CIVIL CONCEPTS
Consulting Civil and Structural Engineers

RIVERWALK - WULA
RIVERWALK BOULEVARD ROAD BRIDGE
METHOD STATEMENT
C2142/WRA/001
MAY 2016

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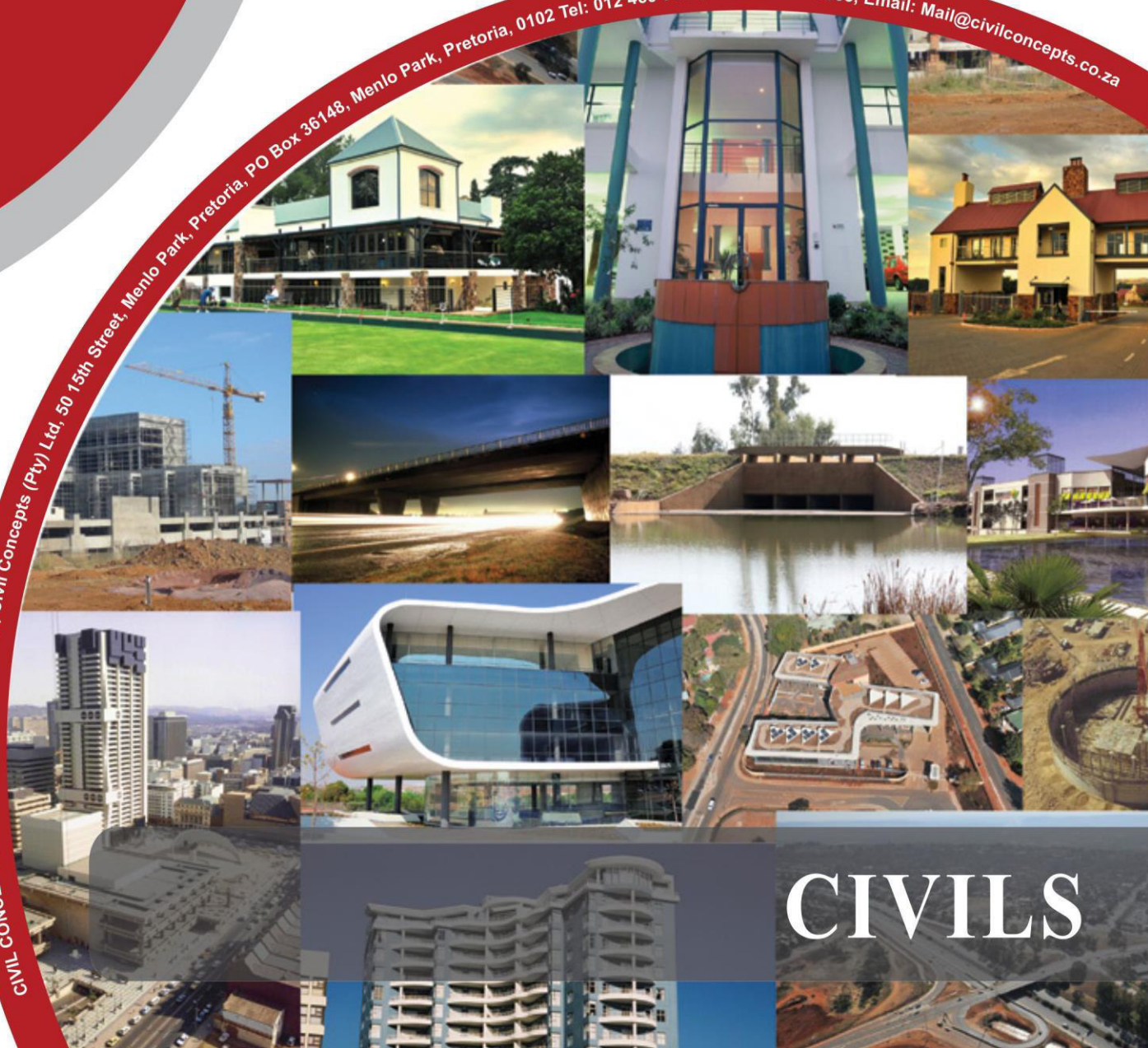


RIVERWALK BOULEVARD BRIDGE - DESCRIPTION OF WORKS FOR WULA

1. PROPOSED NEW CULVERT BRIDGE

The components of the activities include for:

- Temporary deviation of water course;
- Preparation of embankment footprints and bedding for culvert construction and other hydraulic structures;
- Option 1: Construction of 7/ 4000 x 1500mm Precast Rectangular Portal Frame Culverts, or
- Option 2: Construction of 27/1500 mm dia Precast Pipe Culverts;
- Imported filling;
- Embankment protection;
- Erosion control and protection;
- Rehabilitation and reinstatement to original state, and
- An existing temporary crossing will be utilised for transportation and traffic to cross the natural water course.

1.1 Temporary deviation of water course

The natural water course is a non - perennial water course with a fairly large flow volume, thus temporary deviation thereof will be required during construction to allow a workable construction area and prevent unnecessary environmental damage to the surrounding area. All work will be done during the dry season to facilitate water management.

Temporary deviation will entail:

- Construction of a structure diverting the flow to the eastern side of the water course using sandbags;
- The water will be diverted, to allow a workable area on the western side;
- No excavation will be done on the diverting channel but this will be formed using sandbags or other geo-fabric or material, and
- All temporary construction materials will be removed from site once construction is completed, the site backfilled, topsoiled and grassed including non-degradable fabric such as MatMacR or similar.

1.2 Preparation of footprints and bedding

According to geotechnical information available in-situ conditions are poor and it is not advisable to use in-situ conditions as is for construction purposes. Preparation therefor entails:

- Clearing and grubbing of topsoil and vegetation to a depth of 150mm, for a width of 50m wide, over a length of approximately 100m. The total affected area will be approximately 5 000m^2;
- Topsoil will be conserved for use during rehabilitation and on embankment slopes;
- Excavation of the footing by means of a backhoe excavator, and spoiling material to designated spoil site. Footing width plus 500mm for working space;
- Trench bottom will be compacted to 90% MDD before construction of rockfill layer;
- Rockfill layer of imported dump rock to be construction to a minimum thickness of 600mm in accordance with SABS 1200 D;
- Construction of bedding material compacted to 90% MDD, bedding and blanket material will be imported, and

- Final layer stability to be approved by engineer to ensure no displacement of material if loaded.

1.3 Option 1: Construction of Rectangular Culverts; or

Option 1 includes for installation of rectangular culverts, and will be done after deviation of the water course. It will entail the following:

- Construction and casting of a 300mm thick concrete invert slab, Class 30/19 MPa concrete, on a 50mm concrete blinding layer. Including all construction, saw cut and other jointing;
- Installation of 7/ 4000 x 1500mm Precast Rectangular Portal Frame Culverts consisting of 20 units each, adding up to 140 units in total;
- Sealing of joints with bituminous product or similar approved;
- Culverts to be backfilled with soil cement mixture on sides and as indicated in detailed drawings;
- Layer works will continue for road building purposes;
- Culverts will be Class 75S, complying with the requirements of SABS 986:1994;
- Construction of inlet and outlet structures from reinforced concrete, with rip-rap boulder placement downstream. Including all construction, saw cut and other jointing;
- Construction done according to City of Tshwane Metropolitan Municipality specifications and SABS 1200, and
- Refer to Drawings C2142-M910-294, C2142-M910-296 and C2142-M910-298 for more details.

1.4 Option 2: Construction of Pipe Culverts

Option 2 includes for installation of pipe culverts, and will be done after deviation of the water course. It will entail the following:

- Construction of 200mm thick, Class C Bedding with approved granular bedding material;
- Installation of 27/ 1500mm Precast Pipe Culverts consisting of 10 units each, adding up to 270 units in total;
- Sealing of joints with bituminous product or similar approved;
- Culverts to be backfilled with soil cement mixture on sides and as indicated in detailed drawings;
- Layer works will continue for road building purposes;
- Culverts will be Class 50D, complying with the requirements of SANS 677;
- Construction of inlet and outlet structures from reinforced concrete with rip-rap boulder placement downstream. Including all construction, saw cut and other jointing;
- Construction done according to City of Tshwane Metropolitan Municipality specifications and SABS 1200, and
- Refer to Drawings C2142-M910-295, C2142-M910-297 and C2142-M910-299 for more details.

1.5 Imported filling

After confirmation of rock fill layer stability and construction of the culverts, the remainder of the embankment filing will be constructed by imported fill material, minimum G7, compacted to 90% MDD. In accordance with SABS 1200 D specifications.

The final bulk earthworks will suffice for the planned road construction to be done afterwards. Road layer works will be done as specified in Drawing C2142-M910-295.

1.6 Embankment Protection

Side slopes to be constructed:

- At 1:2 to 1:3 side slopes;
- Topsoiled with material from site stockpile and/or commercial sources;
- Hydroseeded to environmental consultant specifications, and
- Additional erosion control will also be implemented as required in the form of non-degradable erosion protection on side slopes.

1.7 Erosion control and protection

Culverts will function under inlet control to protect upstream side of the bridge. At the downstream side of the bridge a hydraulic stilling basin will be constructed by introducing a step with concrete toe and invert slab as well as rip-rap boulder placement. The outlet structure will be 10m long in total with a 10m concrete outlet and rip-rap protection thereafter. Expected velocity at the outlet will be 5.9 m/s with a Froude Number of 2.8, after the stilling basing the expected velocity will be 2.4 m/s with a Froude Number of 0.5.

Construction will entail excavation of the footing, rockfill or compaction of in-situ material to 90% MDD, casting of concrete invert slabs with Class 25/19 MPa concrete.

Downstream of the gabion structure the stream will daylight to natural water course. Additional erosion protection will be implemented by means of rip-rap which has proven very successful on similar projects. Also refer to Section 1.8 Rehabilitation and Reinstatement.

1.8 Rehabilitation and Reinstatement

After completion of construction as specified above the site will be reinstated in accordance with the EMP. All disturbed areas will be rehabilitated and construction material removed from site.

2. CONSTRUCTION ACCESS

An existing low water bridge stream crossing exists along a gravel roadway. The existing stream crossing will be utilised to allow construction vehicles to cross. This crossing will be utilised during the construction of the road bridge.

Please refer to photos below of the existing conditions of the low water bridge.

3. RIVERWALK BOULEVARD ROAD CONSTRUCTION

After completion of the bulk earthworks and construction of the culvert bridge a new municipal Class 4a roadway will be constructed over the earth embankment. The roadway will consist of two 7.4m wide carriageways in a 32m wide road reserve with a crossfall of 3%.

Construction of layer works will be done as follows:

- 30mm Continuously graded Medium grade Asphalt
- 150mm Imported graded Crusted stone Base (G1) – Compacted to 88% Apparent Density
- 150mm Imported Sub-base (G5) stabilised with 3% cement to C4 – Compacted to 95% MDD
- 150mm In-situ selected upper Sub-grade (G7) – Compacted to 95% MDD
- 150mm In-situ selected Sub-grade (G7) – Compacted to 93% MDD
- 300mm Rockfill, process and compact as and when required to 90% MDD.
- 150mm In-situ Roadbed (G9) – Rip and Recompacted to 90% MDD

The bridge crossing will be constructed according to City of Tshwane Metropolitan Municipality specifications including all kerbs, danger and warning signs and balustrades. For more information on the roadway to be constructed refer to Drawings C2142-M910-295 and C2142-M910-296.

4. POSITIONING OF NEW BRIDGE

The new culvert bridge to be constructed will be located at the following coordinates:

Y – Coordinate = 61 505.570
X – Coordinate = 2 850 727.220

We trust the above will be favorably considered.

Yours Faithfully

Werner Stander
PrEng (20060017)
For Civil Concepts (Pty) Ltd

Hannes Welman
Civil Engineer
For Civil Concepts (Pty) Ltd

CIVIL CONCEPTS
Consulting Civil and Structural Engineers

RIVERWALK - WULA
STORMWATER OUTLETS
PROJECT DESCRIPTION
C2142/WRA/004
MAY 2016

CIVIL CONCEPTS CONSULTING ENGINEERS, Civil Concepts (Pty) Ltd, 50 15th Street, Menlo Park, Pretoria, PO Box 36148, Menlo Park, Pretoria, 0102 Tel: 012 460 0008, Fax 012 460 0005, Email: Mail@civilconcepts.co.za

PROJECT OVERVIEW

River Walk, entails a new development consisting of 6000 Res 3 units, a Retail Park with a floor space of 1.3 ha and a school with a floor space of 1.847 ha.

A new stormwater network needs to be constructed in order to route the post development stormwater runoff of the development to the flood line on the Northern boundary of the development. There will be multiple outlet structures daylighting where necessary for each phase of the development with energy dissipation measures at each outlet to the natural stream.

Outlets from upstream developments discharging onto the proposed development also needs to be collected with new stormwater pipes that will discharge into the flood line of the Pienaars River.

The entire stormwater network will be handed over to City of Tshwane of which maintenance becomes their responsibility. Service agreements have been reached with the city and are available on request. This confirms the approval and availability of services.

Refer to Plan C2142-WULA-002 for conceptual layout.

RIVER WALK - DESCRIPTION OF WORKS FOR THE WULA

1. PROPOSED NEW OUTLET STRUCTURES

   The outlet structure will be constructed as follows:

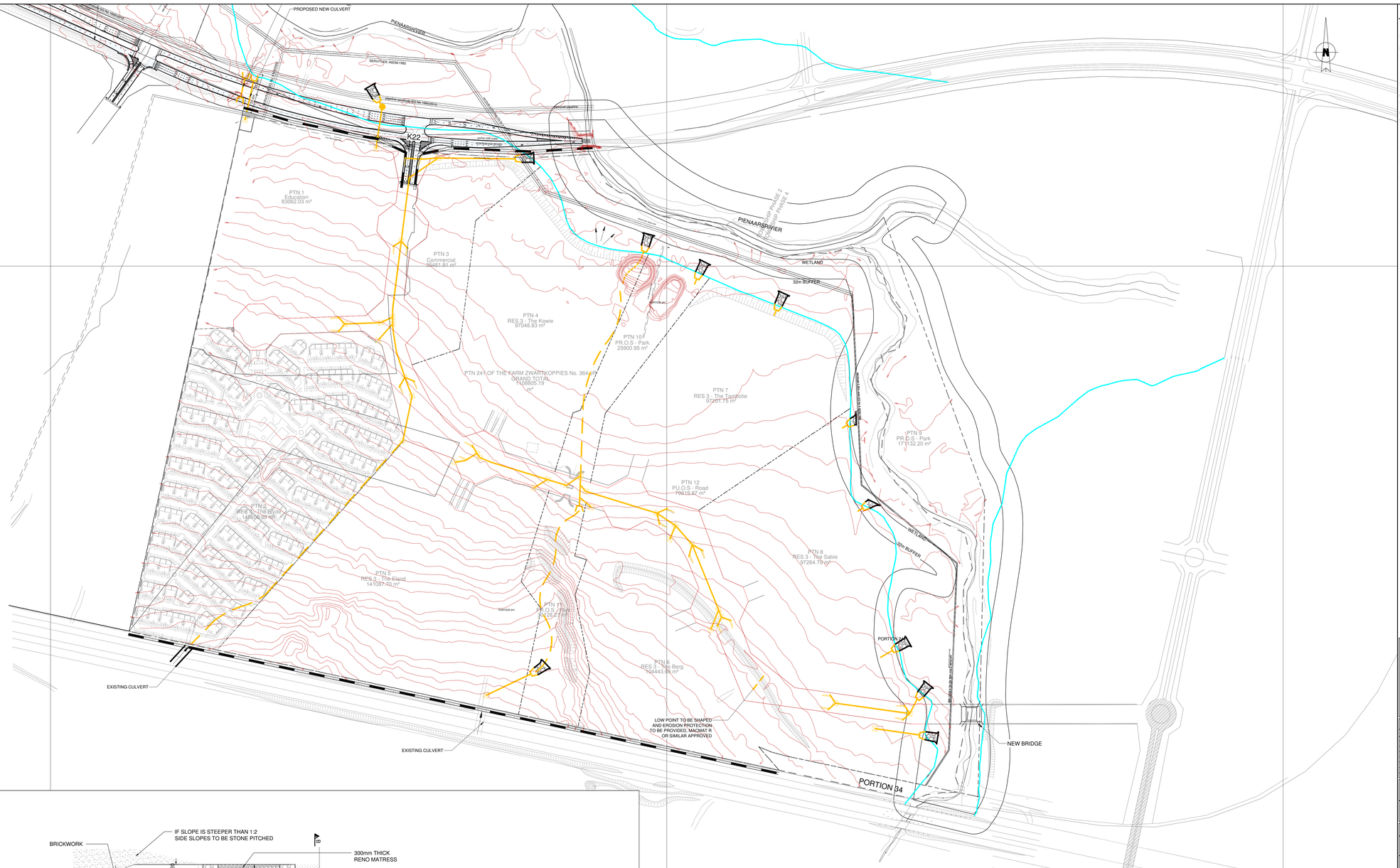
   - Excavate for outlet structure;
   - Rockfill or compaction of in-situ material to 90% MOD AASHTO density;
   - Cast in-situ concrete base with Class 25/19 concrete;
   - Side walls to be constructed with gabion walls with geomembrane;
   - 300 mm gabion mattress downstream to be constructed flush with ground, anchored with 1.0 m y-standard spaced at 1.0 m c/c.

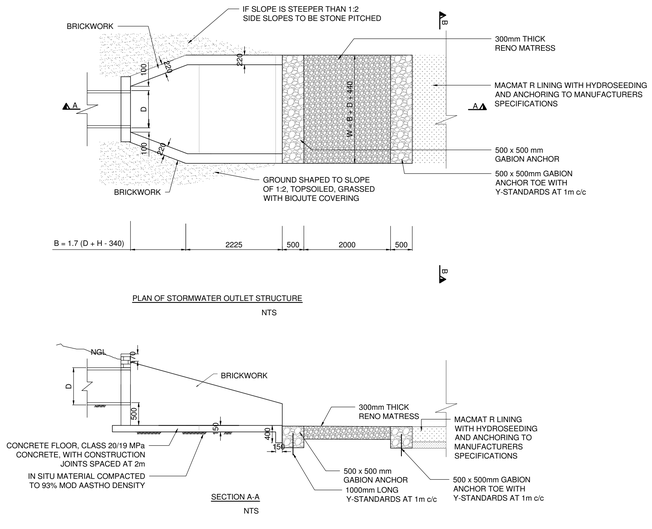
We trust the above will be favorably considered.

Yours Faithfully

Werner Stander
PrEng (20060017)
For Civil Concepts (Pty) Ltd

Jean Botes
For Civil Concepts (Pty) Ltd





PLAN OF STORMWATER OUTLET STRUCTURE

NTS

SECTION A-A

NTS

DETAIL OF LARGER STORMWATER OUTLET

NOTES AND SPECIFICATIONS

1. ALL BELLMOUTH RADII TO BE 10m UNLESS OTHERWISE SHOWN.
2. ALL ROADS TO BE PROVIDED WITH KERBING/EDGING ACCORDING TO TYPICAL DETAILS AND LEGEND BELOW.
3. P.I. CO-ORDINATES AND RADII INDICATED ARE ON THE CENTERLINE OF THE ROAD
4. ROAD CLASSIFICATION:

7.4m ROAD :	ROAD CLASS A	CATEGORY UB :	CLASSIFICATION E1
6.6m ROAD :	ROAD CLASS 5A	CATEGORY UC :	CLASSIFICATION E0
5.5m ROAD :	ROAD CLASS 5B	CATEGORY UC :	CLASSIFICATION E0
4.5m ROAD :	ROAD CLASS 5B,	CATEGORY UC :	CLASSIFICATION E0

5. ALL MATERIAL AND WORKMANSHIP MUST COMPLY WITH THE REQUIREMENTS OF THE LATEST RELEVANT SABS SPECIFICATION.
6. ALL DIMENSIONS ARE IN METERS. (UNLESS OTHERWISE SPECIFIED)
7. DO NOT SCALE FROM THESE DRAWINGS.
8. ALL DIMENSIONS MUST BE CHECKED AND APPROVED ON SITE.
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14. ALL LEVELS OF EXISTING SERVICES ARE TO BE CHECKED AND VERIFIED ON SITE AND SUBMITTED TO THE ENGINEER PRIOR TO THE COMMENCEMENT OF THE CONSTRUCTION.

LEGEND:

- PROPOSED ROAD UPGRADES
- FLOODLINE 1:100 WITH ROAD AND BERM
- NEW STORMWATER LINE
- NEW STORMWATER OUTLET WITH SEDIMENT AND LITTER TRAP
- NEW STORMWATER GRID INLET
- NEW STORMWATER KERB INLET

DEVELOPER DETAIL

Balwin PROPERTIES

ARCHITECTS DETAIL

VTC Architecture
www.vtcgroup.biz

AMENDMENTS

NR.	DATE	APPROVED	DESCRIPTION	PAR.

DESIGNED: W.STANDER — SIGNATURE / DATE

DRAWN: R.WILLERS — SIGNATURE / DATE

DESIGN CHECKED BY: W. STANDER — 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)

INITIALS AND SURNAME: _____ SIGNATURE AND Pr. No. _____ DATE: _____

INSPECTOR OF WORKS (CITY OF TSHWANE):

INITIALS AND SURNAME: _____ SIGNATURE AND Pr. No. _____ DATE: _____

CONSULTANT DETAIL

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Consulting Civil and Structural Engineers

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CITY OF TSHWANE

TRANSPORT DEPARTMENT

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

CITY OF TSHWANE

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

SIGNATURE: _____ DATE: _____

LOCATION OF PROJECT:

RIVERWALK
PORTION 241 OF THE FARM ZWARTKOPPIES No. 364-JR

DESCRIPTION OF PROJECT:

STORMWATER LAYOUT

CONTRACT No. :	PROJECT No. : C2142	
DATE : APRIL_2016	SCALE : 1:10000	ORIGINAL PAPER SIZE: A0
DRAWING NO: C2142-WULA-002	SHEET NO:	REVISION

CIVIL CONCEPTS
Consulting Civil and Structural Engineers

RIVERWALK - WULA
SEWERS INSIDE FLOODLINES
PROJECT DESCRIPTION
C2142/WRA/003
MAY 2016

CIVIL CONCEPTS CONSULTING ENGINEERS, Civil Concepts (Pty) Ltd, 50 15th Street, Menlo Park, Pretoria, PO Box 36148, Menlo Park, Pretoria, 0102 Tel: 012 460 0008, Fax 012 460 0005, Email: Mail@civilconcepts.co.za

PROJECT OVERVIEW

River Walk, entails a new development consisting of 6000 Res 3 units, a Retail Park with a floor space of 1.3 ha and a school with a floor space of 1.847 ha.

An existing municipal outfall sewer needs to be upgraded to a 675 mm Class 50D spigot and socket concrete pipe with a sacrificial layer to the requirements of SANS 677. The new pipe will be installed parallel to the existing pipe in the same servitude.

This municipal outfall sewer is part of the Baviaanspoort drainage area and forms part of the City of Tshwane's Master Plan.

