Stormwater

The existing stormwater management system consists of concrete v-channels, catchpits, manholes and reinforced concrete spigot and socket pipes. These pipes discharge stormwater to the existing private stormwater detention ponds of the larger Stonewood development. No adjustment to the existing stormwater pipe system is required

The existing north-eastern parking areas have permeable paving, stone drainage layers including sub-surface drainage pipes which connects to the above-mentioned stormwater pipe system. At the northern corners of three of these parking areas, overland escapes were constructed to discharge overland flow onto the undeveloped land to surface-flow in the direction of the Mosselbank Channel. This run-off as well as the run-off from the proposed development will be discharged to a new proposed swale pond/channel and a detention pond located within the new proposed development. An emergency grass block overflow channel will direct excess flood water eastwards to discharge at the Mosselbank channel.

Provision in the stormwater design of the development will be made for minor and major storms. The minor stormwater system will be designed as an underground pipe system that will collect the water via a system of catch pits, manholes and pipes to accommodate the runoff of a 1 in 5-year storm event.

The major stormwater system will predominantly consist of suitably shaped roads to accommodate surface runoff of storm events in excess of the 1 in 5-year storm events.

Stormwater runoff was calculated using the Rational Method. The site was analysed for pre-development conditions and post-development conditions and the results were compared. The mainly undeveloped portion of the erf was considered during the calculation, along with some developed parts which directly impact the study area.

Some of the initial parameters include:

PARAMETER	PRE-DEVELOPMENT	POST-DEVELOPMENT
Area (m ²)	11 935	
MAP (mm)	520	
Longest Watercourse (m)	225	185
Average Slope (m/m)	0.0052	0.0055
Proportion Rural (α)	0.58	0.00
Proportion Urban (β)	0.42	1.00

Runoff generated before development was calculated to be ($Q_{pre} =$) 0.056 m³/s. Coupled with a time of concentration of ($T_{c-pre} =$) 573 s, this yields a stormwater volume generated of ($V_{pre} =$) 32.3 m³. Post-development runoff ($Q_{post} =$) 0.177 m³/s and time of

concentration ($T_{c-post} =$) 483 s, results in a generated stormwater volume of ($V_{post} =$) 85.6 m³.

Comparing the two results and subtracting pre-development volume from post-development volume ($V_{post} - V_{pre} = 85.6 - 32.3$), shows the required volume of stormwater detention is ($V_{req} =$) **53.3 m³**.

The design criteria for the stormwater will be as follow :

Runoff and Flow :

- The minor system is designed to cater for a 5-year return period with a maximum overland flow distance of not more than 35 meters between catchpits.
- Stormwater flow velocities in the roadway and side channels will be kept as low as possible to prevent scour and erosion.
- The road will be graded to ensure a free and continuous flow of stormwater towards the main drainage route as well as to prevent the ponding of water.

Materials :

- Stormwater pipes will generally be Class 100D precast reinforced concrete pipes with Spigot and socket joints, laid on Class C bedding.
- Minimum pipe diameter is 300 mm between catchpits, manholes and headwalls.
- The minimum cover on stormwater pipes is generally 0,6 m.
- Pre-cast concrete ring or masonry manholes will be used.

3. Water

The existing water supply point for the Stonewood Flats is located inside the larger Stonewood development therefore part of the existing private services. The private potable and fire water reticulation pipes inside the Stonewood Flats development will be extended to supply the new proposed 96-flats development. No new bulk water connection off the private network will be required. The new internal water network for the proposed development will consist of uPVC pipes, air valves, fire hydrants and metered water connections. Fire hose reels will be provided on every floor of each block of flats as required in the SANS 10400 Part T.

The new internal water mains will be incorporated into the Estate's existing private water reticulation network and will be maintained by the homeowner's association (HOA).

The estimated annual average daily domestic water demand (AADWD) for the proposed flats will be 57,6 Kl/day.

The design criteria for the water reticulation will be as follow :

Consumption & flow :

- An average daily consumption of 600 ℓ/day per flat.
- A peak factor of 2.50
- Maximum static head of 90 m.
- Minimum static head of 25 m.
- Maximum flow velocity of 1,2 m/s in pipes.
- Consumption metering will be done with individual domestic meters for the individual flats.
- Fire risk will be determined as specified in the SANS 10090:2003. The flats development will be classified as Fire risk Category C and the fire flow of 6000 ℓ/min for 2 hours is required.

Materials :

- Minimum pipe diameter of 110 mm.
- Pipes are SABS approved uPVC class 12 pipes on class C bedding.
- Minimum cover on water pipes to be 0.8 m.
- Specifications for isolation valves, air release valves (if required), fire hydrants and valve and hydrant chambers will be compatible with the Local Authority standards.
- On completion of construction, the Engineer will supervise and certify the scouring, chlorinating and testing of all water lines.

4. Sewerage

The estimated peak dry weather sewage flow of the development is calculated to be 46 kℓ/day (for the 80 new units).

The internal sewer network will be a gravitational pipe system that will discharge foul sewer into the larger Stonewood Estate's pipe network.

The design criteria for the sewer network will be as follow:

Discharge & Flow:

- An average discharge of 0.48 m³/day per erf.
- An un-attenuated peak factor of 3,25.
- An infiltration rate of 15%.
- A minimum flow velocity of 0,7 m/s achieved at least once per day.
- A peak flow velocity of 0.23 ℓ/sec.

Materials :

- Pipes are standard lengths, Class 34 heavy duty, solid wall uPVC pipes.
- Minimum pipe diameter is 160 mm for main lines and 110 mm for erf connections.
- A minimum cover of 0,8 m over all pipes.
- Maximum distance between manholes of 90 m.
- Design is such that maximum manhole depth does not exceed 2,0 m to invert.
- Precast concrete ring manholes (suitably waterproofed) will be used.
- On completion of construction, the Engineer will supervise and certify the testing of all sewer lines and the pump station.

5. Household Refuse

Refuse truck enters the estate for the collection of refuse from the refuse yard located at the entrance of the flat's development, for disposal at the municipal landfill site. A new refuse bin room is proposed at the entrance to the newly proposed flats within the existing flats development, for storage of refuse bins.

6. Communication network

The communication (data & telephone) cabling network within the development will be via an underground sleeve system with draw boxes. The existing private internal sleeve network will be extended to provide a connection to each of the new flats.

Yours faithfully



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