

ETHEKWINI MUNICIPALITY

**ERVEN 2954, 2955 AND 2956
KINGSBURGH X9**

**SEWERAGE BULK SERVICES
REPORT**

ETHEKWINI MUNICIPALITY : ERVEN 2954 AND 2956 KINGSBURGH X9 : SEWERAGE BULK SERVICES REPORT

1. CLIENT / DEVELOPER :

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Physical Address	Plot 324 Mooiplaats 36JR PRETORIA 0002
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2. FOR SUBMISSION TO :

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ETHEKWINI MUNICIPALITY : ERVEN 2954 AND 2956 KINGSBURGH X9 : SEWERAGE BULK SERVICES REPORT

3. COMPILED BY :

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ETHEKWINI MUNICIPALITY : ERVEN 2954 AND 2956 KINGSBURGH X9 : SEWERAGE BULK SERVICES REPORT

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ETHEKWINI MUNICIPALITY : ERVEN 2954 AND 2956 KINGSBURGH X9 : SEWERAGE BULK SERVICES REPORT

1. INTRODUCTION

CIVILCONSULT Consulting Engineers (Pty) Ltd was appointed by Riaan van Zyl of Dans Spares CC for the compilation of a Sewerage Bulk Services Report for Erven 2954 and 2956 Kingsburgh X9.

For the purposes of this report, we will refer to Erven 2954 and 2956 Kingsburgh X9 as the Proposed Development.

2. PROFESSIONAL TEAM

The professional team is as follows :

Professional Discipline	Name of Company	Contact Person(s)
Client / Developer	Dans Spares CC	Riaan van Zyl
Environmental Consultant	Metamorphosis Environmental Consultants	Vicki King
Civil Engineer	CIVILCONSULT Consulting Engineers (Pty) Ltd	Leon Wentzel / Marten Tiemensma

3. LOCATION OF DEVELOPMENT

The Proposed Development is located on Erven 2954 and 2956 Kingsburgh X9.

The Little Manzimtoti River forms the southern boundary of the Proposed Development. The Proposed Development is bounded by Kingsburgh X9 to the north and west. Kingsburgh X7 forms the eastern boundary. Erf 2957 Kingsburgh X9 which is Public Open Space between Erven 2954 and 2956 Kingsburgh X9.

Three tributaries of the Little Manzimtoti River intersect Erf 2957 Kingsburgh X9.

Refer to Annexure A, Drawing No. 2882/100/01/00 for a locality plan.

4. LAND USES

The proposed land uses for the Proposed Development are summarised in the Table 4.1 below.

Table 4.1 : Proposed Land Uses

Erf No.	Use Zone / Reservation	Land Uses	No. of Erven	Area (ha)	No. of Units
2954	Residential	Dwelling Units	1	3.9739	108
2956	Residential	Dwelling Units	1	3.8933	88

5. GEOLOGICAL ASPECTS

A Geological Investigation Report was compiled by Drennan Maud (Pty) Ltd for the Proposed Development dated September 2017.

The following is an extract from the report.

“10.5 Site Materials

The laboratory test data and field observations all indicate that the majority of unconsolidated in situ clayey material and weathered shale bedrock is considered poor quality in terms of TRH 14 1985 standards for construction use and thus the use thereof is considered unsuitable.

The only material that may find consistent use as a general fill, subgrade and possibly selected granular fill is the highly weathered tillite. It is noted however that even this material varies considerably in its composition and is often very clayey.

In terms of the above although sufficient quantities of general fill material and subgrade material may be acquired from cuts in the tillite bedrock, selected fill and sub-base/base layer materials will need to be imported to site from a suitable nearby commercial source.”

A copy of the Geological Investigation Report is available on request.

6. CIVIL ENGINEERING SERVICES

6.1 Design Standards

The design standards to be followed are in accordance with the standards specified by the Ethekewini Municipality.

6.2 Design Software

The designs of the civil engineering services will be carried out with Technocad design programs.

6.3 Ownership of Services

The Ethekewini Municipality (EM) will take over and be responsible for the maintenance of the external services.

The Land Owner and/or his successor in title will take over and be responsible for the maintenance of the internal services.

7. SANITATION

7.1 General

The natural drainage pattern of the Proposed Development is towards the three tributaries of the Little Manzimtoti River intersecting Erf 2957 Kingsburgh X9.

7.2 Estimated Sewerage Flow

The estimated sewerage flow for the Proposed Development is shown in Table 7.2 below.

Table 7.2 : Estimated Sewerage Flow

Erf No.	Use Zone / Reservation	Land Uses	Proposed Development		
			No. of Units	Average Annual Daily Flow (AADF)	Sewerage Flow (kℓ/d)
2954	Residential	Dwelling Units	108	0.75kℓ/Unit	81.00
2956	Residential	Dwelling Units	88	0.75kℓ/Unit	66.00
Total					150.00

7.3 Existing Bulk Sanitation Services

An existing 250mm Ø outfall sewer intersects Erf 2957 Kingsburgh X9 from north to south.

The EM confirmed that the existing Kingsburgh Waste Water Treatment Works doesn't have sufficient capacity to accommodate the Average Annual Daily Flow (AADF) of the Proposed Development.

