



**CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD**

**CLARIFICATION MEETING
192C/2024/25**

**PROVISION OF PROFESSIONAL SERVICES FOR CONSTRUCTION
MONITORING AND CONTINUATION OF ENGINEERING SERVICES
FOR THE CONSTRUCTION AND CLOSE OUT OF MULDERSVLEI
300Mℓ RESERVOIR AND BULK WATER PIPELINES**

25 March 2025

Making progress possible. Together.

Welcome and introductions

- Welcome to the clarification meeting for 192C/2024/25 tender clarification presentation for Muldersvlei reservoir and pipelines.
- Presenter/Project Manager: **Mr. Gavin George**
- Other Key Project Stakeholders:
 - Executive Director of Water and Sanitation: Mr. Leonardo Manus
 - Director: Bulk Services: Michael Killick
 - Branch Manager: Bulk Water: Barry Wood
 - Head: Infrastructure and Project Implementation (Bulk Water): Brent Vivier
 - Head of Operations: Myezo Poyo

Presentation Agenda

01

Project Overview

Let's look at the various elements of the project.

02

Tender Data

Let's look at the key elements such as dates, eligibility and functionality.

03

Technical and Engineering Information

04

Use of Reasonable Skill, Care and Due Diligence

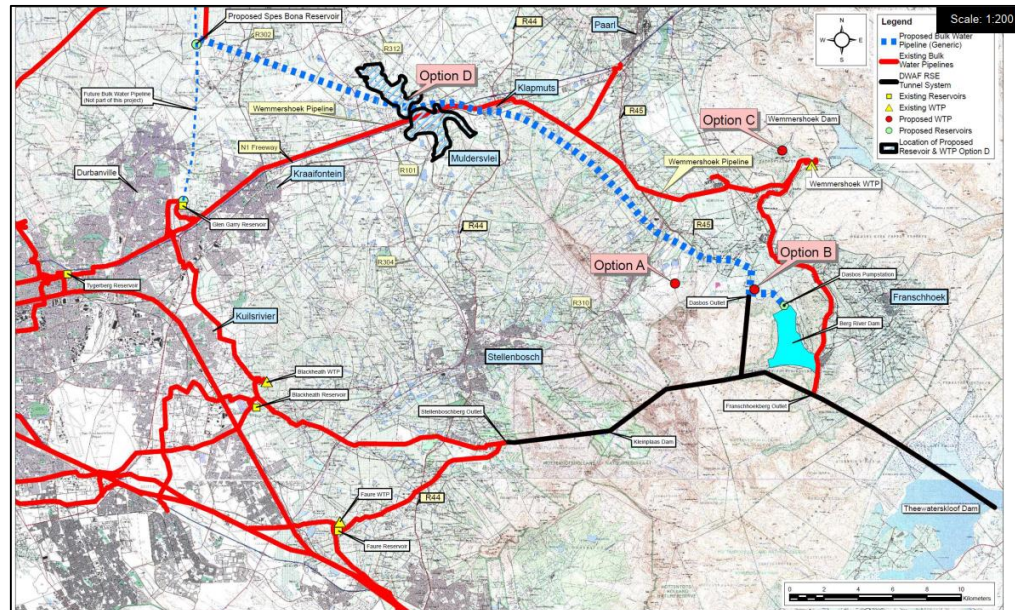
Conclusion and recommendation

Project Overview

Project Overview

Background to BWAS Historic Studies: Feasibility

- Findings from the IRWS the CCT initiated the BWAS to increase the City's bulk water supply **capacity and improve redundancy and resilience** of the bulk water supply system.
- CCT appointed Orrie, Welby-Solomon cc and BKS (Pty) Ltd to undertake a feasibility phase for the Bulk Water Infrastructure Planning Study, which commenced in 2003, for the Muldersvlei component of the BWAS.
- Several alternatives for the WTP position were initially explored:
 - Option A: Dwars River Valley
 - Option B: Dasbos Outlet
 - Option C: Wemmershoek
 - Option D: Muldersvlei / Joostenberg**



Project Overview

Background to BWAS Historic Studies: Feasibility

- Based on environmental, technical and financial considerations **Option D** in the Muldersvlei area was chosen as preferred for the WTP as well as the reservoir. It was also the least environmentally sensitive and had the following advantage:
 - Lowest Capex and Opex costs;
 - WTP and Reservoir located in close proximity and therefore preferred from operation and maintenance perspective; and
 - Allows for maximum availability of raw water.
- Seven (7)** alternative sites within the Muldersvlei / Jostenberg area (as part of Option D) were considered with main considerations being:
 - Hydraulics;
 - Topography;
 - Environmental impacts;
 - Flexibility in O&M; and
 - Minimising costs and risks.



Project Overview

Background to BWAS Historic Studies:

Feasibility

- At the conclusion of the Bulk Water Infrastructure Planning Study the seven (7) feasibly WTP/reservoir combinations were narrowed down to three (3);
 - Site A, B and G
- They were put forward for assessment during the succeeding EIA Phase.

Environmental Impact Assessment

- Chand Environmental Consultants commenced with EIA in 2006 and responsible for:
 - Evaluate set of WTP / reservoir locations;
 - Specify the environmental preference of the options evaluated; and
 - Indicate how the potential impacts could be mitigated.

Project Overview

Detail Design Summary

- The Muldersvlei Reservoir, designed as a 300 Mℓ concrete-lined embankment reservoir, was chosen for several reasons: reduced footprint, suitability to the site's sloped topography, minimized visual impact, lower cost compared to structural concrete designs, safety, and ease of maintenance. Its embankment design offers advantages in safety during construction and operation due to sloped sides, along with accessibility for vehicles. The reservoir aligns with the City of Cape Town's standard procedures for large bulk water reservoirs, which are typically embankment-type.

Project Overview

Background:

- The Bulk Water Augmentation Scheme (BWAS) was initiated to increase the City's bulk water supply capacity and improve redundancy and resilience in the system.
- Phase 1 of **BWAS** comprises of:
 - **Muldersvlei Reservoir (300Mℓ capacity).**
 - **Pipelines associated with the Muldersvlei Reservoir:**
 - ✓ **Incoming pipeline (from Wemmershoek pipeline to reservoir).**
 - ✓ **Outgoing pipeline (from reservoir to Wemmershoek pipeline).**
 - **Access Road to Muldersvlei Reservoir and Water Treatment Works (WTW).**
- This project has future budgetary implications beyond the three financial years covered in the annual budget (MTREF cycle) procured through the SCM Policy. It is for this reason a Section 33 process was triggered and needs to be adhered to.

Project Overview

Background

The following contracts are applicable to this project:

Historic contracts

- WSC1/2006 (Tender No. 325C/2005/06): Provision of Professional Services: Design and Construction Monitoring for a Reservoir and Associated Pipelines near Muldersvlei and Planning of Associated Infrastructure.

Current contracts

- 194C/2020/21: Term Tender for the provision of Multidisciplinary Professional Services for the Water and Sanitation Department of the City of Cape Town.

Future Contracts

- DP8805Q/2024/25: Phase 2 – Construction of Muldersvlei Reservoir and Linking Pipelines.
- 192C/2024/25: Construction Monitoring and Professional Engineering Services for the Construction of 300 Mℓ Reservoir and Bulk Water Pipelines at Muldersvlei.

Project Overview

Background (cont):

- AECOM (2018) has completed the concept and preliminary design for Phase 1, which was the focus of the review to be conducted under 194C-WP007 by Zutari (2021).
- An environmental authorisation was issued for all the BWAS infrastructure components.
- Works Project No BW-WP037 was issued to Zutari for the completion of the design for Phase 1 of the Muldersvlei infrastructure component.

Project Overview

Background:

Scope of Work:

The Muldersvlei Reservoir and associated infrastructure comprises of the following distinct sections:

- Muldersvlei Reservoir (300 Mℓ capacity);
- Muldersvlei Reservoir incoming (DN1525) pipeline (from Wemmershoek pipeline to the reservoir);
- Muldersvlei Reservoir outgoing (DN1220) pipeline (from the reservoir to the Wemmershoek pipeline);
- A disinfection facility (1,5 PPM capacity);
- An administration facility; and
- Internal roads, and site services and ancillaries.

Project Overview

Extent of construction works

The scope of the works includes, but are not limited to, the following:

- Establishment of camp, offices, and plant on site
- Compliance with all Health and Safety and Environmental specifications
- Provision of security for all personnel, plant and materials
- Setting out of the Works
- Accommodation of Traffic (e.g. at the site entrances and at pipe crossings with public roads)
- Dealing with existing services
- Dealing with water (surface and subsurface)
- Site clearance
- Construction of internal roads and site services

Project Overview

Extent of construction works

The scope of the works includes, but are not limited to, the following:

- Construction of the 300 Mℓ reservoir which includes, but is not limited to:
 - Bulk earthworks, with large quantities of material to spoil offsite and importing material from commercial sources for the embankment
 - Geotechnical works such the installation of geosynthetics as a method to mechanically stabilise the earth, and temporary stabilisation of the cut slopes through soil nails and shotcrete, and other means of soil improvement
 - Geotechnical and dam safety monitoring works (temporary and permanent) to monitor the behaviour of the reservoir, such as settlement beacons, pore water pressure sensors, etc.
 - Groundwater drainage and leakage detections systems underneath, in and around the reservoir basin
 - HDPE dam liner over the entire reservoir basin
 - In-situ cast concrete works for the reservoir floors (flat and sloped), foundations, columns, walls, inspection galleries, overflow, vehicle access structure etc, including specials waterstop joints between concrete elements
 - Precast concrete beams and hollow core roof slabs
 - Ancillaries such as ventilation pipes, air vents, access hatches, daylight openings, hand railings, access stairs, roof drainage elements etc
 - Watertightness testing of the structure

Project Overview

Extent of construction works

The scope of the works includes, but are not limited to, the following:

- Construction of bulk steel pipelines and associated chambers which include, but are not limited to:
 - Trench excavations and backfilling
 - Imported pipe bedding
 - DN1600 steel incoming pipeline, approximately 4.6km long, continuously welded
 - DN1200 steel outgoing pipeline, approximately 2.4km long, continuously welded
 - Interconnecting steel pipelines on the reservoir site including DN1600 reservoir inlet pipes, a DN1800 reservoir bypass pipeline, DN1800 reservoir outlet pipes, DN400 reservoir scour pipes and a DN1800/DN1200 reservoir overflow pipe
 - Pipeline corrosion protection in the form of a cement mortar lining and concrete sheathing.
 - Pipeline road crossings through pipe jacking and open trench excavations
 - Bulk pipeline connections to the existing DN1500 and DN1200 prestressed concrete Wemmershoek pipeline
 - Concrete pipeline chambers with all pipe specials, valves and instrumentation for the air valve chambers, scour valve chambers, isolation valve chambers, flow meter chambers, control valve chambers etc
 - Hydrostatic pressure testing of the pipelines and associated infrastructure

Project Overview

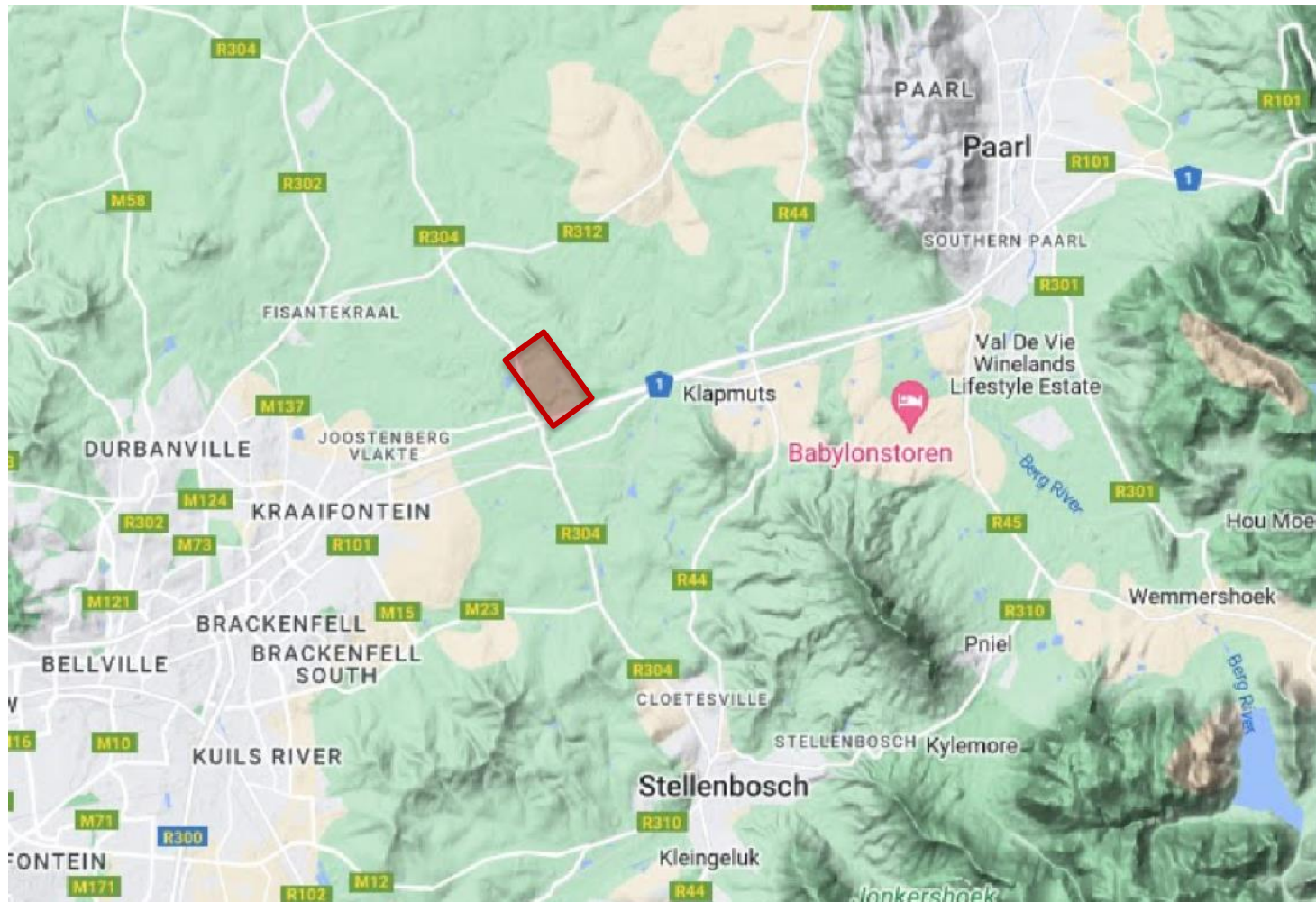
Extent of construction works

The scope of the works includes, but are not limited to, the following:

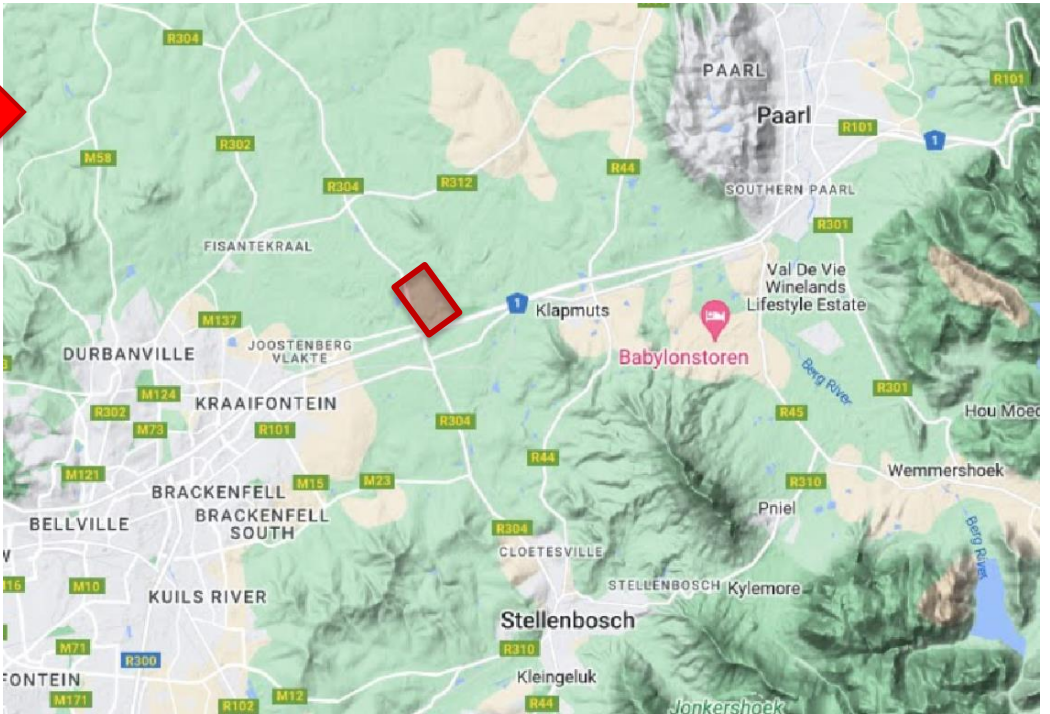
- Construction of the buildings for the disinfection facility, administration facility and guardhouse
- Design, supply, and installation of all mechanical services which include all equipment, pipework, valves, fittings
- Design, supply, and installation of all electrical and electronic services

This description of the Works is not necessarily complete and shall not limit the work to be carried out by the Contractor under this Contract.

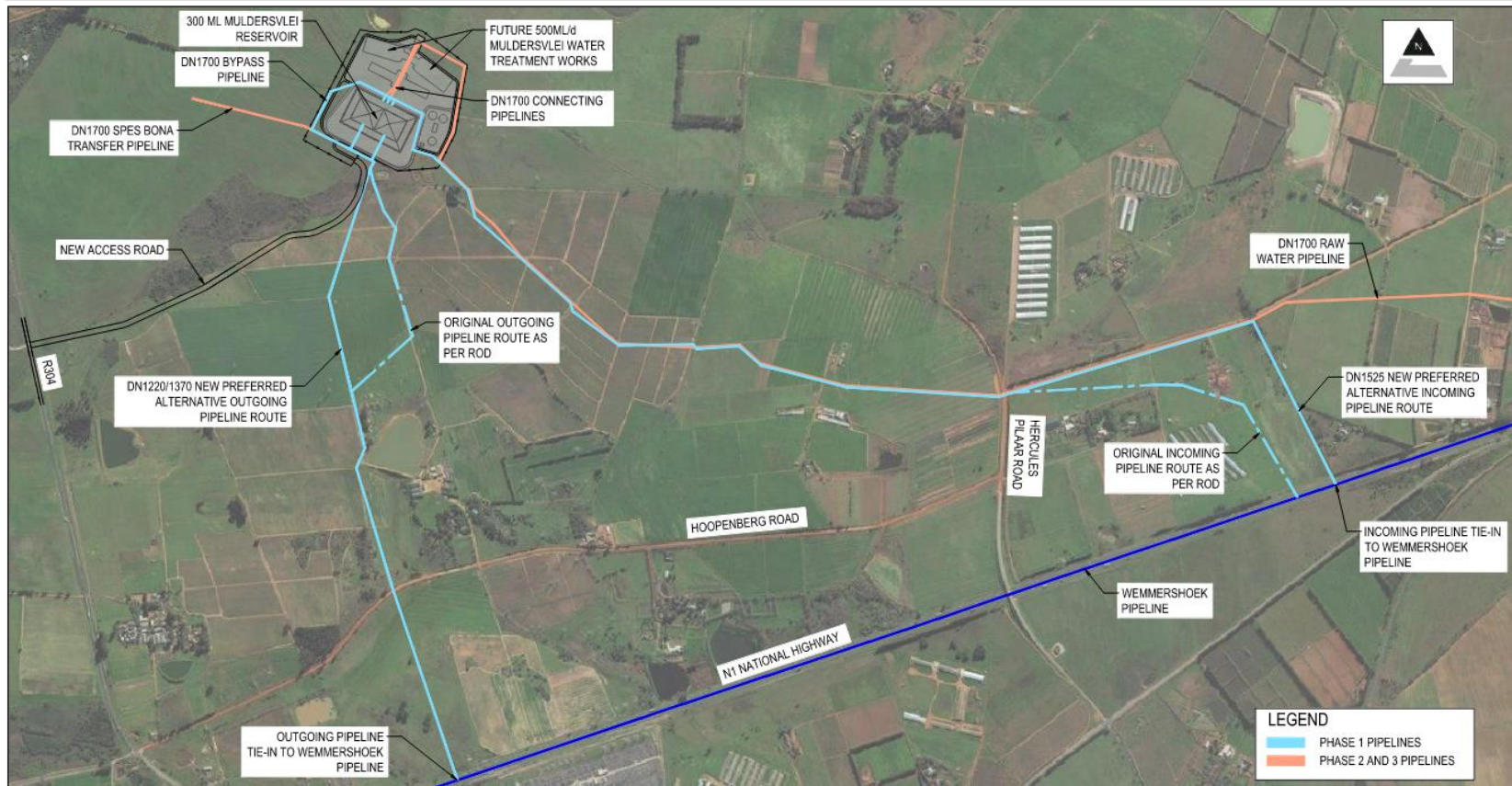
Project Overview



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Project Overview (Cont.)



Project Overview

Project Boundaries

The following boundary limits are applicable:

The boundary between contract 31Q/2023/24 and DP8805Q/2024/25

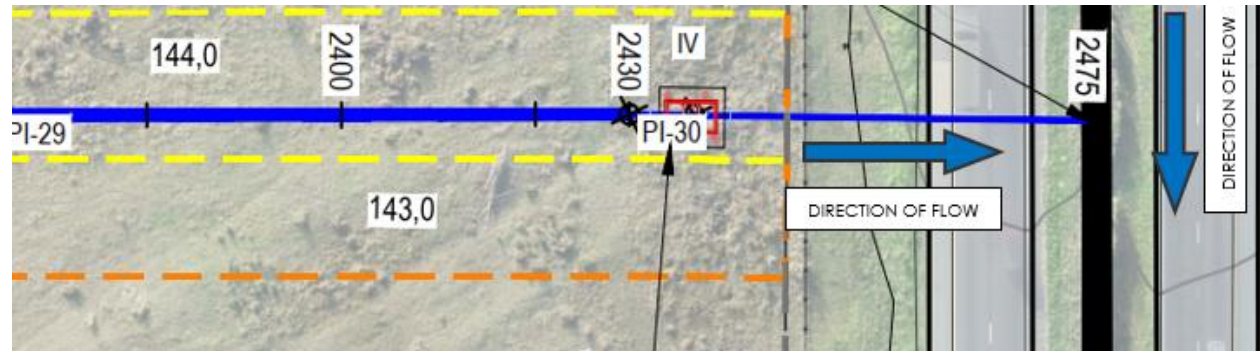
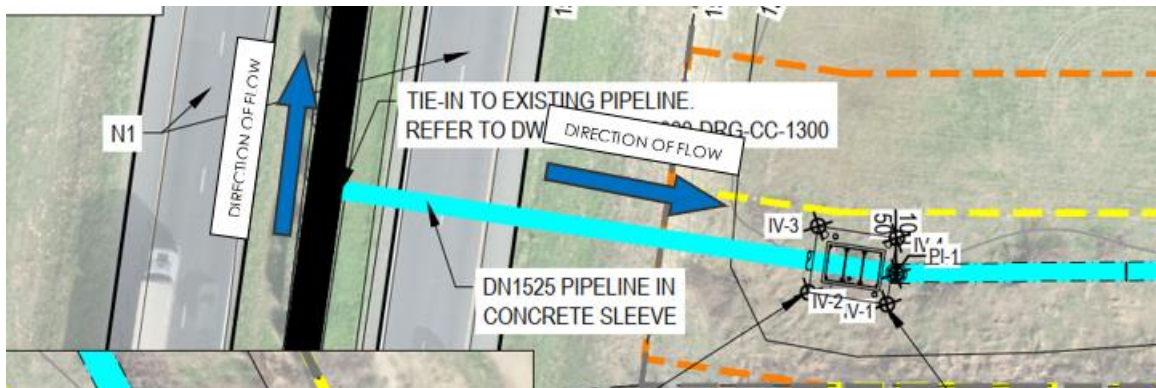


Project Overview (Cont.)

Project Boundaries

The following boundary limits are applicable:

The boundary between the new Wemmershoek incoming pipeline and the existing Wemmershoek pipeline and the new Wemmershoek outgoing pipeline and the existing Wemmershoek pipeline



Tender Data



Tender Data

- **TENDER ADVERTISED** : 14 March 2025
- **CLOSING DATE** : 23 April 2025
- **CLOSING TIME** : 10h00
- **TENDER BOX & ADDRESS** : **Tender Box 221** at the **Tender & Quotation Box Office**, 2nd Floor (Concourse Level), Civic Centre, 12 Hertzog Boulevard, Cape Town

Eligibility

- C.2 Tenderer's obligations
- C.2.1.1 Tenderers are obligated to submit a tender offer that complies in all aspects to the conditions as detailed in this tender document. An 'acceptable tender must "COMPLY IN ALL aspect with the tender conditions, specifications, pricing instructions and contract conditions.
- C.2.1.3 Only those tender submissions from which it can be established that a clear and unambiguous offer has been made to Employer, by whom the offer has been made and what the offer constitutes, will be declared responsive.
- C.2.1.4.1 **Compliance with requirements of CCT SCM Policy and procedures**
- C.2.1.4.2 **Key personnel**
 - **Eligibility**
 - **Functionality**
- C.2.1.4.4 **Professional indemnity insurance** Professional Indemnity (PI) insurance providing cover in an amount of not less than R180 000 000 in respect of each and every claim during the period of insurance**Table B2:**
- **Awards above R50 mil (VAT Inclusive) i.e. 90/10 preference point system**

Eligibility

- **Eligibility:**

- Approved Professional Person (Dam Safety Specialist)
- Mechanical Engineer
- Electrical Engineer
- Architect
- Occupational Health and Safety Agent
- Professional Construction Project Manager
- Employer's Agent (Contracts Engineer)

- **C.2.1.4.6 Minimum score for quality (functionality)**

- Summary of quality (functionality) criteria

Criteria Number	Description of quality (functionality) criteria	Score for Functionality	Maximum possible score
1	Experience of Tenderer	50	50
2	Experience of Key Personnel	50	50
	Maximum possible score	100	100

- The minimum score for quality is **70**. Tenderers that fail to achieve the minimum score for quality will be declared as non-responsive.