The new sewer network servicing the proposed development will connect to the existing bulk sewer line inside of the floodline at some points, it will also connect to the upgraded section at some points as indicated in drawing C2142-000-004 attached to this document.

Refer to Plan C2142-WULA-001 for conceptual layout.

INNOLAND - DESCRIPTION OF WORKS FOR WULA

1. PROPOSED NEW RIVER WALK OUTFALL SEWER

The sewer pipes will be constructed as follows:

- The construction of a 940 m long 675 mm ø outfall sewer pipeline and will have a total of 40 manholes. The sewer line and manholes will be positioned outside the 1:100 year flood line. For the majority it will follow, except for four crossings, the wetland boundary.
- The outfall sewer pipeline will be Class 50D spigot and socket concrete pipe with a sacrificial layer.
- The sewer connections will be solid uPVC wall Class 400, and have water tight seals at joints.
- The pipe will be back filled with in situ material and every 50 m will be provided with a 1.0 m section of 19.0 mm stone to allow subsurface water flow towards the wetland.
- An 8 m strip clearing will be done where construction activity will take place.
- At the construction stage, topsoil to a depth of 150mm will be removed and stockpiled at the designated areas and reinstated after the pipeline is installed.
- Excavation of trenches will be done with a backhoe excavator and material will be stockpiled at designated areas where it does not impact the flow of the watercourse.
- Bedding and blanket material will be imported from commercial sources.
- Backfill material will be from trench excavations which has been temporarily stockpiled. Excess material (spoil) will be carted off site to suitable dumping sites.
- Special filling and blanket will be required in clayey area to absorb any movement due to clay conditions. In addition concrete anchor blocks will be provided at 10 m intervals to avoid any flotation of pipes.
- The work will be in accordance with City of Tshwane Standards.
- Watertight manholes will be used in the floodline for the outfall sewer as well as all connections.

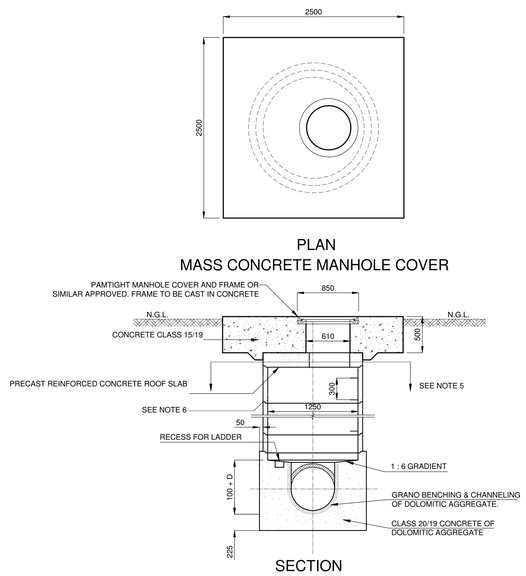
Also refer to detail on Plan C2142-WULA-001.

We trust the above will be favorably considered.

Yours Faithfully

Werner Stander
PrEng (20060017)
For Civil Concepts (Pty) Ltd

Jean Botes
For Civil Concepts (Pty) Ltd



NOTES AND SPECIFICATIONS

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   6.0m ROAD : ROAD CLASS 5A, CATEGORY UC : CLASSIFICATION E3
   5.5m ROAD : ROAD CLASS 5B, CATEGORY UC : CLASSIFICATION E3
   4.5m ROAD : ROAD CLASS 5B, CATEGORY UC : CLASSIFICATION E0

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LEGEND:

- PROPOSED ROAD UPGRADES
- FLOODLINE 1:100 WITH ROAD AND BERM
- EXISTING SEWER LINE
- NEW 160mma uPVC CLASS 400 SEWER LINE
- NEW 250mma uPVC CLASS 400 SEWER LINE
- EXISTING 315mma TO BE UPGRADED TO 675mma
- NEW SEWER MANHOLE

DEVELOPER DETAIL

Balwin PROPERTIES

ARCHITECTS DETAIL

VTC Architecture
www.vtcgroup.biz

AMENDMENTS

NR.	DATE	APPROVED	DESCRIPTION	PAR.

DESIGNED: W.STANDER — DRAWN: R.WILLERS
DESIGN CHECKED BY: W. STANDER — 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

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CITY OF TSHWANE
TRANSPORT DEPARTMENT

Mr P. Lefonkane — 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:

LOCATION OF PROJECT:

RIVERWALK
PORTION 241 OF THE FARM ZWARTKOPPIES No. 364-JR

DESCRIPTION OF PROJECT:

SEWER LAYOUT

CONTRACT No. :
PROJECT No. : C2142
DATE : APRIL_2016
SCALE : 1:10000
ORIGINAL PAPER SIZE: A0
DRAWING NO: C2142-WULA-001
SHEET NO:
REVISION

CIVIL CONCEPTS
Consulting Civil and Structural Engineers

RIVERWALK
BULK SERVICE STATEMENT

C2142/BSS
JANUARY 2016

1. INTRODUCTION

River Walk, previously known as African Renaissance, is situated on part of the remainders of portions 6 and 241, and portion 138 of the Farm Zwartkoppies No 364-JR.

It is bounded by:

- K22 to the north;
- A tributary of the Pienaars River to the east;
- N4 to the south; and
- Savannah Estate to the west.

The previous township application was approved for 4500 low to medium income residential units. Refer to the approved conditions of establishments attached as **Annexure A**.

The new developer, Balwin Properties Pty (Ltd), purchased the land with the intent to develop medium to high income residential, school and a local retail centre. This report addresses the intended developments serviceability.

2. DEVELOPMENT INFORMATION

Development Type - Mixed Use – Residential, School, Retail, etc.
Property size: - 110.915 ha

For the intended land use refer to tables below.

Intended Land Use: Total

Land Use	No. of Units / Area	Inception Phase	First Phase
Retail (Centre)	12 500 m²		
Private School	1 800 Pupils	400 Pupils	
Residential	6 500 Units	500 Units	750 Units

The development will be divided into 8 individual townships. Refer to the proposed development layout in **Annexure B.**

3. WATER SUPPLY

A GLS Assessment was conducted for the entire development addressing the capacity of the bulk water supply. It was confirmed that the development falls within the Vaal River basin which is currently supplied by Rand Water pipelines.

3.1 Water Demand

The total water demand initially allowed for in the masterplan = 884 kℓ /day whilst the proposed development will total 4 130 kℓ/day at a peak flow of 191 ℓ/s. Please refer to the GLS report for method of calculation.

The estimated water demand for the inception phase of a school for approximately 400 pupils and 500 residential units will be 337 kℓ/day, well below the initial 884 kℓ /day in the masterplan.

A further 910 units can be developed before the demand exceeds the initial daily demand.

3.2 Bulk Supply

The development will form part of the RW Bronberg Direct 11 (Zwartkoppies) supply zone.

A connection for the development will be to an 855 mm ø Rand Water pipeline which is currently experiencing high velocities to the order of 3 m/s. A second parallel system of a 1500 mm ø pipeline is in planning.

It was suggested that Rand Water be contacted to update the water volume requirements for the development. The proposed phases will also need to form part of the discussion as the proposed first phase do not exceed the current demand in the masterplan and Rand Water has been informed of the water demands.

3.3 Connection and Network

According to GLS a 450 mm ø with a PRV connection will be provided to the 855 mm ø pipeline. Refer to correspondence from Rand Water confirming the connection and associated cost.

The 450 mm ø will then run eastwards to the new main entrance and follow the main road south towards the first entrance to the Retail Centre. After the Retail connection the pipe size reduces to 355 mm ø, 315 mm ø and finally 250 mm ø to supply the last two proposed townships.

A 200 mm ø pipeline will however continue further east across the natural stream for the connection of Portion 19, also a future residential portion east of the tributary. Also refer to the diagrammatic proposed water network in **Annexure C.**

A wadiso model will be provided at detailed service report stage for confirmation of element sizes.

4. SEWERAGE

As for water, an assessment was conducted by GLS to address the capacity of the existing sewer network.

4.1 Sewer Demand

The total sewer demand for the completed development is calculated at 3 628 kℓ/day with a peak flow of 55 ℓ/s compared to the initial 605 kℓ/day. Please refer to the GLS report for method of calculation.

The estimated sewer demand for the inception phase of the school for approximately 400 pupils and 500 residential units will also total 337 kℓ/day. A further 450 units can be developed before exceeding the initial outflow.

4.2 Sewer Drainage Area

The development will fall in the Baviaanspoort WWTP (Waste Water Treatment Plant) drainage area.

4.3 Bulk Network Capacity

According to GLS the design capacity of Baviaanspoort WWTP is almost fully reached by average flow and expansion of the plant should be considered. Reference is made to phase 2 and 4 in the report and trust the municipality will pursue the matter.

An existing 315 mm ø line running south to north along the western side of the Pienaars River tributary must be upgraded to a 675 mm ø pipe.

4.4 Sewer Network and Connections

The proposed school township in the north western corner will drain to an existing outfall sewer pipe which drains from Savannah Estate in the west and crosses the K22 to the main outfall along the Pienaars River.

A township immediately south, called The Blyde, will also be the inception and first phase as described in the development info. These townships will be serviced by a 250 mm ø uPVC running north along the main road until the K22 where it will turn east towards the main outfall sewer. A portion of the retail development will also drain to this pipeline.

Townships The Eland, Kowie, Tamboti and Berg will drain to a 315 mm ø collector that runs from south to north within the public open space until it connects to the main outfall sewer.

The Sabie and a portion of The Berg will connect to the new 675 mm ø along the eastern boundary. Refer to drawing in **Annexure D.**

5. STORMWATER

5.1 Floodlines

The property is subjected to a floodline as indicated on the township layout included in **Annexure E.**

5.2 Stormwater Drainage

The design guidelines of City of Tshwane will be used to provide a stormwater reticulation network for the 1:2 and 1:20 year recurrence periods.

5.2.1 External Stormwater Systems

There are two stormwater culverts draining under the N4 towards the property. Both culverts will be intercepted and accommodated within the proposed drainage network.

5.2.2 Municipal Network

All systems within the main road reserve will be considered as municipal systems.

Each township will be provided with a 1:20 year stormwater connection as indicated on the attached drawing included in **Annexure E.**

There are 4 drainage systems:

1. K 22 Culverts.

   Only the school property drains towards the K22 with outlets to the natural stream on the northern side of the road.

   Two new culverts will be constructed for draining this portion of the development. This will be completed during the upgrading of the K22, which also forms part of the Riverwalk scope of work.

2. The Blyde and Access Road.

   The Blyde will be the first phase of development with relevant road upgrades. The proposed system drains the entire The Blyde along the access road and eventually along the boulevard towards the K22. The network will commence at the N4 with a system then parallel within a 3 m wide servitude towards The Boulevard.

   A median drainage system is proposed up to the most northern end of the boulevard until it turns east towards the natural stream with an outlet at a daylight position.

3. Open Drainage along Private Open Space.

   An open space is planned approximately in the middle of the development in a south – north direction. This provides a good opportunity for flow in open channel / landscaped furrow that will have connections from adjacent developments.

   This will commence at a culvert under the N4 and flow towards the low point of the boulevard. A 50 year culvert will be provided at this low point.

   All run-off upstream of the boulevard will either be treated within the road or proposed median drainage network. This network will then connect to the low point culvert.

   The vegetated low point will then be shaped and erosion protection will be provided. It will disperse into and existing farm dam, from where it will have a formalised outlet to the natural stream.

4. Drainage Adjacent to Floodline

All developments and the remainder of the boulevard will drain either in pipe systems or overland to the floodline with various outlet positions as indicated.

A full Stormwater Masterplan will be compiled in accordance with City of Tshwane standards.

Outlets to the natural stream, where possible, will be constructed with litter and sediment traps. A water use licence (WULA) will be applied for at each of the outlets as required by the water act.

6. TRAFFIC AND ACCESS

A full Traffic Impact Study has been compiled for the development and will be submitted to relevant authorities. Due to the proposed access from the K22 which is an approved Provincial route but falls under SANRAL's jurisdiction, both departments will be involved. Once approved all upgrades and phasing will be done accordingly. Below is a synopsis of the current findings and proposals.

6.1 Masterplan

The most recent masterplan included for all major development in the area, especially the Hazeldean Node. Refer to an extract from the Masterplan with Riverwalk included (**Annexure F**). Also refer the proposed access routes.

As it stands Riverwalk will be responsible for the Pink, Orange and Green highlighted items of the Road Masterplan extract in **Annexure F**, although Riverwalk will not fully fund the Green highlighted item. The Pink and Green sections will be typically be funded by special contributions.

The Hazeldean developer / Abland will be responsible for the items highlighted in Purple, Blue and Yellow.

6.2 Trip Generation

Development trips generated by the development are:

	Total	Inception	Phase 1
AM Peak hour	5 143	535	478
PM Peak hour	5 363	360	478
Sat Peak hour	3 407	136	255

6.3 Access

This development integrates with the road masterplan of the area. Originally it was served with an access within the boundaries of Savannah Estate, but this was approved and constructed as a security complex.

Subsequently a new intersection on the K22 is being investigated approximately 450 m east of the Savannah Estate intersection. Its position is currently being discussed with SANRAL and will soon be finalised.

This intersection will be built on the final double carriageway position of the K22, where after the road will taper to a single carriageway just before the Pienaars River Bridge. This intersection will be linked via a 4 lane boulevard with a future class 3 road to the east. The latter crosses the N4 and links with K34 – Graham Road as well as a link to the PWV17.

Abland the developer of the Hazeldean node will be responsible for the PWV17 interchange on the N4, part of the PWV17 and the class 3 linking to Graham Road.

6.4 Individual Access

Each individual township will obtain access via a double circle. The school property will have a line of no access for a minimum of 500 m from the K22 provincial road boundary.

6.5 Phasing

The inception phase will obtain access from the existing single carriageway and new intersection on the K22. It is the intention to commence with the doubling of the K22 simultaneously with the inception phase.

Preliminary assessments indicate that once completed the double carriageway K22 and intersection can accommodate up to 2000 units and a 1000 pupil school.

The remainder of the development will require the completed boulevard, class 3 link across the N4 and linkage to the PWV17 interchange.

Refer to the attached masterplan (**Annexure F**) and indicated phasing.

6.6 Non-Motorised Transport (NMT)

As the development intent is mixed use, a major focus will be on NMT to ensure secure pedestrian and cycle movement between residences, the school and the retail centre.

Combined sidewalk and cycle paths will be provided with sufficient crossings at intersections.

A further element is a NMT Bridge to allow for safe crossing.

Yours Faithfully,

WERNER STANDER
CIVIL CONCETPS (PTY) LTD

ANNEXURE A

KUNGWINI LOCAL MUNICIPALITY

DEPARTMENT SERVICE DELIVERY

P O BOX 40 BRONKHORSTSPRUIT 1020
TEL: (013) 932 6333 FAX: (013) 935 1311
SHERE OFFICE TEL: (012) 809 0563 FAX: (012) 809 0871

ENQUIRIES: T S DHLAMINI

5 March 2008

SFP Town Planning
P O Box 908
GROENKLOOF
0027

Sir

PROPOSED TOWNSHIP ESTABLISHMENT: AFRICAN RENAISSANCE LIFESTYLE ESTATE

The abovementioned refers.

The application for township establishment has been approved in terms of section 98(1) of the Town Planning and Townships Ordinance, 1986 (Ordinance 15 of 1986), subject to the conditions as contained in the attached Annexure (Conditions of Establishment). Your attention is however kindly drawn to the fact that my Council in terms of section 98(5) of the abovementioned Ordinance reserves the right to amend or nullify any of the rights under which the approval was granted or may add any additional conditions prior to the publication of the notice in terms of which the township will be proclaimed as an approved township.

Should you wish to make any comments or to object to the attached conditions, such comments or objection must reach this office within 4 weeks of the date hereof. Comments or objections will thereafter only be considered in very special circumstances.

Your attention is drawn thereto that the layout plan was only approved after very careful consideration. Although section 100 of the Ordinance provides for the approval by my Council for the amended of a layout plan, it must be stressed that it shall only by sanctioned in exceptional circumstances. Any request in this regard must be motivated with full reasons of why it is necessary to amend the plan and the reason why it was not requested at an earlier stage.

Kindly take note that the provisions of section 101 of the Ordinance must be complied within 12 months from the date of this approval, or such extended period as approved by Council, failing which the application will lapse. It is therefore in your own interest to immediately take the necessary steps to comply with the pre-proclamation conditions due thereto that my Council will not condone any default, unless proof can be submitted that steps were indeed taken immediately after this date to comply with the conditions and further that due to circumstances beyond your control the matters could not be completed timorously.

...2/

Kindly bring the following important matters to our client's attention:

1. the applicant shall provide all necessary servitudes in conjunction with an approved services Layout Plan for the proposed township;

2. an appropriate services agreement must be entered into by and between the Council and the applicant and the applicant is responsible for the service costs for extension/provision of the civil engineering and electrical services as well as the necessary parks contribution in terms of applicable Council policy. These amounts are payable on the date set out by the Council. All aspects regarding these services must be clarified with the Strategic Executive Officer: Service Delivery.

3. the Council reserves the rights to lay down further or amended conditions as deemed necessary or if the layout is amended; and

4. compliance with conditions of external institutions/departments is the responsibility of the developer.

Kind regards

J S GOMBA
MUNICIPAL MANAGER

STATEMENT OF CONDITIONS UNDER WHICH THE APPLICATION MADE BY LIVING 4 U DEVELOPMENTS (PTY) LIMITED (HEREINAFTER REFERRED TO AS THE APPLICANT) IN TERMS OF THE PROVISIONS OF PART C OF THE TOWN-PLANNING AND TOWNSHIPS ORDINANCE, 1986 (ORDINANCE 15 OF 1986), FOR PERMISSION TO ESTABLISH A TOWNSHIP ON PART OF THE REMAINDER OF PORTION 6 OF THE FARM ZWARTKOPPIES NO 364-JR, HAS BEEN GRANTED

1. CONDITIONS TO BE COMPLIED WITH PRIOR TO THE DECLARATION OF THE TOWNSHIP IN TERMS OF THE PROVISIONS OF SECTION 103 OF THE TOWN-PLANNING AND TOWNSHIPS ORDINANCE, 1986 (ORDINANCE 15 OF 1986) (HEREINAFTER REFERRED TO AS ORDINANCE 15 OF 1986)

1.1 PROVISION AND INSTALLATION OF SERVICES

The applicant shall make the necessary arrangements with the Municipality for the provision and installation of water, electricity and sanitation as well as the construction of roads and stormwater drainage in the township.

1.2 CANCELLATION OF EXISTING CONDITIONS OF TITLE

The applicant shall at his own expense have the following conditions and servitudes cancelled or have the township area freed there from:

Conditions 1, (1.1), (1.2), (1.3), (1.4), (1.5), 2, (2.1), (2.2), (2.3), (2.4), 3, 5 in Deed off Transfer T106850/2007.

1.3 GENERAL

(a) The applicant shall satisfy the Kungwini Local 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) satisfactory access is available to the township and that a public street system is available to all erven in the township;

(iii) a satisfactory traffic impact assessment has been submitted;

(iv) the portions of the road reserves adjoining the proposed township, and which are required for the proper installation and maintenance of the Municipality's services, has been acquired by the township owner;

(v) the name of the township has been approved;

ENDORSEMENT
It is hereby certified that all the conditions imposed by the Kungwini Local Municipality have been complied with.

KUNGWINI LOCAL MUNICIPALITY
APPROVED
In terms of
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(vi) the consent from the holder(s) of the mineral rights has been obtained for the establishment of the township;

(vii) all servitudes in accordance with the services report must be indicated on the Township Layout Plan and registered by the developer.

(viii) The relevant administrative decision of the Gauteng Department of Agriculture, Conservation and Environment has been obtained in terms of the provisions of the Environment Conservation Act, Act 73 of 1989 or the national Environmental management Act, 107 of 1998 as the case may be and that any condition under which such administrative decision has been granted will be incorporated in the conditions of establishment of the proposed township, at the cost of the applicant.

(ix) That a signed services agreement in respect of electricity be obtained from the CTMM confirming the availability of electricity per phase.

(b) The applicant shall comply with the provisions of sections 72, 75 and 101 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 African Renaissance Township.

2.2 DESIGN

The township shall consist of erven and streets as indicated on Layout Plan F1216/2.

2.3 DISPOSAL OF EXISTING CONDITIONS OF TITLE

All erven shall be made subject to existing conditions and servitudes, including the reservation of mineral rights, but excluding –

a) the following servitude which affects the township:

"4. Die Eiendom hierby getransporteer is onderhewig aan 'n Serwituut van Deurgangsreg ten gunste van die STADSRAAD VAN PRETORIA, vir ge geleiding van Elektrisiteit deur middel van lugdrade en ondergrondse kabels, soos meer ten volle sal blyk uit notariële Akte Nr. 1090/1961S, geregistreer op dei 7de dag van September 1961.

ENDORSEMENT
It is hereby certified that all the conditions imposed by the Kungwini Local Municipality have been complied with.

KUNGWINI LOCAL MUNICIPALITY
APPROVED
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6. Kragtens Notariële Akte K 699/93-S is die reg aan ESKOM verleen om elektrisiteit oor die hierinvermelde eiendom te vervoer, tesame met bykomende regte en onderworpe aan voorwaardes, soos meer volledig sal blyk uit gesegde akte en kaart.

7. Kragtens Notariële Akte van kansellasie No. K 6631/93S gedateer 8 September 2993 word Notariële Akte van Serwituut no. K 1223/56S soos vermeld in voorwaarde 6.C gedeeltelik gekanselleer, soos aangedui deur Lyn ABa op kaart L.G. No. A3090/92 daarby aangeheg en verder meer volledig sal blyk uit gemelde Notariële Akte van kansellasie.

8. Die volgende serwitute is onteien en gesedeer aan die Stadsraad van Pretoria K6632/93S.

8.1 'n Serwituut vir Rioolpypleiding 6 meter wyd soos aangedui deur lyn ABCDEFGH op Kaart S.G. No. A9236/92.

8.2 'n Sesrwituut vir Rioolpypleiding 2 meter wyd soos aangedui deur lyn HJKLM op kaart S.G. No. A9236/92.

8.3 'n Serwituut vir Rioolpypleiding 2 meter wyd soos aangedui deur lyn NPQRS op kaart S.G. No. A9236/92.

9. Kragtens Notariële Akte K 658/95S gedateer 23 Januarie 1995 is binnegemelde eiendom onderhewig aan 'n ewigdurende reg om water te neem en te voer oor en deur, deur middel van pypleidings binne stroke grond 3636 virkante meter en 1695 vierkante meter groot soos aangedui deur die figure ABCDa Mid River bEFGH en ABCD op serwituutkaarte no L.G. No. A. 72/1993 en 73/1993 met bykomende regte ten gunste van RANDWATER soos meer volledig sal blk uit gemelde Notariële Akte.

10. Kragtens Notariële Akte No. K 3355/03 S gedateer 28 April 2003 is die eiendom onderhewig aan n 3 (Drie) meter wyd Rioolserwituut aangetoon op diagram 8160/02 deur figuur ABCDERGHA 873 vierkante meter ten gunste van die Trust soos meer volledig sal blyk uit gemelde Notariële Akte.

