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APPENDIX E- METHOD STATEMENT REPORT



SMEC INTERNAL REF. C1946

Method Statement

Upgrading of Baydunes Sewer Pump Station, Mossel Bay

Reference No. C1946

Prepared for Mossel Bay Municipality

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1 Introduction

SMEC South Africa was appointed by the Mossel Bay Municipality for a Multi-Year Professional Services Contract (Tender No. TDR110/2019), which includes the upgrade of Sewer Infrastructure in the Mossel Bay Municipal area.

SMEC was subsequently appointed under Order number T/30198 for the Upgrading of the Baydunes Sewer Pump Station located in Bayview, Mossel Bay.

The project was initiated due to frequent sewer blockages and spills occurring in front of the houses located on the coastline north of the pump station. When these sewer spills occur, it overflows directly into the ocean.

1.1 Problem Identification

During a site visit in October 2022 the following items was listed as the key findings of the investigation:

1. The pump station wet well diameter is 1,524m.
2. The depth of the wet well sump could not be determined due to a large volume of remaining sewage after a pump cycle.
3. 2no. submersible pumps are installed.
4. Before the pump cycle started the pumps was fully submersed.
5. The wet well was emptied until such a point when the pump had to be shut-off due to very low levels compared to pump intake.
6. At the time of shut-off the gravity inlet pipe could not be witnessed.
7. One of the gravity manholes upstream of the gravity pipeline was opened and sewage was observed standing inside the manhole and no manhole benching with laminar flow was evident.
8. The existing gravity pipeline is located partially underneath some of the houses.
9. A green patch of kikuyu grass was observed at the possible overflow point.

1.2 Locality

The sewer pump station, herein after referred to as the pump station, is located on the coastline north of the Baydunes Private Development. The pump stations global position is Latitude -34,142521 and Longitude +22,111236. The pump station is approximately 7.5m above mean sea level and consist of a wet well sump and discharge valve chamber. The pump station is operated by the Mossel Bay Municipality's Mechanical Services and Fleet Management Branch.

Refer to **Figure 1-1** for the locality of the project area.

2 Standards and Specifications

The following specifications and legislative documentation shall apply to the scope of works to ensure that the works are executed in accordance with the design drawings, at acceptable quality and to the relevant safety standards:

- Occupational Health & Safety Specification
- Occupational Health and Safety Act 85 of 1993
- Construction Regulations 2014
- SANS 1200 Standard Specifications
- Project Specifications
- Construction Drawings
- Environmental Management Programme
- Environmental Maintenance Management Plan

2.1 Occupational Health and Safety

An Occupational Health & Safety consultant will be appointed to perform the OH&S duties on the project. The scope of works of the Client's Agent will in general cover the requirements of Section 4 (Duties of the Client) of Construction Regulations 2014. Where the consultant will be requested to compile a Baseline Risk Assessment and OHS Specifications for the scope of works.

Responsibilities, authority and accountability of the Occupational Health and Safety Consulted will include, but are not limited to, the management and review of the following:

- Designs of proposed works.
- The principal contractor shall appoint a full-time competent person as the construction manager with the duty of managing all the construction work on the Site.
- A competent safety officer to perform OHS duties on site.
- OHS file on site with all the necessary documents.
- A site-specific baseline risk assessment and hazard identification will be performed
- Toolbox talks will be carried out at the beginning of each workday with all employees prior to work commencing.
- Ensure all confined space entry works are performed safely and a Confine Space Entry permit system is implemented before entering or works start within a confined space.
- Dust masks are compulsory during dusty conditions.
- Protection around the excavations will be installed. A construction barrier nett of at least 1m high and as close to the excavations as possible will be installed. Warning signs are to be posted on these barriers.
- All employees and contractors involved in this activity are competent to do so.
- All operators must be licenced and certified. Copies of such documents will be kept on file at the Site Office.
- Ensure that environmental issues receive adequate attention in the site induction training.
- Prepare and conduct awareness training (posters and signage) for contractor's personnel on site.
- Take required corrective actions within specified time frame.
- Compilation of project environmental management file.
- Be considerate for the shaft depth as soon as it starts getting deep.