7.4 Proposed Bulk Sanitation Services

Sewerage from Erf 2954 of the Proposed Development will drain to the south western portion of Erf 2954 where an 81.00kℓ/d Sewage Treatment Facility (STF) will be constructed.

Sewerage from Erf 2956 of the Proposed Development will drain to the south western portion of Erf 2955 where a 66.00kℓ/d STF will be constructed.

Only General Limit Standard is required by the Department of Water and Sanitation (DWS) and the EM for the treated effluent, however the effluent of the proposed STF's will be treated to the Special Limit Standard of the DWS and could be stored and utilized for the irrigation of the open spaces and gardens of the Proposed Development. A 5-day sewage retention period will be implemented to achieve the Special Limit Standard effluent standard.

The internal sewerage reticulation of the Proposed Development will connect to the existing 250mm Ø outfall sewer as soon as the capacity at the Kingsburgh Waste Water Treatment Works becomes available.

Refer to Annexure B, Drawing No. 2882/300/01/02 for further details.

7.5 STF Technology

7.5.1 General

The technology to be used in the STF will be the SAM-RAS Process of Uthingo Environmental Services or similar.

The SAM-RAS Process is a sludge free process and consists of the following works methodology consisting of five phases :

- Phase 1 : Primary Setting Phase
- Phase 2 : An-aerobic Digestion
- Phase 3 : Aerobic Digestion
- Phase 4 : Final Settling and Clarifying Phase
- Phase 5 : Disinfection of the Effluent

7.5.2 First Phase

A screening sump will be installed for the removal of debris i.e. plastics, rags etc. are removed.

7.5.3 Second Phase

Two anaerobic tanks will be installed. The first tank allows for digestion of sewage and the separation of solids, i.e. those that settle and those that float. The middle cut of the effluent then flows through to the second tank. The second tank breaks down the fine sewage particle sand alters to carbon dioxide and water. This ideal effluent then passes into the aerobic chamber for polishing.

7.5.4 Third Phase

In this phase the digestion takes place in an aerated environment. This phase is called aerobic digestion also known as the "polishing phase". This phase bio-degrade the smaller solids further. The type of bacteria that operates in this environment is called aerobic bacteria. In the aerobic phase the nitrification takes place. This process breaks down the ammonia to nitrites. In this phase the carbonaceous contaminants such as the oils, fats and grease are broken down to carbon dioxide and water.

7.5.5 Fourth Phase

Secondary settling takes place in the fourth phase. The cell material and settle able solids settles in this phase and forms the so-called "sludge blanket". The sludge blanket is very important for the process. When the blanket matures it is re-circulated to the primary anaerobic settling tank in phase two to "seed" or inoculate the raw sewerage entering into the plant and to alter the nitrates to nitrogen gas. This cycle is called the re-activated sludge and the denitrification cycle. This technology improves the efficiency of the process and the plant.

7.5.6 Fifth Phase

In the fifth and final phase the final effluent is prepared for final discharge to irrigation tanks. The effluent is dis-infected or sterilized to prevent any dangerous or harmful bacteria from entering our environment.

The proposed STF facility is shown in Figure 7.5.6 below and the various sections can be identified as follows.

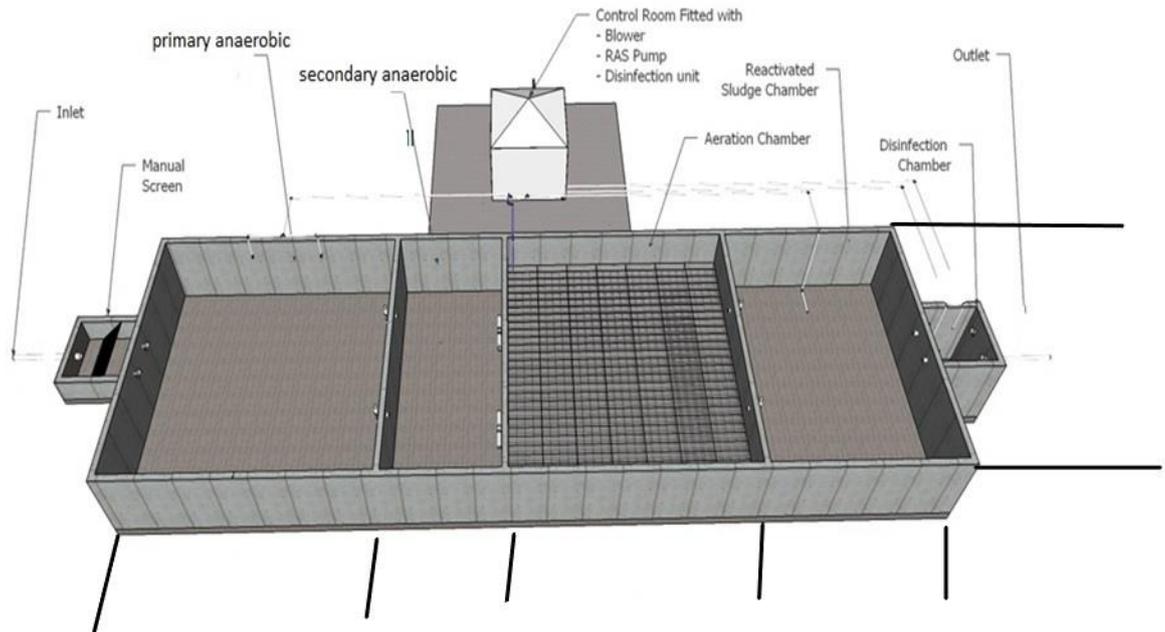


Figure 7.5.6 : Isometric View of Proposed Sewage Treatment Facilities

7.6 Advantages of the Uthingo STF

The advantages of the Uthingo STF are as follows :

