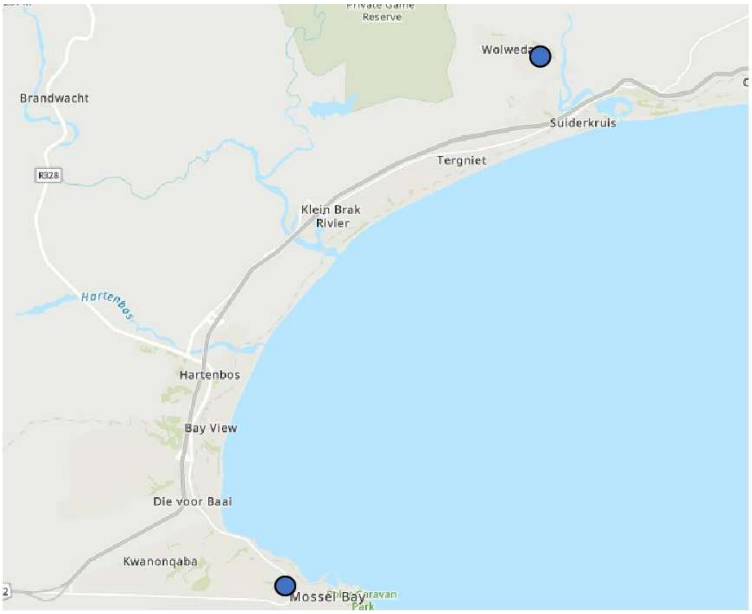
MOSSEL BAY MUNICIPALITY

GREENHAVEN, GROOT BRAKRIVIER, UPGRADING OF SEWER LINES PHASE 3 AND THE UPGRADING OF THE BULK SEWERAGE PIPELINE FROM MULLER / AMY SEARLE STREET TO THE CRICKET FIELD SEWERAGE PUMPSTATION



TECHNICAL REPORT – REVISION 04

FEBRUARY 2025

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QUALITY ASSURANCE DATA

Report Title:	GREENHAVEN, GROOT BRAKRIVIER UPGRADING OF SEWER LINES
Client:	MOSSEL BAY MUNICIPALITY
Revision Number:	REV 04

REVISION HISTORY

Date	Rev	Written By	Issued to		Distribution	Format
			Name	Institution		
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21 February 2025	04	Cobus Louw	Eric Louw / Hendrik Schoeman	Mossel Bay Municipality	E-Mail	.pdf

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1 BACKGROUND

The project is situated within the Western Cape Province and falls under the jurisdiction of Mossel Bay Municipality. A Portion of the work is within the Greenhaven residential area and the upgrading of the bulk sewerage gravity line start at the edge of the Greenhaven residential area flowing to the CBD area of Groot Brakriver to the so-called Cricket Field sewerage pumpstation.

The actual site of the works will be situated within Greenhaven and Groot Brakriver CBD area 24,2km North of Mossel Bay within the town of Groot Brakrivier.

The Greenhaven sewer reticulation network consist of the following pipe sizes, type of material and length or each :

Ø110mm uPVC	214m	
Ø160mm uPVC	4 566m	
Ø200mm uPVC	835m	
Ø250mm uPVC	626m	
Ø300mm uPVC	435m	
Ø100mm Clay	285m	
Ø150mm Clay	1 860m	
Ø150mm Bituminous fibre	2 440m	(Where off 1 215m was replaced with uPVC under Phase 1&2)
Ø150mm HDPE	517m	
TOTAL	11 778m	

For clarity purposes. When the original pitch fibre pipe survey was conducted the assumption was made if the outgoing pipe from a manhole indicate a pitch fibre pipe and the following incoming pipe at the downstream manhole also indicate a pitch fibre pipe the total length between manholes were measured as pitch fibre. The original total length of pitch fibre pipes was measured as 2730m whereof 2730-2440 = 290m was replaced over years as part of the maintenance on the sewer network.

The 2 440m bituminous fibre pipes was installed probably between the 1960-1970's as a sewer network. The clay pipes are probably older than the bituminous fibre pipes but are still in a good condition. Some root penetrations are experienced on some occasions but at least the clay pipes can be cleaned with modern pipe cleaning techniques. In the case of the bituminous fibre pipes rodding is almost impossible due to the insufficient rigidity of the pipe wall, extensive deformation of the pipe profile has taken place over the years making modern rodding techniques almost impossible.

The deformation of pipes is clearly visible from photos taken from previous phases done.

Furthermore, the different type of materials has been used over the years to repair and maintain the network as problems and blockages occur. This has resulted that several types of materials occur randomly throughout the network. Where capacity problems have occurred, upgrading of the specific sections was done by Mossel Bay Municipality over the last few years by using uPVC pipes.

The bituminous fibre network has reached its design lifespan of more than 50 years of service. This application is for the replacement of the last 1 225m of the bituminous fibre network with uPVC class 34 sewer pipes.

Furthermore, the current Ø300mm asbestos cement (AC) bulk sewerage gravity pipeline flowing from the Greenhaven residential area (Amy Searle / Muller Street intersection) flowing to the so-called cricket field sewerage pumpstation needs to be replaced due to the lack of sufficient capacity. This pipeline is 1 455mm long.

Mossel Bay Municipality resolved that a business plan be compiled for the application of MIG funds for the upgrading of the historical sewer line infrastructure in Greenhaven over a four-year period starting at the 2023/2024 financial year. Cobus Louw Professional Engineer cc was appointed to prepare a Technical Report and MIG application for funding.

The Guidelines for human settlement planning and design (red book) will be use as a guideline for the design.

Mossel Bay Municipality's Medium-Term Expenditure Framework (MTEF) Budget for the 2023/2024, 2024/2025 and 2025/2026 financial years and the Integrated Development Plan (IDP) for 2022-2027 were accepted by council: (Resolution Reference Number E84-05/2024). The project is captured on the Mossel Bay Municipalities IDP as approved by Council on 31 May 2024, as prescribed by section 25 of Municipal Systems Act (32 of 2000) (IDP ref no. FA2). This report sets out the proposed approach to the project.

The Water Services Development Plan (WSDP), and more specific Volume 3 the Water Services Development Planning System forms an integrated part in the decision making and prioritization of sewer and water related projects.

2 INTRODUCTION

2.1 Project Title

GREENHAVEN, UPGRADE OF SEWER LINES

2.2 Project Name

PROJECT NUMBER	PROJECT NAME	PROJECT TYPE	LOCAL MUNICIPALITY
To be confirmed	Greenhaven, Groot Brakrivier, upgrading of sewer lines phase 3 and the upgrading of the bulk sewerage pipeline from Muller / Amy Searle Street to the cricket field sewerage pumpstation	Sewer	Mossel Bay Municipality

2.3 Location, extent and layout of Greenhaven, Groot Brakrivier.

The location and town layout of Greenhaven is shown in Figure 1 and Figure 2 below.

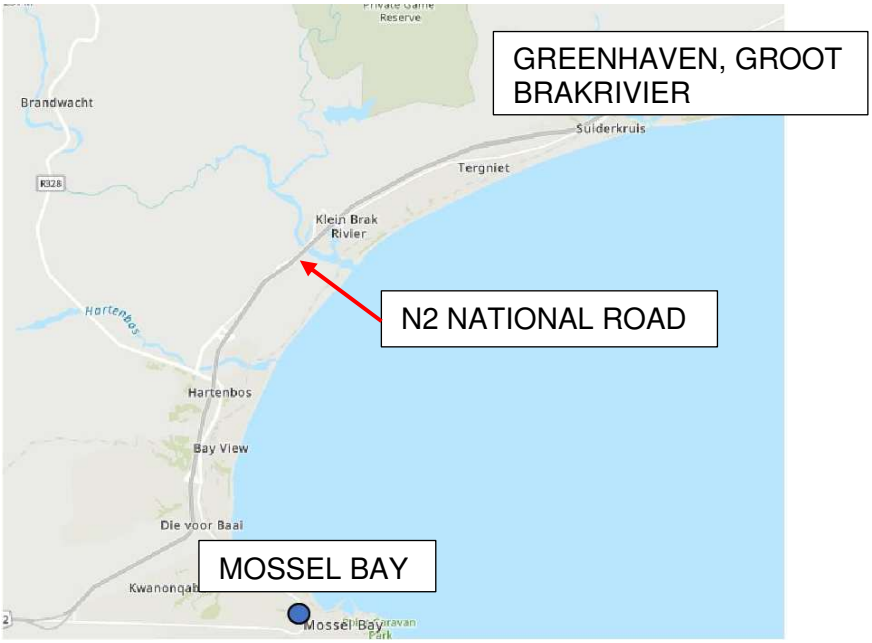


Figure 1 Greenhaven Locality Map

Figure 2 Greenhaven Erf Layout

VILLAGES / COMMUNITIES	NEAREST TOWN AND DISTANCE TO THE VILLAGE	LATITUDE	LONGTITUTE
GREENHAVEN	The area is easily accessible from N2 turn left on N2 at Groot Brakrivier off ramp, turn left on Long Street and then Left on Amy Street Groot Brakrivier.	34°02'46.32"S	22°13'56.28"E

2.4 Project Objectives

Orangeburg pipe (also known as "fibre conduit", "bituminous fibre pipe" or "Bermico") is bituminized fibre pipe made from layers of wood pulp and pitch pressed together. The name comes from Orangeburg, New York, the town in which most Orangeburg pipe was manufactured. These pipes were mainly designed as electrical conduits.