ENDORSEMENT
It is hereby certified that all the conditions imposed by the Kungwini Local Municipality have been complied with.

KUNGWINI LOCAL MUNICIPALITY
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2.4 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.

2.5 DEMOLITION OF BUILDINGS AND STRUCTURES

When required by the Kungwini Local 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.

2.6 REMOVAL OF LITTER

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

2.7 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.

2.8 COMPLIANCE WITH CONDITIONS IMPOSED BY GDACE

The township owner shall at his own expense comply with all the conditions imposed by the Gauteng Department of Agriculture, Conservation and Environment, as well as any other applicable provisions, in terms of the provisions of the Environment Conservation Act, 73 of 1989 or the National Environmental Management Act, 107 of 1998 as the case may be.

2.9 NATIONAL HERITAGE RESOURCE ACT

The township owner shall at his own expense comply with the provisions of the National Heritage Resource Act, 25 of 1999 and that any conditions that may affect the township are incorporated in these conditions as amendments to these conditions.

3. CONDITIONS OF TITLE

3.1 THE ERVEN MENTIONED BELOW SHALL BE SUBJECT TO THE CONDITION AS INDICATED, LAID DOWN BY THE KUNGWINI LOCAL MUNICIPALITY IN TERMS OF THE PROVISIONS OF THE TOWN-PLANNING AND TOWNSHIPS ORDINANCE, 1986 (ORDINANCE 15 OF 1986)

3.1.1 ALL ERVEN

(a) The erf shall be subject to a servitude, 3m wide, for municipal services (water, sewer, electricity and stormwater) (hereinafter referred to as "the services"), in favour of the Municipality / Section 21 Company / Body Corporate along any tow boundaries, excepting a street boundary and, in the case of a panhandle erf, an additional servitude for municipal purposes, 2m wide, over the entrance portion of the erf, if and when required by the Municipality: Provided that the Municipality may waive any such servitude.

ENDORSEMENT
It is hereby certified that all the conditions imposed by the Kungwini Local Municipality have been complied with.

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ENDORSEMENT
It is hereby certified that all the conditions imposed by the Kungwini Local Municipality have been complied with.

KUNGWINI LOCAL MUNICIPALITY
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(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 2m form it.

(c) The Kungwini Local 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 Kungwini Local Municipality shall be entitled to reasonable access to the said property for the aforesaid purpose, subject to the provision that the Kungwini Local Municipality shall make good any damage caused during the laying, maintenance or removal or such services and other works.

4. CONDITIONS WHICH, IN ADDITION TO THE EXISTING PROVISIONS OF THE RULING TOWN-PLANNING SCHEME, HAVE TO BE INCORPORATED IN THE PERI URBAN AREAS TOWN PLANNING SCHEME, 1975 IN TERMS OF SECTION 125 OF ORDINANCE 15 OF 1986.

4.1 ERVEN 1 – 142

1	Use Zone	I Residential 1
2	Uses permitted	Dwelling House
3	Uses with consent	Table D, Column 4
4	Uses not permitted	Table D, Column 5
5	Definitions	Clause 2
6	Density	One Dwelling per 400m²
7	Coverage	50% for double storeys and 60% for single storeys
8	Height	2 storeys
9	Floor space ratio	1.0 for Double Storeys and 0.6 for Single Storeys
10	Site Development Plan and landscape development plan	If required by the Municipality
11	Building lines	3 Meters along street boundaries and 2 meters along side boundaries and 5 meters along the golf course.
12	Parking requirements	As per town-Planning Scheme
13	Paving of traffic areas	Not applicable
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	Must be accommodated on site
16	Turning facilities	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.
17	Physical barriers	As per the requirement of the Local Authority
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 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 Peri Urban Areas Town-Planning Scheme, 1975.		

4.2 ERVEN 143 – 157

1	Use Zone	IX Special
2	Uses permitted	Dwelling Units
3	Uses with consent	See Annexure
4	Uses not permitted	See Annexure
5	Definitions	See Annexure
6	Density	Not applicable
7	Coverage	As per Site Development Plan
8	Height	2 storeys
9	Floor space ratio	As per Site Development Plan
10	Site Development Plan and landscape development plan	(1) A site development plan and a landscape development plan, unless otherwise determined by the Kungwini Local 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.
11	Building lines	In accordance with the Site Development Plan.
12	Parking requirements	As per town-Planning Scheme
13	Paving of traffic areas	In accordance with the Site Development Plan
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	In accordance with the Site Development Plan
16	Turning facilities	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.
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

ENDORSEMENT
It is hereby certified that all the conditions imposed by the Kungwini Local Municipality have been complied with.

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		mounted to the exterior walls of buildings without the prior consent of the Kungwini Local 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 Peri Urban Areas Town-Planning Scheme, 1975.		

4.3 ERVEN 160 – 175

1	Use Zone	IX Special
2	Uses permitted	Dwelling Units
3	Uses with consent	See Annexure
4	Uses not permitted	See Annexure
5	Definitions	See Annexure
6	Density	Not applicable
7	Coverage	As per Site Development Plan
8	Height	3 storeys
9	Floor space ratio	As per Site Development Plan
10	Site Development Plan and landscape development plan	(1) A site development plan and a landscape development plan, unless otherwise determined by the Kungwini Local 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.
11	Building lines	In accordance with the Site Development Plan.
12	Parking requirements	As per town-Planning Scheme
13	Paving of traffic areas	In accordance with the Site Development Plan
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	In accordance with the Site Development Plan
16	Turning facilities	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.
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 Kungwini Local Municipality.
19	Outdoor advertising	Advertisements and/or sign boards shall not be erected

ENDORSEMENT
It is hereby certified that all the conditions imposed by the Kungwini Local Municipality have been complied with.

KUNGWINI LOCAL MUNICIPALITY
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		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 Peri Urban Areas Town-Planning Scheme, 1975.		

4.4 ERVEN 158, 159, 176 – 179

1	Use Zone	IX Special
2	Uses permitted	Dwelling Units
3	Uses with consent	See Annexure
4	Uses not permitted	See Annexure
5	Definitions	See Annexure
6	Density	Not applicable
7	Coverage	As per Site Development Plan
8	Height	3 storeys plus loft
9	Floor space ratio	As per Site Development Plan
10	Site Development Plan and landscape development plan	(1) A site development plan and a landscape development plan, unless otherwise determined by the Kungwini Local 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.
11	Building lines	In accordance with the Site Development Plan.
12	Parking requirements	As per town-Planning Scheme
13	Paving of traffic areas	In accordance with the Site Development Plan
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	In accordance with the Site Development Plan
16	Turning facilities	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.
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 Kungwini Local 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.

ENDORSEMENT
It is hereby certified that all the conditions imposed by the Kungwini Local Municipality have been complied with.

KUNGWINI LOCAL MUNICIPALITY
APPROVED
In terms of
THE TOWN PLANNING AND TOWNSHIPS ORDINANCE,1986 (ORDINANCE 15 OF 1986)

20 General: 1. In addition to the above conditions the erf and buildings thereon are further subject to the general provisions of the Peri Urban Areas Town-Planning Scheme, 1975.

4.5 ERVEN 180 - 197

1	Use Zone	IX Special
2	Uses permitted	Dwelling Units
3	Uses with consent	See Annexure
4	Uses not permitted	See Annexure
5	Definitions	See Annexure
6	Density	Not applicable
7	Coverage	As per Site Development Plan
8	Height	4 storeys plus loft
9	Floor space ratio	As per Site Development Plan
10	Site Development Plan and landscape development plan	(1) A site development plan and a landscape development plan, unless otherwise determined by the Kungwini Local 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.
11	Building lines	In accordance with the Site Development Plan.
12	Parking requirements	As per town-Planning Scheme
13	Paving of traffic areas	In accordance with the Site Development Plan
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	In accordance with the Site Development Plan
16	Turning facilities	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.
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 Kungwini Local 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 Peri Urban Areas Town-Planning Scheme, 1975.

ENDORSEMENT
It is hereby certified that all the conditions imposed by the Kungwini Local Municipality have been complied with.

KUNGWINI LOCAL MUNICIPALITY
APPROVED
In terms of
THE TOWN PLANNING AND TOWNSHIPS
ORDINANCE, 1986 (ORDINANCE 15 OF 1986)

4.6 ERF 198

1	Use Zone	V Business 1
2	Uses permitted	Shops, Business Buildings, Offices, Professional Offices, Places of Refreshment, Places of Entertainment, Community Hall, Dwelling Units except on ground floor
3	Uses with consent	Table D, Column 4
4	Uses not permitted	Table D, Column 5
5	Definitions	Clause 2
6	Density	Not applicable
7	Coverage	60%, the provisions of Clause 30(f) of the Scheme excluded
8	Height	3 storeys
9	Floor space ratio	1,8
10	Site Development Plan and landscape development plan	(1) A site development plan and a landscape development plan, unless otherwise determined by the Kungwini Local 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.
11	Building lines	In accordance with the Site Development Plan
12	Parking requirements	As per town-Planning Scheme
13	Paving of traffic areas	In accordance with the Site Development Plan
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	In accordance with the site development plan
16	Turning facilities	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.
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 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.

ENDORSEMENT

It is hereby certified that all the conditions imposed by the Kungwini Local Municipality have been complied with.

KUNGWINI LOCAL MUNICIPALITY
APPROVED
In terms of
THE TOWN PLANNING AND TOWNSHIPS
ORDINANCE,1986 (ORDINANCE 15 OF 1986)

20 General: 1. In addition to the above conditions the erf and buildings thereon are further subject to the general provisions of the Peri Urban Areas Town-Planning Scheme, 1975.

4.7 ERF 199

1	Use Zone	VI Business 2
2	Uses permitted	Shops, Business Buildings, Offices, Professional Offices.
3	Uses with consent	Table D, Column 4
4	Uses not permitted	Table D, Column 5
5	Definitions	Clause 2
6	Density	Not applicable
7	Coverage	60%,
8	Height	2 storeys
9	Floor space ratio	1,2
10	Site Development Plan and landscape development plan	(1) A site development plan and a landscape development plan, unless otherwise determined by the Kungwini Local 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.
11	Building lines	In accordance with the Site Development Plan
12	Parking requirements	As per town-Planning Scheme
13	Paving of traffic areas	In accordance with the Site Development Plan
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	In accordance with the site development plan
16	Turning facilities	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.
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 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.

ENDORSEMENT
It is hereby certified that all the conditions imposed by the Kungwini Local Municipality have been complied with

20 General: 1. In addition to the above conditions the erf and buildings thereon are further subject to the general provisions of the Peri Urban Areas Town-Planning Scheme, 1975.

KUNGWINI LOCAL MUNICIPALITY
APPROVED
In terms of
THE TOWN PLANNING AND TOWNSHIPS
ORDINANCE,1986 (ORDINANCE 15 OF 1986)

4.8 ERF 200

1	Use Zone	IX Special
2	Uses permitted	Self Storage and / or Business which will inter alia include offices
3	Uses with consent	See Annexure
4	Uses not permitted	See Annexure
5	Definitions	See Annexure
6	Density	Not applicable
7	Coverage	As per Site Development Plan
8	Height	2 storeys
9	Floor space ratio	As per Site Development Plan
10	Site Development Plan and landscape development plan	(1) A site development plan and a landscape development plan, unless otherwise determined by the Kungwini Local 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.
11	Building lines	In accordance with the Site Development Plan.
12	Parking requirements	As per town-Planning Scheme
13	Paving of traffic areas	In accordance with the Site Development Plan
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	In accordance with the Site Development Plan
16	Turning facilities	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.
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 Kungwini Local 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 Peri Urban Areas Town-Planning Scheme, 1975.		

ENDORSEMENT

It is hereby certified that all the conditions imposed by the Kungwini Local Municipality have been complied with.

'UNGWINI LOCAL MUNICIPALITY
APPROVED
In terms of
E TOWN PLANNING AND TOWNSHIPS
NANCE,1986 (ORDINANCE 15 OF 1986)

4.9 ERF 201

1	Use Zone	IX Special
2	Uses permitted	Crechè and or pre-school
3	Uses with consent	See Annexure
4	Uses not permitted	See Annexure
5	Definitions	See Annexure
6	Density	Not applicable
7	Coverage	As per Site Development Plan
8	Height	1 storeys
9	Floor space ratio	As per Site Development Plan
10	Site Development Plan and landscape development plan	(1) A site development plan and a landscape development plan, unless otherwise determined by the Kungwini Local 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.
11	Building lines	In accordance with the Site Development Plan.
12	Parking requirements	As per town-Planning Scheme
13	Paving of traffic areas	In accordance with the Site Development Plan
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	In accordance with the Site Development Plan
16	Turning facilities	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.
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 Kungwini Local 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 Peri Urban Areas Town-Planning Scheme, 1975.		

ENDORSEMENT

It is hereby certified that all the conditions imposed by the Kungwini Local Municipality have been complied with.

KUNGWINI LOCAL MUNICIPALITY
APPROVED
In terms of
THE TOWN PLANNING AND TOWNSHIPS ORDINANCE,1986 (ORDINANCE 15 OF 1986)

4.10 ERF 202

1	Use Zone	IX Special
2	Uses permitted	Special for recreational purposes which will inter alia include a soccer field, tennis courts and children play park
3	Uses with consent	Any such other uses as approved by the Municipality
4	Uses not permitted	Not other uses permitted
5	Definitions	See Annexure
6	Density	Not applicable
7	Coverage	Not applicable
8	Height	Not applicable
9	Floor space ratio	Not applicable
10	Site Development Plan and landscape development plan	Not applicable
11	Building lines	As per Town Planning Scheme
12	Parking requirements	As per Town-Planning Scheme
13	Paving of traffic areas	As required by the Local 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	Not applicable
16	Turning facilities	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.
17	Physical barriers	To the satisfaction of the Local Authority
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 Kungwini Local 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 Peri Urban Areas Town-Planning Scheme, 1975.		

4.11 ERF 203

1	Use Zone	IX Special
2	Uses permitted	Golf Club House and subservient uses and/or Residential 4
3	Uses with consent	Such uses as the Local Authority may deem as compatible
4	Uses not permitted	See Annexure
5	Definitions	See Clause 2
6	Density	Not applicable

ENDORSEMENT
It is hereby certified that all the conditions imposed by the Kungwini Local Municipality have been complied with.

KUNGWINI LOCAL MUNICIPALITY
APPROVED
In terms of
THE TOWN PLANNING AND TOWNSHIPS ORDINANCE,1986 (ORDINANCE 15 OF 1986)

7	Coverage	As per Site Development Plan for the Golf Club House and for residential 40%
8	Height	For the Club House 2 storeys and for residential 3 storeys.
9	Floor space ratio	As per Site Development Plan for the golf club house and 0,6 for the residential component.
10	Site Development Plan and landscape development plan	(1) A site development plan and a landscape development plan, unless otherwise determined by the Kungwini Local 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.
11	Building lines	In accordance with the Site Development Plan.
12	Parking requirements	As per town-Planning Scheme
13	Paving of traffic areas	In accordance with the Site Development Plan
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	In accordance with the Site Development Plan
16	Turning facilities	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.
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 Kungwini Local 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 Peri Urban Areas Town-Planning Scheme, 1975.		

4.12 ERF 205

1	Use Zone	IX Special
2	Uses permitted	Hotel and subservient uses and/or Residential 4
3	Uses with consent	Such uses as the Local Authority may deem as compatible and subservient
4	Uses not permitted	See Annexure
5	Definitions	See Clause 2
6	Density	Not applicable

ENDORSEMENT
It is hereby certified that all the conditions imposed by the Kungwini Local Municipality have been complied with.

KUNGWINI LOCAL MUNICIPALITY
APPROVED
In terms of
THE TOWN PLANNING AND TOWNSHIPS ORDINANCE,1986 (ORDINANCE 15 OF 1986)

7	Coverage	As per Site Development Plan for the Hotel and for residential 40%
8	Height	For the Hotel as per site development plan and for residential 3 storeys.
9	Floor space ratio	As per Site Development Plan for the hotel and 0,6 for the residential component.
10	Site Development Plan and landscape development plan	(1) A site development plan and a landscape development plan, unless otherwise determined by the Kungwini Local 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.
11	Building lines	In accordance with the Site Development Plan.
12	Parking requirements	As per town-Planning Scheme
13	Paving of traffic areas	In accordance with the Site Development Plan
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	In accordance with the Site Development Plan
16	Turning facilities	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.
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 Kungwini Local 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 Peri Urban Areas Town-Planning Scheme, 1975.		

4.13 ERF 204

1	Use Zone	IX Special
2	Uses permitted	For Conference Facility including subservient uses as well as place of amusement and / or Residential 4
3	Uses with consent	Such uses as the Local Authority may deem as compatible and subservient
4	Uses not permitted	See Annexure
5	Definitions	See Clause 2

ENDORSEMENT
It is hereby certified that all the conditions imposed by the Kungwini Local Municipality have been complied with.

KUNGWINI LOCAL MUNICIPALITY
APPROVED
In terms of
THE TOWN PLANNING AND TOWNSHIPS
ORDINANCE,1986 (ORDINANCE 15 OF 1986)

6	Density	Not applicable
7	Coverage	As per Site Development Plan for Conference Facility and for residential 40%
8	Height	For the Conference Facility as per site development plan and for residential 3 storeys.
9	Floor space ratio	As per Site Development Plan for Conference Facility and 0,6 for the residential component.
10	Site Development Plan and landscape development plan	(1) A site development plan and a landscape development plan, unless otherwise determined by the Kungwini Local 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.
11	Building lines	In accordance with the Site Development Plan.
12	Parking requirements	As per town-Planning Scheme
13	Paving of traffic areas	In accordance with the Site Development Plan
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	In accordance with the Site Development Plan
16	Turning facilities	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.
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 Kungwini Local 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 Peri Urban Areas Town-Planning Scheme, 1975.		

4.14 ERVEN 206

1	Use Zone	IX Special
2	Uses permitted	For mashie course including subservient uses
3	Uses with consent	Not applicable
4	Uses not permitted	Not applicable
5	Definitions	See Clause 2

ENDORSEMENT
It is hereby certified that all the conditions imposed by the Kungwini Local Municipality have been complied with.

NGWINI LOCAL MUNICIPALITY
APPROVED
In terms of
E TOWN PLANNING AND TOWNSHIPS
NANCE 1986 (ORDINANCE 15 OF 1986

6	Density	Not applicable
7	Coverage	Not applicable
8	Height	Not applicable
9	Floor space ratio	Not applicable
10	Site Development Plan and landscape development plan	(1) A site development plan and a landscape development plan may be required by the Kungwini Local Municipality. (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.
11	Building lines	As per Town Planning Scheme
12	Parking requirements	As per town-Planning Scheme
13	Paving of traffic areas	As per Town Planning Scheme
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	As per Town Planning Scheme
16	Turning facilities	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.
17	Physical barriers	As per Town Planning Scheme
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 Kungwini Local 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 Peri Urban Areas Town-Planning Scheme, 1975.		

4.15 ERVEN 207, 208 & 209

1	Use Zone	IX Special
2	Uses permitted	For 18 hole golf course including subservient uses
3	Uses with consent	Not applicable
4	Uses not permitted	Not applicable
5	Definitions	See Clause 2
6	Density	Not applicable
7	Coverage	Not applicable
8	Height	Not applicable
9	Floor space ratio	Not applicable
10	Site Development Plan and landscape development plan	(1) A site development plan and a landscape development plan may be required by the Kungwini

ENDORSEMENT
It is hereby certified that all the conditions imposed by the Kungwini Local Municipality have been complied with.

KUNGWINI LOCAL MUNICIPALITY
APPROVED
In terms of 18
THE TOWN PLANNING AND TOWNSHIPS ORDINANCE,1986 (ORDINANCE 15 OF 1986)

		Local Municipality. (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.
11	Building lines	As per Town Planning Scheme
12	Parking requirements	As per town-Planning Scheme
13	Paving of traffic areas	As per Town Planning Scheme
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	As per Town Planning Scheme
16	Turning facilities	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.
17	Physical barriers	As per Town Planning Scheme
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 Kungwini Local 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 Peri Urban Areas Town-Planning Scheme, 1975.		

4.16 ERVEN 210 & 211

1	Use Zone	XIV Special
2	Uses permitted	Access, access control and engineering services
3	Uses with consent	None
4	Uses not permitted	All other uses
5	Definitions	Not applicable
6	Density	Not applicable
7	Coverage	In accordance with the site development plan
8	Height	In accordance with the site development plan
9	Floor space ratio	In accordance with the site development plan
10	Site Development Plan and landscape development plan	1. A site development plan and a landscape development plan, unless otherwise determined by the Municipality, compiled by a person suitably qualified to the satisfaction of 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

ENDORSEMENT
It is hereby certified that all the conditions imposed by the Kungwini Local Municipality have been complied with.

KUNGWINI LOCAL MUNICIPALITY
APPROVED
In terms of
THE TOWN PLANNING AND TOWNSHIPS ORDINANCE,1986 (ORDINANCE 15 OF 1986)

		maintenance of the landscape development shall be to the satisfaction of the Municipality.
11	Building lines	All other building lines shall be in accordance with the approved site development plan.
12	Parking requirements	According to the Municipality.
13	Paving of traffic areas	(a) 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 (b) The access road over the erf shall be paved or tarred to the satisfaction of the City of Tshwane Metropolitan Municipality. This condition does not have to be complied with for purposes of registration in the Deeds Office
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	Shall take place on the property to the satisfaction of the City of Tshwane Metropolitan Municipality.
16	Turning facilities	Not required.
17	Physical barriers	Not required
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 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 Peri Urban Areas Town-Planning Scheme, 1975.		

4.17 ERVEN 212 – 221

1	Use Zone	XXIV Private Open Space
2	Uses permitted	Dwelling houses and private clubs
3	Uses with consent	Table D, Column 4
4	Uses not permitted	Table D, Column 5
5	Definitions	Clause 2
6	Density	Not applicable
7	Coverage	Not applicable
8	Height	Not applicable
9	Floor space ratio	Not applicable
10	Site Development Plan and landscape development plan	Not applicable
11	Building lines	Not applicable
12	Parking requirements	Not applicable
13	Paving of traffic areas	Not applicable

ENDORSEMENT
It is hereby certified that all the conditions imposed by the Kungwini Local Municipality have been complied with.
KUNGWINI LOCAL MUNICIPALITY
APPROVED
In terms of
TOWN PLANNING AND TOWNSHIPS ORDINANCE 15 OF 1986)

14	Access to the erf	Entrances to and exits form the erf shall be sited, constructed and maintained to the satisfaction of the Municipality:
15	Loading and off-loading facilities	Not applicable
16	Turning facilities	Not applicable
17	Physical barriers	Not applicable
18	Health measures	Not applicable
19	Outdoor advertising	Not applicable
20 General: 1. In addition to the above conditions the erf and buildings thereon are further subject to the general provisions of the Peri Urban Areas Town-Planning Scheme, 1975.		

