





DESIGN DEVELOPMENT REPORT

FOR

MONTANA SPRUIT CHANNEL IMPROVEMENT – PHASE 1

Prepared for:			Prepared by:	
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			Signature:	Signature:



SUMMARY

The City of Tshwane intends to improve the Montana Spruit between Bougainvillea Street and approximately 600m downstream from Tsamma Street in order to reduce the impact of the 1:100-year flood on adjacent properties and houses. The shape of the spruit will be improved to accommodate more flow and to ensure that all the buildings and houses adjacent to the spruit is located outside the 1:100-year flood line. Tsamma street will also be upgraded and realigned to improve on the flood line position, culvert capacity and road layout. The culvert crossing at Tsamma street will be upgraded to accommodate the 1:2-year flow by means of a portal culvert crossing, flows from recurrence intervals greater than 1:2 years will overtop Tsamma street and flow on surface.

The Ditlou/Nevhotalu Consortium has been appointed by the City of Tshwane to undertake the detailed design, report preparation and the subsequent construction management and monitoring of the project.

GLOSSARY

ABBREVIATIONS	DESCRIPTION	UNITS	DESCRIPTION
GPS	Geographic Positioning System	ℓ/s	Litres per second
Pr. Tech. Eng.	Professional Engineering Technologist	kW	Kilo Watts
Pr. Eng.	Professional Engineer	MW	Mega Watts
EMP	Environmental Management Plan	a	annum
OH & S	Occupational Health & Safety	°C	Degree Celsius
HL	High Level	MI	Mega Liters
LL	Low Level	KI	Kilo Liters
RW	Rand water	KI/d	Kilo Liters per day
D.O.W	Department of Public Works	m	Meters
CoT	City of Tshwane		
PRV	Pressure Reducing Valve		
PRS	Pressure Reducing Station		
NEMA	National Environmental Management Act		
"E	East		
"S	South		
CBD	Central Business District		
Ext.	Extension		
WWTP	Waste Water Treatment Plant		
ECSA	Engineering Council of South Africa		
VAT	Value Added Tax		
CTMM	City of Tshwane Metropolitan Municipality		
ROD	Record of Decision		
WUL	Water Use License		
WULA	Water Use License Application		
m.a.s.l	Meters above sea level		

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1 INTRODUCTION

1.1 TERMS OF REFERENCE

IR Consulting Engineers were appointed by City of Tshwane in 2007 for the preliminary design and preliminary design report for the Montana Spruit Improvement – Phase 1. The Preliminary Design Report done for this project and received from City of Tshwane forms the basis of this detailed design report and must be referred to. The finding, calculations and recommendation given by IR Consulting Engineers in their Preliminary Design Report dated 21 September 2007 was adopted for the detailed design report with some changes as requested by City of Tshwane. The Preliminary Design Report done by IR Consulting Engineers dated 21 September 2007 is included herewith, please refer **ANNEXURE E**.

The **Ditlou/Nevhutalu** Consortium has been appointed by the City of Tshwane to undertake the detailed design, design report preparation and the subsequent construction management and monitoring of the Montana Spruit Channel Improvement – Phase 1 project. The letter of appointment is included herewith, please refer **ANNEXURE A**.

1.2 PROJECT LOCATION

The project area for the Montana Spruit Channel Improvement – Phase 1 is located within the Doornpoort and Montana Park residential area, south of Pretoria, and is defined to include:

- The Montana Spruit Flood Management area.
- An area 600m upstream of the Tsamma road stream crossing and to about 600m downstream of the same crossing.
- Tsamma Road between Breed Street and Cassia Street.

Please refer Figure 1 for locality Map.

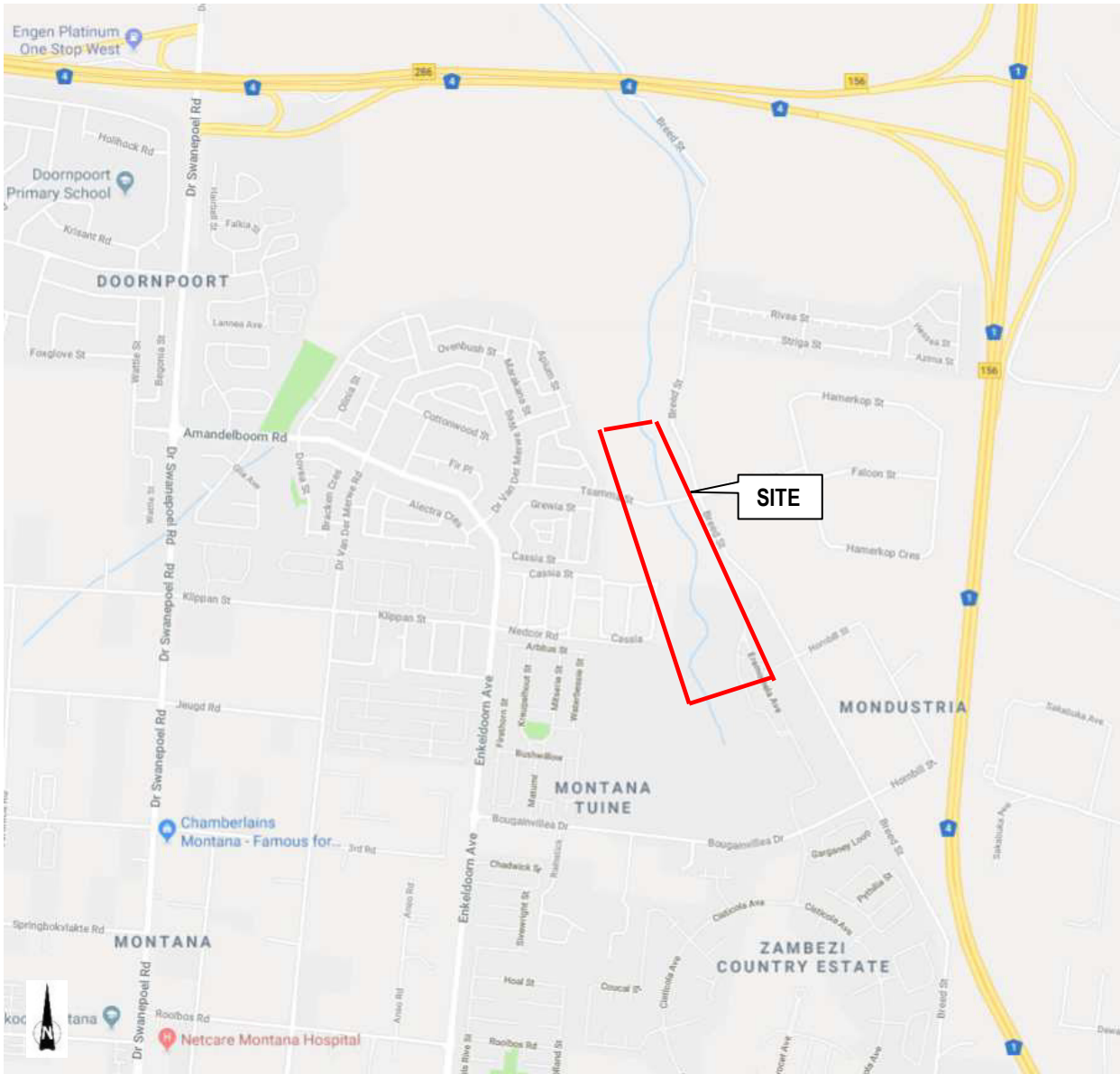
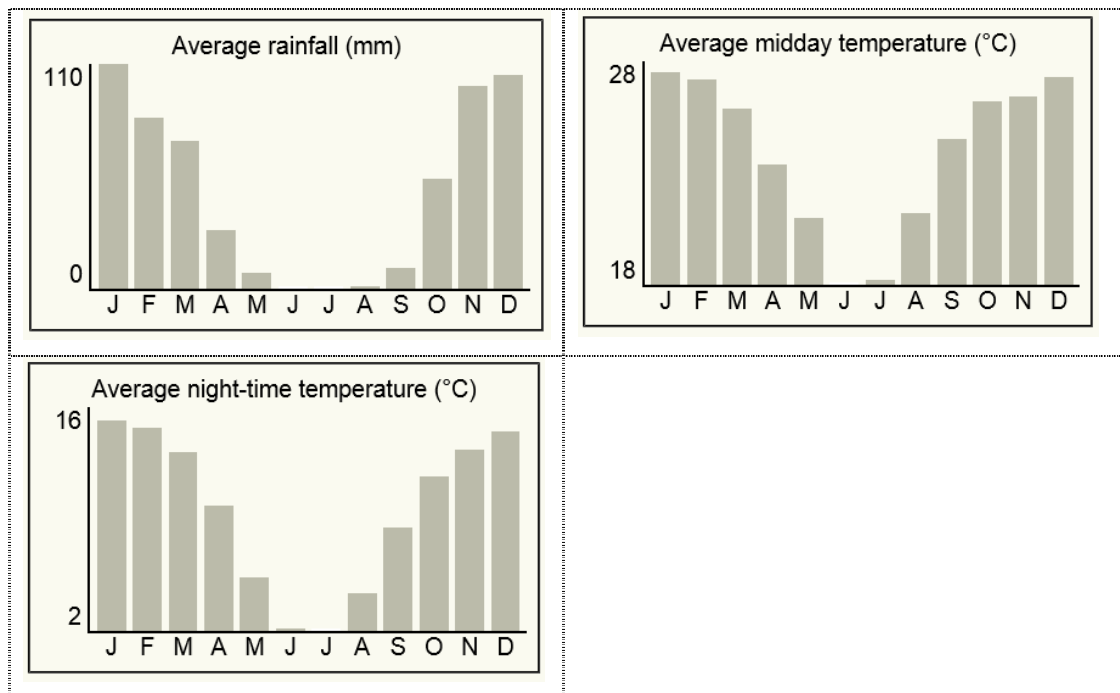