In the case of Greenhaven these bituminous fibre pipes has been installed between the 1960-1970's as the sewer network. Due to insufficient rigidity of the pipe wall extensive deformation of the pipe profile has taken place over the years. Modern pipe cleaning techniques does not work on the profile these pipes have deformed to. The sewer network has reached its design lifespan of more than 50 years of service.

Cleaning of blockages is almost a daily operation. Mainly for this reason this application is for the replacement of the bituminous fibre pipes with modern uPVC pipes to bring down the unrealistic high maintenance cost for the affected area.

On average 33 blockages was clean per month before Phase 1 and 2 was completed. These blockages increase the risk of raw sewerage ending up in the Amy Searle storm water channel flowing to the Groot Brakriver. The actual cost of cleaning blockages was calculated pre-Phase 1 & 2 completion as average R 46 134.00 per month.

The total length of bituminous fibre pipes in the Greenhaven area was 2 440m. Whereof 410m was replaced in the 2019/2020 and 805m in the 2023/2024 - 2024/2025 financial years respectively. This application is for the replacement of the last 1 225m thereof.

Furthermore, the existing Ø300mm bulk AC sewerage gravity pipeline flowing from the Greenhaven residential area to the so-called cricket field sewerage pumpstation in the centre of the town CBD area has insufficient capacity to accommodate the current and planned future developments in the Greenhaven Area.

A separate comprehensive report was conducted to determine the current and estimated future flow volumes.

The project will be implemented in accordance with the EPWP guidelines, and the necessary accredited training will be done to assure a high quality and standard of the final product.

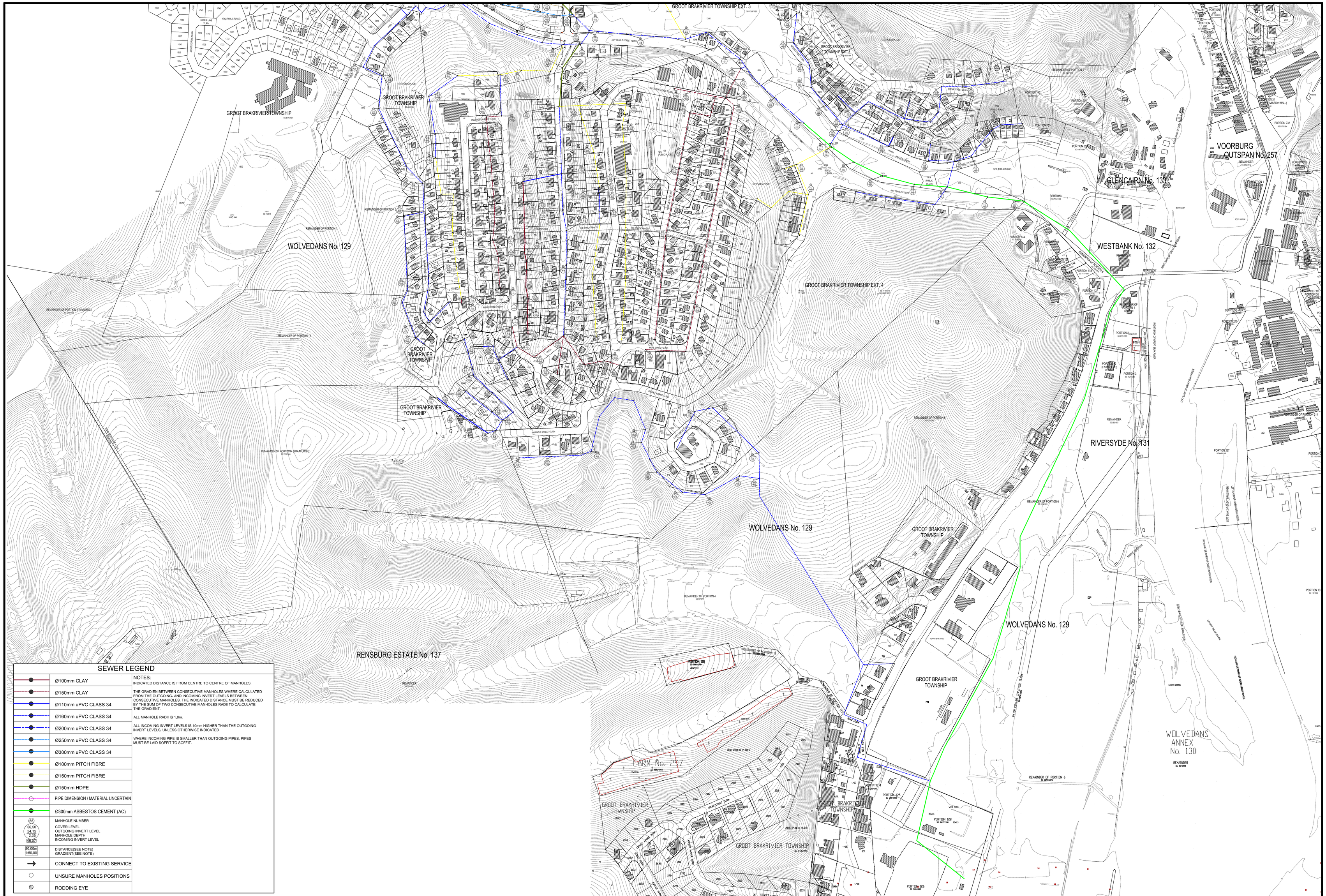
Figure 3 and Figure 4 below indicate the sewer lines to be upgraded as well as phases in which this project are suggested to be done.

The upgrading of the Greenhaven sewerage network will not require an Environmental Approval, but the bulk sewerage pipeline upgrade will. The Environmental Application and Approval process will be budgeted and programmed into the project.

2.5 Scope of works

- Replace all the remaing Orangeburg pipes (also known as "fibre conduit", "bituminous fibre pipe" or "Bermico") with Class 34 uPVC pipes within the Green Haven residential area.
  A total of 1225m of fibre pipes will be replace with Class 34 uPVC sewerage pipes under this application for Phase 3.
- Replace the existing Ø300mm AC pipeline from the Greenhaven residential area (Amy Searle / Muller Street intersection) flowing to the so-called cricket field sewerage pumpstation with a Ø315 or Ø355mm class 34 uPVC pipeline depending on the available gradient. This pipeline is 1 455mm long.
- Most of the work will be done via open trench excavation methods to create the maximum number of labour-days.
- Pipe cracking will be done crossing Long Street
- A total of 18 manholes will be constructed

Figure 3 ***SEWER LINES TO BE UPGRADED IN GREENHAVEN INDICATED IN YELLOW. BULK SEWERAGE LINE IN GREEN***



SEWER LEGEND

Ø100mm CLAY	NOTES: INDICATED DISTANCE IS FROM CENTRE TO CENTRE OF MANHOLES.
Ø150mm CLAY	THE GRADIEN BETWEEN CONSECUTIVE MANHOLES WHERE CALCULATED FROM THE OUTGOING- AND INCOMING INVERT LEVELS BETWEEN CONSECUTIVE MANHOLES. THE INDICATED DISTANCE MUST BE REDUCED BY THE SUM OF TWO CONSECUTIVE MANHOLES RADII TO CALCULATE THE GRADIENT.
Ø110mm uPVC CLASS 34	ALL MANHOLE RADII IS 1,0m.
Ø160mm uPVC CLASS 34	ALL INCOMING INVERT LEVELS IS 10mm HIGHER THAN THE OUTGOING INVERT LEVELS, UNLESS OTHERWISE INDICATED
Ø200mm uPVC CLASS 34	WHERE INCOMING PIPE IS SMALLER THAN OUTGOING PIPES, PIPES MUST BE LAID SOFFIT TO SOFFIT.
Ø250mm uPVC CLASS 34	
Ø300mm uPVC CLASS 34	
Ø100mm PITCH FIBRE	
Ø150mm PITCH FIBRE	
Ø150mm HDPE	
PIPE DIMENSION / MATERIAL UNCERTAIN	
Ø300mm ASBESTOS CEMENT (AC)	
(55) MANHOLE NUMBER	
56.50 COVER LEVEL 54.15 OUTGOING INVERT LEVEL 2.35 MANHOLE DEPTH (53.07) INCOMING INVERT LEVEL	
80.00m DISTANCE(SEE NOTE) 1:50.00 GRADIENT(SEE NOTE)	
CONNECT TO EXISTING SERVICE	
UNSURE MANHOLES POSITIONS	
RODDING EYE	

