BOSCH STEMELE

Contract No. 10120/2/1040 August 2014

UITVAL SHOPPING CENTRE

ENGINEERING SERVICES REPORT

UITVAL SHOPPING CENTRE

ENGINEERING SERVICES REPORT

PROJECT No. : 10120/2	**DATE: August 2014**
CONSULTING ENGINEERS: Bosch Stemele (Pty) Ltd PO Box 2009 Durban 4000 Tel : +27 31 535-6000 Fax : +27 31 535-6011	**COMMISSIONED BY:** Graham Projects 50B Colwyn Drive Sheffield Beach 4399
AUTHORS: G VAN BREDA	**CLIENT CONTACT PERSON(S):** M. GRAHAM
SYNOPSIS: Uitval Shopping Centre - Engineering Services Report	
FUNCTION: Civil Engineering	

BOSCH STEMELE

QUALITY VERIFICATION

This report has been prepared under the control of the Bosch Stemele Quality Management System which meets the requirements of ISO 9001:2008 as independently certified by international auditors.

Verification	Capacity	Name	Signature	Date
Checked by:	Lead Engineer	**G van Breda**		21/08/2014
Reviewed by:	Project Manager/Director	**C. Kroeger**		21/08/2014
Authorised by:	Project Manager/Director	**C. Kroeger**		21/08/2014
Received by:	Client Authorised Representative			

UITVAL SHOPPING CENTRE

ENGINEERING SERVICES REPORT

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- **10120/002/001 Rev A**

Annexure B: **Survey Plan**
- **10120/002/014 Rev A**

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Annexure D: **Ekuvukeni Landfill Location**
- **10120/002/013 Rev A**

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- **10120/002/010 RevA**

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UITVAL SHOPPING CENTRE

ENGINEERING SERVICES REPORT

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1. INTRODUCTION

Bosch Stemele have been appointed by Graham Projects to undertake the design of all civil infrastructure related to this new retail development on Portion 46 of the Farm Uitval No. 1244.

The retail development will have one supermarket anchor tenant together with fast food outlets and other line stores. The current planning is for an 8,000m² retail centre.

2. SITE LOCALITY

The site is located within the township of Uitval which is situated with Ward 2 of the Indaka Local Municipality which forms part of the uThukela District Municipality. The site is bounded by the Provincial Road P32 to the south, a bus and taxi rank to the east together with the provincial road P359 to the east and housing to the north and west.

See Annexure A for Locality Plan.

3. SITE DESCRIPTION

The site sits within a large tribal authority area and the extent of the development area is approximately 3.1 hectares. The site is generally flat with a high point towards the south east corner of the site and it generally falls at 1% in a north westerly direction across the site.

The site is currently used as a soccer field by the local community.

The site currently has no vegetation except on the perimeter of the site where patches of grass still remain.

See Annexure B for Survey Plan.

4. SITE GEOLOGY

A geotechnical investigation has been carried out on the site. The site is underlay by sandstone bedrock ranging from 800 to 1500mm below the existing ground level. There is a layer of weathered sugar dolerite above the bedrock

The area that forms part of the soccer field has been raised and levelled to create a level playing field and in some parts the levels have been raised by means of rubble and general fill.

The in-situ soils appear to be stable but care must be taken during excavation in the overlying sands as they have the potential to collapse.

The weathered dolerite is considered fair to good for use as a subgrade.

Although no ground water was encountered during the investigation, it should be noted that this investigation was carried out in winter and this is a summer rainfall area. With the presence of sandstone bedrock every effort should be made to avoid creating a perched water table on the site.

5. EXISTING SERVICES

5.1. Water

According to uThukela District Municipality's GIS records there is an existing watermain that runs along the P32 past the site. The actual diameter of this main will need to be determined on site. The supply of water to this area is erratic and can't be relied upon as a source of water for this new development.

See Annexure C for uThukela District Municipality GIS Water Plan.

5.2. Sewer

There is currently no waterborne sewer system in Uitval. The residents currently use conservancy tanks which are then cleaned out by means of private honeysucker services.

5.3. Roads

The Provincial Roads, P32 and P359, which run through Uitval are surfaced roads. All other residential roads are gravel roads. The site is located adjacent to the P32 Provincial Road and hence access will be taken from this surfaced road subject to approval from KZN Department of Transport.

5.4. Stormwater

The site is flat with only a gentle fall of approximately 1% from the south east to north west corner of the site. There is virtually no vegetation on the site apart from a couple of trees and small isolated patches of veld grass.

The MAP for this site is 636mm together with an evaporation rate of between 1800 to 2000mm/year.

The current pre-development runoff is:

1:5 yr - 0,21m³/s

1:25 yr - 0.39m³/s

There is currently no piped stormwater drainage system in Uitval other than where the surface drainage crosses existing roads. In general all stormwater run-off is conveyed via open channels and piped cross drainage through to the nearest watercourse. The nearest watercourse Kalkoenspruit is 850m south of the site.

5.5. Solid Waste

The township of Uitval is currently serviced by means of kerbside waste collection which is done on a weekly basis. The waste is then removed to the landfill site at Ekuvukeni 9km west of the site.

See Annexure D for Ekuvukeni Landfill Location.

6. PROPOSED SERVICES

6.1. Water

According to the "Red Book" the development's water demand is based on 400 ℓ/100 m²/day. Based on readings from similar rural retail centres the water demand has actually been calculated at 200 ℓ/100 m²/day. Furthermore as it is a retail centre which typically operates between 8am and 6pm a peak factor has not been applied.

