STELLENBOSCH MUNICIPALITY

Stellenbosch Regional Cemetery: Louw's Bos: SERVICES REPORT

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STELLENBOSCH MUNICIPALITY

STELLENBOSCH REGIONAL CEMETERY: LOUW'S BOS: SERVICE REPORT

SYNOPSIS

The purpose of this services report is to provide detail on the type of development to be provided, as well as providing a design philosophy with regards to the management of storm water and sewage from the development and provision of water and roads to the development.

PROJECT 000/00000/0 – iX engineers FORMAL REPORT TEMPLATE

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1. PURPOSE OF REPORT

The purpose of this report is to summarise the status of all existing services, as well as to provide standards of the services proposed for the development of a regional cemetery for the Stellenbosch Municipality.

2. LOCATION, TOPOGRAPHY AND LAYOUT

A site on Louw's Bos has been identified as a regional cemetery site. The site is approximately 111 ha in size and is situated 8 Km south of Stellenbosch adjacent and opposite Annandale Road.

The area surrounding the proposed site consist mainly of agricultural land, dams, wetlands and buffer areas.

The geotechnical conditions of the site itself is unknown and a geotechnical investigation of Louw's Bos needs to be done in order to establish the soil profile and the soil properties. Early indications are that the terrain consists of sand or sand with a clay content. The materials are therefore pervious which would be conducive for migration of water in this material.

Sandy material overlays the bedrock below. Water will possibly drain through the sandy material up to the bedrock, from where it decants to the closest stream.

Profiling of the material will include the determining of the level of the water table. Additional testing if groundwater will be required to determine yield and quality of groundwater, for consumption and irrigation purposes.

The existing topography for the site of Louw's Bos is predominantly in a north direction with even slopes towards Annandale Road. This topography will be used to accumulate stormwater on site and channelled to 3 detention facilities.

A Land-surveyor had been appointed by Stellenbosch Municipality to do a topographical survey of the site to confirm drainage patterns on site. Topographical surveys will be utilized to design possible earthworks for the development, as well as provision of civil engineering services.

The town planners have produced a draft layout plan for the development which consist of different zones catering for a memorial park centre, chapel, offices workshops, different types of graves and informal zones. This preliminary layout plan is being used to propose the necessary services to be provided.

3. STREET LAYOUT AND DESIGN

Geotechnical investigations will be performed to verify underground conditions and will be used to determine the foundations for roads and buildings proposed. Imported material will be required to provide proper pavement structures to accommodate traffic loading and meet the minimum design standards of Stellenbosch Municipality.

In order to meet minimum drainage requirements and to provide areas for buildings, burial zones and gathering spaces, bulk engineered earthworks will be unavoidable, however it is foreseen at this stage that the current slopes towards the north will be maintained in order to minimize on the amount of earthworks to be performed.

The access road proposed for the facility will integrate with Annandale road where turning and deceleration lanes will be provided. Proper access control to the cemetery is however essential and a proper intersection design will be a requirement from Department of Transport. The Provincial Roads Authority approval for access will depend on the position of the access road, allowing for proper stopping sight distances, deceleration and turning lanes.

The access road has therefore been positioned from the north eastern part of the development to the cemetery. The horizontal and vertical alignment of Annandale road has been taken into consideration, as to adhere to Department of Transport prerequisite.

The Access road will lead to the entrance of the cemetery and parking area for visitors. The standard of road to be provided later in this report.

Internal roads will be provided which will provide access to the memorial park, offices, workshops and offices. A combination of paved areas is proposed for esthetical purposes. The necessity of paved parking areas will be investigated in order to accommodate the turning movements of busses in the parking area. The main access road can be provided with a tarred surface with barrier kerbs and a channel alongside for transportation of the storm water to the irrigation reservoir.

4. STORMWATER

It is envisaged that as part of the facility, the Fynbos will be rehabilitated, and water harvested from the land will be used to irrigate Fynbos and other vegetation.

The overall philosophy that will be followed for the development is to transport storm water from hardened surfaces (roofs of buildings and roads) to detention facilities where storm water can be polished and used for irrigation of trees, vineyards and the Fynbos. The option of providing permeable paving will be investigated in order to transport storm water from the development.

Surface storm water from the areas earmarked for graves and informal areas will be taken via swales or rock lines channels to the storm water reticulation system. It is envisaged that monitoring holes be provided on site in order to track quality of groundwater, upstream and downstream of the regional cemetery.