0 10 25 50 ORSPRONKLIKE SKAAL IN mm/ ORIGINAL SCALE IN mm

Wysig. Amend.	Datum Date	Beskrywing-Description

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Datum-Date: 2022-08-29
Kliënt-Client

Kliënt-Client: MOSSEL BAY MUNICIPALITY

Projek-Project: GREENHAVEN SEWERAGE UPGRADE

Titel-Title: UPGRADING OF PITCH FIBRE SEWER LINES PHASE 3 AND BULK SEWERAGE LINE TO THE CRICKET FIELD SEWERAGE PUMPSTATION

Skaal-Scale	Datum-Date
1:3 000	JULY 2024

Tekening Nr.-Drawing No.: M 1 068-1

Wysiging Amendment:

Figure 4 ***PROJECT PHASING***

SEWER LEGEND

Ø100mm CLAY	
Ø150mm CLAY	
Ø110mm uPVC CLASS 34	
Ø160mm uPVC CLASS 34	
Ø200mm uPVC CLASS 34	
Ø250mm uPVC CLASS 34	
Ø300mm uPVC CLASS 34	
Ø100mm PITCH FIBRE	
Ø150mm PITCH FIBRE	
Ø150mm HDPE	
PIPE DIMENSION / MATERIAL UNCERTAIN	
Ø300mm ASBESTOS CEMENT (AC)	
(50) MANHOLE NUMBER 56.50 COVER LEVEL 54.15 OUTGOING INVERT LEVEL 2.35 MANHOLE DEPTH 45.07 INCOMING INVERT LEVEL	
80.00m DISTANCE(SEE NOTE) 1:50.00 GRADIENT(SEE NOTE)	
CONNECT TO EXISTING SERVICE	
UNSURE MANHOLES POSITIONS	
RODDING EYE	

NOTES:
INDICATED DISTANCE IS FROM CENTRE TO CENTRE OF MANHOLES.

THE GRADIEN BETWEEN CONSECUTIVE MANHOLES WHERE CALCULATED FROM THE OUTGOING- AND INCOMING INVERT LEVELS BETWEEN CONSECUTIVE MANHOLES, THE INDICATED DISTANCE MUST BE REDUCED BY THE SUM OF TWO CONSECUTIVE MANHOLES RADII TO CALCULATE THE GRADIENT.

ALL MANHOLE RADII IS 1,0m.

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WHERE INCOMING PIPE IS SMALLER THAN OUTGOING PIPES, PIPES MUST BE LAID SOFFIT TO SOFFIT.

PHASE 1 - 2019/2020

PHASE 2 - 2023/2024 - 2024/2025

PHASE 3 - THIS APPLICATION

0 10 25 50
OORSPRONKLIKE SKAAL IN mm/ ORIGINAL SCALE IN mm

Wysig Amend.	Datum Date	Beskrywing-Description

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Nagesien-Checked	

Pr.Ing. Pr.Eng.
Raadgewende Ingenieur-Consulting Engineer
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Skaal-Scale	Datum-Date
1:3 000	JULY 2024

Tekening Nr.-Drawing No.: M 1 068-1

Wysiging Amendment

2.6 Feasibility Study

The Integrated Development Plan (IDP) document of Mossel Bay Local Municipality for the five-year period starting 2022 – 2027 as approved on 31 May 2022, highlights development issues and matters of the municipal area that need to be addressed during the next five years.

The Municipality has identified the following key performance areas.

- **Development and upgrade of new Services and Infrastructure**
- Land and Housing
- Governance and Communication
- Community Development, Education and Health
- Community Safety and Security
- Economic Development and Tourism
- Spatial Development and Environment
- Sports, Recreation
- Financial viability and management

The proposed project is in line with the development and upgrade of new services and infrastructure. It also addresses community development and in turn economic development by way of skills transfer and job creation.

The proposed services (Phase 3) will be integrated over a two-year period.

Phase 1 : Red Zone	Historical Phase – Completed 2019/2020
Phase 2 : Yellow Zone	Historical Phase – Completed 2023/2024 – 2024/2025
Phase 3 : Purple Zone	2025/2026 – 2026/2027 Financial Year

The project will be labour based with work opportunities that will be provided specified in the tender document. The upgrading of the sewer infrastructure creates excellent job creating opportunities in the short term during the construction phase.

According to the 2011 Census Groot Brakrivier consist of 1 785 households and 6 021 persons will benefit from the project. The published growth rate for Mossel Bay is 2,24%. Table 1 indicated the estimated population.

Table 1 Estimated population of Groot Brakrivier

	Households	Population
Population Census 2011	1 785	6 021
Estimated at 2,24% population growth rate - 2025	2 488	8 392

The cost is estimated for Phase 3 at R 19 452 778.50 (2025/2026 and 2026/2027), including VAT.

3 NEED DETERMINATION

3.1 Demographics

Table 1 above show the population and number of households in Groot Brakrivier. Population is taken according to Census 2011 (Annexure A) and the 2018 completed housing projected has been added taking into consideration that these new households have four residents each.

Table below indicate the population and household distribution in terms of income.

Table 2 Groot Brakrivier Resident Income Distribution

Description	Population	Poor	Non – Poor
Population	8 392	6 881	1 511
Total Households	2 488	2 040	448
Distribution		82%	18%

3.2 Current Population

AREA	SETTLEMENTS/ VILLAGES	NUMBER OF BENEFICIARIES / HOUSEHOLDS		SOURCE OF DATA
		Total Beneficiaries	Total Households	
Mossel Bay Municipality Area	Groot Brakrivier	8 392	2 488	Mossel Bay Municipality / AfriGIS Census 2011

4 ENGINEERING VIABILITY

4.1 Existing sewer infrastructure and sources

Greenhaven is an extension of Groot Brakrivier and forms an integrated part of the bigger Mossel Bay Municipal area although its sewer network is a network of its own.

The area under discussion still consists of bituminous fibre sewer pipes.

In the case of Greenhaven these bituminous fibre pipes has been installed between the 1960-1970's as the sewer network. Due to insufficient rigidity of the pipe wall extensive deformation of the pipe profile has taken place over the years. Modern pipe cleaning techniques could not be applied to these old pipes due to the deformation of the pipes over time.

Cleaning of blockages is almost a daily operation.

The actual cost to address blockages prior to (as received from the Municipal database) the start of this project over a 12-month period could be summarised as follow:

- Cost per blockage to clean - R 1 398.00
- Average number of blockages per month - 33
- Average cost per month for blockage cleaning - R 46 134.00
- Cost per financial year spend on blockages - R 533 608.00

By upgrading the existing sewerage network and significantly reducing the potential number of sewer blockages, the possibility of sewerage flowing into the so-called Amy Searle storm water channel is greatly reduced. The Amy Searle stormwater channel flows directly into the Groot Brakriver which flows directly into the sea. The hilly landscape of Greenhaven drains naturally to the Amy Searle storm water channel. During the implementation phase of the project modern network upgrading techniques will be applied to limit the possibility of raw sewerage end up in the stormwater system.

The existing Ø300mm asbestos cement (AC) bulk sewerage pipeline from the Amy Searle / Muller Street intersection to the so-called cricket field sewerage pumpstation consist out of 17 sections of pipe between manholes. Five (5) sections do not comply to the minimum gradient to create a 0.7m/s flow velocity once a day.

If the wet weather peaks flows are calculated for the pipeline only three (3) of the 17 sections will have enough capacity to handle the peak wet weather flow. That is exactly what are currently been experienced at the system.

The lack of sufficient flow capacity due to the gradient shortcomings is probably due to years of insufficient flow velocity build-up. The possibility of pipe sagging and deformations over the years is probably also contribute to the flow capacity shortcomings.

The so-called cricket field sewerage pumpstation.

The so-called cricket field sewerage pumpstation is also in the process of being upgraded as part of the 2026 / 2027 financial budget.

This project entails the design and construction of new sewer infrastructure to connect un-serviced erven in Great Brak River to the sewer network. The new infrastructure will be constructed in built up areas in Great Brak River along Lang, Wigget, Fourie, Van Rensburg, Kerk and Stander Streets

It is anticipated that the environmental process will be completed by August 2025.