FIGURE 1: LOCALITY PLAN

1.3 PROJECT CLIMATE

The proposed development is located in Pretoria, which normally receives about 733mm of rain per year, with most rainfall occurring mainly during summer. The chart below shows the average rainfall values for Pretoria per month. It receives the lowest rainfall (0mm) in June and the highest (110mm) in January. The monthly distribution of average daily maximum temperatures (centre chart below) shows that the average midday temperatures for Pretoria range from 18.3°C in June to 27.5°C in January. The region is the coldest during July when the mercury drops to 1.7°C on average during the night.



1.4 ENGINEERING SURVEYS AND PLANNING INFORMATION

A detailed topographical survey was done on the terrain and will be used for the detailed design. The survey included the cadastral data of all adjoining properties, intersections, collector road, existing stormwater structures, existing water features and manholes etc.

1.5 GEOTECHNICAL INVESTIGATION

No Geotechnical Engineering Report is available for this project. Localised soil tests will be done in Tsamma Street for the road design data and information.

1.6 ENVIRONMENTAL

In terms of the National Environmental Management Act, 1998 (Act 107 of 1998) (as amended) (herein referred to as NEMA), the proposed development does trigger a suite of listed activities which require authorisation from the competent environmental authority, namely the Gauteng Department of Agriculture and Rural Development (GDARD) and the Gauteng Department of Water and Sanitation.

City of Tshwane applied for Environmental approval and will make the Record of Decision (ROD), Water Use Licence (WUL), Basic Assessment Report (BAR) and Environmental Management Plan Report (EMPR) available for this project. The contractor will appoint an Environmental Control Officer (ECO) during construction phase to ensure that all the environmental requirements are met and for monthly environmental auditing purposes. Further discussions with City of Tshwane indicated that the ROD has expired, the Ditlou/Nevhotalu Consortium will assist with obtaining quotations from reputable environmentalist to renew the ROD. The cost there off will be indicated under the professional fees section.

1.7 OCCUPATIONAL HEALTH AND SAFETY

Payment items will be included in the Schedule of Quantities for the contractor's obligations in accordance with the construction regulations. We will act as an OH&S agent for the **CoT**.

The service to inter alia include:

- A pre-tender risk assessment of the work to be carried out and the compilation of the OH&S specifications to be included in the bid document.
- Each responsive bidder will be evaluated in terms of OH&S compliance during the adjudication of bids.
- The successful bidder's health and safety plan will be scrutinised and presented to the department for acceptance prior to commencement of construction.
- Monthly safety audits will be conducted. Should the site be found to be unsafe, a non-compliance instruction will be issued and/or an instruction issued to stop construction works.

1.8 LAND OWNERSHIP, SERVITUDES AND WAYLEAVES

The majority of the channel improvement will be executed on private land. The City of Tshwane will communicate with the effected land owners and property holders to obtain their approval; the Ditlou/Nevhotalu Consortium will assist where required. City of Tshwane must advise whether servitude or right of ways are required for the channel improvement.

Wayleaves will also be acquired from City of Tshwane for the road upgrade construction of Tsamma Street.

1.9 CLIENT AND CONSULTANT INFORMATION

PARTICULARS OF THE CLIENT:

Employer: City of Tshwane – Roads and Stormwater Departments

Physical address: Capitol Towers North, 225 Madiba Street, Pretoria

Postal address: PO Box 1409, Pretoria, 0001

Contact Person: Mr Gladstone N. Shirindza

Telephone: 012 358 4811

Email: gladstones@tshwane.gov.za

PARTICULARS OF THE LEAD CONSULTANT:

Consultant (Principal Agent): Ditlou / Nevhutalu Consortium

Physical address: Unit 4, 5th Dimension, 14 Escallonia Str, Montana Park, 0186

Postal address: P O Box 15684, Lynn East, 0039

Contact Person: Mr O Ranamane *Pr. Tech Eng.* 2013 702 69

Telephone: 012 548 0196 / 076 408 4140

Facsimile: 012 548 0298

Email: tshepi@ditloucon.co.za

2 ROADS

2.1 EXISTING INFRASTRUCTURE

The surrounding road network consists of the following municipal roads:

- Breed Street to the east of the development – Class U4(a) Collector
- Cassia Street west of the development – Class 5 Local Street
- Tsamma Street – Class 5 Local Street

