PRELIMINARY ENGINEERING REPORT FOR ADAMAYVIEW OUTFALL SEWER

PREPARED BY:

Rendeals Four Consulting
40 First Street
Unit No 10, Adlo Park
Mahikeng
2745

Tel: (018) 381 5148/9
Fax: (018) 3381 5160

CLIENT:

INSTRATIN (Pty) LTD
Ground Floor, Building 13
The Woodlands Office Park
10 Woodlands Drive
Woodmead, Johannesburg

TEL: (011) 656 1483

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Executive Summary

Background to Investigation

The 1168 units are currently being constructed at Flamwood Ext 24, on 7.5 hectare of Portion 196 of farm Elandsheuwel 402-IP which is to the North of the N12 highway. The property can be accessed from Willow Avenue, off the NN12 Potchefstroom/Stilfontein Main Road, North-East side of Klerksdorp of City of Matlosana Municipality, Northwest Province. The general locality of the site is **S: 26°50'30" and E: 26°42'16"**

City of Matlosana has since experience blockages/overflow of sewage, where the Adamayview outfall sewer line reduces the size from 600Ø to 375Ø then 1000Ø for approximately 3.7km.

The client, Instratin (Pty) Ltd appointed Rendeals Four Consulting to conduct preliminary Investigations, Preliminary Designs and Detail Designs of required in order to facilitate the project's progress. This report will outline the investigation results and highlight the methodology used in designing the required infrastructure as outlined in the Client's terms of reference, which are Structural and Civil Engineering Services.

Method Followed

The methodology in the compilation of this report and its supporting document has been the implementation of traditional design methods which were augmented by empirical data from site. Due to the nature of this project being a social housing development, a feedback design procedure has been used whereby nominal load calculations and demands were compared with the empirical data from site. This was done in order to refine the design and propose a system which will better the existing one. In all the findings and designs, safety factors have been applied in order to allow for future expansions and robustness of the designed services.

1 Introduction

This Preliminary Investigation Report was compiled to present the required deliverables from the Client's terms of reference. The existing municipal services have been analyzed to check current capacity, various options to cater current spillage and future developments.

Rendeals Four Consulting have been appointed for the service provision of the following deliverables as outline in the terms of reference from the client;

- Preliminary Investigations of the Adamayview outfall sewer line status quo adjacent to Flamwood Ext 24 where 1168 units are currently being constructed

This report will present the above mentioned deliverables and provide advice and recommendations to the stakeholders for the successful implementation of this project.

1.1 Status Quo

• Project Area Locality:	Flamwood Ext 36, North West Province, South Africa, City of Matlosana Municipality, *see locality Appendix A* S: 26°50'30" and E: 26°42'16"
• Affected Design population:	1168 units ≈ 4672 People and surrounding areas (±240 liters per second)
• Existing Services	Existing 375mm Adamayview outfall sewer line
• Project Purpose	Investigations of existing Adamayview Outfall Sewer Line

1.2 Report Outline

This report will address one major section which is the 'Preliminary Investigation' of the project. The Preliminary Investigation will analyze the findings from the status quo discussed in section 1.1 and give direction on the contents of the Preliminary Designs with regard to what quantities to design for. The Preliminary Investigations will also contain the procedural outline of the proposed works. Overall Site Works proposal will be a for the outfall sewer line.

In concluding the report, summary cost estimates will be tabulated in order to provide a monetary value of the preliminary works.

2 Preliminary Investigation

The proposed project is aimed at providing intergraded social development to support Flamwood residents who are located in City of Matlosana.

Key guidelines displaying the indicators of a viable residential settlement plan as outlined by the CSIR Red Book Vol. 1 are as follows:

- They have a strong spatial feel, with well-defined public spaces; and
- Their spatial structures are complex, offering choices in terms of intensity of interaction, privacy of living conditions, lifestyles, housing options and movement systems." (CSIR, 2000)

These key indicators will be used to check the current proposal's viability and also used to make improvements where applicable. The investigation is aimed at tailoring the traditional design procedures to better fit the unique features of this project in both Civil and Structural Engineering aspects.

2.1 Adamayview Outfall Sewer Line

The existing Adamayview outfall sewer line runs parallel with the existing stream and the pipe sizes are detailed below:

- The pipe size at highest point of the site starts at 600mm and reduces to 375mm, then 1050mm at the lowest side
- For approximately 3.7km, the pipe size remains at 375mm then enlarges to 1000mm

In this stretch where it is a bottleneck, the municipality has experienced blockages and overflows. Due to this challenges, the municipality took a decision not to approve any future development discharging to the affected section of the outfall sewer line.