- Be aware of the risks and effects of heavy rain or floods and have flood control methods in place.

2.2 Construction Works Specifications

The standard specifications for the completion of the construction works will be the SABS1200, Standardized Specification for Civil Engineering Construction, that includes a section on Earthworks (small works), Concrete (small works) and Precast Concrete (structural) which will form the basis of the standard specifications.

Any variation to the standard specifications named above will be documented and described inside the Project Specifications which will be included in Part C3 of the Contract Document.

Further to the above the construction drawings will comply with the relevant design principles and all works shall be completed as per the dimensions, specifications and requirements set out on the construction drawings.

Where the Contractor is responsible for the design of the temporary works or permanent works, he will submit all designs, calculations and drawings to the Engineer for review, verification and approval prior to the commencement of the relevant works. The Contractor shall further ensure all design completed by him are done by a competent professional person registered with the Engineering Council of South Africa.

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2.3 Environmental Management

The environmental management on this project is taking high priority due to the location of the site being close to the ocean. The site is also close to a residential complex and near a walkway leading to the beach.

Ecosense was appointed as the Environmental Practitioner to provide environmental services. The appointed Environmental Practitioner for this project will conduct regular site visits to ensure the Contractor comply with the relevant environmental specifications and requirements as, but not limited to, the following:

- Monitor compliance with the EMP and environmental method statements.
- Maintain site documentation related to environmental management (permits, EMP, Method statements, audit reports, monitoring results, receipts of waste removal, etc.) These documents need to be stored in the relevant site Documents Control System.
- Inspect and report on environmental incidents and check corrective actions.
- Keep photographic records of all environmental incidents.
- Keep records of environmental incidents, hazardous substance register, complaints register and environmental non-compliance register.

Under the environmental management there will be demarcated NO-GO areas which will be cordoned off and protected during the construction period.

The construction work activities shall be performed within the demarcated and closed-off construction area. This will ensure construction work is carried out within an enclosed area.

The contractor will ensure the walkway is accessible throughout the construction period.

Access to the site will be gained through Hannes Pienaar and Bob Bouwer Cres then towards parking area in corner of Bob Bouwer Cres. Further, the contractor will spoil all excess material off-site and only a limited amount of material may be stockpiled on-site for re-use. Refer to **Figure 2-1** below that shows the various areas in which work will take place and **Figure 2-2** that shows the current status of the area of construction. Refer to **Appendix A** for detailed layout of work areas, etc.



Figure 2-1: Indication of Work Areas



Figure 2-2: Site Access road

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3 Plant & Equipment

For the effective execution of each construction work activity a dedicated team of personnel, plant and equipment must be used. Below is the list of personnel, plant and equipment envisaged to be used during the construction works activities. Note that the below list could be updated without any delay when the conditions on-site change, or when it is required for more specialised plant to be utilised.

3.1 Personnel List

- Employer (Client – Mossel Bay Municipality)
- Engineer (Professional Engineering Consultant – SMEC)
- Employers Agent (Professional Engineering Consultant - SMEC)
- Assistant Employer's Agent (Professional Engineering Consultant - SMEC)
- ECO (Environmental Control Officer – Appointed Environmental Consultant)
- Contracts Manager (Appointed Contractor)
- Construction Manager (Appointed Contractor)
- Work Activity Foreman/Supervisor (Appointed Contractor)
- Drivers and Plant Operators (Appointed Contractor)

3.2 Plant List

- 30ton large excavator
- 3ton small excavator
- 4x4 Tractor Loader Backhoe (TLB)
- 8-ton Crane truck
- 10m³ Tipper Trucks
- 6000 litres water truck
- 1-ton Light Duty Vehicle (LDV)

3.3 Equipment List

- Small size 2" water pump with a pump capacity of ±12l/s
- Padfoot Rammer
- Concrete Mixer
- Concrete vibratory poker machine
- Troxler nuclear density gauge
- Safety Fencing and Netting
- Temporary construction Road signs

4 Methodology of Works Construction

The method statement below will provide a chronological methodology for the construction work activities associated with installation of the new wet well sump using precast concrete rings.