Subsurface drainage will have to be provided to a piped system in order to manage subsurface flow. Soil tests and profiling of the terrain will be performed to establish the exact condition of the in-situ material and water table. The design of pavement structures and other amenities will take cognizance of the prevailing geotechnical conditions in order to provide a stormwater network to the detention facilities. The facilities are earmarked to be adjacent the northern boundary of the development in close proximity to Annandale Road.

5. SEWER RETICULATION

There are currently no existing sewer network services on the terrain or any municipal reticulation system close to the proposed site for development. It is therefore prosed that a sewer package plant be constructed on site which can treat the effluent from the offices/toilets. It is furthermore proposed that the sewer treatment occurs downstream (North) of the offices. The treated effluent will be taken to the detention facility from where it be used for irrigation.

A reticulation underground system will be provided, in order to collect sewage from all buildings using sewer pipes and manholes. It is foreseen that a network of 160 mm piping will be adequate with smaller 110mm individual connections to different buildings.

6. WATER RETICULATION

Adjacent Annandale Road, a main water line can be found which could possibly be used for provision of water to the cemetery. Capacity of this line will however have to be established with the local authority. As an alternative, boreholes(s) can be drilled in order to provide water to the cemetery. Investigations will however be required to determine the position(s) of the hole(s). Investigations must be done in order to check quality of water and the yield.

From the boreholes municipal line, water will be pumped to the offices and toilets via an underground pipe system. Analysis during the design stage, will verify the required sizes of the water lines.

During the investigation phase of the project, the detail of water provision will be finalized.

7. GEOTECHNICAL

A comprehensive geotechnical site investigation must be undertaken with the objective of determining site geotechnical conditions and facilitating the choice and design of foundations and surface beds for the planned structures. The findings of the geotechnical report will be used to determine the founding detail of the buildings and roads, as well as excavation detail for engineering services and backfill of trenches.

8. TELKOM SERVICES

Telkom and other service providers will be approached with a layout of the development and will have the opportunity to provide a distribution system within the development. The necessary sleeves will be provided at street crossings.

9. ELECTRICITY

The electricity supply authority for the development is Escom. The required bulk electrical infrastructure strengthening/upgrades will be investigated, and infrastructure will be proposed.

It is however envisaged that the provision of electricity from a solar system will be favoured. Provision of electricity by means of solar compared to the normal installation and maintenance costs of electricity from Escom will be done. During the design phase, both options will be investigated, and the most cost-effective solution will be followed, considering safety and maintenance of the system.

10. PROPOSED SERVICES

10.1 STREETS

10.1.1 Minimum Standards

- Minimum longitudinal gradient: 0,5%.
- Cross-fall on streets must be 2,5 %.

10.1.2 Road and Street Name Signage

- All approved street name signs shall be cast in kerb type with white lettering on "Kingfisher blue" PVA background.
- All lettering to be 75 mm high, white on blue reflective background.
- All road markings must be repainted just before the end of the Defects Liability Period.

10.1.3 Pavement Layers

- Bituminous surface treatments in the form of Chip and Spray, slurry, Cape Seals or sand asphalt are not acceptable.
- Pavement layers shall be as per the attached table.
- Asphalt surfacing must be laid with a paver. Asphalt only to be considered for the main access road
- 80 mm Interlocking paving will be provided in the parking areas, as well as all load bearing areas.
- 60 mm paving will be provided for pedestrian areas/walkways.

10.1.4 Street Design Layout

- The street layout will consist of the main access road leading to the gateways, the bus and general parking areas. The main access route for the development will connect onto Annandale Road.
- The intersection will be designed in order to provide slip lanes and acceleration lanes, in order to provide safe in and out movement to and from the facility. Minimum stacking requirement will be followed as prescribed by the Department of Transport.

10.2 STORMWATER AND SUBSURFACE DRAINAGE

10.2.1 Pipes

- Minimum pipe size to be OD 375 mm ∅.
- Pipes must be laid crown- to –crown.
- Spigot and socket pipes with rubber ring joints must be used. Interlocking joint pipes (Ogee) is not acceptable.
- Minimum gradients for pipelines must ensure self-cleansing velocity of at least 0,9 m/s and not exceed scour velocity of 3,5 m/s at full flows.
- Minimum cover to pipes to be generally 750 mm and at road intersections cover to be 1000 mm.
- The pipes must be positioned under the roadway.
- Pipes may not run "through" a catchpit. Pipes must be connected to catchpits by means of a manhole (situated in the roadway), except at the beginning of a stormwater line.
- uPVC to SABS 1601, "Corflo" or similar with smooth internal bore with holes or slots, complying with the requirements of SABS 791 shall be used in subsurface drains.
- Sausage and fin type subsoil drains are not permitted.
- The drainage medium to be 9.5 mm stone complying with SABS 1083.