Note that the communal ablution facilities at the centre will be access controlled together with a cover charge of R2 in order to deter people from using the toilets inappropriately. This access control will further reduce the water demand calculation.

Based on an 8,000m² centre, the expected water demand will be 16 kℓ/day or 0.185 ℓ/s.

Although there is municipal water infrastructure in the area, due to the inconsistency of supply, the recommendation is to install 3 No. 10 000ℓ elevated tanks supplied from the existing water reticulation in P32 road reserve. This is to accommodate approximately 48 hours of storage to accommodate possible supply disruptions.

See Annexure E for proposed Water Layout.

6.2. Sewer

Due to the fact that there is no waterborne sewer system within Uitval, the sewer discharge from the site will be treated by means of a septic tank, soakaway which will overflow to a conservancy tank.

In accordance with the water demand calculation above it is expected that a water demand of 16 kℓ/day will generate approximately 12,8 kℓ/day or 0.148 ℓ/s of sewer discharge.

The septic tank will be designed to treat 13 kℓ/day and the soakaway system will dissipate approximately 50% of the effluent into the surrounding soil. The remaining 50% will be discharged into a conservancy tank where it will be drained by a private honeysucker service. Assuming that 8000 ℓ/100/day will be discharged to a conservancy tank, a 32m³ conservancy tank will be constructed to accommodate 4 days storage. A honeysucker service will be required twice a week typically Monday and Friday.

Based on the percolation test result of 1mm/min which is indicated in the Geotechnical Investigation, the results confirm a soakaway load rate of 40 ℓ/m²/day.

Assuming that 50% of the sewer discharge from the septic tank will be subject to soakaway then a soakaway infiltration area of 200m² is required. It is recommended that the Kaytech Infiltrator or similar approved system be used.

It is anticipated that a soakaway system of 70m in length will be required to accommodate 8000 ℓ/day. This soakaway will be located on the north west of the site running along the northern boundary behind the centre.

See Annexure F for Sewer Layout.

6.3. Roads

A KZN Department of Transport Type B1 access intersection is proposed as recommended by the Traffic Engineer and supported by the TIA which is submitted under separate cover.

The pavement design for the centre access will be:

40mm	continuously graded asphalt
150mm	G2 base
150mm	C4 subbase
150mm	G7 Selected Subgrade (Rip & Recompact in-situ or imported)
150mm	rip and recompact in-situ

The pavement design for the internal roads, parking and service yards will be:

80mm	interlocking blocks
20mm	clean sand
100mm	C4 base
100mm	C4 base
150mm	rip and recompact in-situ (assuming min. G7 in-situ)

Cast in-situ ground beams will be constructed to restrain the block paving in areas where high numbers of turning movements are to be expected along bus and heavy vehicle routes within the site.

The road access intersection proposed on P32 Provincial Road is as per Annexure G.

6.4. Stormwater

Once the site has been developed it will maintain a similar topography to the current site as the parking areas will be built to a minimum fall of 1% with some on surface attenuation planned to reduce the peak runoff from the site.

The post development run-off for the site will be:

1:5 yr - 0.37m³/s

1:25 yr - 0.58m³/s

The post development run-off from the site will be attenuated to match the pre development run-off and in all likelihood should end up being less than pre development peak run-off by means of on-surface storage in the parking areas, bioswales and landscaped gardens as attenuation structures. As this is a flat site and although it is 3.1Ha it is expected that approximately 200m³ of attenuation will be required on the site.

The attenuated stormwater will then be discharged in a controlled manor into the nearest stormwater drainage system either within the road reserve of the P32 or adjacent to the district road south of the proposed development access intersection.

See Annexure H for Stormwater Layout.

6.5. Solid Waste

The current kerbside waste pick up will be maintained. A centralised waste disposal area will be provided within the development which will be easily accessible for the Municipal waste collection vehicles.

It is calculated that based on a waste generation rate of 0,6m³/100m²/week approximately 48m³ of waste will be generated by this shopping centre per week.

It is recommended that a waste compactor be employed on site to accommodate once a week collection.

7. OPERATION AND MAINTENANCE

All civil infrastructure services installed within the site boundary will be maintained by the developer. This responsibility will be transferred to any future owner of the property should the developer decide to sell the development.

All civil infrastructure external to the property boundary will be handed over to the relevant authority on completion of the construction project and will be maintained by that authority.