4.18 ERF 227

1	Use Zone	IX Special
2	Uses permitted	For golf driving range
3	Uses with consent	Not applicable
4	Uses not permitted	Not applicable
5	Definitions	See Clause 2
6	Density	Not applicable
7	Coverage	Not applicable
8	Height	Not applicable
9	Floor space ratio	Not applicable
10	Site Development Plan and landscape development plan	(1) A site development plan and a landscape development plan may be required by the Kungwini Local Municipality. (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.
11	Building lines	As per Town Planning Scheme
12	Parking requirements	As per town-Planning Scheme
13	Paving of traffic areas	As per Town Planning Scheme
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	As per Town Planning Scheme
16	Turning facilities	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.
17	Physical barriers	As per Town Planning Scheme
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 Kungwini Local 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

ENDORSEMENT
It is hereby certified that all the conditions imposed by the Kungwini Local Municipality have been complied with.

KUNGWINI LOCAL MUNICIPALITY
APPROVED
In terms of
THE TOWN PLANNING AND TOWNSHIPS ORDINANCE,1986 (ORDINANCE 15 OF 1986)

		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 Peri Urban Areas Town-Planning Scheme, 1975.		

Our Ref.: F1216 Proper Cond Est 13 Feb 2008

ENDORSEMENT

It is hereby certified that all the conditions imposed by the Kungwini Local Municipality have been complied with.

KUNGWINI LOCAL MUNICIPALITY
APPROVED
In terms of
THE TOWN PLANNING AND TOWNSHIPS ORDINANCE,1986 (ORDINANCE 15 OF 1986)

ANNEXURE B

VTC Architecture
www.vtcgroup.biz

Integrated Framework Development Layout

Riverwalk - Zwartkoppies

The Kowie
PTN 241 OF THE FARM ZWARTKOPPIES No. 364-JR
The Tamboti
The Blyde
The Sabie
The Eland
The Berg
PTN 1
PTN 2
PTN 3
PTN 4
PTN 5
PTN 6
PTN 7
PTN 8
PTN 11
PTN 12
PORTION 10
TOWNSHIP PHASE 1
TOWNSHIP PHASE 2
TOWNSHIP PHASE 3
TOWNSHIP PHASE 4
1 in 100yr F/L

NOTES :
1. Coordinate system is WGS1984 Lo.29
2. Height datum is mean sea level
3. Contour interval is 0.50m
LEGEND :
mh - manhole
sewmh - sewer manhole
lp - lamp post
tl - traffic light
v - valve
eb - electric box
pl - power line pole
cl - manhole cover level
inv - invert distance
pm - petronet pipe marker
culv - culvert
ki - kerb inlt
rwpm - rand water pipe marker
rwmh - rand water manhole

N
W
E
S
1 : 2000

Balwin PROPERTIES

Riverwalk

PRETORIA - EAST

2016/01/21

ANNEXURE C

NOTES AND SPECIFICATIONS

1. ALL BELLMOUTH RADII TO BE 10m UNLESS OTHERWISE SHOWN.
2. ALL ROADS TO BE PROVIDED WITH KERBING/EDGING ACCORDING TO TYPICAL DETAILS AND LEGEND BELOW.
3. P.I. CO-ORDINATES AND RADII INDICATED ARE ON THE CENTERLINE OF THE ROAD
4. ROAD CLASSIFICATION:

7.4m ROAD :	ROAD CLASS 4,	CATEGORY UB -	CLASSIFICATION E1
5.5m ROAD :	ROAD CLASS 5A,	CATEGORY UC -	CLASSIFICATION EO
5.0m ROAD :	ROAD CLASS 5B,	CATEGORY UC -	CLASSIFICATION EO
4.5m ROAD:	ROAD CLASS 5B,	CATEGORY UC -	CLASSIFICATION EO

5. ALL MATERIAL AND WORKMANSHIP MUST COMPLY WITH THE REQUIREMENTS OF THE LATEST RELEVANT SABS SPECIFICATION.
6. ALL DIMENSIONS ARE IN METERS. (UNLESS OTHERWISE SPECIFIED)
7. DO NOT SCALE FROM THESE DRAWINGS.
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13. THE CONSULTANT REMAINS RESPONSIBLE TO ENSURE THAT ALL THE GUIDELINES, STANDARD DRAWINGS, STANDARDS AND SPECIFICATIONS OF THE TRANSPORT AND ROADS DEPARTMENT HAVE BEEN MET AND ARE COMPLIED WITH.
14. ALL LEVELS OF EXISTING SERVICES ARE TO BE CHECKED AND VERIFIED ON SITE AND SUBMITTED TO THE ENGINEER PRIOR TO THE COMMENCEMENT OF THE CONSTRUCTION.

LEGEND:

- EXISTING 855mmø RW PIPELINE
- NEW 200mmø uPVC WATER LINE
- NEW 250mmø uPVC WATER LINE
- NEW 315mmø uPVC WATER LINE
- NEW 355mmø uPVC WATER LINE
- NEW 450mmø STEEL WATER LINE
- NEW PRV WATER VALVE
- NEW END CAP

DEVELOPER DETAIL

Balwin PROPERTIES

ARCHITECTS DETAIL

VTC Architecture
www.vtcgroup.biz

AMENDMENTS

NR.	DATE	APPROVED	DESCRIPTION	PAR
A	25-01-2016		ISSUED FOR INFORMATION	

DESIGNED: W.STANDER — SIGNATURE — DATE
DRAWN: R.WILLERS
DESIGN CHECKED BY: W. STANDER — 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)
INITIALS AND SURNAME — SIGNATURE AND Pr. No. — DATE
INSPECTOR OF WORKS (CITY OF TSHWANE):
INITIALS AND SURNAME — SIGNATURE AND Pr. No. — DATE

CONSULTANT DETAIL

CIVIL CONCEPTS Consulting Civil and Structural Engineers

CONSULTING CIVIL AND STRUCTURAL ENGINEERS
P.O. BOX 36148 Menlo Park 0102
Tel: (012) 460-0008
Fax: (012) 460-0005
E-Mail: mail@civilconcepts.co.za

CITY OF TSHWANE
TRANSPORT DEPARTMENT

Mr P. 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: .....

LOCATION OF PROJECT:

RIVERWALK
PORTION 241 OF THE FARM ZWARTKOPPIES No. 364-JR

DESCRIPTION OF PROJECT

WATER LAYOUT (SERVICE REPORT)

CONTRACT No. :	PROJECT No. : C2142	
DATE : JANUARY_2016	SCALE : 1:2500	ORIGINAL PAPER SIZE: A1
DRAWING NO. C2142-SR-004	SHEET NO:	REVISION

ANNEXURE D

NOTES AND SPECIFICATIONS

1. ALL BELLMOUTH RADII TO BE 10m UNLESS OTHERWISE SHOWN.
2. ALL ROADS TO BE PROVIDED WITH KERBING/EDGING ACCORDING TO TYPICAL DETAILS AND LEGEND BELOW.
3. P.I. CO-ORDINATES AND RADII INDICATED ARE ON THE CENTERLINE OF THE ROAD
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5.0m ROAD :	ROAD CLASS 5B,	CATEGORY UC :	CLASSIFICATION EO
4.5m ROAD :	ROAD CLASS 5B,	CATEGORY UC :	CLASSIFICATION EO

5. ALL MATERIAL AND WORKMANSHIP MUST COMPLY WITH THE REQUIREMENTS OF THE LATEST RELEVANT SABS SPECIFICATION.
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14. ALL LEVELS OF EXISTING SERVICES ARE TO BE CHECKED AND VERIFIED ON SITE AND SUBMITTED TO THE ENGINEER PRIOR TO THE COMMENCEMENT OF THE CONSTRUCTION.

LEGEND:

- EXISTING SEWER LINE
- NEW 160mmø uPVC CLASS 400 SEWER LINE
- NEW 250mmø uPVC CLASS 400 SEWER LINE
- NEW 315mmø uPVC CLASS 400 SEWER LINE
- EXISTING 315mmø TO BE UPGRADED TO 675mmø
- NEW SEWER MANHOLE

DEVELOPER DETAIL

Balwin PROPERTIES

ARCHITECTS DETAIL

VTC Architecture
www.vtcgroup.biz

AMENDMENTS

NR.	DATE	APPROVED	DESCRIPTION	PAR
A	25-01-2016		ISSUED FOR INFORMATION	

DESIGNED: W.STANDER (SIGNATURE / DATE)	DRAWN: R.WILLERS
DESIGN CHECKED BY: W. STANDER (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)

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

INSPECTOR OF WORKS (CITY OF TSHWANE):

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

CONSULTANT DETAIL

CIVIL CONCEPTS Consulting Civil and Structural Engineers

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CITY OF TSHWANE

TRANSPORT DEPARTMENT

Mr P. 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:

LOCATION OF PROJECT:

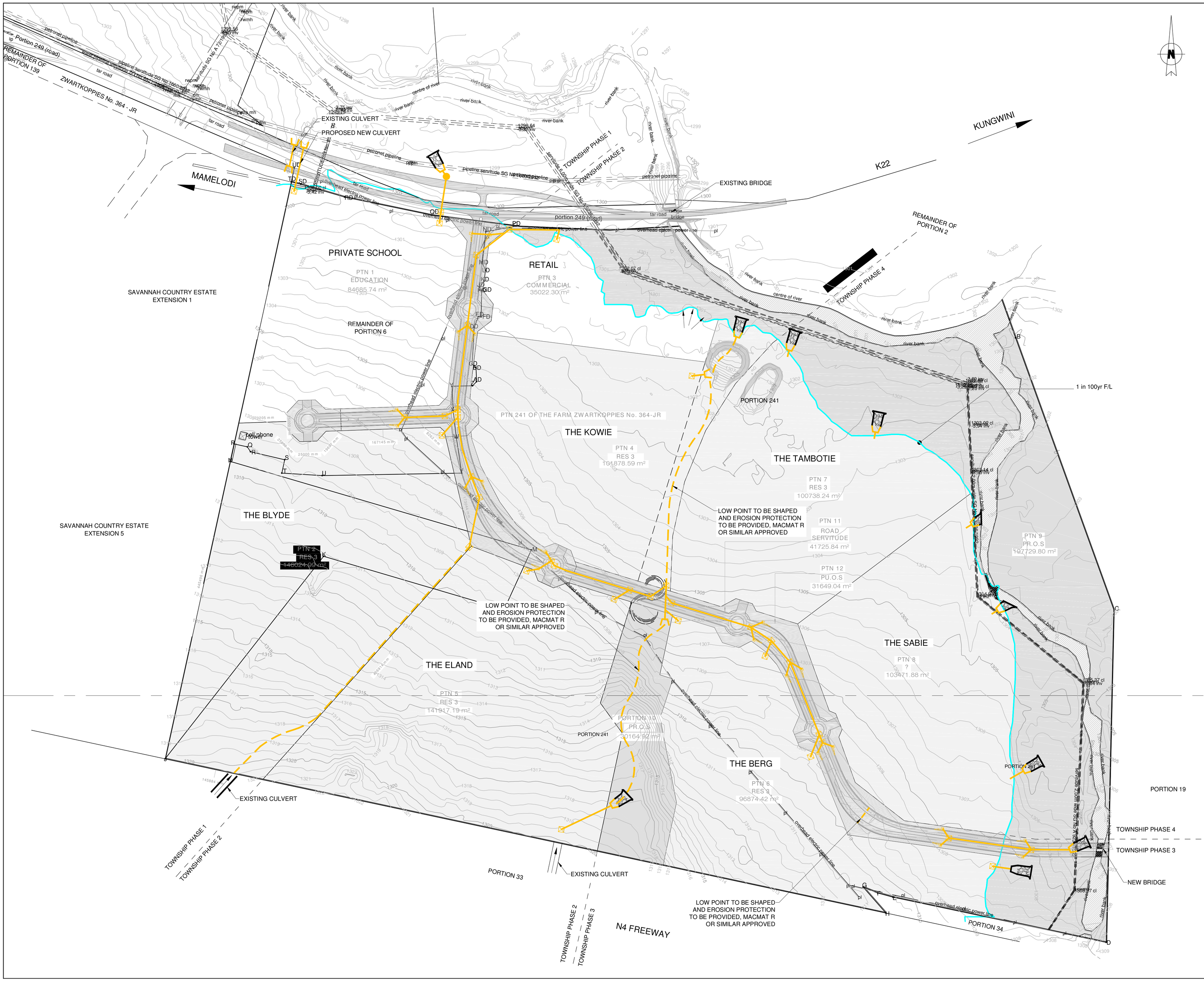
RIVERWALK
PORTION 241 OF THE FARM ZWARTKOPPIES No. 364-JR

DESCRIPTION OF PROJECT

SEWER LAYOUT (SERVICE REPORT)

CONTRACT No. :	PROJECT No. : C2142	
DATE : JANUARY_2016	SCALE : 1:2500	ORIGINAL PAPER SIZE: A1
DRAWING NO. C2142-SR-003	SHEET NO:	REVISION

ANNEXURE E



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LEGEND:

- NEW STORMWATER LINE
- NEW STORMWATER OUTLET WITH SEDIMENT AND LITTER TRAP
- NEW STORMWATER GRID INLET
- NEW STORMWATER KERB INLET
- 1:100 YEAR FLOODLINE

DEVELOPER DETAIL

Balwin PROPERTIES

ARCHITECTS DETAIL

VTC Architecture
www.vtcgroup.biz

AMENDMENTS

NR.	DATE	APPROVED	DESCRIPTION	PAR
A	25-01-2016		ISSUED FOR INFORMATION	

DESIGNED: W.STANDER	DRAWN: R.WILLERS
DESIGN CHECKED BY: W. STANDER	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

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P.O. BOX 1409
PRETORIA
0001

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

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

LOCATION OF PROJECT:

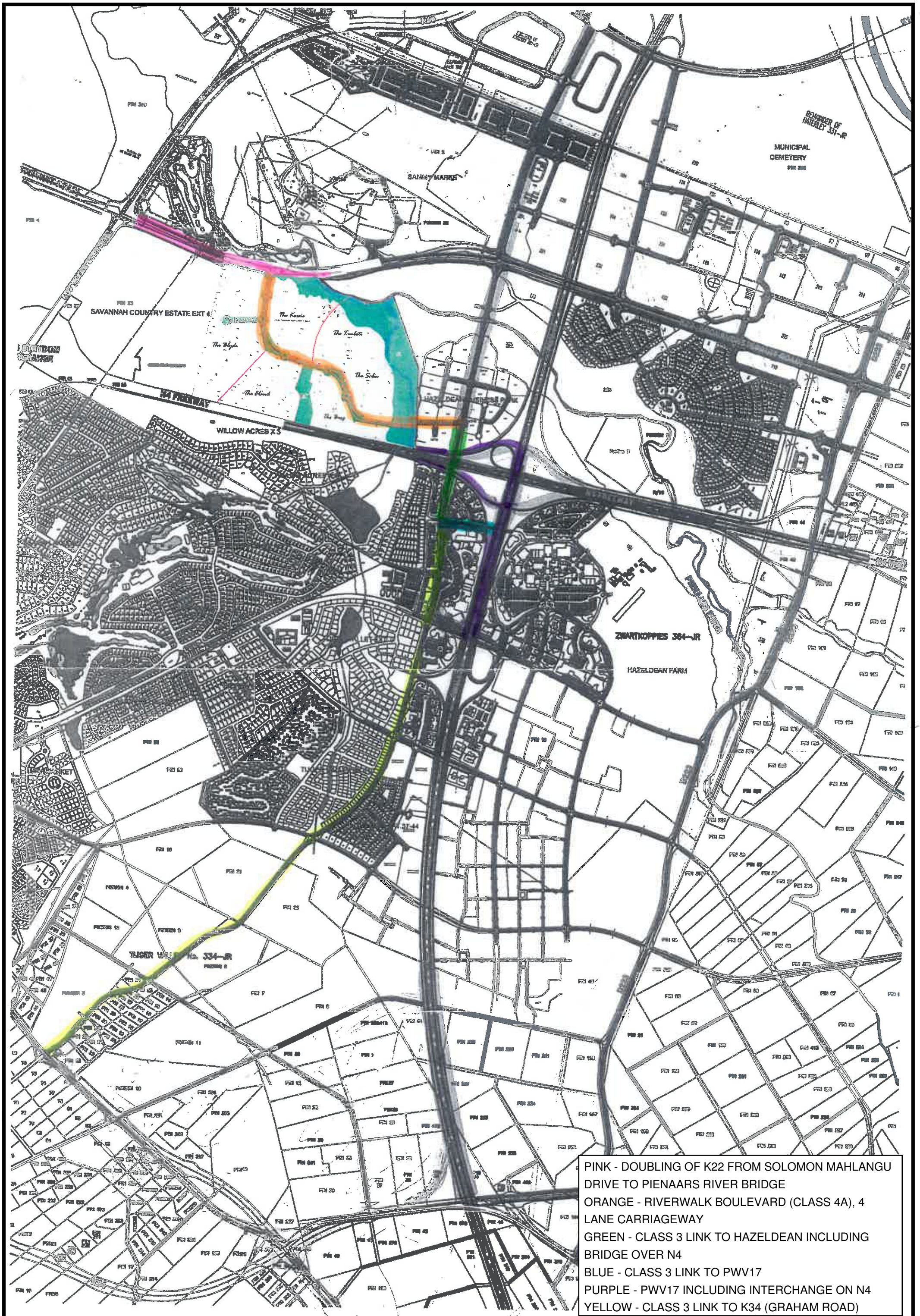
RIVERWALK
PORTION 241 OF THE FARM ZWARTKOPPIES No. 364-JR

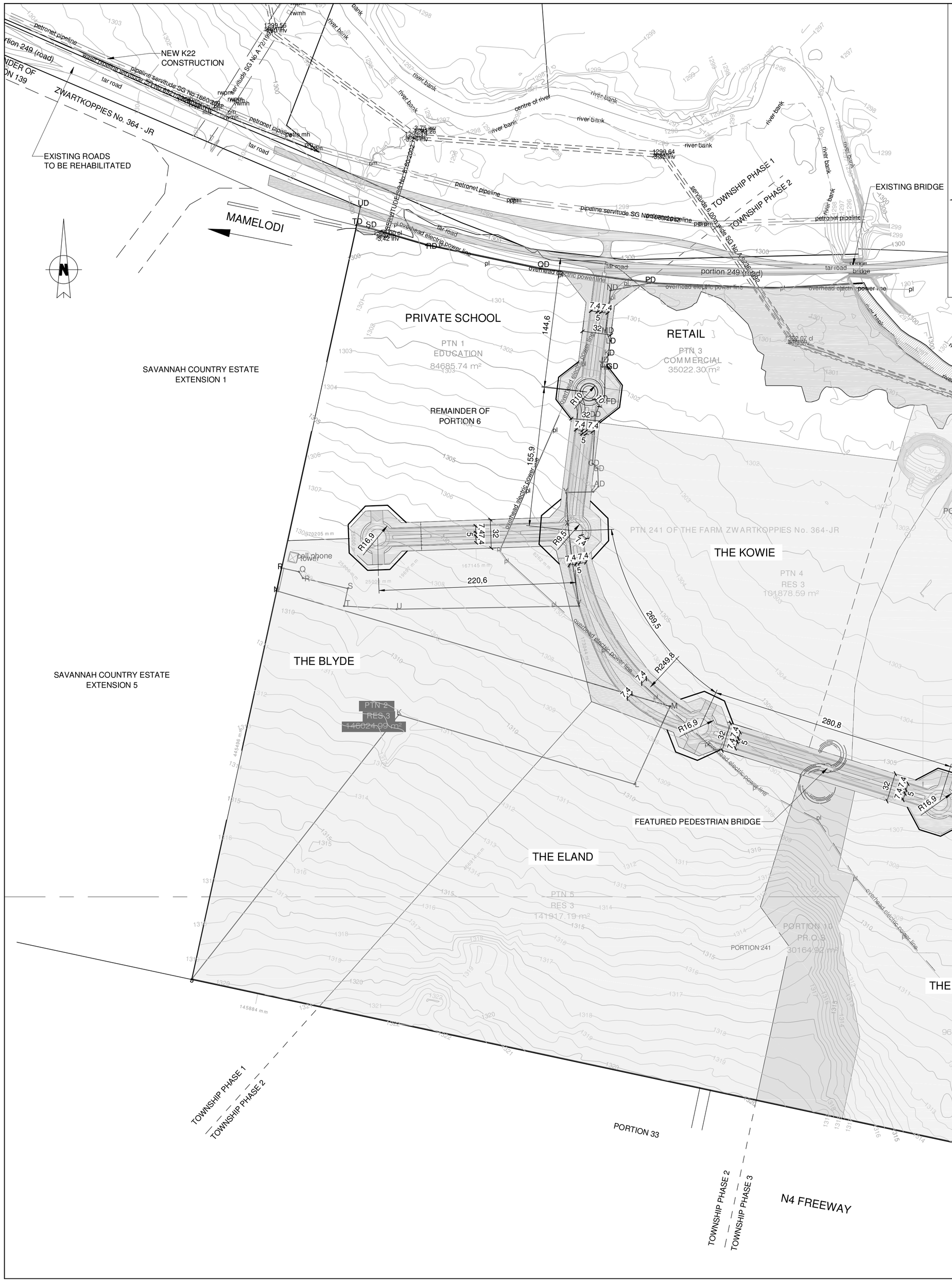
DESCRIPTION OF PROJECT

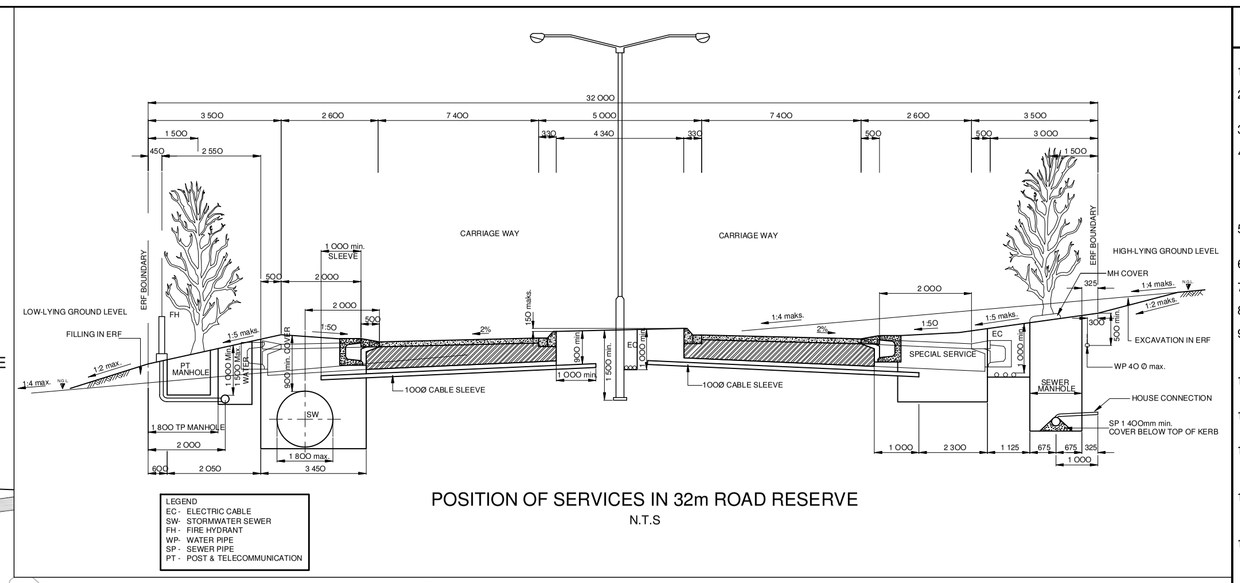
STORMWATER LAYOUT (SERVICE REPORT)

