



**CK RUMBOLL AND PARTNERS**

## **Proposed Extension of Silo's Cemetery (RE/71/158): Ashton: Services Report**

Ref. Revision 0

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**COMPILED FOR:**

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**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.

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**PROJECT 000/00000/0 – PROPOSED EXTENSION OF SILO’S CEMETERY (RE/71/158): ASHTON: SERVICES REPORT**

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REV	DESCRIPTION	ORIG	REVIEW	iXengineers APPROVAL	DATE	CLIENT APPROVAL	DATE
A	Issued for internal review	<u>M. Bekker</u> Author	<u>D. Rossouw</u> A Reviewer	<u>                    </u> N/A	2019-06-19	<u>                    </u> N/A	<u>                    </u>
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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 Silos cemetery for CK Rumboll and Partners.

**2. LOCATION, TOPOGRAPHY AND LAYOUT**

A site on the remainder of Erf 71 of 158(Erf RE71/158) Ashton, has been identified as a cemetery site. The site is approximately 83 ha in size. The proposed cemetery is bordered by the existing cemetery to the west and enclosing the wastewater treatment works (4.62ha) and a small-scale cattle farm within the remainder of the plot of land towards the North with a railway line to the South. A portion of the North-Eastern corner of the Erf has recently been cleared and levelled, presumably for future development.

A layout for the development of the cemetery has not yet been finalised, however it is foreseen that the proposed development will be an extension of the existing cemetery infrastructure and will be limited to an area outside of the existing wastewater treatment plant.

The development will include the following elements:

- Guard house and public toilets;
- Access road;
- Conventional graves with landscaping and hardened pathways;
- Fence with access gate;
- Landscaping of the cemetery and of a parkland including indigenous trees and other applicable indigenous vegetation for shade and screening where appropriate with cleared, unmade pathways in between.

Rainfall stations around the site indicate an annual rainfall of 234mm. The average nighttime temperature varies between 4.3°C and 15.4°C, while the average midday temperature varies between approximately 17.1°C and 30.0°C.

The slope of the ground is almost constant at approximately 3%, predominantly to the South.

The memorial park will be fenced off to protect the graves from vandalism.

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### **3. STREET LAYOUT AND DESIGN**

The layout will be formalized, and the development will incorporate the existing access road to the existing cemetery.

It is proposed that the existing access road be upgraded to a paved road for the full length, up to the existing paved section of the road. The upgrading will be to the same standard as the existing paving.

The walkways between the graveyards are to be hardened and to be level with the surrounding areas between the graves to ensure no stormwater channelling and erosion occurs.

### **4. STORMWATER**

Five watercourses were identified in the immediate vicinity. These include:

- A recently excavated artificial drainage channel
- A formal stormwater canal system
- A remnant portion of a natural drainage line which is now fed almost entirely by effluent overflow from the sewage works and continuously overflowing cattle trough
- A remnant portion of natural drainage line that has been cut off from its catchment, partially infilled and no longer functioning as a drainage line
- And one artificial wetland

Through application of the Macfarlane (2016) buffer guidelines and calculator, it was determined that 15m would be an appropriate minimum buffer for all watercourses affecting this development.

All watercourses within the study area were found to be unnatural or extremely transformed. The limited rehabilitation that would occur within the parkland area would allow the three active watercourses of natural origins to achieve their best states.

As part of the proposal for this application, the following mitigation measures will be implemented:

- Adequate surface drainage will be catered for to ensure no ponding on site.

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- Cut off drains are to be constructed upstream of the site to divert surface water and near surface water around the site and to eliminate lateral groundwater movement through the site. These drains are to be of adequate depth to intercept near surface groundwater.
- Indigenous vegetation is to be planted to lower the water table which may occur from time to time.

A detention facility is required to manage effluent overflow from the adjacent Sewerage Treatment Works in order to prevent entrance to the site. The detention facility with an overflow to an existing stream will be constructed in the North Eastern corner of the site. The detail is to be finalised before design phase.

An additional detention pond for the management of stormwater from the cemetery site is to be constructed in the South Western Corner of the site. The detail is to be finalised before the design phase.

## **5. SEWER RETICULATION**

There is an existing sewer pipeline running parallel to the train track to the South and connecting to the Sewerage Treatment Works adjacent to the proposed cemetery site. Detail of this existing sewer line will have to be obtained in order to determine its capacity and physical features for connection purposes during the design phase of the project.

There is currently a small ablution facility on the existing cemetery site with a proposal for another ablution facility for the new development. If the existing ablution facility is connected to the existing sewer network. In the case of the existing sewer line having additional capacity for the new development, approximately 60m of connecting sewer will be required. If inadequate capacity exists in the existing sewer line, the new development will require approximately 200m of sewer pipe with possibly a small pump station being required due to the topography of the land. The necessity of a pump station will have to be confirmed once a topographical survey of the existing terrain has been conducted.

## **6. WATER RETICULATION**

There is an existing water supply in close proximity to the proposed site for development. The ablution facilities can be connected to the existing water feed. Capacity of the line will be verified, minimal water however will be required to provide water to the new cemetery.