- Save on area and capital costs
- The mode of operation allows for underground placement
- The plants are aesthetic and do not spoil the view and can be covered with soil
- Maintenance is uncomplicated and is user friendly with unskilled labour
- No high level of controls required
- No off-odours are generated
- Mode of operation eliminates the build-up of top and bottom sewage sludge
- Eliminates the use of drying beds
- Substantially reduced electrically supply
- Plants are modular and can be constructed as the phases are developed
- The developer's cash is not tied up in one big plant from day one thus assisting with cash flow
- Adaptability and flexibility of placement
- Repairs and maintenance greatly reduced due to the limited working parts

7.7 Equipment of the Uthingo STF

The following components form part of the STF :

- 2 x air blower 220v 1,5kw (1 x backup blower)
- 1 x ras pump 220v 1,1kw
- 1 x 10gm ozone generators
- Set of diffuser pipes complete and fitted with equipment
- 182 x double panelled bacterial bio media blocks
- 1 x 1m x 2m fibre control room fitted with equipment
- 160mm flow through pipes, manifolds and foot pieces
- Connecting pipes for aeration and disinfection
- DB box

7.8 STF Dimensions

The STF Dimensions for Erven 2954 and 2956 are shown in Table 7.8 below.

Table 7.8 : STF Dimensions

Erf No.	Dimensions
2954	26m long x 8m wide x 2,5m deep
2956	21m long x 8m wide x 2,5m deep

Refer to Annexure B, Drawing No. 2882/350/01/01 & 2882/350/03/01 for further details.

7.9 Water Use Licence

A Water Use License Application (WULA) will be required for the Proposed Development and the proposed STF's will be registered in terms of the act.

7.10 Emergency measures for STF

7.10.1 General

The following measures will be implemented in an event of emergency or STF's breakdown :

- A backup generator will be installed for power outages
- An alarm system will be installed for STF failure
- A standby blower will be installed in the event of blower failure
- 24h sewage storage will be provided for STF failure
- In the event that irrigation cannot take place, the treated effluent will be stored in the irrigation- and anaerobic tanks and be collected and carted away to a registered facility
- A 5-day sewage retention period will be implemented to achieve the Special Limit Standard effluent standard.

7.10.2 Detailed Emergency Procedures

The emergency protocols and procedures to be implemented for the proposed STF's are as follows :

- Storage Capacity of the STF's : The on-site STF's are designed with a 5-day storage capacity of 405kℓ for Erf 2954 Kingsburgh X9 and 330kℓ for Erf 2956 Kingsburgh X9. This capacity has been determined based on the projected volume of sewage to be generated by the Proposed Development and takes into account factors such as peak usage and potential weather fluctuations.
- Response Times: In the event of breakdowns or operational issues, the developer / HOA is committed to maintaining prompt response times. The maintenance staff will be available 24/7 to address any technical problems that may arise. The aim is to minimize downtime and swiftly resolve any issues to prevent disruptions to the treatment process. The Uthingo WWTP has no moving parts. It has surface aerators 2 x 4kw units. 1 x standby air blower supplied. 2 x RAB pumps 1,1 kw. These units are stocked by hardware stores and swimming pool outlets. The air is supplied into the aeration chamber through sets of diffusers. Should a breakdown occur, the replacement parts could easily be obtained and be replaced.
- Should irrigation not be possible due to excessive rain, etc : The treated effluent could be stored in anaerobic tanks and be collected and carted away to a registered facility
- Tankering Protocols: The developer / HOA will make use of a registered honey sucker company to dispose of the treated or untreated sewage to the designated disposal facilities that will follow a well-defined set of tankering protocols. These protocols include guidelines for loading and unloading procedures, hygiene practices, spill prevention measures, and safety protocols to ensure compliance with environmental standards and regulations which the registered companies and disposal facilities are well acquainted with.
- Available Capacity at Suitable Disposal Facilities: Lenesh Sukhlal from the EM confirmed via email that sewage from the Proposed Development could be accepted at the Amanzimtoti WWTW and the Southern WWTW.

Refer to Annexure C for the capacity confirmation email.