From the preliminary design report (reference SHCE-WC-013) it was clearly indicated that the cricket field sewerage pumpstation need to be upgraded if the subserviced erven next to Lang, Wigget, Fourie, Van Rensburg, Kerk and Stander Streets will be connected to the sewerage network. Meaning that the upgrading of the cricket field sewerage pumpstation only needs to be upgraded before any further developments flowing to the pumpstation is approved.

Preliminary Program for the so-called Cricket Field Sewerage pumpstation upgrade

Progress Description	Expected completion Dates	Complete
Inception	18 November 2022	Yes
Concept & Viability – Preliminary Design Report	16 May 2023	Yes
Environmental- and WULA Approval	August 2025	In process
Design Development – Detail Design Report	November 2025	In process
Documentation & Procurement	June 2026	
Contract Administration & Inspection	July 2026 – March 2027	
Close-Out	May 2027	

4.2 Engineering Consideration

Based on the data in *Guidelines for Human Settlement Planning and Design* the following flow volumes is applicable to the Greater Mossel Bay area which includes Greenhaven.

Existing Groot Brakrivier Wastewater Treatment Plant

Average daily sewerage flow of Groot Brakrivier	-	21.73 l/s
Peak daily flow	-	152.11 l/s
Peak wet flow	-	174.92 l/s

Greenhaven sewerage system form part of the Groot Brak WWTW. Sewerage flow from Greenhaven to the town of Groot Brakrivier from where it is been pumped to the Sandhoogte sewerage pump station and from there to the Groot Brak WWTW. The current capacity of the WWTW is 2Ml/day and the average daily flow is 1,36Ml/day.

Groot Brak Wastewater Treatment Works (WWTW)

Water Treatment Plant

Raw water for the Greenhaven area forms part of the bigger Mossel Bay Municipality area water supply schemes. The Wolwedans and Ernest Robertson dams supply the Greenhaven area with raw water and treatment take place at the Groot Brakrivier WTW. **The current dam levels as on 15 July 2024 are as follows:**

Wolwedans Dam	-	99.91%
Ernest Robertson Dam	-	100,68%

The capacity of the WTW is 5,5Ml/day and the plant are running currently at 2,6Ml/day meaning 47,6% of its capacity.

Groot Brakrivier Water Treatment Works (WTW)

Solid Waste

Greenhaven forms part of the Greater Mossel Bay Municipal area where solid waste is been removed from individual erven on a weekly basis to the landfill site next to PetroSA. Currently the new landfill site is in die construction development stage.

Existing landfill site near PetroSA.

Bear in mind this application is not for new erven, it is for the upgrading of the existing sewerage network which has reached it design lifespan after more than 50 years of service. The main reason for this application is to eliminate the unrealistic high maintenance cost of these bituminous fibre sewer pipelines. Meaning that minimum to no additional load will be added to the existing WTW, WWTW and Regional Landfill Site.

4.2.1 Design Resources

Information that will be used for the construction/installation of the infrastructure include the following:

- Survey information, in DTM format.
- Maps indicating the current position of infrastructure.
- The SANS standards will be used.
- Capacity Design Standard - The Red Book (Guidelines for Human Settlement Planning and Design

4.2.2 Design Standard - The Red Book (Guidelines for Human Settlement Planning and Design

The sewer drainage system should form an integral part of the Structure Plan of the area to be developed.

The design of the pipe flows is based on the following data:

- The sewer reticulation will be designed to drain at least 80% of each residential erf and 100% of school and high-density housing sites.
- An average discharge of 500 litres/unit/day.
- A peak factor based on the applicable graph in the guidelines, or the Harman formula based on an average of 5 persons per erf.
- An infiltration flow of 15%
- Pipes designed to flow full at the peak design flow.
- A minimum velocity of 0,7 m/sec.
- A minimum cover of 0.75 m.
- Pipes up to and including Ø200 mm will be uPVC Class 34 sewer pipes with Ø110mm house connection to each erf.
- Pipes are generally to be laid on a Class B bed.
- Midblock sewers based on minimum cleansing velocities.
- Maximum distance between manholes 90 m.
- Number of manholes to be limited by using rodding eyes where possible.
- Minimum pipe diameter 160 mm on mains.
- House connections may be 110 mm diameter and are to be shown on plans.
- Step irons for manholes to be calcamite type.
- Fibre cement manholes are acceptable subject to full resistance to floating being provided otherwise concrete rings.
- House connections are to be marked as per LD 203 and full documentation provided as per SANS 1200.
- Pipes are to be 6m standard lengths.
- Prior to full flow connections being achieved the following guidelines may be used:

• 0 to 10	dwellings	1 : 80 grade
• 11 to 80	dwellings	1 : 120 grade
• 81 to 110	dwellings	1 : 150 grade
• 111 to 130	dwellings	1 : 180 grade
• 131 upwards	dwellings	1 : 200 grade

- "As built" drawing will be uploaded on the Municipal GIS system, after the final inspection and handing over of the scheme to the Local Authority was conducted.

4.3 Level of Community Awareness and Development

The community is well informed of the intension of Mossel Bay Municipality to upgrade the sewer infrastructures of Greenhaven via ward councillor's meetings and the recent public participation process followed for the latest IDP process followed. Upgrading of the sewer infrastructures will uplift the community and create a positive attitude in the community.

Some social upliftment and education will be done via an accredited social facilitator in conjunction with the ward councillor and applicable community structures in the fields of:

1. Personal Hygiene,
2. General education of the importance of a proper sewerage system,
3. Environmental awareness and protection thereof,
4. Vandalism and the effect thereof,
5. Management and maintenance of a sewerage system.

4.4 Pollution Risk and Mitigation Measures

Current Situation

The pollution risk into the storm water system is the greatest during the pre-upgrading phase of the proposed project. Blockages in the sewer network occurs at any time of the day or night which results of raw sewerage ends up in the storm water network flowing to the Amy Searle storm water channel flowing to the Groot Brakriver.

During Construction

The construction work will start from the lowest point to the highest point of the network. The new network will be installed parallel to the existing network as far as possible. Meaning that the existing network will be active during the construction of a specific section until the switch over from the old to the new network will be possible. Rapid set construction material will be used during the switch over process. This is not an unusual method of upgrading live sewerage networks.

After Construction Permanent Mitigation Measures

During the design phase of the project make sure that proper engineering design principals are been followed:

- The angle of sewerage enters a manhole does not restrict flow.
- Benching in manholes is being done properly.
- Pipe gradients allow for a flow velocity of 0,7m/s at least once a day.
- Proper sealing of manhole rings and covers to limit stormwater and ground water infiltration.
- Make sure that manhole cover heights for midblock and open field manholes is between 50-100mm higher as natural ground level.
- Informing and training residence of the content going into a waterborne sewerage system.
- Maximum distance between manholes is 90m to enable proper cleaning of the sewerage system.

5 QUANTITIES AND COSTING

The cost estimate for the work as described in this report is based on similar contracts currently in progress in the same area. The estimated rates make provision for material and labour costs as well as contractor's profit usually associated with this type of work as well as Professional Fees.