The construction activities include, but not limited to, site clearance, dewatering of the new pump area, preparatory excavations, installation of temporary guide block, installation of precast concrete shafts using the open caisson method, excavation, loading and transportation of spoil materials, installation of concrete sump plug, waste management and prescribes the plant, equipment and PPE to be used on-site when carrying out the construction activities.

4.1 Site Clearance

4.1.1 Clear and Grub

The selected area where the new pump station sump, valve chamber, pipe work will be located are cleared and grub in terms of the SABS1200C specification. The clear and grub includes removal of existing grass in the area and neatly stacking the grass for re-planting when the works are complete. The grass will later be reinstated around the chamber to ensure that the area is as it was before construction. Refer to Error! Reference source not found. below showing the type of vegetation.



Figure 4-1: Type of grass found in the area of construction

4.1.2 Removal of Topsoil

Once the clear and grub of the work area is complete the topsoil shall be stripped to a minimum depth of 150mm. The exact depth of the topsoil stripping shall be confirmed by the Employers Agent on-site. The topsoil shall be removed with a Digger loader by scraping the required topsoil on a stockpile and loading it onto a 10m³ Tipper Truck. The topsoil material shall then be hauled to the designated stockpile area.

4.2 Preparation pre-shaft sinking

4.2.1 Dewatering

Once the topsoil has been removed the dewatering up to the depth of the sump will be installed. The dewatering will be completed by a competent service provider for the duration of the works.

4.2.2 Installation of Guide block

The installation of the guideblock could commence once the dewatering has been installed. The guide block installation shall following the following steps:

1. Level material where guide block will be positioned and compact to 95% (100% for sand) MOD AASHTO density.
2. is complete the guide block foundation will be prepared. The construction activity will be cut to spoil.

4.2.3 Excavation of Unsuitable material

- All excavations shall be carried out under supervision and the operator shall be trained with the required certifications, assessed, and deemed competent to operate the respective plant.
- The excavation shall be done with a 4x4 Tractor Loader Backhoe (TLB) and loaded on 10m³ Tipper Truck.
- The loaded material shall be hauled to the designated stockpile area and off-loaded on specifically controlled heaps (stockpiles). The stockpiles shall not be higher than 3m to ensure visibility and safety measures are adhered to.

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4.2.4 Caisson Construction Process (Ring Placement)

- Excavate an area at least 9.3 m deep and 400 mm greater than the external diameter of the shaft. (2800mm diameter Rocla concrete rings)
- Position the cutting edge accurately and level inside the excavation. Lift and fit the first one- piece ring into the cutting edge.
- Surround the base section (immediately above the cutting edge) with 10 - 15 mm thick polystyrene sheet to provide an annulus.
- Fill the area between the first ring and the outer perimeter of the excavation with concrete (min. grade 20 mPa) to form a complete concrete collar; this provides permanent support to the shaft excavation, lateral resistance to jacking forces, and acts as a guide for the shaft sinking. Once the concrete has hardened the polystyrene can be dissolved using a suitable environmentally safe solvent. The concrete is usually sufficiently hardened to allow shaft sinking to begin the next day.
- Lift and position the next ring using a leg chain and lifting clutches – fitted into the lifting anchors on the upper surface. The lower surface of the ring should be cleaned.
- Sink the rings by excavating inside the shaft using hand excavation. The shaft will sink under its own weight in very soft ground.
- Check the shaft for accuracy of sinking, by using a spirit level or plumb line; adjustments can be made by applying pressure to the high point. Selective excavation of the ground will also help to control the sinking.
- Proceed with excavation and add rings until the required depth is reached.

4.2.4.1 Step one: Placing the first Concrete Ring

Placing the first concrete ring on the prepared floor and right position as demonstrated in **Figure 4-2** below.



Figure 4-2: First Concrete Ring Placement

4.2.4.2 Step Two: Excavation

- Excavation inside or within the concrete ring as demonstrated in **Figure 4-3** below.