8. CIVIL ENGINEERING INFRASTRUCTURE BUDGET COST

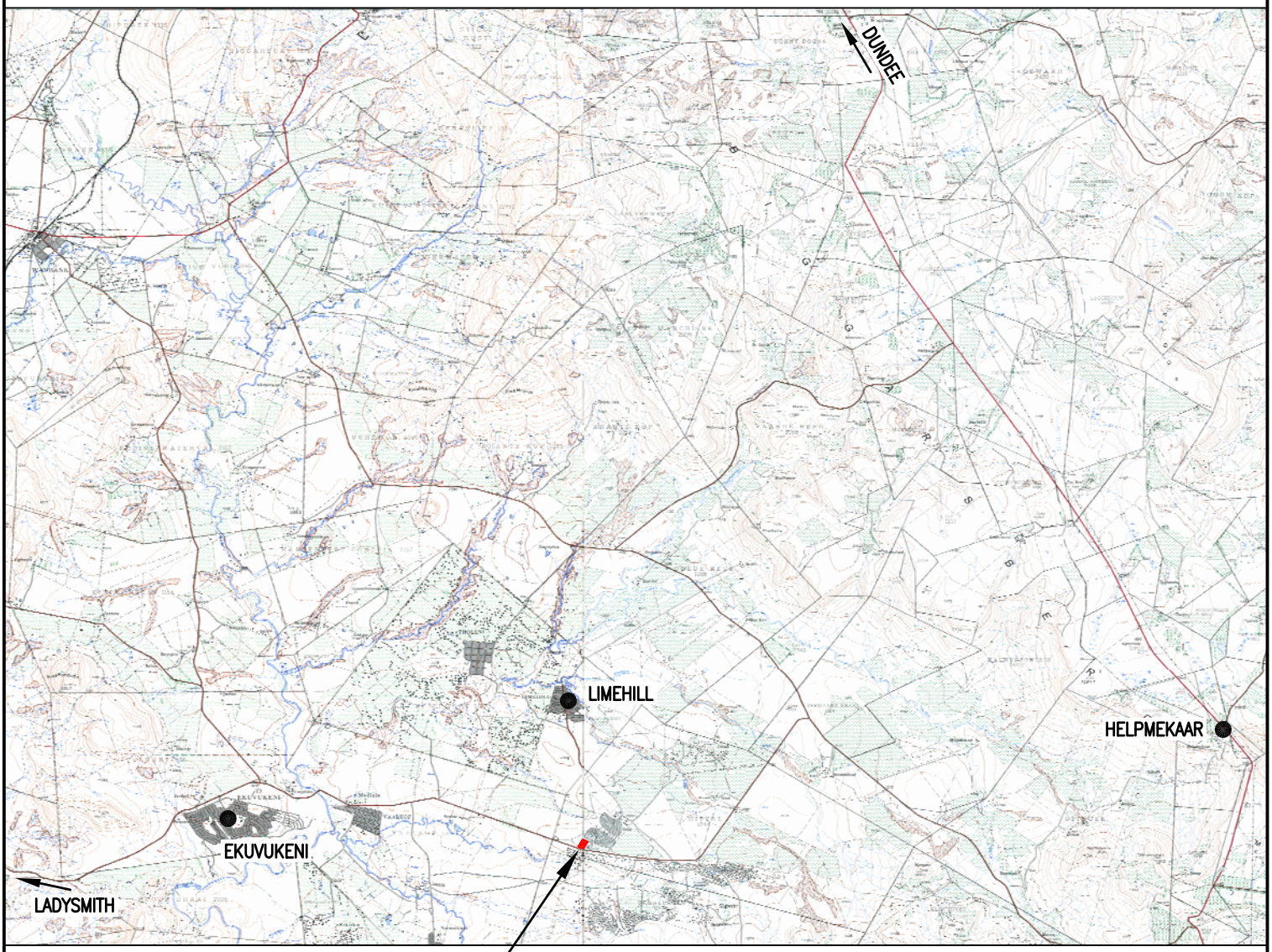
External Roads	R	360,000
Site Internal Roads & Parking	R	2,500,000
External Water	R	45,000
Site Internal Water Reticulation & Storage	R	225,000
Site Internal Sewer Reticulation & Treatment	R	510,000
External Stormwater	R	110,000
Site Internal Stormwater	R	800,000
Sub Total	R	4,550,000
Preliminary & General (15%)	R	682,500
Contingency (10%)	R	523,250
Professional Fees (15%)	R	863,250
TOTAL (Excl. VAT)	**R**	**6,619,000**

Note that this excludes specialist studies, earthworks for building platforms, top-structure costs and plumbing internal to the building up to 1m from building envelope.

The costs above have been supplied in order to request that council consider offsetting the costs of services required external to the site against any bulk contributions payable by the developer.

