PVA Consulting Engineers cc

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LEAD Land Engineering And Developments Pty Ltd

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cc 2013/101367/07
Tel.: 012 804 2029
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e-mail: leonard@landeng.co.za

CIVIL SERVICES REPORT

(ROADS & STORMWATER)

FOR

PROPOSED DEVELOPMENT

SOSHANGUVE EXT 07

FOR

PROPOSED RESIDENTIAL DEVELOPMENT

SITUATED ON

PART OF PORTION 38 OF THE FARM RIETGAT 611-JR

MARCH 2018

Prepared for the Developer:

INSTRATIN PROPERTIES (PTY) LTD

PVA Contact Person:

Mr P Venter Pr Tech Eng

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INSTRATIN PROPERTIES (PTY) LTD

SOSHAGUVE–SS EXT 07

ROADS & STORMWATER PRELIMINARY REPORT

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1. INTRODUCTION

PVA LEAD JV was contracted by the developers, Instratin Properties (Pty) Ltd, as Civil Engineers for the proposed residential development in order to prepare a Civil Services Report for your information and approval on the proposed township to be known as Soshanguve-SS Ext 07, situated on a Part of Portion 38 of the Farm Rietgat 611-JR, in the City of Tshwane Metropolitan Municipal Area, Gauteng Province.

This preliminary report addresses the civil engineering services components as part of the statutory application process for the proposed township establishment:

- Bulk Stormwater Services
- Road Access

Electrical bulk services requirements shall not be discussed in this preliminary report, as the appointed Electrical Engineer shall be responsible for all aspects regarding the Electrical Services.

This Preliminary Services Report is based on information acquired from a visual inspection of the site, information from various appointed professionals, including the appointed Town and Regional Planners, Geotechnical Engineers, Traffic Engineers, Electrical Engineer as well as from the City of Tshwane Metropolitan Municipality.

The project team comprises of the following professional individuals and companies.

Developer	Ground Floor, Building 13 The Woodlands Office Park 10 Woodlands Drive Woodmead Johannesburg, 2191	Tel: 011 534 6900 Email: info@instratin.com
Town Planner	Newtown Town Planners 103 George Storrar Drive Groenkloof Pretoria, 0181	Tel: 011 534 6900 Email: info@instratin.com
Consultant Details	Mr Leonard Dos Santos LEAD (Pty) Ltd P O Box 1394, Silverton, 0127 Mr Piere Venter PVA Consulting Engineers cc P O Box 95673 Waterkloof, 0145 Address: Unit 2 Biz Afrika Park 217 Fakkel Street Pretoria, 0184	Cell: 082 933 3316 Email: leonard@landeng.co.za Cell: 083 259 9360 Email: pierre@pvaconsult.co.za

2. LOCALITY

The proposed land development area comprises of 6.1305 hectares in total, on the proposed Soshanguve-SS Ext 07 situated on a Part of Portion 38 of the Farm Rietgat 611-JR. The proposed residential development will be sub-divided into five erven. Erf 1 (6574m²) is situated on the Northern boundary. Erf 2 (7451m²) situated just below Erf 1. Erf 3 (32904m²) situated above Erf 4 on the Southern boundary of the property. Erf 4 (8035m²) is allocated as Private Open Space

situated on the Southern boundary and also bordering the proposed Soshanguve SS Ext 08. Erf 5 (2565m²) is allocated as Private Open Space situated between Salad Burnet Street and the Eastern boundary.

The proposed development site is located within Soshanguve Ext 07 Block SS. The Northern boundary of the proposed development borders Portion 44, 45, 46 and 47 of the farm Rietgat 611-JR, the Western boundary is bordered by (from North to South) Portions 393 to 397, 420 to 427, as well as Portions 458 to 463 of the Farm Rietgat 611-JR. The South-Eastern boundary shall be bordered by the proposed Soshanguve-SS Ext 08 situated on the more Southerly Portion of Portion 38 of the Farm Rietgat 611-JR and the Eastern boundary is formed by the remainder of Portion 38 of the Farm Rietgat 611-JR. (Refer to *Annexure A* - Locality Plan)

3. GENERAL DESCRIPTION

The proposed township development, Soshanguve-SS Ext 07, shall comprise of 3 Erven, zoned as "Residential 3", with a developable area of 6574m² for Erf 1, 7451m² for Erf 2, 32904m² for Erf 3 and 8035m² for Erf 4 and 2565m² for Erf 5 both Private Open Spaces, as indicated on the Township Layout. (Refer to *Annexure B* - Township Layout)

The property slopes in a North Easterly direction at 1:40 (a gradient of 2,5%).

The developer shall register an association not for gain registered in term of Section 21 of the Companies Act, 1973 (Act 61 of 1973), as amended, which shall operate as the Home Owners Association (HOA) with its main objective being the maintenance of the communal areas of the proposed Township, as well as the internal engineering services of the Township, which maintenance responsibility shall only commence after completion of said development.

Any registered owner of a property within the Township shall automatically become a compulsory member of the HOA on date of transfer of the property onto his name.

The internal civil engineering services shall not be handed over to the City of Tshwane Metropolitan Municipality (CTMM), but in view of the fact that CTMM might at a later stage be in a position to take over said services, all designs, specifications, standards, calculations and installation of the civil engineering services shall be done in accordance with the standards and requirements of CTMM.

Once completed, all external services (those services which are considered to be Municipal when outside the boundaries of the development and to be identified by the Municipality) shall be handed over to the City of Tshwane Metropolitan Municipality.

A copy of the S.G. Plans along with a copy of the title deed can be found in *Annexure C*.

4. ROAD ACCESS

After completion, all internal roads of the proposed Soshanguve X07 development site shall be considered municipal. All internal roads shall gain access from Salad Burnet Street and Modisabana Street, both existing roads, that is situated between Erven 1 & 2 and Erf 3 and no other points of access shall be permitted.

The Traffic Impact Study done by Tranfftrans Traffic Engineers highlights the road upgrades summarized as follows. Road upgrades to be completed in 2018 include a mini roundabout with a dedicated left-turn lane on the eastbound approach of Welcome Street at its intersection with Mokhetle Drive (M43) (Refer to drawing 1763.03U01 in *Annexure* D) and a mini roundabout at the intersection of Thaba Nkwe and Thutong Street.

It has been determined via site visit that the upgrade to Thaba Nkwe and Thutong has already been implemented. (Refer to *Annexure D* for the intersection upgrade)

Also highlighted in the report is the future upgrades around the development which are to be implemented in 2023. These upgrades include a dedicated right-turn lane on the eastern approach of Welcome Street at its intersection with Mokhetle Drive, a dedicated right-turn lane on Mokhetle Drive on the northern approach at its intersection with Welcome Street as well as signalizing the aforementioned intersection. An upgrade is also required at the intersection of Thutong and Thusong Street which is proposed as a mini roundabout.

Due to the road upgrade at the intersection of Welcome Street and Mokhetle Drive a stormwater channel will need to be relocated. (Refer to drawing 1763.03U02 in *Annexure D* for the drawing)

5. STORMWATER DRAINAGE

5.1 General Stormwater Information

The municipal standards for the proposed stormwater pipes will be based on the minimum standards of the Department of Roads and Stormwater, as well as the Standard Specification for Municipal Civil Engineering Works (CoT, 2005) and standard construction drawings.

Standards and Specifications for Roads & Stormwater

PARAMETER	DETAIL	SPECIFICATION
Min. pipe sizes	450mm dia. in municipal road reserve	Refer to section 502 of CoT, 2005
Min. pipe slopes	450mm dia – 1: 150	COT Specification
Design recurrence	Minor flood: 1:2 and 1:20 at low points; Major flood: 1:20	COT Requirements

5.2 Internal Stormwater Drainage

The internal stormwater Runoff calculations can be seen at the back of *Annexure E*. To summarize, the pre-development runoff for Soshanguve X07 is as follows. For Erf 1 the minor (1:2 year event) has a runoff of 35 l/s and the major (1:20 year event) has a runoff of 67 l/s. The post development runoff for the minor (1:2 year event) has a runoff of 111 l/s and the major event (1:20 year event) has a runoff of 213 l/s. For Erf 2 the minor (1:2 year event) has a runoff of 39 l/s and the major (1:20 year event) has a runoff of 76 l/s. The post development runoff for the minor (1:2 year event) has a runoff of 126 l/s and the major event (1:20 year event) has a runoff of 242 l/s. For Erf 3 the minor (1:2 year event) has a runoff of 142 l/s and the major (1:20 year event) has a runoff of 283 l/s. The post development runoff for the minor (1:2 year event) has a runoff of 453 l/s and the major event (1:20 year event) has a runoff of 907 l/s. For Erf 4 the minor (1:2 year event) has a runoff of 35 l/s and the major (1:20 year event) has a runoff of 69 l/s. The post development runoff for the minor (1:2 year event) has a runoff of 35 l/s and the major event (1:20 year event) has a runoff of 69 l/s. For Erf 5 the minor (1:2 year event) has a runoff of 19 l/s and the major (1:20 year event) has a runoff of 34 l/s.

The post development runoff for the minor (1:2 year event) has a runoff of 19 l/s and the major event (1:20 year event) has a runoff of 34 l/s.

There are proposed 450mm Ø pipes at the low points of Erven 1,2 & 3. Erf 4 & 5, the private open spaces won't need a stormwater management system due to the fact that the run-off for post-development matches that of the pre-development. All proposed stormwater pipes will empty via field outlets into the existing body of water running on the Eastern boundary of the development which is the Soutpanspruit river.

The stormwater layout can be found in drawing 1763.04U01 in *Annexure E*.

5.3 External Stormwater Drainage

There is an existing 525mm Ø stormwater pipe that runs along the eastbound section of Salad Burnet Street and ends at the Western boundary of the proposed development. It is proposed to extend the abovementioned stormwater pipe through the proposed development in order to prevent the run-off from the existing area discharging into the development. The lowest drainage point for all the stormwater in the area is the Soutpanspruit river. The existing external stormwater layout can be found in *Annexure F*. Refer to 1763.04U01 for the proposed new stormwater upgrades in *Annexure E*.

6. ROADS & STORMWATER CONSTRUCTION COST ESTIMATE

The estimated internal roads and stormwater construction cost can only be estimated when proposed internal layout plans for the development have been determined. As for the external stormwater and roads construction costs as well as the proposed internal entrance construction cost, calculations can be seen in *Annexure G*, and are summarized below:

Estimated Construction Cost	**External**

	Road Upgrade	Stormwater
Sub-Total 1	R 1 055 465,00	R 276 400,00
P&G's	R 168 874,00	R 44 224,00
Contingencies	R 122 434,00	R 32 062,00
Sub-Total	**R 1 346 773,00**	**R 352 686,00**
Professional Fees	R 134 677,00	R 35269,00
Sub-Total	**R 1 481 451,00**	**R 387 955,00**
VAT	R 207 403,00	R 54 314,00
Total Construction Cost	**R 1 688 854,00**	**R 442 269,00**

It is suggested that the cost of the external road upgrade be shared between the two developments due to the fact that both developments will benefit from the road upgrade.

7. REZOINING CONDITIONS

The approved Rezoning conditions can be seen in *Annexure H.*

8. WAYLEAVE

Since construction activities for this proposed development and road upgrades will be done within municipal roads and road reserves, an approved Tshwane wayleave will be required.

9. BULK SERVICES CONTRIBUTIONS

The bulk contribution payable for roads and stormwater for the Soshanguve X07 development is equal to R_____.

10. CONCLUSION

In conclusion, the Developer intends to commence construction by mid-2018. The developer will submit to the City of Tshwane Metropolitan Municipality complete engineering drawings in respect of all internal services and connection points, prior to commencement of construction of the said services.

All design drawings will be submitted to the offices of the City of Tshwane Metropolitan Municipality within the next few weeks, as to expedite the process. We Trust that this report meets with your approval.

ANNEXURES

1.	**LOCALITY PLAN**	Annexure A
2.	**APPROVED TOWNSHIP LAYOUT**	Annexure B
3.	**TITLE DEED AND SG PLANS**	Annexure C
4.	**TRAFFIC IMPACT STUDY AND PROPOSED INTERSECTION UPGRADES**	Annexure D
5.	**INTERNAL STORMWATER PLAN**	Annexure E
6.	**EXISTING STORMWATER LAYOUT**	Annexure F
7.	**COST ESTIMATES**	Annexure G
8.	**REZONING CONDITIONS**	Annexure H
9.	**GEOTECHNICAL REPORT**	Annexure I

ANNEXURE A

SOSHANGUVE SS EXT.7 A PORTION OF PORTION 38 OF THE FARM RIETGAT 661-JR
INSTRATIN PROPERTIES (PTY) LTD



PVA Consulting Engineers cc

LEAD | Land Engineering And Developments Pty Ltd

ANNEXURE B

PROPOSED TOWNSHIP:

SOSHANGUVE SS EXT.7

SITUATED ON PART OF PORTION 38 OF THE FARM RIETGAT NO.611-JR

LOCAL AUTHORITY: THE CITY OF TSHWANE METROPOLITAN MUNICIPALITY

PART OF PORTION 38
OF THE FARM RIETGAT NO.611-JR

SITE ZONES AND MATERIAL DESCRIPTION			
ZONE	MATERIAL DESCRIPTION	GEOTECHNICAL CONSIDERATIONS	NHBRC CLASSFICATION
WHOLE OF SITE	Sand (transported) overlying gravel (pebble marker) over granite rock OR Sand overlying ferricrete gravel over granophyre rock	No heave (H) No collapse (C) Moderate differential settlement (S1) Intermitent shallow rock (R)	H/C/S1/(R)

This is to certify the township layout plan in accordance with the provisions and recommendations as set out in the geotechnical investigation for the proposed township.

Ed Shedden Pr Sci Nat 402002/83

Y +89 000

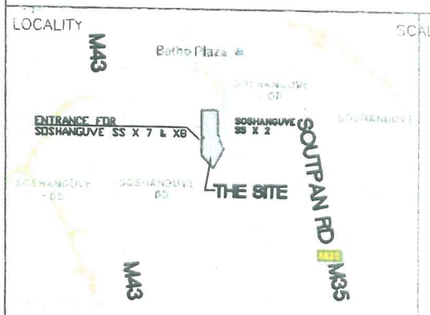
Y +88 800

X +2 820 000

X +2 820 200

X +2 820 400

LOCALITY



SCALE 1:7 500

0 180 540

COUNCIL REF. NR. :CPD 9/1/1/1 SOSH SS X 7/8

USE ZONE	NR. OF ERVEN	AREA (ha)	% OF TOWN	ERF NRS
Residential 3 (70u/ha)	3	4.6967ha	76.6%	2561 - 2563
Private Open Space	2	1,0840ha	17.7%	2564 2565
Street		0.3498ha	5.7%	
TOTAL	4	6.1305ha	100%	2561 - 2565

STREET INFORMATION		
Street length		
Gradient of streets		

AMENDMENTS	
Nov 2013	Amended erf layout and density. Rectified boundary.
Jul 2014	NHBRC Certified table included on map.
Mrt 2015	Final Erf numbers

GENERAL NOTES:

1. PROPOSED SOSHANGUVE SS EXT.7 IS DENOTED BY FIGURE "ABCDEFGHIJKLMNOPQRA" AND MEASURES 6.1305 HECTARES.
2. ALL DISTANCES AND AREAS ARE MEASURED IN SQUARE METRES OR HECTARES AND AREAPPROXIMATE PENDING FINAL SURVEY.
3. CONTOUR LINES ARE IN ACCORDANCE WITH THE STANDARDS LAID DOWN IN REGULATION18 (1) OF THE TOWN PLANNING AND TOWNSHIPS REGULATIONS FRAMED IN TERMS OF SECTIONS 69 AND 96 OF ORDINANCE 15 OF 1986 AND WERE COMPILED BY THE COUNCIL.
4. — — — — EXISTING STORM WATER PIPELINES
5. ---------- 1:50 YEAR FLOOD LINE
6. -·-·-·-·- 1:100 YEAR FLOOD LINE
7. ———— 32m FROM CENTER LINE OF RIVER

CITY OF TSHWANE
APPROVED
2015 -04- 17
CITY PLANNING AND DEVELOPMENT COMMITTEE

Registered owners: SIZANE AGENCIES CC

ERF 2561 "Residential 3" 70u/ha 6574m²

ERF 2562 "Residential 3" 70u/ha 7451m²

ERF 2563 "Residential 3" 70u/ha 32904m²

ERF 2564 POS 8035m²

ERF 2565 POS 2805m²

PROPOSED SOSHANGUVE SS EXT.7

PROPOSED SOSHANGUVE SS EXT.8

SOSHANGUVE SS EXTENSION

REMAINDER OF PORTION 38 RIETGAT No. 611-JR

13m STREET

STREET 15m

STREET 16m

9m wide R.O.W. Servitude

32m WIDE STORMWATER SERVITUDE

FLOODLINE 1:50 YEARS
FLOODLINE 1:100 YEARS

P.O.S 5,93Ha

MUNICIPAL 0,75Ha

MUNICIPAL 0,16Ha

"Residential 3"

0 20 40 60 80 100

COPYRIGHT RESERVED

NEWTOWN ASSOCIATES
TOWN PLANNERS
POSTAL ADDRESS: P.O BOX 95617 WATERKLOOF
STREET ADDRESS: Ashton House 61 Lois Ave Newlands

NTA

Datum: Local
System: LO29

SCALE 1:7 500

ANNEXURE C

GENERAL PLAN

(CONSISTING OF 11 SHEETS)
OF THE TOWNSHIP OF

SOSHANGUVE - SS

PROVINCE : GAUTENG
SCALE 1:600

Surveyed in May - July 1996 by me

Professional Land Surveyor
H COETZER (PLS 1009)

NOTE :

All splay distances are 5,00 metres unless otherwise indicated.

S.G.No. 6956/1996
SHEET 11
Approved for SURVEYOR-GENERAL 1996-09-06

TN

SEE SHEET 6

SEE SHEET 7

SEE SHEET 9

SEE SHEET 10

SEE SHEET 10

STREET 16m

STREET 20m

STREET 13m

STREET 40m

1053 (PARK)

1054 (PARK)

1055 (PARK)

ERF 932

ERF 933

ERF 934

ERF 935

ERF 936

ERF 937

ERF 938

ERF 975

ERF 976

ERF 977

ERF 978

ERF 979

ERF 980

ERF 981

ERF 982

ERF 983

ERF 984

SOSHANGUVE - DD TOWNSHIP

RIETGAT No. 611 - JR
REMAINDER

FILE No.
SURVEY RECORDS No. 3230/1996
COMPILATION JRK
DEEDS : PRETORIA

SOS-SS.11

GENERAL PLAN

(CONSISTING OF 11 SHEETS)
OF THE TOWNSHIP OF

SOSHANGUVE - SS

PROVINCE : GAUTENG
SCALE 1:600

Surveyed in May - July 1996 by me

Professional Land Surveyor
W H COETZER (PLS 1009)

NOTE :

All splay distances are 5,00 metres unless otherwise indicated.

S.G.No. 6956/1996
SHEET 3
Approved for SURVEYOR-GENERAL 1996-09-06

RIETGAT No. 611 - JR
REMAINDER

STREET 13m

SEE SHEET 4

1052 (PARK)

ERF 174
ERF 175
ERF 176
ERF 177
ERF 178
ERF 191
ERF 370
ERF 371
ERF 372
ERF 373
ERF 386
ERF 387
ERF 388
ERF 389
ERF 390
ERF 391
ERF 392
ERF 393
ERF 394
ERF 395
ERF 396
ERF 397
ERF 420
ERF 421

SOSHANGUVE - DD TOWNSHIP

STREET 16m

SERVITUDE 5,00 m

LANE 3m

SEE SHEET 6

SEE SHEET 7

1053 (PARK)

FILE No.

SURVEY RECORDS No. 3230/1996

COMPILATION JR3C

DEEDS : PRETORIA

SOS-SS 3

GENERAL PLAN

(CONSISTING OF 11 SHEETS)
OF THE TOWNSHIP OF

SOSHANGUVE - SS

PROVINCE : GAUTENG
SCALE 1:600

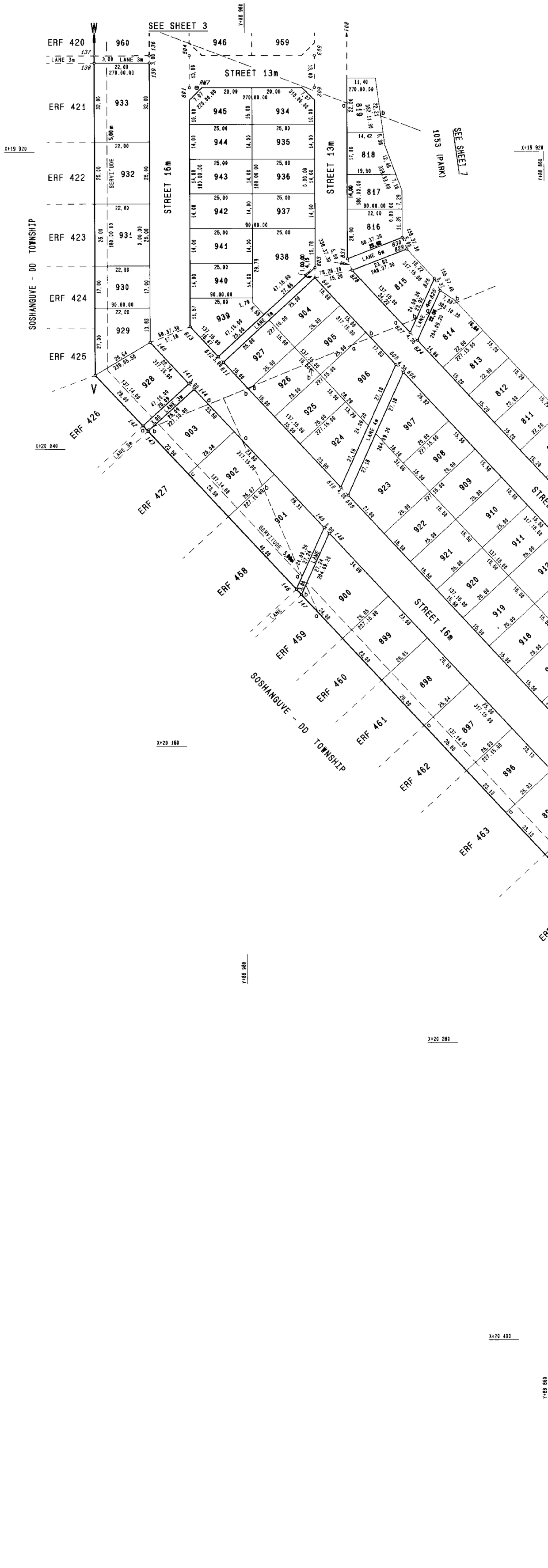
Surveyed in May - July 1996 by me

Professional Land Surveyor
W H COETZER (PLS 1009)

NOTE :

All splay distances are 5,00 metres unless otherwise indicated.

S.G.No. 6956/1996
SHEET 6
Approved for SURVEYOR-GENERAL 1996-09-06



FILE No.
SURVEY RECORDS No. 3230/1996
COMPILATION JR3C
DEEDS : PRETORIA

SOS-SS.6

TM 11522(1)

| MAIN FIGURE DATA | | |

GENERAL PLAN

(CONSISTING OF 11 SHEETS)
OF THE TOWNSHIP OF

SOSHANGUVE - SS

PROVINCE : GAUTENG
SCALE 1: 1 000

Surveyed in May - July 1996 by me

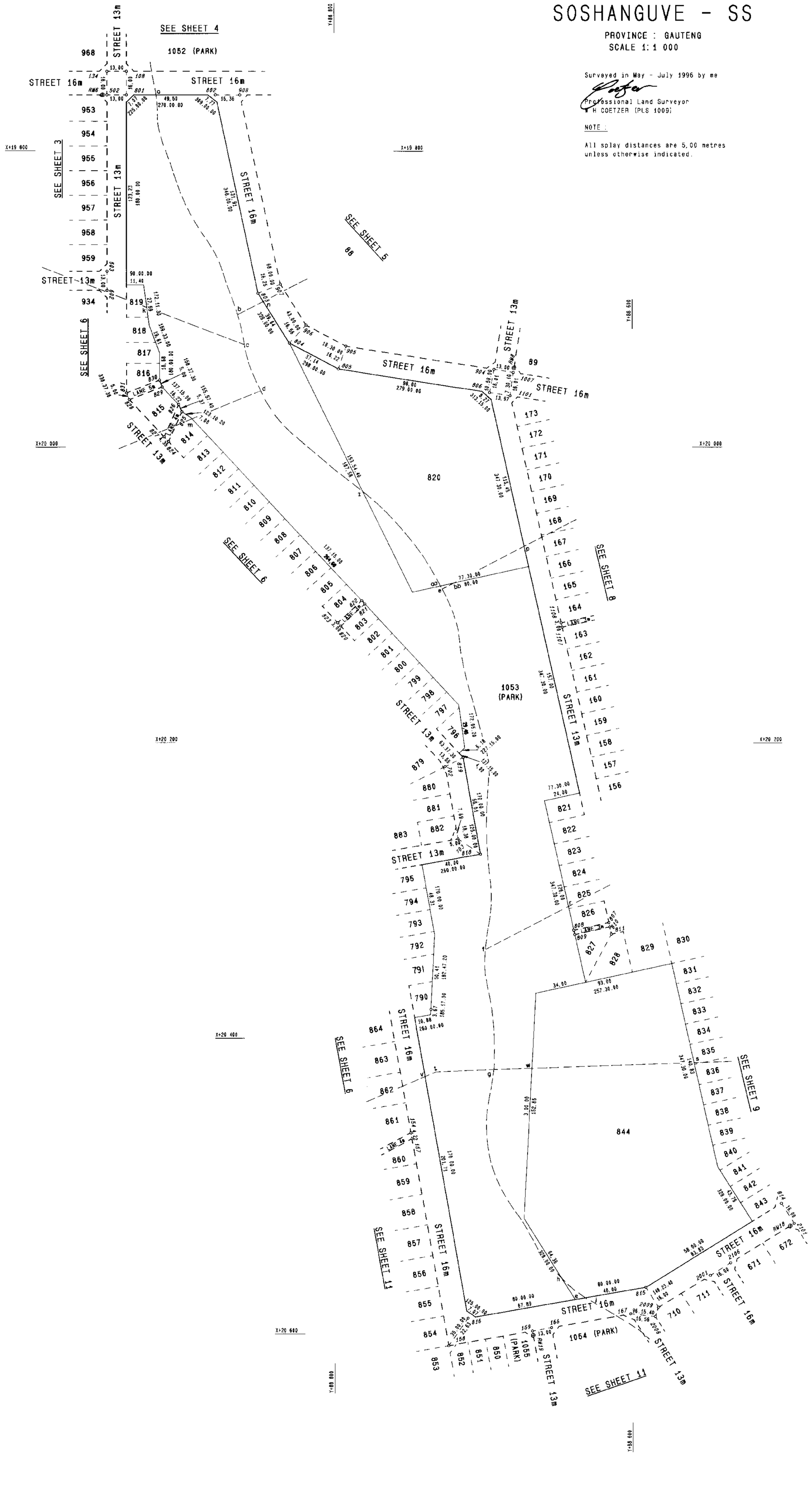
Professional Land Surveyor
W H COETZER (PLS 1009)

NOTE :

All splay distances are 5,00 metres unless otherwise indicated.

S.G.No. 6956/1996
SHEET 7
Approved for SURVEYOR-GENERAL 1996-09-06

TN



FILE No.

SURVEY RECORDS No. 3230/1996

COMPILATION JRK

DEEDS : PRETORIA

SOS-SS.7

SEËLREG
STAMP DUTY.....
FOOI
FEES..... R165,00

Opgestel deur my,

TRANSPORTBESORGER
P J J VAN RENSBURG

BC 59657/98

SECTION 46 (3) ACT 47 OF 1937
ARTIKEL 46 (3) WET 47 VAN 1937

The land herein described has been laid out into
Die grond hierin beskryf is in..... ERWE 1 - 1051

In accordance with General Plan SG No. A
uitgelê ooreenkomstig die Algemene Plan SG-no. A..... 6956/96

approved/compiled by the Surveyor-General on the
goedgekeur/opgestel deur die Landmeter-generaal op die..... 06/09/96

and booked in a separate register under the name of
en te boek gestel in 'n aparte register onder die naam van.....

SOSHANGUVE - SS

Deeds Office,
Aktekantoor,
PRETORIA

Registrar of Deeds.
Registrateur van Aktes.

VIR VERDERE ENDOSSEMENTE SIEN BLADSY

FOR FURTHER ENDORSEMENTS SEE PAGE

T 75415/98

AKTE VAN TRANSPORT

HIERBY WORD BEKEND GEMAAK

DAT:- PETRUS JOHANNES JANSE VAN RENSBURG

verskyn het voor my, REGISTRATEUR VAN AKTES vir Gauteng te PRETORIA, en dat hy die genoemde Komparant synde behoorlik daartoe gemagtig kragtens 'n Volmag aan hom verleen deur:-

Die PROVINSIE GAUTENG

gedateer te PRETORIA op 2 APRIL 1998.

For Information Only

Welke Volmag aan my getoon is en die genoemde Komparant het verklaar dat nademaal sy Prinsipaal op 2 JUNIE 1995 ooreengekom het om die hiernagenoemde eiendom te transporteer aan die hiernagenoemde transportontvanger in ruil vir die eiendom bekend as:-

GEDEELTE 23 van die plaas RIETGAT 611,
Registrasie Afdeling J.R., Provinsie Gauteng;

GROOT: 122,2775 (EENHONDERD TWEE EN TWINTIG komma TWEE SEWE SEWE VYF) Hektaar;

EN NADEMAAL die transportnemer ook addisioneel 'n bedrag van R23 924,37 (DRIE EN TWINGTIGDUISEND NEGEHONDERD VIER EN TWINTIG RAND EN SEWE EN DERTIG SENT) aan die transportgewer betaal ten einde die waardes van die eiendomme wat verruil word, gelyk te stel.

En dat hy in sy voornoemde hoedanigheid, hiermee in volle en vrye eiendom sedeer en transporteer aan en ten gunste van:-

SIZANE AGENCIES CC
CK 92/23202/23
diese Opvolgers in Titel en Regsverkrygendes:-

GEDEELTE 38 van die plaas RIETGAT 611,
Registrasie Afdeling J.R., Provinsie Gauteng;

GROOT: 93,3535 (DRIE EN NEGENTIG komma DRIE VYF DRIE VYF) Hektaar;

SOOS AANGEDUI op die aangehegte Kaart L.G. No. 6955/1996 EN GEHOU kragtens Sertifikaat van Verenigde Titel T.76794/1989;

For Information Only

ONDERHEWIG AAN DIE VOLGENDE VOORWAARDE:

Die restant van Minerale Gebied 3 geleë op die Resterende Gedeelte van Gedeelte 8 van die plaas Rietgat 105, Registrasie Afdeling J.R., Transvaal, Groot 1132,5223 (EEN EEN DRIE TWEE komma VYF TWEE TWEE DRIE) hektaar, 'n gedeelte waarvan aangedui word deur die figuur y x middel van spruit hh jj kk U aa op Kaart S G No 6955/1966 hierby aangeheg is onderhewig aan 'n voorbehoud van alle regte tot minerale soos gesedeer aan die Suid-Afrikaanse Ontwikkelingstrust kragtens Akte van Sessie van Regte op Minerale K 4120/89 RM.

EN verder onderhewig aan al sodanige voorwaardes as wat in genoemde Akte vermeld staan of na verwys word.

WESHALWE die Komparant afstand doen van al die reg en titel wat sy Prinsipaal voorheen tot genoemde eiendom gehad het en gevolglik ook erken dat hy geheel en al uit die besit daarvan onthef is en nie meer daartoe geregtig is nie en dat kragtens hierdie Akte, die genoemde

SIZANE AGENCIES CC

diese Opvolgers in Titel of Regverkrygendes, tans en voortaan daartoe geregtig is, ooreenkomstig plaaslike gebruik, behoudens die regte van die Staat, en ten slotte erken dat hereregte betaal is op die bedrag van R503 924,37 (VYFHONDERD EN DRIEDUISEND NEGEHONDERD VIER EN TWINTIG RAND EN SEWE EN DERTIG SENT), synde die billike waarde van die eiendom.

For Information Only

TEN BEWYSE WAARVAN ek, die genoemde Registrateur van Aktes, tesame met die Komparant hierdie Akte onderteken en my die ampseël bekragtig het.