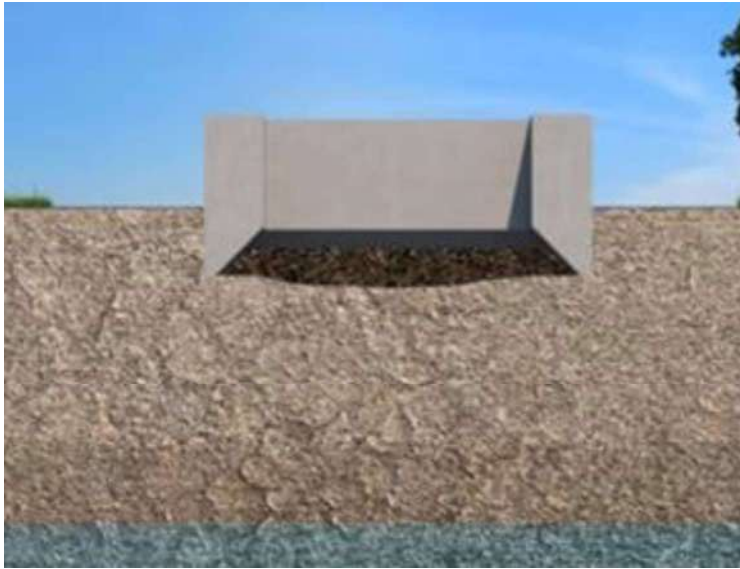


Figure 4-3: Excavation within Concrete Ring

4.2.4.3 Step Three: Excavation & Ring Placing

- Placing second then excavation within the concrete ring and placing of a third concrete ring on top of the second ring. Refer to **Figure 4-4** below for demonstration.

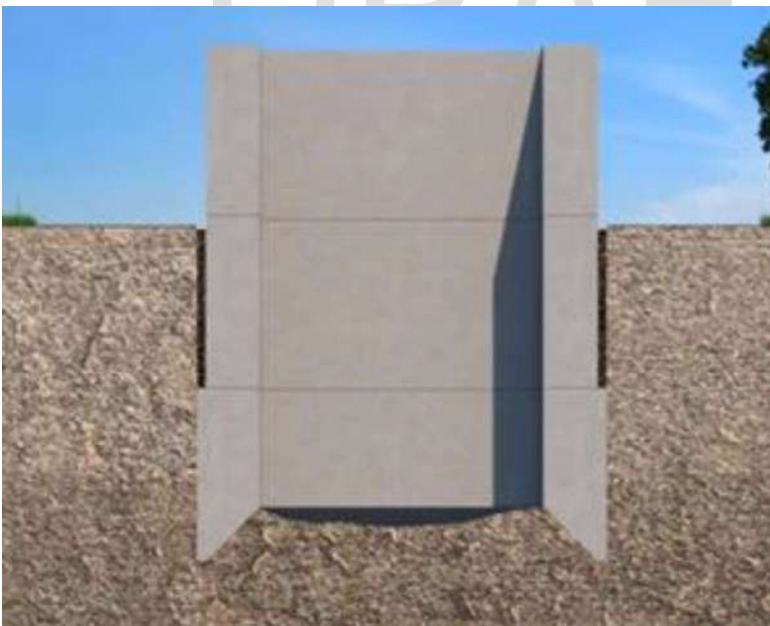


Figure 4-4: Placing Second Ring and Third Ring

4.2.4.4 Step Four: Placing of more rings to the required Depth

- The process mentioned above is repeated as requires until the required depth is reached. Refer to **Figure 4-5** below for demonstration.



Figure 4-5: Placing of more Concrete rings

4.2.4.5 Step Five: Excavation and placement Complete

- The process is carried out as many times as required to reach the required depth of 11 meters below the ground. Refer to **Figure 4-6** below for demonstration.



Figure 4-6: A Complete Caisson method

4.3 Valve Chamber

- Excavation for the new sump valve chamber next. The valve will be 1,5m deep with a 200 mm concrete floor and 200mm thick slab on top supported by a 230 double brick wall on the sides. Please Refer to **Figure 4-7** and **Figure 4-8** below.