Eligibility (functionality)

Criteria 1: Quality (Functionality) Score for Work Experience of Tenderer

Description	Points	Maximum points
Criteria 1 a): Comparable large reinforced concrete bulk water reservoir projects	5 points for each project	0 projects = 0 points 1 project = 5 points 2 projects = 10 points 3 projects = 15 points 4 projects = 20 points 5 projects or more = 25 points
Criteria 1 b): Comparable water projects with large diameter high pressure steel (continuously welded), ductile iron or GRP pipes	5 points for each project	0 projects = 0 points 1 project = 5 points 2 projects = 10 points 3 projects = 15 points 4 projects = 20 points 5 projects or more = 25 points

Eligibility (functionality)

Criteria 2: Quality (Functionality) Score for Key Personnel

Item No.	Key Personnel	Minimum Qualification	Compulsory Professional Registration	Relevant Experience	*Points per Comparable Project	Maximum Points per Comparable Project	Maximum Points
C.2.1.4.6 (a)	Employer's Agent (Contracts Engineer)	BSc (Eng)/BEng/ (Civil Engineering)	Pr Eng	The Employer's Agent must have contract management and administration experience in comparable projects.	1 point for each completed project	0 projects = 0 points 1 project = 1 point 2 projects = 2 points 3 projects = 3 points 4 projects = 4 points 5 projects = 5 points	5
C.2.1.4.6 (b)	Employer's Agent Representative (Engineer's Representative)	BSc (Eng)/BEng/ BTech (Civil Engineering)	Not compulsory.	The Employer's Agent Representative's experience must include construction management and monitoring in comparable projects.	1 point for each completed project	0 projects = 0 points 1 project = 1 point 2 projects = 2 points 3 projects = 3 points 4 projects = 4 points 5 projects = 5 points	5
C.2.1.4.6 (c)	Approved Professional Person (Dam Safety Specialist)	BSc (Eng)/BEng (Civil Engineering)	Pr Eng	Dam Safety Approved Professional Person (APPP). The proposed team member must be registered as an APPP in terms of Regulation 45 and 46 of the Dam Safety Regulations. The incumbent APPP must be eligible to enrol with the DSO as per Regulation 45 or currently appear on the Register of Approved Professional Persons as per Regulation 46 to undertake the design & quality control responsibilities duties for concrete lined and roofed earthenfill dam with an 18m embankment height. The reservoir is envisaged to be categorised as a Category II dam / reservoir with a safety risk.	1 point for each completed project	0 projects = 0 points 1 project = 1 point 2 projects = 2 points 3 projects = 3 points 4 projects = 4 points 5 projects = 5 points	5
C.2.1.4.6 (d)	Geotechnical Engineer/Engineering Geologist	MSc (MEng)/ BSc (Eng)/ BEng/ BSc (Geology)	Pr Eng/ Pr Nat Sci	The geotechnical engineer/engineering geologist must be a professionally registered civil engineer or professional natural scientist (Pr Eng or Pr Nat Sci) with relevant experience in complex geotechnical designs and must have a postgraduate qualification in the specialised field.	1 point for each completed project	0 projects = 0 points 1 project = 1 point 2 projects = 2 points 3 projects = 3 points 4 projects = 4 points 5 projects = 5 points	5
C.2.1.4.6 (e)	Civil Engineer (Pipeline and Hydraulics Engineer)	BSc (Eng)/BEng (Civil Engineering)	Pr Eng	The civil engineer shall be qualified as an engineer and must have design experience in bulk water supply pipelines and hydraulics. Particular experience in large diameter pipeline projects in steel (continuously welded), ductile iron and GRP pipes are essential to demonstrate experience. Experience shall include verifiable post graduate experience in the analysis, design and construction of the civil components in large water conveyance projects.	1 point for each completed project	0 projects = 0 points 1 project = 1 point 2 projects = 2 points 3 projects = 3 points 4 projects = 4 points 5 projects = 5 points	5
C.2.1.4.6 (f)	Structural Engineer	BSc (Eng)/ BEng (Civil Engineering)	Pr Eng	The structural engineer shall be qualified as an engineer and must have structural design experience in water retaining structures as per comparable projects definition. Experience shall include verifiable post graduate experience in the analysis, design and construction of large water retaining structures.	1 point for each completed project	0 projects = 0 points 1 project = 1 point 2 projects = 2 points 3 projects = 3 points 4 projects = 4 points 5 projects = 5 points	5
C.2.1.4.6 (g)	Mechanical Engineer	BSc (Eng)/ BEng/ BTech (Mechanical Engineering)	Pr Eng/ Pr Tech Eng	Experience shall include the analysis, design and construction of the mechanical components for typical projects as defines as a comparable project.	1 point for each completed project	1 project = 1 point 2 projects = 2 points 3 projects = 3 points 4 projects = 4 points 5 projects = 5 points	5
C.2.1.4.6 (h)	Electrical Engineer	BSc (Eng)/ BEng/ BTech (Electrical Engineering)	Pr Eng/ Pr Tech Eng	Experience shall include the analysis, design and construction of the mechanical components for typical projects as defines as a comparable project.	1 point for each completed project	1 project = 1 point 2 projects = 2 points 3 projects = 3 points 4 projects = 4 points 5 projects = 5 points	5
C.2.1.4.6 (i)	Architect	NQF 7 or Higher	Pr Arch/ Professional Senior Architectural Technologist	Registered Professional Architect (Pr Arch). Experience shall include water and wastewater treatment plants facilities and/or municipal depots.	1 point for each completed project	0 projects = 0 points 1 project = 1 point 2 projects = 2 points 3 projects = 3 points 4 projects = 4 points 5 projects = 5 points	5
C.2.1.4.6 (j)	Occupational Health and Safety Agent	National Diploma in Safety Management, BTech in Safety Management, BComm (Operational Risk Management) or MSc in Construction Health and Safety Management	Pr CHSA	Professional Construction Health and Safety Agent (Pr CHSA) registered with the South African Council for Project and Construction Management Professions (SACPCMP). The CHS Agent shall possess the necessary competencies and resources to act as the Employer's Agent in terms of the Occupational Health and Safety Act.	1 point for each completed project	0 projects = 0 points 1 project = 1 point 2 projects = 2 points 3 projects = 3 points 4 projects = 4 points 5 projects = 5 points	5
Total Points							50

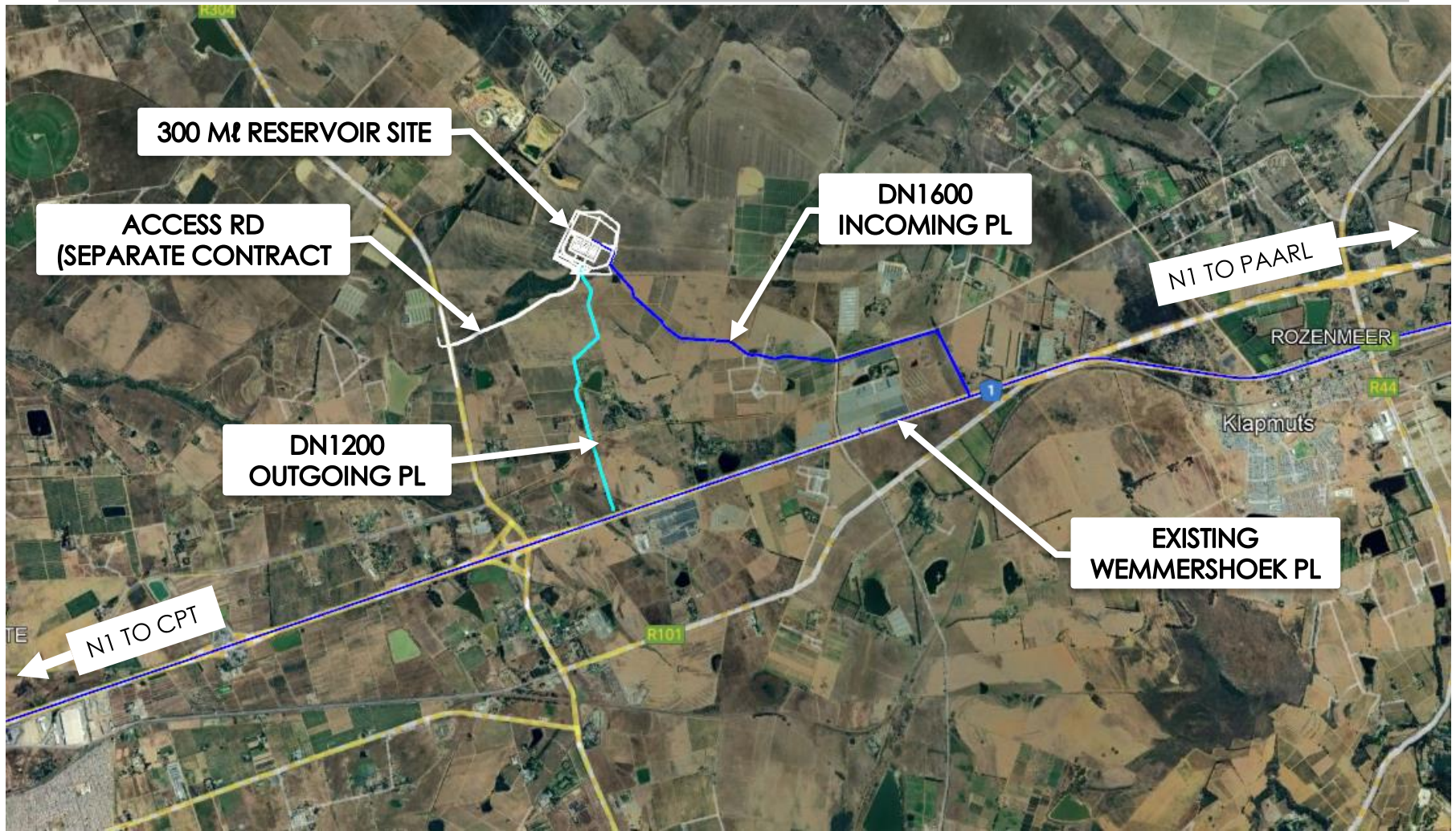
Technical and Engineering Information

Technical/Engineering Information

The key infrastructure to be constructed under this project includes:

- A 300 Mℓ rectangular (238 m long, 137 m wide) concrete-lined earth-fill embankment reservoir, with concrete floor slabs, columns, and roof.
- DN1600 and DN1200 connecting pipelines with appurtenance structures.
- A disinfection facility (1,5 PPM capacity).
- An administration facility.
- Site services including internal roads, water supply, sewerage, stormwater, electricity supply etc.

Technical/Engineering Information Overview



Technical/Engineering Overview

300 Mℓ RESERVOIR SITE



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Technical/Engineering Information

Supplementary Geotechnical Investigation

- A geotechnical investigation was completed in 2017 during the preliminary design phase under AECOM's appointment
- A need was identified for a supplementary geotechnical investigation under the detailed design phase.
- The supplementary geotechnical investigation was completed in 2022 and comprised of the following:
 - **Geophysical Surveys:** 2 x Electrical Resistivity Imaging (ERI) traverses, 2 x Seismic Refraction Tomography (SRT) traverses, and 6 x Multichannel Analysis of Surface Wave (MASW) tests.
 - **Test Pits:** Excavation of 75 test pits with an excavator incl. Dynamic Cone Penetrometer (DCP) testing adjacent to each test pit.
 - **Boreholes:** Drilled 18 boreholes to a depth of 30 m, with one reaching 45 m. Piezometers were installed in 6 boreholes across the reservoir site to monitor groundwater levels.
 - **Laboratory Testing:** Comprehensive tests conducted, including foundation indicator tests, dispersity, compaction (MDD and CBR), moisture content, pH and conductivity, consolidation, permeability, direct shear box, triaxial, oedometer, and uniaxial compressive strength (UCS) with deformation modulus testing on rock samples.

Technical/Engineering Information

Supplementary Geotechnical Investigation

- The supplementary geotechnical investigation together with the geotechnical investigation conducted during the preliminary design phase was used to inform the detailed design.
- The key conclusions from the geotechnical investigations are:
 - **Variable Ground Conditions:** Highly variable soil and rock profiles due to complex geology, with deeply weathered layers.
 - **Settlement and Stability:** Complex soil profiles and shallow water tables may require ground improvement for settlement control and excavation support during construction. The soil horizons are underlain by very soft to soft rock siltstone or granite, with medium hard rock to a lesser extent.
 - **Unsuitable Materials:** Expansive and dispersive soils, unsuitable for embankment construction and road pavement layers, necessitating material import.

Technical/Engineering Information

Geotechnical Design

Key Design Considerations

The **key performance criteria** of the geotechnical design where as follows:

- Mitigate differential settlements to prevent reservoir leaks due to joint failures or cracking.
- Ensure the long-term stability of the embankment under all operating conditions.

Key Geotechnical Design Considerations:

- **Ground Stiffness:** Variations in the stiffness of the ground due to variability in material type and bedrock level impact settlement behaviour, affecting the watertightness of the structure.
- **Long-term Consolidation:** Fine-grained soils and the shallow water table could cause long-term consolidation settlement, affecting structural performance.
- **Shear Strength:** The stability of embankments and cut slopes depends on the shear strength of the in-situ material.
- **Reuse of In-site Material:** The reuse of in-situ material for the embankment construction is governed by the properties of the available material, such as shear strength, expansiveness, and permeability, in a remoulded (compacted) state.
- **Groundwater Levels:** Groundwater impacts drainage systems and slope stability, influencing design solutions.

Technical/Engineering Information

Geotechnical Design

Design Approach & Methods

- **Slope Stability:**
 - Stability of slopes (cut and fill) was modelled with limit equilibrium analysis (Geostudio 2021.3)
 - Various scenarios (empty reservoir, full reservoir, seismic event etc.) were investigated, each with a required safety factor to be met.
 - Additionally, the bearing and local stability of the reservoir column footings was analysed.
 - Material improvements, slope stabilisation measures, geosynthetics etc. were specified to meet the safety factors for the various scenarios.
- **Settlement :**
 - A 2D finite element analysis (Bentley, Version 22) was used to investigate settlement, guiding the design of floor slab joints and subgrade reactions.
 - The magnitude of settlement due to consolidation, as well as time required for consolidation was assessed.

Technical/Engineering Information

Geotechnical Design

Final Solution:

- **Excavation:**

- Upper 3 m of unsuitable transported and pedogenic materials below the basin and embankment to be removed.
- The excavated material from the cut slope is also unsuitable for the construction of the embankment and must be spoiled off-site.
- Cut slopes to be supported by soil nails and drainage systems, with shotcrete on cut faces for stability.