7.11 STF Maintenance

The following daily, monthly, six monthly and annual maintenance are required to ensure that the STF's are fully efficient :

7.11.1 Daily Maintenance

- Check the electricity supply has not tripped
- Check that blower motor is working
- Check that RAS pump is working and clean out the filter trap
- Check the dosing pumps are working
- Check the dosing liquid levels
- Check the effluent discharged from the plant.
- Add 300gm of biological powder into the first chamber
- Check the RAS pump timer to ensure that the timing has not changed due to electrical failure. The timer is set to operate between 1am until 4am

7.11.2 Monthly Maintenance

- Take sample for analyses. (Test COD and Chemical composition of effluent)
- Check biological and disinfection liquid levels. Should this be low, then replace the drums.
- Check operation of blower motors.
- Check operation of re-activated sludge extraction motor
- Check the level of the top sludge in the plant 1st chamber
- Check the level of the sludge at the bottom of the 1st chamber

7.11.3 Six Monthly Maintenance

- Replace the air-filter on the blower motor

7.11.4 Annual Maintenance

- Check the first chamber and assess the thickness of the crust and the thickness of the precipitated solids
- When the thickness of either exceeds 750mm, immediately begin with a regular dosing of the sewage activator powder. Continue with this dosing until the surface sludge is eliminated. Check the bottom sludge and should it be apparent, continue dosing with the powder at 500gm per week. When the bottom sludge is eliminated, dose the powder at 300gm per week
- Check the rubber siphon pipes in the dosing pumps and replace if necessary

7.11.5 Financial Guarantee

The Developer will be required to lodge a bank guarantee in favor of the EM which is a sum equivalent to 1,5 times the cost of the design, supervision, installation, construction and commission of the STF. The abovementioned guarantee will have to be valid for 5 years commencing from the date of completion of the successful commission of the STF's.

7.12 Internal Sewerage Reticulation

7.2.1 Sewerage Reticulation Design Criteria

The design criteria used to design the sewerage reticulation is indicated in Table 7.12.1 below.

Table 7.12.1 : Sewerage Reticulation Design Criteria

Item No.	Design Element	Criteria
1.	Average Annual Daily flow for the Proposed Development	Refer to Table 9.4.2 below
2.	Peak Factor	$14P^{-1/6}$ P = population served
3.	Allowance for infiltration	15%
4.	Capacity of Sewer	Pipes may run full at the Total Design Flow, which includes the peak and infiltration flows
5.	Sewer pipe type	Heavy Duty uPVC
6.	Minimum velocity	0,6m/s
7.	Minimum pipe diameter	160mm
8.	Minimum depth of cover	1,0m

8. PRELIMINARY CONSTRUCTION COST ESTIMATES

8.1 Sewage Treatment Facilities Cost Estimates

The preliminary cost estimates for the construction of the Sewage Treatment Facilities and Monthly Operational Costs are shown in Tables 8.1.1 and 8.1.2 below.

Table 8.1.1 : Preliminary Cost Estimates for Sewage Treatment Facilities

Erf No.	Description		Amount (R)
2954	81.00kl/d Sewage Treatment Facility	Mechanical Costs	818,636.00
		Civil Costs	4,355,263.00
		Professional Fees	517,389.00
Total (VAT Excluded)			5,691,288.00
2956	66.00kl/d Sewage Treatment Facility	Mechanical Costs	755,105.00
		Civil Costs	3,768,211.00
		Professional Fees	452,331.60
Total (VAT Excluded)			4,975,647.60
Total (Erf 2954 & 2956) (VAT Excluded)			10,666,935.60

Notes : Costs exclude retaining walls for bulk earthworks.

Table 8.1.2 : Monthly Operational Costs

Erf No.	Description		Amount (R)
2954	81.00kl/d Sewage Treatment Facility	Electricity	3,280.00
		Bacteria Bio Augmentation	220.00
		Unskilled Labour	2,150.00
		Water Analysis	1,280.00
Total (VAT Excluded)			6,930.00
2956	66.00kl/d Sewage Treatment Facility	Electricity	3,280.00
		Bacteria Bio Augmentation	220.00
		Unskilled Labour	2,150.00
		Water Analysis	1,280.00
Total (VAT Excluded)			6,930.00
Total (Erf 2954 & 2956) (VAT Excluded)			13,860.00

9. CONCLUSION

We trust that the above report meets with your requirements. Please contact us should you require any additional information.