5.1 Construction cost

Table 3 Project Cost

GREEN HAVEN SEWER INFRASTRUCTURE	Green Haven - Phase 3		Sewer gravity line to Pumpstation (cricket field)			
	2025 - 2026		2025 - 2026		2026 - 2027	
	MIG 82%	CRR 18%	MIG 82%	CRR 18%	MIG 82%	CRR 18%
	Ø160mm		Ø315/355mm		Ø315/355mm	
CONSTRUCTION COST	1225	m			1455	m
Preliminary and General Cost - 16%	R317 922.54	R69 787.80	R354 854.27	R107 152.39	R598 071.51	R101 806.93
Construction Items						
Site Clearance	R108 443.11	R23 804.56	R117 630.96	R35 610.09	R188 633.56	R32 110.21
Trench Excavation	R431 072.36	R94 625.53	R467 595.02	R141 553.72	R749 837.54	R127 641.35
Expose and repair existing services	R74 478.47	R16 348.91	R80 788.67	R24 456.93	R129 553.08	R22 053.22
Bedding	R358 038.34	R78 593.69	R388 373.18	R117 571.12	R622 797.03	R106 015.84
Sewer pipes	R541 661.62	R118 901.20	R587 553.97	R177 868.55	R942 204.26	R160 387.04
Manholes	R473 321.99	R103 899.83	R513 424.26	R155 427.48	R823 329.51	R140 151.55
Pipe Jacking					R181 913.42	R30 966.27
Escalation - 7%/year for 12 Months	R161 345.69	R35 417.31	R175 715.42	R53 174.82	R613 845.65	R104 492.09
Unforeseen Expenses - 10%	R246 628.41	R54 137.88	R268 593.58	R81 281.51	R485 018.56	R82 562.45
Sub Total A	**R2 712 912.52**	**R595 516.72**	**R2 954 529.34**	**R894 096.60**	**R5 335 204.11**	**R908 186.95**
PROFESSIONAL COST						
Primary Fee	R198 886.31	R43 657.92	R216 599.48	R65 547.11	R391 129.10	R66 580.09
Secondary Fee	R86 164.87	R18 914.22	R93 838.87	R28 397.42	R169 451.53	R28 844.94
Factor for alterations to existing works 1.25	R71 262.79	R15 643.03	R77 609.59	R23 486.13	R140 145.16	R23 856.26
10% discount on Fee	-R35 631.40	-R7 821.52	-R38 804.79	-R11 743.07	-R70 072.58	-R11 928.13
Survey	R7 085.73	R1 555.40	R7 716.80	R2 335.25	R13 934.77	R2 372.05
Occupational Health and Safety	R11 134.72	R2 444.20	R12 126.40	R3 669.68	R21 897.50	R3 727.51
Accredited Training	R13 159.21	R2 888.60	R14 331.19	R4 336.89	R25 878.86	R4 405.24
Bind of Tender Documents	R3 542.86	R777.70	R3 858.40	R1 167.62	R6 967.39	R1 186.03
Environmental Checklist	R8 097.98	R1 777.60	R8 819.20	R2 668.86	R15 925.45	R2 710.92
Environmental Approval	R34 416.40	R7 554.81	R37 481.59	R11 342.64	R67 683.17	R11 521.39
WULA	R5 061.24	R1 111.00	R5 512.00	R1 668.04	R9 953.41	R1 694.32
Environmental Control Officer	R32 898.03	R7 221.51	R35 827.99	R10 842.23	R64 697.15	R11 013.09
Social upliftment and education	R13 159.21	R2 888.60	R14 331.19	R4 336.89	R25 878.86	R4 405.24
Supervision for Labour intensive construction	R262 374.44	R57 594.33	R285 741.98	R86 470.94	R515 984.65	R87 833.66
Sub Total B	**R711 612.40**	**R156 207.43**	**R774 989.87**	**R234 526.63**	**R1 399 454.41**	**R238 222.61**
Sub Total A + B	**R3 424 524.92**	**R751 724.14**	**R3 729 519.21**	**R1 128 623.22**	**R6 734 658.52**	**R1 146 409.56**
15% VAT	**R513 678.74**	**R112 758.62**	**R559 427.88**	**R169 293.48**	**R1 010 198.78**	**R171 961.43**
TOTAL	**R3 938 203.65**	**R864 482.76**	**R4 288 947.09**	**R1 297 916.71**	**R7 744 857.29**	**R1 318 371.00**
TOTAL PER FINANCIAL YEAR	**R4 802 686.42**		**R5 586 863.80**		**R9 063 228.29**	
TOTAL PROJECT COST	**R19 452 778.50**					

5.2 Funding

MIG funding will be needed to finance the project. The cost will not be higher than the allocation.

The bulk (82%) of the beneficiaries within Groot Brakrivier cannot contribute to the funding of the project by paying rates and taxes. The municipality does not have enough resources to cover all the capital projects within the greater Mossel Bay area. MIG funding is needed to finance this project to enable the municipality to deliver the basic services to the community of Groot Brakrivier with acceptable standards and quality. The current high maintenance cost via the ageing of the bituminous fibre sewer pipes will be minimized by replacing the old sewer pipelines with uPVC.

6 EXPECTED PROGRAMME

It is estimated that the funds will become available in the 2023/2024 and 2024/2025 financial years. Based on that, the envisaged programme for the execution of the project is as follows:

Table 4 Project Programme

	Description	2025/2026	2026/2027
6.1	Complete detail design	July 2025	
6.2	Environmental Approval Process	December 2025	
6.2	Tender process completed	December 2025	
6.3	Contractor appointed	January 2026	
6.4	Contractor completed		June 2027
6.5	Retention paid out		June 2028

7 MAINTENANCE AND OPERATION

The short-term maintenance cost should be minimal and should be considered in budget applications on the longer term. An allocation of approximately 0.25% of the construction cost per annum should be enough to cover the maintenance cost on the sewer infrastructure.

The maintenance component will be funded from the annual budget of the Mossel Bay Municipality, which makes provision for the maintenance of the sewer infrastructure.

All maintenance work will be carried out by the Municipal maintenance team, which is already in place. Service cost will be part of an operational budget.

Projected maintenance cost on the sewer reticulation network under discussion:

2027/2028 - R 19 400.00
2028/2029 - R 20 750.00
2029/2030 - R 22 200.00
2030/2031 - R 23 755.00
2031/2032 - R 25 420.00

8 PROPOSED TRAINING

Accredited multi-skills training will be provided as the project progresses to ensure that trainees stay on the training course and on the project for the full lifespan of the project. Training will be done up to NQF Level 1 for technical- and Level 2 for administrative aspects. Training should be presented in such a way that trainees develop the necessary skills to get involved in the next phase within their applicable NQF level of training for the full extent of the project.

Typical training will be in die following construction sectors:

- Apply Occupational Health and Safety to a Work Area. (US 9964)
- Excavate a trench and install shoring. (US 254061)
- Lay pipes for water and wastewater reticulation systems. (US 254070)
- Join pipe fittings and other pipeline devices. (US 14017)
- Demonstrate Knowledge of Backfilling and Compaction. (US 254059)
- Office Administration Training

About 20 trainees will receive a combination of formal and practical on-site training at a cost of ± R 3 250.00 / trainee for at least 10 days in some of the above-mentioned fields. The specific field will be determined once the project has commenced, and a basic training need assessment will be conducted among the EPWP workers appointed on the project via the Municipal shake-shake process. Inputs from the appointed main contractor will also be incorporated.

Table 5 Summary of proposed NQF training activities

Training description	NQF Level	Number of persons	Training days	Training cost
To be determine	1 / 2	20	10	R 65 000.00

9 LABOUR BASED CONSTRUCTION

The project will be Labour Based where possible. An estimated 7 200 number of person days is calculated, accommodating 20 employees for the duration of the construction.

10 PRELIMINARY COST ESTIMATE

Table 6 through to Table 7 below depicts the preliminary cost estimate for the project during the 2023/2024 and 2024/2025 financial years combined.

Table 6 Preliminary Cost Estimate for total Project Cost

Total Project Cost (Incl. VAT)	VAT	Direct Costs (Construction) (Excl. VAT)	Indirect Costs (Professional Fees & Disbursements) (Excl. VAT)
R 19 452 778.50	R 2 537318.94	R 13 400 446.23	R 3 515 013.34

Table 7 : 2025/2026 and 2026/2027 Preliminary Cost Estimate Phase 3

Project Cost	R 19 452 778.50
Number of Households	2 488
Cost per Household (MIG)	R 6 428.64 (82%)
Cost per Household (CRR)	R 1 412.76 (18%)
Cost per Household (TOTAL)	R 7 841.50 (100%)
Total Pipe Length	2 680m
Unit cost / m	R 7 258.50 / m

11 ENVIRONMENT ASSESSMENT AND LEGAL REQUIREMENTS

All activities will take place within and existing Municipal neighbourhood and CBD area. Meaning that all properties consist of legal registered owners, servitudes for numerous services does exist and that these servitudes will be used for the upgrading of the dilapidated infrastructure due to aging. Therefore, an EIA will not be required for the portion of work within the Greenhaven residential area.

The bulk sewerage line is within a watercourse area and will require an Environmental Approval and a Water Use Licence (WULA).

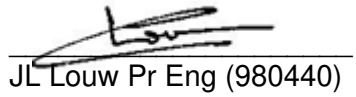
Typical existing servitudes within residential area applicable.

12 RECOMMENDATION

It is recommended that the above project is considered positively to uplift the community of Groot Brakrivier, near Mossel Bay.