ALDUS GEDOEN EN VERLY op die kantoor van die Registrateur van Aktes te PRETORIA op 9-7-98

In my teenwoordigheid:-

q.q.

REGISTRATEUR VAN AKTES

For Information Only

BLADSY/PAGE 5

T 75415/98

W.O.P. B 28596/06

B 028596/06

VERBIND
MORTGAGED

vir
for R 6180 00

Akteskantoor
Deeds Office

27/02/06
Registrateur
Registrar

27/02/06

BC 181562/2007

GEKANSELLEER
CANCELLED

(2)

REGISTRATEUR/REGISTRAR

24/10/2007

(1)

ENDOSSEMENT KRAGTENS ARTIKEL 27D VAN WET 61 VAN 1973	ENDORSEMENT BY VIRTUE OF SECTION 27D OF ACT 61 OF 1973
BINNEGEMELDE BESLOTE KORPORASIE IS OMSKEP IN 'N MAATSKAPPY EN STAAN NOU BEKEND AS	WITHIN-MENTIONED CLOSE CORPORATION HAS BEEN CONVERTED INTO A COMPANY AND IS NOW KNOWN AS
Sizane Agencies (Pty) Ltd	
NO. 2006/014134/07	
BC 59529 07	
17 09 /07	REGISTRATEUR/REGISTRAR

(2)

SERTIFIKAAT VAN GEREGISTREERDE TITEL UITGEREIK
CERTIFICATE OF REGISTERED TITLE ISSUED

TEN OPSIGTE VAN Ged 46 (Ged v Ged 38) Plaas Rietpan
IN RESPECT OF

611 JR = 22,5521 ha RESTANT 70,8014 ha
REMAINDER

T 127667/07

17 09 707

REGISTRATEUR/REGISTRAR

dkf 24/10/07

For further endorsement see page 6

For Information Only

BLADSY/PAGE 6

AKTE No./DEED No. T. 75415/98

ONTEIENING DEUR EXPROPRIATION BY

City of Tshwane Metropolitan Municipality

VAN/OF Act/Ord No: Sec 79(24) of Ord 1939 read with Sec 5 of the expropriation Act 63/1975

GROOT ONGEVEER/MEASURING APPROXIMATELY ± 57,29 ha.

EX 77/2007

REGISTRATEUR/REGISTRAR

For Information Only

ANNEXURE D

Proposed Township Development
Soshanguve Extension 7 & 8

Traffic Impact Assessment

Report No T2018/006
February 2018

TRAFFTRANS (PTY) LTD
TRAFFIC-LAB

Prepared by:
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Sinoville, **PRETORIA**
☎ 012 543 1379 fax 086 576 8611
F H van Heerden

Instratin Properties (Pty) Ltd **Contact person: Tebogo Modishane**

TRAFFTRANS (PTY) LTD
TRAFFIC-LAB

Verkeersopnames en Analise | **80/03663/07** | **Traffic Surveys and Analysis**

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E-mail traffic@trafftrans.co.za

U verw/Your ref APS .....

Ons verw/Our ref Trafftrans T2018/006

14 February 2018

The Director
Infrastructure Planning & Management
Tshwane Metropolitan Municipality
PO Box 1409
PRETORIA
0001

Dear Sirs

PROPOSED TOWNSHIP DEVELOPMENT, SOSHANGUVE EXTENSION 7 & 8:
TRAFFIC IMPACT ASSESSMENT

We are pleased to submit our report for the traffic impact assessment undertaken for the proposed township establishment on the above mentioned property, located in the geographical confines of the Tshwane Metropolitan Municipality.

It is hereby certified that this Traffic Impact Assessment for Soshanguve Extension 7 & 8 has been prepared according to requirements of the *South African Impact and Site Traffic Assessment Manual, TMH 16, Vol 1 & 2.*

We trust this report meets with your requirements, however, should you require any further information, please do not hesitate to contact us.

Yours faithfully

FH VAN HEERDEN Pr Eng (860575)
M Eng Transport
TRAFFTRANS (PTY) LTD

PROPOSED TOWNSHIP DEVELOPMENT
SOSHANGUVE EXTENSION 7 & 8

Traffic Impact Assessment

REPORT NUMBER T2018/006

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1. INTRODUCTION

1.1. Appointment / Terms of Reference

The following report relates to the appointment of Trafftrans (Pty) Ltd by Instratin Properties (Pty) Ltd, to undertake an traffic investigation into the impact of the proposed township development of Soshanguve Extension 7 & 8, on the road network in the immediate vicinity of the property. The location of the site is shown in **Figure 1**.

1.2. Background and Objectives

Background

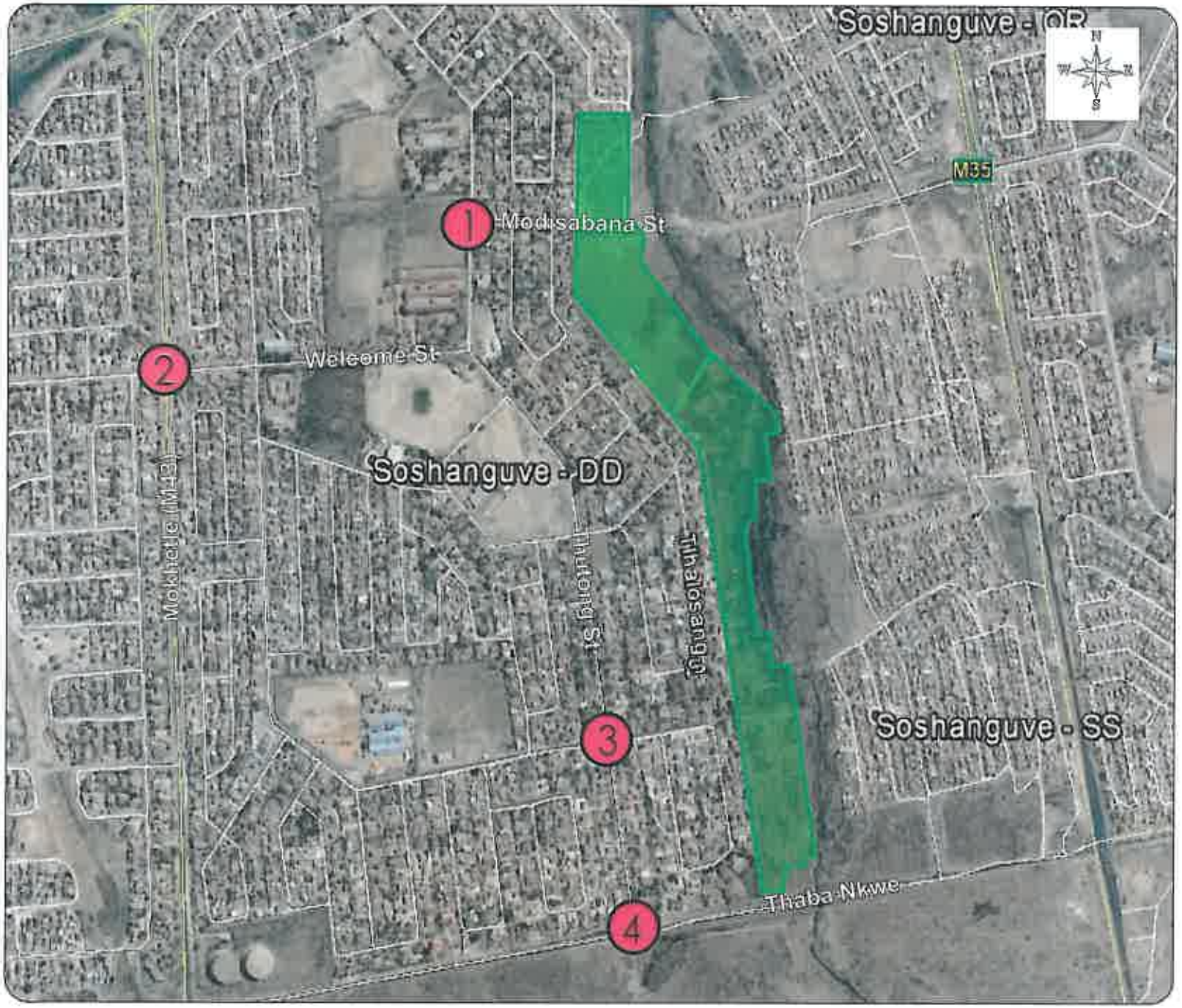
Soshanguve Extension 7 is to be established on Erf 2561, 2562, 2563, 2564 and 2565, Soshanguve SS, while Soshanguve Extension 8 is to be established on Erf 2566, 2567 and 2568, Soshanguve SS. The total extent of the land under consideration is 13,0928ha of which Extension 7 is to cover 6,1305ha and Extension 8 cover 6,9623ha. The land is bounded by a waterway to the east, Thaba Nkwe Road to the south, Soshanguve DD to the west and north. The land resorts under the jurisdiction of the Tshwane Metropolitan Municipality and falls inside of the urban edge in a medium densifying developing area.

The current zoning of the property is "Agricultural". The location of the nearest existing major intersections to be affected, is that of Mokhetle Road (M43) & Welcome Street as well as Thutong Street & Thaba Nkwe Road.

Currently, all affected roads are paved, and in a fair to poor physical condition. All the roads fall under the jurisdiction of, and therefore, the responsibility of the Tshwane Metropolitan Municipality.

Objectives

The objective of this study is to assess the impact of the proposed development on the existing surrounding road network and the intersections in the immediate vicinity and to establish the capacity requirements, if and where required, of the road infrastructure and any additional capacity that would be required to ensure acceptable traffic flow through the affected junctions/intersections.



PROJECT

SOSHANGUVE, X7 & X8

LOCALITY PLAN

KEY

MANUAL COUNTS

SITE

TRAFFTRANS (PTY) LTD

Proj. T20187/006 Fig. 1

1.3 Methodology

The methodology followed, relates closely to the guideline document of the Committee of Transport Officials (COTO), entitled, "TMH 16 (Volume 1), South African Traffic Impact and Site Traffic Assessment Manual, Version 1.0, August 2012". The following additional procedures were followed:

- The identification of the key intersections in the vicinity on which the development may have a significant impact and which may have an impact on the flow of traffic through these intersections. According to publication of the Institute of Traffic Engineers, Washington D.C. entitled, *"Traffic Access and Impact Studies for Site Development, A proposed recommended practice, 1988"*, key intersections are those through which the newly generated peak hour traffic composes at least 5% of the existing capacity.
- Selecting an appropriate horizon year to be considered in the analyses, based on the type of development and the extent thereof as suggested in "TMH 16 (Volume 1), South African Traffic Impact and Site Traffic Assessment Manual, Version 1.0, August 2012", Appendix B.
- Acquiring traffic data for the key intersections and/or other traffic infrastructure as well as establishing the appropriate growth rates in the traffic flows.
- Establishing the traffic generated by the proposed development in accordance with the guideline document of Committee of Transport Officials (COTO), entitled, *TMH 17 (Volume 1), South African Trip Data Manual, Version 1.0, September 2012"* and the guideline document of the Institute of Traffic Engineers, Washington D.C. entitled, *"Trip Generation, 6th edition, Volume 1 to 3, 1997"*
- The distribution of the generated traffic derived from the existing traffic flow patterns in addition to other external factors that may affect the new traffic flow patterns.
- The effect of other developments in the immediate vicinity that are in the process of construction, developments already approved or developments awaiting approval.
- An assessment will be made on the performance of the intersections and other traffic elements. For this purpose the software developed by the Australian Research Board Ltd, **Sidra Intersection 7.0**, Victoria, Australia, 2015 and/or the **Vistro 6.0** software suite, developed by PTV Planung Transport Verkehr AG. The Sidra software suite has limitations in its application of assessing all-way stop controlled intersections, and largely underestimates the performance of it as well, and for this purpose, either **Vistro 6.0** or the **AutoJ 1712** software package, developed locally by Dr John Sampson or the software developed by Mc Trans Centre, **Highway Capacity Software Version 4.1c**, University of Florida, USA, 2000 will be used to analyse such intersections. Where necessary to assess a wider network, or where the former analysis software does not cover the specific road conditions, the traffic analysis software

Synchro 6, developed by Trafficware Corporation California, USA, 2003, will be used.

- The generally accepted limit for traffic facility performance within an urban environment is LOS D (level-of-service) and that of a rural environment LOS C. In conjunction herewith, it is preferable that a V/C-ratio (volume-capacity ratio), of less than 0,95 will be maintained, where possible, but not exceeding 1,00 as a worst case scenario.
- The effect of security control at entrances to developments will be assessed based on requirements set out in the document of the Committee of Transport Officials (COTO), entitled, *TMH 16 (Volume 2), South African Traffic Impact and Site Traffic Assessment Standards and Requirements Manual, Version 1.01, February 2014"*
- The requirements for traffic signals and traffic signs as contained in the SARTSM *"South African Roads Traffic Signs Manual"* as amended, South African Department of Transport.
- If applicable, the impact of and on the public transport system will also be evaluated.

2. STUDY CONSIDERATIONS

2.1 Description of the proposed development

The property is located in a slow to medium pace developing urban area. The application is for single and duplex units as "Residential 3" with a density of 70 units/ha on Extension 7 and 80 units/ha on Extension 8. This amounts to 328 units on Extension 7 (4,6967ha developable land) and 492 units on Extension 8 (6,1576ha developable land).

2.2 Access to the proposed development

Due to its elongated form, the development will get access to the local road network at two locations - one for Extension 7 and one for Extension 8. Both these access roads will link up with Thutong Street, and from there with the rest of the larger road network. For the purpose of this assessment, all trips generated by this development will be carried along Thutong Street either northbound or southbound to join the larger road network.

2.3 Road Infrastructure

Thutong Street is a paved single carriageway road, running north-south and the section north of Welcome Street, according to the Tshwane Roads Master Plan, has not been identified as a significant road, and therefore would, by default, act as a Class U5 road (local street), requiring a 15m road reserve. This section, however, only provides for a 12m road reserve. The section of Thutong Street between Welcome Street and Thaba Nkwe Road, Welcome Street and Thaba Nkwe Road have been identified as Class U4a roads (collector - non residential) requiring a 25m reserve. However, provision has only been made for a 20m reserve on the first two roads, with more than adequate road reserve that should be available on the latter. Mokhetle Road (R43) has been identified as a future Class U3 road (district distributor). Such roads require a 32m road reserve, which has been allowed for.

2.4 Study Area

The extent of the study area is established, based on a number of criteria. The applicable criteria, for identifying key intersections, are the following:

- All intersections where the newly generated peak hour traffic composes **more than 5%** of the existing capacity, are regarded as key intersections.
- In dense urban road networks, a cut-off distance of 1km to 1,5km from the site along the major road network, will be regarded as the limit of the study for large developments, requiring full impact studies.
- Any other extra-ordinary features or conditions that require assessment.

3. DATA / INFORMATION

3.1. Relevant horizon year

The area surrounding the proposed development currently has an urban character, with slow to medium densification been ongoing. This development can be regarded as a medium size development, generating more than 150 vehicle-trips in the peak hour. The required assessment period for such a development, will be taken as the design year as well as the horizon year.

The design year is taken as 2018, with 2023 been taken as the horizon year.

3.2. Applicable peak period

From the traffic counts undertaken at the affected intersections, it is clear that the roads in the immediate vicinity of the site, carrying typical commuter traffic with its associated peak periods during the early morning and afternoon. The weekday morning (AM) peak hour has been found to typically start at between 06:45 and 07:00, with the associated afternoon (PM) peak hour already starting between 15:00 and 15:15 on the internal roads and 17:00 on the external roads. For the purpose of this study, these peak periods will be assessed.

3.3. Relevant development scenarios

It is assumed that the development, once approved, should be constructed and operational within a 12-month period following its approval.

3.4. Data collection

- **Current traffic volumes**

Detailed 12-hour intersection counts were undertaken on Monday, 29 January 2018. A summary of the results of the traffic counts done at these intersections is given in **Table 1 and Figure 2**. The peak-hour factors (phf) for the various approaches, have also been included.

TABLE 1: TRAFFIC VOLUMES - 2018

Intersection	Peak	Approach				phf	12-hr Vol
		N	E	S	W		
Thursday (06:00 - 18:00)							
Modisabana & Thutong	AM	72	40	102		0.91	1258
	PM	92	24	88		0.86	
Welcome & Mokhetle (M43)	AM	597	456	240	201	0.84	7784
	PM	347	201	122	132	0.94	
Thusong & Thutong	AM	156	16	236	126	0.86	2365
	PM	73	7	141	42	0.81	
Thaba Nkwe & Thutong	AM	238	254		133	0.93	4114
	PM	63	172		175	0.92	
Welcome & Thutong	AM	105		133	214	0.80	
	PM	100		67	125	0.90	

The traffic through the intersections, on average, during the AM peak is high at 18,5% of the 12-hour traffic volumes, and a more typical 11,9% for the PM peak. This is typical of commuter traffic flows in residential urban areas (typically >10%). The heavy vehicle component of the traffic, varies between 1% and 3% during the AM and PM peaks and 2% of the total 12-hour traffic.

- **Future traffic volumes**

For the purpose of traffic growth along the routes through the area, the area could be regarded as a slow to medium developing urban area, and a medium growth scenario is expected for the next 5 years. **An annual growth in traffic of 3% has been allowed for over the next five years**. The expected traffic volumes for 2023 is depicted in **Figure 3**.

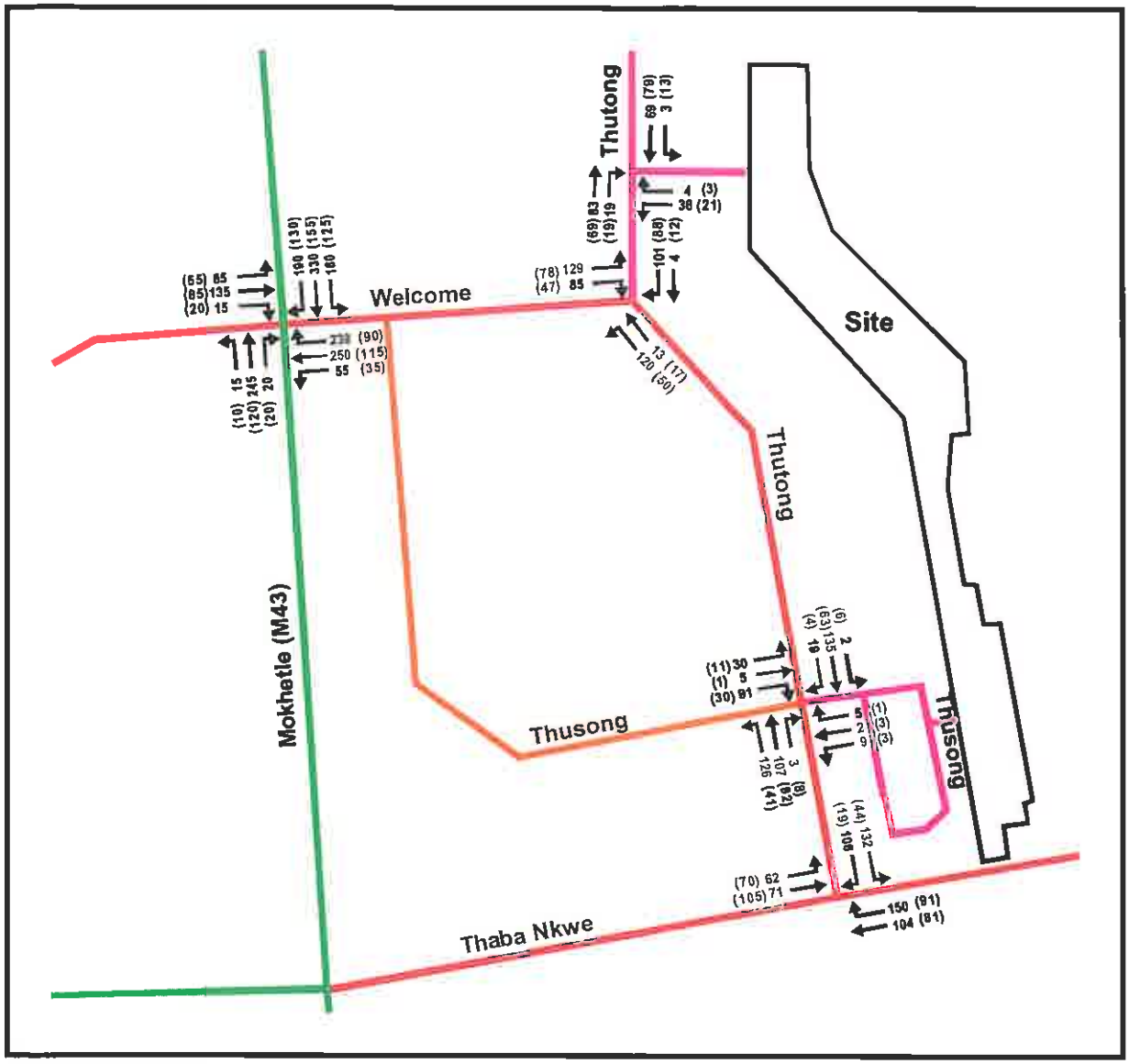


FIGURE 2: TRAFFIC VOLUMES - 2018

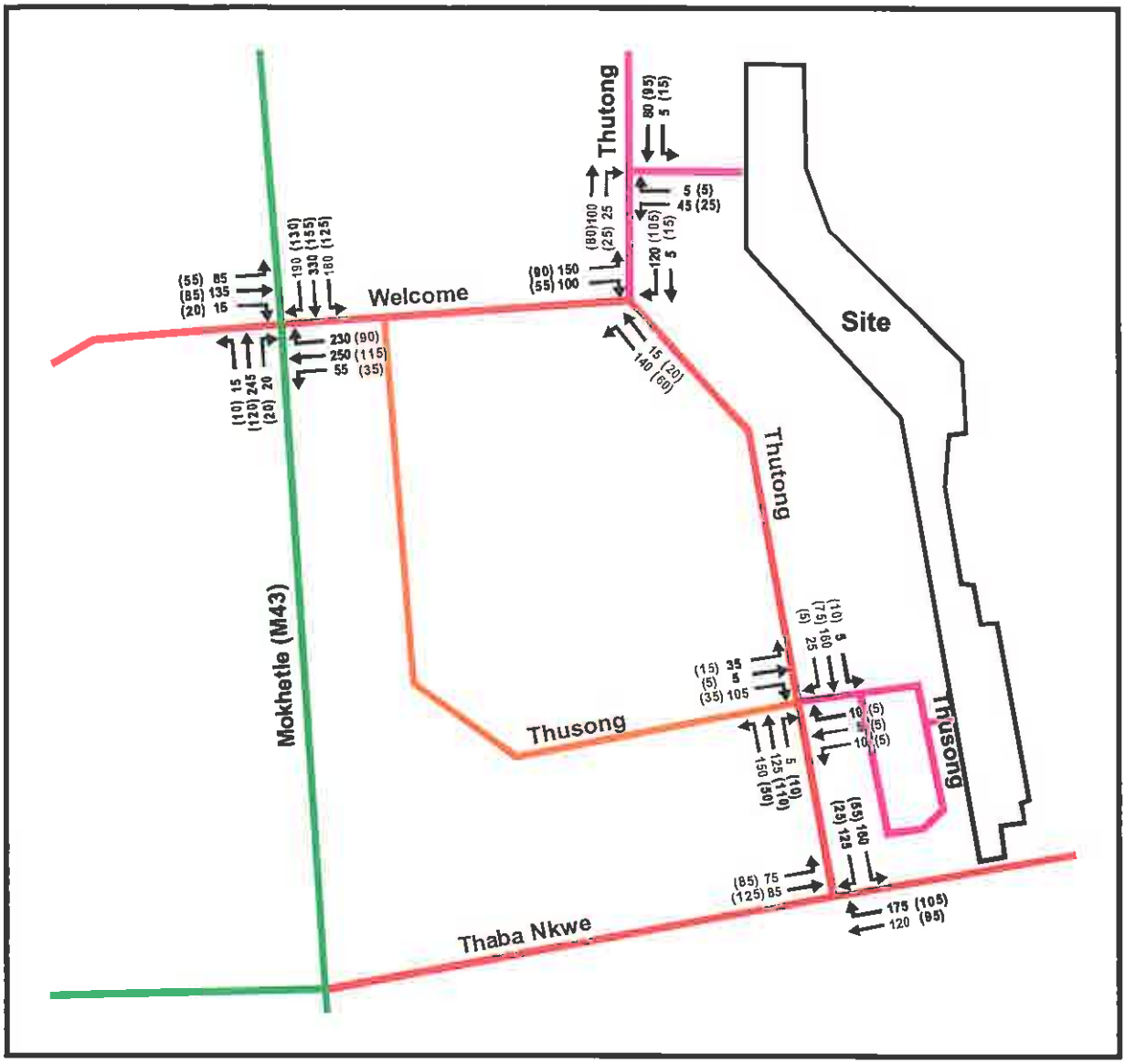


FIGURE 3: TRAFFIC VOLUMES - 2023

- **Traffic control**

The current traffic control at the identified intersections is as follows:

- Modisabana & Thutong — mini roundabout control
- Mokhetle (M43) & Welcome — priority stop control
- Welcome & Thutong — mini roundabout control
- Thusong & Thutong — priority stop control
- Thaba Nkwe & Thutong — priority stop control

4. TRIP GENERATION AND DISTRIBUTION

4.1. Estimated trip generation

The estimated generated trips, are taken from the Committee of Transport Officials (COTO) "TMH 17, Volume 1 - South African Trip Data Manual, Version 1.0, September 2012". Where rates are not available in the document from the former or where the land use contained in the document does not represent the proposed land use well enough, the rates suggested in the *"Trip Generation, 6th edition, Volume 1, 1997"* of the Institute of Transportation Engineers have been applied.

The application at this stage is for the zoning for a "Residential 3" for the development of both townships to a total of 820 units. The total trip generation by the land use for low vehicle ownership is summarised in **Table 2** below.

TABLE 2: TRIPS GENERATED BY THE LAND USE

Land use	Units	Trip Rate	Trips	Peak	Split	In	Out
Extension 7 Residential 3	328	0.45/unit	149	AM	25:75	37	112
				PM	70:30	104	45
Extension 8 Residential 3	492	0.45/unit	224	AM	25:75	56	168
				PM	70:30	157	67
TOTAL	820	0.45/unit	373	AM	25:75	93	280
				PM	70:30	261	112

4.2 Modal split

Due to the nature of the development, it is expected that most of the traffic generated by the development will consist of light vehicles during the peak hours.

4.3 Trip allocation

The trips generated by the development have been manually allocated to and from the development, in line with to the existing traffic flow patterns in the area and the attraction to and from the typical feeding areas. The trip allocation is depicted in **Figure 4**.

Since the generated trips are more than 50 trips in the peak hours, further assessment of the intersections/junctions need to be made with the generated trips on top of the background traffic for all key intersections. This is further discussed in Section 6.1.

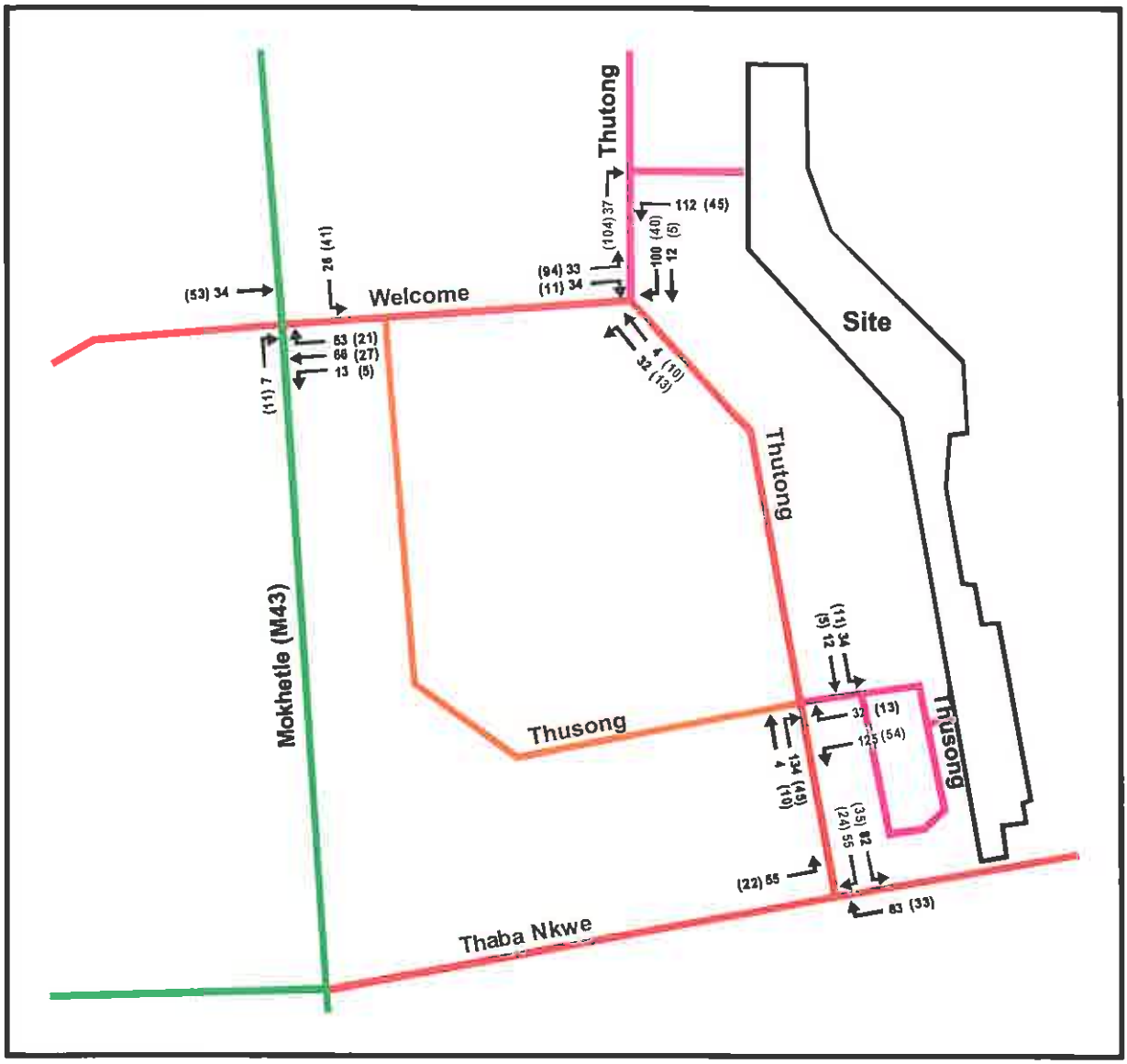


FIGURE 4: GENERATED TRIP ALLOCATION

5. EVALUATION OF BACKGROUND TRAFFIC

5.1 Current Traffic (2017)

The results of the assessment of the relevant intersections under **current existing layout and control conditions** (the performance (LOS) and V/C) of the intersections are summarised in **Table 3** below.

TABLE 3: INTERSECTION PERFORMANCE - 2018 CONDITIONS

Intersection	Peak	Over all	North			East			South			West		
			R	S	L	R	S	L	R	S	L	R	S	L
Thutong & Modisabana	AM	A		A	A	A		A	A	A				
		0.10		0.06	0.06	0.04		0.04	0.10	0.10				
	PM	A		A	A	A		A	A	A				
		0.09		0.09	0.09	0.03		0.03	0.07	0.07				
Mokhetle (M43) & Welcome	AM	F	F	F	F	A	A	A	F	F	F	A	A	A
		3.20	3.20	3.20	3.20	0.39	0.39	0.39	1.58	1.58	1.58	0.16	0.16	0.16
	PM	C	C	C	B	A	A	A	C	B	B	A	A	A
		0.58	0.58	0.58	0.58	0.14	0.14	0.14	0.31	0.31	0.31	0.08	0.08	0.08
Thutong & Welcome	AM	A		A	A		A	A	A	A				
		0.21		0.10	0.10		0.15	0.15	0.21	0.21				
	PM	A		A	A		A	A	A	A				
		0.12		0.09	0.09		0.07	0.07	0.12	0.12				
Thutong & Thusong	AM	B	A	A	A	B	B	A	A	A	A	B	B	A
		0.27	0.11	0.11	0.11	0.03	0.03	0.03	0.14	0.14	0.14	0.27	0.27	0.27
	PM	A	A	A	A	A	A	A	A	A	A	A	A	A
		0.08	0.05	0.05	0.05	0.01	0.01	0.01	0.08	0.08	0.08	0.08	0.08	0.08
Thutong & Thaba Nkwe	AM	B	B		A	A	A						A	A
		0.37	0.37		0.37	0.19	0.19						0.08	0.08
	PM	B	B		A	A	A						A	A
		0.14	0.11		0.11	0.14	0.14						0.10	0.10

R- Right S - Straight L - Left X - Continuous movement

* The V/C=1.00 is due to the short lanes overflowing into adjacent lanes

** Long delays, very low volumes

From the information summarised in **Table 3**, one of the five intersections is NOT performing satisfactory within the acceptable LOS D (for urban intersections) and V/C < 0.95, during the AM and/or PM peaks under the current traffic conditions and existing layouts.