Prepared by G van Breda
Bosch Stemele (Pty) Ltd

ANNEXURE A



LOCALITY PLAN
NTS

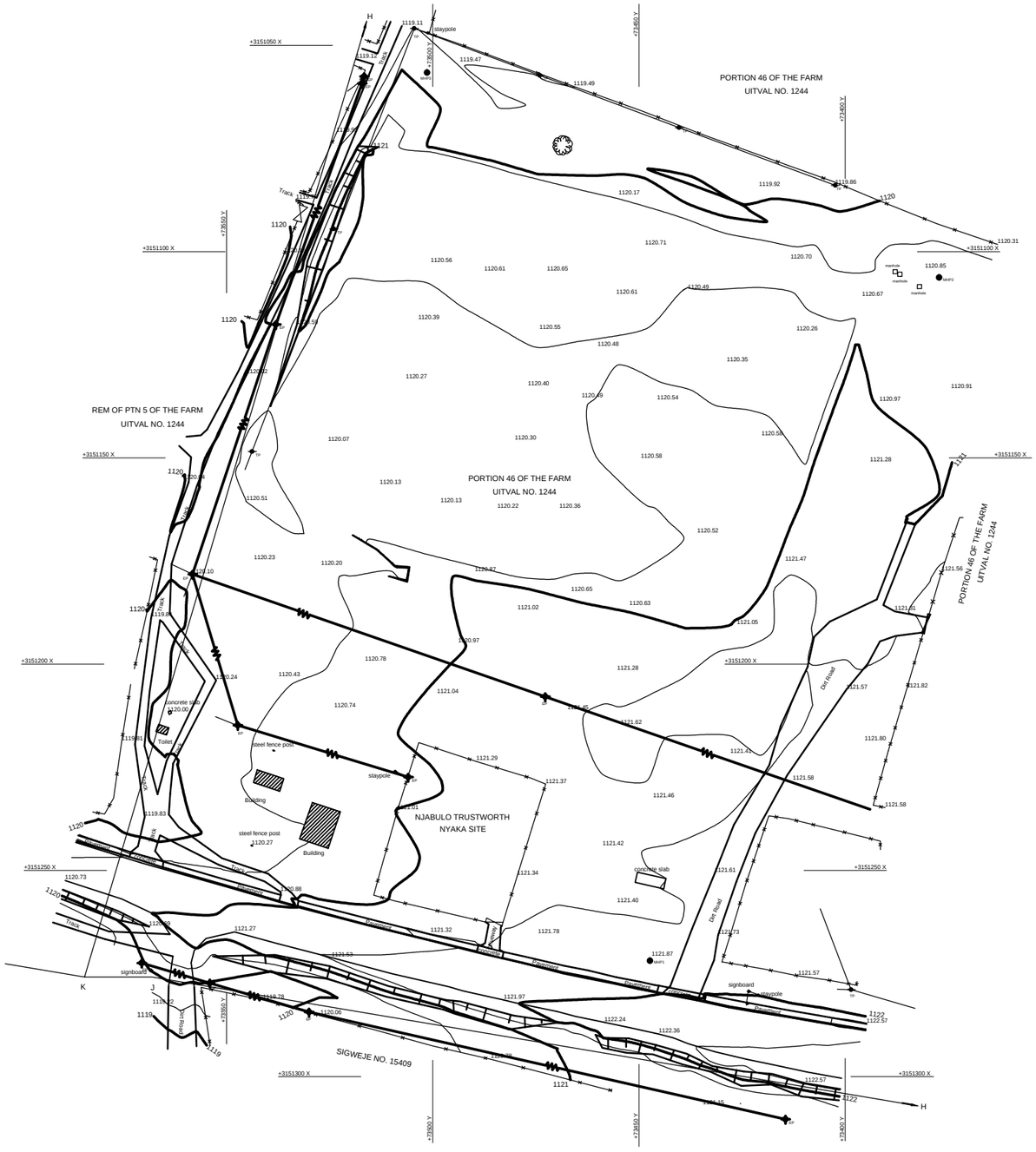
UITVAL SHOPPING CENTRE

LOCALITY PLAN

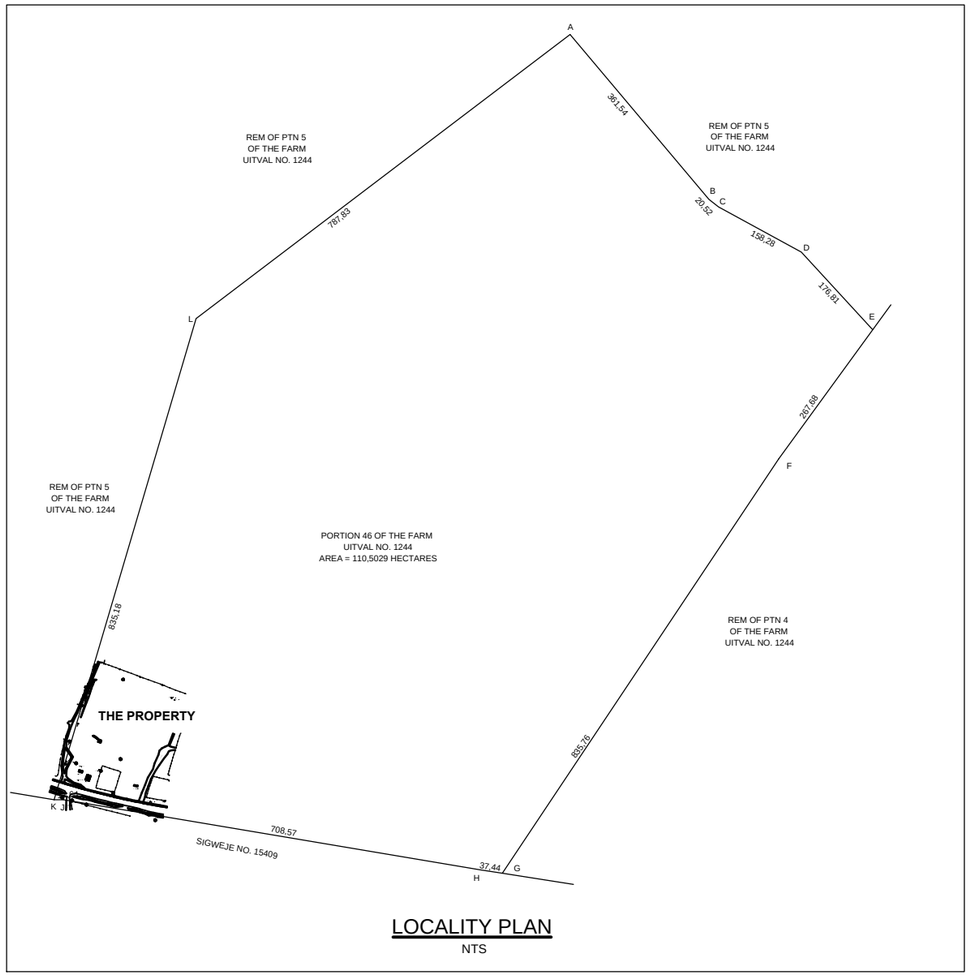
BOSCH STEMELE
Consulting Engineers • Project Managers
ISO 9001:2008 CERTIFIED