13 GENERAL

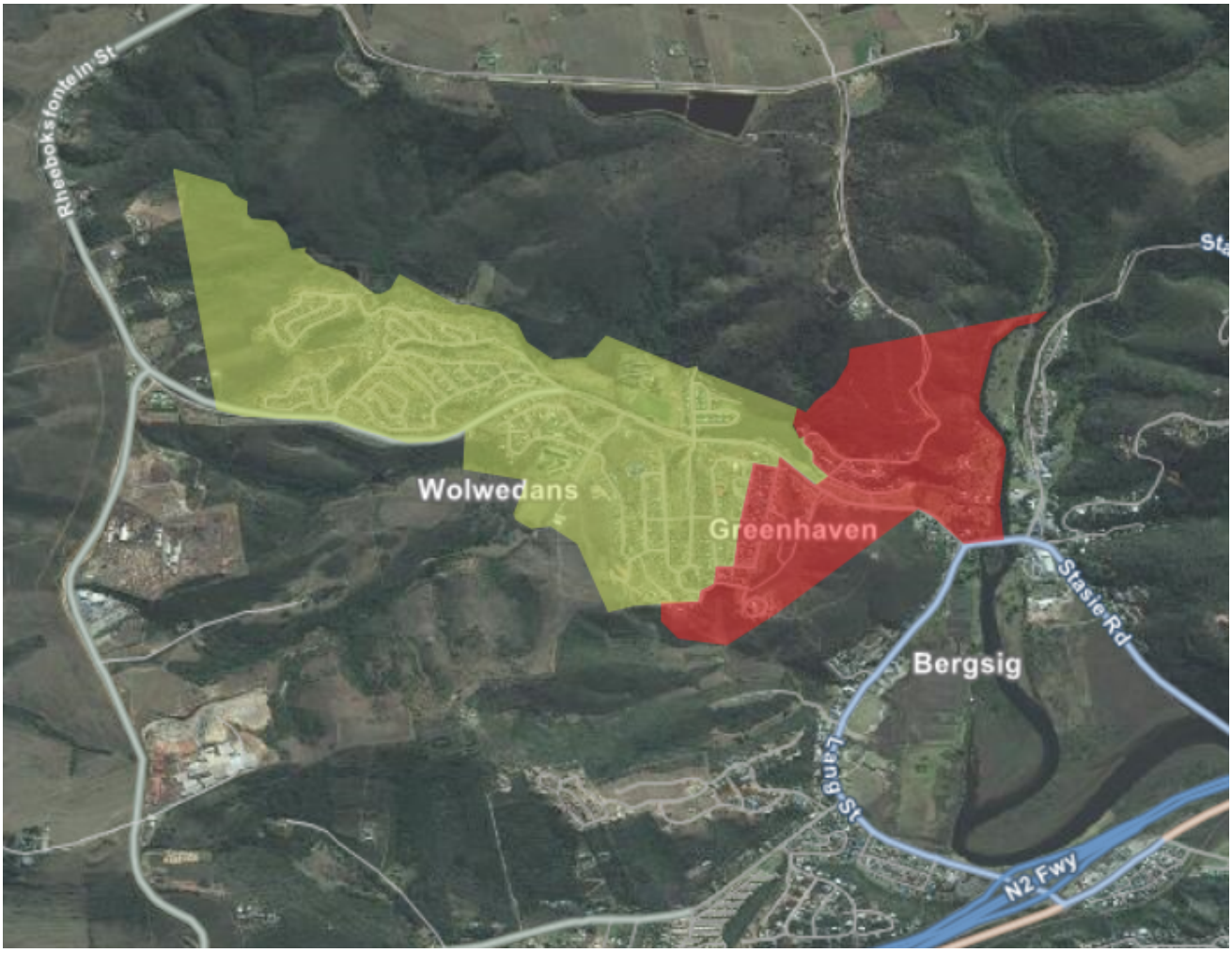
It is confirmed that the project will be an asset of Mossel Bay Municipality.



JL Louw Pr Eng (980440)

COBUS LOUW PROFESIONAL ENGINEER
20 February 2025

ANNEXTURE A CENSUS 2011 AREA FOR GROOT BRAKRIVIER, GREENHAVEN



ANNEXTURE B BILL OF QUANTITIES

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	SABS 1200 C	SITE CLEARANCE				
B1	8.2.1	Clear and grub for:				
B1.1		Sewer pipe routes	ha	0.675	47 799.83	32 264.89
B2	PS C 8.2.11	Removal of existing walls, kerbs, ect.				
B2.1		Remove existing vibracrete wall and store for re-use	m	0	667.57	0.00
B2.2		Remove existing tar road surface - Cutting of tar measured elsewhere	m²	150	166.89	25 033.50
B2.3		Remove existing hexagon paving bricks and store for re-use on sidewalks	m²	150	166.89	25 033.50
B2.4		Remove existing bevel paving bricks and store for re-use on sidewalks	m²	840	166.89	140 187.60
B2.5		Remove existing interlocking paving bricks and store for re-use on sidewalks	m²	0	166.89	0.00
B2.6		Remove existing concrete (75-125mm) used as paved sidewalks and driveways - Cutting of concrete measured elsewhere	m²	0	333.78	0.00
B2.7		Remove kikuyu grass sods and keep for replanting	m²	1700	166.89	283 713.00
B3	8.3.6	**OVERHAUL**				
B3.1		Limited overhaul	m³	0	24.79	0.00
B3.2		Long overhaul	m³.km	0	21.64	0.00

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
C.1	8.3.2	**EXCAVATION**				
C1.1	PS DB 8.3.2	a) **Machine Excavate** in all materials for trenches backfill, compact, and dispose of surplus material Dia up to 160 mm for depths: Over and Up to				
C.1.1.1		0,0 m 1,0 m	m	0	220.00	0.00
C.1.1.2		1,01 m 1,5 m	m	950	250.00	237 500.00
C.1.1.3		1,51 m 2,0 m	m	0	275.00	0.00
C1.2	PS DB 8.3.2	a) **Hand Excavate** in all materials for trenches backfill, compact, and dispose of surplus material Dia up to 160 mm for depths: Over and Up to				
C1.2.1		0,0m 1,0m	m	0	275.00	0.00
C1.2.2		1,01m 1,5m	m	275	310.00	85 250.00
C1.2.3		1,51m 2,0m	m	0	350.00	0.00
C1.3	PS DB 8.3.2	a) **Machine Excavate** in all materials for trenches backfill, compact, and dispose of surplus material Dia up to 355 mm for depths: Over and Up to				
C.1.3.1		0,0 m 1,0 m	m	0	200.00	0.00
C.1.3.2		1,01 m 1,5 m	m	0	250.00	0.00
C.1.3.3		1,51 m 2,0 m	m	0	300.00	0.00
C.1.3.4		2,01 m 2,5 m	m	1200	350.00	420 000.00
C.1.3.5		2,51 m 3,0 m	m	0	400.00	0.00
C1.3.6		3,01 m 3,5 m	m	0	450.00	0.00
TOTAL CARRIED FORWARD						742 750.00

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
BROUGHT FORWARD						742 750.00
C1.3A	PS DB 8.3.2	a) **Hand Excavate** in all materials for trenches backfill, compact, and dispose of surplus material Dia up to 355 mm for depths: Over and Up to				
C1.3.7		0,0m 1,0m	m	0	250.00	0.00
C1.3.8		1,01m 1,5m	m	200	325.00	65 000.00
C1.3.9		1,51m 2,0m	m	55	375.00	20 625.00
C1.3.10		2,01m 2,5m	m		410.00	Rate Only
C1.3.11		2,51 m 3,0 m	m		450.00	Rate Only
C1.3.12		3,01 m 3,5 m	m		475.00	Rate Only
	PS DB 8.3.2	b) Extra-over item C1.1 for: (provisional):				
C1.4		Excavate in wet conditions	m³	2182.5	950.00	2 073 375.00
	PS DB 8.3.2	b) Extra-over item C1.2 for: (provisional):				
C1.5		Excavate in wet conditions	m³		650.00	0.00
C1.6	PS DB 8.3.2(c)	Excavate unsuitable material from trench bottom	m³	291	350.00	101 850.00
	PS DB 8.3.2(d)	Hand excavation to expose existing services				
C1.7		Soft excavation	m³	250	450.00	112 500.00
C1.8		Control of Water Inflow from Excavations				
C1.8.1		a) Provide all required equipment	Sum	1	4 500.00	4 500.00
C1.8.2		b) Operate and Maintain	Sum	1	10 500.00	10 500.00
C1.8.3		c) Remove equipment on completion	Sum	1	2 500.00	2 500.00
C2	8.3.3	**EXCAVATION ANCILLARIES**				
	8.3.3.1	Make up deficiency in backfill material (provisional)				
C.2.1		a) sand or suitable granualar material from other necessary excavations on site	m³	291	450.00	130 950.00
TOTAL CARRIED FORWARD						3 264 550.00

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
BROUGHT FORWARD						3 264 550.00
C.2.2		c) by importation from commercial sources	m³	291	550.00	160 050.00
C.2.3	8.3.3.4	Overhaul				
C2.3.1		a) Limited overhaul (provisional)	m³	291	450.00	130 950.00
C2.3.2		b) Long overhaul (provisional)	m³.km	645	15.00	9 675.00
C.3	PS DB 8.3.5	**EXISTING SERVICES**				
	8.3.8.1	Location				
	PS D 8.3.8.1	b) Use or hire specialist equipment for detection of the following underground services:				
C3.1		Electrical cables	hour	15	2 500.00	37 500.00
	PS DB 8.3.5	**a) Services that intersect a trench**				
C3.2		Water Mains	No	1	350.00	350.00
C3.3		Water house connections (15-25mm)	No	0	455.00	0.00
C3.4		Telkom cable	No	5	250.00	1 250.00
C3.5		Stormwater pipeline up to 600mm dia.	No	5	650.00	3 250.00
C3.6		Concrete kerb (Combination or single)	No	10	455.00	4 550.00
C3.7		Underground Electrical cable	No	1	1 200.00	1 200.00
C3.8		Overhead Electrical cable	No	1	550.00	550.00
C3.9		Sewer pipeline up to 160mm dia	No	5	1 550.00	7 750.00
C3.10		Vibracrete / Brick wall erf boundary	No	0	550.00	0.00
C3.11		Wire erf boundary fences	No	0	450.00	0.00
	PS DB 8.3.5	**b) Services that adjoin a trench**				
C3.12		Water main pipes	m	150	150.00	22 500.00
C3.13		Underground Telkom cable	m	10	200.00	2 000.00
TOTAL CARRIED FORWARD						3 646 125.00