- **Founding and Embankment:**

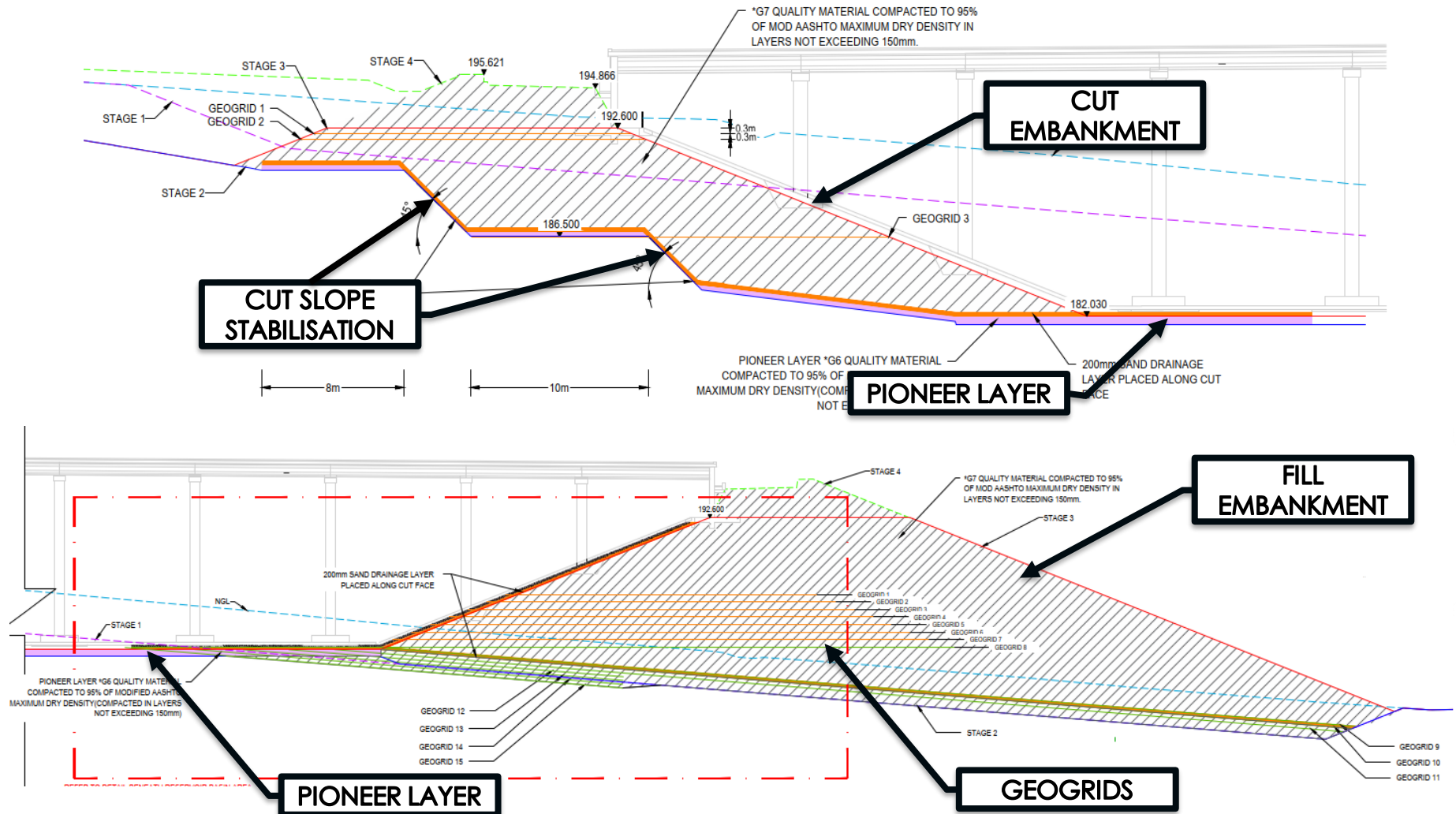
- A pioneer layer of *G6 material* with specific grading requirements is to be imported and placed beneath the basin floor for trafficability and bearing capacity.
- G7 quality material with specific grading requirements is to be imported for the embankment construction.
- Embankments are to be reinforced with geogrids at specific locations for strength and stability.

- **Consolidation:**

- A minimum time is required for embankment consolidation: Northern, Eastern, Western slopes: 280 days; Southern slope: 210 days.
- Piezometers to be installed during construction to monitor excess pore pressure within the embankments and foundations.

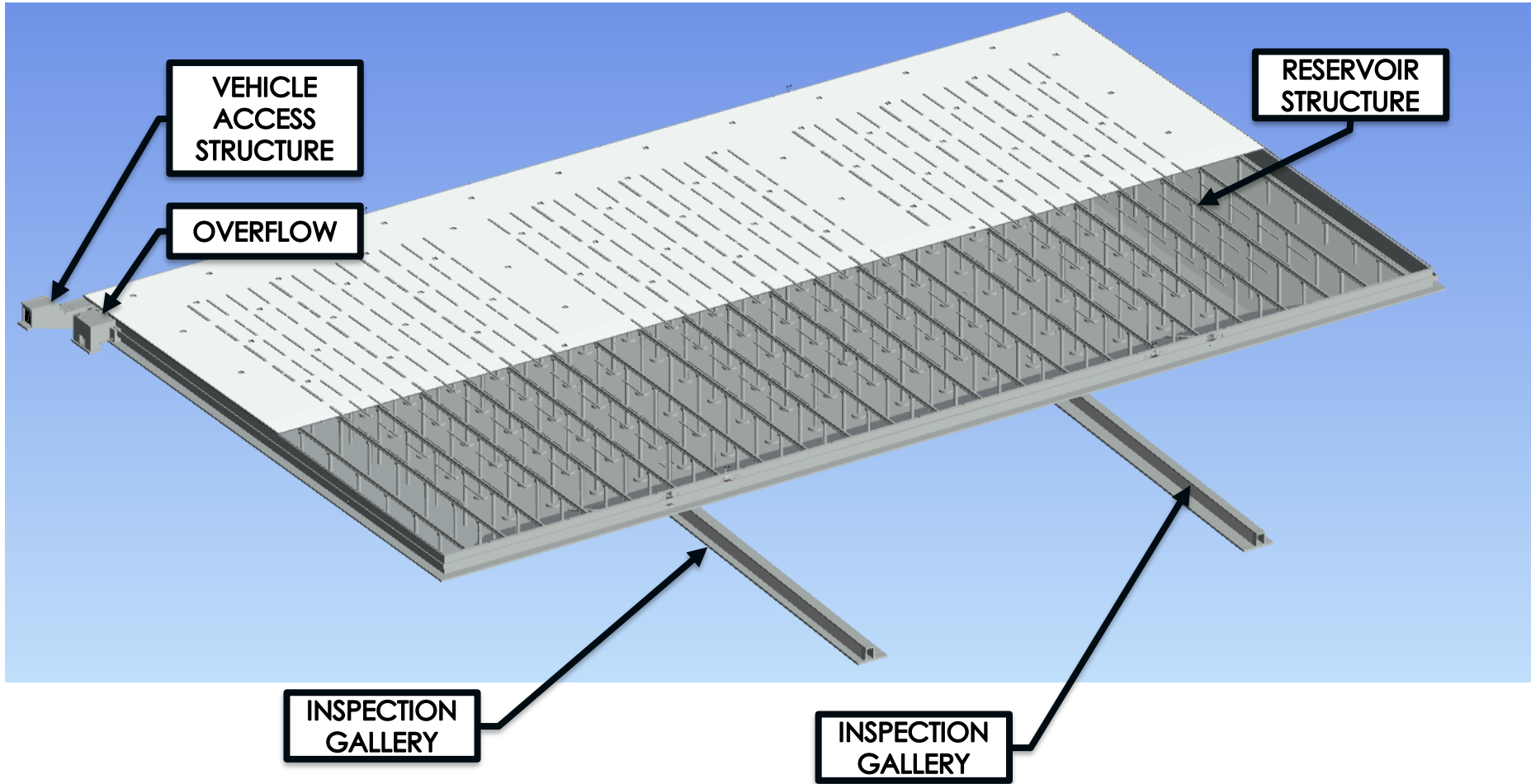
Technical/Engineering Information

Geotechnical Design



Technical/Engineering Information

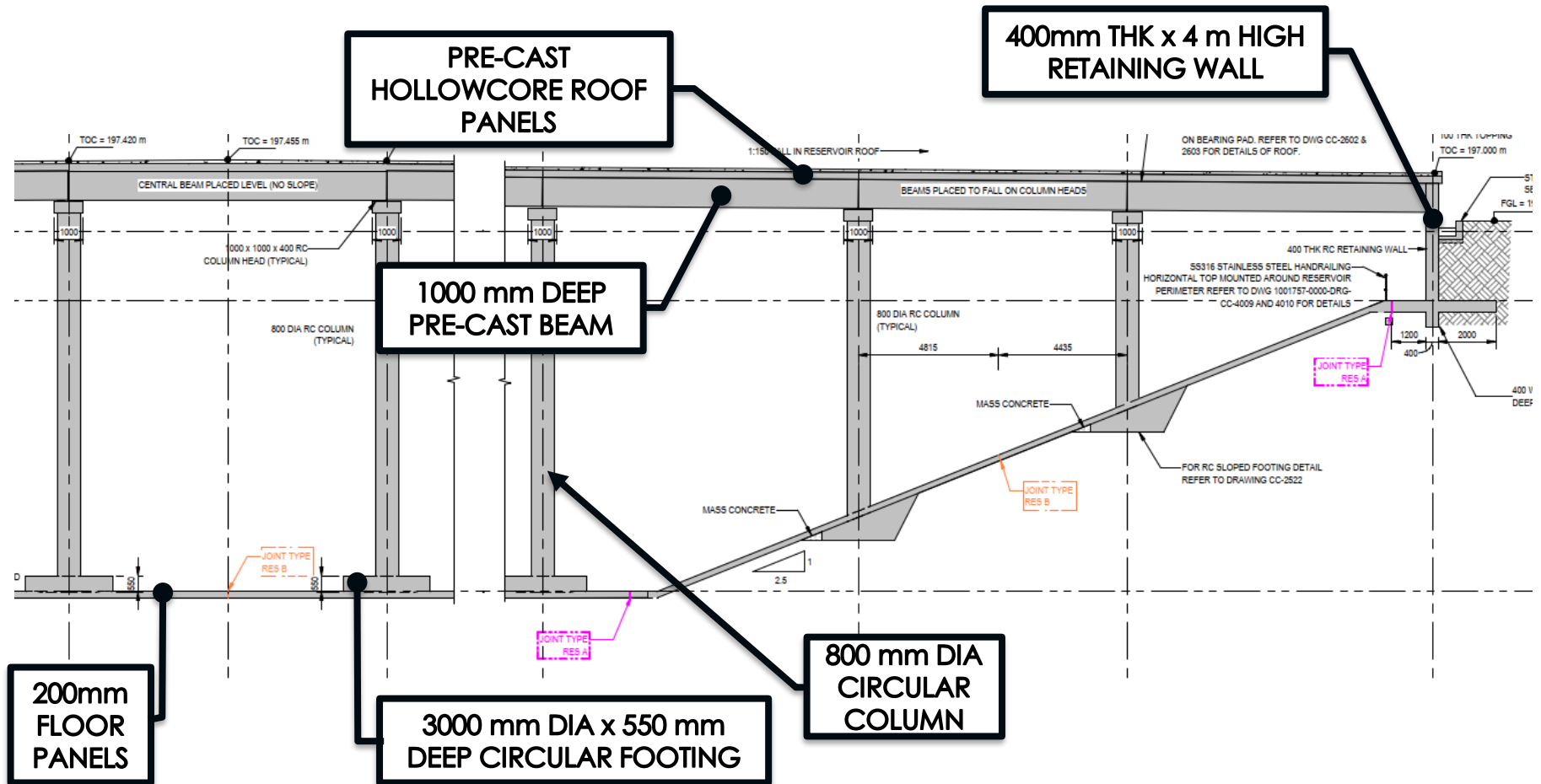
Reservoir Design



Technical/Engineering Information

Reservoir Design

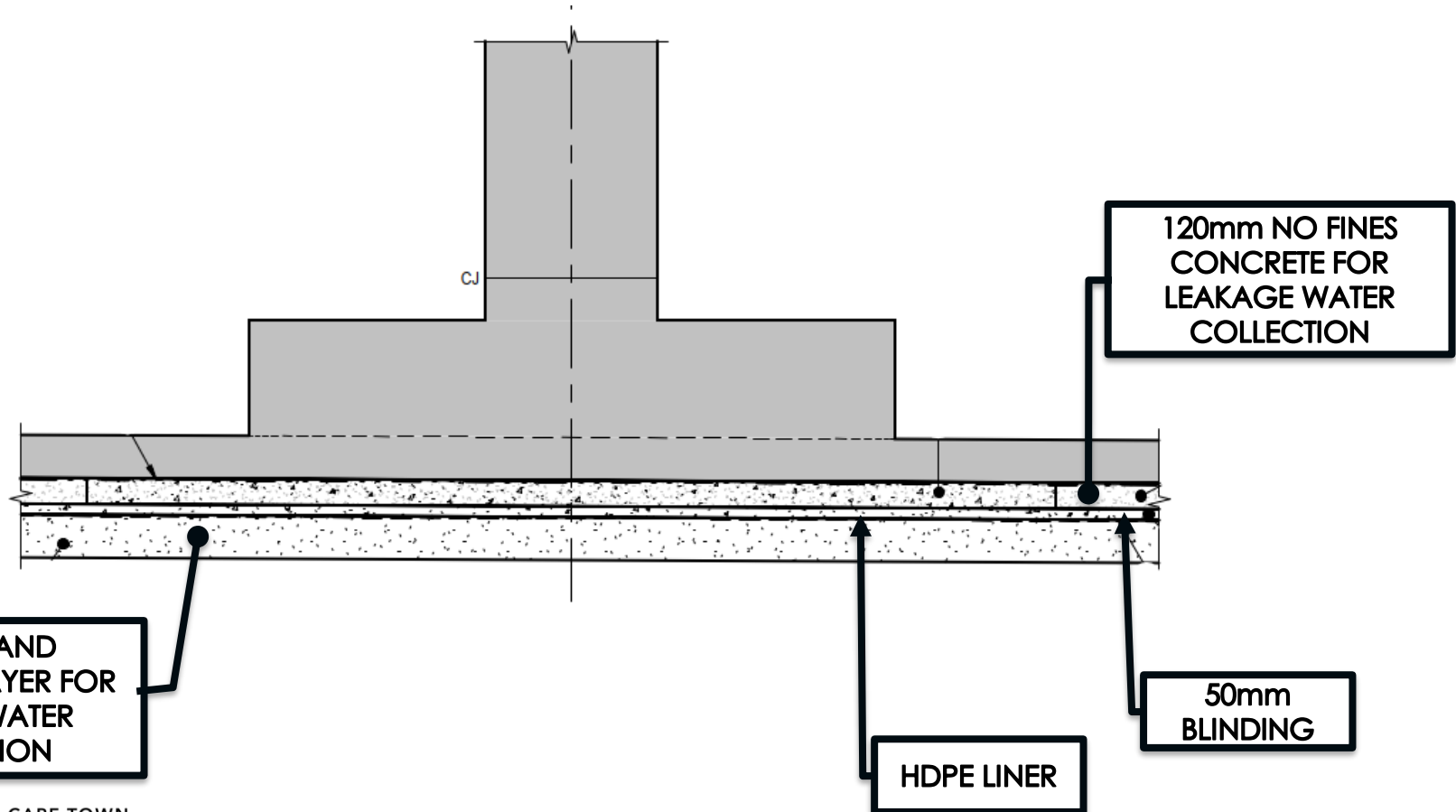
Reservoir Structure:



Technical/Engineering Information

Reservoir Design

Reservoir Layerworks (underneath floor panels):