DESIGNED	S.P.	APPROVED
DRAWN	S.P.	
CHECKED	G.V.B.	DRAWING No. 10120/002/001 / REV A
SCALE	NTS	
DATE	08/08/14	

ANNEXURE B



SURVEY PLAN
NTS



LOCALITY PLAN
NTS

REV.	DESCRIPTION	DATE	APPR'D
A	FOR INTERNAL REVIEW	07/08/14	

DESIGNED
DRAWN S.P.
CHECKED

APPROVED
PROJECT MANAGER
DIRECTOR

SCALE
AS SHOWN

DATE
07/08/14

UITVAL SHOPPING MALL

SURVEY PLAN

DRAWING NUMBER 10120/002/014

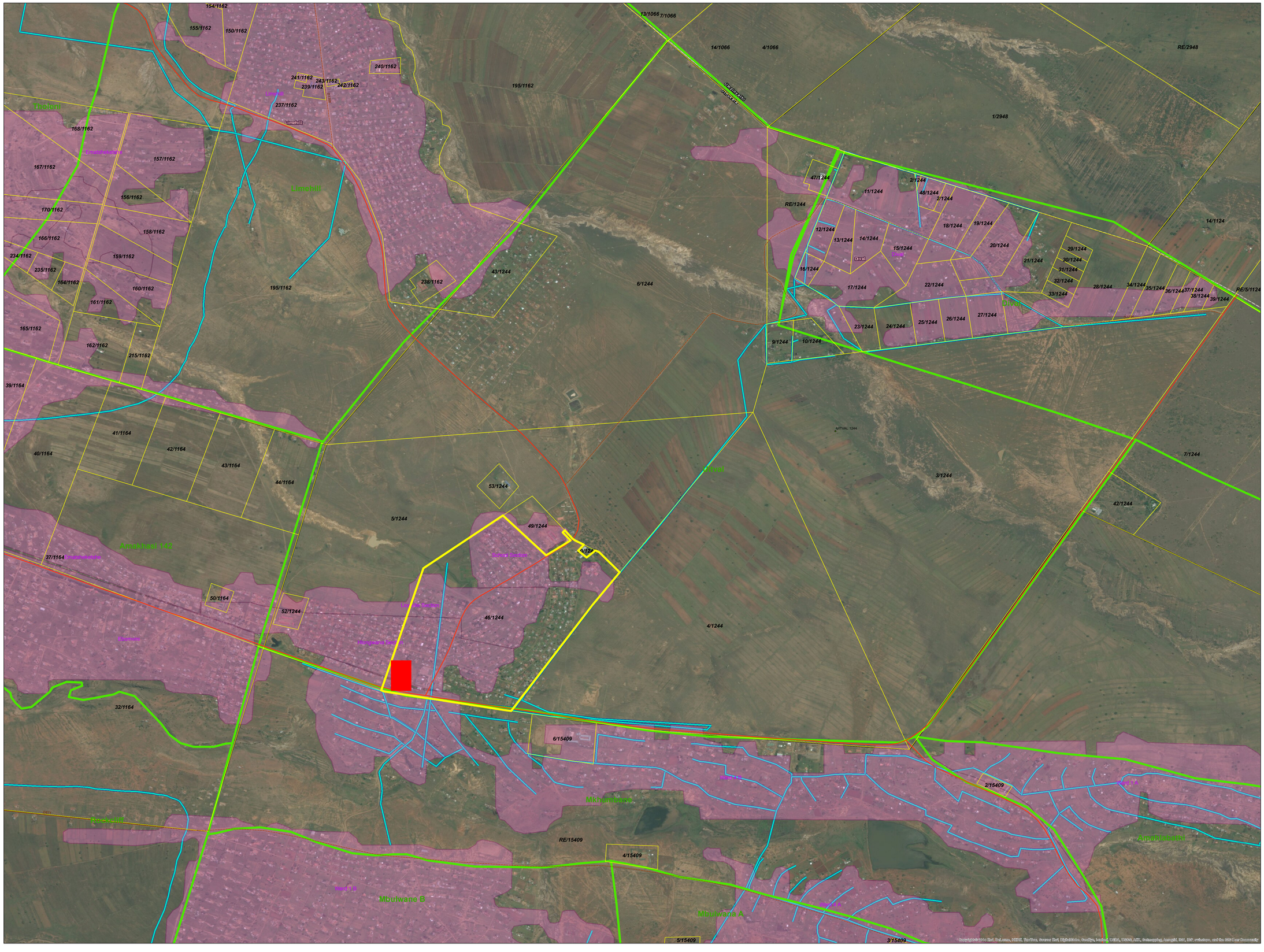
A3

REVISION A

BOSCH STEMELE
Consulting Engineers • Project Managers
BOSCH STEMELE (PTY) LTD.
P.O.BOX 2009, DURBAN, 4000.
1 HOLWOOD PARK, 5 CANEGATE ROAD,
LA LUCIA RIDGE OFFICE ESTATE, KWAZULU-NATAL, RSA
TELEPHONE: (031) 535 6000 TELEFAX: (031) 535 6011
E-mail: bskzn@boschstemele.co.za
www.boschstemele.co.za
ISO 9001:2008 CERTIFIED

ANNEXURE C

UITVAL CIVIL INFRASTRUCTURE



Legend

- Provincial Roads
- District Roads
- Farm Portions
- Isigodi
- Towns
- Settlements
- Pipelines
- Farm Parents

Notes

Projection: Transvers Mecator

Spheriod: WGS84

Datum: Hartebeeshoek

N
W E
S

Scale of Map

0 125 250 500 750

Meters

Produced By:

GIS Office

PO Box 116
Ladysmith
3370

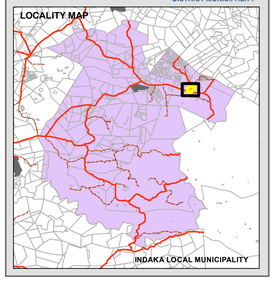
Tel: 036 - 638 5100 Fax: 036 - 635 5501

Date : 24 July 2014

File Path:
c:\gis\mum\ind\uitval2014

UTHUKELA
UMKHANDLU WESIFUNDA
DISTRIKSMUNISIPALITEIT
DISTRICT MUNICIPALITY

LOCALITY MAP



ANNEXURE D

EKUVUKENI LANDFILL LOCATION

SCALE 1:25000

REV.	DESCRIPTION	DATE	APPR'D
A	FOR INTERNAL REVIEW	07/08/14	

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DRAWN S.P.
CHECKED G.V.B.