CONTRACT No. :	PROJECT No. : C2142	
DATE : JANUARY_2016	SCALE : 1:2500	ORIGINAL PAPER SIZE: A1
DRAWING NO. C2142-SR-002	SHEET NO:	REVISION

ANNEXURE F


SAMMY MARKS
MUNICIPAL CEMETERY
REMAINDER OF HATERLEY 351-JR
SAVANNAH COUNTRY ESTATE EXT 6
N4 FREEWAY
WILLOW ACRES X 3
ZWARTKOPPIES 364-JR
HAZELDEAN FARM
PINK - DOUBLING OF K22 FROM SOLOMON MAHLANGU DRIVE TO PIENAARS RIVER BRIDGE
ORANGE - RIVERWALK BOULEVARD (CLASS 4A), 4 LANE CARRIAGEWAY
GREEN - CLASS 3 LINK TO HAZELDEAN INCLUDING BRIDGE OVER N4
BLUE - CLASS 3 LINK TO PWV17
PURPLE - PWV17 INCLUDING INTERCHANGE ON N4
YELLOW - CLASS 3 LINK TO K34 (GRAHAM ROAD)





POSITION OF SERVICES IN 32m ROAD RESERVE
N.T.S

NOTES AND SPECIFICATIONS

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LEGEND:

PRPOSED NEW ROAD

DEVELOPER DETAIL

Balwin PROPERTIES

ARCHITECTS DETAIL

VTC Architecture
www.vtcgroup.biz

AMENDMENTS

NR.	DATE	APPROVED	DESCRIPTION	PAR
A	25-01-2016		ISSUED FOR INFORMATION	

DESIGNED: W.STANDER — SIGNATURE — DATE
DRAWN: R.WILLERS
DESIGN CHECKED BY: W. STANDER — 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)
INITIALS AND SURNAME — SIGNATURE AND Pr. No. — DATE
INSPECTOR OF WORKS (CITY OF TSHWANE):
INITIALS AND SURNAME — SIGNATURE AND Pr. No. — DATE

CONSULTANT DETAIL

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

LOCATION OF PROJECT:

RIVERWALK
PORTION 241 OF THE FARM
ZWARTKOPPIES No. 364-JR

DESCRIPTION OF PROJECT

ROADS LAYOUT
(SERVICE REPORT)

CONTRACT No. :	PROJECT No. :	
	C2142	
DATE :	SCALE :	ORIGINAL PAPER SIZE:
JANUARY_2016	1:2500	A1
DRAWING NO.	SHEET NO:	REVISION
C2142-SR-001		A

Cycling Track

Appendix G5

Riverwalk

PRETORIA-EAST

Landscape Framework Development Layout

Riverwalk - Pretoria East

Landscape Architects
Uys & White (Pty) Ltd

Balwin PROPERTIES

Heritage Impact Assessment

Appendix G6

PHASE 1 HERITAGE IMPACT ASSESSMENT FOR THE PROPOSED RIVER WALK DEVELOPMENT ON REMAINDER OF PORTION 6, PORTION 241, PORTION 138 OF THE FARM ZWARTKOPPIES 364-JR

Leonie Marais-Botes
Heritage Practitioner

868 Endeman Street
Wonderboom South
Pretoria
0084
Mobile: 082 576 6253
E-mail: leoniembotes@gmail.com

BA (Cultural History and Archaeology) (UP), BA (Hons) Cultural History (UP), Post Grad Dip Museology (UP), Cert Conservation of Traditional Buildings (Univ of Canberra) Post Grad Dip: Heritage (Wits)

Accredited member: SA Society for Cultural History (CH002)

For:

BOKAMOSO LANDSCAPE ARCHITECTS
& ENVIRONMENTAL CONSULTANTS
P.O. BOX 11375
MAROELANA
0161

August 2016

DISCLAIMER:

Although all possible care is taken to identify/find all sites of cultural importance during the initial survey of the study area, the nature of archaeological and historical sites are as such that it is always possible that hidden or sub-surface sites could be overlooked during the study. Leonie Marais-Botes Heritage Practitioner will not be held liable will not be held liable for such oversights or for the costs incurred as a result thereof.

ACKNOWLEDGEMENTS

Australia ICOMOS. *The Burra Charter*.

Bergh, J.S. Geskiedenis Atlas van Suid-Afrika. Die vier Noordelike Provinsies. Van Schaik Uitgewers, 1998.

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Government Printers. 1: 50 000

National Heritage Resources Act (Act 25 of 1999)

National Environmental Management Act (Act 107 of 1998)

Ordinance on Exhumations (no 12 of 1980)

Potgieter, D.J. (editor-in-chief) Standard Encyclopaedia of Southern Africa. London 1971.

Rosenthal E. (Editor) Encyclopaedia of Southern Africa, 1973

The National Archives of South Africa databases.

Contents page

Contents **Page**

ABOUT THIS REPORT

The heritage report must reflect that consideration has been given to the history and heritage significance of the study area and that the proposed activities is sensitive towards the heritage resources and does not significantly alter or destroy the heritage significance of the study area.

The heritage report must refer to the heritage resources currently in the study area.

The opinion of an independent heritage consultant is required to evaluate if the proposed work generally follows a good approach that will ensure the conservation of the heritage resources.

The National Heritage Resources Act (Act 25 of 1999), the National Environmental Management Act (Act 107 of 1998), Ordinance on Exhumations (no 12 of 1980) and the Human Tissues Act (Act 65 of 1983 as amended) are the guideline documents for a report of this nature.

Leonie Marais-Botes was appointed by Bokamoso to carry out a Phase 1 Heritage Impact Assessment (HIA) for the proposed River Walk Development on Remainder of Portion 6, Portion 241, Portion 138 of the Farm Zwartkoppies, Gauteng Province. The site visit took place on 22 August 2016.

DEFINITION OF TERMS:

‘‘alter’’ means any action affecting the structure, appearance or physical properties of a place or object, whether by way of structural or other works, by painting, plastering or other decoration or any other means.

“archaeological’’ means—
(a) material remains resulting from human activity which are in a state of disuse and are in or on land and which are older than 100 years, including artefacts, human and hominid remains and artificial features and structures;
(b) rock art, being any form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and which is older than 100 years, including any area within 10m of such representation;
(c) wrecks, being any vessel or aircraft, or any part thereof, which was wrecked in South Africa, whether on land, in the internal waters, the territorial waters or in the maritime culture zone of the Republic, as defined respectively in sections 3, 4 and 6 of the Maritime Zones Act, 1994 (Act No. 15 of 1994), and any cargo, debris or artefacts found or associated therewith, which is older than 60 years or which SAHRA considers to be worthy of conservation; and
(d) features, structures and artefacts associated with military history which are older than 75 years and the sites on which they are found.

‘‘conservation’’, in relation to heritage resources, includes protection, maintenance, preservation and sustainable use of places or objects so as to safeguard their cultural significance.

‘‘cultural significance’’ means aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance.

‘‘development’’ means any physical intervention, excavation, or action, other than those caused by natural forces, which may in the opinion of a heritage authority in any way result in a change to the nature, appearance or physical nature of a place, or influence its stability and future well-being, including—
(a) construction, alteration, demolition, removal or change of use of a place or a structure at a place;
(b) carrying out any works on or over or under a place;
(c) subdivision or consolidation of land comprising, a place, including the structures or airspace of a place;
(d) constructing or putting up for display signs or hoardings;
(e) any change to the natural or existing condition or topography of land; and
(f) any removal or destruction of trees, or removal of vegetation or topsoil; object that is specifically designated by that state as being of importance.

‘‘grave’’ means a place of interment and includes the contents, headstone or other marker of such a place, and any other structure on or associated with such place.

‘‘heritage resource’’ means any place or object of cultural significance.

‘‘heritage resources authority’’ means the South African Heritage Resources Agency, or in respect of a province, a provincial heritage resources authority.

‘‘heritage site’’ means a place declared to be a national heritage site by SAHRA or a place declared to be a provincial heritage site by a provincial heritage resources authority.

‘‘improvement’’, in relation to heritage resources, includes the repair,
restoration and rehabilitation of a place protected in terms of Act 25 of 1999.
‘‘living heritage’’ means the intangible aspects of inherited culture, and may include—
(a) cultural tradition;

(b) oral history;
(c) performance;
(d) ritual;
(e) popular memory;
(f) skills and techniques;
(g) indigenous knowledge systems; and
(h) the holistic approach to nature, society and social relationships.

‘‘local authority’’ means a municipality as defined in section 10B of the Local Government Transition Act, 1993 (Act No. 209 of 1993).

‘‘management’’, in relation to heritage resources, includes the conservation, presentation and improvement of a place protected in terms of Act 25 of 1999.

‘‘meteorite’’ means any naturally-occurring object of extraterrestrial origin.

‘‘object’’ means any movable property of cultural significance which may be protected in terms of any provisions of Act 25 of 1999, including—
(a) any archaeological artefact;
(b) palaeontological and rare geological specimens;
(c) meteorites; and
(d) other objects.

‘‘palaeontological’’ means any fossilised remains or fossil trace of animals or plants which lived in the geological past, other than fossil fuels or fossiliferous rock intended for industrial use, and any site which contains such fossilised remains or trance.

‘‘place’’ includes—
(a) a site, area or region;
(b) a building or other structure which may include equipment, furniture, fittings and articles associated with or connected with such building or other structure;
(c) a group of buildings or other structures which may include equipment, furniture, fittings and articles associated with or connected with such group of buildings or other structures;
(d) an open space, including a public square, street or park; and
(e) in relation to the management of a place, includes the immediate surroundings of a place.

‘‘presentation’’ includes—
(a) the exhibition or display of;
(b) the provision of access and guidance to;
(c) the provision, publication or display of information in relation to; and
(d) performances or oral presentations related to, heritage resources protected in terms of Act 25 of 1999.

‘‘public monuments and memorials’’ means all monuments and memorials—
(a) erected on land belonging to any branch of central, provincial or local government, or on land belonging to any organisation funded by or established in terms of the legislation of such a branch of government; or
(b) which were paid for by public subscription, government funds, or a public-spirited or military organisation, and are on land belonging to any private individual.

‘‘site’’ means any area of land, including land covered by water, and including
any structures or objects thereon.
‘‘structure’’ means any building, works, device or other facility made by people and which is fixed to land, and includes any fixtures, fittings and equipment associated therewith.
‘‘victims of conflict’’ means—

(a) certain persons who died in any area now included in the Republic as a direct result of any war or conflict as specified in the regulations, but excluding victims of conflict covered by the Commonwealth War Graves
Act, 1992 (Act No. 8 of 1992);
(b) members of the forces of Great Britain and the former British Empire who died in active service in any area now included in the Republic prior to 4 August 1914;
(c) persons who, during the Anglo-Boer War (1899-1902) were removed as prisoners of war from any place now included in the Republic to any place outside South Africa and who died there; and
(d) certain categories of persons who died in the ‘‘liberation struggle’’ as defined in the regulations, and in areas included in the Republic as well as outside the Republic.

EXE**CUTIVE SUMMARY**

Leonie Marais-Botes Heritage Practitioner was requested by Bokamoso to conduct a Phase 1 Heritage Impact Assessment (HIA) for the proposed River Walk Development.

A field survey was conducted after which a survey of literature was undertaken.

It should be noted that the sub-surface archaeological and/or historical deposits and graves are always a possibility. Care should be taken during any work in the entire area and if any of the above is discovered, an archaeologist/heritage practitioner should be commissioned to investigate.

Please note this study forms part of an Environmental Impact Assessment or Basic Assessment and that public participation is conducted by the Environmental Assessment Practitioner.

1. INTRODUCTION

The proposed development is mainly residential.

1.1 WHY A PHASE 1 HERITAGE IMPACT ASSESSMENT IS REQUIRED?

This project may potentially impact on any types and ranges of heritage resources that are outlined in Section 3 of the National Heritage Resources Act (Act 25 of 1999). Subsequently a Phase 1 Heritage Impact Assessment (HIA) was commissioned by Bokamoso and conducted by Leonie Marais-Botes.

1.1.1 METHOD

The objective of this Phase 1 Heritage Impact Assessment (HIA) was to gain an overall understanding of the heritage sensitivities of the area and indicate how they may be impacted on through development activities. The site survey took place on 27 July 2016.

In order to establish heritage significance the following method was followed:

- Investigation of primary resources (archival information)
- Investigation of secondary resources (literature and maps)
- Physical evidence (site investigation)
- Determining Heritage Significance.

1.2 PROPERTY DESCRIPTION

Remainder of Portion 6, Portion 241, Portion 138 of the Farm Zwartkoppies, Gauteng Province.

1.3 HISTORIY OF THE GREATER STUDY AREA

Zwartkoppies farm to the east of Pretoria where Senator Samuel (Sammy) Marks lived for many years. He moved there during the early 1880's and carried out many of the first experiments in modern agriculture including ploughing, silage and diaring. Zwartkoppies Hall, the homestead was enlarged until it had over 40 rooms. The estate has been entai,ed for several generations under the will of Mr Marks and are currently managed by the Ditsong Museums of South Africa.

The original farm has been subdivided.

1.4 LOCATION AND PHOTOGRAPHIC RECORD OF STUDY AREA

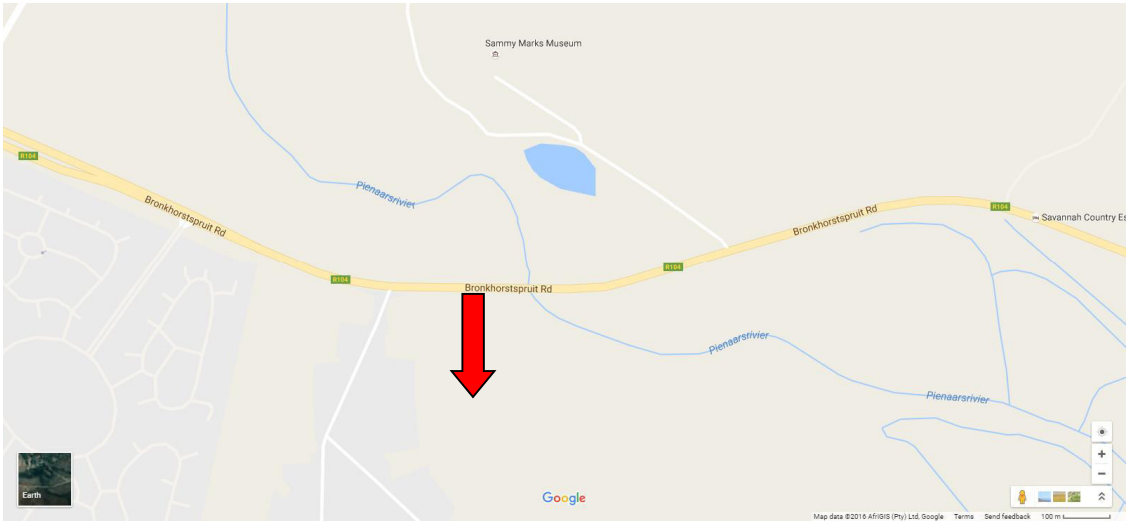

Figure 1: Map indicating location of the study area

Figure 2: Aerial map of study area

Site earmarked for develoment

Figure 3: Landscape element (front)

Figure 4: Landscape element (rear)

Figure 5: Trough

Figure 6: Trough

Figure 7: Foundations, Structure and Trough

Figure 8: Trough

Figure 9: Pigsty

2. FINDINGS

2.1 PRE-COLONIAL HERITAGE SITES

Possibilities: Greater study area taken into account.

Stone Age

The Stone Age is the period in human history when stone material was mainly used to produce tools[1]. In South Africa the Stone Age can be divided in three periods[2];

- Early Stone Age 2 000 000 – 150 000 years ago
- Middle Stone Age 150 000 – 30 000 years ago
- Late Stone Age 40 000 years ago - +/- 1850 AD
-

Iron Age

The Iron Age is the period in human history when metal was mainly used to produce artefacts[3]. In South Africa the Iron Age can be divided in three periods;

- Early Iron Age 250-900 AD
- Middle Iron Age 900-1300 AD
- Late Iron Age 1300-1840 AD[4]

[1] P. J. Coertze & R.D. Coertze, Verklarende vakwoordeboek vir Antropologie en Argeologie.
[2] S.A. Korsman & A. Meyer, *Die Steentydperk en rotskuns* in J.S. Bergh (red) Geskiedenisatlas van Suid-Afrika. Die vier noordelike provinsies.
[3] P.J. Coertze & R.D. Coertze, Verklarende vakwoordeboek vir Antropologie en Argeologie.
[4] M.M. van der Ryst & A Meyer. *Die Ystertydperk* in J.S. Bergh (red) Geskidenisatlas van Suid-Afrika. Die vier noordelike provinsies and T.N Huffman, A Handbook to the Iron Age: The **Archaeology** of Pre-Colonial Farming Societies in Southern Africa.

There are no pre-colonial heritage sites evident in the study area. This can be attributed to extensive farming activities and infrastructure development in the greater study area.

2.2 HISTORICAL PERIOD HERITAGE SITES

Possibilities: Greater study area taken into account.

- Pioneer sites;
- Sites associated with early mining;
- Structures older than 60 years;
- Graves (Graves younger than 60 years, graves older than 60 years, but younger than 100 years, graves older than 100 years, graves of victims of conflict or of individuals of royal descent).

No items older than 60 years were identified in the study area.

2.3 ORIGINAL LANDSCAPE

No original landscape features survived in the study area.

2.4 INTANGIBLE HERITAGE

The intangible heritage of the greater study area can be found in the stories of past and present inhabitants.

3 CATEGORIES OF HERITAGE VALUE (ACT 25 OF 1999)

The National Heritage Resources Act (Act 25 of 1999) identifies the following categories of value under section 3(1) and (2) of the Act under the heading "National Estate":

"3 (1) For the purpose of this Act, those heritage resources of South Africa which are of cultural significance or other special value for the present community and for future generations must be considered part of the national estate and fall within the sphere of operations of heritage resources authorities.

(2) Without limiting the generality of subsection (1), the national estate may include-

(a) places, buildings, structures and equipment of cultural significance;
(b) places which oral traditions are attached or which are associated with living heritage;
(c) historical settlements and townscapes;
(d) landscapes and natural features of cultural significance;
(e) geological sites of scientific or cultural importance;
(f) archaeological and palaeontological sites;
(g) graves and burial grounds, including-
(i) ancestral graves;
(ii) royal graves and graves of traditional leaders;
(iii) graves of victims of conflict;
(iv) graves of individuals designated by the Minister by notice in the Gazette
(v) historical graves and cemeteries; and
(vi) other human remains which are not covered in terms of the Human Tissue Act, 1983 (Act No. 65 of 1983);

(h) sites of significance relating to the history in South Africa;
(i) movable objects, including-
    (i) objects recovered from the soil or waters of South Africa including archaeological and palaeontological objects and material, meteorites and rare geological specimens;
    (ii) objects to which oral traditions are attached or which are associated with living heritage;
    (iii) ethnographic art and objects;
    (iv) military objects
    (v) objects of decorative or fine art;
    (vi) objects of scientific or technological interests; and
    (vii) books, records, documents, photographic positives and negatives, graphic, film or video material or sound recordings, excluding those that are public records as defined in section I (xiv) of the National Archives of South Africa Act, 1996 (Act No. 43 of 1996).

(3) Without limiting the generality of the subsections (1) and (2), a place or object is to be considered part of the national estate if it has cultural significance or other special value because of-
    (a) It is importance in the community, or pattern of South Africa's history;
    (b) Its possession of uncommon, rare or endangered aspects of South Africa's natural or cultural heritage;
    (c) Its potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage;
    (d) Its importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural objects;
    (e) Its importance in exhibiting particular aesthetic characteristics valued by a community or cultural group;
    (f) Its importance in demonstrating a high degree of creative or technical achievement at a particular period;
    (g) Its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons;
    (h) Its strong or special association with the life and work of a person, group or organisation of importance in the history of South Africa; and
    (i) Sites of significance relating to the history of slavery in South Africa."

3.1 HERITAGE VALUE OF WEIGHED AGAINST CULTURAL SIGNIFICANCE CATEGORIES

3.1.1 Spiritual value

During the site visit/field work no indication of any spiritual activity was observed on/near the proposed site. Thus no sites of spiritual value will be impacted on by the proposed project.

3.1.2 Scientific value

No sites of scientific value were observed on or near the site earmarked for development.

3.1.3 Historical value

No historical value associated with the site could be found in primary and secondary sources.

3.1.4 Aesthetic value

No heritage item with exceptional aesthetic (architectural) value was identified in the study area.

3.1.5 Social value

Social value is attributed to sites that are used by the community for recreation and formal and informal meetings regarding matters that are important to the community. These sites include parks, community halls, sport fields etc. None of the said evident in the immediate study area.

3.2 SPECIFIC CATEGORIES INVESTIGATED AS PER SECTION 3 (1) AND (2) OF THE NATIONAL HERITAGE LEGISLATION (ACT 25 OF 1999)

3.2.1 Does the site/s provide the context for a wider number of places, buildings, structures and equipment of cultural significance?

The study area does not provide context for a wider number of places, buildings, structures and equipment of cultural significance. The reason being the low density of heritage items in the immediate study area.

3.2.2 Does the site/s contain places to which oral traditions are attached or which are associated with living heritage?

Places to which oral traditions are attached or associated with living heritage are usually find in conjunction with traditional settlements and villages which still practises age old traditions. None of these are evident near or on the proposed site.

3.2.3 Does the site/s contain historical settlements?

No historical settlements are located on or near the proposed site.

3.2.4 Does the site/s contain landscapes and natural features of cultural significance?

Due to large scale farming activities and infra-structure development the original character of the landscape has been altered significantly.

3.2.5 Does the site/s contain geological sites of cultural importance?

Geological sites of cultural importance include meteorite sites (Tswaing Crater and Vredefort Dome), fossil sites (Karoo and Krugersdorp area), important mountain ranges or ridges (Magaliesburg, Drakensberg etc.). The proposed site is not located in an area known for sites of this importance.

3.2.6 Does the site/s contain a wide range of archaeological sites?

The proposed site does not contain any surface archaeological deposits.

The possibility of sub-surface findings always exists and should be taken into consideration in the Environmental Management Plan.

If sub-surface archaeological material is discovered work must stop and a heritage practitioner preferably an archaeologist contacted to assess the find and make recommendations.

3.2.7 Does the site/s contain any marked graves and burial grounds?

The site does not contain any marked graves or burial grounds.

The possibility of graves not visible to the human eye always exists and this should be taken into consideration in the Environmental Management Plan.