The following improvements are required:

Mokhetle (M43) & Welcome

- **Introduce a mini roundabout**

The results of the assessment of the relevant intersections under the **improved control and layout conditions** (the performance (LOS) and V/C) of the intersections are summarised in

Table 3A below, showing the impact of the improvements on the performance of the intersection.

TABLE 3A: INTERSECTION PERFORMANCE - 2018 CONDITIONS (IMPROVED)

Intersection	Peak	Over all	North			East			South			West		
			R	S	L	R	S	L	R	S	L	R	S	L
Mokhetle (M43) & Welcome	AM	B	B	A	A	C	C	C	B	B	B	B	B	B
		0.88	0.71	0.71	0.71	0.88	0.88	0.88	0.62	0.62	0.62	0.46	0.46	0.46
	PM	A	A	A	A	A	A	A	A	A	A	A	A	A
		0.31	0.31	0.31	0.31	0.24	0.24	0.24	0.20	0.20	0.20	0.16	0.16	0.16

R- Right S - Straight L - Left X - Continuous movement

* The V/C=1.00 is due to the short lanes overflowing into adjacent lanes

** Long delays, very low volumes

5.2 Future Traffic (2023)

The results of the assessment of the relevant intersections under **future layout and control conditions** (the performance (LOS) and V/C) of the intersections are summarised in **Table 4** below.

TABLE 4: INTERSECTION PERFORMANCE - 2023 CONDITIONS

Intersection	Peak	Over all	North			East			South			West		
			R	S	L	R	S	L	R	S	L	R	S	L
Thutong & Modisabana	AM	A		A	A	A		A	A	A				
		0.12		0.08	0.08	0.05		0.05	0.12	0.12				
	PM	A		A	A	A		A	A	A				
		0.11		0.11	0.11	0.04		0.04	0.08	0.08				
Mokhetle (M43) & Welcome (mini roundabout)	AM	D	B	B	B	F	F	F	C	C	C	B	B	B
		1.21	0.87	0.87	0.87	1.21	1.21	1.21	0.73	0.73	0.73	0.57	0.57	0.57
	PM	A	A	A	A	B	A	A	B	A	A	A	A	A
		0.38	0.38	0.38	0.38	0.31	0.31	0.31	0.26	0.26	0.26	0.21	0.21	0.21
Thutong & Welcome	AM	A		A	A		A	A	A	A				
		0.25		0.13	0.13		0.18	0.18	0.25	0.25				
	PM	A		A	A		A	A	A	A				
		0.15		0.11	0.11		0.09	0.09	0.15	0.15				
Thutong & Thusong	AM	C	A	A	A	B	B	A	A	A	A	C	C	B
		0.36	0.13	0.13	0.13	0.06	0.06	0.06	0.17	0.17	0.17	0.36	0.36	0.36
	PM	B	A	A	A	B	B	A	A	A	A	B	B	A
		0.11	0.06	0.06	0.06	0.03	0.03	0.03	0.09	0.09	0.09	0.11	0.11	0.11
Thutong & Thaba Nkwe	AM	C	C		B	A	A						A	A
		0.49	0.49		0.49	0.23	0.23						0.10	0.10
	PM	B	B		A	A	A						A	A
		0.17	0.15		0.15	0.17	0.17						0.12	0.12

R- Right S - Straight L - Left X - Continuous movement

* The V/C=1.00 is due to the short lanes overflowing into adjacent lanes

** Long delays, very low volumes

From the information summarised in **Table 4**, one of the five intersections is NOT performing satisfactory within the acceptable LOS D (for urban intersections) and V/C < 0.95, during the AM and/or PM peaks under the future traffic conditions and further improvements are necessary, as set out below.

The following improvements are required:

Mokhetle (M43) & Welcome

- **Introduce a left-turn slip lane on the eastern approach (Welcome) with 60m storage capacity**

The results of the assessment of the relevant intersections under the **improved control and layout conditions** (the performance (LOS) and V/C) of the intersections are summarised in **Table 4A** below, showing the impact of the improvements on the performance of the intersection.

TABLE 4A: INTERSECTION PERFORMANCE - 2023 CONDITIONS (IMPROVED)

Intersection	Peak	Over all	North			East			South			West		
			R	S	L	R	S	L	R	S	L	R	S	L
Mokhetle (M43) & Welcome (left-turn slip)	**AM**	**C**	B	B	B	C	C	A	D	D	D	B	B	B
		0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.86	0.86	0.86	0.60	0.60	0.60
	PM	**A**	A	A	A	A	A	A	A	A	A	A	A	A
		0.38	0.38	0.38	0.38	0.21	0.21	0.21	0.26	0.26	0.26	0.21	0.21	0.21

R- Right S - Straight L - Left X - Continuous movement

* The V/C=1.00 is due to the short lanes overflowing into adjacent lanes

** Long delays, very low volumes

6. TRAFFIC ASSESSMENT WITH PROPOSED DEVELOPMENT

6.1 Key Intersections

The extent of the study area is established, based on the a number of criteria as set out in Section 2.4. The traffic generated by this development as a percentage of the available capacity of the peak-hour through the main intersections in the vicinity of the development, satisfying the above requirements, is summarised in **Table 5** below.

TABLE 5: GENERATED TRAFFIC THROUGH INTERSECTION

No	Intersection	% of most critical peak period	Key Intersection
1	Modisabana & Thutong	5,6%	Yes
2	Mokhetle (M43) & Welcome	33,1%	Yes
3	Welcome & Thutong	13,4%	Yes
4	Thusong & Thutong	14,8%	Yes
5	Thaba Nkwe & Thutong	7,8%	Yes

From the above, **all of the five intersections above qualify as a key intersections** (generated trips through them less than 5% of intersection capacity), and only need to be assessed with the background traffic conditions (see Section 5 above).

6.2 Intersection/Junction Performance

6.2.1 Modisabana & Thutong

The results of the performance (LOS and V/C) of the above intersection without any improvements are summarised in **Table 6** below.

TABLE 6: MODISABANA & THUTONG: INTERSECTION PERFORMANCE

Intersection	Peak	Over all	North			East			South			West		
			R	S	L	R	S	L	R	S	L	R	S	L
2018	AM	A		A	A	A		A	A	A				
		0.15		0.15	0.15	0.13		0.13	0.07	0.07				
	PM	A		A	A	A		A	A	A				
		0.15		0.09	0.09	0.15		0.15	0.10	0.10				
2023	AM	A		A	A	A		A	A	A				
		0.23		0.09	0.09	0.16		0.16	0.23	0.23				
	PM	A		A	A	A		A	A	A				
		0.21		0.13	0.13	0.10		0.10	0.21	0.21				

R- Right S - Straight L - Left X - Continuous movement

* The V/C=1.00 is due to the short lanes overflowing into adjacent lanes

** Long delays, very low volumes

From the information summarised in **Table 6**, the intersection is performing satisfactory within the acceptable LOS D (for urban intersections) and V/C < 0.95, during the AM and PM peaks under expected 2018 and 2023 traffic conditions and **no further improvements are required.**

6.2.2 Mokhetle (M43) & Welcome

The results of the performance (LOS and V/C) of the above intersection without any improvements are summarised in **Table 7** below.

TABLE 7: MOKHETLE (M43) & WELCOME: INTERSECTION PERFORMANCE

Intersection	Peak	Over all	North			East			South			West		
			R	S	L	R	S	L	R	S	L	R	S	L
2018	AM	D	B	B	B	F	F	F	C	C	C	B	B	B
		1.16	0.81	0.81	0.81	1.16	1.16	1.16	0.69	0.69	0.69	0.56	0.56	0.56
	PM	A	A	A	A	A	A	A	B	A	A	A	A	A
		0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.24	0.24	0.24	0.24	0.24	0.24
2023	AM	E	D	D	D	F	F	A	F	F	F	C	C	C
		1.10	0.99	0.99	0.99	1.10	1.10	1.10	1.02	1.02	1.02	0.72	0.72	0.72
	PM	A	A	A	A	A	A	A	B	A	B	B	A	A
		0.47	0.47	0.47	0.47	0.28	0.28	0.28	0.30	0.30	0.30	0.30	0.30	0.30

R- Right S - Straight L - Left X - Continuous movement

* The V/C=1.00 is due to the short lanes overflowing into adjacent lanes

** Long delays, very low volumes

From the information summarised in **Table 7**, the intersection is not performing satisfactory within the acceptable LOS D (for urban intersections) and V/C < 0.95, during the AM and PM peaks under expected 2018 and 2023 traffic conditions and **further improvements are required.**

2018

- **Introduce a left-turn slip lane on the eastern approach (Welcome)**

2023

- **Introduce traffic signal control**
- **Provide a dedicated right-turn lane on the eastern approach (Welcome) with a 60m storage capacity**
- **Provide a dedicated right-turn lane on the northern approach (Mokhetle) with a 60m storage capacity**

The results of the assessment of the relevant intersections under the **improved control and layout conditions** (the performance (LOS) and V/C) of the intersections are summarised in **Table 7A** below, showing the impact of the improvements on the performance of the intersection.

TABLE 7A: MOKHETLE (M43) & WELCOME: INTERSECTION PERFORMANCE - IMPROVED

Intersection	Peak	Over all	North			East			South			West		
			R	S	L	R	S	L	R	S	L	R	S	L
2018 (slip lane)	AM	B	B	B	B	C	C	A	C	C	C	B	B	B
		0.85	0.81	0.81	0.81	0.85	0.85	0.85	0.80	0.80	0.80	0.58	0.85	0.85
	PM	A	A	A	A	A	A	A	B	A	A	A	A	A
		0.38	0.38	0.38	0.38	0.28	0.28	0.28	0.24	0.24	0.24	0.24	0.24	0.24
2023 (signalised)	AM	C	C	D	D	D	B	B	C	C	C	B	B	B
		0.95	0.64	0.95	0.95	0.95	0.56	0.56	0.83	0.83	0.83	0.54	0.54	0.54
	PM	B	C	B	B	C	B	C	B	B	B	C	B	C
		0.40	0.25	0.40	0.40	0.33	0.29	0.29	0.36	0.36	0.36	0.38	0.38	0.38

R- Right S - Straight L - Left X - Continuous movement

* The V/C=1.00 is due to the short lanes overflowing into adjacent lanes

** Long delays, very low volumes

From the information summarised in **Table 7A**, the intersection is performing satisfactory within the acceptable LOS D (for urban intersections) and V/C < 0.95, during the AM and PM peaks under expected 2018 and 2023 traffic conditions with the proposed improvements.

6.2.3 Welcome & Thutong

The results of the performance (LOS and V/C) of the above intersection without any improvements are summarised in **Table 8** below.

TABLE 8: WELCOME & THUTONG: INTERSECTION PERFORMANCE

Intersection	Peak	Over all	North			East			South			West		
			R	S	L	R	S	L	R	S	L	R	S	L
2018	AM	A		A	A	A		A	A	A				
		0.28		0.23	0.23	0.22		0.22	0.28	0.28				
	PM	A		A	A	A		A	A	A				
		0.23		0.14	0.14	0.10		0.10	0.23	0.23				
2023	AM	A		A	A	A		A	A	A				
		0.32		0.25	0.25	0.25		0.25	0.32	0.32				
	PM	A		A	A	A		A	A	A				
		0.26		0.16	0.16	0.12		0.12	0.26	0.26				

R- Right S - Straight L - Left X - Continuous movement

* The V/C=1.00 is due to the short lanes overflowing into adjacent lanes

** Long delays, very low volumes

From the information summarised in **Table 8**, the intersection is performing satisfactory within the acceptable LOS D (for urban intersections) and V/C < 0.95, during the AM and PM peaks under expected 2018 and 2023 traffic conditions and **no further improvements are required.**

6.2.4 Thusong & Thutong

The results of the performance (LOS and V/C) of the above intersection without any improvements are summarised in **Table 9** below.

TABLE 9: THUSONG & THUTONG: INTERSECTION PERFORMANCE

Intersection	Peak	Over all	North			East			South			West		
			R	S	L	R	S	L	R	S	L	R	S	L
2018	AM	C	A	A	A	C	C	A	A	A	A	D	C	B
		0.49	0.14	0.14	0.14	0.37	0.37	0.37	0.29	0.29	0.29	0.49	0.49	0.49
	PM	B	A	A	A	B	B	A	A	A	A	B	B	A
		0.14	0.06	0.06	0.06	0.14	0.14	0.14	0.12	0.12	0.12	0.10	0.10	0.10
2023	AM	D	A	A	A	C	D	B	A	A	A	E	D	C
		0.69	0.17	0.17	0.17	0.46	0.46	0.46	0.32	0.32	0.32	0.69	0.69	0.69
	PM	B	A	A	A	B	B	A	A	A	A	B	B	A
		0.18	0.08	0.08	0.08	0.18	0.18	0.18	0.14	0.14	0.14	0.13	0.13	0.13

R- Right S - Straight L - Left X - Continuous movement

* The V/C=1.00 is due to the short lanes overflowing into adjacent lanes

** Long delays, very low volumes

From the information summarised in **Table 9**, the intersection is performing satisfactory within the acceptable LOS D (for urban intersections) and V/C < 0.95, during the AM and PM peaks under expected 2018, but not satisfactory under 2023 traffic conditions and **further improvements are required.**

2023

- **Introduce a mini roundabout**

The results of the assessment of the relevant intersections under the **improved control and layout conditions** (the performance (LOS) and V/C) of the intersections are summarised in **Table 9A** below, showing the impact of the improvements on the performance of the intersection.

TABLE 9A: THUSONG & THUTONG: INTERSECTION PERFORMANCE - IMPROVED

Intersection	Peak	Over all	North			East			South			West		
			R	S	L	R	S	L	R	S	L	R	S	L
2018	AM													
	PM													
2023 (mini circle)	AM	C	C	D	D	D	B	B	C	C	C	B	B	B
		0.95	0.64	0.95	0.95	0.95	0.56	0.56	0.83	0.83	0.83	0.54	0.54	0.54
	PM	B	C	B	B	C	B	C	B	B	B	C	B	C
		0.40	0.25	0.40	0.40	0.33	0.29	0.29	0.36	0.36	0.36	0.38	0.38	0.38

R- Right S - Straight L - Left X - Continuous movement

* The V/C=1.00 is due to the short lanes overflowing into adjacent lanes

** Long delays, very low volumes

From the information summarised in **Table 9A**, the intersection is performing satisfactory within the acceptable LOS D (for urban intersections) and V/C < 0.95, during the AM and PM peaks under expected 2023 traffic conditions with the proposed improvements.

6.2.5 Thaba Nkwe & Thutong

The results of the performance (LOS and V/C) of the above intersection without any improvements are summarised in **Table 10** below.

TABLE 10: THABA NKWE & THUTONG: INTERSECTION PERFORMANCE

Intersection	Peak	Over all	North			East			South			West		
			R	S	L	R	S	L	R	S	L	R	S	L
2018	AM	D	E		C	A	A						A	A
		0.79	0.79		0.79	0.36	0.36						0.12	0.12
	PM	B	B		A	A	A						A	A
		0.24	0.24		0.24	0.18	0.18						0.12	0.12
2023	AM	D	E		D	A	A						A	A
		0.87	0.87		0.87	0.33	0.33						0.13	0.13
	PM	B	C		A	A	A						A	A
		0.30	0.30		0.30	0.21	0.21						0.14	0.14

R- Right S - Straight L - Left X - Continuous movement
* The V/C=1.00 is due to the short lanes overflowing into adjacent lanes
** Long delays, very low volumes

From the information summarised in **Table 10**, the intersection is not performing satisfactory within the acceptable LOS D (for urban intersections) and V/C < 0.95, during the AM and PM peaks under expected 2018 and 2023 traffic conditions and **further improvements are required.**

2018

- **Introduce a mini roundabout**

The results of the assessment of the relevant intersections under the **improved control and layout conditions** (the performance (LOS) and V/C) of the intersections are summarised in **Table 10A** below, showing the impact of the improvements on the performance of the intersection.

TABLE 10A: THABA NKWE & THUTONG: INTERSECTION PERFORMANCE - IMPROVED

Intersection	Peak	Over all	North			East			South			West		
			R	S	L	R	S	L	R	S	L	R	S	L
2018 (mini circle)	AM	A	A		A	A	A						A	A
		0.43	0.32		0.32	0.43	0.43						0.27	0.27
	PM	A	A		A	A	A						A	A
		0.21	0.15		0.15	0.19	0.19						0.21	0.21
2023 (mini circle)	AM	A	A		A	A	A						A	A
		0.41	0.38		0.38	0.41	0.41						0.29	0.29
	PM	A	A		A	A	A						A	A
		0.26	0.18		0.18	0.22	0.22						0.26	0.26

R- Right S - Straight L - Left X - Continuous movement

* The V/C=1.00 is due to the short lanes overflowing into adjacent lanes

** Long delays, very low volumes

From the information summarised in **Table 10A**, the intersection is performing satisfactory within the acceptable LOS D (for urban intersections) and V/C < 0.95, during the AM and PM peaks under expected 2018 and 2023 traffic conditions with the proposed improvements.

6.3 Access

The access to the development will be from Thutong Street at two locations. Access to Extension 7 will be via Modisabana Street in the north and that to Extension 8, via Thusong Street in the south. Access security to the developments is not expected to be introduced.

Since the two townships will each have its separate access, which will be a public road, no further requirements will be posed in this report.

6.4 Traffic control

The type of traffic control at the intersection will be as follows (see **Table 6** for improvement schedule):

	Current control	**Future control**
• Modisabana & Thutong	mini circle control	mini circle control
• Mokhetle (M43) & Welcome	priority stop control	traffic signal control
• Welcome & Thutong	mini circle control	mini circle control
• Thusong & Thutong	priority stop control	mini circle control
• Thaba Nkwe & Thutong	priority stop control	mini circle control

6.5 Parking

The parking requirement for this development as prescribed in the guidelines contained in the *"Parking Standards, PG 3/85 (second edition)"* published by the Department of Transport and Part 5 of the "*Tshwane Town-Planning Scheme 2008 (Revised 2014)*" of the Tshwane Metropolitan Municipality, are to be provided on site.

All parking for the developments are to be provided on-site. Two parking scenarios are provided. The maximum requirement will be where residential units have three habitable rooms or more and the minimum, where the units have two habitable rooms or less. However, it is envisaged at this stage to cater for the latter of the two scenarios above. Since this area is associated with low car ownership, the total number of parking spaces to be provided on site according to the Tshwane Town-Planning Scheme, is to be scaled down in proportion to the reduction in the expected trips to be generated by such developments. In this regard, the normal parking ratio is to be reduced by 35%. However, since such a provision is still expected to be on the high side, no additional provision will be made for parking for visitors (expected to be included in the total number of parking spaces being provided). The total number of parking bays to be provided, will therefore be **213 spaces for Soshanguve X7** and **320 spaces for Soshanguve X8**.

6.6 Public Transport

6.5.1 Introduction

In terms of the National Land Transport Transition Act, Act 5 of 2009, it is also required that a public transport assessment should be carried out as part of the traffic evaluation of all new developments.

The assessment need to address aspects such as the number of new employment opportunities that will be created for workers, the expected travelling pattern of workers, as well as the impact it may have on the existing public transport network.

6.5.2 Existing Public Transport Infrastructure

Mokhetle (M43), Welcome and Thutong Street are all public transport routes in the area, both for Tshwane's public transport service, but also frequented by taxis and other bus services. Both developments are situated fairly close to Thutong Street. The access of Soshanguve X7 is located approximately 450m from the intersection of Welcome and Thutong located on the public transport route, while the access of Soshanguve X8 is located less than 350m from the intersection of Thusong and Thutong, also located on the public transport route. It could therefore easily be utilised by residents, without any further action required from either the local authority or the developer.

6.5.3 Proposed Public Transport Infrastructure

The proposed developments will be located close to Thutong Street and within walking distance of the available public transport. This is therefore in line with the objectives of the National Transport Policy (published by the Department of Transport in September 1996), aiming to limit walking distances for public transport users to **less than 1km in urban areas**. The study area is therefore well served and no additional public transport planning is required at this point in time.

7. CAPACITY ANALYSIS CONCLUSIONS

It is proposed in the "TMH 16 (Volume 1), South African Traffic Impact and Site Traffic Assessment Manual, Version 1.0, August 2012", that the developer mitigate the traffic impact of the proposed development under the following circumstances:

- If and where the Level-of-Service (LOS) of any element of a facility drops below LOS D in an urban environment or LOS C in a rural environment; or
- If the Volume-Capacity (V/C) ratio of any element of a facility increases above 0,95 and
- If the contribution of the development is at least 5% of the sum of the critical lane volumes of the element of a facility.

In terms of the above warrants for mitigation measures and the results of the analysis, the mitigation measures are summarised in **Table 11** below.

The measures and contributions in the table below are based on the background (existing) traffic, the traffic generated by other developments in the vicinity, and the proposed development as well as the traffic growth assumed in this report. The final contribution of the developer will be a matter of negotiation, based on the above, with the proportional contributions as proposed in the findings of this report, as well as additional information not available at this stage, at the time of establishment of the final contribution.

TABLE 11: PROPOSED MITIGATION MEASURES AND CONTRIBUTIONS

Intersection	Year	Mitigation Measures	Responsibility		
			Gautrans	Tshwane	Development
Modisbana & Thutong	2018	• None	NA	NA	NA
	2023	• None	NA	NA	NA
Welcome & Mokhetle (M43)	2018	• Introduce a mini roundabout • Introduce a left-turn slip lane on the eastern approach (Welcome) with a 60m storage capacity (for Soshanguve X7)	NA NA	100% 50%	0% 50%
	2023	• Introduce a traffic signal • Provide a dedicated right-turn lane on the eastern approach (Welcome) with a 60m storage capacity (for Soshanguve X7) • Provide a dedicated right-turn lane on the northern approach (Mokhetle) with a 60m storage capacity (for Soshanguve X7)	NA NA NA	0% 0% 0%	100% 100% 100%
Welcome & Thutong	2018	• None	NA	NA	NA
	2023	• None	NA	NA	NA
Thusong & Thutong	2018	• None	NA	NA	NA
	2023	• Introduce a mini roundabout (for Soshanguve X8)	NA	0%	100%

Intersection	Year	Mitigation Measures	Responsibility		
			Gautrain	Tshwane	Development
Thaba Nkwe & Thutong	2018	• Introduce a mini roundabout (for Soshanguve X8)	NA	0%	100%
	2023	• None	NA	NA	NA

In the event of the event of Tshwane not able to meet its responsibilities as depicted in **Table 11** above, the developer could be requested to undertake the necessary improvements on behalf of Tshwane, the cost of such improvements are then to be deducted from the bulk contributions for roads and stormwater, for each particular phase of the development and applied within these financial constraints - therefore improvements that could be financially covered by each phase's contribution value. Since such improvements referred to here, are not the responsibility of the developer, such improvements are not linked to any specific phase of the project and could be completed at any stage of the development, as affordable by the developer.

It is therefore recommended that the improvements, (due to background traffic) mentioned in **Table 11** above, be completed at such a stage of the development (but before completion of the total development), as affordable by the developer and not exceeding the total amount available as bulk contributions for the total development. Where improvements mentioned in this report, have already been completed by the time of the signing of a Services Agreement between the developer and Tshwane, such improvements would be regarded as not applicable any more and therefore not part of any responsibility, whatsoever, to the developer.

8. ESTIMATED COST OF IMPROVEMENTS

The estimated cost of the improvements proposed in the assessment, is summarised in **Table 12** below.

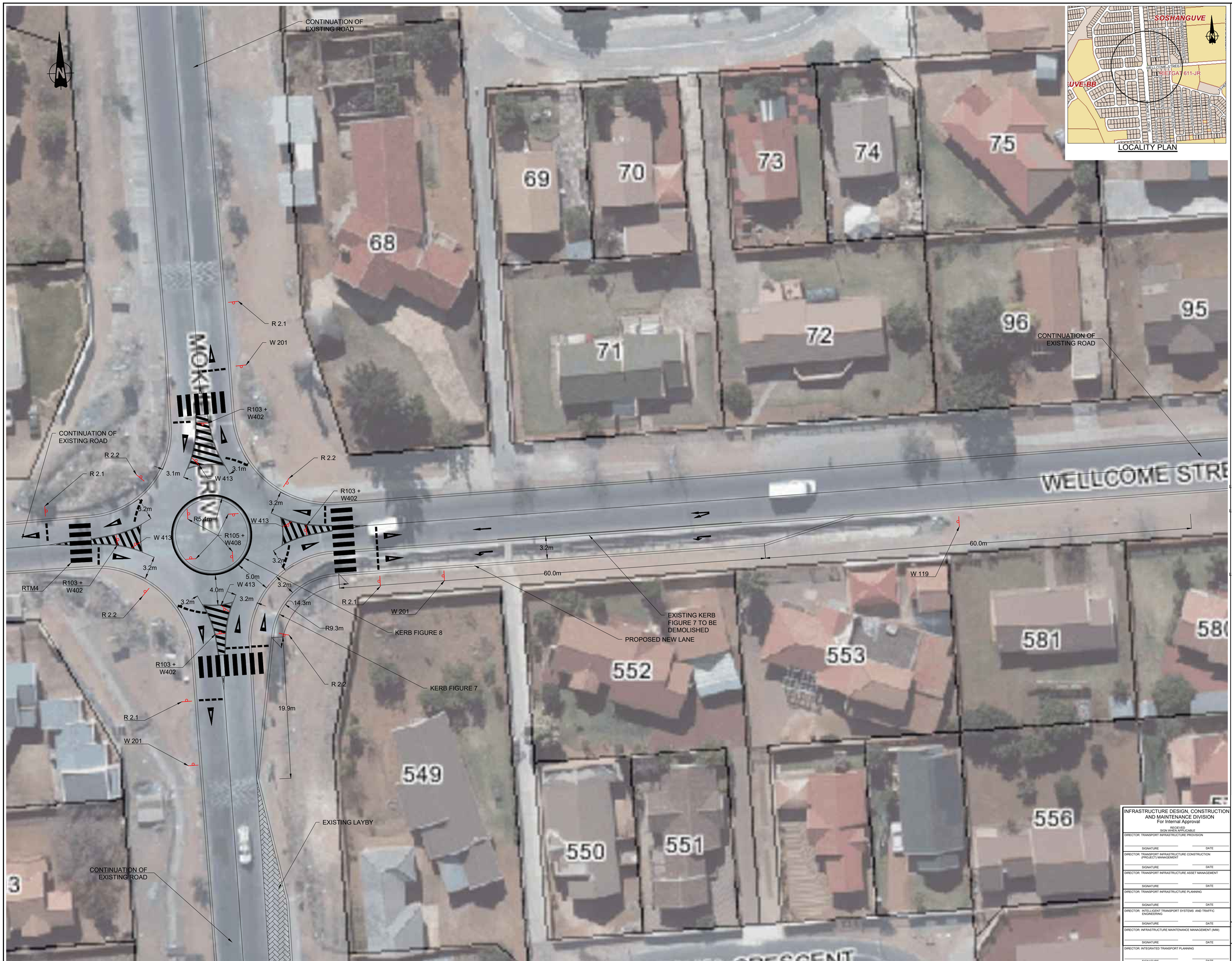
TABLE 12: ESTIMATED COST OF IMPROVEMENTS

Intersection	Year	Estimated Value of Responsibility	
		Tshwane/Gautrans	Development
Welcome & Mokhetle (M43)	2018	R 272,500	R 247,500
	2023	R 0	R 1,198,000
Thusong & Thutong	2018	R 0	R 0
	2023	R 0	R 25,000
Thaba Nkwe & Thutong	2018	R 0	R 25,000
	2023	R 0	R 0
TOTAL	2018	R 272,500	R 272,500
	2023	R 0	R 1,198,000

9. RECOMMENDATIONS

Based on the findings of this study into the traffic conditions in the vicinity of the proposed development, it is recommended that this traffic impact study be accepted and the application for the development of **Soshanguve Extension 7 and Soshanguve Extension 8**, be approved subject to the following conditions:

- The **Developer** must comply with the access arrangements, parking requirements and road upgrades, which are the **Developer's** responsibility, as stated in the Traffic Impact Study. All such road improvements must be in place before a Section 82 or Section 101 certificate (as applicable) will be issued by the **Tshwane Metropolitan Municipality**.
- The minimum number of parking spaces to be provided on-site, are to be provided as indicated in the *"Parking Standards, PG 3/85 (second edition)"* published by the Department of Transport and Part 5 of the "*Tshwane Town-Planning Scheme 2008 (Revised 2014)*" of the Tshwane Metropolitan Municipality.
- All costs for the upgrading of the roads infrastructure and provision of access will be for the account of the responsible entity as indicated in the mitigation measures proposed in **Table 11** and must be discussed with the Section: Infrastructure Planning and Management to be incorporated where necessary, in the Services Agreement between the **Developer** and the **Tshwane Metropolitan Municipality**.
- A Site Development Plan indicating the access, is to be submitted for approval. If a security gate is to be used at the access point, it should be located in such a way that ample storage area is provided in order not to congest the road reserve, as proposed in the impact study.
- Access points and road upgrading of the road infrastructure will only be valid if all the geometric requirements that might be required by the Manager: Roads and Stormwater **Tshwane Metropolitan Municipality** can be met. The planning, design and construction of the access and road infrastructure shall be done in accordance with the latest specifications, and no work inside the road reserve may be done without written permission of the Division: Roads and Stormwater **Tshwane Metropolitan Municipality** obtained (for work involving metropolitan roads) and **Gautrans** (for work involving provincial roads).
- All design plans must be submitted to the Division: Roads and Stormwater **Tshwane Metropolitan Municipality** for approval and/or **Gautrans** as may be required.
- The needs of pedestrians should be taken into consideration in the planning and the design of the access to the development as well as the design of the road infrastructure.
- The requirements for public transport, as identified in the impact study, are to be provided for.
- The applicant will be responsible to obtain any additional road reserve that may be required for the provision of new roads or any additional lanes, applicable to this development.



LOCALITY PLAN

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 CTMM 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.

NOTES

1 KERBING TO BE AS PER STANDARD DETAIL PLANS A AND B AND SECTION 10 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 VERTICAL AND HORIZONTAL ALIGNMENT TO FOLLOW THE EXISTING ROAD SURFACE, WITH A MINIMUM CROSS FALL OF 2 % (IF APPLICABLE)

4 NEW ROAD SURFACES TO MATCH EXISTING INFRASTRUCURE UNLESS SPECIFIED OTHERWISE

AMENDMENTS

NR.	DATE	APPROVED	DESCRIPTION	PAR.