Please see Figure 2 below for the existing road infrastructure

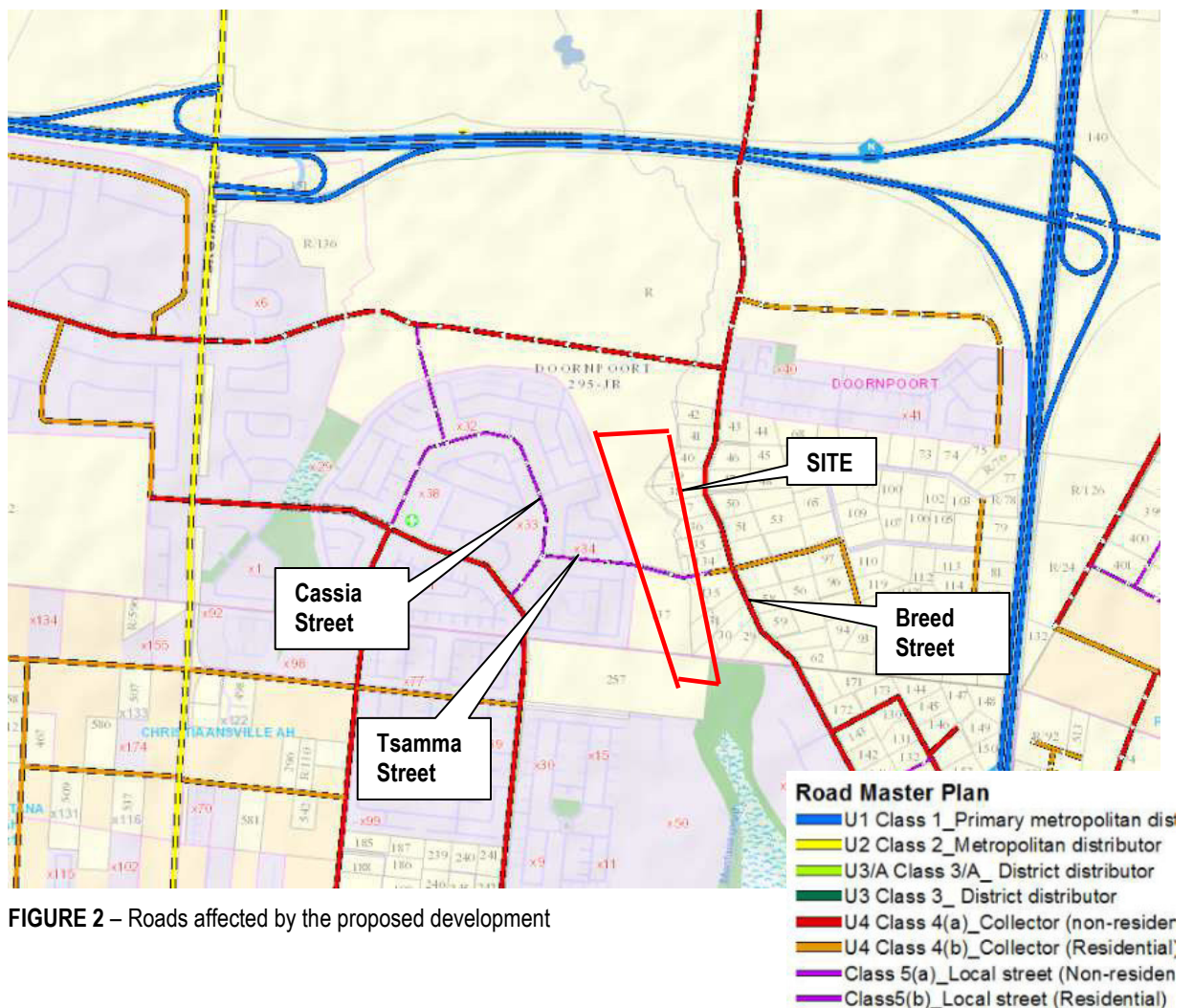


FIGURE 2 – Roads affected by the proposed development



Photo 1: Existing Tsamma Street

Tsamma Street is a lower order mobility route and consist of 1 lane per direction with a 16m road reserve. It is currently 6m wide with kerbing on both side and consists of block paving for road surfacing. The current condition of the road is poor with uneven riding surface and deteriorated paving blocks.

2.2 PROPOSED NEW ROAD UPGRADES

The geometric road layout will be designed according to the Guideline for Human Settlement and Planning (Red Book) and the pavement design will be based on the UTG2 Structural Design of Segmented Block Pavements for Southern Africa. The construction specification and schedule of quantities for roads will be based on the City of Tshwane Standard Specifications for Municipal Civil Engineering Works, Third Edition 2005. The road can be classified as a Road Category C with E3 Traffic and Pavement class (refer UTG2). The design life of the pavement structure is 15 years; regular road maintenance will be required to achieve this however.

The existing Tsamma Street will be reconstructed on the same horizontal alignment as before. The vertical alignment will be changed to lower the road and accommodate the culvert crossing. The lowering of the road is also required to ensure that the 1:100-year flood can overtop the road without the flood lines encroaching against the buildings on adjacent land.

The roadway will be 6.0m wide consisting of 2 x 3,0m lanes in each direction. The higher side of the road will have a 400mm sloping kerb with a 2m wide paved walkway and the lower side will have a 400mm sloping kerb. The road will have a 3% crossfall with the natural slope to improve on the channel flow and to drain surface water away. Please refer to typical cross section in Annexure C.

The road crossfall at the culvert crossing will be 1%, this is to match the slope of the portal culverts. A 250mm concrete slab will be cast over the portal culverts as the final road surface.

2.3 MATERIALS AND CONSTRUCTION

All material and construction specifications will comply with the STANDARD SPECIFICATIONS FOR MUNICIPAL CIVIL ENGINEERING WORKS - Third Edition 2005.

Road Pavement Structure:

Surfacing	80mm thick class 30/2.0 (SANS 1058) type S-A concrete segmented interlocking block paving
Base	150 mm thick gravel sub-base (imported G5) stabilized to C3 (TRH14, UCS > 1000 kPa) compacted to 97% MOD AASHTO density at O.M.C.
Sub-base	150 mm thick gravel sub-base (imported G5) stabilized to C4 (TRH14, UCS > 500 kPa) compacted to 95% MOD AASHTO density at O.M.C.
Upper Selected	150 mm thick G7 (TRH14) compacted to 93% MOD AASHTO at O.M.C.
Lower Selected	150 mm thick G7 (TRH14) compacted to 93% MOD AASHTO at O.M.C.
Roadbed	150 mm thick rip and recompact to 90% MOD AASHTO at O.M.C.

3 STORMWATER

The hydrology information and hydraulic calculation incorporated in this report will be based on the Preliminary Design Report done by IR Consulting Engineers dated 21 September 2007, included herewith, please refer **ANNEXURE E**.

The Ditlou/Nevhotalu Consortium did a design review on the hydrology and hydraulic information provided in the Preliminary Design Report done by IR Consulting Engineers and found the results and findings to be accurate. This was also confirmed by the flood line calculations and master plan of City of Tshwane.