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**7. GEOTECHNICAL**

A comprehensive geotechnical site investigation has been carried out, with the objectives of fully 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**

If connection to the communication network is required, 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**

A comparison of electricity by means of solar will be compared to the normal installation and maintenance costs of electricity from Eskom. 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 Pavement Layers**

80mm Interlocking Concrete pavers are to be used for the surfacing of the access road. Provided that the insitu material has an adequate bearing capacity, the pavement layers will consist of the following:

- 150mm C4 Cemented Subbase
- 150mm G7 Subgrade

The final detail of the pavement layers will be finalised at design stage.

**10.1.2 Verges**

The area adjacent the main access road shall be provided with a 75 mm thick gravel material (both sides of the road).



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The remainder of the verge will be trimmed and shaped with the possibility of trees to be provided.

All verges to walkways will be so shaped as to ensure no channelling of stormwater occurs.

**10.1.3 Street Design Layout**

The street layout will consist of the main access road with a parking area that leads to the gate and walkways. The walkways are to be designed to be able to manage vehicular traffic as well. The walkways will be designed to ensure that there is an adequate road reserve width between the graves for the possibility of vehicles using the walkways for access during emergencies or in the case of handicapped individuals being transported by vehicles to graves.

**10.2 STORMWATER AND SUBSURFACE DRAINAGE**

**10.2.1 Subsoil**

- Subsoil drains will be installed to lower the water table.
- 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 Detention Facilities**

A detention pond is to be built in the South Western corner of the site to manage overland stormwater. This is to be connected to an existing adjacent water course.

**10.3 FOUL SEWER**

**10.3.1 Detention Facilities**

A detention pond for the management of sewer effluent from the Sewerage Treatment Plant will be required. The detention facility with an overflow to an existing stream will be constructed in the North Eastern corner of the site. Discussions with the local authority will be held with regards to the most cost-effective treatment and management of the treated effluent.

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**10.3.2 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  $\varnothing = 1:100$  with a limiting gradient of 1:180 for 150/160 mm  $\varnothing$  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 for buildings) and where topography requires, 80 % of the premises must be able to drain towards the connection.

**10.3.3 Pipes**

- Pipes to be positioned adjacent to 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

**10.3.4 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 Langeberg Municipality, Water Services.
- All manholes to be provided with calcamite (or polypropylene) step irons.

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- Maximum spacing between manholes to be 90 m. (according to Langeberg specifications).
- Maximum chimney height may not exceed 400 mm.

**10.3.5 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 Langeberg Municipal standards shall apply)**

- Minimum pipe size to be 110 mm Ø.
- 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 Langeberg 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.

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- 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  $\varnothing$  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.

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**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 Langeberg 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 Eskom Provision Area and the option of connecting to Eskom 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 Eskom as a supplier and installation costs. The position of the closest Eskom 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 if required 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.

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- Outdoor lighting will be restricted to a minimum.
- Rainwater will be harvested from roofs and taken to the 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.

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**11. COST ESTIMATE**

**11.1 CONSTRUCTION COSTS**

**11.1.1 Earthworks**

- Cut to spoil : 10 600m<sup>3</sup> at R80/m<sup>3</sup> R 848,000.00

**11.1.2 Roads**

- Paved Roads : 3500m<sup>2</sup> at R550/m<sup>2</sup> R 1,925,000.00
- Parking areas : 5500m<sup>2</sup> at R450/m<sup>2</sup> R 2,475,000.00
- Walkways 13200m<sup>2</sup> at R200/m<sup>2</sup> R 2,640,000.00

**11.1.3 Stormwater**

- Cut off drains : 1500m<sup>3</sup> at R60/m<sup>3</sup> R 90,000.00
- Subsoil : 2000m at R900/m R 1,800,000.00
- North Eastern Pond : R100 000/Pond R 100,000.00
- South Western Pond : R100 000/Pond R 100,000.00

**11.1.4 Sewer**

- Pipes : 200m of 160mm Ø pipes at R900/m R 180,000.00
- Pump Station : Possibly 1 of at R500 000/Pump Station R 750,000.00

**11.1.5 Water**

- Pipes : 40m of 110mm Ø pipes at R800/m R 32,000.00

**11.1.6 Security**

- Diamond Mesh Fence : 1100m of 1.8m high fence at R650/m R 715,000.00
- Gate : 1 of 1.8m high by 7m wide gate at R6000/gate R 6,000.00

**11.1.7 Electricity**

- Electrical Connection : Provisional sum at R100 000 R 100,000.00

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**11.2 SUMMARY**

Construction costs Subtotal	R 11,761,000.00
25% P&G's	<u>R 2,940,250.00</u>
Subtotal	R 14,701,250.00
10% Contingencies	<u>R 1,470,125.00</u>
Subtotal	R 16,171,375.00
15% Professional Fees	<u>R 2,425,706.25</u>
Subtotal	R 18,597,081.25
15% VAT	<u>R 2,789,562.19</u>
<b>TOTAL</b>	<b><u>R 21,386,643.44</u></b>