APPROVED

PROJECT MANAGER

DIRECTOR

SCALE AS SHOWN

DATE 07/08/14

UITVAL SHOPPING MALL

EKUVUKENI LANDFILL LOCATION

DRAWING NUMBER 10120/002/013

A3

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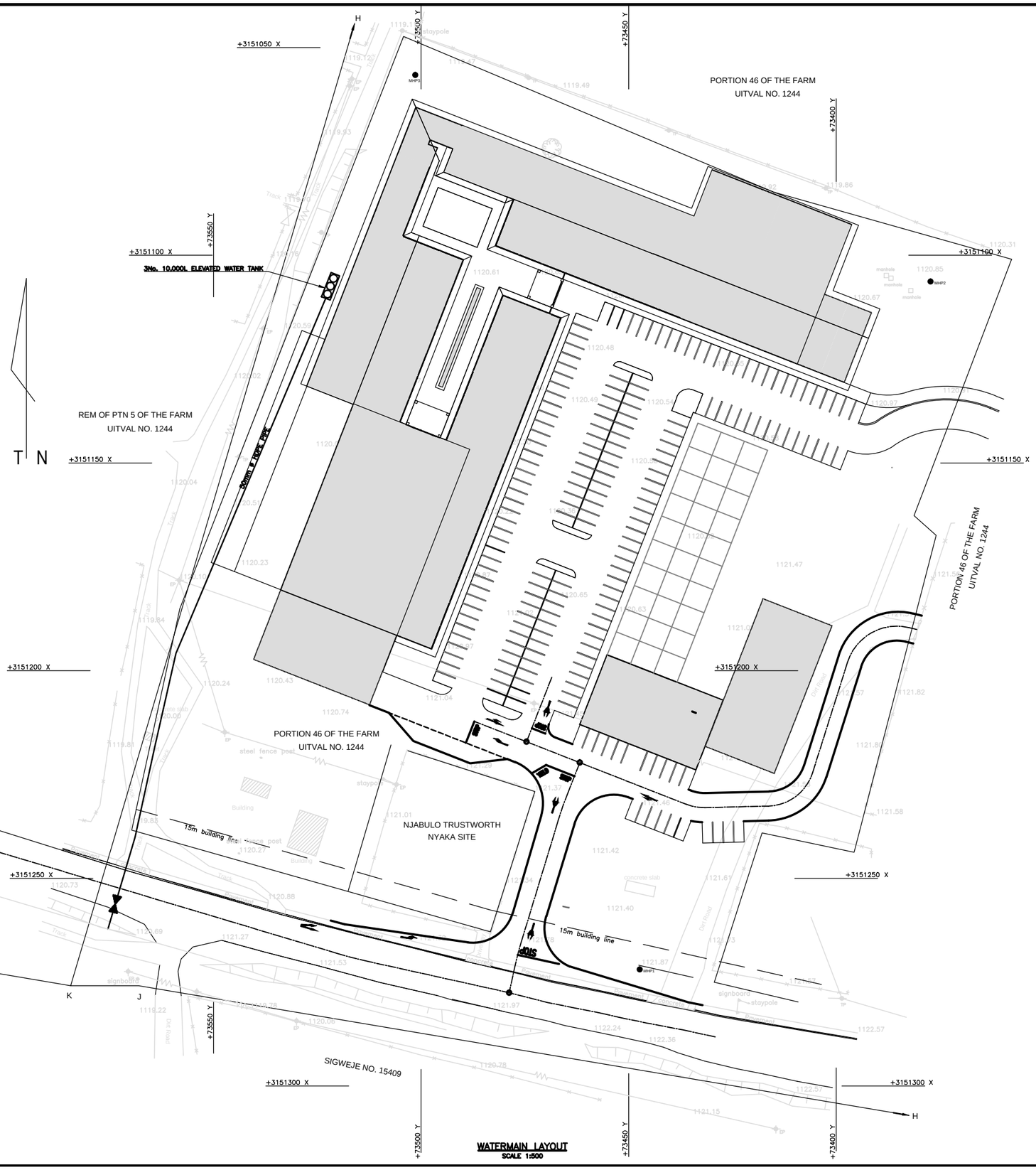
BOSCH STEMELE
Consulting Engineers • Project Managers
BOSCH STEMELE (PTY) LTD.
P.O.BOX 2009, DURBAN, 4000.
1 HOLWOOD PARK, 5 CANEGATE ROAD,
LA LUCIA RIDGE OFFICE ESTATE, KWAZULU-NATAL, RSA
TELEPHONE: (031) 535 6000 TELEFAX: (031) 535 6011
E-mail: bskzn@boschstemele.co.za
www.boschstemele.co.za
ISO 9001:2008 CERTIFIED

ANNEXURE E



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A	FOR INTERNAL REVIEW	05/08/14	