It is important to note that all graves and cemeteries are of high significance and are protected by various laws. Legislation with regard to graves includes the National Heritage Resources Act (Act 25 of 1999) whenever graves are 60 years and older. Other legislation with regard to graves includes those when graves are exhumed and relocated, namely the Ordinance on Exhumations (no 12 of 1980) and the Human Tissues Act (Act 65 of 1983 as amended).

If sub-surface graves are discovered work should stop and a professional preferably an archaeologist contacted to assess the age of the grave/graves and to advice on the way forward.

3.2.8 Does the site/s contain aspects that relate to the history of slavery?

This is not an area associated with the history of slavery like the Western Cape Province.

3.2.9 Can the place be considered as a place that is important to the community or in the pattern of South African history?

In primary and secondary sources the proposed site is not described as important to the community or in the pattern of South African history.[5]

3.2.10 Does the site/s embody the quality of a place possessing uncommon or rare endangered aspects of South Africa's natural and cultural heritage?

The proposed site does not possess uncommon, rare or endangered aspects of South Africa's natural and cultural heritage. These sites are usually regarded as Grade 1 or World Heritage Sites.

[5] Standard Encyclopaedia of Southern Africa and the TAB database at the National Archives of South Africa;
J.S. Bergh (red), Geskiedenisatlas van Suid-Afrika. Die Vier Noordelike Provinsies.

3.2.11 Does the site/s demonstrate the principal characteristics of South Africa's natural or cultural places?

The proposed site does not demonstrate the principal characteristics of South Africa's natural or cultural places. These characteristics are usually associated with aesthetic significance.

3.2.12 Does the site/s exhibit particular aesthetic characteristics valued by the community or cultural groups?

This part of the greater study area does not exhibit particular aesthetic characteristics valued by the community or cultural groups. The reason being the low density of heritage buildings and structures located in the study area.

3.2.13 Does the site/s contain elements, which are important in demonstrating a high degree of creative technical achievement?

The site does not contain elements which are important in demonstrating a high degree of creative technical achievement. Reason being none of the above are evident on site.

3.2.14 Does the site/s have strong and special associations with particular communities and cultural groups for social, cultural and spiritual reasons?

The proposed site does not have a strong or special association with particular communities and cultural groups for social, cultural and spiritual reasons. No comment in this regard was received during the public participation period.

3.2.15 Does the site/s have a strong and special association with the life or work of a person, group or organisation?

No indication of the above could be found in primary and secondary research sources.[6]

4. RECOMMENDATIONS

- The structures on site is not older than 60 years.
- There are no visible restrictions or negative impacts in terms of heritage associated with the site earmarked for development. In terms of heritage the proposed access routes project can proceed.
- The discovery of subsurface archaeological and/or historical material as well as graves must be taken into account in the Environmental Management Plan. See 3.2.6 and 3.2.7.

[6] Dictionary of South African Biography (vol I-V) and the TAB database at the National Archives of South Africa

5. THE WAY FORWARD

- **Submit this report as a Section 38 application to the Provincial Heritage Authority of Gauteng (PHRAG) for comment/approval.**

Environmental Management Programme (EMPr)

Appendix H

Environmental Management Programme (EMPr)

For the Proposed Riverwalk External Services and Open Space Area

on Remainder of Portion 6 of the Farm Zwartkoppies No 364-JR, Portion 241, 138 of the Farm Zwartkoppies No 364-JR and the R104/K22 road reserve.

City of Tshwane Metropolitan Municipality, Gauteng Province.

November 2016

BOKAMOSO

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1 Project Outline

1.1 Background

Bokamoso Landscape Architects and Environmental Consultants CC were appointed by Balwin Properties Limited to conduct a Basic Assessment Application to obtain Environmental Authorisation for the Proposed Riverwalk External Services and Open Space Area at a township that has already received Authorisation.

1.2 Project description

The Proposed development of External Services and Open Space Area will be on the Remainder of Portion 6 of the Farm Zwartkoppies No 364-JR, Portion 241, 138, 34, 33 and 19 of the Farm Zwartkoppies No 364-JR and the R104/K22 road reserve. City of Tshwane Metropolitan Municipality, Gauteng Province.

The proposed project will include rehabilitation and upgrading in areas below the flood line and within the wetland buffer at the approved Riverwalk residential development. It is the intention of the applicant to install and upgrade some external services in open space areas for the purpose of the Riverwalk development and other surrounding developments. This will also include the upgrading of roads and associated infrastructure. This will include a dual carriage way that will form part of the development layout. Storm water management for such infrastructure and the residential development will also be implemented (where required). It is also the applicant's intention to implement (if possible) a cycling track along the river in order to afford the residents and members of the public the opportunity to enjoy the natural assets of this open space area. The R104 will also be upgraded.

Timeframe for construction:

Will be provided when Environmental Authorisation is received. Therefore the timeframe for construction is still unknown but it is expected that construction will commence soon after authorisation is received.

The developer will be responsible for the on-site activities. The EMPr will be a binding document for purposes of compliance.

1.3 Receiving Environment

Biodiversity:

- The proposed study area falls within the Marikana Thornveld vegetation unit according to Mucina and Rutherford (2006).
- Majority of the study area is regarded as degraded with some illegal dumping taking place.
- Some areas along the N4 highway is regarded as sensitive with rocky outcrops and in addition to this area, the drainage line/watercourse should be regarded as sensitive, however it should be noted that the impact of installation and upgrading of services will mostly be limited to the construction phase.

Hydrology:

- A perennial river and wetland occurs within the study area.
- The study area is affected by floodlines.
- The perennial river and associated wetland occur on the northern border of the site and along the eastern boundary there is a wetland associated with a tributary to the perennial river.

Cultural /Historical:

- No cultural heritage resources are expected to be present on the proposed development area.

Visual:

- The proposed development will be visible from the N4 Highway (between Pretoria and Witbank) bordering the study area on the south as well as from the R104/K22.

2 EMPr Objectives and context

Objectives

The objectives of this plan are to:

- Identify the possible environmental impacts of the proposed activity;
- Develop measures to minimise, mitigate and manage these impacts;
- Meet the requirements of the Environmental Authorisation of GDARD and requirements of other Authorities; and
- Monitor the project.

EMPr context

This EMPr fits into the overall planning process of the project by carrying out the conditions of consent set out by the Gauteng Department of Agriculture and Rural Development.

This EMPr addresses the following three phases of the development:

- Pre-construction planning phase;
- Construction phase; and
- Operational phase.

3 Monitoring

In order for the EMPr to be successfully implemented all the role players involved must have a clear understanding of their roles and responsibilities in the project.

These role players may include the Authorities (A), other Authorities (OA), Developer/ Proponent (D), Environmental Control Officer (ECO), Construction Manager (CM), Contractors (Principal)(C), Environmental Assessment Practitioner (EAP) and Environmental Site Officer (ESO). Landowners, Interested and Affected Parties (I&APs) and the relevant environmental and project specialists are also important role players.

3.1 Roles and responsibilities

Developer (D)

The developer is ultimately accountable for ensuring compliance with the EMP and conditions contained in the Environmental Authorisation. The developer must appoint an independent Environmental Control Officer (ECO), for the duration of the pre-construction and construction phases, to ensure compliance with the requirements of this EMPr. The developer must ensure that the ECO is integrated as part of the project team.

Construction Manager (CM)

The Construction Manager is responsible for the coordination of various activities and ensures compliance with this EMPr through delegation of the EMPr to the contractors and monitoring of performance as per the Environmental Control Officer's monthly reports.

Environmental Control Officer (ECO)

An independent Environmental Control Officer (ECO) shall be appointed, for the duration of the pre-construction and construction phases of the development, by the developer to ensure compliance with the requirements of this EMPr.

- The Environmental Control Officer shall ensure that the contractor is aware of all the specifications pertaining to the project.
- Any damage to the environment must be repaired as soon as possible after consultation between the Environmental Control Officer, Consulting Engineer and Contractor.
- The Environmental Control Officer shall ensure that the developer staff and/or contractor are adhering to all stipulations of the EMPr.
- The Environmental Control Officer shall be responsible for monitoring the EMP throughout the project by means of site visits and meetings. This should be documented as part of the site meeting minutes.
- The Environmental Control Officer shall be responsible for the environmental training program.
- The Environmental Control Officer shall ensure that all clean up and rehabilitation or any remedial action required, are completed prior to transfer of properties.
- A post construction environmental audit is to be conducted to ensure that all conditions in the EMPr have been adhered to.

Principal Contractor (C):

The Principal contractor shall be responsible for ensuring that all activities on site are undertaken in accordance with the environmental provisions detailed in this document and that sub-contractors and laborers are duly informed of their roles and responsibilities in this regard.

The Principal Contractor will be required, where specified to provide Method Statements setting out in detail how the management actions contained in the EMPr will be implemented.

The Principal Contractors will be responsible for the cost of rehabilitation of any environmental damage that may result from non-compliance with the environmental regulations.

Environmental Site Officer (ESO):

The ESO is appointed by the developer and then finally the home owner as his/her environmental representative to monitor, review and verify compliance with the EMPr by the contractor. The ESO is not an independent appointment but must be a member of the contractor's management team. The ESO must ensure that he/she is involved at all phases of the construction (from site clearance to rehabilitation). For this project, the Health and Safety Officer on site will also take the responsibility of the Environmental Site Officer. This individual should convey any queries or concerns the ECO.

Authority (A):

The authorities are the relevant environmental department that has issued the Environmental Authorization. The authorities are responsible for ensuring that the monitoring of the EMPr and other authorization documentation is carried out by means of reviewing audit reports submitted by the ECO and conducting regular site visits.

Other Authorities (OA):

Other authorities are those that may be involved in the approval process of the EMPr.

Environmental Assessment Practitioner (EAP):

According to Section 1 of NEMA the definition of an Environmental Assessment Practitioner is "the individual responsible for the planning, management and coordination of Environmental Impact Assessments, Strategic Environmental Assessments, Environmental Management Programmes or any other appropriate environmental instruments through regulations".

3.2 Lines of Communication

The Environmental Control Officer in writing should immediately report any breach of the EMPr to the Project Manager. The Project Manager should then be responsible for rectifying the problem on-site after discussion with the contractor. Should this require additional cost, then the developer should be notified immediately before any additional steps are taken.

3.3 Reporting Procedures to the Developer

Any pollution incidents must be reported to the Environmental Control Officer immediately (within 12 hours). The Environmental Control Officer shall report to the Developer on a regular basis (site meetings).

3.4 Site Instruction Entries

The site instruction book entries will be used for the recording of general site instructions as they relate to the works on site. There should be issuing of stop work order for the purposes of immediately halting any activities of the contractor that may pose environmental risk.

3.5 ESA/ESO (Environmental Site Officer) Diary Entries

Each of these books must be available in duplicate, with copies for the Engineer and Environmental Site Officer. These books should be available to the authorities for inspection or on request. All spills are to be recorded in the ESA/Environmental Site Officer's dairy.

3.6 Methods Statements

Methods statements from the contractor will be required for specific sensitive actions on request of the authorities or ESA/ESO (Environmental Site Officer). All method statements will form part of the EMPr documentation and are subject to all terms and conditions contained within the EMPr document. For each instance wherein it is requested that the contractor submit a method statement to the satisfaction of ESA/ESO, the format should clearly indicate the following:

- What – a brief description of the work to be undertaken;
- How – a detailed description of the process of work, methods and materials;
- Where – a description / sketch map of the locality of work; and
- When – the sequencing of actions with due commencement dates and completion date estimate.

The contractor must submit the method statement before any particular construction activity is due to start. Work may not commence until the method statement has been approved by the ESA/ESO.

3.7 Record Keeping

All records related to the implementation of this Management Programme (e.g. site instruction book, ESA/ESO dairy, methods statements etc.) must be kept together in an office where it is safe and can be retrieved easily. These records

should be kept for two years at any time be available for scrutiny by any relevant authorities.

3.8 Acts

3.8.1. The National Water Act, 1998 (Act No: 36 of 1998)

The purpose of this Act is to ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled in ways that take into account, amongst other factors, the following:

- Meeting the basic human needs of present and future generations;
- Promoting equitable access to water;
- Promoting the efficient, sustainable and beneficial use of water in the public interest;
- Reducing and preventing pollution and degradation of water resources;
- Facilitating social and economic development; and
- Providing for the growing demand for water use.

Impact on proposed Development:

The site borders a perennial wetland and river system as well as a tributary. Some of the services upgrades/installations as well as the bridge will be across or within the wetland or its associated buffer. A Section 21 (c) and (i) Water Use License will be required by the Department of Water and Sanitation and such applications are in the process of being submitted.

3.8.2. Atmospheric Pollution Prevention Act (Act 45 of 1965)

The NEM: AQA serves to repeal the Atmospheric Pollution Prevention Act (45 of 1965) and various other laws dealing with air pollution and it provides a more comprehensive framework within which the critical question of air quality can be addressed.

The purpose of the Act is to set norms and standards that relate to:

- Institutional frameworks, roles and responsibilities
- Air quality management planning
- Air quality monitoring and information management
- Air quality management measures
- General compliance and enforcement

Amongst other things, it is intended that the setting of norms and standards will achieve the following:

- The protection, restoration and enhancement of air quality in South Africa;
- Increased public participation in the protection of air quality and improved public access to relevant and meaningful information about air quality;
- The reduction of risks to human health and the prevention of the degradation of air quality.

The Act describes various regulatory tools that should be developed to ensure the implementation and enforcement of air quality management plans. These include:

- Priority Areas, which are air pollution 'hot spots';
- Listed Activities, which are 'problem' processes that require an Atmospheric Emission License;
- Controlled Emitters, which includes the setting of emission standards for 'classes' of emitters, such as motor vehicles, incinerators, etc.;
- Control of Noise;
- Control of Odours.

Impact on proposed Development:

The Act have relevance to the proposed services and roads upgrades/installations during the construction phase. Dust pollution could be a concern primarily during the construction phase of the proposed project. Dust control would be adequately minimised during this phase by way of water spraying and possible dust-nets, when working close to existing residential dwellings or roads/highways. It

is not forseen that the proposed services and roads would contribute significantly to pollution in terms of emissions and noise during its operational phase.

3.8.3 National Environmental Management Act (Act 107 of 1998)

The NEMA is primarily an enabling Act in that it provides for the development of environmental implementation plans and environmental management plans. The principles listed in the act serve as a general framework within which environmental management and implementation plans must be formulated.

The principles in essence state that environmental management must place people and their needs at the forefront of its concern and that development must be socially, environmentally and economically sustainable.

Impact on proposed Development:
Section 28 (1) of NEMA stated that every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment.

The EMPr is compiled in terms of Section 28 of NEMA.

3.8.4. The National Environmental Management: Waste Act (Act 59 of 2008)

This Act came into effect on 11 June 2009. It aims to consolidate waste management in South Africa, and contains a number of commendable provisions, including:

- The establishment of a national waste management strategy, and national and provincial norms and standards for, amongst others, the classification of waste, waste service delivery, and tariffs for such waste services;

- Addressing reduction, reuse, recycling and recovery of waste;
- The requirement for industry and local government to prepare integrated waste management plans;
- The establishment of control over contaminated land;
- Identifying waste management activities that requires a licence, which currently include facilities for the storage, transfer, recycling, recovery, treatment and disposal of waste on land;
- Co-operative governance in issuing licenses for waste management facilities, by means of which a licensing authority can issue an integrated or consolidated license jointly with other organs of state that has legislative control over the activity; and
- The establishment of a national waste information system.

On 3 July 2009 the Minister of Environmental Affairs and Tourism promulgated a list of waste management activities that might have a detrimental effect on the environment. These listed activities provide the activities that require a Waste Management License. Two Categories is specified: Category A and Category B. As part of a Category A: Waste Management License application, a Basic Assessment in terms of Section 24(5) of the National Environmental Management Act (Act 107 of 1998) must be submitted to the relevant Authority. As part of a Category B: Waste Management License application, a Scoping and EIA process in terms of Section 24(5) of the National Environmental Management Act (Act 107 of 1998) must be followed and submitted to the relevant Authority.

On 29 November 2013 the Minister of Environmental Affairs and Tourism amended the list of waste activities that might be detrimental to the environment and this was published under Government Notice 921.

Impact on proposed Development:

No Waste Management License is expected to be required during the construction or operational phase of the proposed services and roads within the wetland area and associated buffer.

3.8.5. The Municipal Systems Act (Act 32 of 2000)

This Act was introduced to provide for the core principles, mechanisms and processes that are necessary to enable municipalities to move progressively towards the social and economic upliftment of local communities, and ensure universal access to essential services that are affordable to all.

The proposed development will support the local authority in complying with the principles of the Municipal Systems Act, by assisting in providing the community with essential services, such as water and sewage infrastructure.

Impact on proposed Development:
The proposed development will contribute to the municipal services to an extent as it is upgrading the existing sewer pipeline.

3.8.6 National Veld and Forest Fire Act, 1998 (Act No. 101, 1998)

The purpose of this Act is to prevent and combat veld, forest and mountain fires throughout the Republic. Furthermore the Act provides for a variety of institutions, methods and practices for achieving the prevention of fires.

Impact on proposed Development:
Fires of construction workers may only be lit in the designated site camp as indicated in assistance with the ECO. It is important that a site development camp be located on a part of the application site that is already disturbed.

3.8.7 National Heritage Resources Act, 1999 (Act No. 25 of 1999)

The National Heritage Resources Act legislates the necesity and heritage impact assessment in areas earmarked for development, which exceed 0.5ha. The Act makes provision for the potential destruction to existing sites, pending the

archaelogist's recommendations through permitting procedures. Permits are administered by the South African Heritage Resources Agency (SAHRA).

Impact on proposed Development:

No features of Heritage importance are expected to be found on the proposed study area. The proposed development is more than 4 km from a world heritage site. If any such features are discovered during construction activities and clearing of the application site, the correct "procedures for an Environmental incident" (at the end of the EMPr) must be followed.

3.8.8. Conservation of Agricultural Resources Act (Act No. 43 of 1983)

This Act provides for control over the utilization of the natural agricultural resources of the Republic in order to promote the conservation of the soil, the water sources and the vegetation and the combating of weeds and invader plants; and for matters connected therewith.

Impact on proposed Development:

According to the Gauteng Agriculture Potential Atlas (GAPA 3) the study area has a very low to moderate agricultural potential.

3.8.9. National Environmental Management Act: Biodiversity Act (Act No. 10 of 2004)

The purpose of the Biodiversity Act is to provide for the management of South Africa's biodiversity within the Framework of the NEMA and the protection of species and ecosystems that warrant National protection. As part of the implementation strategy, the National Spatial Biodiversity Assessment was developed.

Impact on proposed Development:

Majority of the study area is regarded as degraded with some illegal dumping taking place. Some areas along the N4 highway is regarded as sensitive with rocky outcrops and in addition to this area, the drainage line/watercourse should be regarded as sensitive.

3.8.11. National Spatial Biodiversity assessment

The National Spatial Biodiversity Assessment (NSBA) classifies areas as worthy of protection based on its biophysical characteristics, which are ranked according to priority levels.

Impact on proposed Development:

The proposed development is situated within the Marikana Thornveld vegetation type according to Mucina and Rutherford (2006).

3.8.12 Protected Species – Provincial Ordinances

Provincial ordinances were developed to protect particular plant species within specific provinces. The protection of these species is enforced through permitting requirements associated with provincial lists of protected species. Permits are administered by the Provincial Departments of Environmental Affairs.

Impact on proposed Development:

Majority of the study area is regarded as degraded with some illegal dumping taking place. Some areas along the N4 highway is regarded as sensitive with rocky outcrops and in addition to this area, the drainage line/watercourse should be regarded as sensitive.

3.8.13. National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003)

The purpose of this Act is to provide for the protection, conservation and management of ecologically viable areas representative of South Africa's biological biodiversity and its natural landscapes.

Impact on proposed Development:

The Application site is not located within any conservancy or protected area.