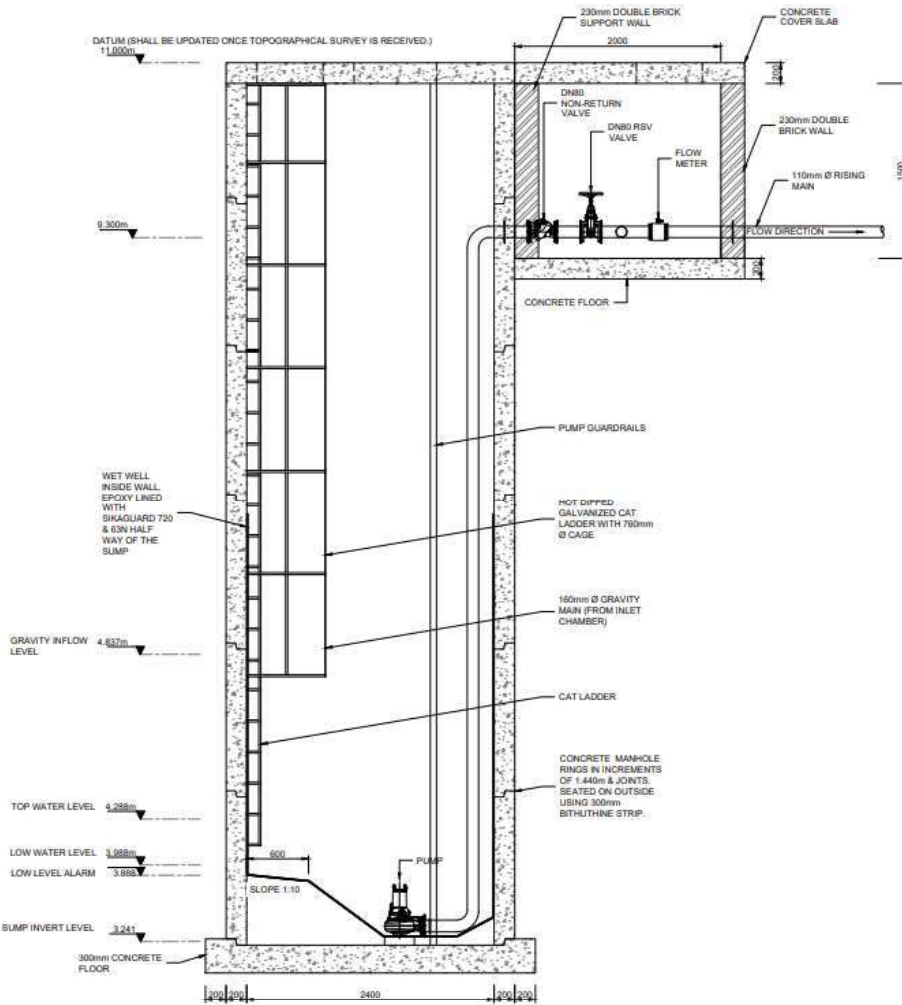


Figure 4-7: Side View of Pump Station Sump & Valve Chamber

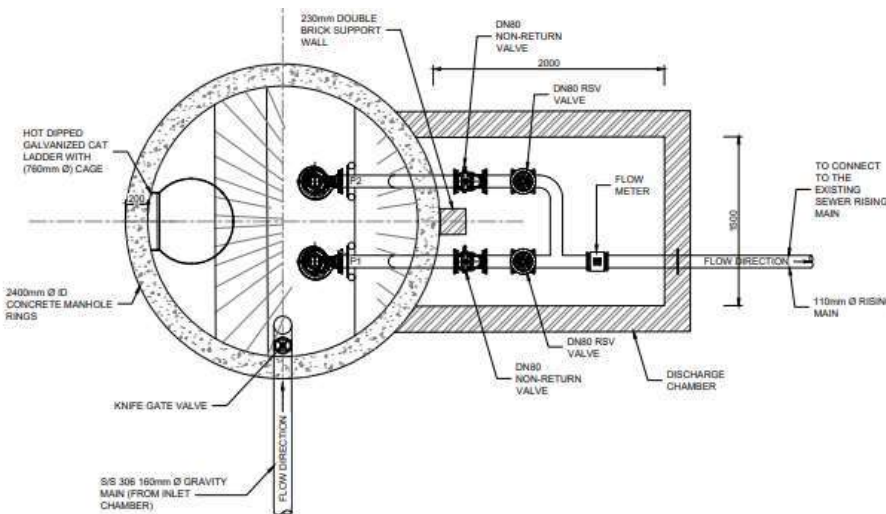


Figure 4-8: Plan view of the Pump Station & Valve Chamber

4.3.1 Backfill material (Imported Fill Material or from Stockpile)

- The material used for backfilling will be similar to material excavated from the ground, material can be from a commercial source or the stockpile. Pad-foot rammer will be used to carry out compaction during the backfill process. Backfilling around the top concrete ring depth will be up to 300mm as the ground underneath will hardly be disturbed.
- The valve chamber, a depth of 1900mm and 300mm wide will require backfilling in layers of not more than 300mm to ensure desired compaction is carried out. Refer to **Figure 4-9** shows backfill areas.

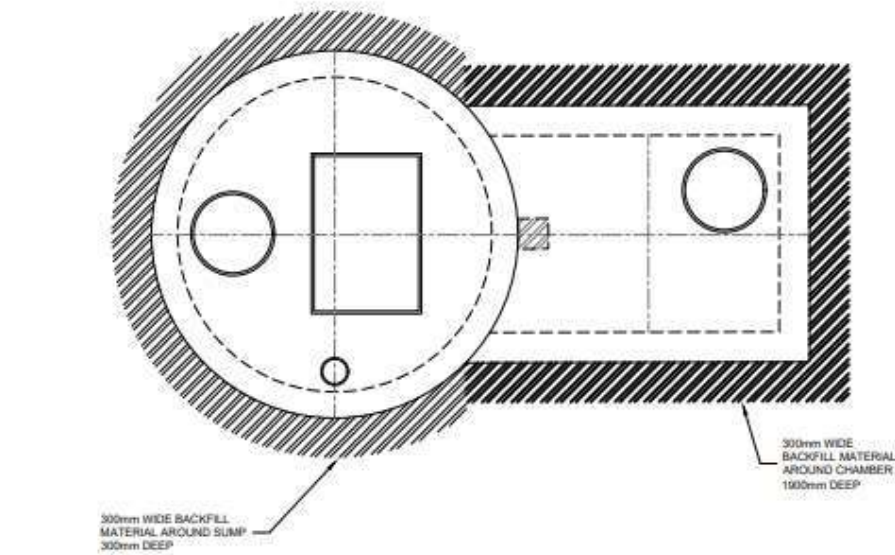


Figure 4-9: Backfill all around sump & Valve Chamber

4.4 Pipe & Associated Works

Pipe work will be conducted to connect the existing pump station to the new built pump station and sewer pipe extension from newly built pump station to the current sewer line.

4.4.1 Excavations

- The pipe trench will be excavated as per the dimensions indicated.
- All excavations shall be done with a TLB or by hand where possible.
- Disposing unsuitable material from the trench
- Once the excavations are completed the pipe trench shall be prepared and levelled with bedding material.
- The bedding layer shall be checked and approved by the assigned personnel to ensure quality work is carried out.
- After bedding preparations are complete a sewer pipes of 110mm and 160mm in diameter pipes to be laid to connect the new sump and chamber to the existing sump and sewer pipeline.
- Once the pipes are laid and connected backfilling the trench can be carried out with suitable material.

Refer to **Figure 4-10** below that shows a typical Pipe structure and backfilling.