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
BROUGHT FORWARD						3 646 125.00
C3.14		Underground Electrical cable	m	20	150.00	3 000.00
C3.15		Concrete kerb (Combination or single)	m	250	155.00	38 750.00
C3.16		Stormwater pipeline up to 600mm dia.	m	50	200.00	10 000.00
C3.17		Sewer pipeline up to 160mm dia	m	200	255.00	51 000.00
C3.18		Vibracrete / Brick wall erf boundary	m	0	200.00	0.00
C3.19		Wire erf boundary fences	m	0	200.00	0.00
C3.20		Formal / Informal Building structure	m	0	255.00	0.00
C3.21		Electrical poles	No	4	200.00	800.00
C.4	8.3.6	**FINISHINGS**				
	PS DB 8.3.6.1	Reinstate road surfaces complete with all courses				
C.4.1		c) Asphalt 30 mm thick on roadway	m²	150	400.00	60 000.00
C4.2		Concrete (100 - 120mm thick 25MPa/19 with Mesh 193)	m²	0	450.00	0.00
C4.3	PS DB 8.3.6.2	Extra over for imported material				
C4.3.1		150mm Subbase material (G5)	m³	22.5	550.00	12 375.00
C4.3.2		150mm Base material (G4)	m³	22.5	550.00	12 375.00
C4.4	PS DB 8.3.6.5	Reinstate kukuju sods	m²	1700	100.00	170 000.00
C4.5	PS DB 8.3.8	Saw-cut of existing tar road surface				
C4.5.1		(1) Thickness exceeding 0 mm but not exceeding 50 mm	m	75	120.00	9 000.00
C4.5.2		(2) Thickness exceeding 50 mm but not exceeding 100 mm	m	75	200.00	15 000.00
C4.6	PS DB 8.3.8	Saw-cut of existing concrete driveways				
C4.6.1		(1) Thickness exceeding 0 mm but not exceeding 75 mm	m	0	150.00	0.00
TOTAL CARRIED FORWARD						4 028 425.00

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
BROUGHT FORWARD						4 028 425.00
C4.6.2		(2) Thickness exceeding 75 mm but not exceeding 125 mm	m	0	200.00	0.00
C4.7		Seal joint between new and old road surface	m	150	250.00	37 500.00
C5	SABS 1200 MJ	SEGMENTED PAVING				
C5.1	PS MJ 8.2.2	Re-use existing Bevel paving bricks layed on 25mm river sand for walkways	m²	640	200.00	128 000.00
C5.2	PS MJ 8.2.2	New Bevel paving bricks layed on 25mm river sand for walkways	m²	200	385.00	77 000.00
C5.3	8.2.3	Cutting of Bevel paving bricks at kerbs / edging	m	700	150.00	105 000.00
C5.4	8.2.4	Role 50mm Bevel paving bricks for walk ways to close state	m²	840	200.00	168 000.00
C5.5	PS MJ 8.2.2	Re-use existing Hexagon paving bricks layed on 25mm river sand for walkways	m²	0	140.00	0.00
C5.7	8.2.3	Cutting of Hexagon paving bricks at kerbs / edging	m	0	140.00	0.00
C5.8	8.2.4	Role 50mm Hexagon paving bricks for walk ways to close state	m²	0	150.00	0.00
C5.9	PS MJ 8.2.2	Re-use existing Interlocking paving bricks layed on 25mm river sand for walkways	m²	0	185.00	0.00
C5.10	PS MJ 8.2.2	New Interlocking paving bricks layed on 25mm river sand for walkways	m²	0	400.00	0.00
C5.11	8.2.3	Cutting of Interlocking paving bricks at kerbs / edging	m	0	100.00	0.00
C5.12	8.2.4	Role 50mm Interlocking paving bricks for walk ways to close state	m²	0	150.00	0.00
TOTAL CARRIED FORWARD						4 543 925.00

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
BROUGHT FORWARD						4 543 925.00
C6	SABS 1200 LB	**BEDDING (PIPES)**				
	8.2.2	Provision of bedding compacted to 93% of MOD AASHTO density (100% for sand) with material				
	8.2.2.1	From other necessary excavations (provisional)				
C6.1	8.2.2.1	a) Selected granular material	m³		90.00	Rate Only
C6.2		b) Selected fill material	m³		90.00	Rate Only
	PS LB 8.2.2.3	From commercial sources (provisional)				
C6.3		a) Selected granular material	m³	188	517.68	97 324.73
C6.4		b) Selected fill material	m³	1477	517.68	764 482.71
C6.5		c) Bedding for wet conditions	m³	80	650.00	52 000.00
C7	SABS 1200 LD	**SEWERS**				
	8.2.1	Supply, lay, joint, bed class C and test uPVC class 34 sewer pipes				
C7.1		160 mm dia	m	1225	225.00	275 625.00
C7.2		355 mm dia	m	1455	375.00	545 625.00
C8	8.2.3	**MANHOLES**				
C8.1		**Alternative 1** : Precast concrete manholes 1,0 m dia complete with Type 2A concrete manhole access lid and frame to SANS 558 heavy duty concrete cover and frame for pipe diameters up to 160 mm, for depths (Please note that cover slabs needs to be of the precast type):				
		Over and Up to				
C8.1.1		0,0m 1,0m	No.	0	11 500.00	0.00
C8.1.2		1,01m 1,5m	No.	0	15 500.00	0.00
TOTAL CARRIED FORWARD						6 278 982.45

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
BROUGHT FORWARD						6 278 982.45
C8.1.3		1,51m 2,0m	No.	0	15 500.00	0.00
C8.1.4		2,01m 2,5m	No.	18	18 200.00	327 600.00
C8.1.5		2,51m 3,0m	No.	0	21 100.00	0.00
~~C8.2~~	~~-~~	~~**Alternative 2** : Precast concrete manholes 1,0 m dia complete with Type 2AH hinged manhole access lid and frame manufactured to SANS 50124 EN124 Class D400 to SANS 558 heavy duty concrete cover and frame for pipe diameters up to 160 mm, for depths (Please note that cover slabs needs to be of the precast type):~~				
~~-~~		~~Over and Up to~~				
~~C8.2.1~~		~~0,0m 1,0m~~	~~No.~~	~~16~~		
~~C8.2.2~~		~~1,01m 1,5m~~	~~No.~~	~~11~~		
~~C8.2.3~~		~~1,51m 2,0m~~	~~No.~~	~~3~~		
~~C8.2.5~~		~~2,51m 3,0m~~	~~No.~~	~~2~~		
~~C8.3~~	~~-~~	~~**Alternative 3** : Precast concrete manholes 1,0 m dia complete with Type City of Cape Town Standard 2010 concrete filled manhole access lid and frame manufactured to SANS 50124 Class D400 to SANS 558 heavy duty concrete cover and frame for pipe diameters up to 250 mm, for depths (Please note that cover slabs needs to be of the precast type):~~				
~~-~~		~~Over and Up to~~				
~~C8.3.1~~		~~0,0m 1,0m~~	~~No.~~	~~16~~		
~~C8.3.2~~		~~1,01m 1,5m~~	~~No.~~	~~11~~		
~~C8.3.3~~		~~1,51m 2,0m~~	~~No.~~	~~3~~		
~~C8.3.4~~		~~2,01m 2,5m~~	~~No.~~	~~2~~		
~~C8.3.5~~		~~2,51m 3,0m~~	~~No.~~	~~2~~		
TOTAL CARRIED FORWARD						6 606 582.45