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BOSCH STEMELE

Consulting Engineers • Project Managers

BOSCH STEMELE (PTY) LTD.
P.O.BOX 2009, DURBAN, 4000.
1 HOLWOOD PARK, 5 CANEGATE ROAD,
LA LUCIA RIDGE OFFICE ESTATE,
KWAZULU-NATAL, RSA
TELEPHONE: (031) 535 6000
TELEFAX: (031) 535 6011
E-mail: bskzn@boschstemele.co.za
www.boschstemele.co.za
REGIONAL OFFICES IN:
CAPE TOWN • EAST LONDON • PORT ELIZABETH • JOHANNESBURG

DESIGNED	S.P.	DRAWN	S.P.
CHECKED	G.V.B.	CIVIL ENGINEER	
STRUCTURAL ENGINEER		MECHANICAL ENGINEER	
ELECTRICAL ENGINEER		CO—ORDINATION ENGINEER	

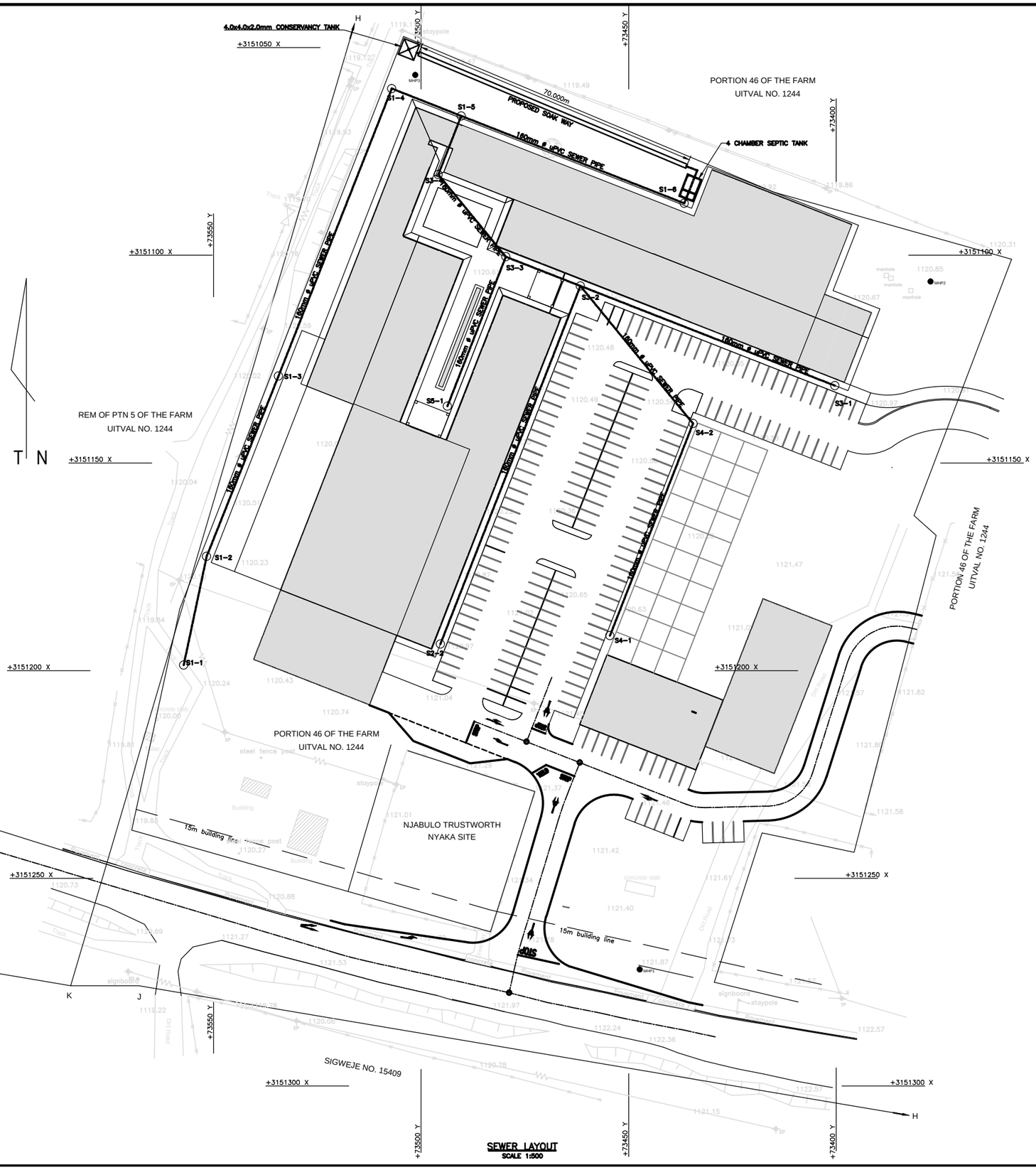
APPROVED _____ PROJECT MANAGER _____ DIRECTOR

UITVAL SHOPPING CENTRE

PROPOSED WATER LAYOUT PLAN

SCALE	1:500	DATE	06/08/14
DRAWING NUMBER	10120/002/010	A1	REVISION A

ANNEXURE F



SEWER LAYOUT
SCALE 1:500

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Consulting Engineers • Project Managers

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P.O.BOX 2009, DURBAN, 4000.
1 HOLWOOD PARK, 5 CANEGATE ROAD,
LA LUCIA RIDGE OFFICE ESTATE,
KWAZULU-NATAL, RSA
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TELEFAX: (031) 535 6011
E-mail: bskzn@boschstemele.co.za
www.boschstemele.co.za
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CHECKED	G.V.B.	CIVIL ENGINEER	
STRUCTURAL ENGINEER		MECHANICAL ENGINEER	
ELECTRICAL ENGINEER		CO-ORDINATION ENGINEER	