10.2.2 Manholes/Catchpits

- Manholes to be standard brick manholes with precast top slabs, with calcamite step irons placed at 300 mm c/c below manhole opening. Alternatively, precast ring type manholes may be used (minimum ∅ 1050 mm).
- Catchpits to be side inlet kerb type with precast concrete cover and slab. Full benching shall be constructed throughout the catchpit. Details as per Stellenbosch Municipality
- No junction boxes will be allowed in stormwater lines. Catchpit positions will be determined from run-off calculations and financial implications.

- Inlets may not be positioned on bell mouth radii.
- Manhole cover and frames to be SG Iron (ductile iron), type 2A, GJ rotating wedge lock system.
- All kerb inlets to be "Stirling" type, galvanised metal hinged cover and frames, for single and double inlets.

10.2.3 Detention Facilities

It is proposed that a storm water detention facility be used for attenuation of storm water.

10.3 FOUL SEWER

10.3.1 Minimum Design Criteria

- Minimum gradient for pipelines must ensure a minimum velocity of 0,7 m/s.
- Minimum acceptable starting gradient for 100/110 mm ∅ = 1:100 with a limiting gradient of 1:180 for 150/160 mm ∅ pipes. Where possible, 1:80 gradients will be used at the start of all sewer lines.
- Minimum cover to pipes to be 1 000 mm.
- Minimum building connection depth to be generally 1,0 m (invert level to lowest ground level on premises) and where topography requires, 80 % of the premises must be able to drain towards the connection.

10.3.2 Pipes

- Pipes to be positioned in the middle of one of the carriageways.
- Minimum pipe size for collecting sewers to be 150/160 mm.
- Minimum pipe size for building connection to be 100/110 mm.
- The following pipes may be used:
    - Bitumen dipped Fibre Cement – series 4 pipes with Triplex couplings
    - Class 34 heavy duty uPVC

10.3.3 Manholes

- Manholes to be
    - Dolomitic precast concrete rings
    - Fibre Cement manholes (full resistance to flotation provided)
    - Brick manholes (wall must be plastered internally)
- Manhole cover and frames to be SG Iron (duct tile iron), type 2A, GJ rotating wedge lock system to EN 124 D400.
- Manholes to be constructed as per details of Stellenbosch Municipality, Water Services.
- All manholes to be provided with calcamite (or polypropylene) step irons.
- Maximum spacing between manholes to be 90 m. (according to Stellenbosch specifications).
- Maximum chimney height may not exceed 400 mm.

10.3.4 General

- All amenities with wet areas to be provided with water and sewer connections.
- All manholes to be water tight.
- Double connections will be allowed terminating with an endcap. Connections to be visible and clearly marked.
- Rodding eyes to be provided with split sewer connections.

10.4 WATER

10.4.1 Minimum Design Criteria

- Minimum cover to pipes shall be 900 mm, with maximum 1000 mm.
- Connection for buildings to be laid to cross roadways with a minimum cover of 800 mm terminating 1,0 m inside the boundary at a depth of 400 mm.

10.4.2 Pipes (Standard specifications for uPVC pipes and pressure bends and cast iron fittings and specials Stellenbosch Municipal standards shall apply)

- Minimum pipe size to be 110 mm ∅.
- uPVC Class 12 heavy duty pipes to be used.
- Pipes generally to be positioned 1,0 m off the road reserve boundary.

10.4.3 Valves (Standard specification for gate valves Stellenbosch Municipal standards shall apply)

- Isolating valves should be provided to ensure that not more than 4 valves must be closed to isolate any section.
- Valves to be positioned opposite splays and where possible outside paved areas.
- Spindle top to be maximum 450 mm below beltoby cover.
- Valves to be clearly marked and visible.