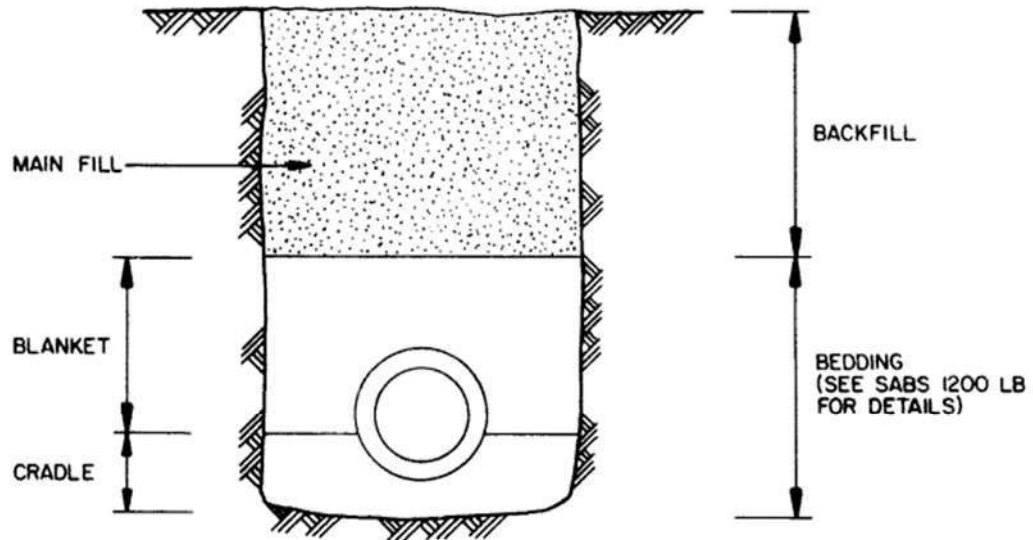


Figure 4-10: Typical Pipe Cross Section

4.5 Finishing

4.5.1 Kikuyu Grass Reinstatement

- Kikuyu grass Initially cleared for the purpose of carrying out construction of the sump, valve chamber, pipe work will be reinstated.
- This will be done through seeds or by acquiring Kikuyu grass rolls from a reputable landscaping service provider.

4.5.2 Paving (Block Paving)

- After all the backfill material layers are complete to the correct level and compaction, 20mm sand and 60mm block with similar specification will be reinstated.

5 Programme

The anticipated programme for the rehabilitation of the Botanical Garden Dam Wall is listed below in **Table 4-1**.

Table 5-1: Project Programme

No.	Stages	Anticipated Completion Date
1	Commencement Date	08 September 2022
2	Submission of Inception Report	25 October 2022
3	Topographical and land surveys	4 November 2023
4	Geotechnical Investigation	4 November 2023
5	Submission of Concept Design Report	13 December 2022
6	Submission of Detailed Design Report	02 March 2023
7	Submission Draft Tender Document	16 March 2023
8	Tender Advert	23 March 2023
9	Tender Closing	13 April 2023
10	Tender Evaluation Report	27 April 2023
11	Bid Evaluation Committee (BEC)	11 May 2023
12	Bid Adjudication Committee (BAC)	18 May 2023
13	Construction Commencement (Include 14-day appeal period)	01 June 2023
14	Construction Practical Completion	01 December 2023
15	Construction Completion	15 December 2023
16	Close-Out	12 January 2024
17	Construction Final Approval & Retention Release	13 December 2024

6 Summary

The Mossel Bay Municipality is responsible for service delivery in the Mossel Bay Municipal area and appointed SMEC South Africa (Pty) Ltd for providing professional engineering services for the Upgrading of Baydunes Sewer Pump Station.

The existing pump station wet well is composed of a well sump of 1,524 diameter with an unknown depth due as a result of large volume of sewage volume at the bottom. The problem was identified as one of the sewer pipelines that gravitates from the houses on the coastline north of the pump station to the pump station has a very flat gradient and due to flat gradient, the sewer pushes back and overflows out of a manhole located on the sewer pipeline and is causing sewer spillages in the area. The objective of the Mossel Bay Municipality is to mitigate any risks, prevent any environmental impact into the ocean due to sewer spillages and to ensure that it provides effective service to the residents of Mossel Bay affected by this problem. This will be achieved through the Upgrading of Baydunes sewer pump station in accordance to the specifications.

Specifications that include the OHS Act 85 of 1993, SANS 1200 Standard Specifications, construction drawings, project Specifications and Environment Specifications shall apply to this contract to ensure that the works are performed within the relevant safety and environmental parameters and in compliance with the design while still ensuring good quality work.

The methodology of works to be carried out involved 5 main steps:

1. Site Clearance
2. Removal of unsuitable material
3. Caisson-One-piece shafts
4. Pipework Construction
5. Finishing

The anticipated starting date for construction is 01 June 2023.

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Appendix A: Concept Design Drawings

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Redefining exceptional

Through our specialist expertise, we're challenging boundaries to deliver advanced infrastructure solutions.

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