For the Ditlou/Nevhotalu Consortium design review information please refer **ANNEXURE F**. The 1:100 year flow at Tsamma Road was calculated by the Ditlou/Nevhotalu Consortium to be 116m³/s, compared against the 119m³/s as documented in the Preliminary Design Report done by IR Consulting Engineers dated 21 September 2007.

The hydrology and hydraulic information that will be used for the detailed design can be found in the Preliminary Design Report done by IR Consulting Engineers dated 21 September 2007 in **ANNEXURE E**, a summary of that information is presented below.

3.1 EXISTING CATCHMENT PROPERTIES

3.1.1 CATCHMENT DESCRIPTION

Area and Size

The catchment for the Montana Spruit Channel Improvement Project has a fairly compact shape with average dimensions being 15 km long by 3 km wide. The total catchment area which is shown on drawing 0414-05G01 is 9.73km², Refer annexure F.

Topography and Slope

The Montana Spruit catchment is surrounded by a mountainous range in the south but eventually slopes towards the north at about 2%, the average slope determined according to 10-85 method along the watercourse is about 1.7%. The longest watercourse to the end of the project is about 5.1 km. The maximum elevation in the catchment is about 1372 m and the lowest is 1223 m. The elevation difference is 149 m.

Land Use

The land use has been determined for fully developed future state.

Geology and Soils

The Montana Spruit area in general is covered by a transported clayey sand which varies in thickness and show possible potential expansive properties. It was observed on the Site and confirmed on the 1:50 000 Geological Map 2628 CB Pretoria that both the Montana Spruit and the N1 areas is underlain by – Norite, Gabbro Unit, Bushveld Igneous Complex, Post Transvaal.

Site Services

A 400Ø municipal steel water pipe crosses the stream perpendicular between Portion 137 and 257. A 200Ø uPVC sewer pipe also crosses the stream perpendicular east of Portion 257. Two bulk sewer pipelines runs parallel with the stream from Portion 257 to Portion 40 at the end of breed street.



Photo 2: Existing 400Ø Steel water pipe that crosses Montana Spruit

Several stormwater outlets drain into the spruit at various places. Tsamma Street also crosses the spruit with 6 x 450Ø stormwater pipes below the road at the stream crossing.



Photo 3: Existing Stormwater Pipe Outlets into Montana Spruit

3.1.2 HYDROLOGY

The 1:50 and 1:100 year return period has been adopted for the determination of design peak flows for the Montana Spruit flooding problems

The input parameters selected for the Rational Methods are shown below:

- Catchment area: 9.9 km²
- Slope: 1.65 %
- C: 0.404
- MAP = 690mm
- Time of concentration: 66 minutes
- 1:50 year runoff = 110m³/s
- 1:100-year runoff = 119m³/s
- The general velocity of the spruit will be around 1,4-1,9m/s with isolated areas where the velocity will be around 2,4m/s. The Froude number is 1.01 for the section where the velocity is 2,4m/s, the remaining section have a Froude number of less than 1. Please refer Annexure F for the HECRAS hydraulic information.

3.1.3 HYDRAULIC ANALYSIS

Hydraulic computations for the Montana Spruit Channel were performed using the HEC-RAS software program. Water surface levels were computed for the following conditions and 1:50 and 1:100 design peak flow events

Montana Spruit

Pre-determined cross-sections within specified limits as previously determined by IR Consulting Engineers will be used to do the hydraulic computations as to ensure that the maximum width of the river state is utilised.

Flood Lines for Modified River State

In an attempt to contain the 1:50 and 1:100 year floodlines within the specified limit as determined previously by IR Consulting Engineers, the river reach have been modified to enlarge the available flow area. As far as possible, we have tried to maintain the natural condition of the defined stream. The existing dam downstream of Tsamma Road has been kept as is. The embankment Section close to the Old Age Home has been kept. The hydraulic calculations were repeated for the modified river state. The water surface levels at Sections 1-14 (refer annexure D) were calculated using Hec Ras. The results of the hydraulic calculations and the hydraulic profiles are attached in Annexure F. The estimated future floodlines for recurrence periods of 1:50 and 1:100 years are shown in drawing 1063K-01U01 attached in Appendix B.

The hydraulic results for Montana Spruit confirms the following:

- Under existing conditions some properties lie within the 1: 100 year floodline;
- Containment of the 1:100 year floodline out of reach of property is possible through changing the dimension of the Montana Spruit channel where the flooding problems occur, and by providing stormwater retaining structures in places.
- The preferred option for containment of the 1:100 year flood is to channelize the Montana Spruit through widening the spruit area.



Photo 4: Montana Spruit south of Tsamma Street



Photo 5: Montana Spruit north of Tsamma Street

3.2 PROPOSED NEW CHANNEL IMPROVEMENT

Montana Spruit stormwater channel

The Ditlou/Nevhotalu Consortium have analysed the hydrology analysis and above to opted for the following solutions:

- Channelize the Montana Spruit by changing the existing channel through excavating & shaping and widening of the spruit, please refer to typical sections in Annexure D.
- The overall objective of any natural stream channelisation improvement design should be to provide enough space to meet flood conveyance targets, increase vegetation in the channel, improve habitat conditions, and improve water quality in the stream.
- The horizontal alignments decided for the proposed Montana Spruit Improvements will follow the existing stream bed line.
- The natural low flow area of the spruit will be kept and all improvements will be above the water level of the low flow. This option is preferred because it does not disturb flow and natural ecological activities in the main stream influence.
- A berm will be constructed at the old age home to prevent any flood water from entering the estate. The floodline will not encroach onto the berm, the berm is just a precautionary measure implemented to prevent any flood damage. Please refer annexure D for drawings.
- A well-designed stream channelization will typically have three zones on either side of the watercourse: a streamside zone, a middle zone, and an outer zone (Figure 3).

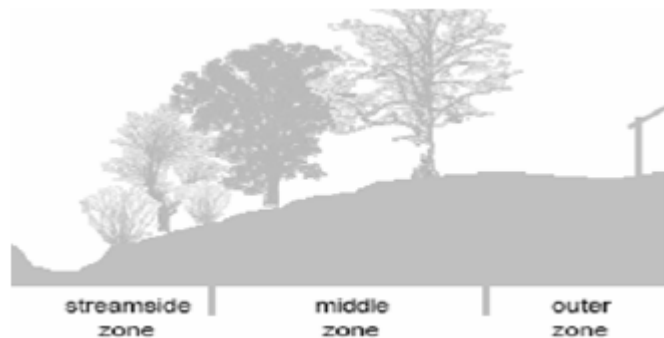


FIGURE 3 – Schematic Layout of river bed

To enhance the ecological conditions, natural bedding and excavated stream flood banks with re-vegetation will be provided for the Montana Spruit Channelisation. To make the proposed Spruit more environmentally friendly, the stream banks will be lined with natural substrates to produce a suitable environment similar to the existing main stream condition (Figure 4).

The cross-sectional area of the stream channel will be widening by excavating one or both banks outwards to provide a larger cross-section for flow conveyance. Typical Modified cross-section of the Montana Spruit The extend of the Montana Spruit is indicated and shown on drawings Attached as annexure D.