10.4.4 Fire Hydrants

- Fire hydrants to be pillar type, fitted with tamper proof quick coupling type hydrant outlets, painted yellow.
- All fire hydrants shall be 65 mm diameter (internal)Fire hydrants shall be positioned such that the spacing does not exceed 180 m, and where possible care must be taken not to place them in front of driveways.
- Fire hydrants are to be anti-clockwise closing – Ainsworth RSV type with London round thread" with loose cap and securing chain.
- Fire hydrants to be placed on high/low points and at pipe ends in cul-de-sac roads.
- Hydrant outlet to be between 400 and 600 mm below hydrant cover.
- Hydrant chambers to be in accordance with Drawing W2.

- Hydrant covers shall be ductile iron conforming to EN 124 and painted with yellow oil paint. Covers to be secured to the frame with a galvanised chain or cable.

10.4.5 Connections to Buildings

- Building connections shall be installed according to all wet service areas of buildings
- All water connection pipes to be HDPE PE 100 PN16 pipes.
- Saddles must be ductile / cast iron, secured with stainless steel bolts and nuts, and wrapped in "Denso" tape or similar approved.
- Single connection to be minimum 20 mm nominal.
- Double connections to be minimum 22 mm nominal ∅ splitting to 2 x 20 mm nominal diameter connection.
- All connections to be clearly marked on kerb by a cutting slot. The slot must be painted with an approved paint.

10.4.6 General

- Valve cover and frame to be painted King blue with a 200 mm wide blue strip painted on the kerb face.
- Hydrant cover and frame to be painted yellow with a 200 mm wide yellow strip painted on the kerb face.
- Valve and hydrant chambers to be constructed as per Stellenbosch Municipal standards.

10.5 ELECTRICAL

All electrical infrastructure will be designed and installed in order to provide electricity to buildings and other amenities such as pump rooms and guard houses. The terrain for the development is within the Escom Provision Area and the option of connecting to Escom power will be investigated. It is however envisaged that a solar system and/or wind turbine system be provided in order to provide electricity to the development.

During winter months sunlight might necessitate the introduction of a wind turbine to provide electricity. The cost of this installation will be compared to the rates from Escom as a supplier and installation costs. The position of the closest Escom connecting point will contribute to additional costs, if connecting electrical lines

need to be established. During the design phase of the electrical distribution network, both options will be investigated.

10.6 RESOURCE EFFICIENCY

The proposed development will address, inter alia, water, energy and resource demand management and efficiency measures to ensure that all devices and fittings are energy and water efficient, including, but not limited to the following:

- All toilets will have interruptible flush mechanisms, or the cistern will be supplied with a fitted weight to interrupt the flow.
- Dual flush toilet cisterns.
- All taps will include an aerator to reduce the flow of water to 6 litres / minute.
- Shower heads will have restrictor or aerators to reduce water flow to 10 litres / minute.
- Energy saving light bulbs such as CFL's and LED's will be installed instead of incandescent bulbs.
- Outdoor lighting will be restricted to a minimum.
- Rain water will be harvested from roofs and taken to the irrigation reservoir.
- Adequate thermal insulation will be provided in roofs.
- Provision for installation of future solar geysers will be made.

10.7 CABLE DUCTING

Marking of cable ducting will be as follows:

- Communication ducts
    - 5mm thick T, cut out on kerb and painted green. Draw wire attached to a wooden marker with a 200 mm green painted top.
- Electrical ducts

- 5mm thick V, cut out on kerb and painted red. 2,5mm galvanised steel draw wire attached to a wooden marker with a 200 mm red painted top, end sealed with polyurethane plugs or double layer of warning tape bound with wire.

- Valve
  - Beltoby to be painted blue with 5 mm wide V cut on kerb and 250 mm wide blue strip painted on kerb directly opposite valve.

- Hydrant
  - Cover to be painted yellow with standard FH marking as per SARTSM marked on road surface directly opposite hydrant.

Appendix 1 - Minimum Requirements for Road Cross Sections

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TABLE 1: MINIMUM REQUIREMENTS FOR ROAD CROSS SECTIONS

Road class	Function	Road reserve width (m)	Blacktop width	Camber/ crossfall	Kerb type	Pavement layers	Surfacing	Minimum bell mouth radius
4	Main access	N/A	8 m	Cross fall	BK2 + C1	150 mm G4 basecourse 150 mm G5 subbase 150 mm G7 selected	40 mm premix	10 m
4	Internal Roads	N/A	TBC m	Cross fall	BK2 + C1	150 mm C4 basecourse 150 mm G5 subbase 150 mm G7 selected	80 mm pavers	10 m