DESIGNED	DRAWN
LF DOS SANTOS	LF DOS SANTOS
SIGNATURE DATE	
DESIGN CHECKED BY: LF DOS SANTOS (SIGNATURE DATE)	INFRASTRUCTURE TECHNICAL INFORMATION MANAGEMENT: D.J. CHALMERS (SIGNATURE DATE)

PROJECT STATUS

● CONCEPT DRAWING ○ TENDER DRAWING ○ APPROVED FOR CONSTRUCTION DRAWING ○ AS BUILT DRAWING

PROJECT ENGINEER (CONSULTANT):

LF DOS SANTOS

INITIALS AND SURNAME | SIGNATURE AND Pr. No. | DATE

INSPECTOR OF WORKS (CITY OF TSHWANE):

INITIALS AND SURNAME | SIGNATURE AND Pr. No. | DATE

CONSULTANT DETAIL

PVA CONSULTING ENGINEERS cc
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LEAD Land Engineering And Developments Pty Ltd

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CITY OF TSHWANE

ROADS AND TRANSPORT DEPARTMENT

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Ms. L. V. Kegakilwe-Piki
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0001

DRAWING APPROVED BY EXECUTIVE DIRECTOR
Ms. L. V. Kegakilwe-Piki

SIGNATURE: DATE:

INFRASTRUCTURE DESIGN, CONSTRUCTION AND MAINTENANCE DIVISION
For Internal Approval
RECEIVED
SIGN WHEN APPLICABLE

DIRECTOR: TRANSPORT INFRASTRUCTURE PROVISION	SIGNATURE DATE
DIRECTOR: TRANSPORT INFRASTRUCTURE CONSTRUCTION (PROJECT) MANAGEMENT	SIGNATURE DATE
DIRECTOR: TRANSPORT INFRASTRUCTURE ASSET MANAGEMENT	SIGNATURE DATE
DIRECTOR: TRANSPORT INFRASTRUCTURE PLANNING	SIGNATURE DATE
DIRECTOR: INTELLIGENT TRANSPORT SYSTEMS AND TRAFFIC ENGINEERING	SIGNATURE DATE
DIRECTOR: INFRASTRUCTURE MAINTENANCE MANAGEMENT (MM)	SIGNATURE DATE
DIRECTOR: INTEGRATED TRANSPORT PLANNING	SIGNATURE DATE

0 10 20 40 60 80m
SCALE 1:1000

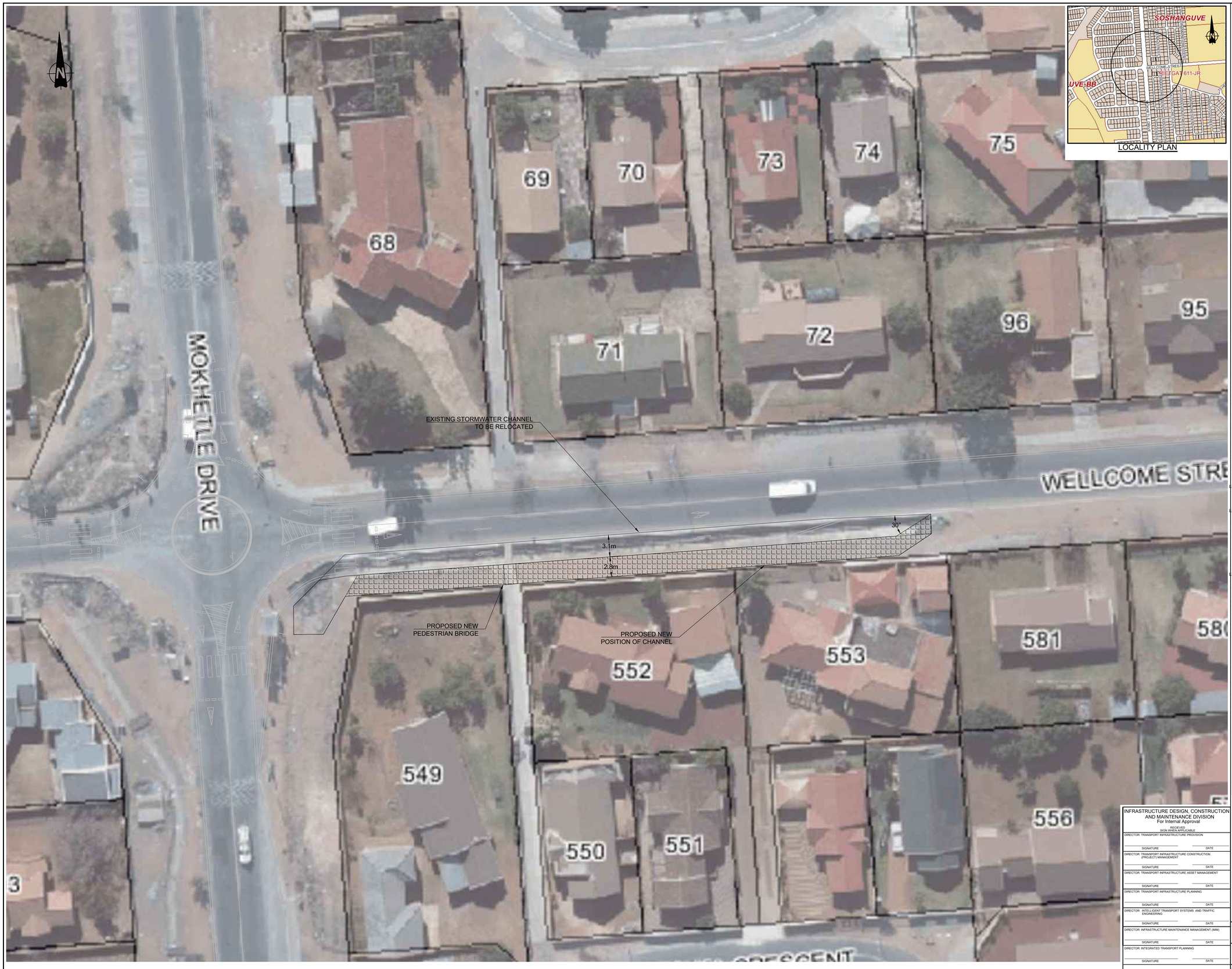
LOCATION OF PROJECT:

C/O MOKHETLE (M43) & WELCOME STREET, SOSHANGUVE

DESCRIPTION OF PROJECT

PROPOSED ROAD UPGRADES FOR THE INTRSECTION OF MOKHETLE (M43) & WELCOME STREET

CONTRACT No.:	PROJECT No. :
1763	1763
DATE : MARCH2018	SCALE : 1:250
ORIGINAL PAPER SIZE: A1	
DRAWING NO. 1763.03U01	SHEET NO: 1
REVISION 0	



LOCALITY PLAN

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 CTMM 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.

1 KERBING TO BE AS PER STANDARD DETAIL PLANS A AND B AND SECTION 10 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 VERTICAL AND HORIZONTAL ALIGNMENT TO FOLLOW THE EXISTING ROAD SURFACE, WITH A MINIMUM CROSS FALL OF 2 % (IF APPLICABLE)

AMENDMENTS

NR.	DATE	APPROVED	DESCRIPTION	PAR.

DESIGNED	DRAWN
LF DOS SANTOS	LF DOS SANTOS
SIGNATURE DATE	
DESIGN CHECKED BY	INFRASTRUCTURE TECHNICAL INFORMATION MANAGEMENT
LF DOS SANTOS	D.J. CHALMERS
SIGNATURE DATE	SIGNATURE DATE

PROJECT STATUS

● CONCEPT DRAWING ○ TENDER DRAWING ○ APPROVED FOR CONSTRUCTION DRAWING ○ AS BUILT DRAWING

PROJECT ENGINEER (CONSULTANT)

LF DOS SANTOS

INITIALS AND SURNAME SIGNATURE AND Pr. No. DATE

INSPECTOR OF WORKS (CITY OF TSHWANE):

INITIALS AND SURNAME SIGNATURE AND Pr. No. DATE

CONSULTANT DETAIL

PVA CONSULTING ENGINEERS cc
CONSULTING ENGINEERS & PROJECT MANAGERS
LEAD Land Engineering And Developments Pty Ltd

217 Fakkel Street
Silverton 0184
PO Box 1394 Silverton 0127
Tel:+ 27 (0) 12 804 2029
Pretoria
E-mail: info@landeng.co.za
www.landeng.co.za

CITY OF TSHWANE

ROADS AND TRANSPORT DEPARTMENT

Mr P. I. Letlonkane
STRATEGIC EXECUTIVE DIRECTOR
P.O. BOX 1409
PRETORIA
0001

Ms. L. V. Kegakilwe-Piki
EXECUTIVE DIRECTOR
P.O. BOX 1409
PRETORIA
0001

DRAWING APPROVED BY EXECUTIVE DIRECTOR
Ms. L. V. Kegakilwe-Piki

SIGNATURE: DATE:

INFRASTRUCTURE DESIGN, CONSTRUCTION AND MAINTENANCE DIVISION
For Internal Approval

RECEIVED
SIGN WHEN APPLICABLE

DIRECTOR: TRANSPORT INFRASTRUCTURE PROVISION	SIGNATURE DATE
DIRECTOR: TRANSPORT INFRASTRUCTURE CONSTRUCTION (PROJECT) MANAGEMENT	SIGNATURE DATE
DIRECTOR: TRANSPORT INFRASTRUCTURE ASSET MANAGEMENT	SIGNATURE DATE
DIRECTOR: TRANSPORT INFRASTRUCTURE PLANNING	SIGNATURE DATE
DIRECTOR: INTELLIGENT TRANSPORT SYSTEMS AND TRAFFIC ENGINEERING	SIGNATURE DATE
DIRECTOR: INFRASTRUCTURE MAINTENANCE MANAGEMENT (IMM)	SIGNATURE DATE
DIRECTOR: INTEGRATED TRANSPORT PLANNING	SIGNATURE DATE

0 10 20 40 60 80m
SCALE 1:1000

LOCATION OF PROJECT:

C/O MOKHETLE (M43) & WELCOME STREET, SOSHANGUVE

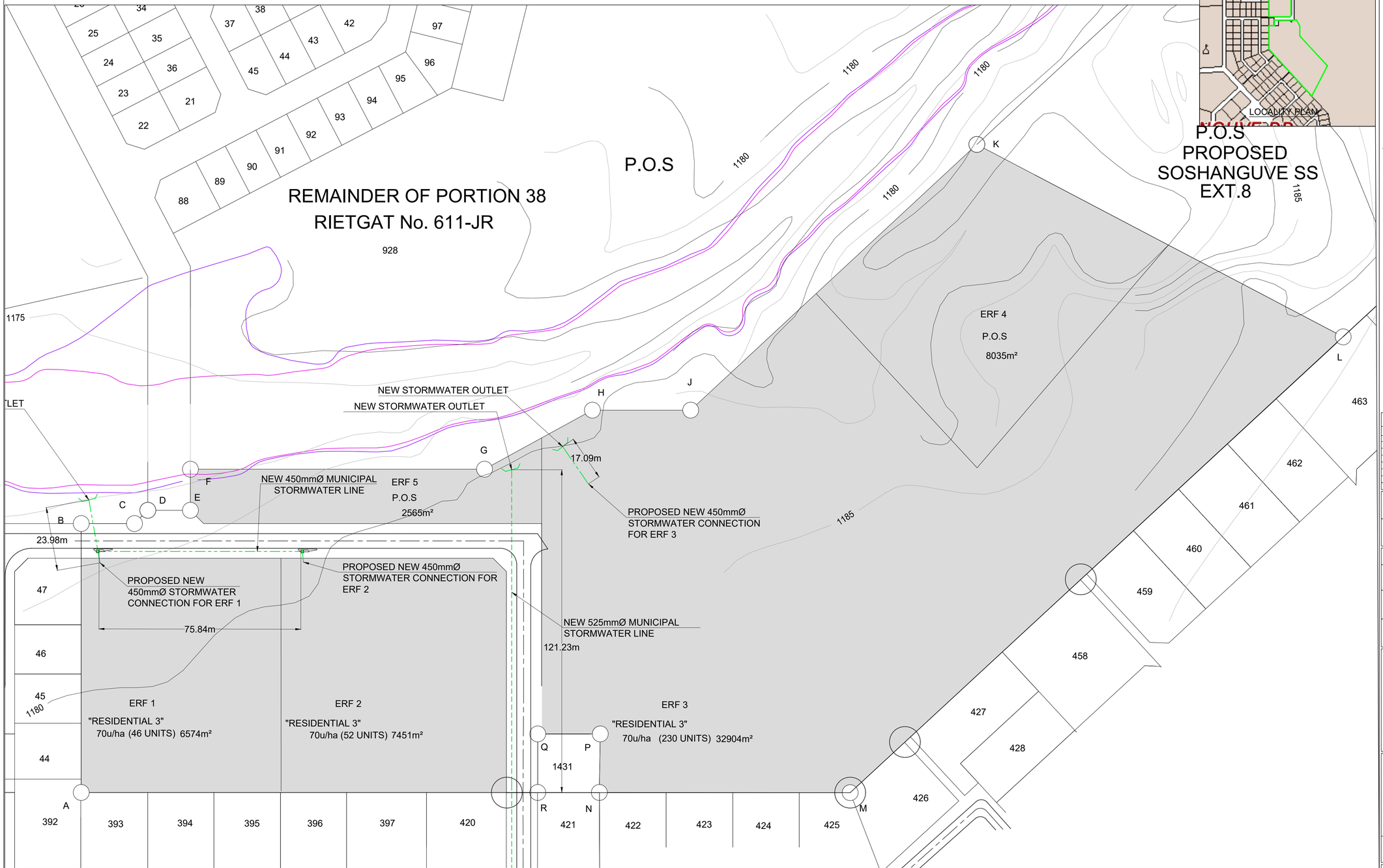
DESCRIPTION OF PROJECT

PROPOSED STORMWATER RELOCATION FOR THE INTRSECTION OF MOKHETLE (M43) & WELCOME STREET

CONTRACT No. :	PROJECT No. :
1763	1405
DATE :	SCALE :
MARCH2018	1:250
ORIGINAL PAPER SIZE:	A1
DRAWING NO.	SHEET NO:
1763.03U02	1
REVISION	0

ANNEXURE E

SOSHANGUVE X07



STORMWATER MANAGEMENT LAYOUT
1:750

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 CTMM 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.

STORMWATER

1 MINIMUM PIPE DIAMETER TO BE 450mm.

2 MINIMUM FALL TO BE 1:150.

3 PIPE BEDDING TO BE CLASS B UNLESS OTHERWISE SPECIFIED.

4 ALL EXCAVATIONS AND BEDDING MUST BE INSPECTED AND APPROVED BY THE ENGINEER BEFORE LAYING OF ANY PIPES.

5 CLEAN EXISTING STORMWATER INLETS AND REPAIR WHERE NECESSARY.(IF APPLICABLE)

LEGEND:

PROPOSED:	EXISTING:
STORMWATER LINE	
MANHOLE	
JUNCTION BOX	
KERB INLET	
CATCHPIT LENGTH	
2/3/2	
TRANSITION LENGHT	
CATCHPIT LENGTH	
TRANSITION LENGTH	

AMENDMENTS

NR.	DATE	APPROVED	DESCRIPTION	PAR.

DESIGNED — DRAWN

DESIGN CHECKED BY — INFRASTRUCTURE TECHNICAL INFORMATION MANAGEMENT
D.J. CHALMERS

PROJECT STATUS

CONCEPT DRAWING ● | TENDER DRAWING ○ | APPROVED FOR CONSTRUCTION DRAWING ○ | AS BUILT DRAWING ○

PROJECT ENGINEER (CONSULTANT)

INITIALS AND SURNAME — SIGNATURE AND Pr. No. — DATE

INSPECTOR OF WORKS (CITY OF TSHWANE):

INITIALS AND SURNAME — SIGNATURE AND Pr. No. — DATE

CONSULTANT DETAIL

PVA CONSULTING ENGINEERS cc
CONSULTING ENGINEERS & PROJECT MANAGERS

Unit 6 Biz Afrika Park
217 Fakkel Street
Silverton 0184
PO Box 95673 Waterkloof 0145
Tel: 086 110 6256
E-mail: pva@iafrica.com
www.pvaconsult.co.za

LEAD | Land Engineering And Developments Pty Ltd

Unit 6 Biz Afrika Park
217 Fakkel Street
Silverton 0184
PO Box 1394 Silverton 0127
Tel:+ 27 (0) 12 804 2029
Pretoria
E-mail: info@landeng.co.za
www.landeng.co.za

CITY OF TSHWANE

ROADS AND TRANSPORT DEPARTMENT

Mr P. I. Letlonkane
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PRETORIA
0001

Ms. L. V. Kegakilwe-Piki
EXECUTIVE DIRECTOR
P.O. BOX 1409
PRETORIA
0001

DRAWING APPROVED BY EXECUTIVE DIRECTOR
Ms. L. V. Kegakilwe-Piki

SIGNATURE:..... DATE:.....

INFRASTRUCTURE DESIGN, CONSTRUCTION AND MAINTENANCE DIVISION
For Internal Approval
RECIEVED
SIGN WHEN APPLICABLE

DIRECTOR: TRANSPORT INFRASTRUCTURE PROVISION — SIGNATURE — DATE

DIRECTOR: TRANSPORT INFRASTRUCTURE CONSTRUCTION (PROJECT) MANAGEMENT — SIGNATURE — DATE

DIRECTOR: TRANSPORT INFRASTRUCTURE ASSET MANAGEMENT — SIGNATURE — DATE

DIRECTOR: TRANSPORT INFRASTRUCTURE PLANNING — SIGNATURE — DATE

DIRECTOR: INTELLIGENT TRANSPORT SYSTEMS AND TRAFFIC ENGINEERING — SIGNATURE — DATE

DIRECTOR: INFRASTRUCTURE MAINTENANCE MANAGEMENT (IMM) — SIGNATURE — DATE

DIRECTOR: INTEGRATED TRANSPORT PLANNING — SIGNATURE — DATE

0 10 20 40 60 80m
SCALE 1:1000

LOCATION OF PROJECT:

SOSHANGUVE X07

DESCRIPTION OF PROJECT

STORMWATER MANAGEMENT LAYOUT FOR SOSHANGUVE X07

CONTRACT No. :	PROJECT No. :	
1763	1763	
DATE : FEB 2018	SCALE : AS SHOWN	ORIGINAL PAPER SIZE: A1
DRAWING NO. 1763.04U01	SHEET NO: 1	A REVISION

ANNEXURE F

CITY OF TSHWANE
METROPOLITAN MUNICIPALITY

TRANSPORT DEPARTMENT.
ROADS AND STORMWATER DIVISION
SECTION: INFRASTRUCTURE PROVISION.
SUBSECTION: INFRASTRUCTURE TECHNICAL INFORMATION MANAGEMENT

CITY OF TSHWANE
IGNITING EXCELLENCE



LEGEND: STORMWATER NETWORK

JunctionPoints
ST — <all other values>
Junction Box
Manhole

Inlets
ST — <all other values>
Grid Inlet
Kerb Inlet
Veld Inlet

Outlets
Pipes
Channel
sde.SDE.TPC_DAM
sde.SDE.RIVER

NOTAS / NOTES:

GEEN SIVIELE DIENSTE MAG OORSKRY WORD NIE.
NO CIVIL SERVICES MUST BE ENCROACH UPON.

DIE PLAN MAG NIE AS 'N KONSTRUKSIE DOKUMENT GEBRUIK WORD NIE, MAAR ALLEENLIK AS 'N INLIGTINGSSTUK.
THIS DRAWING MUST NOT BE USED AS AN CONSTRUCTION DOCUMENT, BUT FOR INFORMATION ONLY.

N

CITY OF TSHWANE
ROADS AND STORMWATER INFORMATION
2013 -09- 19
Acknowledge that service information is given in good faith and that the accuracy of information is not guaranteed, must be verified.

0 3570 140 210 280
Meters

TITEL/TITLE:

SOSHANGUVE

STORMWATER LAYOUT

VERIFY INFORMATION ON SITE

VERWYS NR. / REF. NO.	WL/
SKAAL / SCALE:	NOT TO SCALE
GETEKEN / DRAWN:	C OOSTHUIZEN
HANDTEKENING / SIGNATURE:	Oosthuizen
DATUM / DATE:	19 SEPTEMBER 2013

ANNEXURE G

PVA Consulting Engineers cc

Unit 2 Biz Afrika Park, 217 Fakkel Street Pretoria, 0184
PO Box 95673 Waterkloof 0145
e-mail: pva@iafrica.com
Tel: 086 110 6256

LEAD | Land Engineering And Developments Pty Ltd

Unit 2 Biz Afrika Park, 217 Fakkel Street Pretoria, 0184
PO Box 1349 Silverton, 0127
e-mail: info@landeng.co.za
Tel: 082 933 3316

Estimates For Civil Services

Project: Shoshanguve Ext 07
Roads & Stormwater

Date: February 2018
Project Nr. 1763
No of Units: 328

Done By:	**LEAD**
Approved:	**-**
-	

	DESCRIPTION	UNIT	Price p. unit	SUB TOTAL	TOTAL	
1,1	**Internal ROADS**					
	60mm Grey interlocking paving incl sand	m²	R 0	R 0		R 0 PER UNIT
	C4 Sub-base with Stabilisation 3% cement 150mm Thick	m²	R 0	R 0		
	G6 Layer beneath Road Sub-base	m²	R 0	R 0		
	G9 Layer beneath Streets and Parking	m²	R 0	R 0		
	Kerb figure 3	m	R 0	R 0		
	Pinting of Parking Bays and Lanes	m	R 0	R 0		
	Painting Arrows and Stop Lines	0	R 0	R 0		
	Road Signs	0	R 0	R 0		
	Site Clearence	m²	R 0	R 0		
					R 0	
1,2	**SEWER**					
	200Ø Pipes (Mainlite) All in	m	R 290	R 0		R 0 PER UNIT
	160Ø Pipes (Mainlite) All in	m	R 240	R 0		
	Manholes >2m	0	R 14 000	R 0		
	Manholes <2m	0	R 11 000	R 0		
	Lamp Holes	0	R 1 500	R 0		
	Extra over Rock Exc	m³	R 500	R 0		
	Connections	0	R 2 800	R 0		
	Road Crossing	0	R 18 000	R 0		
	Camera Inspection	m	R 70	R 0		
	Reinstate Existing Sidewalks / Landscaping	m	R 350	R 0		
					R 0	
1,3	**WATER**					
	200∅ Pipes	m	R 450	R 0		R 0 PER UNIT
	160∅ Pipes	m	R 320	R 0		
	110∅ Pipes	m	R 260	R 0		
	75∅ Pipes	m	R 180	R 0		
	40∅ Pipes	m	R 165	R 0		
	Connections (±12%)	0	R 2 500	R 0		
	Saddles	0	R 650	R 0		
	Extra over Rock Exc	m³	R 500	R 0		
	Fire Hydrants Complete	0	R 8 500	R 0		
	Valve Complete	0	R 6 000	R 0		
	Road Crossing	0	R 18 000	R 0		
	Main Meters Connection + Dep	0	R 35 000	R 0		
	Connections (short)	0	R 2 800	R 0		
	Double Connections (Road Crossing)	0	R 3 500	R 0		
	Reinstate Existing Sidewalks / Landscaping	m	R 350	R 0		
					R 0	
1,4	**STORM WATER**					
	1050∅ Pipes	m	R 2 300	R 0		R 843 PER UNIT
	600∅ Pipes	m	R 1 050	R 0		
	450Ø Pipes	233 m	R 750	R 174 750		
	300Ø Pipes	m	R 650	R 0		
	SW Inlets (2.5m) Grid	2	R 15 000	R 30 000		
	Junction Box	0	R 12 000	R 0		
	Extra over Rock Exc	23 m³	R 500	R 11 650		
	Road Crossing	2	R 18 000	R 36 000		
	Stormwater Outlet structure	3	R 8 000	R 24 000		
					R 276 400	
	SUB TOTAL 1				**R 276 400**	
	Ps + Gs ±16%				R 44 224	
	Sub-Total				R 320 624	
	CONTINGENCIES ±10% sum				R 32 062	
	Sub-Total				R 352 686	
	Professional Fees 10%				R 35 269	
	Sub-Total				R 387 955	
	VAT 14%				R 54 314	
	TOTAL 1				**R 442 269**	
	Total Price per Unit – ? Units				R 1 348	
	The above exclude VAT					

ANNEXURE H

City Planning and Development Department

Room 12007 | 12th Floor | Isivuno | 143 Lilian Ngoyi Street (Van der Walt) | Pretoria | 0002
PO Box 3242 | Pretoria | 0001
Tel: 012 358 0975 | Fax: 086 214 4411
Email: makgorometiem@tshwane.gov.za I www.tshwane.gov.za I www.facebook.com/CityOfTshwane

My ref:	CPD 9/1/1/1- SOSH-SS X 7 223	Tel:	012 358 9092
Your ref:		Fax:	012 358 9115
Contact person:	Mariëtte Theron	Email:	mariettet@tshwane.gov.za
Section/Unit:	Regional Spatial Planning		

New Town Associates

P.O.BOX 95617

WATERKLOOF

0145

Sir/Madam

AMENDMENT OF CONDITIONS OF ESTABLISHMENT IN TERMS OF SECTION 98(5) OF THE TOWN PLANNING AND TOWNSHIPS ORDINANCE, 15 OF 1986: SOSHANGUVE - SS EXTENSION 7

Attached please find a copy of the approved amended conditions of establishment for the above-mentioned township for your attention.

CITY OF TSHWANE
APPROVED
2015 -01- 17
CITY PLANNING AND
DEVELOPMENT COMMITTEE

Yours Faithfully

f STRATEGIC EXECUTIVE DIRECTOR: CITY PLANNING AND DEVELOPMENT

Date.....

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

STATEMENT OF CONDITIONS UNDER WHICH THE APPLICATION MADE BY SIZANE AGENCIES CC REGISTRATION NUMBER 92/23202.23 (HEREINAFTER REFERRED TO AS THE APPLICANT/ TOWNSHIP OWNER) IN TERMS OF THE PROVISIONS OF CHAPTER III: PART C (or CHAPTER IV) OF THE TOWN-PLANNING AND TOWNSHIPS ORDINANCE, 1986 (ORDINANCE 15 OF 1986), FOR PERMISSION TO ESTABLISH A TOWNSHIP ON A PART OF PORTION 38 OF THE FARM RIETGAT 611 REGISTRATION DIVISION JR PROVINCE OF GAUTENG, HAS BEEN GRANTED

1. **CONDITIONS TO BE COMPLIED WITH PRIOR TO THE TOWNSHIP BEING DECLARED AN APPROVED TOWNSHIP IN TERMS OF THE PROVISIONS OF SECTION 103 OFTHE TOWN-PLANNING AND TOWNSHIPS ORDINANCE, 1986 (ORDINANCE 15 OF 1986)**

1.1 INSTALLATION AND PROVISION OF SERVICES

The applicant shall make the necessary arrangements for the finalization of the services agreements with the local authority for the provision and installation of water, electricity and sanitation as well as the construction of roads and storm water drainage in the township.

If external services are not available or the existing external services are not sufficient to accommodate the township, special arrangements will have to be made after consultation with the applicable departments in the Municipality.

1.2 MINERAL RIGHT PERMITS

The consent shall be obtained from the Department of Mineral and Energy regarding the mineral rights in respect of the land on which the township is being established.

1.3 GENERAL

(a) The applicant shall satisfy the City of Tshwane Metropolitan Municipality (hereafter referred to as the Municipality) that:

(i) the relevant amendment scheme (in terms of section 125 of Ordinance 15 of 1986) is in order and may be published simultaneously with the declaration of the township an approved township;

(ii) a detailed Public Transport Assessment must be submitted in compliance with the provisions of the National Land Transport Act, 2009 (Act 5 of 2009), Section 38. The assessment must comply with the requirements of the Municipality (Transport and Roads Department: Transport Development Division) and must indicate how such facilities will be provided and how public transport and non motorised transport facilities will be integrated with the development;

(iii) the portions of the road reserves adjoining the proposed township, and which are required for the proper installation and maintenance of the Municipality's electrical services must be acquired by the township owner to the satisfaction of the Public Works and Infrastructure Development Department (Energy and Electricity Division);

(iv) the name of the township as well as the street names have been approved by the Council and it is indicated on the layout plan or General Plan in accordance with regulation 18.(1)(a)(iv) of the Town-Planning and Townships Ordinance 15 of 1986.

(b) The applicant shall comply with the provisions of Sections 72, 75 and 101(2) of Ordinance 15 of 1986.

2. CONDITIONS OF ESTABLISHMENT (CONDITIONS WHICH WILL BE APPLICABLE TO THE APPROVED TOWNSHIP IN TERMS OF SECTION 103 OF ORDINANCE 15 OF 1986)

2.1 NAME

The name of the township shall be Soshanguve SS Extension 7.

2.2 DESIGN

The township shall consist of erven, parks and streets as indicated on Plan CPD Sosh SSX7/8.

2.3 REMOVAL OR REPLACEMENT OF MUNICIPAL SERVICES

Should it become necessary to move or replace any existing municipal services as a result of the establishment of the township, the cost thereof shall be borne by the township owner.

2.4 DEMOLITION OF BUILDINGS AND STRUCTURES

When required by the City of Tshwane Metropolitan Municipality to do so, the township owner shall at his own expense cause to be demolished to the satisfaction of the Municipality all existing buildings and structures situated within building line reserves and side spaces or over common boundaries, or dilapidated structures.

2.5 REMOVAL OF LITTER

The township owner shall at his own expense have all litter within the township area removed to the satisfaction of the City of Tshwane Metropolitan Municipality, when required to do so by the Municipality.

2.6 REMOVAL AND/OR REPLACEMENT OF TELKOM SERVICES

Should it become necessary to remove and/or replace any existing TELKOM services as a result of the establishment of the township, the cost thereof shall be borne by the township owner.

2.7 COMPLIANCE WITH CONDITIONS IMPOSED BY GDARD

The township owner shall at his own expense comply with all the conditions imposed, by which the Gauteng Department of Agriculture and Rural Development including if applicable those by which exemption has been granted from compliance with Regulations No 1182 and 1183 promulgated in terms of Sections 21, 22 and 26 of the Environmental Conservation Act, (Act 73 of 1989) or the National Environmental

Management Act, 1998 (Act 107 of 1998) and Regulations thereto, as the case may be, for the development of this township.

2.8 OBLIGATIONS WITH REGARD TO SERVICES AND RESTRICTIONS

REGARDING THE ALIENATION OF ERVEN

The township owner shall within such period as the Local Authority may determine fulfil its obligations in respect of the provision of water, electricity and sanitary services as well as the construction of roads and stormwater drainage and the installation of systems thereof, as previously agreed upon between the township owner and the local authority. Erven may not be alienated or transferred into the name of a purchaser prior to the Local Authority certifying that sufficient guarantees/cash contributions in respect of the supply of services by the township owner have been submitted or paid to the said Local Authority.

3. CONDITIONS TO BE COMPLIED WITH BEFORE THE ERVEN IN THE TOWNSHIP BECOME REGISTERABLE

INSTALLATION OF INTERNAL AND EXTERNAL SERVICES

A certificate issued in terms of section 82 of the town-planning and Townships Ordinance (Ordinance 15 of 1986) must be lodged with the first transfer or with any other act of registration such as the issuing of a Certificate of Title.

The township applicant shall install and provide internal engineering services in the township as provided for in the services agreement.

The Local Authority shall install and provide external engineering services for the township as provided for in the services agreement.

4. DISPOSAL OF EXISTING CONDITIONS OF TITLE

All erven shall be made subject to existing conditions and servitudes, if any, including the reservation of the rights to minerals.

5. CONDITIONS OF TITLE

THE ERVEN MENTIONED BELOW SHALL BE SUBJECT TO THE CONDITIONS AS INDICATED, LAID DOWN BY THE CITY OF TSHWANE METROPOLITAN MUNICIPALITY IN TERMS OF THE PROVISIONS OF THE TOWN-PLANNING AND TOWNSHIPS ORDINANCE, 1986 (ORDINANCE 15 OF 1986)

5.1 ALL ERVEN

(a) The erf shall be subject to a servitude, 3 m wide, for municipal services (water, sewer, electricity and stormwater) (hereinafter referred to as "the services"), in favour of the local authority, along any two boundaries, excepting a street boundary and, in the case of a panhandle erf, an additional servitude for municipal purposes, 3 m wide, over the entrance portion of the erf, if and when required by the local authority: Provided that the local authority may waive any such servitude.

(b) No buildings or other structures may be erected within the aforesaid servitude area and no trees with large roots may be planted within the area of such servitude or within a distance of 2 m thereof.

(c) The Municipality shall be entitled to temporarily deposit on the land adjoining the aforesaid servitude, any material it excavates during the laying, maintenance or removal of such services and other works which in its discretion it regards necessary, and furthermore the Municipality shall be entitled to reasonable access to the said property for the aforesaid purpose, subject to the provision that the Municipality shall make good any damage caused during the laying, maintenance or removal of such services and other works.

5.2 ERVEN SUBJECT TO SPECIAL CONDITIONS

In addition to the relevant conditions set out in paragraph 5.1.1 above, the undermentioned erven shall be subject to the conditions as indicated:

5.2.1 ERF 2563

(a) The erf shall be subject to a servitude 3m wide for municipal services (stormwater) in favour of the City of Tshwane Metropolitan Municipality, as indicated on the general plan.

(b) No buildings or other structures may be erected within the aforesaid servitude area and no trees with large roots may be planted within the area of such servitude or within a distance of 2 m therefrom.

(c) The City of Tshwane Metropolitan Municipality shall be entitled to temporarily deposit on the land adjoining the aforesaid servitude, any material it excavates during the laying, maintenance or removal of such services and other works which in its discretion it regards essential, and furthermore the City of Tshwane Metropolitan Municipality shall be entitled to reasonable access to the said property for the aforesaid purpose, subject to the provision that the City of Tshwane Metropolitan Municipality shall make good any damage caused during the laying, maintenance or removal of such main sewer pipelines and other works.