4 Project activities

4.1 Pre-Construction Phase

TYPE	*Environmental risk or issue*	*Objective or requirement*	*Mitigation measure*	*Performance indicator*	*Responsibility*	*Frequency of Action*
General	**Project contract**	To make the EMPr enforceable under the general conditions of the contract.	The EMPr document must be included as part of the tender documentation	The EMPr is included as part of the tender documentation	Developer	-
Design and planning	**Stability of structures and restriction of land use due to geology**	To ensure stability of structures	The layout and land uses must correspond to the stability zonation and development types recommended by the geotechnical engineer.	The land uses and layout corresponds to the recommended stability zonation and development types.	Individual Developer Engineer	-
			Strip footings should be used for the foundations of construction.	Excavations and foundations remain stable	Engineer Individual Developer	
			More detailed foundation investigation shall be done for each of the structures.	More detailed foundation investigations done.	Engineer Individual Developer	-
	Stability of excavations due to geology	To ensure stability of excavations	Sides of excavations should be either shored or else battered back.	Excavations remain stable.	Engineer Individual Developer	
	Geology and Soils	To avoid impacts on the	Topsoil and sub-soil must be dumped above the 1:100 year flood line and outside the watercourse buffer areas in			

TYPE	*Environmental risk or issue*	*Objective or requirement*	*Mitigation measure*	*Performance indicator*	*Responsibility*	*Frequency of Action*
		watercourse	designated soil storage areas of the Riverwalk development site.			
	Storm water design	**Erosion of drainage lines**	**1) Appropriate flow diversion and erosion control structures i.e. earth embankments must be put in place in areas where soil may be exposed to high levels of erosion due to steep slopes etc.** **2) Any damage, displacement or loss of soil resulting from unforeseen events is to be recorded and remediated immediately. Should this occur due to negligence on the contractor's behalf, the contractor shall carry remediation costs.** **3) Storm water at the site camp must be managed so as to reduce/ minimise the silt loads in the stream channel.** **4) Construction on steep slopes and in soft or erodible material will require erosion control measures and appropriate grassing/ hydroseeding measures.** **5) All construction areas should be suitably top-soiled and vegetated as soon as it is possible after construction; and disturbed areas to be rehabilitated must be ripped and the area must be backfilled with topsoil.**			
		Stream – increased sediment	**1) To prevent erosion of material that is stockpiled for long periods, the material must be retained in a bermed area.**			

TYPE	*Environmental risk or issue*	*Objective or requirement*	*Mitigation measure*	*Performance indicator*	*Responsibility*	*Frequency of Action*
		input	**2) All topsoil within the area to be developed must be removed and stockpiled on site.** **3) The temporary storage of topsoil must be above the 100yr floodline or at least 20m from the top of any bank or drainage lines.** **4) An earth bank is to be constructed around the upslope portion of any stockpiles in order to direct runoff and prevent scouring of stockpiles.** **5) A silt fence is to be erected around any stockpiles in order to trap sediment and prevent stockpile sediment loss.**			
	Light pollution	To minimise light pollution	The generation of light by night events, security lighting and other lighting shall be effectively designed so as not to spill unnecessary outward into the oncoming traffic, or into the yards of the neighbouring properties, oncoming traffic on highway or open spaces.	Lighting effectively designed	Architect/ Landscape Architect	-
	Visual impact	To minimise the visual impact of the proposed developmen t.	Architectural guidelines to minimize the visual impact: 1) Roof colour will blend in tastefully with the surrounding environment. Building design must be aesthetically pleasing. 2) Suitable plant materials should be used at strategic points to screen off impacts caused by roofs, cars in large parking areas. 3) Mature existing trees should be retained as far as possible. The trees will soften the impact of the proposed	Architectural guidelines minimise visual impact	Architect	-

TYPE	*Environmental risk or issue*	*Objective or requirement*	*Mitigation measure*	*Performance indicator*	*Responsibility*	*Frequency of Action*
			development. 4) Rubble and litter must be removed on a weekly basis and be disposed of at a suitably registered landfill site.			
Climate	**Extreme change in micro climate temperatures**	To prevent the extreme change in micro climate temperatures	Where open parking bays are involved, one tree for every two parking bays shall be indicated on the Landscape Development Plan which shall be approved by the Design Review Committee/ Local Authority.	Landscape Development Plan complies	Landscape Architect	-
Fauna and flora	**Floral biodiversity and ecological health**	To ensure that the species introduced to the area, are compatible with the current and future quality of the ecological processes.	1) The Landscape Development Plan for the proposed development shall be submitted to the local authority for approval. 2) It is important that all the plant positions, quantities and coverage per m^2 be indicated on a plan. 3) The proposed planting materials for the areas to be landscaped shall be non-invasive, and preferably indigenous and/ or endemic. Indigenous tree species will aid in habitat creation that will attract indigenous faunal species into the area. 4) Where possible, trees naturally growing on the site should be retained as part of the landscaping.	The landscape development plan submitted to the local authority for approval.	Landscape Architect	-
Preparing Site Access	**Environmental integrity**	To avoid erosion and disturbance to indigenous	1) Designated routes shall be determined for the construction vehicles and designated areas for storage of equipment. 2) Clearly mark the site access point	Access to site is erosion free. Minimum disturbance to	Contractor	Continuous

TYPE	*Environmental risk or issue*	*Objective or requirement*	*Mitigation measure*	*Performance indicator*	*Responsibility*	*Frequency of Action*
		vegetation	and routes on site to be used by construction vehicles and pedestrians. 3) Provide an access map to all contractors whom in turn must provide copies to the construction workers. Instruct all drivers to use access point and determined route.	surrounding vegetation. Vehicles make use of established access routes.		
		Entrance of Vehicles	Entrance by vehicles, especially off-road cars and bakkies, off-road bicycles and quad bikes and construction staff should be prohibited, both during the construction phase and during the lifespan of the project.			
	Waste storage	To control the temporary storage of waste.	Temporary waste storage points on site shall be determined. These storage points shall be accessible by waste removal trucks and these points should not be located in sensitive areas/areas highly visible from the properties of the surrounding land-owners/tenants/in areas where the wind direction will carry bad odours across the properties of adjacent tenants or landowners.		Contractor ESO	-
		Ensure waste storage area does not generate pollution	Build a bund around waste storage area to stop overflow into storm water.		Contractor	-

4.2 Construction Phase

TYPE	*Environmental risk or issue*	*Objective or requirement*	*Mitigation measure*	*Performance indicator*	*Responsibility*	*Frequency of Action*
Contractors Camp	**Vegetation and topsoil**	To minimize damage to and loss of vegetation and retain quality of topsoil	1) Site to be established under supervision of ECO. 2) Clearing and relocation of plants to be undertaken in accordance with site specific requirements.	Minimal vegetation removed/ damaged during site activities.	Contractor	As and when required
	Surface and ground water pollution	To minimize pollution of surface and Groundwater resources.	1) Sufficient and temporary facilities including ablution facilities must be provided for construction workers operating on the site. 2) A minimum of one chemical toilet shall be provided per 10 persons. The contractor shall keep the toilets in a clean, neat and hygienic condition. Toilets provided by the contractor must be easily accessible and a maximum of 50m from the works area to ensure they are utilized. The contractor (who must use reputable toilet-servicing company) shall be responsible for the cleaning, maintenance and servicing of the toilets. The contractor (using reputable toilet-servicing company) shall ensure that all toilets are cleaned and emptied before the builders' or other public holidays. 3) No person is allowed to use any other area than chemical toilets. 4) No French drain systems may be installed. 5) No chemical or waste water must be	Effluents managed Effectively. No pollution of water resources from site. Workforce use toilets provided.	Contractor ESO	As and when required

TYPE	*Environmental risk or issue*	*Objective or requirement*	*Mitigation measure*	*Performance indicator*	*Responsibility*	*Frequency of Action*
			allowed to contaminate the run-off on site. 6) Avoid the clearing of the site camp (of specific phase) or paved surfaces with soap.			
		Minimize impacts due to topsoil storage	Topsoil and sub-soil must be dumped above the 1:100 year flood line and outside the watercourse buffer areas in designated soil storage areas of the Riverwalk development site.			
		To minimize pollution of surface and Groundwater resources due to spilling of materials.	1) Drip trays and/ or lined earth bunds must be provided under vehicles and equipment, to contain spills of hazardous materials such as fuel, oil and cement. 2) Repair and storage of vehicles only within the demarcated site area. 3) Spill kits must be available on site. 4) Oils and chemicals must be confined to specific secured areas within the site camp. These areas must be bunded with adequate containment (at least 1.5 times the volume of the fuel) for potential spills or leaks. 5) All spilled hazardous substances must be contained in impermeable containers for removal to a licensed hazardous waste site. 6) No leaking vehicle shall be allowed on site. The mechanic/ the mechanic of the appointed contractor must supply the environmental officer with a letter of confirmation that the vehicles and equipment are leak proof. 7) No bins containing organic solvents such	No pollution of the environment	Contractor ESO	Daily

TYPE	*Environmental risk or issue*	*Objective or requirement*	*Mitigation measure*	*Performance indicator*	*Responsibility*	*Frequency of Action*
			as paints and thinners shall be cleaned on site, unless containers for liquid waste disposal are placed for this purpose on site.			
		To minimize pollution of surface and groundwater resources by cement	The mixing of concrete shall only be done at specifically selected sites, as close as possible to the entrance, on mortar boards or similar structures to prevent run-off into drainage lines, streams and natural vegetation.	No evidence of contaminated soil on the construction site.	Contractor ESO	Daily
		To minimize pollution of surface and Groundwater resources due to effluent.	No effluent (including effluent from any storage areas) may be discharged into any water surface or ground water resource.	No evidence of contaminated water resources.	Contractor ESO	Daily
	Pollution of the environment	To prevent unhygienic usage on the site and pollution of the natural assets.	1) Weather proof waste bins must be provided and emptied regularly. 2) The contractor shall provide laborers to clean up the contractor's camp and construction site on a daily basis. 3) Temporary waste storage points on the site should be determined. THESE AREAS SHALL BE PREDETERMINED AND LOCATED IN AREAS THAT IS ALREADY DISTURBED. These storage points should be accessible by waste removal trucks and these points should be located in already disturbed areas /areas not highly visible from the properties of the surrounding land-owners/ in areas where the wind direction will not carry bad odours across the properties of adjacent landowners. This site should comply with the following:	No waste bins overflowing No litter or building waste lying in or around the site	Contractor ESO	Daily Weekly

TYPE	*Environmental risk or issue*	*Objective or requirement*	*Mitigation measure*	*Performance indicator*	*Responsibility*	*Frequency of Action*
			• Skips for the containment and disposal of waste that could cause soil and water pollution, i.e. paint, lubricants, etc.; • Small lightweight waste items should be contained in skips with lids to prevent wind littering; • Bunded areas for containment and holding of dry building waste. 4) No solid waste may be disposed of on the site. 5) No waste materials shall at any stage be disposed of in the open veld of adjacent properties. 6) The storage of solid waste on the site, until such time as it may be disposed of, must be in a manner acceptable to the local authority and DWS. 7) Cover any wastes that are likely to wash away or contaminate storm water.			
		Recycle material where possible and correctly dispose of unusable wastes	1) Waste shall be separated into recyclable and non-recyclable waste, and shall be separated as follows: • General waste: including (but not limited to) construction rubble, • Reusable construction material. 2) Recyclable waste shall preferably be deposited in separate bins. 3) All solid waste including excess spoil (soil, rock, rubble etc) must be removed to a permitted waste disposal site on a weekly basis.	Sufficient containers available on site No visible signs of pollution	Contractor ESO	Daily Weekly

TYPE	*Environmental risk or issue*	*Objective or requirement*	*Mitigation measure*	*Performance indicator*	*Responsibility*	*Frequency of Action*
			4) No bins containing organic solvents such as paints and thinners shall be cleaned on site, unless containers for liquid waste disposal are placed for this purpose on site. 5) Keep records of waste reuse, recycling and disposal for future reference. Provide information to ECO.			
	Waste	To keep the site clean and tidy. To ensure waste enters the appropriate waste stream in order to optimize recycling opportunities.	1) Rubble must be removed from the construction site frequently and be disposed of at an approved dumping site. 2) Sufficient and covered containers must be available on the construction site. 3) Such containers are to be emptied frequently. 4) All liquid effluent is to be disposed of in a manner approved of by the Local Authority. 5) Material to be used as backfill during a later stage of the building construction must be covered with a layer of soil to prevent litter from being blown over the site and to prevent unhygienic conditions. 6) Chemical containers and packaging brought onto the site must be removed for disposal at a suitable site. 7) The burning of waste is prohibited. 8) Where possible, waste must be separated into clearly marked containers and subsequent recycling thereof must be a priority.		Contractor	Monitor daily
	Increased fire risk to site and surrounding	To decrease fire risk.	1) Fires shall only be permitted in specifically designated areas and under controlled circumstances.	No open fires on site that have been	Contractor	Monitor daily

TYPE	*Environmental risk or issue*	*Objective or requirement*	*Mitigation measure*	*Performance indicator*	*Responsibility*	*Frequency of Action*
	areas		2) Food vendors shall be allowed within specified areas. 3) No wood may be collected from the site for fires. 4) Fire extinguishers to be provided in all vehicles and fire beaters must be available on site. 5) Emergency numbers/ contact details must be available on site, where applicable.	left unattended		
Constructio n site	**Geology and soils**	To protect underground services from alkaline or corrosive attack.	Underground services should be treated appropriately prior to installation.	Underground services are not being corroded	Contractor	Monitor regularly/ as required
		To prevent the damage of the existing soils and geology.	1) The top layer of all areas to be excavated for the purposes of construction shall be stripped and stockpiled in areas where this material will not be damaged, removed or compacted. 2) All surfaces that are susceptible to erosion, shall be protected either by cladding with biodegradable material or with the top layer of soil being seeded with grass seed/planted with a suitable groundcover.	Excavated materials correctly stockpiled No signs of erosion	Contractor	Monitor daily
		To prevent the loss of topsoil To prevent siltation & water pollution.	1) Stockpiling will only be done in designated places where it will not interfere with the natural drainage paths of the environment. 2) In order to minimize erosion and siltation and disturbance to existing vegetation, it is recommended that stockpiling be done/	Excavated materials correctly stockpiled No visible signs of	Contractor of the Individual Developer	Monitor daily

TYPE	*Environmental risk or issue*	*Objective or requirement*	*Mitigation measure*	*Performance indicator*	*Responsibility*	*Frequency of Action*
			equipment is stored in already disturbed/ exposed areas. 3) Cover stockpiles and surround downhill sides with a sediment fence to stop materials washing away. 4) Remove vegetation only in areas designated during the planning stage. 5) Rehabilitation/ landscaping are to be done immediately after the involved works are completed. 6) All compacted areas should be ripped prior to them being rehabilitated/ landscaped by the contractor as appointed by the developer/ individual erf owner. 7) The top layer of all areas to be excavated must be stripped and stockpiled in areas where this material will not be damaged, removed or compacted. This stockpiled material should be used for the rehabilitation of the site and for landscaping purposes. 8) Strip topsoil at start of works and store in stockpiles no more than 1,5 m high in designated materials storage area. 9) During the laying of any cables, pipelines or infrastructure (on or adjacent to the site) topsoil shall be kept aside to cover the disturbed areas immediately after such activities are completed. 10) Topsoil and sub-soil must be dumped above the 1:100 year flood line and outside the watercourse buffer areas in	erosion and sedimentation Minimal invasive weed growth Vegetation only removed in designated areas		

TYPE	*Environmental risk or issue*	*Objective or requirement*	*Mitigation measure*	*Performance indicator*	*Responsibility*	*Frequency of Action*
			designated soil storage areas of the Riverwalk development site.			
	Erosion and siltation	**To prevent erosion and siltation**	**1) It is recommended that the construction of the development be done in phases.** **2) Each phase should be rehabilitated immediately after the construction for that phase has been completed. The rehabilitated areas should be maintained by the appointed rehabilitation contractor until a vegetative coverage of at least 80% has been achieved as appointed by the developer/ individual erf owner.** **3) Mark out the areas to be excavated.** **4) Large exposed areas during the construction phases should be limited. Where possible areas earmarked for construction during later phases should remain covered with vegetation coverage until the actual construction phase. This will prevent unnecessary erosion and siltation in these areas.** **5) Unnecessary clearing of flora resulting in exposed soil prone to erosive conditions should be avoided.** **6) All embankments must be adequately compacted and planted with grass to stop any excessive soils erosion and scouring of the landscape if required.** **7) The eradication of alien vegetation should be followed up as soon as possible by replacement with indigenous vegetation to ensure quick and sufficient**	No erosion scars No loss of topsoil All damaged areas successfully rehabilitated	Contractor ESO	Monitor daily

TYPE	*Environmental risk or issue*	*Objective or requirement*	*Mitigation measure*	*Performance indicator*	*Responsibility*	*Frequency of Action*
			coverage of exposed areas by the individual erf owner. **8) Storm water outlets shall be correctly designed to prevent any possible soil erosion.** **9) All surface run-offs shall be managed in such a way so as to ensure erosion of soil does not occur.** **10) Implementation of temporary storm water management measures that will help to reduce the speed of surface water by the individual erf owner / developer.** **11) All surfaces that are susceptible to erosion shall be covered with a suitable vegetative cover as soon as construction is completed by the individual erf owner / developer.**			
	Storm Water Management	**Erosion – drainage line**	**1) Appropriate flow diversion and erosion control structures i.e. earth embankments must be put in place in areas where soil may be exposed to high levels of erosion due to steep slopes etc.** **2) Any damage, displacement or loss of soil resulting from unforeseen events is to be recorded and remediated immediately. Should this occur due to negligence on the contractor's behalf, the contractor shall carry remediation costs.** **3) Storm water at the site camp must be managed so as to reduce/ minimise the silt loads in the stream channel.** **4) Construction on steep slopes and in soft or erodible material will require erosion**			

TYPE	*Environmental risk or issue*	*Objective or requirement*	*Mitigation measure*	*Performance indicator*	*Responsibility*	*Frequency of Action*
			control measures and appropriate grassing/ hydroseeding measures. **5) All construction areas should be suitably top-soiled and vegetated as soon as it is possible after construction; and disturbed areas to be rehabilitated must be ripped and the area must be backfilled with topsoil.**			
		Increased sediment	**1) To prevent erosion of material that is stockpiled for long periods, the material must be retained in a bermed area.** **2) All topsoil within the area to be developed must be removed and stockpiled on site.** **3) The temporary storage of topsoil must be above the 100yr floodline or at least 20m from the top of any bank or drainage lines.** **4) An earth bank is to be constructed around the upslope portion of any stockpiles in order to direct runoff and prevent scouring of stockpiles.** **5) A silt fence is to be erected around any stockpiles in order to trap sediment and prevent stockpile sediment loss.**			
		Storm Water Management	**Details from the Storm Water Management Plan:** • **The embankment will be constructed with fill material from site, at a slope of 1% with a side slope of 1:3 and protective measures.** • **Special attention will be given to outlet structures and steep side slopes and measures to prevent erosion such a**			

TYPE	*Environmental risk or issue*	*Objective or requirement*	*Mitigation measure*	*Performance indicator*	*Responsibility*	*Frequency of Action*
			McMatR, Ecologs and grassing will be used as and when required. • **Temporary work will use sandbags or similar measures to prevent erosion and deviate any storm water away from active construction sites.** • **Work will be completed and affected areas will be reinstated.**			
	Stability of structures due to geology	To ensure stability of structures	Preventative foundation designs shall be done. Detailed foundation inspections should be carried out at the time of construction to identify any variances and adjust foundation designs accordingly if need be. The foundation recommendations from the geotechnical engineers must be adhered to.		Engineers / Contractor / Individual Developer	When required
	Seepage of groundwater into excavations	To ensure that excavations do not become flooded	Provision should be made for the removal of groundwater from excavations.		Contractor	Monitor daily
	Cracking of structures	To ensure that built structures do not crack due to collapsible soils and settlement	1)The floors of foundation excavations should be compacted by a hand-operated vibratory roller or else by a machine equivalent to a Wacker Rammer (a mechanised tamping device); a test section should firstly be compacted under supervision of the Engineer in order to determine the number of roller passes. The structures may then be constructed by conventional means. Additional precautionary measures that can be employed are:	Built structures show no sign of cracks	Engineer/ Contractor	As required

TYPE	*Environmental risk or issue*	*Objective or requirement*	*Mitigation measure*	*Performance indicator*	*Responsibility*	*Frequency of Action*
			2) The provision of expansion joints in the walls of structures; 3) A concrete walkway of 1,0m in width around the perimeter of each structure; and 4) The shaping of the walkway and the ground surface in the vicinity of the structures so as to drain water away from each structure so that no ponding of surface water can take place in the vicinity of the structures.			
	Hydrology	**To minimise pollution of soil, surface and groundwater**	**1) Increased run-off during construction must be managed using berms and other suitable structures as required to ensure flow velocities are reduced.** **2) The contractor shall ensure that excessive quantities of sand, silt and silted water do not enter the storm water system.**	No visible signs of erosion. No visible signs of pollution	Contractor	Monitor daily
		To minimise pollution of soil, surface and groundwater.	**1) Containment of run-off from construction areas should be implemented and the streams closed off from access by construction workers.** **2) Cut-off drains should be trenched between the streams and the construction activities and hay bales should be stacked along the trenches where possible to contain siltation.** **3) All spillages must be cleaned up and contaminated soil removed as hazardous waste.** **5) Affected soil must be treated with DRIZIT or similar product.**	No visible signs of erosion. No visible signs of pollution.	Contractor	
	Wetland	Preserving River	1) The delineated wetland and river area	No visible	Contractor	

TYPE	*Environmental risk or issue*	*Objective or requirement*	*Mitigation measure*	*Performance indicator*	*Responsibility*	*Frequency of Action*
		and Wetland areas.	with its associated buffer zones should be clearly marked prior to construction. These areas are strictly excluded from development and should remain open space during the proposed development activities. 2) Construction of water control structures to prevent and control any erosion on the site. 3) Prevent contamination of wetland areas from polluted runoff/ seepage/ drainage water by utilizing relevant control measures. 4) During the construction phase, no dumping and no stockpiling of materials within the wetland areas and associated buffers should take place. 5) No construction or dumping of activities should take place within the 1:50 year or 1:100 year floodline or a horizontal distance of 100m from a water resource unless authorized by DWS. 6) No vehicles should be allowed to indiscriminately drive through the wetland areas. Fence-off sensitive areas prior to construction and apply temporary storm water management measures outside the watercourse and watercourse buffer zones to prevent entry into the wetland areas and drainage line by construction vehicles and prevent storing or dumping of topsoil, construction material and other waste in the wetland/drainage line.	signs of pollution		

TYPE	*Environmental risk or issue*	*Objective or requirement*	*Mitigation measure*	*Performance indicator*	*Responsibility*	*Frequency of Action*
			7) The area should be prepared with sandbags or other applicable measures to avoid siltation into the wetland/ river area.			
		To minimise impacts on wetland system	1) Compacted earth berms should be constructed at suitable intervals to reduce the volume and speed of runoff from construction areas into the storm water and wetland systems for the duration of the construction phase of the pipeline. The following guidelines should be used: - Where the area has a slope of less than 2%, berms every 50m should be installed. - Where the area slopes between 2% and 10% berms every 25m should be installed. - Where the area slopes between 10% - 15%, berms every 20m should be installed. - Where the area has a slope greater than 15% berms every 10m should be installed. 2) Reduce runoff from surface areas as far as possible. The storm water should be introduced into the system at a shallow angle to prevent erosion of the opposite bank of the system. 3) No vehicles should be allowed to indiscriminately drive through the wetland areas. A fence should be erected to prevent entry into the wetland areas and drainage line by construction vehicles and prevent storing or dumping of topsoil, construction material and other waste in the wetland / drainage line. 4) All areas affected by construction should be rehabilitated upon completion	Berms constructed. Fence erected	Contractor / Engineer	

TYPE	*Environmental risk or issue*	*Objective or requirement*	*Mitigation measure*	*Performance indicator*	*Responsibility*	*Frequency of Action*
			of the construction phase of the pipeline. Areas should be reseeded with indigenous grasses as required. 5) Upon completion of the construction in the area, the area should be rehabilitated to a level that will ensure that wetland vegetation can become re-established. In this regard special mention of the following is made: ♦ All areas of disturbed and compacted soils need to be compacted and reprofiled. ♦ Ongoing removal of alien vegetation from the area must take place after the completion of the structure to prevent the uncontrollable species. 6) Care must be taken to ensure that construction activities remain within the boundary of the planned sewer pipeline. 7) Limited access to the water of the Pienaars River should be given to construction vehicles by fencing off all access points to the water, except at the predetermined water-intake point.	Affected areas continuously rehabilitated.		
		To ensure protection of wetlands and rivers	The wetland crossings should take place at 90 degree angles to the drainage line to minimize the length of the crossing within the wetland areas.	River and wetland crossings designed accordingly	Engineer	
		Important mitigation measures for the construction and	1. Sediment generation should be prevented through adequate housekeeping during construction as the swelling soils are particularly dispersive			

TYPE	Environmental risk or issue	Objective or requirement	Mitigation measure	Performance indicator	Responsibility	Frequency of Action
		maintenance of the infrastructure as provided by the wetland specialist in order to minimise impact on the wetland.	and erodible. The specific mitigation measures should be generated by the project engineer and implemented by the site manager. These measure include: a. The establishment of earth bunds on the downslope area to trap sediment. b. Timing of the excavation (if possible) to coincide with the dry season. c. Compaction of fill material on the surface to increase hardness and resistance to erosion. This is not possible if swelling soil material is used and it is recommended non-swelling soil material be used for the infilling. d. Identification of preferential flow areas of water on the surface (as a function of local topography) and the establishment of stabilised vegetated or concreted preferential flow areas into the storm water infrastructure. 2. Post development the exposed surface area of the pipeline corridor should be stabilised against erosion on slopes. 3. Lateral seepage water that accumulates upslope of the compacted fill area of the pipeline trench should be mitigated and managed to allow for flowing over the in-filled trench area without causing erosion. This can be done through the establishment of			