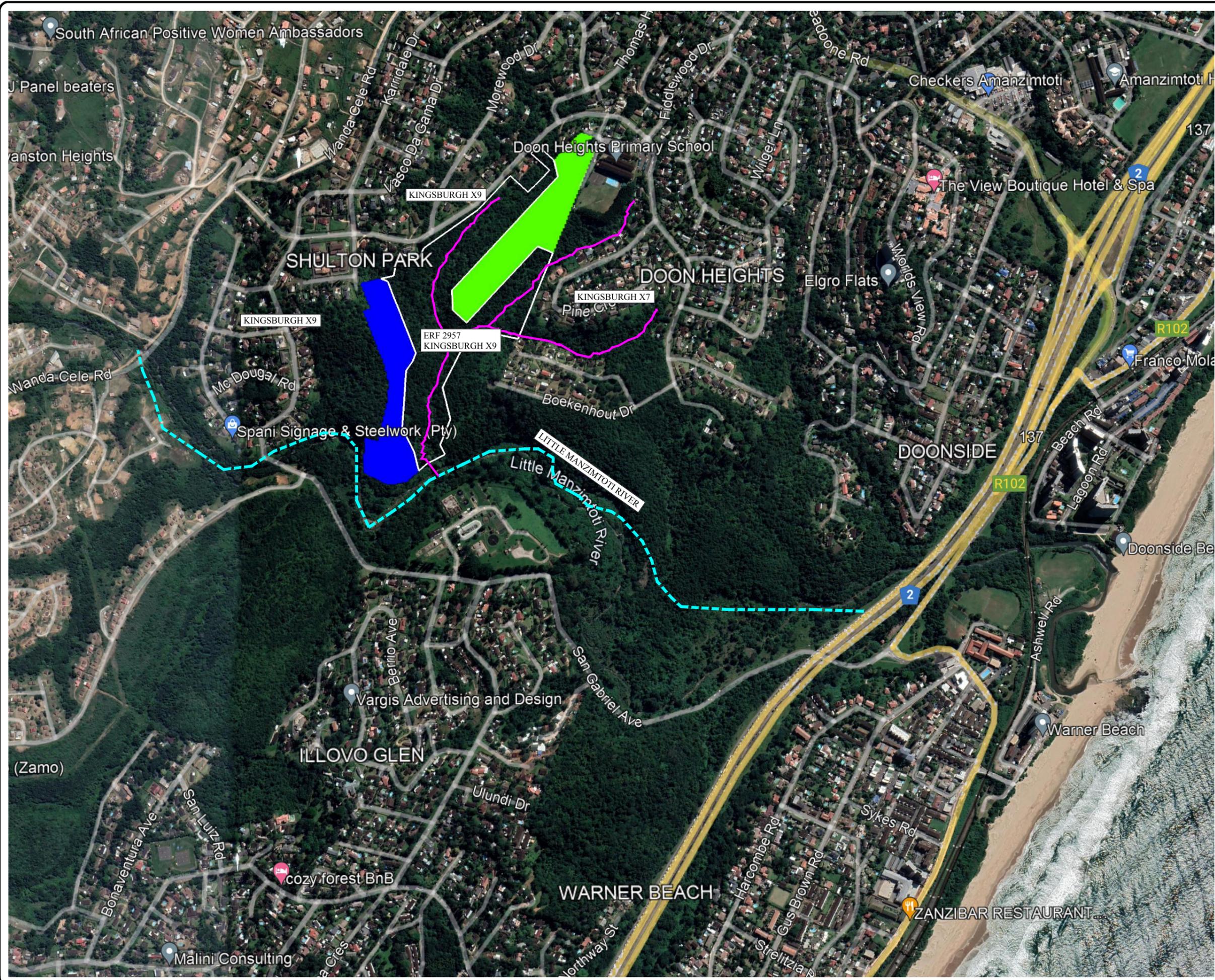
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Leon Wentzel
for **CIVILCONSULT Consulting Engineers (Pty) Ltd**

12/06/2023

.....
Date

ANNEXURE A

LOCALITY PLAN



NOTES / NOTAS

- █ ERF 2954 KINGSBURGH X9
- █ ERF 2956 KINGSBURGH X9
- - - - LITTLE MANZIMTOTI RIVER
- - - - TRIBUTARIES OF THE LITTLE MANZIMTOTI RIVER

REFERENCE / VERWYSINGS

ETHEKWINI MUNICIPALITY



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ENGINEER / INGENIEUR : L. WENTZEL