APPROVED _____ PROJECT MANAGER _____ DIRECTOR

UITVAL SHOPPING CENTRE

PROPOSED SEWER LAYOUT PLAN

SCALE	1:500	DATE	06/08/14
DRAWING NUMBER	10120/002/007	A1	REVISION A

ANNEXURE G

A	FOR INTERNAL REVIEW	05/08/14	
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BOSCH STEMELE

Consulting Engineers • Project Managers

BOSCH STEMELE (PTY) LTD.
P.O.BOX 2009, DURBAN, 4000.
1 HOLWOOD PARK, 5 CANEGATE ROAD,
LA LUCIA RIDGE OFFICE ESTATE,
KWAZULU-NATAL, RSA
TELEPHONE: (031) 535 6000
TELEFAX: (031) 535 6011
E-mail: bskzn@boschstemele.co.za
www.boschstemele.co.za
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STRUCTURAL ENGINEER		MECHANICAL ENGINEER	
ELECTRICAL ENGINEER		CO-ORDINATION ENGINEER	

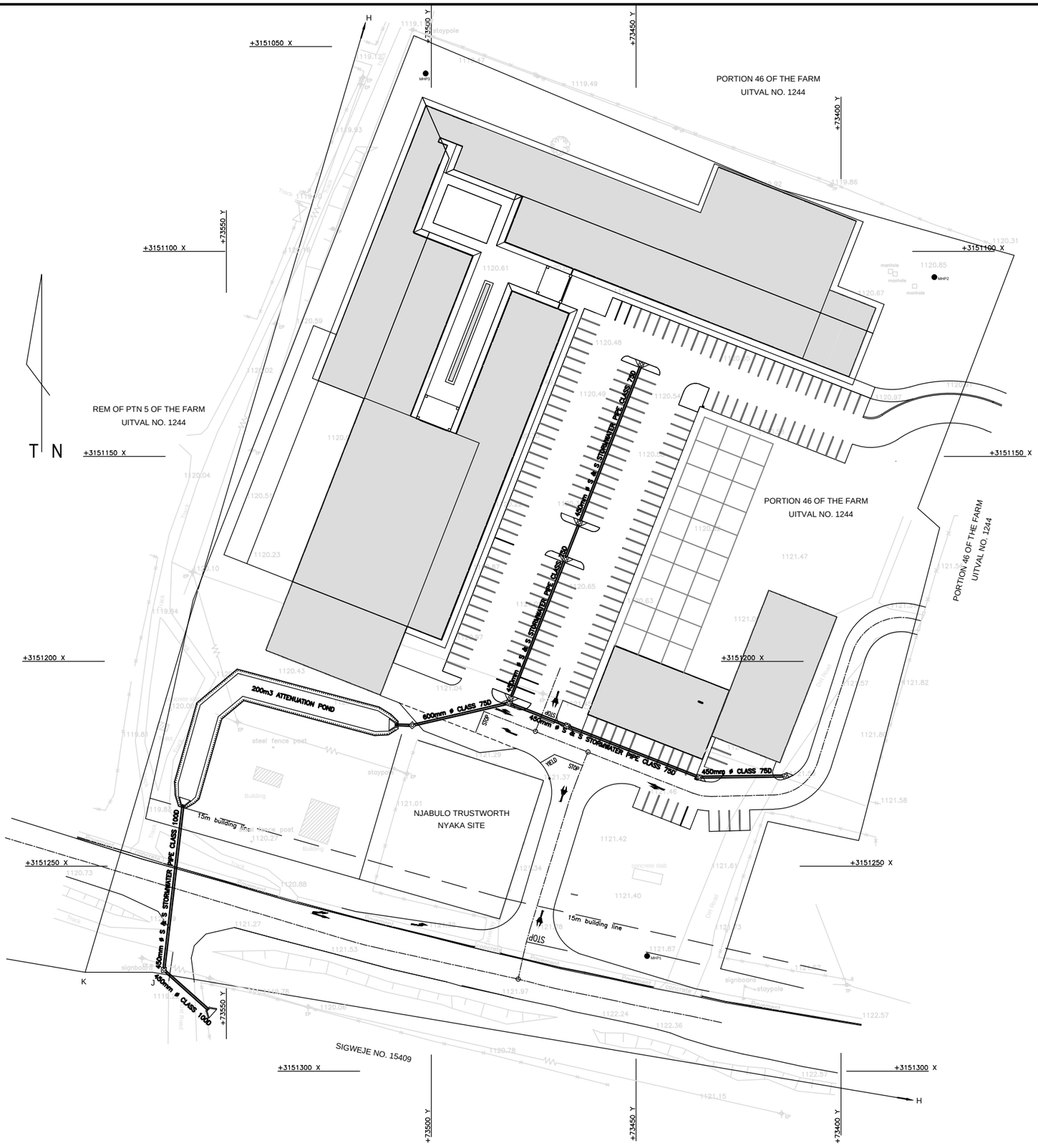
APPROVED
PROJECT MANAGER
DIRECTOR

UITVAL SHOPPING CENTRE

ROAD LAYOUT PLAN

SCALE 1:500		DATE 06/08/14	
DRAWING NUMBER 10120/002/003	A1	REVISION A	

ANNEXURE H



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STRUCTURAL ENGINEER		MECHANICAL ENGINEER	
ELECTRICAL ENGINEER		CO-ORDINATION ENGINEER	

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UITVAL SHOPPING CENTRE

PROPOSED STORMWATER LAYOUT PLAN

SCALE 1:500		DATE 06/08/14	
DRAWING NUMBER 10120/002/005	A1	REVISION A	