Technical/Engineering Information

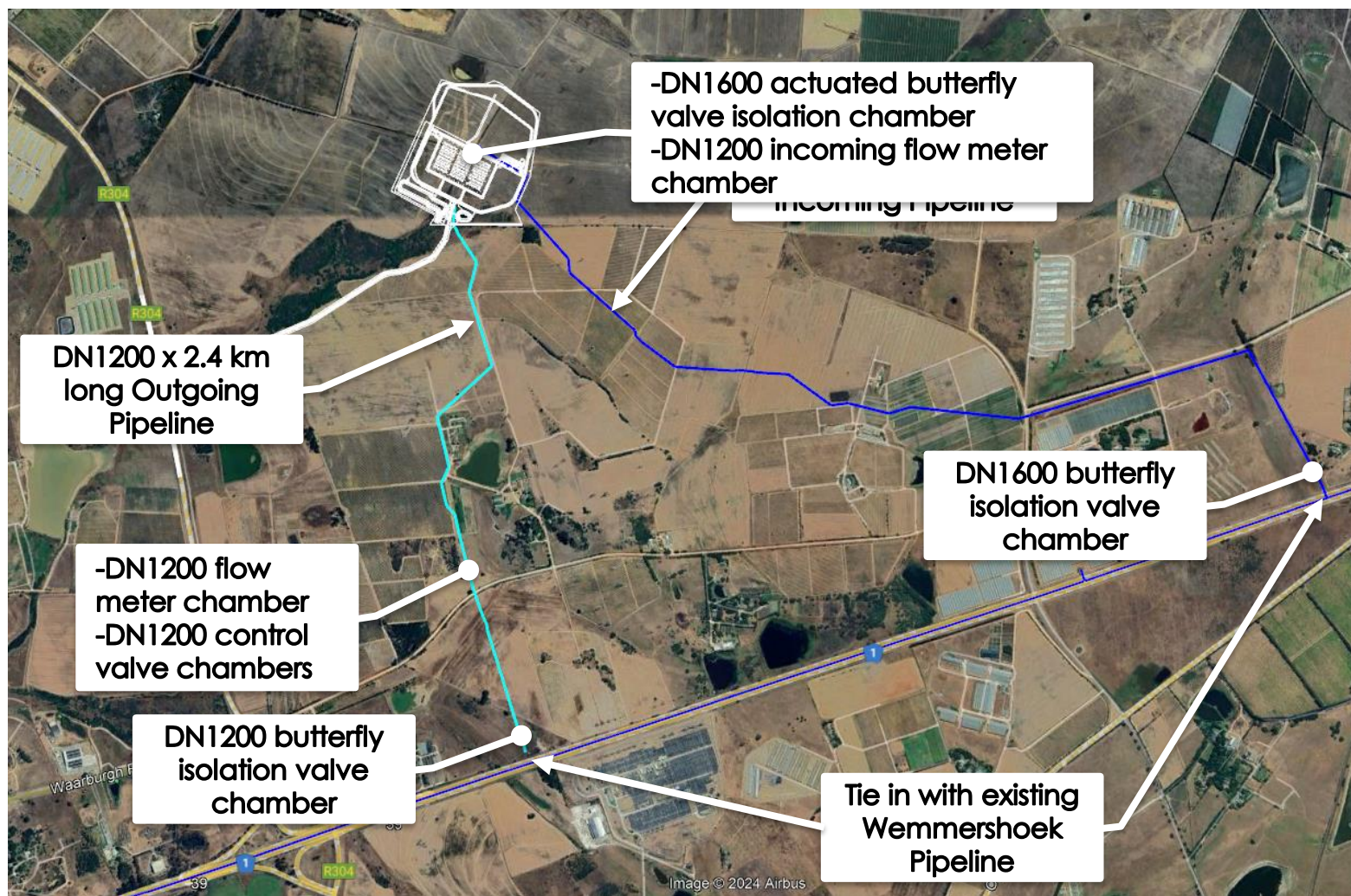
Reservoir Design

Key Considerations:

- **Watertightness:**
 - Dual joint system (PVC rearguard (floor) or centrebulb (wall) with flexible bandage) ensures leakage control.
 - Crack-width limitations and strategic joint placement help maintain structure integrity.
- **Inspection Galleries:** Groundwater and reservoir leakage monitoring systems are provided through the inspection galleries to ensure potential leaks are effectively managed.
- **Access:** Safe vehicular through vehicle access structure. Four other additional access points for human access.
- **Overflow:** Piano key spillway designed to handle maximum inflow.
- **Rooftop PV:** Structural design makes allowance for a future PV installation on the roof with the provision of upstands to fix the PV support structures.
- **Daylight Openings:** Several roof openings that can be opened for natural lighting during maintenance.

Technical/Engineering Information

Bulk Pipeline and Chambers



Technical/Engineering Information

Bulk Pipeline and Chambers

Pipeline design considerations:

- Continuously welded mild steel (grade X52) pipelines
- DN1600 to have a 12mm wall thickness with a 20 mm internal cement mortar lining and a 25 mm exterior cement mortar sheathing.
- DN1200 to have a 10mm wall thickness with a 15 mm internal cement mortar lining and a 25 mm exterior cement mortar sheathing.
- All valves, fittings and flanges to have a PN10 pressure rating.
- The wall thicknesses and pressure ratings where designs to account for all internal pressures (working, static and surge) as well as all external loads.
- AC Mitigation required to prevent electrical coupling during powerline fault conditions:
 - Pipelines to be electrically continuous
 - Insulating flange kits required at the start and end of the pipelines.
 - Equipotential planes required at several valve chambers for personnel safety.
- No cathodic protection required with the cement mortar sheathing as an external coating.

Technical/Engineering Information

Bulk Pipeline and Chambers

Appurtenances:

- **On the DN1600 Incoming Pipeline:**
 - 1 x DN1600 butterfly isolation valve chamber downstream of Wemmershoek connection
 - 9 x air valve chambers at all high points and at distances not exceeding 500m to ensure proper aeration and de-aeration of the pipeline. Air valves also serve as access points into the pipeline.
 - 6 x DN500 scour valve chambers at all the low points.
 - 1 x DN1600 actuated isolation valve is installed upstream of the Muldersvlei Reservoir (MVR) that will close automatically when the MVR starts to overflow.
 - 1 x DN1200 electromagnetic flow meter to measure the MVR inflow rate.
- **On the DN1200 outgoing pipeline:**
 - 1 x DN1200 butterfly isolation valve at the tie-in with the Wemmershoek pipeline.
 - 2 x DN1200 plunger flow control valves to control the outflow from MVR to Glen Garry reservoir. DN1200 butterfly isolation valves will be installed upstream and downstream of each flow control valve for maintenance.
 - 1 x DN1200 electromagnetic flow meter to measure the MVR outflow rate located upstream of the flow control valves.
 - 5 x Air valves were placed at high points and at distances not exceeding 500 m.
 - 3 x DN400 scour valve chambers at all the low points.

Interconnecting Pipelines and Major Chambers on Reservoir Site:



Technical/Engineering Information

Site Development

The site development design considered the following:

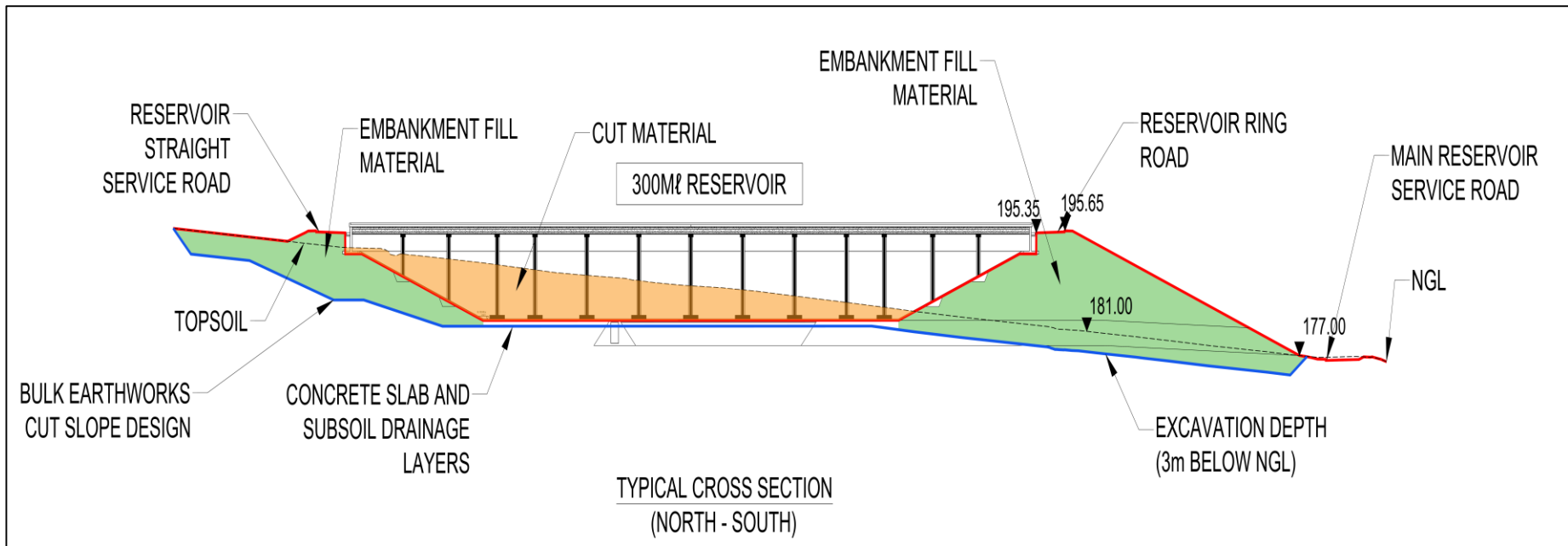
- Bulk Earthworks
- Internal Service Roads
- Stormwater
- Sewer
- Water Reticulation
- Ducting
- Fencing and Access Control

Technical/Engineering Information

Site Development

Bulk Earthworks

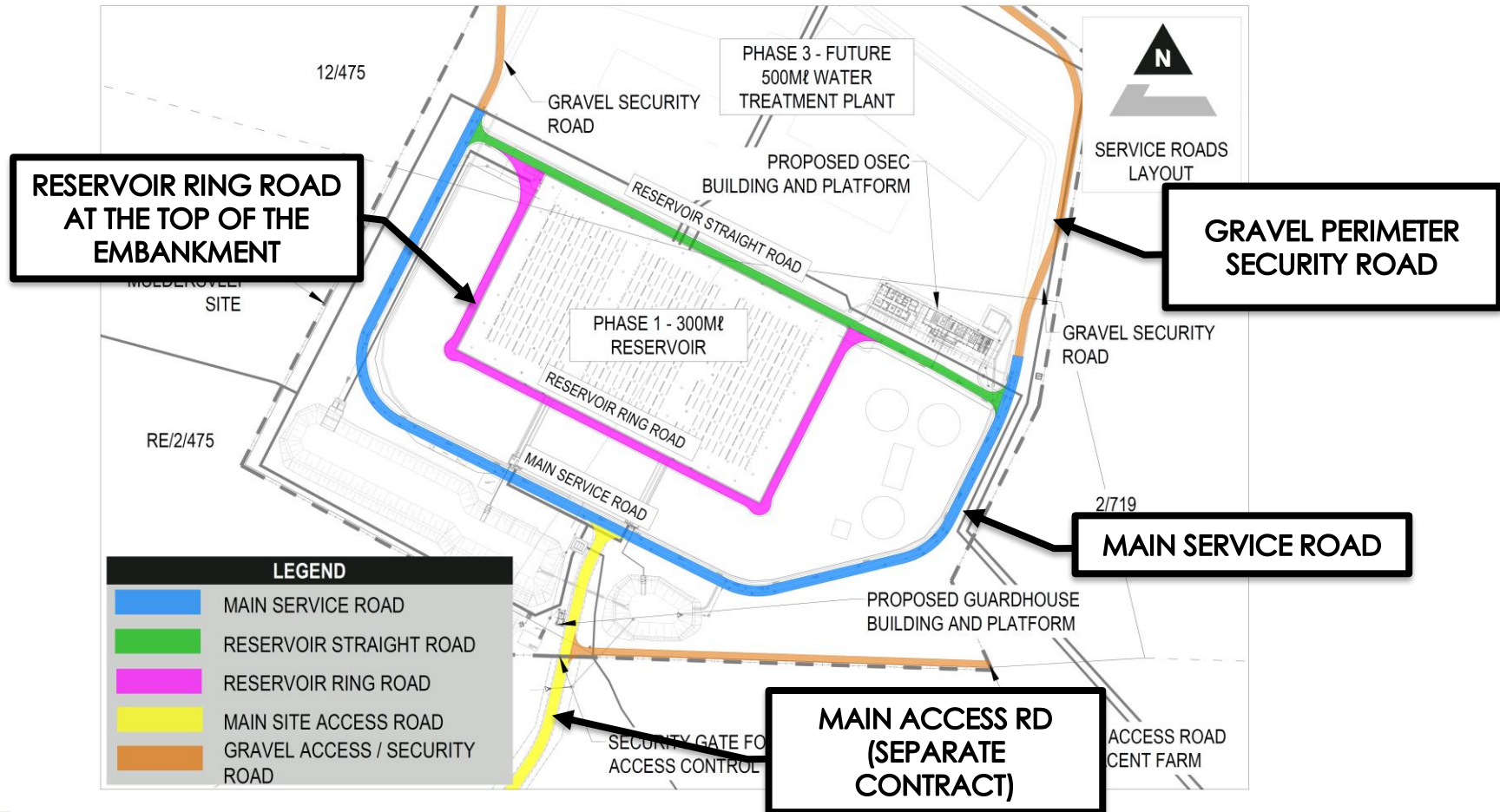
- Cut to spoil of approximately 350 000 m³ of unsuitable material as per Geotechnical Design
- Import approximately 435 000 m³ of G6 and G7 material for the founding and embankment construction.