5.2.2 ERF 2563

The erf shall be subject to a servitude for road purposes in favour of the City of Tshwane Metropolitan Municipality, as indicated on the general plan. Upon submission of a certificate by the City of Tshwane Metropolitan Municipality to the Registrar of Deeds in which it is mentioned that such servitude is no longer needed, the condition shall lapse.

6. CONDITIONS WHICH, IN ADDITION TO THE EXISTING PROVISIONS OF THE RULING TOWN-PLANNING SCHEME, HAVE TO BE INCORPORATED IN THE TSHWANE TOWN-PLANNING SCHEME, 2008, IN TERMS OF SECTION 125 OF ORDINANCE 15 OF 1986.

6.1 ERVEN 2561, 2562 AND 2563 SOSHANGUVE SS EXTENSION7

1	Use Zone	**3: Residential 3**
2	Uses permitted	Duplex Dwellings and Dwelling-units
3	Uses with consent	Table B, Column 4.
4	Uses not permitted	Table B, Column 5.
5	Definitions	Clause 5
6	Density	70 dwelling units per hectare
7	Coverage	As per SDP
8	Height	2 Storeys
9	Floor space ratio	As per SDP
10	Site development plan and landscape development plan	(1) A site development plan and a landscape development plan, unless otherwise determined by the City of Tshwane Metropolitan Municipality, compiled by a person suitably qualified to the satisfaction of the Municipality, shall be submitted to the Municipality for approval prior to the submission of building plans. (2) The landscaping, in terms of the landscape development plan, shall be completed by completion of the development or any phase thereof. The continued maintenance of the landscape development shall be to the satisfaction of the Municipality. (3) $4m^2$ per dwelling unit must be provided on site and developed as a children's play area with play equipment.
11	Building lines	In terms of Clause 9 and clause 12.
12	Parking requirements	Demarcated parking spaces, together with the necessary paved manoeuvring space, shall be provided on the erf in the following ratios to the satisfaction of the Municipality: (1) One covered and paved parking space for each dwelling-unit with two habitable

		rooms or less. (2) One covered and paved and one paved parking spaces for each dwelling-unit with three habitable rooms or more. (3) One paved parking space per three dwelling-units for visitors.
13	Paving of traffic areas	All parts of the erf upon which motor vehicles are allowed to move or park, shall be provided with a permanent dust-free surface, which surface shall be paved, drained and maintained to the satisfaction of the Municipality.
14	Access to the erf	Entrances to and exits from the erf shall be sited, constructed and maintained to the satisfaction of the Municipality.
15	Loading and off-loading facilities	The loading and off-loading of goods shall only take place within the boundaries of the erf.
16	Turning facilities	In accordance with the Site Development plan.
17	Physical barriers	In accordance with the Site Development Plan.
18	Health measures	(1) Any requirements for air pollution-, noise abatement- or health measures set by the Municipality shall be complied with to the satisfaction of the Municipality without any costs to the Municipality. (2) No air-conditioning units or compressors may be mounted to the exterior walls of buildings without the prior consent of the City of Tshwane Metropolitan Municipality.
19	Outdoor advertising	Advertisements and/or signboards shall not be erected or displayed on the erf without the written consent of the Municipality first being obtained in terms of municipal by-laws for outdoor advertising.
20	General: (1) An engineer must be appointed before building plans are submitted, who must submit, together with the building plans, a certificate which states that he has studied the relevant geological report and that he has established the necessary measures with regard to building work, drainage of the buildings and the site and the installation of wet services so that the whole development is safe as far as possible from a geological point of view. On completion he must certify that all his specifications have been met. (2) Before approval of the Site Development Plan, the engineering	

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geologist and the Council for Geoscience must certify that the final lay-out of structures and wet services are in accordance with the geological findings and recommendations.

(3) In addition to the above conditions the erf and buildings thereon are further subject to the general provisions of the Tshwane Town-planning Scheme, 2008.

6.2 ERVEN 2564 AND 2565, SOSHANGUVE SS EXTENSION7

1	Use Zone	21: Private Open Space
2	Uses permitted	Table B, Column 3.
3	Uses with consent	Table B, Column 4.
4	Uses not permitted	Table B, Column 5.
5	Definitions	According to the scheme
6	Density	Not applicable
7	Coverage	As per Site Development Plan
8	Height	As per Site Development Plan
9	Floor space ratio	As per Site Development Plan
10	Site development plan and landscape development plan.	A site development plan and a landscape development plan, unless otherwise determined by the City of Tshwane Metropolitan Municipality, compiled by a person suitably qualified to the satisfaction of the Municipality, shall be submitted to the Municipality for approval prior to the submission of building plans
11	Building lines	In accordance to the scheme
12	Parking requirements	As per Site Development Plan
13	Paving of traffic areas	All parts of the erf upon which motor vehicles may move or park shall be provided with a permanent dust-free surface, which surface shall be paved, drained and maintained to the satisfaction of the Municipality.
14	Access to the erf	Entrance to and exits from the erf shall be located, constructed and maintained to the satisfaction of the Municipality.
15	Loading and off-loading facilities	Not Applicable

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16	Turning facilities	Not Applicable
17	Physical barriers	In accordance to the scheme
18	Health measures	Any requirements for air pollution-, noise abatement- or health measures set by Municipality shall be complied with to the satisfaction of the Municipality without any costs to the Municipality.
19	Outdoor advertising	Advertisements and/or sign boards shall not be erected or displayed on the erf without the written consent of the Municipality first being obtained in terms of municipal by-laws for outdoor advertising.
20	General: 1. In addition to the above conditions the erf and buildings thereon are further subject to the general provisions of the Tshwane Town Planning Scheme, 2008.	

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PROPOSED TOWNSHIP:

SOSHANGUVE SS EXT.7

SITUATED ON PART OF PORTION 38 OF THE FARM RIETGAT NO.611-JR

LOCAL AUTHORITY: THE CITY OF TSHWANE METROPOLITAN MUNICIPALITY

PART OF PORTION 38
OF THE FARM RIETGAT NO.611-JR

SITE ZONES AND MATERIAL DESCRIPTION			
ZONE	MATERIAL DESCRIPTION	GEOTECHNICAL CONSIDERATIONS	NHBRC CLASSFICATION
WHOLE OF SITE	Sand (transported) overlying gravel (pebble marker) over granite rock OR Sand overlying ferricrete gravel over granophyre rock	No heave (H) No collapse (C) Moderate differential settlement (S1) Intermitent shallow rock (R)	H/C/S1/(R)

This is to certify the township layout plan in accordance with the provisions and recommendations as set out in the geotechnical investigation for the proposed township.

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Y +89 000

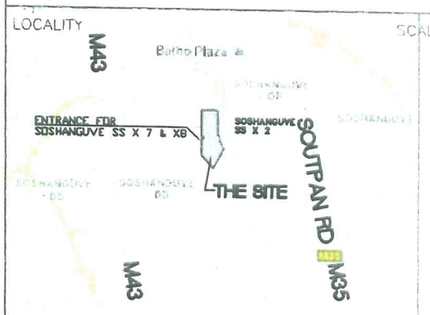
Y +88 800

X +2 820 000

X +2 820 200

X +2 820 400

LOCALITY



SCALE 1:7 500

0 180 540

COUNCIL REF. NR. :CPD 9/1/1/1 SOSH SS X 7/8

USE ZONE	NR. OF ERVEN	AREA (ha)	% OF TOWN	ERF NRS
Residential 3 (70u/ha)	3	4.6967ha	76.6%	2561 - 2563
Private Open Space	2	1,0840ha	17.7%	2564 2565
Street		0.3498ha	5.7%	
TOTAL	4	6.1305ha	100%	2561 - 2565

STREET INFORMATION		
Street length		
Gradient of streets		

AMENDMENTS	
Nov 2013	Amended erf layout and density. Rectified boundary.
Jul 2014	NHBRC Certified table included on map.
Mrt 2015	Final Erf numbers

GENERAL NOTES:

1. PROPOSED SOSHANGUVE SS EXT.7 IS DENOTED BY FIGURE "ABCDEFGHIJKLMNOPQRA" AND MEASURES 6.1305 HECTARES.
2. ALL DISTANCES AND AREAS ARE MEASURED IN SQUARE METRES OR HECTARES AND AREAPPROXIMATE PENDING FINAL SURVEY.
3. CONTOUR LINES ARE IN ACCORDANCE WITH THE STANDARDS LAID DOWN IN REGULATION18 (1) OF THE TOWN PLANNING AND TOWNSHIPS REGULATIONS FRAMED IN TERMS OF SECTIONS 69 AND 96 OF ORDINANCE 15 OF 1986 AND WERE COMPILED BY THE COUNCIL.
4. — — — — EXISTING STORM WATER PIPELINES
5. ---------- 1:50 YEAR FLOOD LINE
6. -·-·-·-·- 1:100 YEAR FLOOD LINE
7. ———— 32m FROM CENTER LINE OF RIVER

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CITY PLANNING AND DEVELOPMENT COMMITTEE

Registered owners: SIZANE AGENCIES CC

ERF 2561 "Residential 3" 70u/ha 6574m²

ERF 2562 "Residential 3" 70u/ha 7451m²

ERF 2563 "Residential 3" 70u/ha 32904m²

ERF 2564 POS 8035m²

ERF 2565 POS 2805m²

PROPOSED SOSHANGUVE SS EXT.7

PROPOSED SOSHANGUVE SS EXT.8

SOSHANGUVE SS EXTENSION

REMAINDER OF PORTION 38 RIETGAT No. 611-JR

13m STREET

STREET 15m

STREET 16m

9m wide R.O.W. Servitude

32m WIDE STORMWATER SERVITUDE

FLOODLINE 1:50 YEARS
FLOODLINE 1:100 YEARS

P.O.S 5,93Ha

MUNICIPAL 0,75Ha

MUNICIPAL 0,16Ha

"Residential 3"

0 20 40 60 80 100

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NEWTOWN ASSOCIATES
TOWN PLANNERS
POSTAL ADDRESS: P.O BOX 95617 WATERKLOOF
STREET ADDRESS: Ashton House 61 Lois Ave Newlands

NTA

Datum: Local
System: LO29

SCALE 1:7 500

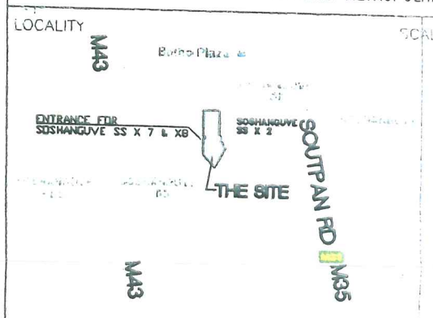
PROPOSED TOWNSHIP:

SOSHANGUVE SS EXT.7

SITUATED ON PART OF PORTION 38 OF THE FARM RIETGAT NO.611-JR

LOCAL AUTHORITY: THE CITY OF TSHWANE METROPOLITAN

LOCALITY



SCALE

COUNCIL REF. NR. :CPD 9/1/1/1 SOSH

USE ZONE	NR. OF ERVEN	AREA (ha)	% TOWN
Residential 3 (70u/ha)	3	4.6967ha	
Private Open Space	2	1,0840ha	
Street		0.3498ha	
TOTAL	4	6.1305ha	

STREET INFORMATION		
Street length		
Gradient of streets		

AMENDMENTS	
Nov 2013	Amended erf layout and density. Rectif
Jul 2014	NHBRC Certified table included on ma
Mrt 2015	Final Erf numbers

GENERAL NOTES:

1. PROPOSED SOSHANGUVE SS EXT.7 IS DENOTED "ABCDEFGHIJKLMNOPQRA" AND MEASURES 6.130
2. ALL DISTANCES AND AREAS ARE MEASURED IN METRES OR HECTARES AND AREAPPROXIMATE PENDING FINAL SURVEY.
3. CONTOUR LINES ARE IN ACCORDANCE WITH THE LAID DOWN IN REGULATION18 (1) OF THE TOWN AND TOWNSHIPS REGULATIONS FRAMED IN TERMS SECTIONS 69 AND 96 OF ORDINANCE 15 OF WERE COMPILED BY THE COUNCIL.
4. — — — — EXISTING STORM WATER PIPELINE
5. ····· 1:50 YEAR FLOOD LINE
6. -·-·- 1:100 YEAR FLOOD LINE
7. ——— 32m FROM CENTER LINE OF

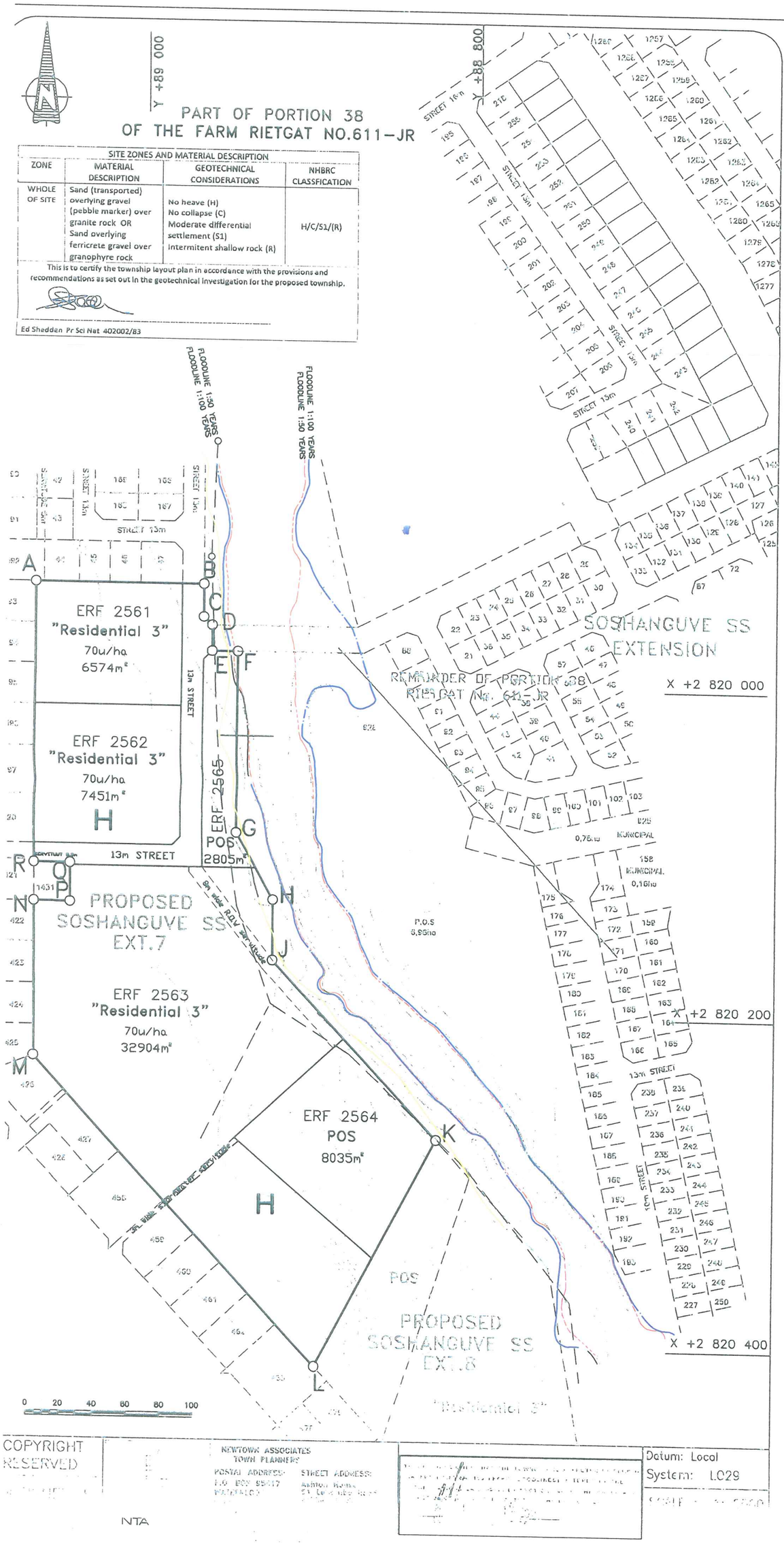
CITY OF TSHWANE
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2015 -04- 17
CITY PLANNING AND DEVELOPMENT COMMITTEE

Registered owner: SIZANE AGENCIES CC

SITE ZONES AND MATERIAL DESCRIPTION			
ZONE	MATERIAL DESCRIPTION	GEOTECHNICAL CONSIDERATIONS	NHBRC CLASSFICATION
WHOLE OF SITE	Sand (transported) overlying gravel (pebble marker) over granite rock OR Sand overlying ferricrete gravel over granophyre rock	No heave (H) No collapse (C) Moderate differential settlement (S1) Intermitent shallow rock (R)	H/C/S1/(R)

This is to certify the township layout plan in accordance with the provisions and recommendations as set out in the geotechnical investigation for the proposed township.

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NEWTOWN ASSOCIATES
TOWN PLANNERS
POSTAL ADDRESS: P.O. BOX 95617 WATERKLOOF
STREET ADDRESS: ASHTON HOUSE

Datum: Local
System: LO29

NTA

ANNEXURE I

CITY OF TSHWANE
"We are the same"

SERVICE DELIVERY DEPARTMENT
ROADS AND STORMWATER DIVISION

Tel: (012) 358-3797
Fax: (012) 358-3361

Address: PO Box 14013 C/o Basden & Rable Streets,
LYTTELTON LYTTELTON AGRICULTURAL HOLDINGS
0140 0157

SECTION: INFRASTRUCTURE PLANNING AND MANAGEMENT

MEMO

Your ref.:
My ref.: V10/1/2/1-S24/SS
Date: 29 June 2007

Enquiries: Hannes Claassen
Tel: 012-358 3287

The Manager: Land Use Legislation and Application
City Planning
AKASIA OFFICES
Attention: Mariette Theron

TOWNSHIP ESTABLISHMENT: GEOLOGICAL REPORT: SOSHANGUVE BLOCK SS

1. The report compiled by Geostrata CC dated January 1997 is in order. The investigation indicates the presence of soil that exhibits in medium collapsible conditions (C2) within the depths normally excavated for strip footings/foundations that would require additional special measures to overcome the detrimental foundation conditions.

2. The following condition must be included in the conditions of establishment:

2.1.1 No structures shall be erected prior to the appointment of a professional structural or geotechnical engineer who must design, specify and supervise structural measures for foundations of all structures according to the soil classification for each specific zone as described in the report. On completion of the structures he must certify that all his specifications have been met.

3. This report is accepted for proclamation purposes.

Yours faithfully

GENERAL MANAGER : ROADS AND STORMWATER
Le-TE-Soshanguve BLOCK SS

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1. INTRODUCTION

This report presents the results of a soils investigation carried out for the proposed township of Block SS Soshanguve, on portion of the farm Rietgat 105 JR, in the Akasia metropolitan area.

The purpose of the investigation was to provide information on the nature and geotechnical properties of the shallow soils encountered on the site. This information has been obtained so that areas may be delineated where similar geotechnical problems occur. Prospective developers may assess the suitability of certain types of development within specific areas.

This report has been prepared in accordance with the Provincial Administration: Gauteng (previously the Transvaal Provincial Administration) requirements regarding the establishment of a township as well as the National Home Builders Registration Council's (Reference 8) guidelines regarding geotechnical problems. The contents of this report are intended for use by town planners and Local Authorities and not for use by individual stand owners. It is not the purpose of this report to provide information necessary for detailed foundation design.

The project was commissioned at the verbal request of Mr P Shelley of the firm Protown cc.

The field work was initiated and completed in January 1997.

2. SITE DESCRIPTION

The site is an approximately rectangular area of about 95ha located some 18km north of the Onderstepoort Research Institute, north of Pretoria.

The area is bounded by the suburb of Soshanguve Block DD along the west, Block R along the east, Block CC in the south and Block KK in the north. The eastern boundary is coincident with an existing surfaced road known as "Soutpan Road" for a distance of about 800m in the north. A well-defined stream, Soutpan, flows in a shallow valley from south to north and divides the site into a western third and an eastern two-thirds.

The main access to the site is via Soutpan Road. Another route, via the south, is proposed but is at present a rocky track. Vehicular access is also possible from the surfaced road forming the northern boundary of the property.

The site comprises undeveloped areas in the south and along the boundary of Block DD. An informal settlement has developed along the eastern two-thirds of the site. The southern limit of the settlement is indicated on the edge of the map in Appendix F.

Structural development consists of a few single storey buildings (shops) in the north eastern corner and numerous informal structures of corrugated iron along the eastern boundary. A fairly large area representing an abandoned borrow source is located in the middle of the undeveloped western bank. The approximate location of this area is indicated on the map in Appendix F.

Vegetation over the undeveloped areas consists of a variety of indigenous trees along the stream. Scattered thorn trees and smaller shrubs are typical of the vegetation away from the stream. Veld grasses are found throughout the site.

The relief of the site is low except at the southern end where a small knoll occurs. There is an overall crossfall of some 58m from south east to north west. The gradient of the side slopes of the shallow valley varies from about 3% in the

flatter eastern half to about 6% on the slopes of the knoll at the southern end.

3. SITE INVESTIGATION

The subsoil conditions were investigated by means of 12 shallow test pits excavated to depths ranging from 0,9m to 2,8m below existing ground level. The pits were excavated by means of a JCB 3CX TLB machine and were terminated when excavation conditions became difficult in the ferruginised residual granite/granophyre, at maximum excavation depth of the machine or at machine refusal on soft rock or hardpan ferricrete.

Detailed soil profiles were drawn up from a visual examination of the in situ material observed in the test pits by an engineering geologist according to recommended standard procedures (Reference 5).

Detailed individual soil profile descriptions are given in the Soil Profiles in Appendix A and the positions of the test pits are shown on the maps in Appendices F and G.

4. LABORATORY TESTING

Sieve analyses and Atterberg limits were determined for a number of disturbed soil samples obtained from representative horizons during the investigation. The soils were classified according to Unified Soil and T R B classification systems and the results are tabulated in Appendix B.

Chemical tests were carried out on a disturbed sample to determine the pH and electrical conductivity of the ferruginous soils.

5. GEOLOGY

According to the 1:250 000 Geological Series, Sheet No. 2528 Pretoria, the area is underlain by granophyre (fine grained granite) of the Rashoop Granophyre Suite and younger Nebo granite of the Lebowa Granite Suite. These Suites form the top of the Bushveld Complex.

The hard rock geology is mantled by colluvial and residual soils in the flatter lying areas. Outcrops of granophyre and granite are common in the southern half of the site. Scattered intermittent outcrops do occur further north on the western side of the stream.

6. SOILS

The site is characterised by four typical soil profiles depending on the underlying parent rock and topography.

i) **Alluvium:** Alluvial sand was intersected in test pit (TP) 8 from surface to a depth of 1,9m. Hard rock granite underlies the alluvium. Scattered boulders of granophyre and granite occur within the alluvial sand. Alluvial sand is presumed to be present along Noga Street to the north.

ii) **Ferricrete:** Hardpan ferricrete was encountered below 0,7m of colluvial sand in TP 10 while similar hardpan ferricrete occurred below 0,6m of ferruginous gravel in TP 7. Machine refusal occurred in both test pits at a depth of about 1m.

Numerous exposures of hardpan ferricrete were observed in southern half of the eastern portion of the site.

iii) **Bushveld Complex:** Nebo Granite: The presence of a coarse-grained igneous rock is assumed to indicate granite on this site.

The largest portion of the site is underlain by Nebo granite, described as grey to pink, coarse-grained granite. This rock type gives rise to two distinct soil profiles. The most common soil profile developed on the granite may be described as

0,0-0,2m slightly moist light brown to reddish brown loose silty sand (colluvium) overlying

0,2-1,0m medium and fine quartz gravel in minor matrix of silty sand (pebble marker) OR orange mottled black and brown dense to very dense gravel of ferruginous concretions in a minor matrix of silty sand with pockets of hardpan ferricrete in places overlying

1,0-2,0m medium and fine gravel of hard and soft ferruginous concretions in sandy matrix varying in consistency from loose to dense (ferruginised residual granite) grading into

>2m slightly moist orange mottled pink gravelly sand/sandy gravel (residual granite).

The nature of residual granite intersected below the layer of ferricrete gravel varies from a gravelly sand where ferruginisation is limited to a gravel of ferruginised concretions with pockets of honeycomb ferricrete in places where the process of ferruginisation is more advanced.

In the central portion of the western side a generalised profile soil may be described as

0,0-0,3m fine and scattered medium gravel of quartz and granite in an abundant matrix of light brown silty sand (colluvium) overlying

0,3-0,7m medium and fine friable gravel of quartz and granite in a minor matrix of orange brown silty sand (residual granite) overlying

0,7-1,0m pink speckled brown and white highly weathered to weathered soft rock granite grading into

>1,0m hard rock granite.

Rashoop Granophyre: A typical profile in this area may be described as

0,0-0,3m medium and fine with scattered coarse gravel of quartz, granophyre and granite in a brown sandy matrix overlying

0,3-0,9m medium and fine gravel of ferruginised granophyre and granite in a light brown speckled black sandy matrix overlying

0,9-1,8m slightly moist orange yellow mottled brown dense slightly ferruginised silty sand grading into granophyre with depth.

Granophyre was positively confirmed in only one test pit (TP 4). The distinction between granophyre and granite is not always easy since granophyre is basically a fine grained granite. In some instances, the two rock types may tend to each other.

7. BEDROCK

The weathering pattern of granite and granophyre is generally very irregular with deeply weathered soil adjacent to outcrop such as observed in the vicinity of TP 11 where hard rock granite outcrops within 2m or 3m of a 2,4m deep test pit.

The probability of encountering shallow, hard rock granite (or granophyre) is moderate throughout the site although limited field mapping indicates a higher probability in the south.

Nebo Granite: Scattered outcrops of pink to "red" coarse-grained granite were observed in an "old" borrow pit in the central western area as well as in the south eastern portion of the property.

Rashoop Granophyre: At the time of the investigation, a trench about 1,5m deep had been excavated along the southern and part way along the south western boundaries of the site. The southern trench was almost entirely in hard rock granophyre from a depth of about 200mm to 400mm below the surface while the western trench encountered pockets of hard rock between soft rock to dense residual granophyre. Scattered and intermittent outcrops of granophyre occur in the southern half of the site, particularly in the vicinity of the knoll.

8. GEOHYDROLOGY

The main drainage feature of the site is the northerly flowing Soutpan stream. A moderate flow of water was observed in the stream at the time of the investigation.

A large volume of storm water run off finds its way into the stream via numerous large culverts that drain Block DD in the west. A smaller volume of run off is generated in the informal settlement where no storm water culverts are present and run off flows along unsurfaced roads and paths, often resulting in significant soil erosion.

A 1:50 year floodline has not been indicated on the map supplied. Any proposed development along the river must take the floodline into account.

Ground water was encountered in TP's 8 and 12. The seepage in TP 8 occurs below the alluvium, at the contact with the hard rock granite, while the seepage in TP 12 flows from small discontinuities in the residual granite. Although the volumes of water were small in both instances, problems due to ground

water seepage should be expected. It is probable that perched water tables may arise in localised areas during the wet season as run off percolates through the sandy topsoil until relatively impermeable ferricrete layers or residual granite are encountered.

9. GEOTECHNICAL DISCUSSION

The following observations are based upon our interpretation of the conditions on the site, of the soil material sampled and of the tests performed in the laboratory.

9.1 Potentially Expansive Soil: Observations made during the field work suggested that the soils blanketing the site were unlikely to exhibit any expansiveness.

Laboratory test results confirm the field observations and indicate low expansiveness for all soil types tested. The site has been classified as Class H according to Reference 8 as detailed in Table 3.

TABLE 3

NHBRC CLASSIFICATION OF EXPANSIVE SOILS

CLASS	ESTIMATED TOTAL HEAVE (mm)
H	<7,5
H 1	7,5 - 15
H 2	15 - 30
H 3	>30

Differential movement = 50% total heave.

The absence of heave problems does not imply the absence of other geotechnical problems.

9.2 Collapsible Soil: No undisturbed samples were cut from the sidewalls of test pits for consolidation tests since the only significant layer of sand was confined to an area along the stream in the vicinity of TP 8. Although no collapse tests were undertaken, it is almost certain that

the alluvial sand is potentially collapsible and the appropriate design and construction modifications should be implemented in the vicinity of Noga Street.

According to Reference 8, a site should be classified into three classes depending on the amount of expected settlement (collapse and normal). The classification is given in Table 4.

TABLE 4

NHBRC CLASSIFICATION OF COLLAPSIBLE SOILS

CLASS	ESTIMATED TOTAL SETTLEMENT (mm)
C	<5
C 1	5 - 10
C 2	>10

Differential movement = 75% total settlement.

Most of the site has been classified as Class C except for the area in the vicinity of TP 8 extending north along Noga Street which has been conservatively classified as Class C 2.

9.3 Settlement (Differential Movement): The irregular and sporadic occurrence of rock or hardpan ferricrete near the surface is likely to lead to numerous structures being founded partly on "incompressible" rock and partly on "compressible" soil. The probability of excessive differential movement due to these founding conditions is unacceptably high. Appropriate design and construction modifications should be incorporated into structures to overcome this problem.

The entire site, except where alluvium occurs, has been conservatively classified as Class S 1 as a consequence of the irregular occurrence of rock or hardpan. The likelihood that extensive areas, particularly in the

north, will require little or no foundation modifications is favourable and normal founding methods are liable to be adequate.

TABLE 5

NHBRC CLASSIFICATION OF CONSOLIDATION SETTLEMENT

CLASS	ESTIMATED TOTAL SETTLEMENT (mm)
S	<7,5
S 1	7,5 - 15
S 2	>15

Differential movement = 50% total settlement.

9.3 Excavation Properties: Machine refusal (JCB 3CX TLB) occurred in seven of the 12 test pits excavated for this investigation. Excavation problems were experienced below a depth of about 1m, particularly in the southern half of the site. Intermittent rock outcrop and areas of hardpan ferricrete are the causes of shallow refusal. The use of heavier machinery in areas underlain by hardpan ferricrete may allow greater depths to be achieved without too much difficulty but this will not be the case where hard rock granite or granophyre outcrops.

Excavations in excess of 3m will be possible over large areas in the north east.

An indication of the variable nature of the bedrock topography may be gained from the irregular floor of the abandoned borrow area on the west bank. Colluvial and residual soils have been stripped to expose bedrock over most of the borrow area.

An excavation classification (SABS 1200) would see the most of the site classified as soft excavation (very loose/soft through to stiff or dense) for the top 0,75m to 1m (top 2,5m in the north east). An intermediate classification (very stiff or dense through to soft rock)

would be appropriate below a depth of about 1m for the southern half of the site although scattered areas would be classified as hard excavation where soft to hard rock granite/granophyre or hardpan ferricrete occurs close to surface.

The use of pneumatic equipment and/or limited blasting may be necessary for the installation of services, particularly where unweathered hard rock granite outcrops. Construction waste, in the form of large granite boulders, may also prove to be a problem along the western bank. The boulders are believed to have originated from Block DD.

9.5 Sidewall Stability: No problems were encountered with the stability of the sidewalls in any of the test pits. Any excavations below a depth of 1,5m should be treated with care, particularly if undertaken in the wet season and if left open for a lengthy period.

The stability of a sidewall is a function of the soil moisture content and if this increases through poor surface drainage unstable conditions may occur.

9.6 Construction Material: Fair quality construction material is likely to be available over large portions of the site, particularly where thick layers of ferruginised granite have developed. Two CBR tests indicate the material to range in quality between G5 and G6 (Reference 3). An average specification is likely to be G6.

Unfortunately, the extensive borrowing of construction material on this site will have a negative impact of township development because of drainage problems and rehabilitation costs. At present, portion of the west bank is unsuitable for development because of the existence of the "old" borrow area.

9.7 Septic Tanks: The use of septic tanks and associated French drains or soakaways is unlikely to meet with success over the site because of impermeable hardpan ferricrete and hard rock granite at shallow depths. If on-site sanitation methods are to be considered, care must be exercised to ensure adequately sized French drains as well as the prevention of ground water contamination.

9.8 Chemical tests: A chemical test was carried out to obtain an indication of the aggressiveness (corrosiveness) of the soil with respect to galvanised pipes. Laboratory test results indicate the soil layer between surface and 1,2 in the TP 11 to be slightly acidic with a pH of 5,87.