Existing flows have been verified by Flow Metrix and the peak flow is 225*l/s,* detailed results are attached on *Appendix B.*

The proposed development comprising of 1168 units will discharge 15 liters per second including a peak factor of 2.5. The current outfall sewer line is discharging 225 litres per second including 2.5 factor. The total discharge will be 240 liters per second.

Due to unavailability of the As-Built information from City of Matlosana, a Professional Surveyor was appointed to undertake 40m strip survey along 3.7km including invert levels where possible. The data was used to build a model be used to analyze the outfall sewer capacity and pipe sizing thereof.

The Adamayview outfall sewer line was analyzed in two scenarios and are as follows:

a) Required Pipe Size

Using peak flow of 240*l/s*, the following pipe sizes were analyzed to perceive if it would be able to cater the flows:

Table 1

Pipe Size	***240 l/s***	***Spare Capacity***
450Ø	X	
525Ø	X	
600Ø	✓	16 l/s

From Table 1 above, it was concluded that 600Ø pipe will be able to cater for current sewer flows including 1168 units. Detailed results for 600Ø pipe are attached on *Appendix C*

b) For future development

The municipality requested that the 375Ø pipe be replaced with 1050Ø pipe to cater for future development. Using peak flow of 240*l/s*, 1050Ø was analyzed using the same gradient to accommodate existing sewer networks.

Table 2

Pipe Size	***240 l/s***	***Spare Capacity***
600Ø	✓	855 l/s

From Table 2 above, it is recommended that 375Ø pipe be upgraded to 1050Ø pipe.

3 Cost Estimates

Based on the preliminary design report as presented in section 2 of this report, this section will show a summary of the estimated cost that will be needed in implementing this project successfully. The cost estimate will be per item in the scope of work as isolated in the detail design section. These cost estimates are at preliminary stage as guided by this report and can only be used on an advisory level to give a reasonable expectancy of the Cost Estimates to be done in the Detail Design. The latter may change relative to the changes that may arise in the Detail Design Stage. All ground conditions are assumed to be predominantly clay.

3.1 Summary Cost Estimate

Table 3: Summary cost for 600Ø

Item	**Description**	**Cost (R)**
1. Preliminaries and General @ 12.5% of Construction Cost	Preliminaries and General	R 3 237 500.00
2. Outfall Sewer	Earthworks, Pipes and manholes for 3.7km	R 25 900 000.00
	Subtotal 1 (Construction + Ps&Gs)	R 29 137 500.00
3. Add Disbursements	*WULA @ R 200 000* *Geotech @ R 300 000* *EIA @ R 150 000*	R 650 000.00
4. Add Professional Fees	Fees @ 15%	R 4 370 625.00
	Total Project Cost (Excl. VAT)	R 34 158 125.00
	VAT @ 14%	R 4 782 137.50
	Total Project Cost	R 38 940 262.50

Table 4: Summary cost for 1050Ø

Item	Description	Cost (R)
1. Preliminaries and General @ 12.5% of Construction Cost	Preliminaries and General	R 6 937 500.00
2. Outfall Sewer	Earthworks, Pipes and manholes for 3.7km	R 55 500 000.00
	Subtotal 1 (Construction + Ps&Gs)	R 62 437 500.00
3. Add Disbursements	*WULA @ R 200 000* *Geotech @ R 300 000* *EIA @ R 150 000*	R 650 000.00
4. Add Professional Fees	Fees @ 15%	R 9 365 625.00
	Total Project Cost (Excl. VAT)	R 72 453 125.00
	VAT @ 14%	R 10 143 437.50
	Total Project Cost	R 82 596 562.50

4 Conclusion

The project can be implemented successfully in accordance with these reports findings and as illustrated in the preliminary drawings. Further investigations are to include a Geotechnical investigation, EIA, WULA, Land acquisition.

Appendices

Appendix A – Locality Plan

Appendix B – Flow Metrix Results

Appendix C – Flow Analysis

Appendix D – Drawings

Appendix A – Locality Plan

Appendix B – Flow Metrix Results

Appendix C – Flow Analysis

Appendix D – Drawings