Case 5: Technical / Engineering Case

Site Development

Service Roads



Technical/Engineering Information

Site Development

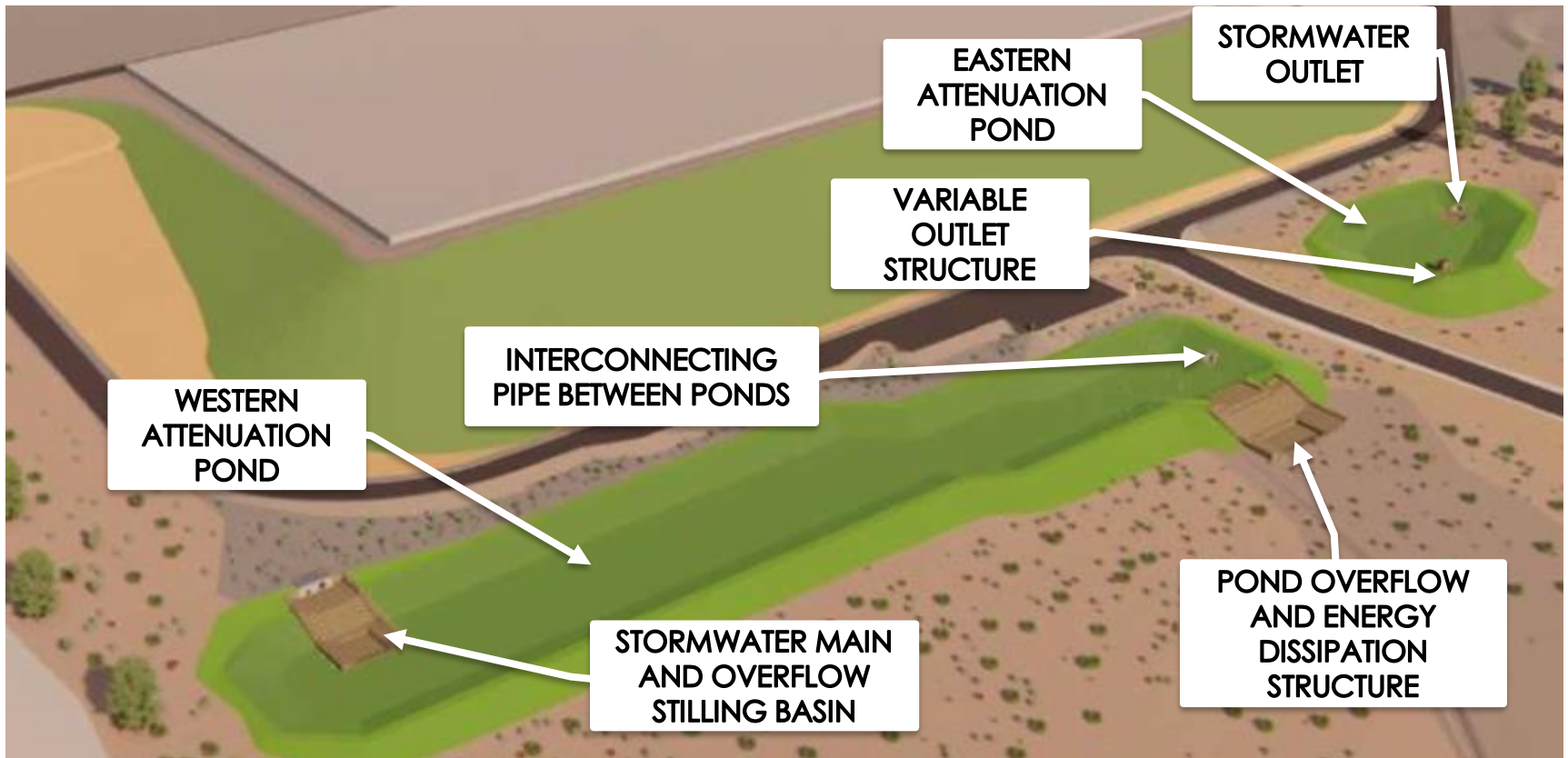
Stormwater

- **No Existing Municipal Connections:** All overland stormwater flow from the site (reservoir, buildings, landscaped areas) will be discharged onto roads and then directed into the piped stormwater network.
- **Dual Stormwater System:** Major and Minor Networks collect stormwater through pipes and overland channels and direct it into two dry attenuation ponds on the east and west sides of the site.
- **Attenuation ponds:** The attenuation ponds ensure stormwater discharge from the site (in quantity and quality) is equivalent to the predevelopment levels.
- **Reservoir Overflow:** The overflow from the reservoir will also be directed into the attenuation ponds.
- **Off-Site Management:**
 - The attenuation ponds discharge into a natural stream toward the R304 and eventually end up in a downstream farmer's dam.
 - Floodline Studies: Confirmed that downstream infrastructure can handle stormwater flows and reservoir overflows for the current phase (phase 1)

Technical/Engineering Information

Site Development

Stormwater



Technical/Engineering Information

Site Development

- **Sewer:**
 - Gravitational sewer network, no pump stations
 - Conservancy tank for wastewater storage (14-day capacity, emptied every 7 days)
- **Water Reticulation:**
 - Separate reticulation network are provided for potable and fire water.
 - The potable network will service all potable water needs, irrigation requirements, reservoir cleaning water supply points.
 - The fire network incorporates fire storage and fire water pumps (1 electric, 1 diesel) at the Disinfection Facility with hydrants and booster points.
- **Ducting:**
 - Ducting are provided as required for the EC&I design on site.
 - Ducting consist of 110 mm and 160 mm uPVC sleeves with junction boxes at major changes in direction.
- **Fencing:** The site will be fenced with a 2.4m high security fence with an electrical wire overhang.
- **Access Control:**
 - Primary access control will be at the guard house at the site entrance.
 - Access control at the start of the main access road will be done remotely remote-controlled gates, an intercom system and CCTV cameras.

Technical/Engineering Information

Disinfection Facility

The Disinfection facility allows for re-chlorination at Muldersvlei Reservoir to maintain chlorine residual between Muldersvlei and Glen Garry reservoirs, protecting against pathogens.

The design capacity of the disinfection systems is 1,5 ppm at a flow rate of 240 Mℓ/d. The facility will enable for disinfection upstream or downstream of the reservoir through the following methods:

- **Primary:** Sodium hypochlorite dosing via on-site generation (OSEC) – 4 X 10kg/hr chlorine generators
- **Backup:** Calcium hypochlorite dissolution and dosing
- **Secondary Backup:** Commercial sodium hypochlorite dilution and dosing

Technical/Engineering Information

Disinfection Facility

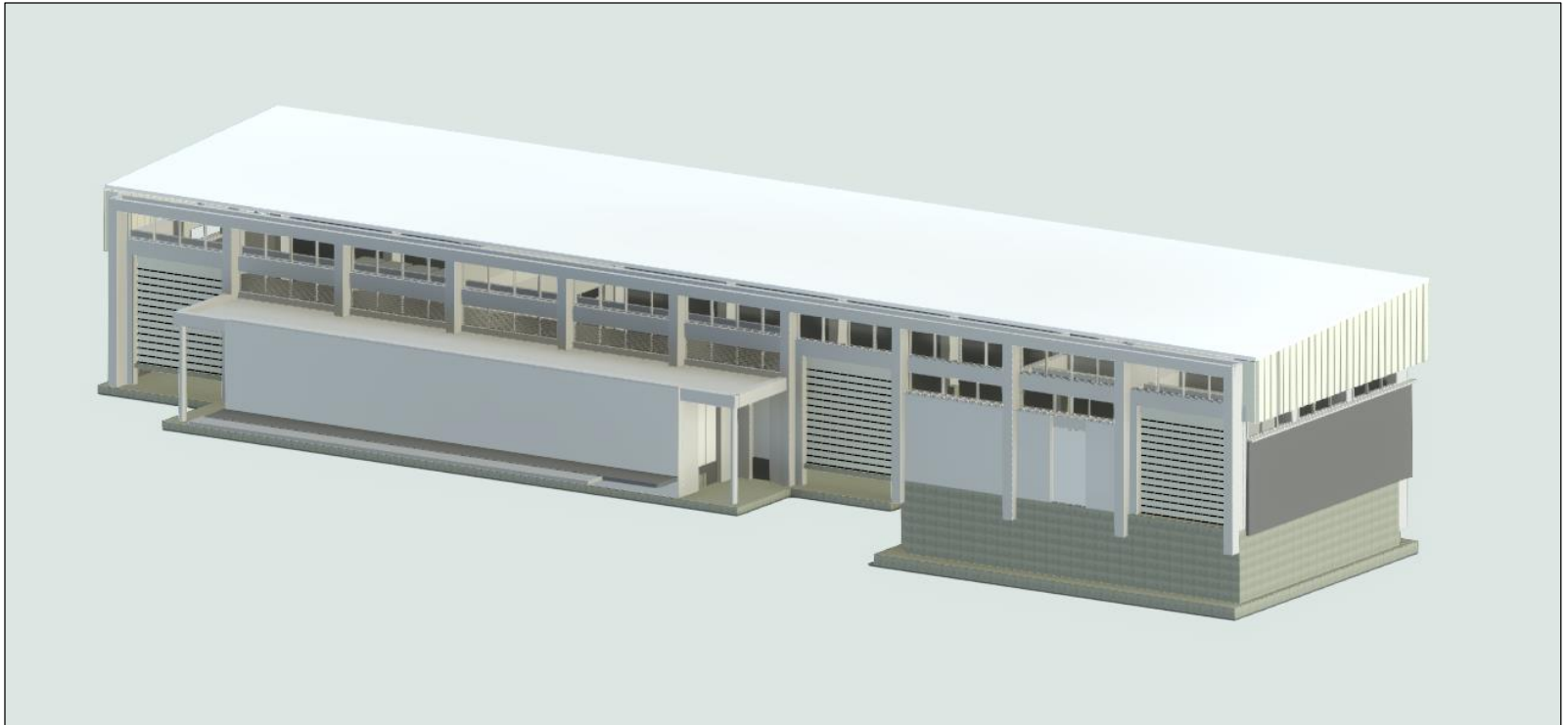
In addition to the disinfection systems, the Disinfection Facility will also incorporate the following infrastructure:

- **Service water pump station** servicing the disinfection facility as well as other potable water requirements on the site.
- **Fire water pump station** servicing the entire site.
- **Storage reservoir** for potable and fire water storage requirements.

Technical/Engineering Information

Disinfection Facility

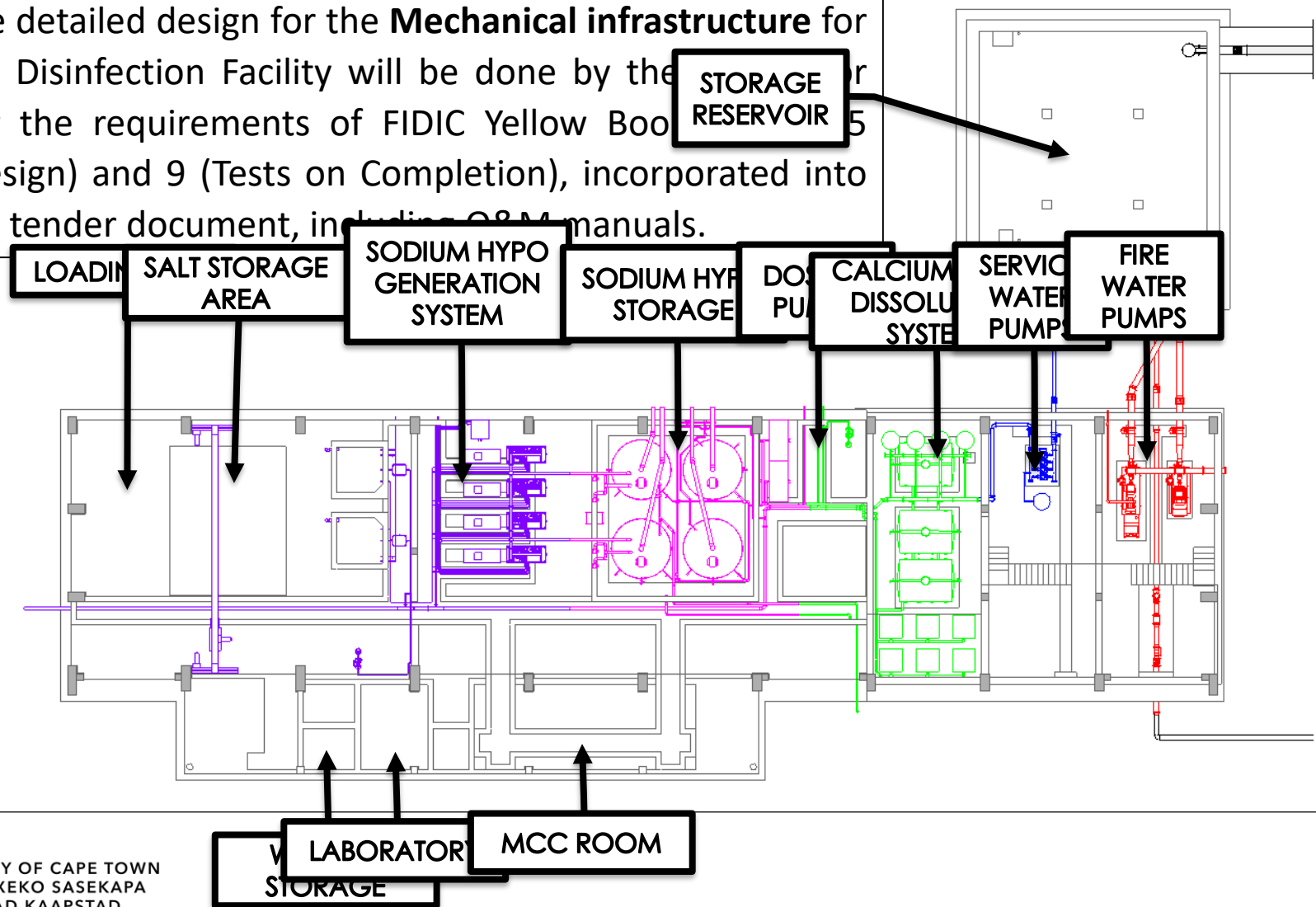
The detailed design for the **Civil infrastructure** for the Disinfection Facility is done by the Employer in line with standard GCC requirements.