The Electrical Conductivity (EC) of this soil layer is 6mS/m (16 600ohm/cm). A table in Appendix D indicates that soil with an EC value of <10mS/m is non-corrosive for galvanised pipes.

The corrosion of buried galvanised pipes is a complex problem influenced by a number of factors such as EC, acidic soils (pH < 7,0), corrosive bacteria and stray electrical currents. No attempt has been made to analyse all the factors but indications are that the ferruginous soil is a fairly non-aggressive environment even though slightly acidic.

9.9 Drainage: The sandy nature of the topsoil facilitates fairly rapid topsoil erosion, particularly along paths and on the sides of unsurfaced roads. Storm water drains should be designed to minimise flow velocities where unlined drains are to be located.

Seepage as a result of perched water tables may create drainage problems if and when construction occurs during a wet season. The problem is most severe where an impermeable layer "daylights" at the bottom of a slope.

Problems relating to the drainage of the abandoned borrow area on the west bank may be expected, particularly in the wet season. At the time of the investigation, a fair volume of standing water in the form of numerous separate ponds was evident in the borrow area.

9.10 Cemetery Site: The suitability of an area for use as a cemetery is based on various factors such as the excavatability, the depth to solid rock, stability of sidewalls, permeability of soil and depth to water table. An evaluation of this site in terms of these factors indicates a portion of the site in the north east, underlain by ferruginous residual gravel, may be suitable although hand excavation may be difficult below a depth of about 1,5m. Hardpan ferricrete may occur locally.

9.11 Solid Waste Disposal: No area was immediately evident as suitable for use as a solid waste disposal site within the area investigated. Certain requirements have to be met before an area may be licensed for use as a disposal site. The proximity of the stream, the relatively porous nature of the soil profile and the likelihood of intermittent shallow rock are factors against the use of any portion of this site for waste disposal.

9.12 Road Subgrade: Road construction should not pose a serious problem over most of the site since the shallow soils are invariably of reasonable quality (average G6). Areas where some problems may occur are in the south where intermittent hard rock and hardpan ferricrete are present. The presence of potentially collapsible alluvium in the vicinity of Noga Street may require additional design considerations.

10. CONCLUSIONS AND RECOMMENDATIONS

A guideline prepared by a committee of Local Authorities involved in township establishment recommends that a site be classified into three zones according to the prevailing geological conditions.

Zone I - No special precautions necessary for development.

Zone II - Suitable for development but subject to standard precautions such as the compaction of collapsible soils or removal of expansive clays.

Zone III- Conditions require a detailed investigation for each structure or stand before construction is initiated. Specialised foundation designs may be necessary.

In order to determine the classification, the site is evaluated in terms of three parameters, namely: founding conditions (expansive clay, collapsible sand and shallow rock); slope stability (rock or soil) and drainage conditions. Each parameter is assessed on a scale of 1 (good) to 3 (bad) and the designation of zones determined according to the highest scale.

The National Home Builders Registration Council (Reference 8) has proposed a similar classification in which a site is subdivided according to the type and severity of a geotechnical problem present and the founding solution required to solve the problem. The NHBRC classification has been adopted for this report because of its relevance to residential development.

The various precautions and solutions recommended to overcome the geotechnical problems, using the latter classification, are given in the following paragraphs. All of the solutions are made with respect to the erection of lightly loaded, single storey structures.

10.1 Expansive Soils: Expansive soils are absent on this site and as a consequence no design or construction modifications, with respect to heave, need to be adopted for the erection of single storey structures.

10.2 Collapsible Soils: Foundations for structures and roads located within the area along Noga Street should be suitably modified to accommodate the solutions recommended for a Class C 2. The various solutions are given below:

i) **Stiffened Strip Footings, Stiffened or Cellular Raft:** Stiffened strip footings or stiffened or cellular raft with mesh reinforcement in floor slabs and articulation joints or solid, lightly reinforced masonry. Bearing pressures should not exceed 50kPa. Sites should be properly drained and appropriate service and plumbing precautions implemented.

ii) **Deep Strip Footings:** Founding on a competent horizon below the collapsible layer. Fabric reinforcement should be included in the floor slabs.

iii) **Soil Compaction below Footings:** Remove in situ soil to a depth and width of 1,5 times the foundation width or a competent horizon. Replace with suitable material compacted to 93% MOD. AASHTO density at ± 2% of OMC. Removed material is often suitable for replacement. Normal construction methods with lightly reinforced strip foundations and masonry may then be utilised.

vi) **Soil Raft:** Remove in situ soil to a metre beyond the perimeter of a building and replace with suitable material compacted at 93% MOD> AASHTO at ±2% of OMC. The use of normal construction methods with lightly

reinforced strip foundations and masonry may then be considered.

v) **Piled or Pier Foundations:** Reinforced concrete ground beams or solid slabs on piled or pier foundations with fabric reinforcement in ground slabs. Sites should be properly drained.

Normally constructed foundations may be used for light structures in the areas delineated as Class C provided foundations are placed on the gravelly material below the blanket of sandy colluvium. Cognisance must also be taken of other geotechnical problems which may negate the blanket use of normal founding methods within a Class C area.

10.3 Settlement (Differential Movement): Design modifications to accommodate excessive differential movement should be incorporated in those structures built partly on rock and partly on soil. Since the exact location of all occurrences of rock outcrop or hardpan ferricrete is beyond the scope of this investigation, the entire site must be regarded as suspect. The possible foundation solutions are detailed below.

i) **Modified Normal:** Reinforced strip footings with articulation joints at some internal and all external doors. The masonry should be lightly reinforced. Foundation pressures should not exceed 50kPa.

ii) **Soil Compaction below Footings:** Remove in situ soil to a depth and width of 1,5 times the foundation width or a competent horizon. Replace with suitable material compacted to 93% MOD. AASHTO density at ± 2% of OMC. Removed material is often suitable for replacement. Normal construction with lightly

reinforced strip foundations and masonry may then be utilised.

iii) **Deep Strip Footings:** Found structures on a uniform, competent horizon below the layer of compressible soil. Foundations should be suitably reinforced where single structures straddle different material types such as rock and soil.

iv) **Soil Raft:** Remove in situ soil to a metre beyond the perimeter of a building to a depth of 1,5 times the widest foundation or to a competent horizon and replace with suitable material compacted at 93% MOD. AASHTO at -1% to +2% of OMC. The use of normal construction methods with lightly reinforced strip foundations and masonry may then be considered.

Normal construction methods using shallow strip footings may be used where shallow rock or hardpan is absent provided the foundations are placed on a competent layer below the sandy topsoil. The inspection of foundation excavations by competent persons may avoid the excessive use of modified construction methods.

10.4 Excavation Properties: A TLB should be capable of excavating service trenches to a depth of about 2m over most of the northern half of the site without too much difficulty. The presence hardpan ferricrete in places may pose a small problem in some places.

A more powerful machine, such as a Komatsu PC 200, should experience few problems at depths of <3m in the same area and may be capable of excavating a large portion of the service trenches in the south but problems with shallow hard rock granite/granophyre and hardpan are liable to be encountered.

The use of pneumatic tools and/or limited blasting may be necessary where rock outcrop occurs, particularly in the southern half.

10.5 Sidewall Stability: Unstable sidewalls are not expected in excavations less than 1,5m deep. Where excavations exceed 1,5m in depth, adequate care should be exercised to ensure workers safety but instability is not regarded as a serious problem.

Poor surface drainage around excavations may increase the probability of unstable conditions. The presence of ground water along fissures and fractures should be regarded a warning sign and particular care must be exercised. Conditions are likely to be more unstable during a wet season.

10.6 Construction Material: Construction material meeting a G5 to G6 specification is present on this site in the form of ferricrete gravel, ferruginised residual granite and weathered, very soft rock granite. However, the extensive borrowing of construction material must be weighed up against the rehabilitation costs and loss of ground for township development. An example is the existing "old" borrow area on the western side of the site which is unsuitable for development at present. Fairly large areas of open, undeveloped land in the vicinity of the site, underlain by similar geology, may provide more favourable sources of construction material.

10.7 Septic Tanks: On-site sanitation disposal is not recommended for this site because of the likelihood of ground water contamination due to the presence of shallow impermeable layers of rock or hardpan ferricrete. The proximity of the stream is another negative factor with respect to on-site sanitation disposal.

If septic tanks are regarded as essential then adequately sized soakaways must be constructed. Previous experience of on-site sanitation in other granitic areas with under-sized soakaways has been most unfavourable.

10.8 Chemical Tests: The chemical test results indicate slightly corrosive conditions towards galvanised pipes in terms of acidity (pH=5,87) but not conductivity (EC<10mS/m). If galvanised piping is to be used on a large scale, more detailed investigations should be undertaken to assess the corrosion potential of the topsoil throughout the site. The use of PVC pipes (or similar) should overcome the problems associated with corrosion.

10.10Drainage: Cognisance of the erosive powers of storm water run off must be considered in the design of township services, particularly where unsurfaced streets are to be built.

The perched water tables may hamper construction because of constant seepage and in some areas excavation trenches may fill with water for prolonged periods. Seepage may also lead to the rapid deterioration of surfaced roads. The natural slope of the site should facilitate the drainage of storm water run off towards the stream.

The draining of the borrow area in the centre of the west bank should be considered.

10.11Cemetery: Portion of the northern half of the site would be suitable for the location of a cemetery although difficult hand excavation and scattered pockets of hardpan ferricrete may pose problems. In the south, shallow hard rock and hardpan may pose serious problems for cemetery development.

10.12 Solid Waste Disposal: No area is suitable for the large scale disposal of domestic waste on this site.

18.12 Road Subgrade: The site is underlain by good subgrade conditions. Ferruginised gravel and/or residual granite occurs within the top 300mm to 500mm of the soil profile and generally meets a G 6 specification.

The layer of potentially collapsible alluvium along Noga Street may require some form of remedial treatment before construction takes place.

11. GENERAL

It must be borne in mind that an investigation of this nature is aimed at delineating broad areas in which problems may occur. Consequently, certain generalisations have to be made to avoid the necessity of a costly investigation at each building location. It may be found that soil conditions at variance with those discussed in this report do occur locally. The variant conditions should be inspected by competent personnel to ensure that these conditions do not pose a problem for a specific development. The potential for problems due to under-design must also be considered.

It is recommended that consideration be given to mapping any service trenches that are excavated on the site. This exercise will allow for a refinement of the soil boundaries and the magnitude of the geotechnical problems within those areas. The information in this report is not sufficient for detailed foundation design.

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APPENDIX A

SOIL PROFILES

SOIL PROFILE

PROJECT: *Block SS, SOSHANGUVE.*

TEST PIT No.: *TP 1*

MACHINE: *JCB 3CX TLB.*

PROFILED By: es

CONTRACTOR: *ROUNDUP PLANT RENTALS.*

DATE: *08/01/97*

UNIFIED/ TRH CLASS.	SAMPLE No.	LEGEND	DEPTH (m)	DESCRIPTION	POTENTIAL EXPANSIVENESS
			0,6	Slightly moist, light brown, loose, intact, silty SAND with abundant, fine gravel of quartz and scattered granite; colluvium.	
			1,8	Medium and fine, angular, slightly ferruginised, closely packed GRAVEL of quartz and hard and soft, ferruginous concretions in a minor matrix of moist, reddish brown blotched yellow, silty sand; overall consistency is medium dense with loose and dense pockets; residual granite (slightly ferruginised). Tends locally to pockets of hardpan ferricrete.	(LOW)
			2,8	Medium and fine, angular, tightly packed GRAVEL of quartz, pink feldspar and scattered, hard and soft, ferruginous concretions in a trace matrix of moist, brown, silty sand; overall consitency is dense to very dense locally; residual granite. EOH NOTES: 1) Hole stopped at 2,8m in residual granite. No refusal. 2) Ground water not encountered during excavation but water at base after 24hrs due to rain overnight. 3) Fine roots in top 400mm. 4) Excavated at end of culvert discharge.	

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SOIL PROFILE

PROJECT: *Block SS, SOSHANGUVE.*

TEST PIT No.: *TP 2*

MACHINE: *JCB 3CX TLB.*

PROFILED By: es

CONTRACTOR: *ROUNDUP PLANT RENTALS.*

DATE: *07/01/97*

UNIFIED/ TRB CLASS.	SAMPLE No.	LEGEND	DEPTH (m)	DESCRIPTION	POTENTIAL EXPANSIVENESS
			0,3	Fine and scattered medium, subrounded, closely packed, friable GRAVEL of quartz and granite in an abundant matrix of slightly moist, light brown, silty sand; overall consistency is loose; colluvium.	
			0,7	Medium and fine, subangular, tightly packed, friable GRAVEL of granite and quartz in a minor matrix of dry, orange brown sand; overall consistency is medium dense becoming dense with depth; residual granite.	(LOW)
			1,0	Pink speckled brown and white, weathered, soft rock to hard rock GRANITE. EOH	

NOTES:

1) Machine refusal at 1,0m on hard rock granite.
2) Ground water not encountered during excavation.
3) Fine roots in top 300mm.

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SOIL PROFILE

PROJECT: *Block SS, SOSHANGUVE.*

TEST PIT No.: *TP 3*

MACHINE: *JCB 3CX TLB.*

PROFILED By: es

CONTRACTOR: *ROUNDUP PLANT RENTALS.*

DATE: *07/01/97*

UNIFIED/ TRB CLASS.	SAMPLE No.	LEGEND	DEPTH (m)	DESCRIPTION	POTENTIAL EXPANSIVENESS
			0,4	Medium and fine, subrounded, closely packed, friable GRAVEL of quartz and granite in a minor matrix of slightly moist, brown, silty sand; overall consistency is loose with medium dense pockets; colluvium.	
			0,9	Medium and fine, subangular, tightly packed, friable GRAVEL of granite in a minor matrix of slightly moist, yellowish brown, silty sand; overall consistency is medium dense to dense; residual granite.	(LOW)
			1,5	Pinkish orange speckled white, highly weathered, very closely fractured, soft rock to hard rock GRANITE. Becoming hard rock below 1,5m. EOH	

NOTES:

1) Machine refusal at 1,5m on hard rock granite.
2) Ground water not encountered during excavation.
3) Fine roots in top 500mm.

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SOIL PROFILE

PROJECT: *Block SS, SOSILANGUVE.*

TEST PIT No.: *TP 4*

MACHINE: *JCB 3CX TLB.*

PROFILED By: cs

CONTRACTOR: *ROUNDUP PLANT RENTALS.*

DATE: *07/01/97*

UNIFIED/ TRB CLASS.	SAMPLE No.	LEGEND	DEPTH (m)	DESCRIPTION	POTENTIAL EXPANSIVENESS
			0,3	Medium and fine with scattered coarse, subrounded, closely packed, friable GRAVEL of quartz, granophyre and granite in a minor matrix of slightly moist, brown, silty sand; overall consistency is loose; colluvium.	
			0,6	Medium and fine, subangular, closely packed, friable GRAVEL of ferruginised granophyre in a minor matrix of slightly moist, light brown speckled black in places, silty sand; overall consistency is loose with medium dense pockets; residual granophyre.	(LOW)
			0,9	Medium and fine, angular to subangular, tightly packed GRAVEL of slightly ferruginised granophyre in a trace matrix of slightly moist, orange brown, speckled black, silty sand; overall consistency is dense; residual granophyre.	
SMC A-4(1)	4/1			Slightly moist, orange yellow mottled brown speckled black, dense to very dense, intact, slightly ferruginsed, silty SAND; residual granophyre.	LOW
			1,8	EOH	

NOTES:

1) Difficult excavation at 1,8m in ferruginised granophyre. Almost refusal.
2) Ground water not encountered during excavation.
3) Fine roots in top 400mm.

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SOIL PROFILE

PROJECT: *Block SS, SOSHANGUVE.*

TEST PIT No.: *TP 5*

MACHINE: *JCB 3CX TLB.*

PROFILED By: es

CONTRACTOR: *ROUNDUP PLANT RENTALS.*

DATE: *07/01/97*

UNIFIED/ TRB CLASS.	SAMPLE No.	LEGEND	DEPTH (m)	DESCRIPTION	POTENTIAL EXPANSIVENESS
			0,2	Slightly moist, brown, medium dense, intact, silty, coarse SAND; colluvium.	
				Fine, subangular, tightly packed, friable GRAVEL of quartz and granite in a trace matrix of slightly moist, brown, silty sand; overall consistency is medium dense; residual granite.	
TRH 14 = G6	M36 SL3828 SC A-2-6(0)		0,9	Medium and fine, angular, tightly packed GRAVEL of soft rock granite in a trace matrix of grey, silty sand; overall consistency is dense becoming medium dense in places below 1,5m; residual granite.	LOW
				Tends to highly weathered, very soft rock granite in places.	
			2,1	EOH	
				NOTES: 1) Hole stopped at 2,1m in highly weathered granite. No refusal. 2) Ground water not encountered during excavation but moist at base of pit. 3) Fine roots in top 100mm. 4) CBR test undertaken on bulk sample over entire depth.	

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SOIL PROFILE

PROJECT: *Block SS, SOSHANGUVE.*

TEST PIT No.: *TP 6*

MACHINE: *JCB 3CX TLB.*

PROFILED By: es

CONTRACTOR: *ROUNDUP PLANT RENTALS.*

DATE: *08/01/97*

UNIFIED/ TRB CLASS.	SAMPLE No.	LEGEND	DEPTH (m)	DESCRIPTION	POTENTIAL EXPANSIVENESS
			0,2	Slightly moist, reddish brown, loose, intact, silty, coarse SAND with minor, quartz gravel; colluvium.	(LOW)
SMC A1-b(0)	6/1		0,9	Medium and fine, subrounded to subangular, closely packed, friable GRAVEL of quartz in a minor matrix of slightly moist, light brown, silty sand; overall consistency is medium dense to loose; pebble marker.	LOW
			1,8	Fine, subangular, tightly packed, ferruginised GRAVEL of quartz and hard and soft, ferruginous concretions in a minor matrix of slightly moist, yellowish orange mottled black, silty sand; overall consistency is dense; residual granite (ferruginised). Tends to hardpan ferricrete in places.	(LOW)
			2,2	Fine, angular, tightly packed GRAVEL of quartz and pink feldspar in a trace matrix of slightly moist to moist, pinkish orange, sandy silt; overall consistency is dense to medium dense; residual granite (coarse grained). EOH NOTES: 1) Hole stopped at 2,2m in residual granite. No refusal. 2) Ground water not encountered during excavation. 3) Fine roots in top 300mm. 4) Termite tunnel at 0,5m below the surface.	

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SOIL PROFILE

PROJECT: *Block SS, SOSHANGUVE.*

TEST PIT No.: *TP 7*

MACHINE: *JCB 3CX TLB.*

PROFILED By: cs

CONTRACTOR: *ROUNDUP PLANT RENTALS.*

DATE: *08/01/97*

UNIFIED/ TRB CLASS.	SAMPLE No.	LEGEND	DEPTH (m)	DESCRIPTION	POTENTIAL EXPANSIVENESS
				Coarse, medium and fine, angular, closely packed, GRAVEL of hard ferricrete concretions in an abundant matrix of moist, brown, silty sand; overall consistency is loose; nodular ferricrete.	(LOW)
			0,6	Orange mottled black and brown, very dense, hardpan FERRICRETE.	
			1,0	EOH	

NOTES:

1) Machine refusal at 1,0m on hardpan ferricrete.
2) Ground water not encountered during excavation.
3) Fine roots in top 600mm.
4) Excavated in drainage channel amongst informal houses.

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SOIL PROFILE

PROJECT: *Block SS, SOSHANGUVE.*

TEST PIT No.: *TP 8*

MACHINE: *JCB 3CX TLB.*

PROFILED By: es

CONTRACTOR: *ROUNDUP PLANT RENTALS.*

DATE: *08/01/97*

UNIFIED/ TRB CLASS.	SAMPLE No.	LEGEND	DEPTH (m)	DESCRIPTION	POTENTIAL EXPANSIVENESS
SC A2-4(0)	S/1			Moist, light brown becoming beige with depth, loose, intact, slightly silty SAND with scattered granite and granophyre boulders; allivium (potentially collapsible).	LOW
			1,9	Pink stained light brown (weathering), slightly weathered, very closely fractued, hard rock GRANITE.	(LOW)
			2,1	EOH	

NOTES:

1) Machine refusal at 2,1m on hard rock granite.
2) Seepage of ground water from fractured granite at base of pit.
3) Fine roots in top 600mm.

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SOIL PROFILE

PROJECT: *Block Ss, SOSHANGUVE.* **TEST PIT No.:** *TP 9*

MACHINE: *JCB 3CX TLB.* **PROFILED By:** es

CONTRACTOR: *ROUNDUP PLANT RENTALS.* **DATE:** *08/01/97*

UNIFIED/ TRB CLASS.	SAMPLE No.	LEGEND	DEPTH (m)	DESCRIPTION	POTENTIAL EXPANSIVENESS
			0,3	Slightly moist, brown, loose, intact, silty SAND with minor quartz gravel; colluvium.	
			0,8	Medium and fine, angular, tightly packed, friable GRAVEL of ferruginised, granite fragments and quartz in a minor matrix of dry, brown, silty sand; overall consistency is medium dense to dense; residual granite(?).	(LOW)
			1,0	Slightly moist, orange mottled pink, black and yellow, dense, fractured, silty SAND with pockets of very soft rock granite; residual granite(?). EOH Grades into pink, weathered, very closely fractured, hard rock GRANITE(?) at base of pit.	

NOTES:

1) Refusal 1,0m on hard rock granite(?).
2) Ground water not encountered during excavation.
3) Fine roots in top 400mm.
4) Contact between residual gravel and underlying sand is very irregular.

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SOIL PROFILE

PROJECT: ***Block Ss, SOSHANGUVE.*** **TEST PIT No.:** *TP 10*

MACHINE: *JCB 3CX TLB.* **PROFILED By:** es

CONTRACTOR: *ROUNDUP PLANT RENTALS.* **DATE:** *08/01/97*

UNIFIED/ TRB CLASS.	SAMPLE No.	LEGEND	DEPTH (m)	DESCRIPTION	POTENTIAL EXPANSIVENESS
			0,7	Moist to slightly moist, light brown becoming beige with depth, loose, intact, silty SAND with traces of gravel; colluvium.	(LOW)
			1,0	Slightly moist, beige, medium dense, intact, silty SAND with minor quartz gravel; colluvium. Becoming orange brown speckled black, very dense FERRICRETE; hardpan ferricrete.	

NOTES:

1) Refusal 1,0m on hardpan ferricrete.
2) Ground water not encountered during excavation.
3) Fine roots in top 300mm.

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SOIL PROFILE

PROJECT: *Block SS, SOSHANGUVE.* **TEST PIT No.:** *TP 11*

MACHINE: *JCB 3CX TLB.* **PROFILED By:** es

CONTRACTOR: *ROUNDUP PLANT RENTALS.* **DATE:** *08/01/97*

UNIFIED/ TRB CLASS.	SAMPLE No.	LEGEND	DEPTH (m)	DESCRIPTION	POTENTIAL EXPANSIVENESS
TRH 14 = G5	2000 TJ53 SMC A-1-b(0)		0,2	Slightly moist, light brown, loose, intact, silty SAND with minor fine, quartz gravel; colluvium.	LOW
			0,6	Orange mottled black and brown, dense to very dense FERRICRETE with numerous pockets of nodular ferricrete; hardpan ferricrete.	
			1,2	Coarse, medium and fine, angular, closely packed, friable GRAVEL of hard, ferruginous concretions in a minor matrix of slightly moist, light brown, silty sand; overall consistency is dense with loose pockets; residual granite (ferruginised). Pockets of loose sand occur in places.	
			1,8	Slightly moist, light brown blotched and mottled orange and black, dense, intact, silty SAND with abundant, hard and soft, ferruginous concretions; residual granite. Tends to sandy gravel in places.	(LOW)
			2,2	Slightly moist to moist, orange mottled grey blotched black in places, dense, slightly ferruginised, silty SAND with scattered, ferruginous concretions; residual granite. EOH NOTES: 1) Hole stopped at 2,2m in residual granite. No refusal. 2) Ground water not encountered during excavation. 3) Fine roots in top 300mm. 4) CBR test undertaken on bulk sample taken 0m to 1,2m.	

Prepared By: **GEOSTRATA cc** **P O Box 74573** **LYNNWOOD RIDGE** **0040**

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SOIL PROFILE

PROJECT: *Block SS, SOSHANGUVE.* **TEST PIT No.:** *TP 12*

MACHINE: *JCB 3CX TLB.* **PROFILED By:** es

CONTRACTOR: *ROUNDUP PLANT RENTALS.* **DATE:** *08/01/97*

UNIFIED/ TRB CLASS.	SAMPLE No.	LEGEND	DEPTH (m)	DESCRIPTION	POTENTIAL EXPANSIVENESS
				Slightly moist, light brown, loose, intact, silty SAND with minor fine, quartz gravel; colluvium.	
			0,4	Medium and fine, subangular to subrounded, closely packed GRAVEL of ferruginous concretions and quartz in a minor matrix of moist, yellow brown, silty sand; overall consistency is medium dense; residual granite (ferruginised in places with scattered hardpan ferricrete).	(LOW)
			1,0		
SC A2-6(0)	12/1			Fine, angular, tightly packed GRAVEL of quartz, pink feldspar and scattered, ferruginous concretions in a minor matrix of moist, orange, silty sand; overall consistency is medium dense to dense; residual granite (ferruginised in places with scattered hardpan ferricrete).	LOW
				Pockets of dense to very dense, ferruginised, residual granite in places.	
			1,9	Some slight seepage below 1,9m.	
			2,4	EOH	
				NOTES:	
				1) Hole stopped at 2,4m in residual granite. No refusal. 2) Slight ground water seepage below 2,3m. 3) Fine roots in top 300mm. 4) Termite tunnel at 0,95m.	

Prepared By: **GEOSTRATA cc** **P O Box 74573** **LYNNWOOD RIDGE** **0040**

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APPENDIX B

SUMMARY OF TECHNICAL INFORMATION ON MATERIALS

SUMMARY OF TECHNICAL INFORMATION ON MATERIALS

PROJECT: *BLOCK SS Soils*

SITE: *SOSHANGUVE*

HOLE No.	SAMPLE No.	DEPTH (m)	MATERIAL DESCRIPTION	SIEVE ANALYSIS (%PASSING)									SOIL MORTAR ANALYSIS					CONSTANTS				CLASSIFICATION	
				37,5 mm	26,5 mm	19,0 mm	13,2 mm	4,75 mm	2,0 mm	0,425 mm	0,075 mm	0,002 mm	C Sand	CF Sand	MF Sand	FF Sand	<0,75 mm	LL	PI	LS	GM	T.R.B.	UNIF
TP 4	4/1	0,9-1,8	silty SAND			100	98	90	79	59	41	-	26	9	7	7	51	20	5	2,5	1,21	A-4(1)	SMC
TP 5	CBR	0,0-2,1	gravelly SAND				100	86	62	37	24	-	41	7	6	8	38	28	13	6,5	1,77	A-2-6(0)	SC
TP 6	6/1	0,2-0,9	sandy GRAVEL				100	78	45	30	19	-	32	10	8	7	43	21	6	2,5	2,06	A-1-b(0)	SMC
TP 8	8/1	0,0-1,9	SAND					100	97	72	20	-	26	20	19	15	20	NP		0,0	1,11	A-2-4(0)	SC
TP 11	CBR	0,0-1,2	GRAVEL	99	97	92	87	62	50	38	19	-	24	15	12	11	38	20	6	3,0	1,93	A-1-b(0)	SMC
TP 12	12/1	1,0-2,4	gravelly SAND				100	89	64	38	27	-	41	7	5	6	41	26	12	6,0	1,71	A-2-6(0)	SC

GEOSTRATA cc P O Box 74753 LYNNWOOD RIDGE 0040 Tel: 012 982049 Fax: 012 998 6890 Cellular: 082 551 6034

APPENDIX C

DETAILS OF EXPANSIVENESS OF MATERIALS

DETAILS OF POTENTIAL EXPANSIVENESS OF MATERIALS					PROJECT: *Block SS Soils* LOCATION: *Soshanguve*	
PROFILE No.	SAMPLE No.	DEPTH OF SAMPLE (m)	THICKNESS OF LAYER (m)	POTENTIAL EXPANSIVENESS	PREDICTED HEAVE (mm)	TOTAL PREDICTED HEAVE (mm)
NOTE: No expansive soils were encountered in any of the twelve test pits excavated for this proposed development.						

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APPENDIX D

CBR RESULTS

CBR Values of Bulk Samples at TP 5 and TP 11

Locality: Block SS	Residual Granite TP 5 0,0-2,1	Ferricrete Gravel TP 11 0,0-1,2
Screen Analysis (%PASS)		
53,0mm	100	100
37,5mm	100	99
26.5mm	100	97
19.0mm	100	92
13.20mm	98	87
4,75mm	86	62
2,00mm	75	50
0,425mm	59	33
0,075mm	41	18
Soil Mortar		
Coarse Sd 2-0.425	41	24
C Fine Sd 0.425-0.25	7	15
Medium F Sd 0.25-0.15	6	12
Fine Fine Sd 0.15-0.075	8	11
Material <0.075	38	38
Constants		
Grading Modulus	1.77	1.83
Liquid Limit	28	29
Plasticity Index	13	6
Linear Shrinkage (%)	6.6	3.0
Classification - TRB	A-2-6(0)	A-1-b-(0)
Classification - TRH14	GS	GS
TYPE OF TEST (CBR/UCS)	**CBR**	**CBR**
MOD. AASHTO		
Max Dry Density (kg/m3)	2103	2068
Optimum Moisture Cont(%)	7.1	7.6
Moulding Moisture Cont(%)	6.8	7.7
Dry Density (kg/m3)	2118	2081
% of Max Dry Density	101	101
100% Mod CBR/UCS	68	143
% Swell	0.0	0.0
NRB		
Dry Density (kg/m3)	2048	2008
% of Max Dry Density	97	97
100% NRB CBR/UCS	44	82
% Swell	0.1	0.1
PROCTOR		
Dry Density (kg/m3)	1919	1906
% of Max Dry Density	91	92
100% NRB CBR/UCS	23	61
% Swell	0.1	0.0
CBR/UCS Values		
100% Mod AASHTO	63	133
98% Mod AASHTO	48	104
97% Mod AASHTO	42	91
95% Mod AASHTO	34	72
93% Mod AASHTO	28	57
90% Mod AASHTO	20	40

APPENDIX E

CHEMICAL TEST RESULTS

CHEMISTRY RESULTS

TEST PIT	SAMPLE No	DEPTH (m)	pH	CONDUCTIVITY mS/m	RESISTIVITY ohm/cm
TP 11	CBR	0,0-1,2	5.87	6.01	16638

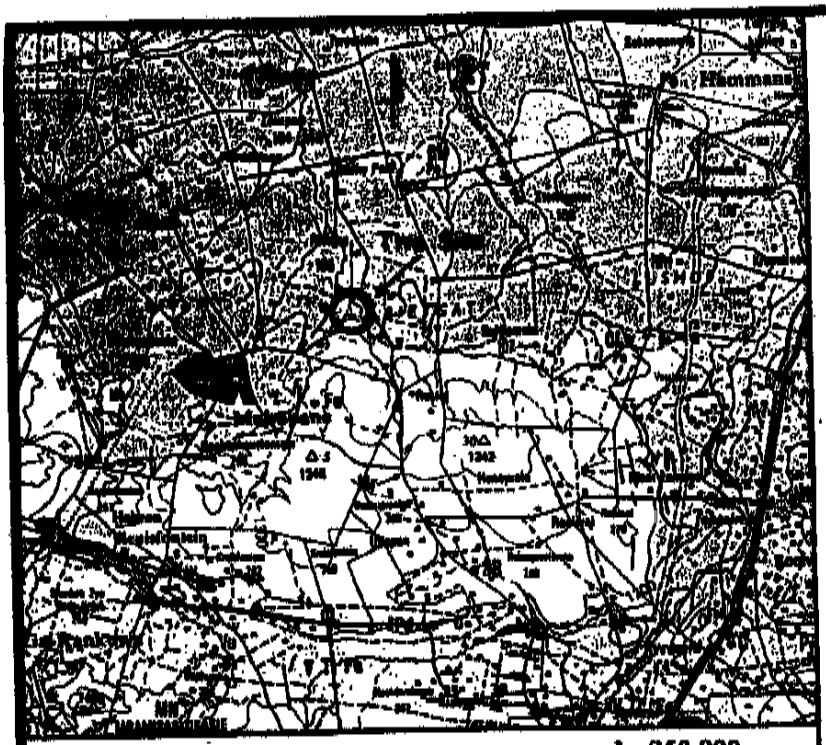
TABLE OF CORROSIVENESS

Conductivity	Resistivity	Corrosiveness
>110mS/m	0 - 900ohms/cm	Very Highly corrosive
110 - 45mS/m	900 - 2300ohms/cm	Highly corrosive
45 - 20mS/m	2300 - 5000ohms/cm	Medium corrosive
20 - 10mS/m	5000 - 10000ohms/cm	Slightly corrosive
<10mS/m	>10000ohms/cm	Non-corrosive

According to the above table the ferruginised residual granite is unlikely to be corrosive.