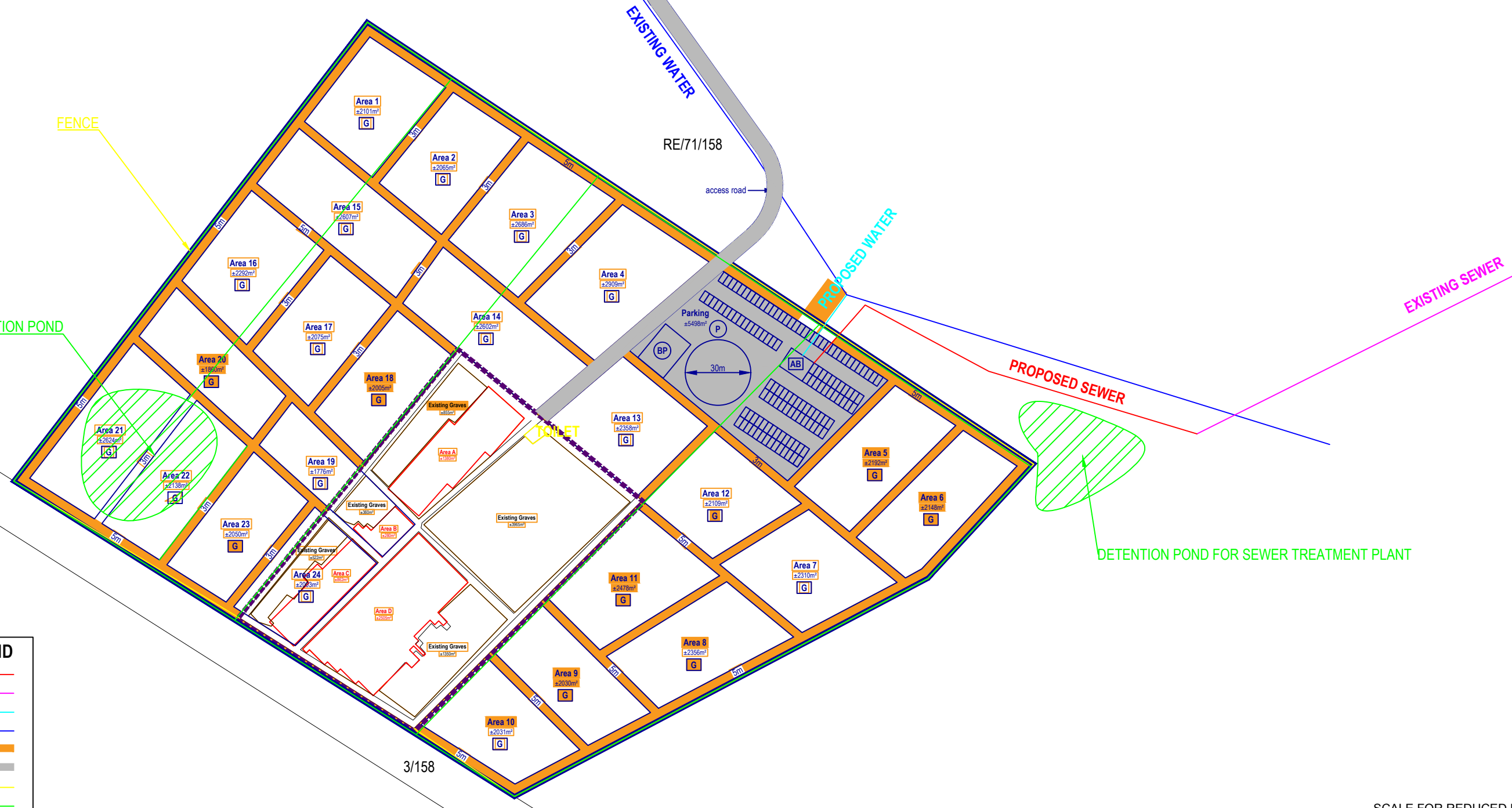


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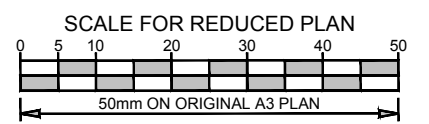
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## APPENDIX 1



**SERVICES LEGEND**

- PROPOSED SEWER —
- EXISTING SEWER —
- PROPOSED WATER —
- EXISTING WATER —
- GRAVEL AREAS
- PAVED ROADS
- FENCE —
- SUBSOIL DRAIN —



P:\Civil\New Civil Project\Folders\Langenberg Cemeteries\Ashton\Drawings\SILOS.dwg

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REVISION SCHEDULE		
No	DATE	DESCRIPTION

CONSULTING ENGINEER		
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SIGNATURE	PR No	DATE
CLIENT		
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SIGNATURE	DATE	

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PROJECT	
PROPOSED EXTENSION OF SILOS CEMETERY (RE/71/158): ASHTON	
DRAWING DESCRIPTION	
SERVICES LAYOUT	

DESIGNED	DRAWN	CHECKED
MB	MB	FVL
DATE		SCALE
2019/06/21		N.T.S.
DRAWING NUMBER		REV
301439-RE-CI-001		00