DESIGN / ONTWERP : TRACED / NAGETREK

DRAWN / GETEKEN : M. TIEMENSMA : CHECKED / NAGESIEN

PROJECT / PROEKT

ERVEN 2954 AND 2956
KINGSBURGH X9

DRAWING TITLE / TEKENINGTITEL

LOCALITY PLAN

DATE / DATUM : DECEMBER 2020

SCALE / SKAAL : N.T.S

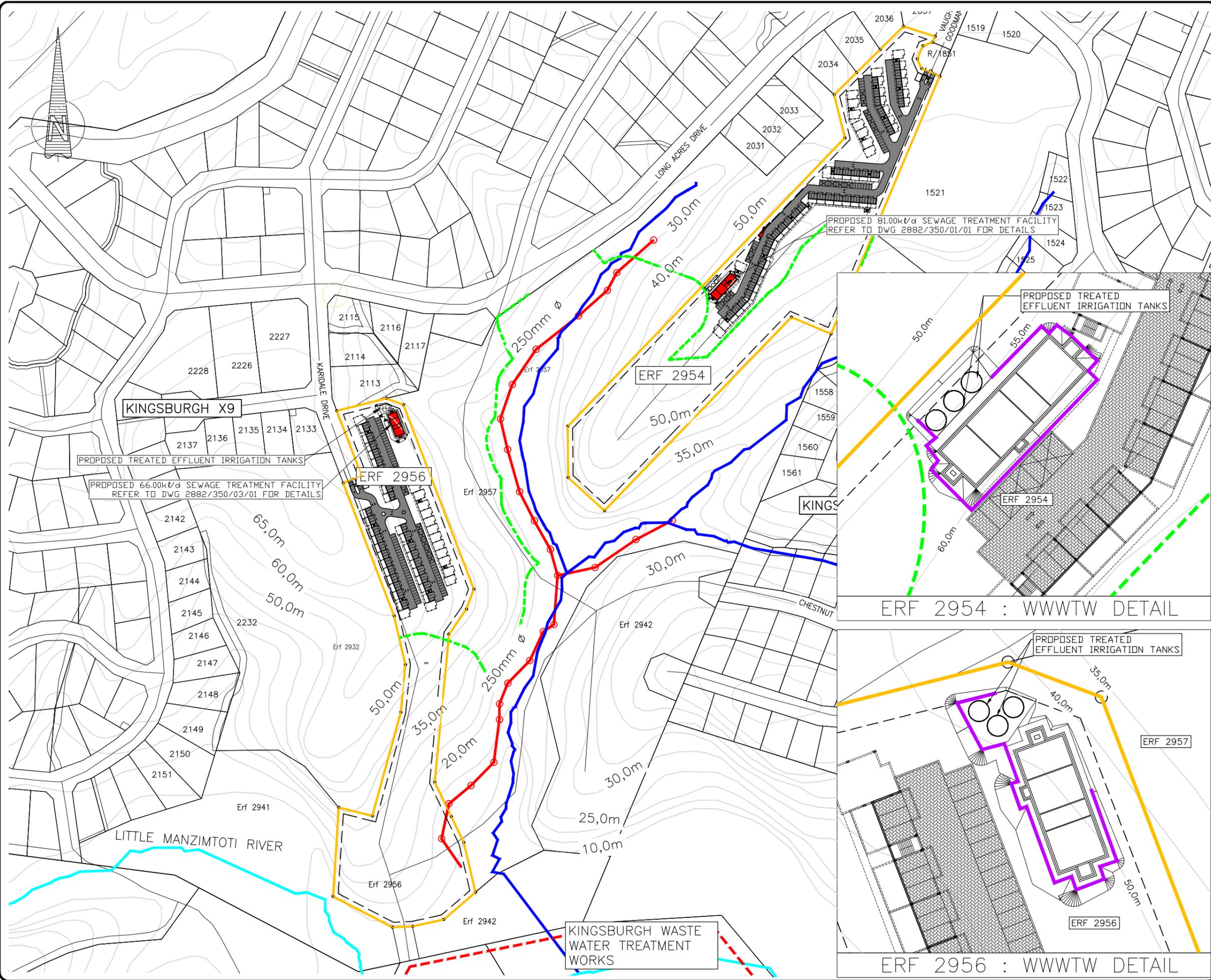
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CLIENT DWG. NO./KLIENT TEK. NR. --	FILE NO./L.E/R. NR. --

2882/100/01/01

ANNEXURE B

ENGINEERING LAYOUT DRAWINGS



- NOTES / NOTAS
- DEVELOPMENT BOUNDARY
 - EXISTING SEWER PIPE
 - TRIBUTARIES OF THE LITTLE MANZIMTOTI RIVER
 - LITTLE MANZIMTOTI RIVER
 - PROPOSED SEWAGE TREATMENT FACILITY
 - - - KINGSBURGH WASTE WATER TREATMENT WORKS
 - - - 30.0m FOREST BUFFER
 - RETAINING WALL

REFERENCE / VERWYSINGS

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DESIGN / ONTWERP : M. TIEMENSMA TRACED / NAGETREK : ✓

DRAWN / GETEKEN : M. TIEMENSMA CHECKED / NAGESIEN : ✓

PROJECT / PROEKT : ERVEN 2954 AND 2956 KINGSBURGH X9

DRAWING TITLE / TEKENINGTITEL : SEWER LAYOUT PLAN

DATE / DATUM : DECEMBER 2020

SCALE / SKAAL : N.T.S.