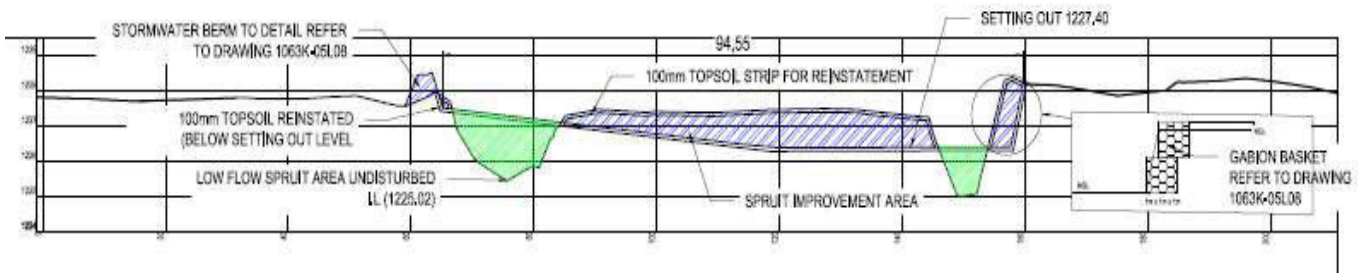


FIGURE 4 – Typical Cross section of spruit improvement

Embankment Protection

From the hydraulic analysis for a 1:50 year and 1:100 year return period it is evident that some embankment erosion might occur especially along the eastern embankment of the Montana Spruit. The general velocity of the spruit will be around 1,4-1,9m/s with isolated areas where the velocity will be around 2,4m/s. The Froude number is 1.01 for the section where the velocity is 2,4m/s, the remaining section have a Froude number of less than 1. The embankment of the spruit will be 1:5 and hydro seeded for erosion protection. Some section of the spruit buildings and walls are close to the waterfront a gabion basket wall will be used for erosion protection.

Re-vegetation and rehabilitation of Montana Spruit

The 1:50 and 1:100 year return period flood may cause extensive surface erosion and it is important that the slope and surfaces be protected by grass. The topsoil will be replaced on the entire disturbed area and will be hydroseeded with a recommended seed mixture. The disturbed spruit area will be rehabilitated as recommended in the Rehabilitation and Floodplain Restoration Plan document that for part of the Environmental Management Plan.

Existing stormwater dam north of Tsamma Street

For the purpose of this report it is suggested that no remedial measures be taken at the existing stormwater dam north of Tsamma Street, the dam will remain as is.



Photo 6: Existing stormwater dam north of Tsamma Street

Tsamma Street Crossing



Photo 7: Existing stormwater crossing at Tsamma Street

Tsamma Road alignment will be lowered to increase the flow capacity of water that can overtop the road in flood conditions. The 9 x Ø450mm existing concrete pipe has insufficient capacity to accommodate the minor flood and will be replaced by 20 1500x450mm CL100S portal culverts to accommodate the 1:2-year flow. The capacity of the combined portal culvert system is 38m³/s which is sufficient to accommodate the 1:2 year spruit flow of 34m³/s. Flow from storms greater than the 1:2-year recurrence interval will overtop Tsamma Street and run on surface. Please refer Table 1 below for summary of the culvert hydraulic information and refer annexure F for a complete HECRAS analysis for the hydraulic information.

	1:2 Year	1:50 Year	1:100 year
Culvert Flow (m ³ /s)	34.71	38.06	37.94
Culvert Velocity (m/s)	2.64	2.82	2.81
Road (Weir) Flow (m ³ /s)	0	61.94	81.06
Road (Weir) Max Flow Depth (m)	0	0.69	0.79

TABLE 1: TSAMMA STR STORMWATER CULVERT AND WEIR FLOW

250Ø Concrete pillars of approximately 1000mm high will be constructed on both sides of the of the concrete slab and road as to indicate to motorists the extend of the road width during floods. The embankments at the Tsamma crossing will be lined with reno mattresses to protect against erosion.

3.3 MATERIALS AND CONSTRUCTION

The materials, construction and testing of the stormwater drainage system will comply with the STANDARD SPECIFICATIONS FOR MUNICIPAL CIVIL ENGINEERING WORKS - Third Edition 2005 and relevant City of Tshwane details.

4 IMPLEMENTATION FRAMEWORK

4.1 PROPOSED COSTING

TABLE 2: CONSTRUCTION COST ESTIMATE

001	GENERAL REQUIREMENTS AND CHARGES	R4 837 500.00
002	ENGINEER'S ACCOMMODATION	R155 000.00
101	SITE CLEARING AND GRUBBING	R1 137 000.00
102	ACCOMMODATION OF TRAFFIC	R339 800.00
103	OVERHAUL	R4 396 000.00
104	LANDSCAPING AND GRASSING	R5 173 700.00
105	FENCING	R692 300.00
106	SERVICE DUCTS	R69 150.00
202	TRENCHING	R32 530.00
203	MASS EARTHWORKS	R9 072 000.00
502	PREFABRICATED CULVERTS AND STORMWATER SEWERS	R1 219 198.80
503	KERBING AND CHANNELING	R378 400.00
505	EROSION PROTECTION	R3 505 550.00
601	GRAVEL PAVEMENT LAYERS	R728 000.00
604	STABILIZATION	R166 500.00
609	SEGMENTED PAVING	R791 700.00
610	CONCRETE PAVEMENTS	R182 100.00
612	TRAFFIC SIGNS	R36 550.00
613	TRAFFIC MARKINGS	R30 914.00
903	QUALITY CONTROL TESTING	R50 000.00
	Sub-total	R32 993 892.80
	10 % CONTINGENCIES	R3 299 389.28
	Sub-total	R36 293 282.08
	15 % VAT	R5 443 992.31
	TOTAL CARRIED FORWARD TO SUMMARY OF SCHEDULES	R41 737 274.39