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
BROUGHT FORWARD						6 606 582.45
	8.2.4	Extra-over item C8.1,C8.2 & C8.3 for : (Provisional)				
C8.4		20MPa/19 concrete for manholes deeper that 1,5m to prevent buoyancy	m³	36	2 400.00	86 400.00
C8.5		Connect new 110mm PVC sewer main to existing manhole and repair benching.	No	0	3 000.00	0.00
C8.6		Connect new 160mm PVC sewer main to existing manhole and repair benching.	No	20	4 500.00	90 000.00
	PS LD 8.2.6	**Erf connections (uPVC-pipes)**				
		Direct as per dwg. no. LD-7 up to 1,0 m inside the erf boundary				
C8.7		110 mm dia uPVC Class 34 connections to Ø160 mm sewer				
		Short connections for depths:				
		Over and Up to				
C8.7.1		0,0m 1,0m	No.		450.00	0.00
C8.7.2		1,0m 2,0m	No.		500.00	0.00
C8.7.3		2,0m 3,0m	No.	20	550.00	11 000.00
C8.7.4		3,0m 4,0m	No.		600.00	0.00
C9		**PIPE CRACKING**				
	PS LD 8.2.15	**BULK CLEANING**				
		for nominal diameters:				
C9.1		(a) less or equal to 160mm	m	0	250.00	0.00
C9.2		(b) more than 160mm	m		300.00	Rate Only
	SANS 1200 DB	**Earthworks (Pipe Trenches)**				
	8.3.2(a)	Short Trench Excavations				
TOTAL CARRIED FORWARD						6 793 982.45

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
BROUGHT FORWARD						6 793 982.45
		Excavate in all materials for pulling, feeding and house connection pits for the following depths:				
C9.3		a) Up to a depth of 1,0m	m³		300.00	0.00
C9.4		b) Up to a depth of 1,5m	m³		350.00	0.00
C9.5		c) Up to a depth of 2,0m	m³		355.00	0.00
C9.6		d) Up to a depth of 2,5m	m³	30	350.00	10 500.00
	PS LD 8.2.16	**OVERPUMPING**				
		Over-pumping of sewage flow from pipes of the following nominal diameters				
C9.7		a) up to 160 mm diameter	Hr	0	2 600.00	0.00
C9.8		b) exceeding 160mm diameter up to 300 mm diameter	Hr	160	3 500.00	560 000.00
		PIPE-CRACKING				
		UPSIZING / SIZE FOR SIZE REPLACEMENT				
		Replace with size for size or upsize existing sewer by pipe-cracking including the supply, installation and testing of HDPE (PE100, PN10) pipe including all welds and removal of internal and external beads, with the following diameters:				
C9.9		a) Ø100mm existing fiber to Ø100mm HDPE	m	10	280.00	2 800.00
C9.10		b) Ø300mm existing fiber to Ø355mm OD HDPE	m	0	3 300.00	0.00
C9.11		c) Ø300mm existing AC to Ø400mm OD HDPE	m	0	3 900.00	0.00
C10	SANS 1200 LG	**PIPE JACKING**				
C10.1	8.2.1	Pipe Jacking establishment	Sum	1	60 000.00	60 000.00
TOTAL CARRIED FORWARD						7 427 282.45

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
BROUGHT FORWARD						7 427 282.45
C10.2		Drill plan and scanning for Jacobs Street road up to 13m road reserve with - Position 1	Sum	1	6 000.00	6 000.00
C10.3		Drill plan and scanning for Jacobs Street road up to 13m road reserve with - Position 2	Sum	0	6 000.00	0.00
C10.4		Drill plan and scanning for Murray Street road up to 13m road reserve with	Sum	0	6 000.00	0.00
		Supply of HDPE material				
C10.5	8.2.2	Supply and install of PE100, PN10, SDR17 HDPE pipes suitable for butt-fusion jointing for pipe jacking. The rate shall include for the supply and delivery to the work site of all pipes, fittings & specials including all other associated accessories such as gaskets, backing rings (to suite PN 16 flange), bolts and nuts, etc. required for complete installation.				
		HDPE Pipes				
C10.5.1		OD355mm - PE100, PN10, SDR17	m	150	1 059.15	158 872.50
C10.5.2		OD400mm - PE100, PN10, SDR17	m	0	1 345.50	0.00
	8.2.2	Extra-over C5.2 for the suppling, fixing and bedding (Class B) of specials complete with couplings				
		HDPE SDR11 Stub flanges				
C10.5.3		OD180mm - stub flange complete with DN 180 backing ring, nuts and bolts	No	0	500.00	0.00
C10.5.4		OD110mm - stub flange complete with DN 110 backing ring, nuts and bolts	No		300.00	Rate Only
C10.6	8.2.3	**Directional pipe jacking**				
C10.6.1		Jacobs Street Position 1 - Pipe OD180mm	m	150	355.00	53 250.00
C10.6.2		Jacobs Street Position 2 - Pipe OD180mm	m	0	355.00	0.00
TOTAL CARRIED FORWARD						7 645 404.95

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
BROUGHT FORWARD						7 645 404.95
C10.6.3		Murray Street - Pipe OD180mm	m	0	450.00	0.00
C10.7	PS LG 8.2.4	Excavation for pipe jacking	m³	0	550.00	0.00
C10.8	8.2.10	Standing time for pipe jacking	hour	0	450.00	0.00
C10.9	PS LG 8.2.11	Work concerning existing services				
C10.9.1		Jacobs Street Position 1 - Pipe OD180mm	Sum	0	650.00	0.00
C10.9.2		Jacobs Street Position 2 - Pipe OD180mm	Sum	0	650.00	0.00
C10.9.3		Murray Street - Pipe OD180mm	Sum	0	650.00	0.00
		MANHOLES				
C11	SANS C 8.2.8	Demolish and remove existing sewer manholes for the following depth categories				
		Over and Up to				
C11.1		0,5 m 1,0 m	No	0	1 500.00	0.00
C11.2		1,0 m 1,5 m	No	0	1 500.00	0.00
C11.3		1,51 m 2,0 m	No	17	2 000.00	34 000.00
		CONNECTIONS				
		Locate and reconnect existing lateral property connections to the HDPE sewer main using PVC saddle fittings, including the relaying up to 3,0m of new 110mm dia UPVC pipe.				
C11.4		a) 110mm diameter	No	5	1 800.00	9 000.00
C11.5		b) 160mm diameter	No	5	2 500.00	12 500.00
TOTAL CARRIED FORWARD						7 700 904.95

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
BROUGHT FORWARD						7 700 904.95
	8.3	**FIXED-CHARGE ITEMS**				
	8.3.2	Establish facilities on the site for pipe cracking crew				
	8.3.2.2	Facilities for contractor				
C11.6		Ø110mm sewer main	Sum	0	4 500.00	0.00
C11.7		Ø160mm sewer main	Sum	1	55 000.00	55 000.00
	8.4	**TIME-RELATED ITEMS**				
	8.4.4	Time related costs including Supervision, living out allowances,accommodation, site facilities and any other costs for pipe cracking crew:				
C11.8		Ø110mm sewer main	Sum	0	19 200.00	0.00
C11.9		Ø160mm sewer main	Sum	1	26 500.00	26 500.00
		DE-WATERING				
		Dawatering by Akwasol	Sum	1	950 000.00	950 000.00
		ASBESTOS REMOVAL				
		Asbestos removal	Sum	1	250 000.00	250 000.00
TOTAL CARRIED FORWARD TO SUMMARY						8 982 404.95

TDR07/2023/2024 **MOSSEL BAY MUNCIPALITY**

UPGRADING OF SEWER NETWORK IN GREENHAVEN AND NEW SEWER PUMPSTATION IN WOLWEDANS, GROOT BRAKRIVIER

BILL OF QUANTITIES **SUMMARY OF SCHEDULES**

PAGE	DESCRIPTION	TENDER AMOUNT
91	**SECTION A: PRELIMINARY AND GENERAL**	1 549 595.44
92	**SECTION B: SITE CLEARANCE SEWER LINES**	506 232.49
102	**SECTION C: SEWER NETWORK**	8 982 404.95
	SUB-TOTAL A	11 038 232.87
	Escalation allowance - 7%/year for 12 Months	1 143 990.98
	Allow 10% contingencies to be spent in part or as a whole at the discretion of the Client and the Engineer	1 218 222.39
	SUB-TOTAL B	13 400 446.24
	PROFESSIONAL COST	
	Primary Fee	982 400.00
	Secondary Fee	425 611.85
	Factor for alterations to existing works 1.25	352 002.96
	10% discount on Fee	-176 001.48
	Survey	35 000.00
	Occupational Health and Safety	55 000.00
	Accredited Training	65 000.00
	Bind of Tender Documents	17 500.00
	Environmental Checklist	40 000.00
	Environmental Approval	170 000.00
	WULA	25 000.00
	Environmental Control Officer	162 500.00
	Social upliftment and education	65 000.00
	Supervision for Labour intensive construction	1 296 000.00
	SUB-TOTAL C	3 515 013.34
	SUB-TOTAL B + C	16 915 459.57
	Add 15% VAT	2 537 318.94
	TOTAL CARRIED FORWARD TO FORM OF TENDER	19 452 778.51