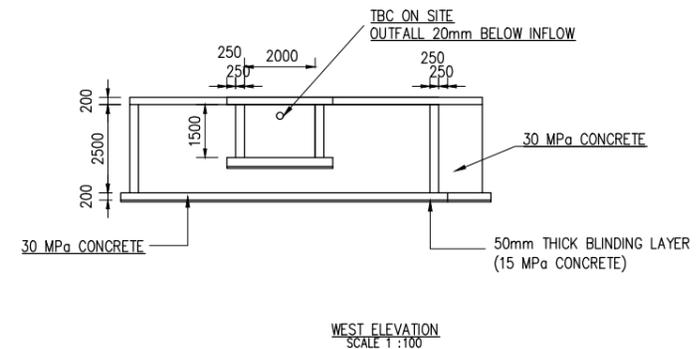
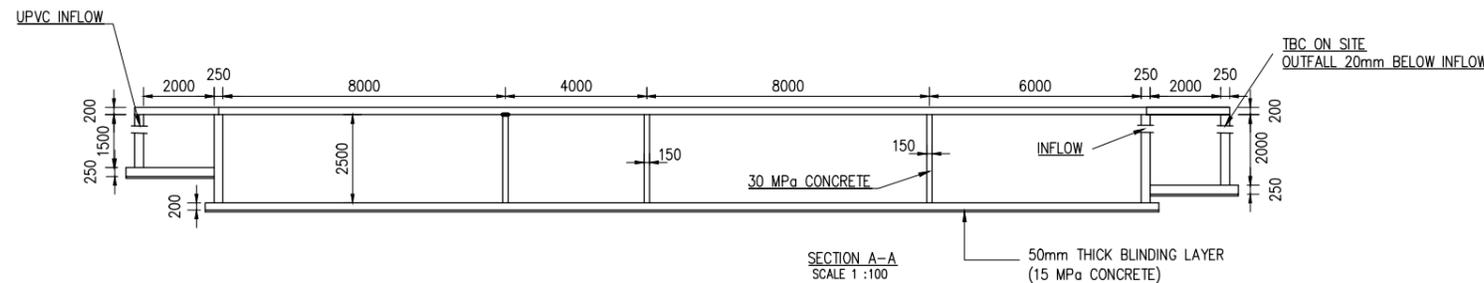
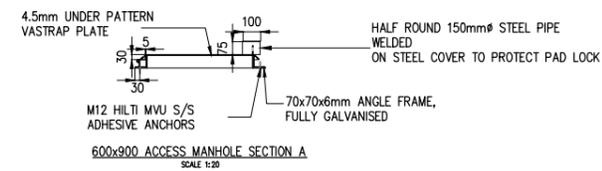
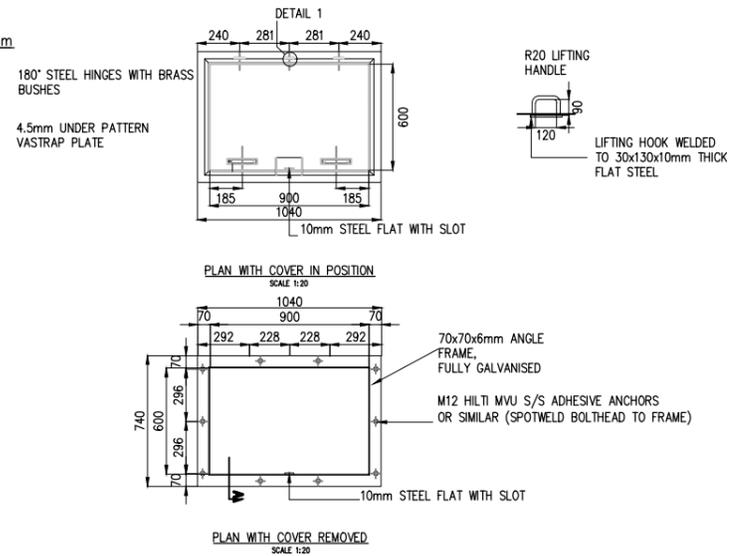
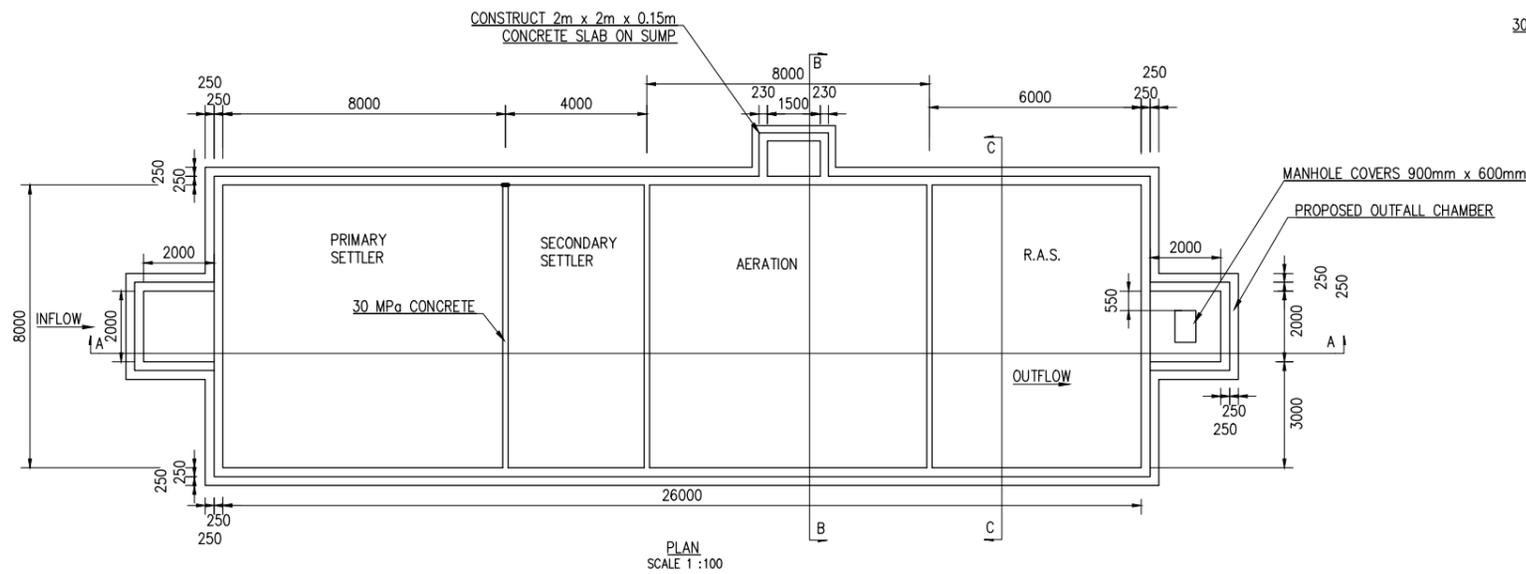
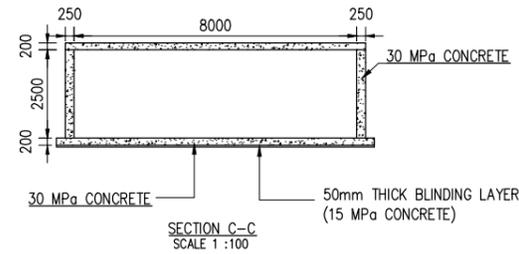
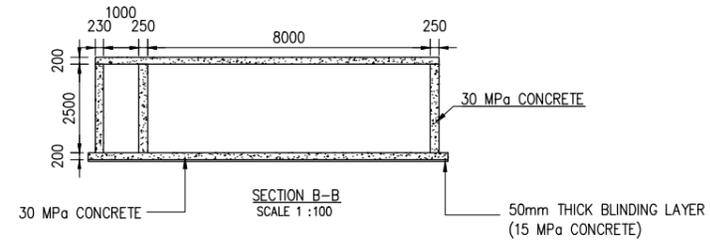
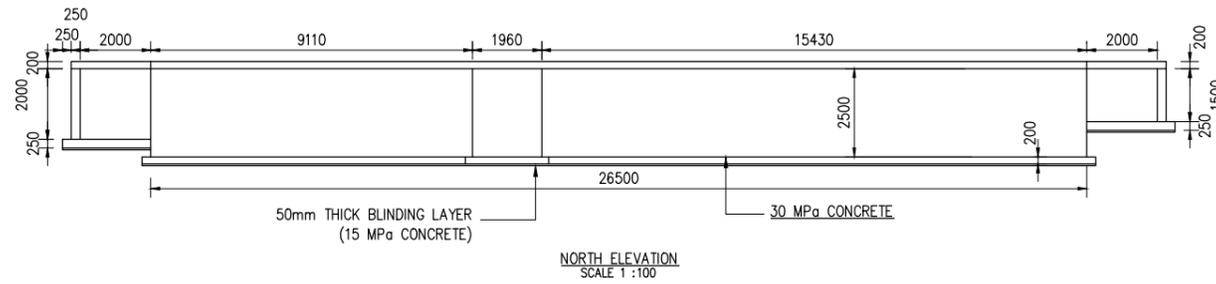
REVISION / WYSIGING				
No.	DATE / DATUM	INITIAL / VOORL.	DESCRIPTION / BESKRYWING	
1	18/02/21	M.T.	SITE MOVED	
2	09/10/2021	M.T.	SEWER TREATMENT PLANT SIZE AND POSITION CHANGED	