Technical/Engineering Information

Disinfection Facility

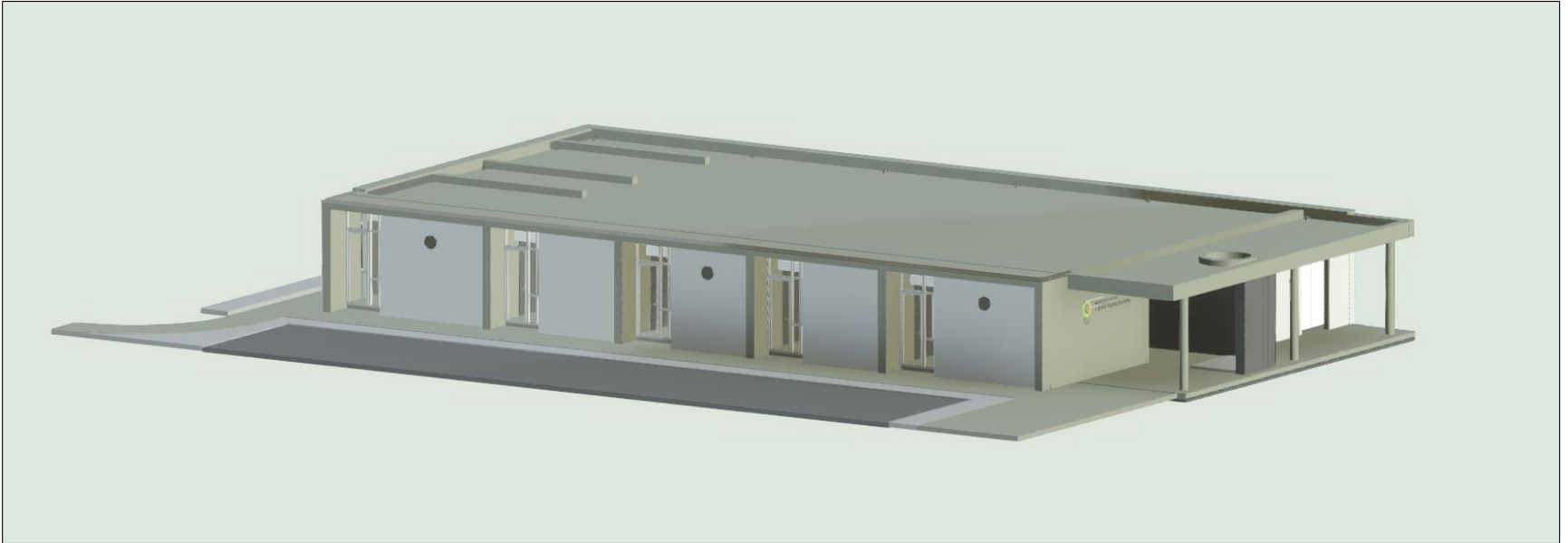
The detailed design for the **Mechanical infrastructure** for the Disinfection Facility will be done by the [redacted] per the requirements of FIDIC Yellow Book (Design) and 9 (Tests on Completion), incorporated into the tender document, including O&M manuals.



Technical/Engineering Information

Admin and ancillary facilities

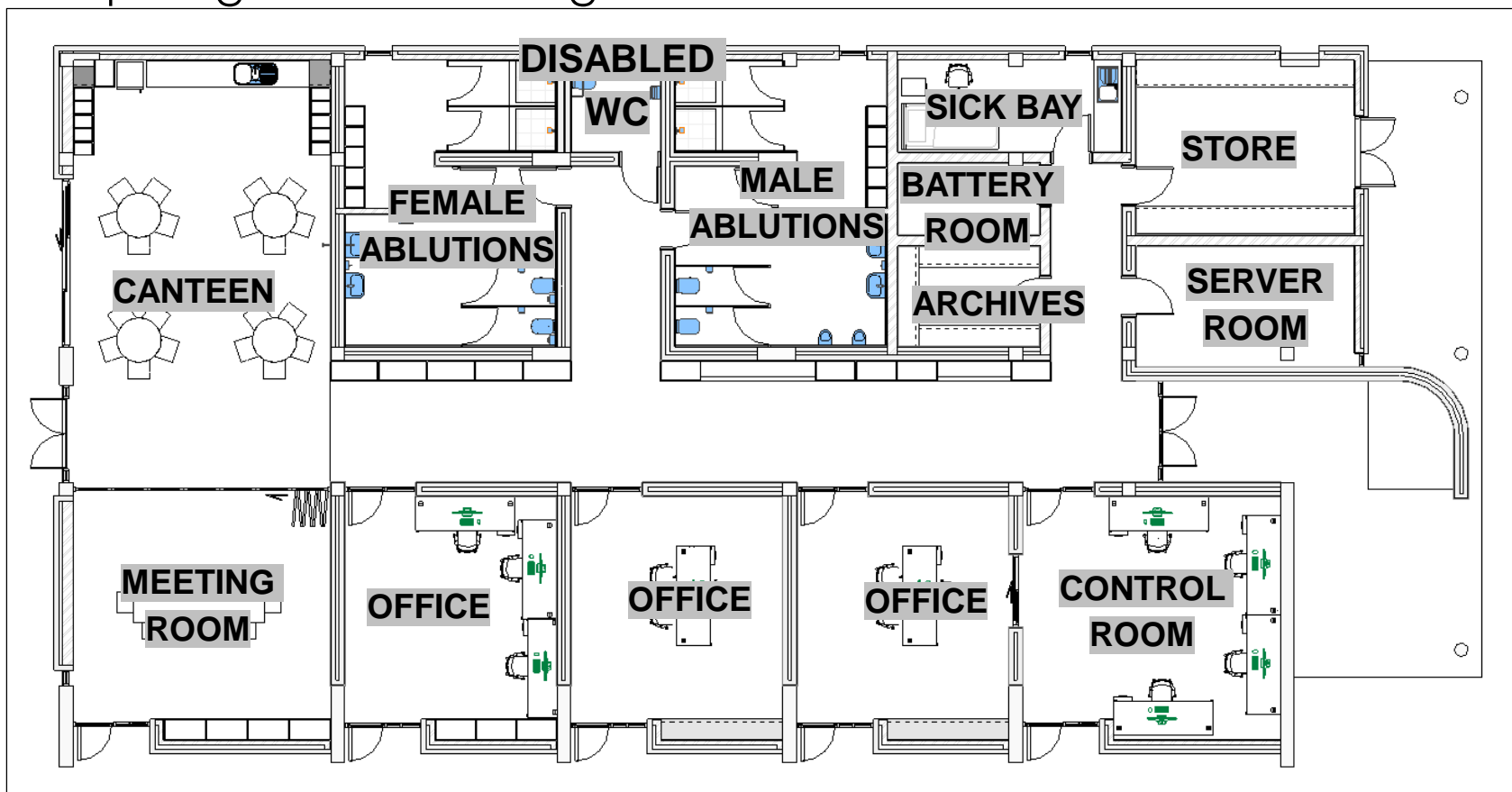
An administration facility will be provided for the operation of the Muldersvlei 300Mℓ reservoir and associated infrastructure as well as other bulk water infrastructure in the supply region.



Technical/Engineering Information

Admin and ancillary facilities

The Administration Facility will be a 480 m² single story building comprising of the following:



Technical/Engineering Information

Admin and ancillary facilities

Access control and security operations will be managed from a Guardhouse that will be located at the entrance to the reservoir site.



Technical/Engineering Information

Electrical, Control & Instrumentation

The detailed design for the EC&I infrastructure will be done by the Contractor per the requirements of FIDIC Yellow Book Clauses 5 (Design) and 9 (Tests on Completion), incorporated into the tender document, including O&M manuals.

The key aspects of the Electrical Design are as follows:

- **Electrical Supply:** Separate dedicated Eskom supplies required for different sites (reservoir, valve chamber, access gate).
- **Back-up Power Supply:** Diesel generator in ISO container; 24-hour operation capacity at full load.
- **Motor Control Centre (MCC):** Houses functional units for the disinfection plant and control panels for fire pumps, building distribution boards, PLC, and HMI.
- **Control Valve Distribution Boards:** Power and control for valve chambers, including local/remote control and ancillary equipment.
- **Low Voltage Cabling:** Cables installed in trenches, sleeves, cable ladders (stainless steel in corrosive areas).

Technical / Engineering Case

Electrical, Control & Instrumentation

The key aspects of the Electrical Design are as follows (cont'd):

- **Building Electrical Services:** Lighting and small power designs for all buildings, with area lighting controlled by photocells.
- **Rooftop Solar:** PV system for admin building with BESS for load shedding/night-time coverage (up to 10 hours).

The key aspects of the Control and Instrumentation Design are as follows:

- **Control System:** PLC system for sodium hypochlorite generation and reservoir control.
- **Control Network:** Fibre optic network for supervisory, control, field instrumentation, and building services.
- **SCADA and Remote Monitoring:** Central SCADA system for local and remote monitoring (via CCT's DSS) with hot-standby server.
- **Instrumentation:** Flow, level, temperature, pressure, chlorine measurement; leak detection for hydrogen gas; control valve status indicators.
- **Building Electronic Services:** Fire detection, video surveillance (license plate recognition, perimeter, and internal monitoring), RFID access control, intruder detection, and panic alarms.

Technical/Engineering Information

Dam Safety

- Dam safety considerations follow the **National Water Act No 36 of 1998** and **Regulations Regarding the Safety of Dams** (Government Notice No R. 139, February 2012).
- **Classification:**
 - Classification Document: Dated 12 October 2016, by the Department of Water and Sanitation.

Details:

- Registration No: 12/2/G202/BJ
- Maximum Wall Height: 18 m
- Storage Capacity: 300,000 m³
- Size: Medium
- Hazard Potential Rating: Significant
- Category: II

Technical/Engineering Information

Dam Safety

- **Approved Professional Person (APP):**
 - APP Appointment required for design and construction quality control.
 - Responsibilities include approval of new dam designs, compilation of as-built drawings and completion reports, and preparation of the O&M manual and emergency preparedness plan.
 - Current APP: Dr. FJM Denys (Zutari), appointed on 6 July 2022, and ratified by DWS on 7 July 2022
- **Licence to Construct:**
 - The APP must apply for a *Licence to Construct* at DWS before construction on the dam can commence.
 - The application must be supported by the specifications and detailed engineering design drawings.
- **Licence to Impound:**
 - The APP must apply for a *Licence to Impound* at DWS before first filling and watertightness testing.
 - This application will be supported by the Operation and Maintenance Manual (O&MM) and emergency preparedness plan (EPP).

USE OF REASONABLE SKILL, CARE and DUE DILIGENCE

USE OF REASONABLE SKILL, CARE AND DUE DILIGENCE

- This project is a large project lifecycle in terms of the City's Stage Gate Review guideline meaning that this project has a total project cost higher than R100 million and has a high implementation complexity score value as per the City's Project Portfolio Management Stage Gate Review Guideline Revision 6 of June 2024.
- As per Board Notice 21 of 2021 (Government Gazette, Vol 669, No. 44333 of 26 March 2021) i.e. Identification of Engineering Work Regulations, this project is defined as a Complex project. For this reason, the appointed Service Provider must fully familiarise themselves with the merits and technical requirements this project requires to be executed till completion/close-out in order to exercise reasonable skill, care and diligence. For this reason, the Service Provider must ensure that key and support personnel that performs any identified engineering work in a particular engineering discipline must, in addition to any other requirement contemplated in the Engineering Profession Act:
 - be suitably qualified;
 - be registered by ECSA in the appropriate category applicable to the level of service performed; and
 - possess the necessary core competency in the competency areas referred to in this item to perform such core service as a professional engineer, professional engineering technologist, or a specified category practitioner.
- It's imperative that the Service Provider Safeguards the Employer against potential losses and ensure that their staff possess the core competencies required for a complex project of this nature, and appropriately experienced and qualified personnel are assigned to this project to deal with project complexities at any stage of the project for the duration of the project.

The tenderers are to take cognisance of the following elements highlighting the complexity of this project. These are just key highlights, and the Service Provider is expected to thoroughly understand the project's complexities to effectively address any challenges:

USE OF REASONABLE SKILL, CARE AND DUE DILIGENCE

Nature of ground and subsoil conditions

a) General

Reservoir - The geotechnical and materials investigations carried out during 2017 and June 2022 indicated that the ground profile within the reservoir footprint generally comprises an upper layer of topsoil and transported materials, with some occurrences of pedogenic materials, which are underlain by residual horizons, generally comprising sandy or silty clays, which have weathered from the underlying shale, siltstone and granite-gneiss bedrock. The residual material is in turn underlain by very soft to soft rock, and medium hard rock to a lesser extent where the depth to bedrock varies across the site. The site has highly variable ground conditions with a deeply weathered profile. Groundwater levels are also highly variable across the site and were encountered at depths between 0.5m and 9.6m. The residual materials have varying degree of expansive potential.

Pipelines - Excavations across the majority of the pipeline routes are expected to be soft excavations. The very soft and soft bedrocks is deemed to be excavatable by heavy equipment or plant, or by ripping. However, isolated sections of boulder excavations and hard rock excavations can be expected. The test pits sidewalls were encountered to be generally stable on the stiff to very stiff residual soils to depths of up to 5m. However, in the loose to medium dense transported soils, the very loose to loose gravelly pedogenic materials and the soft to firm residual soils in the upper horizons were susceptible to instability owing to their low in-situ consistency. In these sections, the stability of excavations during construction may be compromised and shoring or battering of excavations may be required. Where gravel, ferricrete nodules and groundwater ingress are encountered, further slope battering, or shoring may also be required.

Excavations during construction are likely to experience groundwater ingress especially during the rainy season, which will require dewatering.

USE OF REASONABLE SKILL, CARE AND DUE DILIGENCE

b) Materials investigation

The majority of materials encountered along the pipeline routes and across the reservoir site in general are classified as having quality poorer than G9 according to COLTO guidelines. The materials are classified as unsuitable for use in engineered fill or pipeline construction. In general, the embankment fill material and pipeline bedding material will be imported from commercial sources.

USE OF REASONABLE SKILL, CARE AND DUE DILIGENCE

Operations Requiring Special Attention

Connections to existing Wemmershoek pipeline

Two connections between the existing Wemmershoek pipeline and Muldersvlei reservoir pipelines are required to link the new reservoir to the CCT bulk water network. These connections are located within the median between the east bound and west bound carriageways of the N1 and will involve amongst other things, pipe jacking, traffic accommodation and temporary lateral support within a confined area. The maximum shutdown period for the existing Wemmershoek pipeline is 48 hours per connection. The pipeline will be isolated at the Wemmershoek treatment works and shall be suitably drained before commencement of the connection.

The Service Provider will be responsible for obtaining prior approval for any planned shutdown from the operations manager of the Bulk Water Directorate for the City of Cape Town Water and Sanitation department, as well as the planning for construction wayleaves and traffic accommodation approvals required from SANRAL.