TABLE 3: PROFESSIONAL FEES ESTIMATE

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
1	Percentage Fee (ECSA Guideline Scope of Services and Tariff of Fees for Persons registered in terms of the Engineering Professions Act, 2000 (Act No. 46 of 2000))	%	R36 293 282.08	8.60%	
1.1	Inception	%	R3 121 222.26	0%	R0.00
1.2	Concept and Viability (Preliminary design review)	%		0%	R0.00
1.3	Design Development	%		25%	R780 305.56
1.4	Documentation and Procurement	%		15%	R468 183.34
1.5	Contract Administration and Inspection	%		25%	R780 305.56
1.6	Close-out	%		5%	R156 061.11
2	Time Based Fee (ECSA Guideline Scope of Services and Tariff of Fees for Persons registered in terms of the Engineering Professions Act, 2000 (Act No. 46 of 2000))	Sum	1	R187 112.30	R187 112.30
3	Level 3 Full Time Site Supervision	Months	6	R65 000.00	R390 000.00
4	Geotechnical Investigations	Sum	1	R50 000.00	R50 000.00
5	Soil investigations and testing for road design purposes	km	1	R15 000.00	R15 000.00
6	Submission of wayleaves to obtain existing services positions from respective services owners	no	1	R50 000.00	R50 000.00
7	Services location by means of excavation and survey	Sum	1	R25 000.00	R25 000.00
8	Topographical Survey	Sum	1	R15 000.00	R15 000.00
9	Occupational Health and Safety				
9.1	Project Specific Baseline Risk Assessment	no	1	R15 000.00	R15 000.00
9.2	Project Specific Health and Safety Specifications	no	1	R15 000.00	R15 000.00
9.3	Application for Construction Work Permit	no	1	R8 000.00	R8 000.00
9.4	Evaluate and approve Contractors Health and Safety File	no	1	R8 000.00	R8 000.00
9.5	Monthly Auditing and Reporting	month	6	R15 000.00	R90 000.00
10	Environmental Authorization				
10.1	Environmental Impact Assessment	Sum	1	R90 000.00	R90 000.00
10.2	Extra Over for Handling of EIA	%	R90 000.00	10.00%	R9 000.00
11	Disbursements				
11.1	Document Typing, Printing and Duplicating	Sum	1	R140 035.00	R140 035.00
11.2	Printed or copied bound documents	Sum	1	R237 660.00	R237 660.00
12				SUB-TOTAL A	R3 529 662.88
13				VAT (15%)	R529 449.43
14				TOTAL	R4 059 112.31

TABLE 4: PROJECT BUDGET

ITEM	DESCRIPTION	AMOUNT
		(RAND)
1	CONSTRUCTION COST ESTIMATE	R41 737 274.39
2	PROFESSIONAL FEE ESTIMATE	R4 059 112.31
3	TOTAL	R45 796 386.71

4.2 IMPLEMENTATION PROGRAMME

1	INCEPTION	Mon 18/03/05
1.1	Appointment of consultant	Mon 18/03/05
1.2	Project inception meeting	Thu 18/03/15
1.3	Collection of existing information, masterplans, meeting with local leadership	Thu 18/03/15
1.4	Site Visit	Mon 18/03/19
2	PRELIMINARY DESIGN AND PLANNING STAGE	Fri 18/04/20
2.1	Appoint Land Surveyors	Fri 18/04/20
2.2	Appoint Environmentalist	Fri 18/10/26
2.3	Appoint Health and Safety Consultant	Fri 18/10/26
2.4	Appointment of a Geotechnical Engineer	Fri 18/10/26
2.5	Site Surveying	Mon 18/04/30
2.6	Geotechnical investigations & compilation of report	Fri 18/10/26
2.7	Conduct Environmental Impact Assessment	Thu 18/11/01
2.8	Preliminary Drawings	Tue 18/05/22
2.9	Preliminary Schedule Of Quantities	Tue 18/07/17
2.10	Approval of Preliminary Design	Tue 18/08/07
3	DESIGN DEVELOPMENT REPORT (DDR)	Fri 18/08/17
3.1	Construction Drawing	Fri 18/08/17
3.2	Project Specification	Mon 18/10/01
3.3	Calculation of final Quantities	Mon 18/10/01
3.4	Compile Design Development Report	Mon 18/10/01
3.5	Submit Design Development Report	Mon 18/10/15
3.6	Approval of DDR	Tue 18/10/16
4	DRAFT TENDER DOCUMENT	Mon 19/01/14
4.1	Compile Draft Tender Documents	Mon 19/01/14
4.2	Submit Draft Tender Document	Mon 19/01/28
4.3	Approve Tender Document	Tue 19/01/29
4.4	Printing Tender Document	Wed 19/02/13
4.5	Submit Tender Document	Fri 19/02/15
5	PROCUREMENT STAGE	Tue 19/02/19
5.1	Invitation of contractors on the CoT Panel	Tue 19/02/19
5.2	SITE INSPECTION	Tue 19/03/05
5.3	TENDER CLOSURE	Wed 19/03/06
6	AWARDING STAGE	Fri 19/03/15
6.1	EVALUATION OF SUBMISSIONS	Fri 19/03/15
6.2	TENDER AWARD	Mon 19/03/25
7	CONSTRUCTION STAGE	Mon 19/06/03
7.1	COMMENCEMENT OF CONSTRUCTION	Mon 19/06/03

A detailed Programme of Works are provided in Annexure I.

4.3 CASH FLOW ESTIMATE

A detailed Cash Flow Estimate are provided in Annexure H.

5 CONCLUSION

With the existing stream conditions there is a risk of flooding during heavy rainstorms in the Doornpoort area near Tsamma road crossing. The potential consequences of such flooding include

- Flooding will persist during big storm events.
- Development in the area will be hindered.
- The existing drainage system will not provide the flood protection standard required for future development.
- Further development will increase the frequency, severity and extent of flooding.
- Damage to properties, blockage of roads and accesses, nuisance to the public and risk to lives will remain.

If the Project does not proceed, these risks to the community in the Doornpoort area will continue and some future development may need to be compromised. There are no simple, small-scale works that can be implemented to reduce these risks. The only effective solution to provide adequate flood relief is to implement the drainage improvement works identified in this Detailed Design Report.

6 RECOMMENDATION

- It is recommended that this Document no. **1063K-DC-DDR-001V1**, titled Detailed Design Report for the Montana Spruit Channel Improvement – Phase 1 be approved with all its recommendations.
- It is recommended that the necessary road upgrades are implemented as described in this document.
- It is recommended that the necessary stormwater upgrades are implemented as described in this document.
- Pedestrian facilities be implemented as described in this document.
- The required Council Wayleaves must be obtained prior to work commencing in the municipal road reserve area.

ANNEXURE A:

Appointment Letter



Office of the City Manager

Block D | 2nd Floor | Tshwane House | 320 Madiba Street | Pretoria | 0002
PO Box 440 | Pretoria | 0001
Tel: 012 358 4901 or 012 358 4904 | Fax: 012 358 1112 or 012 358 6660
Email: citymanager@tshwane.gov.za | www.tshwane.gov.za | www.facebook.com/CityOfTshwane

My ref: RTD 04-2014/15-TIDCM041
Your ref:
Contact person: Gladstone N. Shirindza
Division/Section/Unit: Infrastructure Design, Construction and Maintenance

Tel: 012 358 4811
Fax:
Email:

Messrs. **DITLOU & NEVHUTALU - JV**
(REGISTRATION NUMBER: **2003/060102/23**)
P.O. BOX 15684
LYNN EAST
0039
(Attention: Mr. T. Ranamane)

05 March 2018

Sir/Madam

PANEL: APPOINTMENT OF PROFESSIONAL ENGINEERING SERVICES FOR THE MONTANA SPRUIT CHANNEL IMPROVEMENT: PHASE 1

I have the pleasure to inform you that your tender/quotation has been accepted by the City of Tshwane for the Montana Spruit channel improvement: phase 1,

at a price of R2 268 080.78 (exclusive of VAT),

all in accordance with the Municipality's Specification and Conditions of Tender/Quotation and your tender/quotation.

It must be noted that the City of Tshwane can appoint the next tenderer in line to render the work as and when you cannot render the work or not having adequate capacity to do the work.