APPENDIX F

GEOTECHNICAL MAP



LOCALITY PLAN 1 : 250 000

LEGI

TP 4 Test Pit Position and Nu

Total Estimated Heave

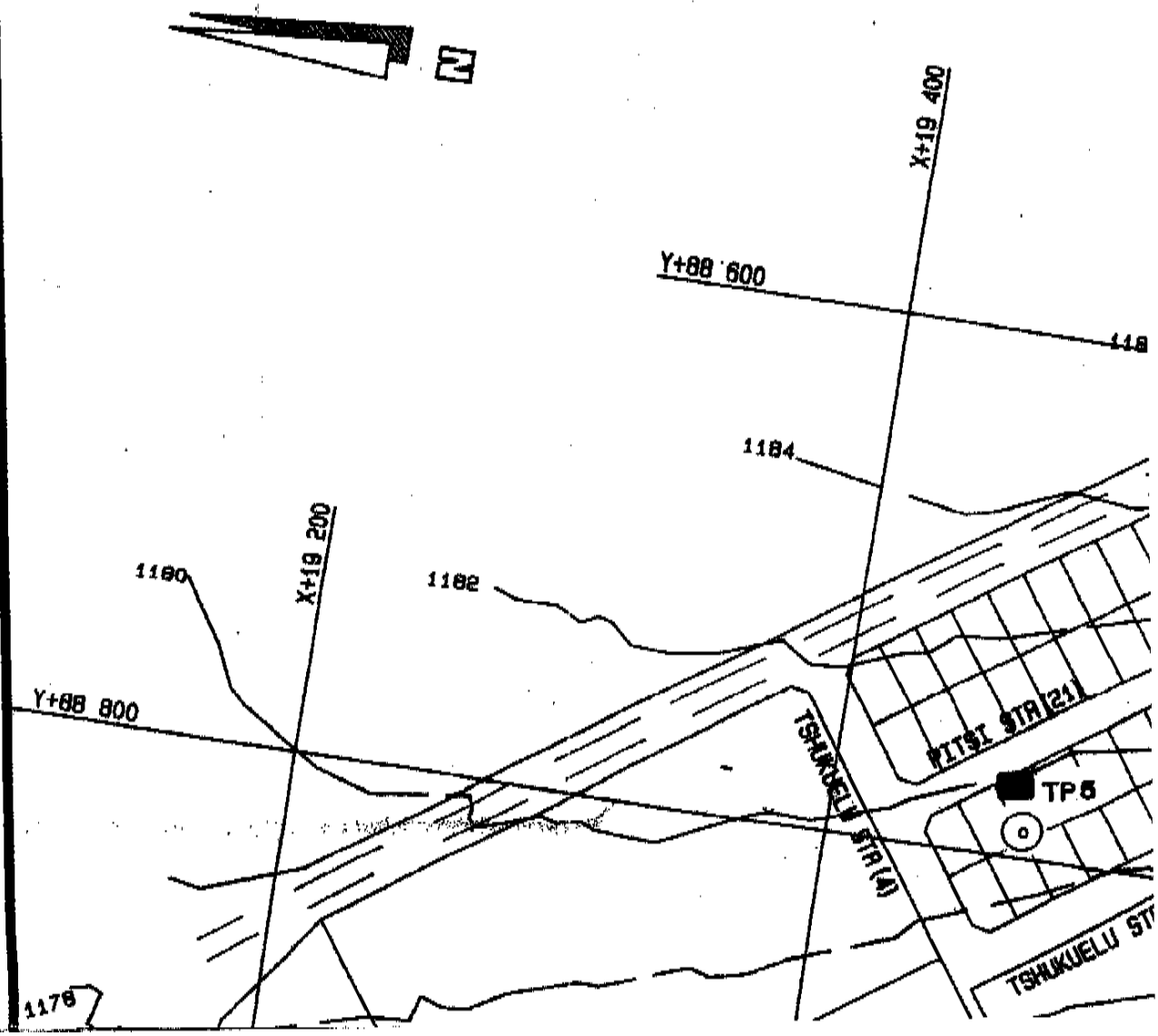
Intermittent Rock Outc

Intermittent Hardpan F

Scattered Large Hard R

Approximate Extent of

Approximate Soil Unit I



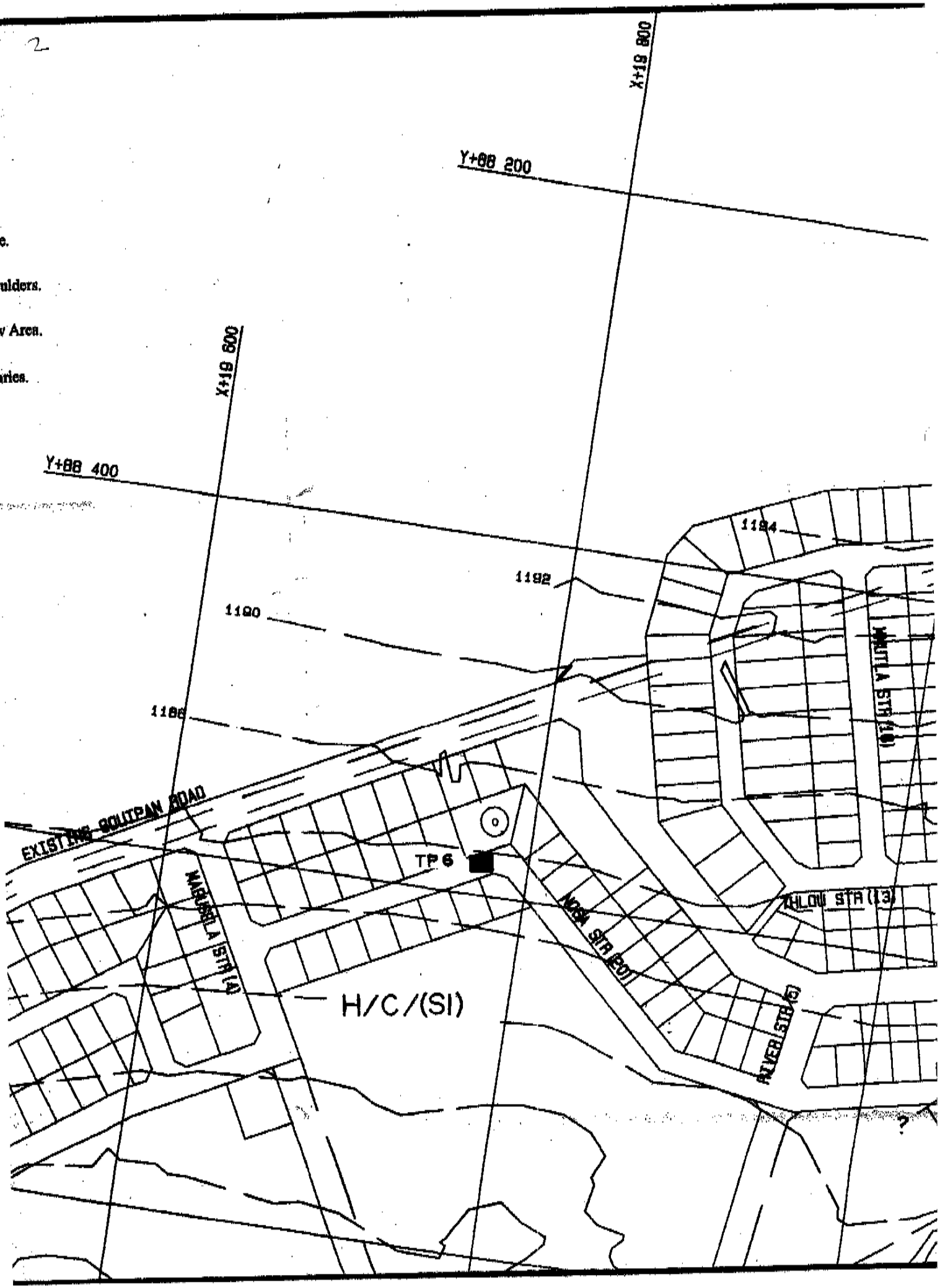
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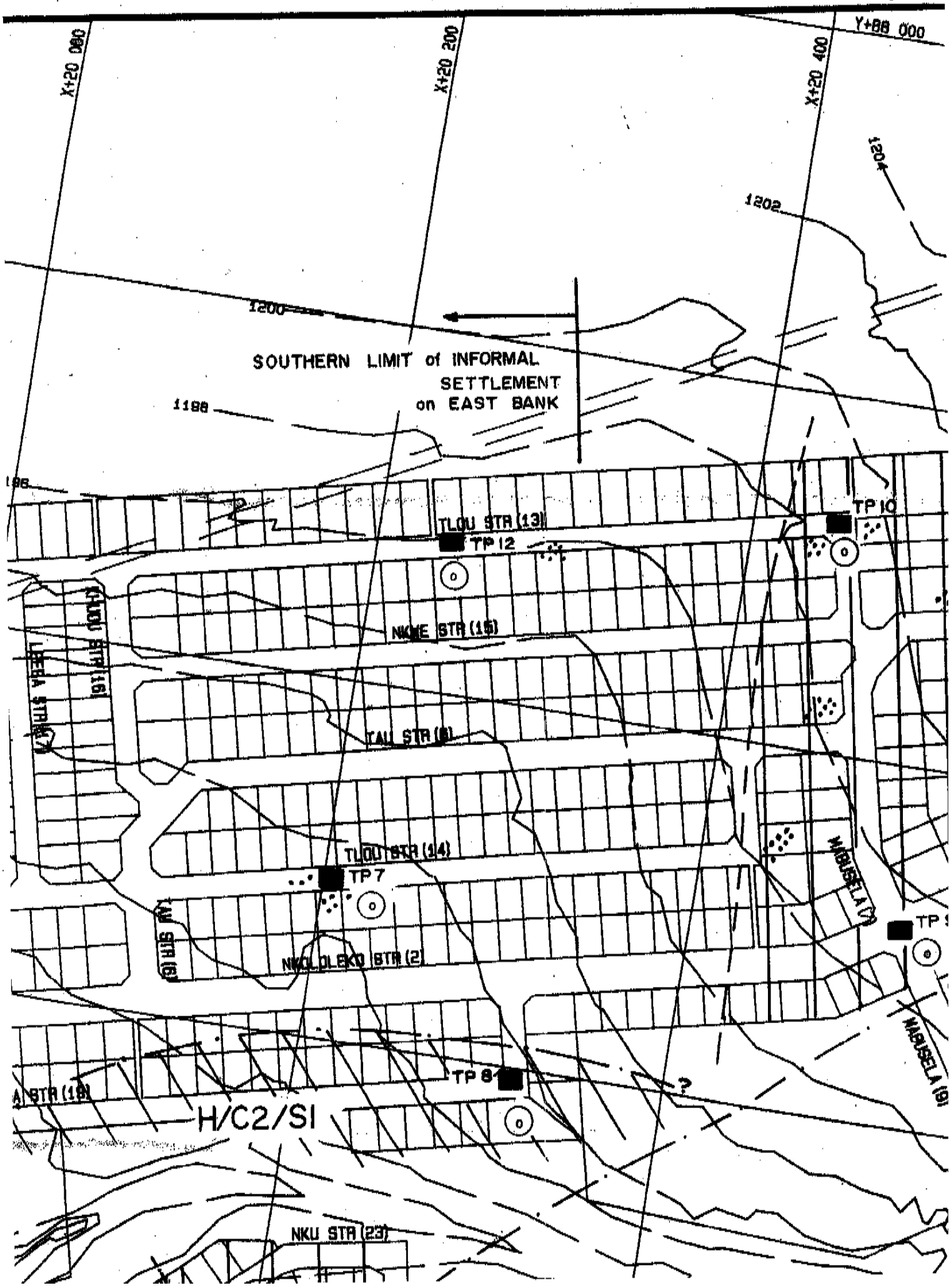
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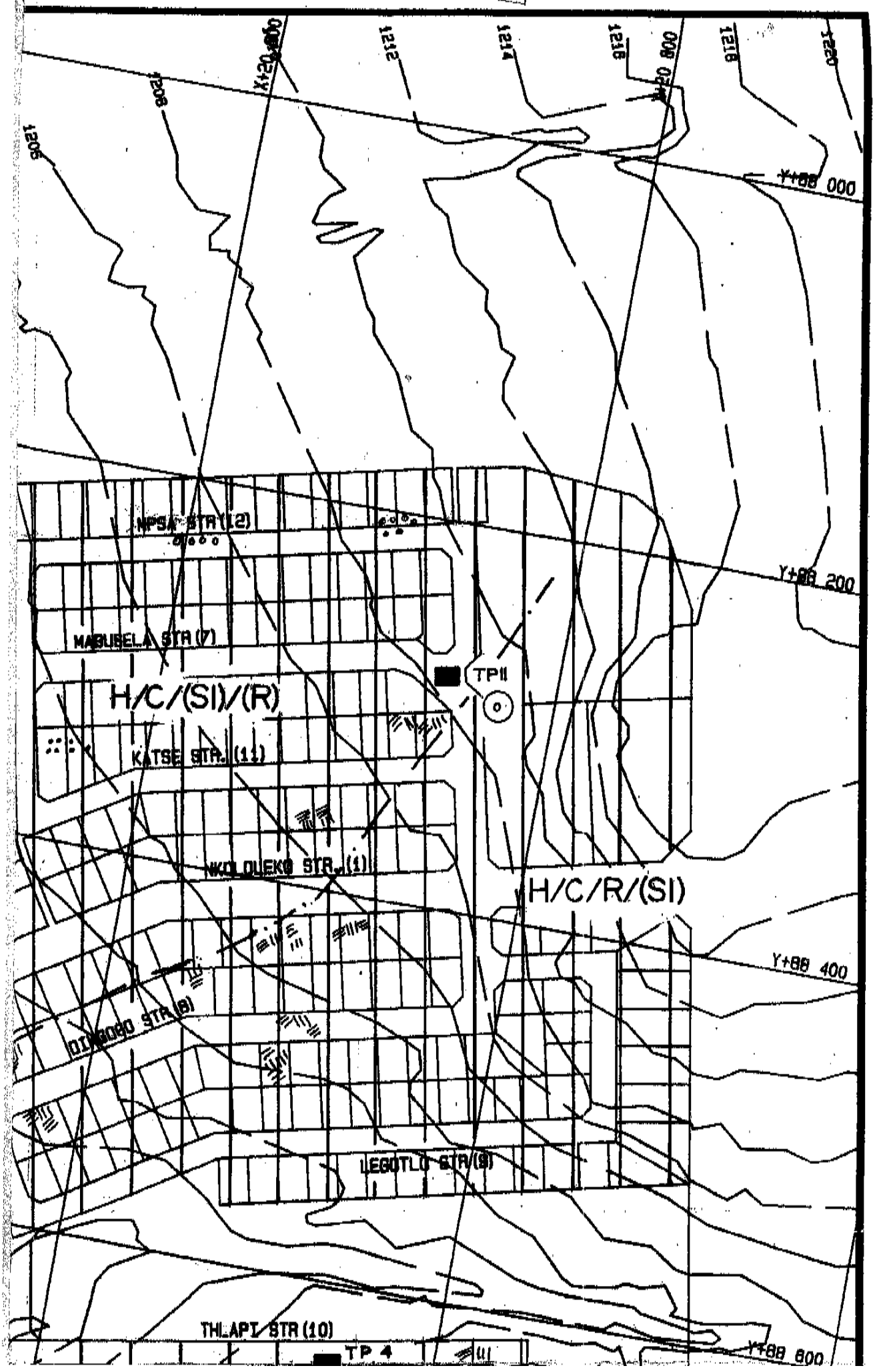
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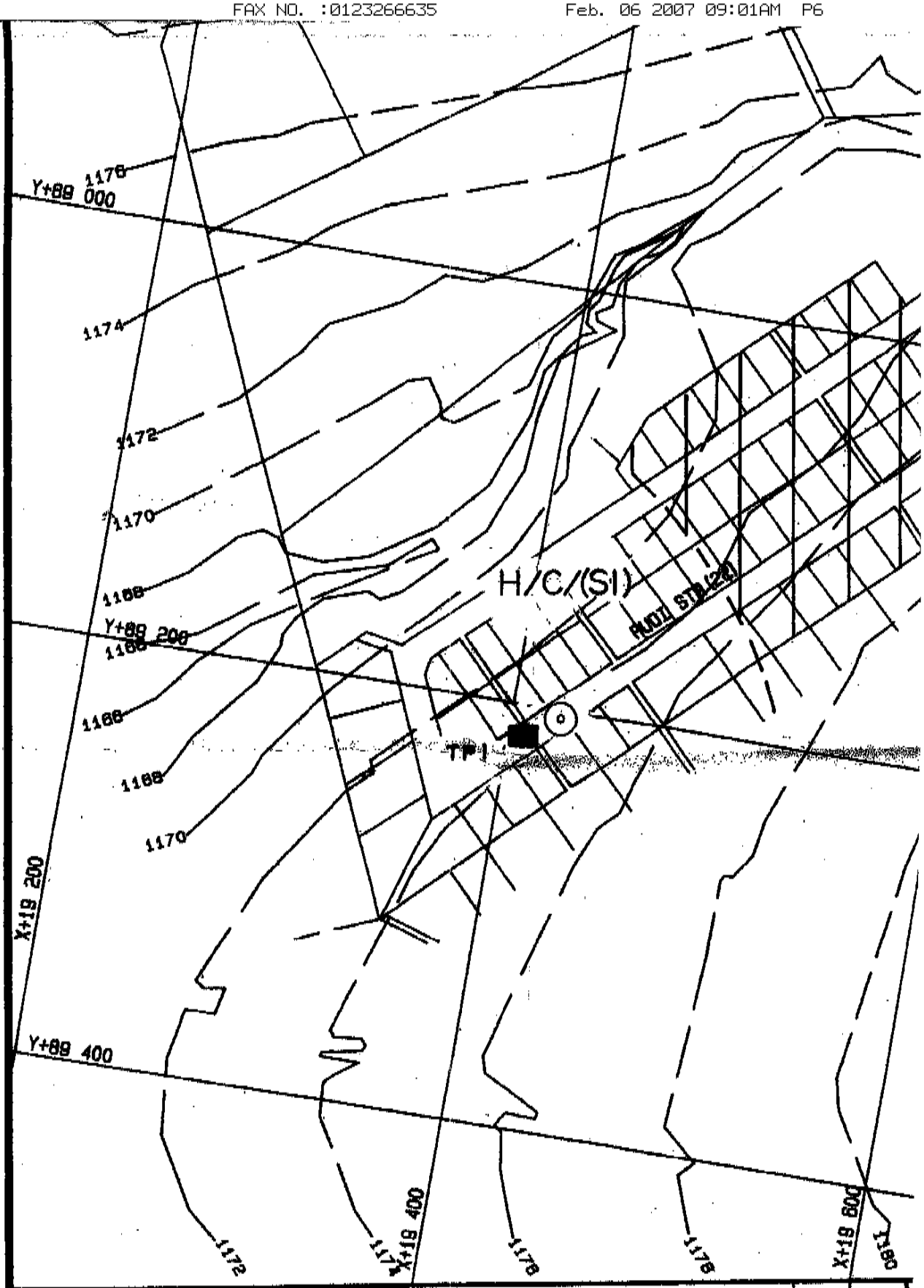



X+20 000
X+20 200
X+20 400
Y+88 000
1204
1202
1200
1198
SOUTHERN LIMIT of INFORMAL SETTLEMENT on EAST BANK
TP 10
TLOU STR (13)
TP 12
NKWE STR (15)
TAU STR (8)
TLOU STR (14)
TP 7
NKOLOLEKO STR (2)
TP 8
H/C2/SI
NKU STR (23)
MABUSELA (9)

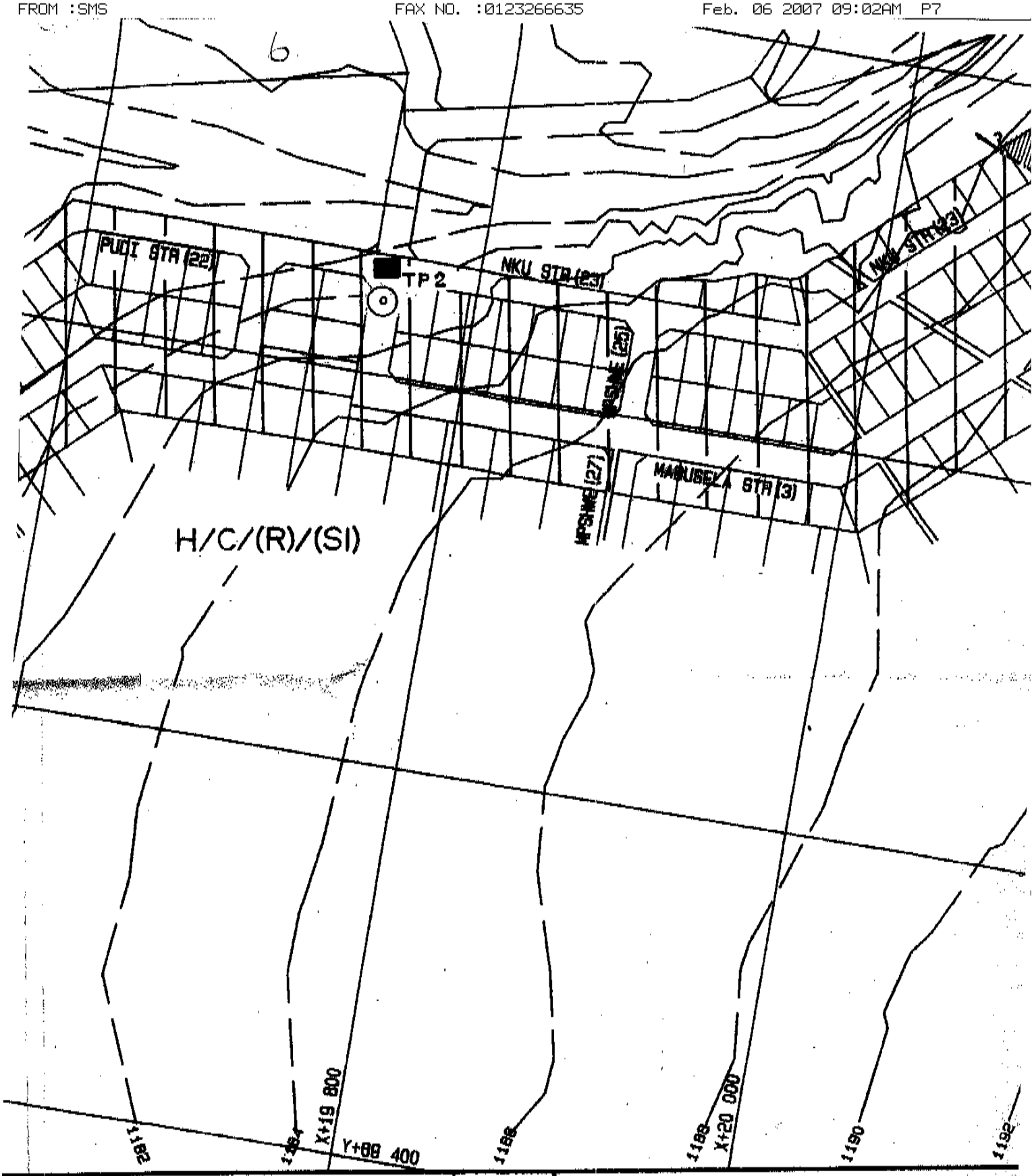
4


Y+88 000
Y+88 200
Y+88 400
Y+88 600
NPSA STR (12)
MABUSELA STR (7)
H/C/(SI)/(R)
TP11
KATSE STR. (11)
NKOLOLEKO STR. (1)
H/C/R/(SI)
LEGOTLO STR (9)
THLAPI STR (10)
TP 4

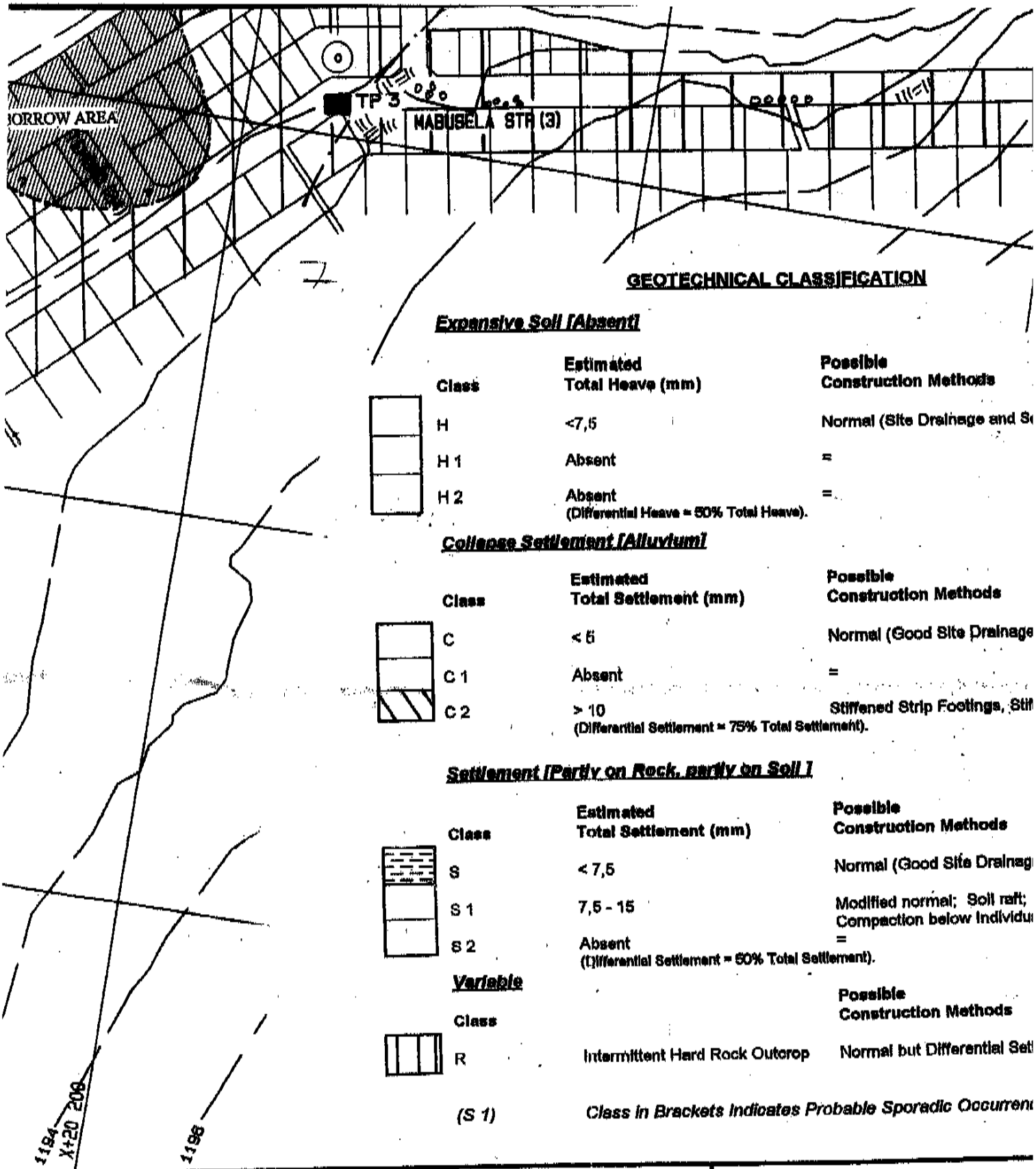
S



1	11/86	PHASES ADDED		
NO	DATUM DATE	DESCRIPTION	CHKD CHK	STARTING FROM CHK
		WYSIGINGS / AMENDMENTS		



BEMEET DEUR SURVEYED BY		DATUM/ DATE	STADSRAAD VAN AKASIA
NTWERP DEUR DESIGN BY		MAY '98 DATUM/ DATE	
AGESIEN DEUR CHECKED BY		DATUM/ DATE	DEPARTEMENT VAN DIE STADSINGENIEUR
TEKEN DEUR RAWN BY		MAY '98 DATUM/ DATE	
AGESIEN DEUR CHECKED BY		DATUM/ DATE	



GEOTECHNICAL CLASSIFICATION

Expansive Soil [Absent]

Class	Estimated Total Heave (mm)	Possible Construction Methods
H	<7,5	Normal (Site Drainage and S
H 1	Absent	=
H 2	Absent (Differential Heave = 50% Total Heave).	=

Collapse Settlement [Alluvium]

Class	Estimated Total Settlement (mm)	Possible Construction Methods
C	< 5	Normal (Good Site Drainage
C 1	Absent	=
C 2	> 10 (Differential Settlement = 75% Total Settlement).	Stiffened Strip Footings, Stif

Settlement [Partly on Rock, partly on Soil]

Class	Estimated Total Settlement (mm)	Possible Construction Methods
S	< 7,5	Normal (Good Site Drainag
S 1	7,5 - 15	Modified normal; Soil raft; Compaction below Individu
S 2	Absent (Differential Settlement = 50% Total Settlement).	=

Variable

Class		Possible Construction Methods
R	Intermittent Hard Rock Outcrop	Normal but Differential Set

(S 1) *Class in Brackets Indicates Probable Sporadic Occurren*

WN COUNCIL

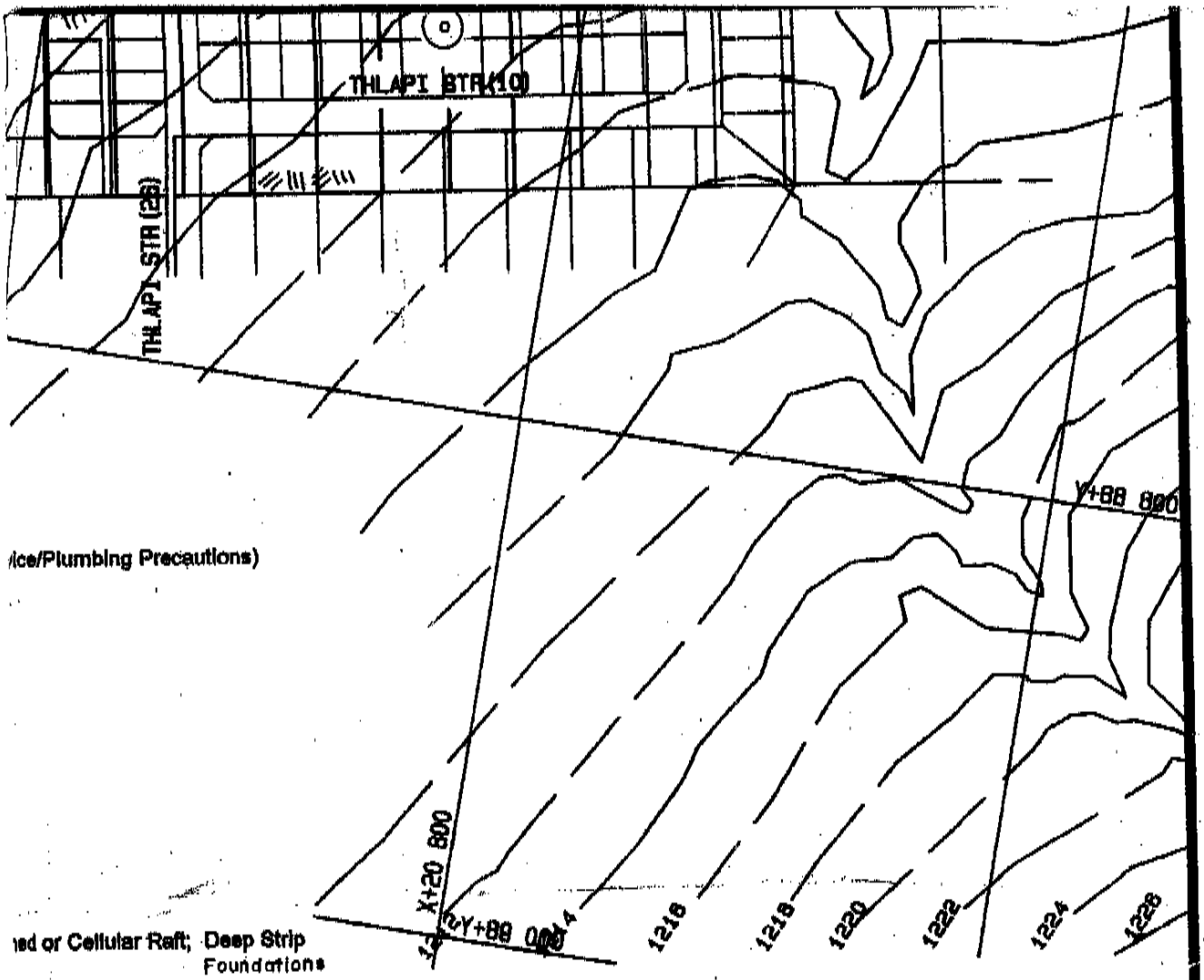
TOWN ENGINEER'S DEPARTMENT

STADSINGENIEUR
TOWN ENGINEER

RAADGEWENDE ING.
CONSULTING ENG.