USE OF REASONABLE SKILL, CARE AND DUE DILIGENCE

Operations Requiring Special Attention

Reservoir bulk earthworks

(a) Embankment Stability

The stability of the cut and fill embankments is a critical consideration during construction. The Service Provider shall exercise due care to execute the design objectives for embankment stability to avoid potential disasters during construction. The Service Provider shall take due cognisance of embankment stability during the construction of the cut and fill embankments, which requirements are in accordance with the geotechnical design:

The construction rate for raising the embankments is limited as specified in clause 7.3.1. The stability of the embankments relies on controlling excess pore pressure build-up within the in-situ materials. It's crucial to manage the rate at which the embankment height increases to facilitate the dissipation of excess pore pressures. Raising the embankment too quickly can lead to embankment instability.

The northern cut slope is expected to be unstable, and must be stabilised and dewatered. See clause 7.2.3 for details on the slope stabilisation required.

Both surface and groundwater management are required during the construction to maintain the stability of the embankments. Continuous dewatering will be required, especially for the excavation of the cut face.

Monitoring of excess pore pressures within the embankment and in-situ founding material is required during construction. Piezometers shall be installed and monitored to ensure that maximum excess pore pressure limits, defined per material lift height, are not exceeded.

USE OF REASONABLE SKILL, CARE AND DUE DILIGENCE

Operations Requiring Special Attention

(b) Materials of Construction

The in-situ material present at the reservoir site is deemed unsuitable for constructing the reservoir embankments. Therefore, imported material meeting the quality standards outlined in SANS 1200 DE and its applicable amendments, and references, is required for the embankment construction.

The embankments of the reservoir comprise various zones with specified grading curve envelopes which are crucial for managing water flow, particle flow and stability. These zones' grading curves are interdependent i.e., changing the grading of one zone will impact the required grading for all the other zones. It is noted that these fill zones also interface with the in-situ material and are therefore also interdependent with it.

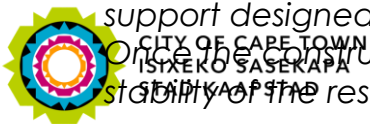
Zone G7 constitutes the bulk of the reservoir embankment fill material. The material quality for Zone G7* is derived from that of a standard G7 material as specified in SANS 1200 M, but with a narrower envelope specified for the material grading (refer to SANS 1200 DE and its amendments). The Service Provider shall take cognisance of the grading requirements of the G7* material, including the time implications associated with obtaining such volume of material from commercial sources.*

7.2.3 Cut slope embankment stabilisation

The reservoir's cut slope necessitates over-excavation to facilitate the installation of higher-quality material and ground water drainage features, ensuring the embankment's long-term stability. Lateral support, comprising soil nails, shotcrete, and drainage features, is essential to stabilize the cut slopes. In addition to stabilise the cut slope, the soil nails are also necessary for post-fill placement to ensure embankment stability during crane loading for the precast roof element installation.

The final geometry of the northern cut slope, is engineered for long-term reservoir stability, with lateral support designed to preserve this shape.

Once the construction of the reservoir is completed, the soil nails are not required for the long-term stability of the reservoir and does not have to be maintained.



USE OF REASONABLE SKILL, CARE AND DUE DILIGENCE

- **Planning and Programming**
-
- *The Service Provider shall carefully manage the planning and programming the following critical elements during construction:*
-
- *7.3.1 Embankment construction*
- *To ensure embankment stability, a minimum duration is required for the construction and consolidation of embankments. Stability is predominantly influenced by the management of excess pore pressure within the in-situ materials. The following minimum total consolidation times are required:*
- *Northern, Eastern, and Western Embankments: 280 days*
- *Southern Fill Embankment: 210 days*
- *In accordance with these consolidation times, the rate of embankment fill placement must not exceed the following specified limits:*
- *For Southern Embankment:*
- *Up to 181.7 mamsl: 2 days per meter increase in embankment height*
- *Over 181.7 mamsl and up to the full embankment height: 14 days per meter increase in embankment height*
- *For Northern, Eastern and Western Embankments:*
- *Up to 181.7 mamsl: 2 days per meter increase in embankment height*
- *Over 181.7 mamsl up to 186.7 mamsl: 5 days per meter increase in embankment height*
- *Over 186.7 mamsl and up to 189.7 mamsl: 25 days per meter increase in embankment height*
- *Over 189.7 mamsl and up to the full embankment height: 45 days per meter increase in embankment height*
- *Adherence to these construction rates are mandatory for each meter of embankment height increase. Monitoring of the maximum construction rates specified above shall occur after each meter increase in embankment height, ensuring compliance. If the specified rate is exceeded when placing the layer, the Contractor may proceed with embankment construction of the next layer only after the required duration for the previous one meter layer has elapsed.*

USE OF REASONABLE SKILL, CARE AND DUE DILIGENCE

Planning and Programming

- Licence to Impound
- A Licence to Impound is required from the Department of Water and Sanitation: Dam Safety Office before the first filling of the reservoir can commence. The Contractor must formally notify the Employer's Agent of their intention to commence first filling at least 90 days prior to the intended first filling date. At the same time as notifying the Employer's Agent, the Contractor must submit all relevant data, construction records, and related details required for the Employer's Agent/Approved Professional Person to prepare the relevant licence application. The licence application must be submitted at least 60 days prior to the intended first filling date. Delays caused due to the Contractor's failure to notify the Employer's Agent in time, or to provide the required information at least 90 days in advance of the first filling date, will be for the Contractor's account.
- Reservoir watertightness testing
- The following conditions shall apply to the first filling and subsequent watertightness testing of the reservoir:
- The Department of Water and Sanitation: Dam Safety Office must issue the Licence to Impound (refer to C7.3.2).
- All concrete works of the reservoir, including precast elements, must be completed, tested, and approved by the Employer's Agent.
- The reservoir shall be disinfected in accordance with the specifications (refer to SANS 1200 G and its amendments).
- The reservoir overflow and scour systems shall be fully operational, including the completion of the associated downstream infrastructure (e.g. energy dissipation structure, stormwater ponds, overflows, etc.).
- The reservoir shall be filled via the DN1600 incoming pipeline. Accordingly, the completion and testing of the DN1600 incoming pipeline and its associated valves are also prerequisites before initiating the initial filling.
- The Contractor must note that the reservoir will be filled from the existing Wemmershoek bulk water pipeline. To safeguard the City of Cape Town's capacity to meet other demands on the bulk distribution network, the Employer reserves the right to limit the flow rate to 20 Ml/d. This minimum flow should be read in conjunction with the maximum permissible filling rate stipulated in SANS 1200G.
- Upon completion of the reservoir filling, a stabilisation period as specified in SANS 1200 G shall be allowed before commencing with the actual watertightness test.
- The disinfection facility must be sufficiently completed to enable outlet dosing once the reservoir's watertightness testing is completed. This ensures that water can be disinfected after remaining stagnant in the reservoir during the water tightness testing phase.
- Trail and Operation Period
- The trail and operation period of the disinfection facility shall only commence once the watertightness testing of the reservoir is successfully completed.

USE OF REASONABLE SKILL, CARE AND DUE DILIGENCE

- **METHOD STATEMENTS**

- *The Service Provider shall review and evaluate method statements prepared by the Contractor. Method Statements will be required in terms of the Health and Safety or Environmental regulations or specifications, the Contractor shall submit within 2 weeks (14 days) of date of such written request or otherwise at least 2 weeks (14 days) prior to when the particular activity is planned to commence, whichever time is the soonest, a method statement detailing the Contractor's proposed construction procedure of certain elements of the Works.*
-

USE OF REASONABLE SKILL, CARE AND DUE DILIGENCE

- **DAM SAFETY**
-
- *The dam safety considerations were undertaken in terms of the requirements of the following legislation:*
-
- *National Water Act No 36 of 1998 (NWA)*
- *Regulations Regarding the Safety of Dams (hereinafter referred to as the Regulations), as published under Government Notice No R. 139 in Government Gazette 35062 of 24 February 2012, in terms of section 123(1) of the NWA.*
- 7.5.1 *Hazard Potential and Risk*
-
- 7.5.1.1 *Consequence of failure and risk assessment*
-
- *Should a dam break occur, all flow will discharge towards the southeast direction into a tributary at the upper reaches of the Mosselbankrivier. There are fields, households, and farms located directly adjacent to the Mosselbankrivier which may be inundated. It appears that a number of these are located well above this river's 1:100-year floodline which the dam break flood is not expected to exceed.*
-
- *The population at risk from a dam failure is estimated at less than 30 and includes local residents, farm labourers, and road users. The estimated risk of loss of life is less than 5 lives.*
- *Direct economic loss is expected to be in the order of R 10 – 15 million.*
- *The potential adverse impact on the resource quality is insignificantly low.*
-
- *Accordingly, the dam has been classified as a Medium sized dam with a Significant Hazard, qualifying it as a Category II dam.*
-
- 7.5.1.2 *Safety of existing development*
-
- *The site is a greenfield site with no significant development in the nearby vicinity. The proposed reservoir basin of the dam will not adversely affect major upstream developments regarding inundation or submergence. The reservoir consists of a basin which is entirely enclosed and is created by effectively excavating a pit in the local terrain.*
-
- *The river channel downstream of the reservoir crosses under the regional R304 road through a culvert. The Flood Risk Assessment Report (Zutari, 2024) showed that the culvert is capable of passing the 3 m³/s flood from the dam's spillway and it is smaller than the peak of the 1:5 year recurrence interval flood for the catchment. Phase 1 of the development will therefore not impact on the downstream R304 crossing.*
-



USE OF REASONABLE SKILL, CARE AND DUE DILIGENCE

- **DAM SAFETY**

- Downstream of the road crossing, the stream enters an existing small unregistered dam. The dam has an estimated capacity of 182 000 m³ and wall height of ~5 m. The floods from the existing dam's catchment were therefore assessed as if it were classified as a Category I dam, and found to exceed the dam's spillway capacity. The spillway of the dam is able to pass the Phase 1 Muldersvlei development discharge from the reservoir which is 3 m³/s. However, at the time of the Muldersvlei Phase 2 implementation additional impacts to the downstream developments could be realised and would need to be assessed at the time of implementation.

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- 7.5.1.3 Occupational health and safety

-

- All spaces intended for regular access by personnel would be fitted with railings, barriers, lighting, ventilation or similar. The gallery would be fitted with passive ventilation pipes to prevent the development of stagnant or stale air pockets. That being said, standard confined space protocols must still be used to access the galleries.

-

- The dam is located on private property and access thereto will be controlled, to prevent members of the public or unauthorised personnel from accessing the dam or its reservoir.

-

- Appropriate warning signs informing personnel of possible dangers will be displayed prominently.

-

- There is ample cell phone signal at the dam site in case of emergencies.

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- 7.5.1.4 Classification

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- The classification document, in terms of the Dam Safety Regulations (Government Notice R139) of Muldersvlei Reservoir, is dated 12 October 2016. The classification from the Department of Water and Sanitation: Dam Safety Office (DSO) is contained in Appendix 7A of Volume 7 of the design report.

-

- The classification of the dam is as follows:

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- Registration number : 12/2/ G202/BJ
- Maximum wall height : 18 m
- Storage capacity : 300 000 m³
- Size : Medium
- Hazard potential rating Significant : Category II

-



USE OF REASONABLE SKILL, CARE and DUE DILIGENCE

- **DAM SAFETY**
-
- *As part of the design and quality control (during construction) an Approved Professional Person (APP) must be appointed for the tasks, as specified in the Dam Safety Regulations. The services required from an APP for Category II dams are as follows:*
-
- *Approve the design of a new dam,*
- *Ensure that an up-to-date set of as-built drawings are compiled,*
- *Issue a completion certificate and compile a construction completion report with up-to-date information,*
- *Compile an operation and maintenance manual and emergency preparedness plan for the dam.*
-
- *7.5.3 Licence to construct*
-
- *In terms of the regulations as above a licence to construct must be obtained from the DSO before construction of the dam may commence. Part of this application is a design report; to this end Volume 7: Dam Report has been compiled. Along with the design report, the following must be submitted as part of the application:*
-
- *Form DW695, application for the licence to construct a dam with a safety risk*
- *Document number 1001757-000-REP-JJ-0004, Revision number C, Date 2025/03/12 63*
- *Specifications for the construction*
- *Detailed engineering design drawings for the dam and its appurtenant works*

USE OF REASONABLE SKILL, CARE AND DUE DILIGENCE

DAM SAFETY

Licence to impound

Towards the end of the construction period, but before first filling (which includes the watertightness testing), a licence to impound must be obtained from the DSO. As part of this application for this licence, the following must be submitted:

- *Application form DW696*
- *Information in regulation 26, which includes an Operation and Maintenance Manual (O&MM) and emergency preparedness plan (EPP)*

USE OF REASONABLE SKILL, CARE AND DUE DILIGENCE

Environmental Authorisation (EA)

Water Use License Authorisations (WULA)

A WULA for Phase 1 was approved by DWS, dated 25 August 2023 (WARMS Certificate received 12 October 2023). The WULA covers the storage of water in the reservoir, and the crossing of wetlands and rivers with roads and pipelines.

USE OF REASONABLE SKILL, CARE AND DUE DILIGENCE

HAZOP Study

From the 22nd to 23rd of May 2023, the designs of the Muldersvlei 300Ml Reservoir and a disinfection facility were subjected to a Hazards and Operability (HAZOP) study which was attended by City of Cape Town Bulk Water branch (including Operations and Projects), Zutari (designers).

The HAZOP study, which is part of the design stage, was facilitated by one of Zutari's engineering professionals who was not involved in the project.

It's of paramount importance that the Service Provider familiarise themselves with Muldersvlei Reservoir and Disinfection Facility's Hazard and Operability Study Report, dated 1 June 2023.

7.8 Risk Assessment

The purpose of this Project Risk Management Plan is to describe the project risk management system and supporting procedures to be applied by the City of Cape Town and Zutari during the design and construction of the reservoir and associated infrastructure to effectively identify and manage risk.

As such, it will guide and convey overall requirements of the Project Risk Management Plan (PRMP) to project management, execution contractors and other stakeholders. It is not intended to remove all risk to the project, but to identify risks that may materially affect the project's objectives and transparently manage them to maximise project outcomes. Success requires the implementation of a clear risk management strategy supported by adequate resources and a strong risk-aware culture.

It's imperative that the Service Provider familiarise themselves with the content of Risk Management Plan, dated 1 November 2023.



CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

Thank You

For queries contact SCM.Tenders7@capetown.gov.za

Making progress possible. Together.