Your appointment is also subject to your company submitting a detailed proposal within one month on the following:

- No. of jobs to be created through this project;
- Spin offs to the Local Economy;
- Strategy for appointment of Locals.

All other requirements and information concerning this contract can be obtained from Gladstone N. Shirindza at telephone 012 358 4811.

The Montana Spruit channel improvement: phase 1 must be executed in strict accordance with the Municipality's Specification and Conditions of Tender and your tender.

Information regarding insurance is obtainable from the office of the Chief Financial Officer, attention: Ms. Morongwa Mokoena at telephone number (012) 358 1126.

M. S.

2/...

Please submit, to the relevant department, every 3 months, proof by your company that all municipal rates and taxes or Municipal service charges owed by your company or any of the directors are paid and not in arrears for more than three months.

PLEASE ACKNOWLEDGE RECEIPT OF THIS LETTER to:

Office of the City Manager (attention **Ms. Ninette Botha**),
PO Box 440,
Pretoria,
0001,

after which all correspondence must be forwarded to the Roads and Transport Department,
Infrastructure Design, Construction and Maintenance Division, attention Gladstone N. Shirindza
at telephone 012 358 4811.

Yours faithfully



Dr. Moeketsi Mosola
CITY MANAGER

On request, this document can be provided in another official language.

M.E

RTD 04-2014/15-TIDCM041: PANEL: APPOINTMENT OF PROFESSIONAL ENGINEERING SERVICES FOR THE MONTANA SPRUIT CHANNEL IMPROVEMENT: PHASE 1

1. ROADS AND TRANSPORT:
INFRASTRUCTURE DESIGN, CONSTRUCTION AND MAINTENANCE
ATTENTION: Gladstone N. Shirindza

2. THE CHIEF FINANCIAL OFFICER
(For your information re: Insurance)
ATTENTION: Ms. Morongwa Mokoena

3. OFFICE OF THE CITY MANAGER
ATTENTION: Mr. Aigan Williams

4. SUPPLY CHAIN MANAGEMENT
ATTENTION: Ms. Thembeke Mphefu

For your information:

Firm: Messrs. **DITLOU & NEVHUTALU JV**
(REGISTRATION NUMBER: **2003/060102/23**)
P.O. BOX 15684
LYNN EAST
0039

Contact Person: Mr. T. Ranamane
Cell: 076 408 4140
Tel: 012 548 0196
Fax: 012 548 0298
Email: info@ditloucon.co.za



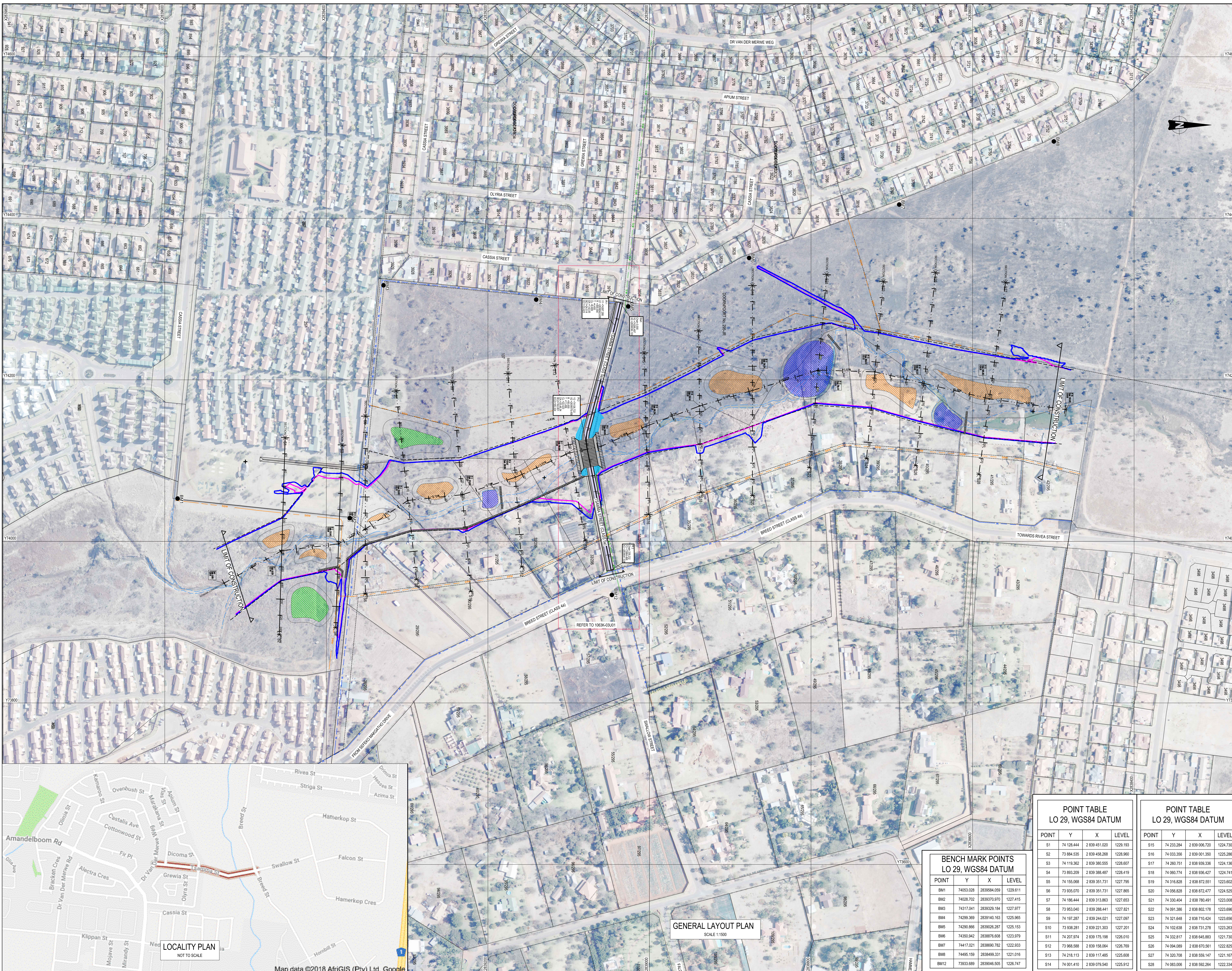
Dr. Moeketsi Mosola
CITY MANAGER

On request, this document can be provided in another official language.

M.E.