SOSHAN

8



lice/Plumbing Precautions)

ad or Cellular Raft; Deep Strip Foundations

ep Strip Foundations; Footings.

nent Possibly a Problem.

BLOCK SS, SOSHANGUVE.

SOILS INVESTIGATION.

GEOTECHNICAL MAP

Prepared By: GEOSTRATA cc
P O Box 74753
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SCALE:	DATE:
1 : 2 500	January 1997
JOB No.: 833soos/96	FIGURE No.:

UVE UNIT SS

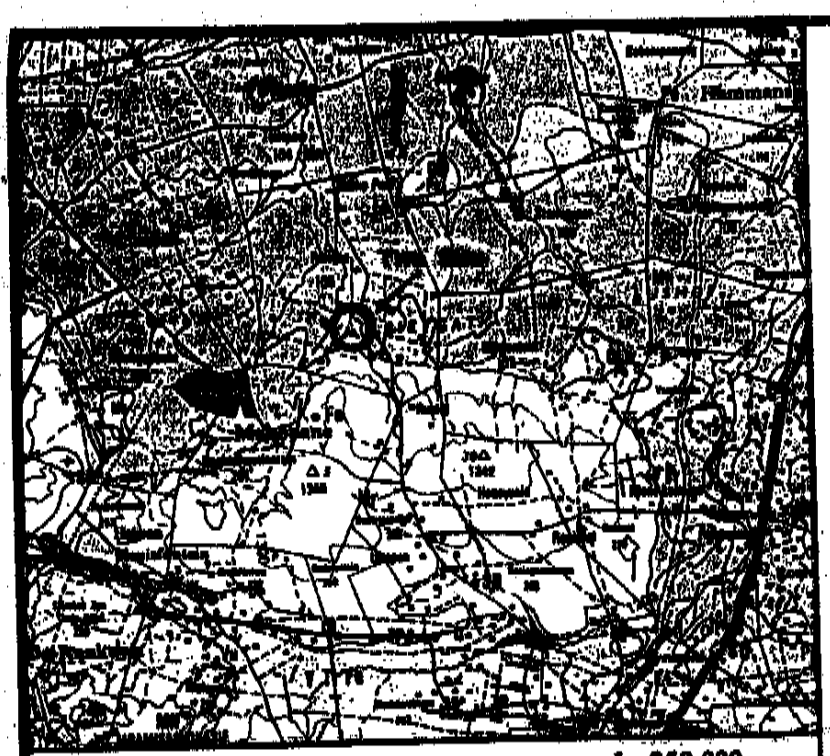
SKAAL : VERT
SCALE : HOR. 1 : 2500

SKAAL OP OORSPRONKLIKE
SCALE ON ORIGINAL

PLAN NR.
PLAN NO.

APPENDIX G

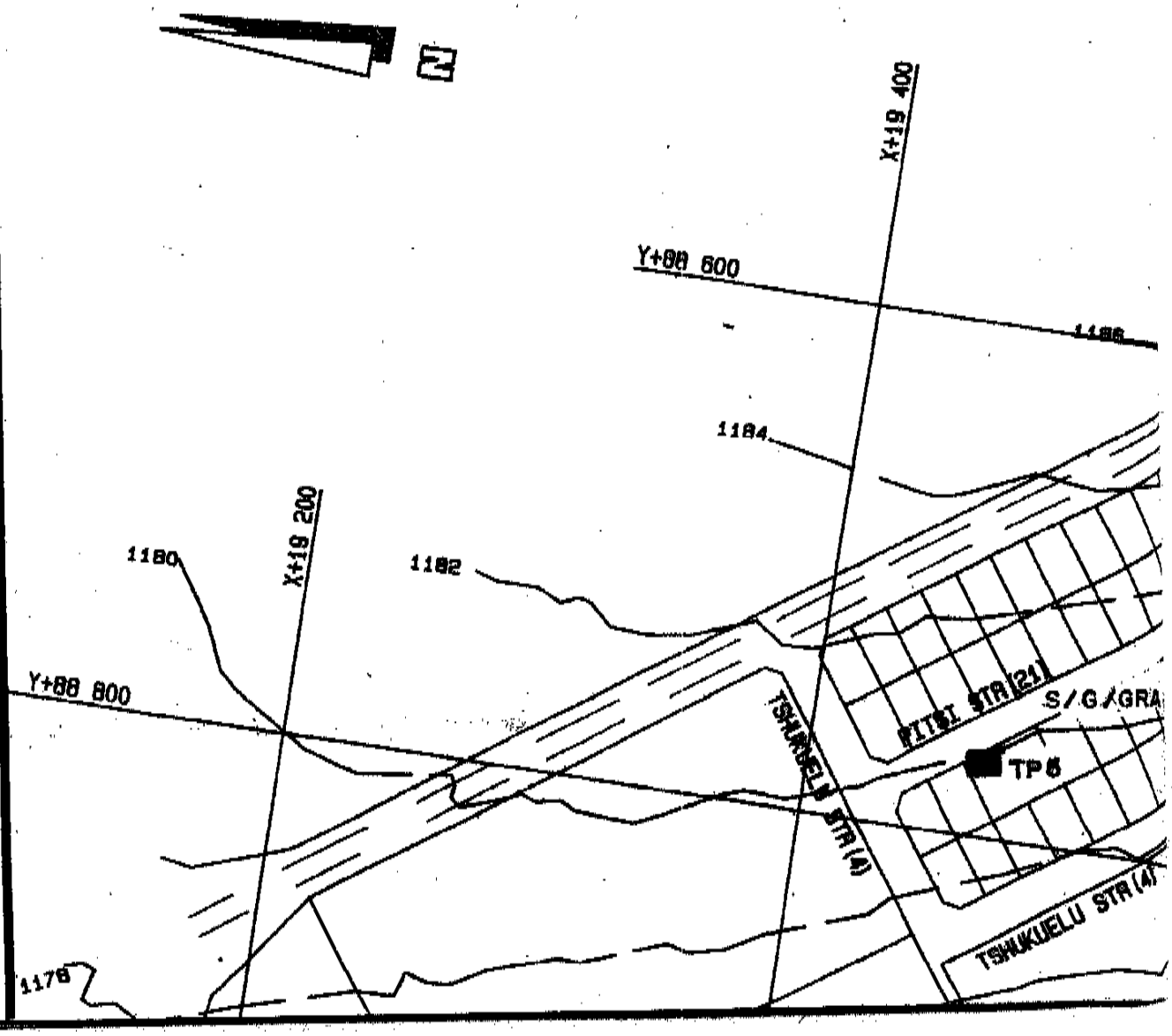
GEOLOGY MAP



LOCALITY PLAN 1 : 250 000

GENERALIS

S/ Fer G/ Fer GRA/ GRA	San
S/ Fer G/ GRA	San
S/ G/ GRA	San
S/ GRA	San
S/ Fer G/ GRN	San



2.

SOIL PROFILES

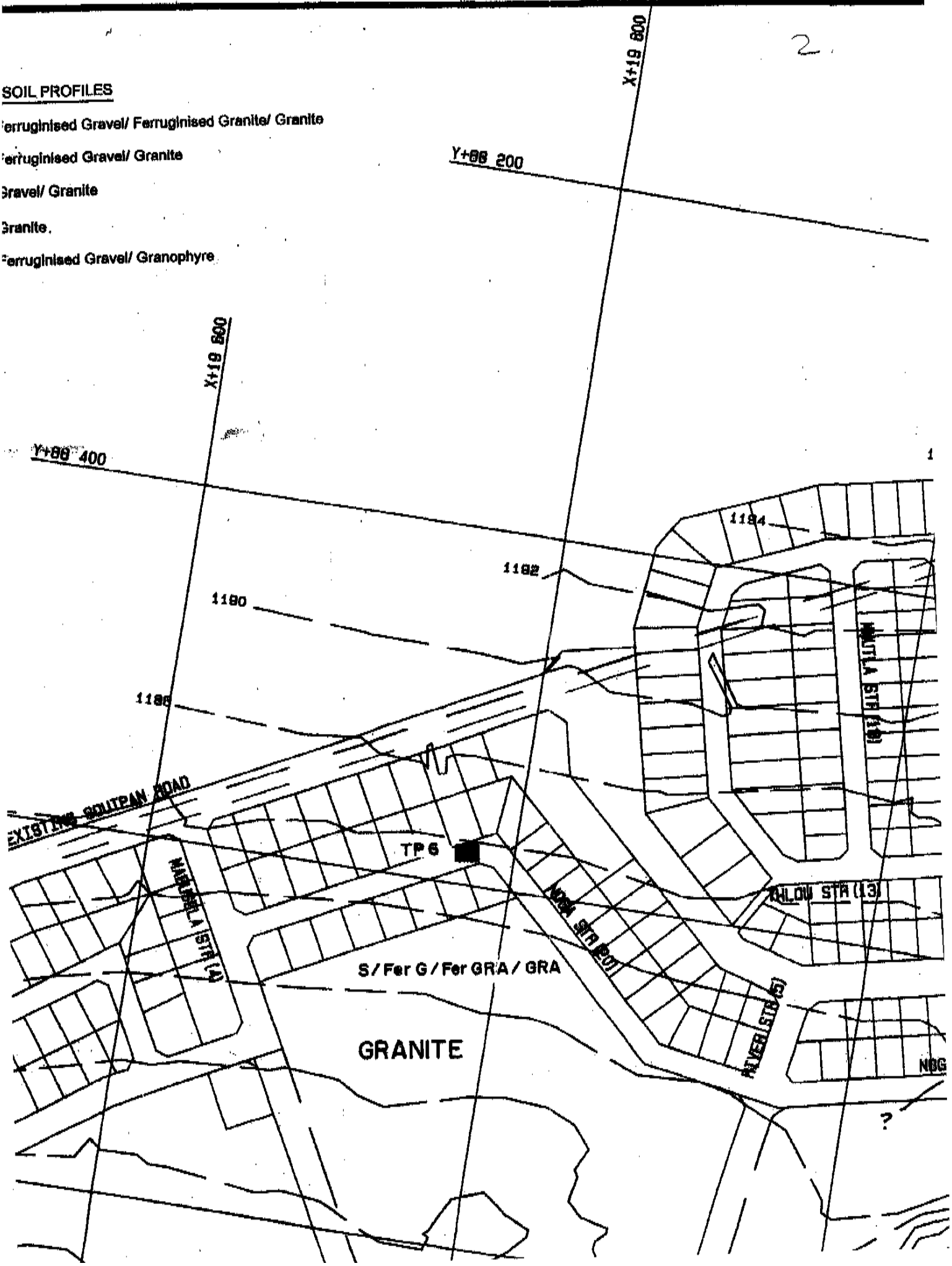
Ferruginised Gravel/ Ferruginised Granite/ Granite

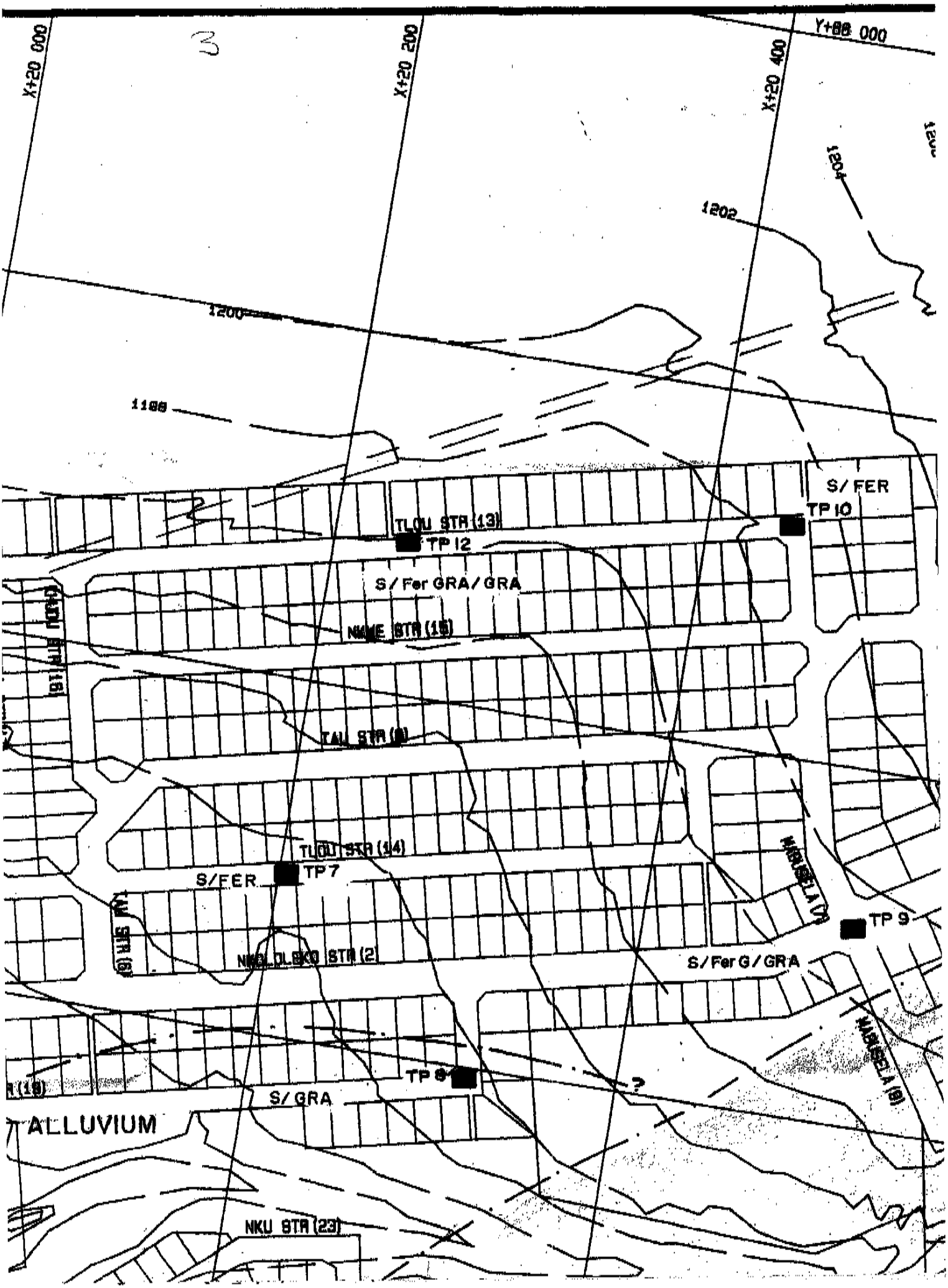
Ferruginised Gravel/ Granite

Gravel/ Granite

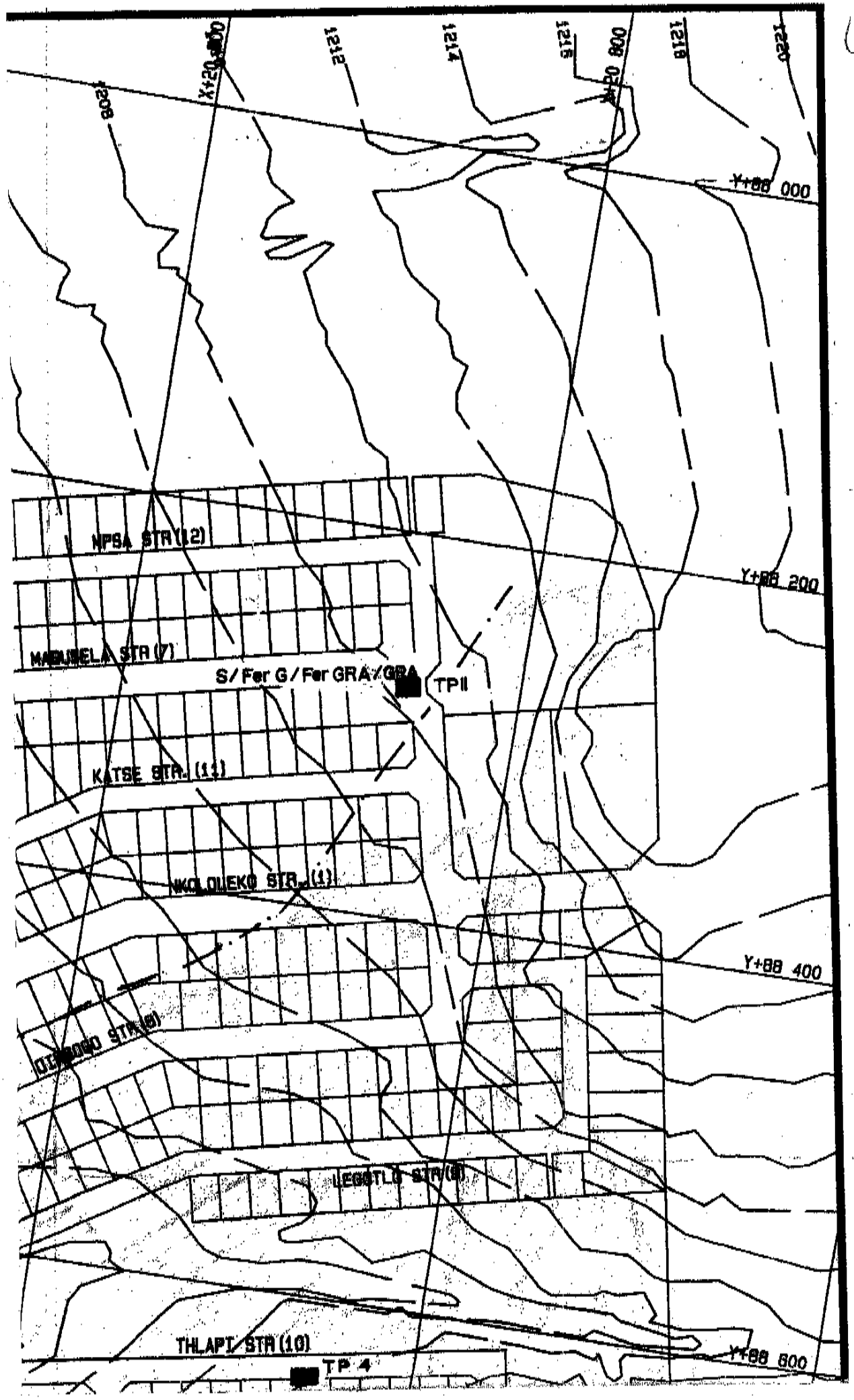
Granite.

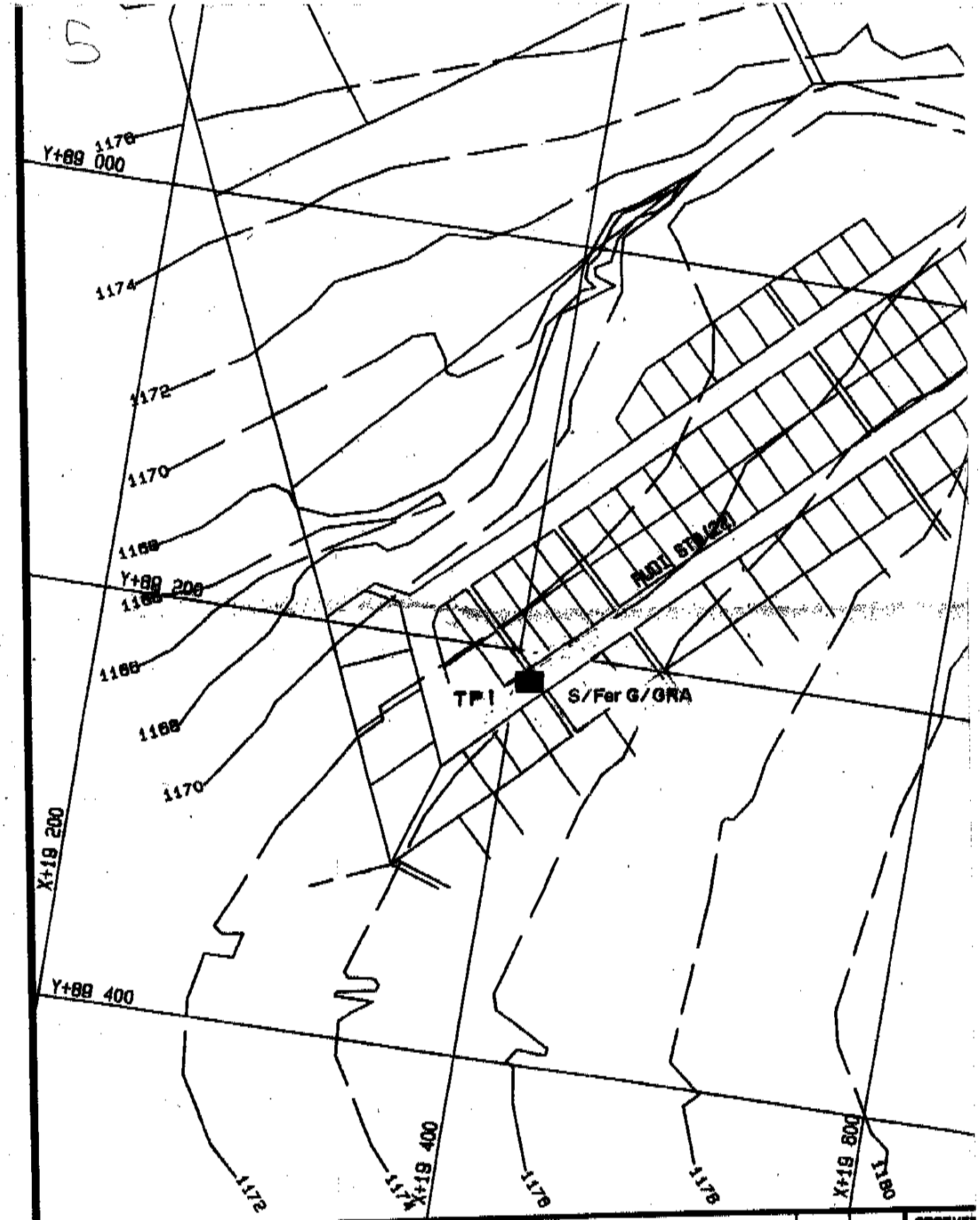
Ferruginised Gravel/ Granophyre




3
X+20 000
X+20 200
X+20 400
Y+00 000
1204
1202
1200
1198
S/FER
TP 10
TLOU STR (13)
TP 12
S/Fer GRA/GRA
NAME STR (15)
TAU STR (8)
TLOU STR (14)
S/FER
TP 7
NKOLOKO STR (2)
S/Fer G/GRA
TP 9
TP 6
S/GRA
ALLUVIUM
NKU STR (23)

4


Y+88 000
Y+88 200
Y+88 400
Y+88 600
NPSA STR(12)
MABUBELA STR (7)
S/Fer G/Fer GRA/GRA
TP11
KATSE STR. (11)
LEGOTLO STR(8)
THLAPI STR (10)
TP 4

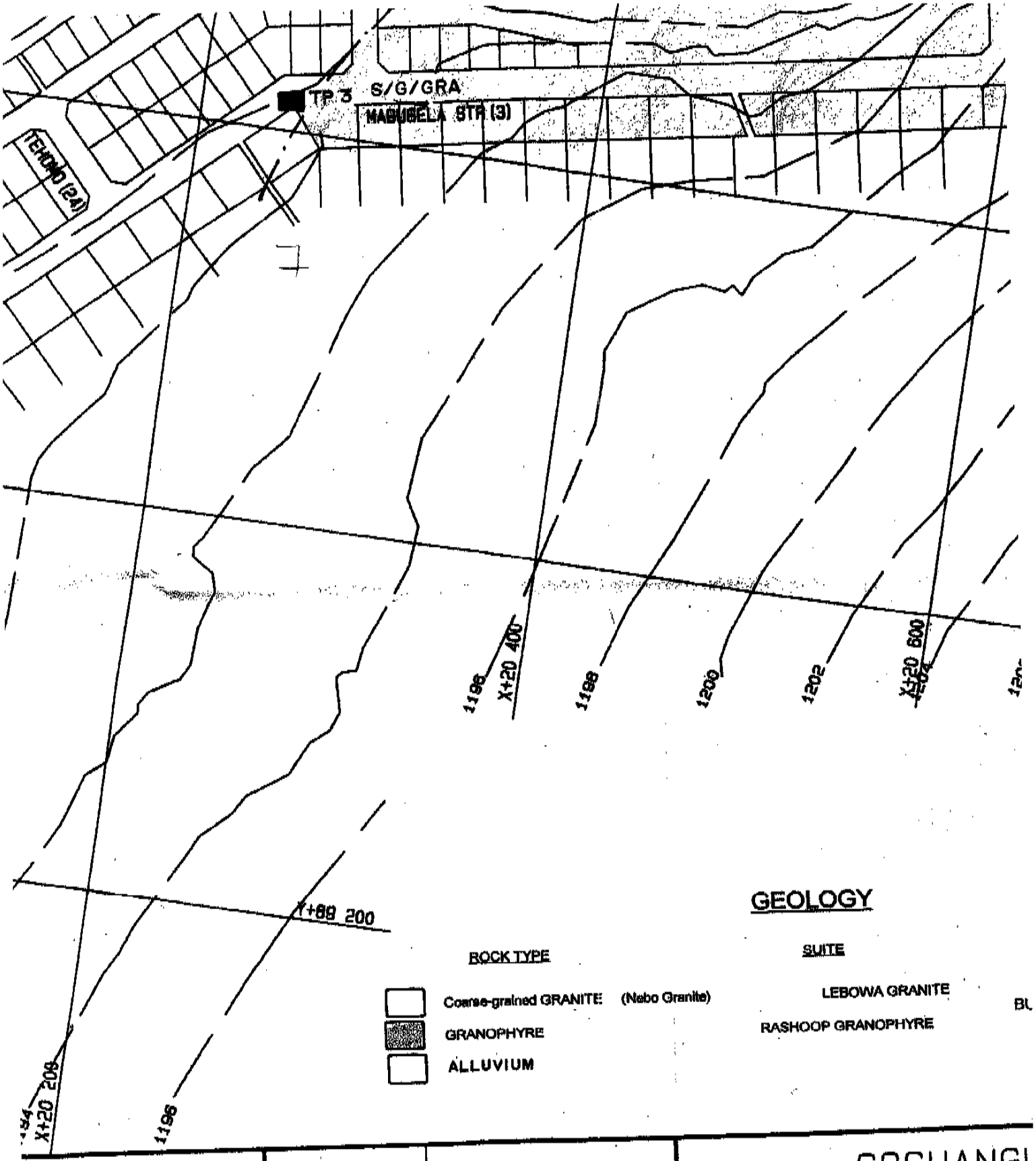


					OPSEMEE SURVEYE
					ONTWERP DESIGN
					NABEBIE CHECKED
1	11/06	PHASES ADDED			GETEKEN DRAWN
NB	DATUM DATE				NABEBIE CHECKED

WYSIGINGS / AMENDMENTS



T DEUR D BY		DATUM/ DATE	STADSRAAD VAN AKASIA TO
DEUR BY		MAY '98 DATUM/ DATE	
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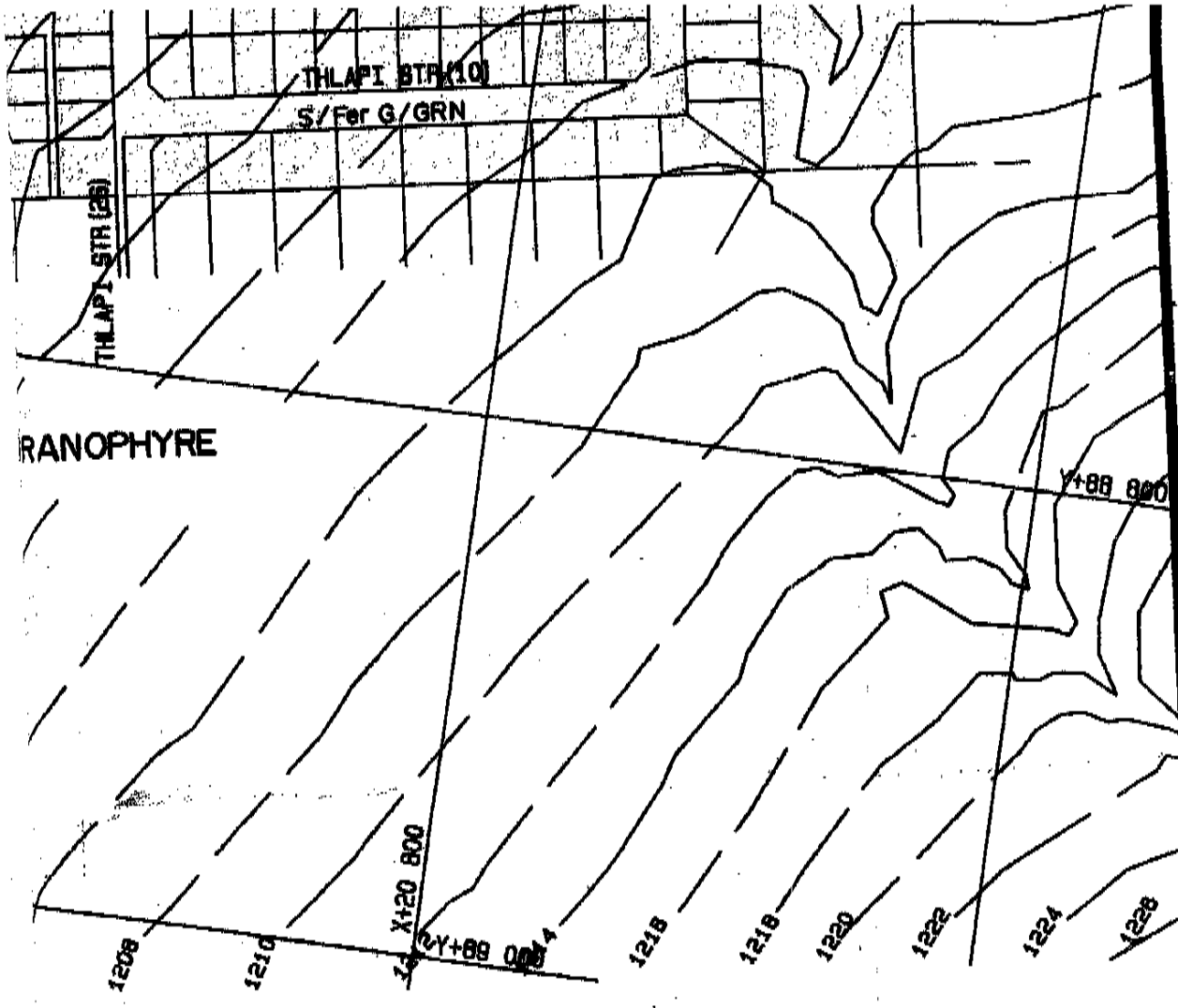
COUNCIL

SOSHANGU

N ENGINEER'S
EPARTMENT

STADSINGENIEUR
TOWN ENGINEER

RAADGEWENDE ING.
CONSULTING ENG.



BLOCK SS, SOSHANGUVE.

SOILS INVESTIGATION.

GEOLOGY

VELD COMPLEX

RECENT

Prepared By: GEOSTRATA cc
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Tel: 012 98 2049 / 4202023
Fax: 012 998 6890

SCALE: 1 : 2 500

DATE: January 1997

JOB No.: 533eos/96

FIGURE No.:

E UNIT SS

SKAAL : VERT
SCALE : HOR. 1 : 2500

SKAAL OP ORSPRONKLIKE
SCALE ON ORIGINAL

PLAN NR.

PLAN NO.