CC DWG. NO./CC TEK. NR. 2882/300/01/02	FILE NO./L.E.R. NR.
CLIENT DWG. NO./KLIENT TEK. NR. --	FILE NO./L.E.R. NR. --

2882/300/01/02

WATERPROOFING:

ALL CHAMBERS TO BE WATERTIGHT. EXPANSION AND CONSTRUCTION JOINTS TO BE SEALED WITH SIKA WATERBAR V-24 AND SIKADUR COMBIFLEX 200x2mm STRIPS OR SIMILAR APPROVED. WALLS AND FLOORING TO BE COATED WITH SIKAGARD - 63N OR SIMILAR APPROVED. ALL INSTALLED TO MANUFACTURER'S SPECIFICATIONS. SIKASWELL P-200M AT CONSTRUCTION JOINT TO EXISTING WALL.



NOTES / NOTAS

REFERENCE / VERWYSINGS

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DESIGN : M. TIEMENSMA

DRAWN : M. TIEMENSMA

PROJECT / PROEKT

ERVEN 2954 AND 2956
KINGSBURGH X9

DRAWING TITLE / TEKENINGTITEL

ERF 2954 - SEWAGE TREATMENT
FACILITY : DETAIL AND SECTIONS

DATE / DATUM : DECEMBER 2020

SCALE / SKAAL : N.T.S

REVISION / WYSIGING

No.	DATE / DATUM	INITIAL / VOORL.	DESCRIPTION / BESKRYWING
1.	19/10/21	MT	STF SIZE CHANGED

CC DWG. NO./CC TEK. NR.
2882/350/01/01

FILE NO./LêR NR.

CLIENT DWG. NO./KLIENT TEK. NR.

FILE NO./LêR NR.

2882/350/01/01

ANNEXURE C

WWTW CAPACITY CONFIRMATION

----- Forwarded Message -----

From: Lenesh Sukhlal <lenesh.sukhlal@durban.gov.za>

To: Andre Wolfaardt <awolfaardt@yahoo.com>; Nkosinathi Dlamini <nkosinathi.dlamini@durban.gov.za>

Sent: Friday, June 9, 2023 at 09:14:45 AM GMT+2

Subject: RE: Kingsburgh X9

Hi Andre

The closest Wastewater Treatment Works that can accept sewage via tankers is Amanzimtoti WWTW and Southern WWTW.

Please consult with your Environmental Consult whether a sewage disposal permit will be required now or after EIA approval.

Regards

Lenesh Sukhlal

From: Andre Wolfaardt <awolfaardt@yahoo.com>

Sent: Tuesday, 06 June 2023 9:22 AM

To: Lenesh Sukhlal <Lenesh.Sukhlal@durban.gov.za>; Nkosinathi Dlamini <Nkosinathi.Dlamini@durban.gov.za>

Subject: Fw: Kingsburgh X9