ANNEXURE B:

Site Layout



- ### NOTES AND SPECIFICATIONS
- GENERAL**
- 1 ALL MATERIAL AND WORKMANSHIP MUST COMPLY WITH THE REQUIREMENTS OF THE LATEST RELEVANT SABS REQUIREMENTS.
 - 2 ALL DIMENSIONS ARE IN MILLIMETERS. (UNLESS OTHERWISE SPECIFIED)
 - 3 DO NOT SCALE FROM THESE DRAWINGS.
 - 4 ALL DIMENSIONS MUST BE CHECKED AND APPROVED ON SITE.
 - 5 ALL CONSTRUCTION TO BE DONE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS FOR MUNICIPAL CIVIL ENGINEERING WORKS, THIRD EDITION 2005 AND THE STANDARD CTM DETAIL DRAWINGS.
 - 6 THESE DRAWINGS MUST BE READ IN CONJUNCTION WITH THE ARCHITECTS DRAWINGS, IF APPLICABLE.
 - 7 THIS DRAWING MUST BE READ IN CONJUNCTION WITH THE STANDARD SPECIFICATIONS FOR MUNICIPAL CIVIL ENGINEERING WORKS, SERIES 4.
 - 8 THE SIGNATURE OR INITIALS ON THIS DRAWING OF ANY MANAGER OF THE TRANSPORT DEPARTMENT, IN NO WAY REMOVES ANY RESPONSIBILITY WHATSOEVER FROM THE CONSULTANT.
 - 9 THE CONSULTANT REMAINS RESPONSIBLE TO ENSURE THAT ALL THE GUIDELINES, STANDARD DRAWINGS, STANDARDS AND SPECIFICATIONS OF THE TRANSPORT DEPARTMENT HAVE BEEN MET AND ARE COMPLIED WITH.
 - 10 FINAL POSITION OF SERVICES TO BE DETERMINED ON SITE.
- ROADS:**
- 1 KERRING TO BE AS PER STANDARD DETAIL PLANS (MINIMUM WIDTH AND SECTION OF VOLUME 1 OF CONTRACT DOCUMENT).
 - 2 TRAFFIC CONTROL MUST COMPLY WITH THE REQUIREMENTS OF THE SOUTH AFRICAN ROAD TRAFFIC SIGNS MANUAL, THIRD EDITION.
 - 3 ALL EXCAVATIONS AND BEDDING MUST BE REFERENCED AND APPROVED BY THE ENGINEER BEFORE LAYING OF ANY PIPES.
- STORMWATER**
- 1 MINIMUM PIPE DIAMETER TO BE 450mm.
 - 2 MINIMUM FALL TO BE 1:150.
 - 3 PIPE BEDDING TO BE CLASS 8 UNLESS OTHERWISE SPECIFIED.
 - 4 ALL EXCAVATIONS AND BEDDING MUST BE REFERENCED AND APPROVED BY THE ENGINEER BEFORE LAYING OF ANY PIPES.
 - 5 CLEAN EXISTING STORMWATER INLETS AND REPAIR WHERE NECESSARY (IF APPLICABLE).
- LEGEND**
- CHANNEL IMPROVEMENT AREA
 - NATURAL SPRUIT CHANNEL
 - 1:100 YEAR FLOOD LINE
 - 1:50 YEAR FLOOD LINE
 - SHALLOW ATTENUATION INSIDE CHANNEL IMPROVEMENT
 - SHALLOW ATTENUATION OUTSIDE CHANNEL IMPROVEMENT
 - EXISTING POND/DAM TO BE KEPT
 - RENO MATRESS
 - 180mm CONCRETE PAVEMENT
 - 60mm OBLONG BLOCKS
 - 60mm INTERLOCKING BLOCKS
 - 500 --- EXISTING SEWER PIPE
 - EXISTING WATER PIPE
 - 50 --- EXISTING STORM WATER PIPE
 - NEW FENCE
 - EXISTING FENCE TO BE MOVED AND REINSTATED
 - BM BENCH MARKS

AMENDMENTS			
NO.	DATE	APPROVED	DESCRIPTION
A	JUNE 2018		ISSUED FOR PRELIMINARY
B	AUG 2018		ISSUED FOR APPROVAL

DESIGNED BY: M RAMONGANE
 CHECKED BY: F.J. VAN RENSBURG
 DRAWN BY: M RAMONGANE
 TECHNICAL INFORMATION BY: D.J. CHALMERS

PROJECT STATUS

PROJECT ENGINEER/CONSULTANT: M RAMONGANE
 PROJECT ENGINEER/CONSULTANT: F.J. VAN RENSBURG
 INITIALS AND SURNAME: F.J. VAN RENSBURG
 INSPECTOR OF WORKS (CITY OF TSHWANE):

CONSULTANT DETAIL

MITOU
 Unit 4, 5th Floor, P.O. Box 10584, Lynn East, 009
 14 E. Kwa-Mantsha Street, P.O. Box 12548, Midrand
 Midrand Park, P.O. Box 12548, Midrand
 1612

CITY OF TSHWANE
 ROADS AND TRANSPORT DEPARTMENT
 M. Nene Phiso
 Acting STRATEGIC EXECUTIVE DIRECTOR
 P.O. BOX 1409, PRETORIA 0001

M. L. V. Kgagela-Phe
 EXECUTIVE DIRECTOR
 P.O. BOX 1409, PRETORIA 0001

GENERAL LAYOUT PLAN

CONTRACT NO: RFD01-2018-110C18
 PROJECT NO: 1063K

DATE: AUG 2018
 SCALE: 1:1500
 SHEET NO: 1

BENCH MARK POINTS
 LO 29, WGS84 DATUM

POINT	Y	X	LEVEL
BM1	74653.028	2839584.059	1229.611
BM2	74628.702	2839370.970	1227.415
BM3	74317.641	2839329.184	1227.977
BM4	74299.369	2839140.163	1225.965
BM5	74290.866	2839028.287	1225.153
BM6	74350.942	2838876.608	1223.979
BM7	74417.621	2838990.782	1222.933
BM8	74495.159	2838499.331	1221.016
BM12	73933.689	2839046.505	1226.747

POINT TABLE
 LO 29, WGS84 DATUM

POINT	Y	X	LEVEL
S1	74 128.444	2 839 451.020	1229.193
S2	73 884.535	2 839 458.268	1228.960
S3	74 119.362	2 839 380.555	1228.607
S4	73 863.209	2 839 388.487	1228.419
S5	74 156.068	2 839 351.731	1227.795
S6	73 835.070	2 839 351.731	1227.865
S7	74 185.444	2 839 313.863	1227.853
S8	73 953.040	2 839 288.441	1227.821
S9	74 197.287	2 839 244.021	1227.097
S10	73 838.281	2 839 221.303	1227.201
S11	74 207.974	2 839 175.198	1226.014
S12	73 968.588	2 839 158.064	1226.769
S13	74 218.113	2 839 117.485	1225.606
S14	74 001.410	2 839 079.540	1225.912

POINT TABLE
 LO 29, WGS84 DATUM

POINT	Y	X	LEVEL
S15	74 233.284	2 839 006.720	1224.730
S16	74 033.356	2 839 001.350	1225.286
S17	74 260.751	2 838 939.338	1224.136
S18	74 060.774	2 838 936.427	1224.741
S19	74 316.828	2 838 872.251	1223.602
S20	74 056.628	2 838 872.471	1224.525
S21	74 330.404	2 838 780.491	1223.088
S22	74 091.386	2 838 802.178	1223.696
S23	74 321.648	2 838 731.278	1223.656
S24	74 102.638	2 838 731.278	1223.263
S25	74 332.817	2 838 645.883	1221.730
S26	74 094.069	2 838 670.561	1222.825
S27	74 320.708	2 838 658.147	1221.167
S28	74 083.006	2 838 592.264	1222.334