TYPE	*Environmental risk or issue*	*Objective or requirement*	*Mitigation measure*	*Performance indicator*	*Responsibility*	*Frequency of Action*
			stabilised overflow areas and vegetation of the soil covering. 4. The hydrological impact of the trenching and compaction of the fill material cannot be mitigated but is negligible in the presence of a roadbed that runs along the pipeline corridor. In this regard the hydrological attenuation should be conducted along with the approved and established storm water management infrastructure associated with the roads on the site. 5. Bridge crossing of the watercourse should be stabilised on the banks and within the stream bed making use of the erosion mitigation and control procedures described above.			
	Fauna and flora	To protect the existing fauna and flora.	1) All exotic invaders and weeds must be eradicated on a continuous basis. 2) Exotic invaders must be included in an alien management program for the site. Eradication must occur every 3 months. 3) No plants not indigenous to the area, or exotic plant species, especially lawn grasses and other ground-covering plants, should be introduced in the communal landscaping of the proposed site, as they will drastically interfere with the nature of the area. 4) Where possible, trees naturally growing on the site should be retained as part of the landscaping.	No exotic plants used for landscaping	Contractor ESO / Home Owners Association / Design Review Committee	As and when required Every 6 months

TYPE	*Environmental risk or issue*	*Objective or requirement*	*Mitigation measure*	*Performance indicator*	*Responsibility*	*Frequency of Action*
		To protect the existing fauna and flora.	1) Trees that are intended to be retained shall be clearly marked on site. 2) Snaring and hunting of fauna by construction workers on or adjacent to the study area are strictly prohibited and the Council shall prosecute offenders. 3) All mitigation measures for impacts on the indigenous flora of the area should be implemented in order to limit habitat loss as far as possible and maintain and improve available habitat, in order to maintain and possibly increase numbers and species of indigenous fauna. 4) Wood harvesting of any trees or shrubs on the study area or adjacent areas shall be prohibited. 5) Where possible, work should be restricted to one area at a time. 6) Noise should be kept to a minimum and the development should be done in phases to allow faunal species to temporarily migrate into the conservation areas in the vicinity. 7) The integrity of remaining wildlife should be upheld, and no trapping or hunting by construction personnel should be allowed. Caught animals should be relocated to the conservation areas in the vicinity. 8) Entrance by vehicles, especially off-road cars and bakkies, off-road bicycles and quad bikes and construction staff into the application site should be prohibited, both during the construction phase and during	No measurable signs of habitat destruction	Contractor ESO	As and when required

TYPE	*Environmental risk or issue*	*Objective or requirement*	*Mitigation measure*	*Performance indicator*	*Responsibility*	*Frequency of Action*
			the lifespan of the project.			
		To protect the existing fauna and flora.	1) Retain natural habitat elements such as tree stumps, termite mounds, etc. where possible. 2) Preserve, maintain and construct biological corridors where possible, as well as retaining green belts interconnected with these corridors.	No measurable signs of habitat destruction	Contractor ESO	As and when required
		Recommendations by the specialist	• Before construction is initiated, the watercourse area should be fenced-off from the proposed residential development, and all construction-related impacts must be contained within the fenced-off development areas; • However, services (such as storm water management and sewer treatment) as well as a proposed off-road cycling track may be authorised in the demarcated area. The activities triggered within the watercourse should ensure minimum impact on the environment and should be carefully monitored by an appointed Environmental Control Officer. Removal of vegetation in the watercourse due to the mentioned services and proposed off-road cycling track should be kept to a minimum; • Rehabilitation of natural vegetation should proceed in accordance with the rehabilitation plan as well as the alien species eradication and monitoring plan; • Engineering measures are recommended to lower the risk of spillages		Contractor ESO	As and when required

TYPE	*Environmental risk or issue*	*Objective or requirement*	*Mitigation measure*	*Performance indicator*	*Responsibility*	*Frequency of Action*
			into any watercourses located in and surrounding the proposed development; • Where active rehabilitation or restoration is mandatory, it should make use of indigenous plant species native to the study area. The species selected should strive to represent habitat types typical of the ecological landscape prior to construction. As far as possible, indigenous plants naturally growing within the vicinity of the study area, but would otherwise be destroyed during construction, should be used for re-vegetation/landscaping purposes; • Minimize artificial edge effects (e.g. water runoff from developed areas and application of chemicals); • Construction activities at or close to wetlands, drainage lines and water bodies should be limited; • Where a road is to traverse a wetland, measures are required to ensure that the road has minimal effect on the flow of water through the wetland, e.g. by using a high level clearspan bridge or box culverts rather than pipes; • No vehicles should be allowed to move in or through the watercourse and associated buffer zone. The area should be demarcated prior to construction; • It is recommended that all concrete and cement works be restricted to areas of low ecological sensitivity and			

TYPE	*Environmental risk or issue*	*Objective or requirement*	*Mitigation measure*	*Performance indicator*	*Responsibility*	*Frequency of Action*
			defined on site and clearly demarcated. Cement powder has a high alkalinity pH rating, which can contaminate and affect both soil and water pH dramatically. A shift in the pH can have serious consequences on the functioning of soil, vegetation and fauna; • The Orange-listed plant species, *Hypoxis hemerocallidae*, which is present on the site need to be re-vegetated/ transferred to the open space areas in the corridor link and at the riparian area; • A comprehensive surface runoff and storm water management plan should be compiled, indicating how all surface runoff generated as a result of the road development (during both the construction and operational phases) will be managed (e.g. artificial wetlands / storm water and flood retention ponds) prior to entering any natural drainage system or wetland and how surface runoff will be retained outside of any demarcated buffer/flood zones and subsequently released to simulate natural hydrological conditions; • Where roads traverse streams/rivers, an underpass should provide for the movement of aquatic as well as terrestrial species through the inclusion of appropriate buffer zones within the underpass (a 32m buffer zone from the edge of the riparian zone recommended			

TYPE	Environmental risk or issue	Objective or requirement	Mitigation measure	Performance indicator	Responsibility	Frequency of Action
			for rivers within urban areas and a 100m buffer zone from the edge of the riparian zone recommended for rivers outside urban areas); • Where roads traverse natural corridors such as streams/rivers and ridges, traffic control measures are recommended (appropriate speed limits, speed traps, rumble strips and speed bumps); • Sealing of surfaces under a bridge or gabion construction should be avoided; • Appropriate road design and traffic control measures are recommended to reduce environmental pollution and animal mortality; • All storm water structures should be designed so as to block amphibian and reptile access to the road surface; • A barrier (either prefab concrete wall or galvanized sheeting that extends as a continuous sheet above ground for at least 40cm and below ground for at least 30cm) that will physically block animals from accessing the road surface should be constructed for a distance of 200m on either side of all aquatic and terrestrial underpasses. Holes under barriers should be routinely filled in and areas directly adjacent to the barrier should be kept free of vegetation.			
		To protect existing flora	The Orange-listed plant species, *Hypoxis hemerocallidae*, which is present on the site need to be re-vegetated/transferred	Species re-vegetated.	Contractor, ECO, Landscape	

TYPE	*Environmental risk or issue*	*Objective or requirement*	*Mitigation measure*	*Performance indicator*	*Responsibility*	*Frequency of Action*
			to the open space areas in the corridor link and at the riparian area.		architect	
Social	**Noise impact**	To maintain noise levels below "disturbing" as defined in the national Noise Regulations.	1) Site workers must comply with the Provincial noise requirements as outlined in Provincial Notice No. 5479 of 1999: Gauteng Noise Control Regulations. 2) Noise activities shall only take place during working hours.	No complaints from surrounding residents and I & APs	Contractor	Monitored daily
	Dust impact	Minimise dust from the site	1) Dust pollution could occur during the construction works, especially during the dry months. Regular and effective damping down of working areas (especially during the dry and windy periods) must be carried out to avoid dust pollution that will have a negative impact on the surrounding environment. 2) When necessary, these working areas should be damped down in the mornings and afternoons.	No visible signs of dust pollution No complaints from surrounding residents and I & APs	Contractor	Monitored daily
	Safety and security	To ensure the safety and security of the public.	1) Although regarded as a normal practice, it is important to erect proper signs indicating the operations of heavy vehicles in the vicinity of dangerous crossings and access roads or even in the development site if necessary. 2) Construction vehicles and activities to avoid peak hour traffic times 3) Presence of law enforcement officials at strategic places must be ensured 4) Following actions would assist in management of safety along the road ▪ Adequate road marking ▪ Adequate roadside recovery	No incidences reported	Contractor ESO	Monitored daily

TYPE	*Environmental risk or issue*	*Objective or requirement*	*Mitigation measure*	*Performance indicator*	*Responsibility*	*Frequency of Action*
			areas ▪ Allowance for pedestrians and cyclists where necessary ▪ Although regarded as a normal practice, it is important to erect proper signs indicating the danger of the excavation in and around the development site. Putting temporary fencing around excavations where possible.			
		Management of workers staying on the site.	It is important to note that the construction workers stay on the site and is provided with temporary accommodation facilities. There are also ablution facilities that need to be approved by the Health and Safety Officer. There will be a designated area at the accommodation facilities where fire can be made for food and/or warmth. There will be a shop/cafeteria on the site where food can be bought. There should also be bins for general waste. It is also important to take cognisance of the fact that as construction activities increase on site, the amount of workers and accommodation facilities will also increase. Due to the aforementioned it will be essential to monitor this area carefully and have the Health and Safety Officer to daily checks to ensure that all is compliant.	No incidences reported and the environment is not degraded.	Contractor Developer ESO Health and Safety Officer	Monitored daily
	Blasting	To ensure safety during blasting operations.	1) Surrounding residents must be informed of blasting exercises at least one week in advance. 2) Blasting operations should be carefully	Surrounding residents informed. Safety	Engineer Project Manager	

TYPE	*Environmental risk or issue*	*Objective or requirement*	*Mitigation measure*	*Performance indicator*	*Responsibility*	*Frequency of Action*
			controlled and the necessary safety precautions must be implemented.	precautions in place.		
	Infrastructure and services	Installation of services	Determine areas where services will be upgraded and relocated well in advance. Discuss possible disruptions with affected parties to determine most convenient times for service disruptions and warn affected parties well in advance of dates that service disruptions will take place.	No complaints from I & AP	Contractor ESO	When required
		To reduce the traffic of the R104/K22, especially with the upgrades on the R104/K22	1) Construction vehicles and activities to avoid peak hour traffic times i.e. between 7am. and 9 am. and again between 4 pm. and 6 pm. On weekdays. Sewer pipeline should be well planned to avoid construction vehicles travelling through residential areas where possible. 2) It is important to erect warning signs on existing routes when impacted on by the construction of the pipeline (i.e. construction of intersections / bridges). 3) Traffic on existing routes should be controlled during construction activities impacting on these routes (i.e. construction works at intersections, construction of bridges). 4) Heavy vehicles must be instructed to only use the main roads during off-peak hours. 5) These vehicles should use only specific roads and strictly keep within the speed limits and abide to all traffic laws. No speeding or reckless driving should be allowed. Access to the site for			

TYPE	*Environmental risk or issue*	*Objective or requirement*	*Mitigation measure*	*Performance indicator*	*Responsibility*	*Frequency of Action*
			construction vehicles should be planned to minimize the impact on the surrounding network.			
		Do not allow any materials to be on the road causing difficulty for road users	Remove erosion and sediment controls only if all bare soil is sealed, covered or re-vegetate. Sweep roadways clean and remove all debris from kerb and gutter areas. Do not wash into drains.	No cars damaged or road users injured.	Contractor	
		No damage to waterbodies/ wetlands/ watercourses while upgrading the R104/K22	Please refer to mitigation measures as supplied by the wetland specialist and ecologist (earlier in this EMPr).			
	Cultural Resources		If any graves or archaeological sites are exposed during construction work it should immediately be reported to a museum. The report from the archaeologist must be provided to GDARD if any graves are recovered.	No destruction of or damage to graves or known archaeological sites	Contractor ESO	Monitor daily
	Visual impact	In order to minimise the visual impact.	1) The disturbed areas shall be rehabilitated immediately after the involved construction works are completed. 2) Shade cloth must be used to conceal and minimise the visual impact of the site camps and storage areas.	Visual impacts minimized	Contractor ESO	Monitor daily
	Vegetation	Landscaping	1) When planting trees, care should be taken to avoid the incorrect positioning of trees and other plants, to prevent the roots	Landscaping done according to	Landscape architect Contractor /	When required

TYPE	*Environmental risk or issue*	*Objective or requirement*	*Mitigation measure*	*Performance indicator*	*Responsibility*	*Frequency of Action*
			of trees planted in close proximity to the line of water-bearing services from causing leaking in, or malfunctioning of the services. 2) The proposed planting materials for the areas to be landscaped should preferably be endemic and indigenous. 3) All new trees and shrubs to be planted on the study area shall be inspected for pests and diseases prior to them being planted. 4) The inspection shall be carried out by the maintenance contractor at the property of the supplier and not on the study area. 5) All trees to be planted shall be in minimum 100L containers with a height of approximately 3 metres and a main stem diameter of approximately 80 mm.	landscape development plan	Individual Developer	
		Loss of plants	1) Aerate compacted soil and check and correct pH for soils affected by construction activities. 2) Make sure plant material will be matured enough and hardened off ready for planting. Water in plants immediately as planting proceeds. 3) Apply mulch to conserve moisture. Plant according to the layout and planting techniques specified by the Landscape Architect in the Landscape Development plans for the site.	Landscaping done according to landscape development plan	Landscape architect Contractor / Individual Developer	When required
		Spread of weeds	Ensure that materials used for mulching and topsoil/ fertilisers are certified weed	Weed growth	Landscape architect	When required

TYPE	*Environmental risk or issue*	*Objective or requirement*	*Mitigation measure*	*Performance indicator*	*Responsibility*	*Frequency of Action*
			free. Collect certifications where available. Control weed growth that appears during construction.	controlled	Contractor	
		To ensure rehabilitation of the site	1) Compacted soils shall be ripped at least 200mm. 2) All clumps and rocks larger than 30mm diameter shall be removed from the soil to be rehabilitated. 3) The soil shall be leveled before seeding 4) Hydroseed the soil with Potch mixture 5) Watering shall take place at least once per day for the first 14 days until germination of seeds have taken place 6) Thereafter watering should take place at least for 20 minutes every 4 days until grass have hardened off.	Grass have hardened off	Landscape architect Contractor	Once a day Then every 4 days
		Rehabilitation of area directly surrounding stream	1) Vehicles and workers associated with construction should not have free access to the stream and unnecessary disturbance to the stream should be avoided. 2) No vegetation may be removed from the stream area or buffer zone unless stipulated in a Water Use License granted to the owner of the site. 3) Erosion control measures should be implemented on all open soils and steep slopes. 4) Upon completion of the construction in the area, the area should be rehabilitated to a level that will ensure that wetland vegetation can become re-established. In	No erosion surrounding new river area	Landscape architect Contractor	Immediately after construction

TYPE	*Environmental risk or issue*	*Objective or requirement*	*Mitigation measure*	*Performance indicator*	*Responsibility*	*Frequency of Action*
			this regard special mention of the following is made: • All areas of disturbed and compacted soils need to be compacted and reprofiled. • Ongoing removal of alien vegetation from the area must take place after the completion of the structure to prevent the uncontrollable recruitment of these species.			

4.3 Operational Phase

TYPE	*Environmental risk or issue*	*Objective or requirement*	*Mitigation measure*	*Responsibility*	*Frequency of Action*
Site cleanup and preparation for use	**Storm water pollution**	Do not allow any materials to wash into the storm water system.	Remove erosion and sediment controls only if all bare soil is sealed, covered or re-vegetate. Sweep roadways clean and remove all debris from kerb and gutter areas. Do not wash into drains.	Contractor	-
		Minimise waste	Decontaminate and collect waste in storage area ready for off-site recycling or disposal Arrange for final collection and removal of excess and waste materials.	Contractor	-
Establishing plants	**Slow or no re-vegetation to stabilise**	To ensure re-vegetation to stabilize soil	Agreed schedule for regular follow-up watering, weed control, mulch supplements and amenity pruning, if needed. Replace all plant failures within three month period	Contractor	To be agreed

TYPE	*Environmental risk or issue*	*Objective or requirement*	*Mitigation measure*	*Responsibility*	*Frequency of Action*
	soil; loss or degradation of habitat		after planting.		
Materials failure	**Structural damage. Loss of site materials.**		Inspect all structures monthly to detect any cracking or structural problems. Confirm with designer if there are design problems. Rectify with materials to match, or other agreed solution.	Contractor	-
Drainage failure	**On-site and downstream drainage pollution or flooding**	**Storm water management plan**	**Inspect all site drainage works and repair any failures. Confer with design engineer and to correct site problems.**	Contractor	-
Site audit	**Eventual project failure**	Successful project establishment	Routinely audit the works and adjust maintenance schedule accordingly.	Contractor	-
General			Open fires and smoking during maintenance works are strictly prohibited.	Contractor	-
	Degradation of the wetland and river systems.	Protecting the wetland and river systems	Cyclists on the track should not litter. Cyclists may not remove any fauna or flora species. Cyclists should stay in the track and not wander of and make new tracks.	Developer	
	Water pollution	To prevent water pollution of river and wetland systems	1) All spillages must be cleaned up and contaminated soil removed as hazardous waste. 2) Affected soil must be treated with DRIZIT or similar product.	Contractor	

5 Alien Invasive Programme

An alien invasive eradication and monitoring programme is recommended for the whole study area as this will promote biodiversity in the area and limit the distribution of alien invasive species via water and humans.

There are a number of methods to eradicate or control alien invasive species (WESSA – KZN 2008).

Control methods for alien invasive species

Method	Description
Mechanical	The removal of species by hand or with appropriate tools, instruments and machines
Chemical	The optimal use of herbicides to control target species
Biological	This involves the intentional use of populations of natural enemies of the target alien or invasive species or other methods that adversely affect the biological integrity of the target species
Habitat management	This control methods uses measures such as prescribed burning, grazing and other activities
Integrated pest management (IPM)	This involves a combination of methods above based on ecological research regular monitoring and careful co-ordination

A recommended eradication programme includes:

- The areas to be disturbed during construction should be limited.
- Careful removal of indigenous plants before construction commences. Plants should be replanted on the study site (as suggested by the landscape architect) as soon as construction is completed.

For this project the following plant species is of concern:

Eucalyptus sp.

Melia azedarach

Morus alba

Salix babylonica
Solanum sisymbriifolium
Paspalum dilatatum
Campuloclinium macrocephalum
Gomphrena celosioides
Tagetes minuta
Tribulus terrestris
Verbena bonariensis
Xanthium sp.
Zinnia peruviana
Lantana camara

The best mitigation measure for alien and invasive species is the early detection and eradication of these species.

A suggested method of establishing a continual eradication program is:

1. The scope of the problem should be assessed and a clearing plan should be established. Funding should be included in the budget to rehabilitate the areas in which alien and invasive species have been removed in order to prevent further destruction to the ecosystem.

2. Decide where control should start and how much can be coped with. Remove weeds in the least affected areas and work outwards to the heavier weed infestations thus rapidly safeguarding relatively large areas.

3. Identify areas where vigorous indigenous bush meets weedy areas and carefully work outwards from the indigenous area to the weedy area. If possible always start at the peak and work downwards.

4. Remove weeds carefully and try to cover exposed soil with cut vegetation or leaf litter that is free of weeds, seeds which will not regrow if in contact with the soil.

5. Press any loosened soil down lightly taking care not to damage native plants and mulch with plant material where possible. This will help prevent alien weeds from filling gaps left by weeding.

6. Wherever possible try to prevent weeds from producing seeds or fruit by controlling them before they flower. Do not transport seeds, fruits, bulbs, tuber or stems that root easily away from the areas. It is advisable to burn the pieces "on site" if at all possible.

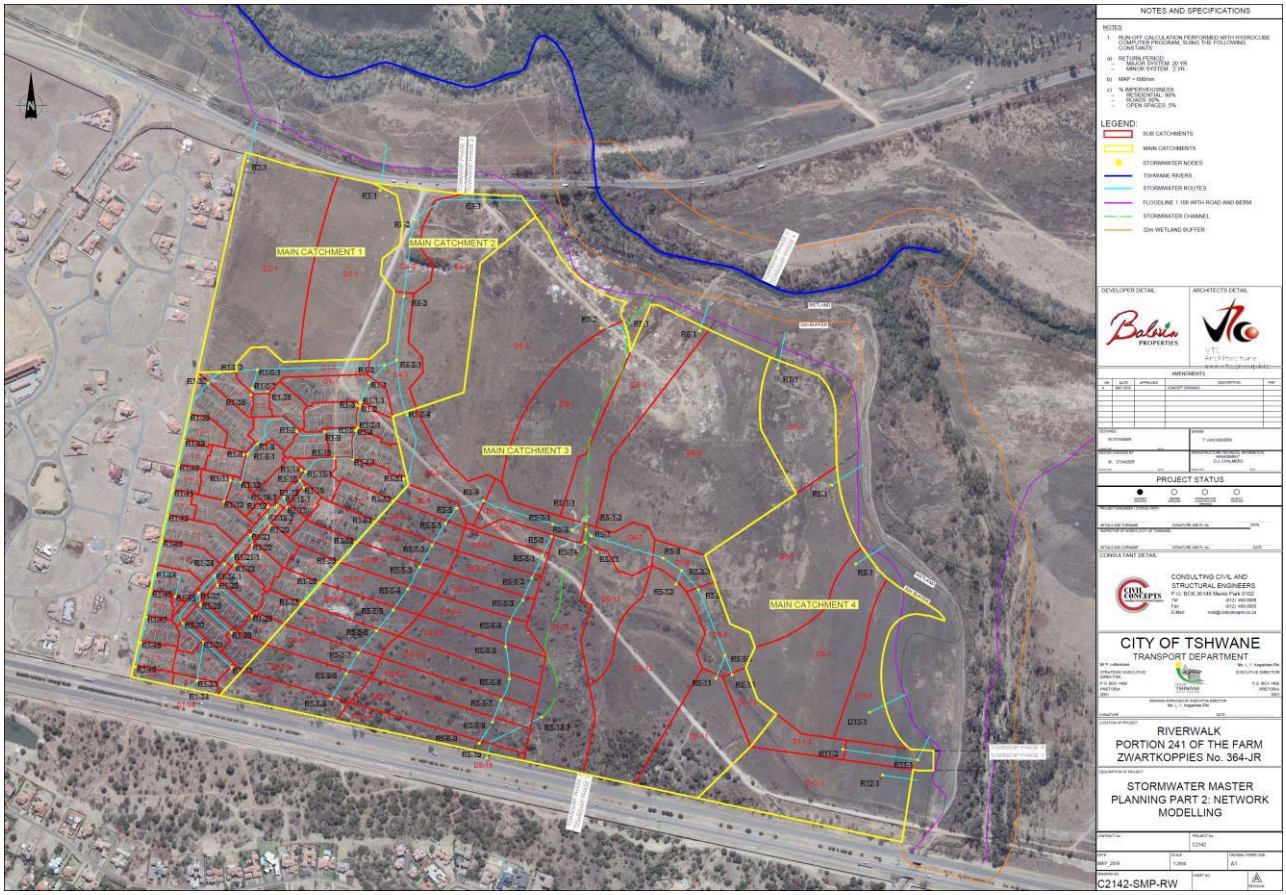
7. Often the most time/cost effective way of dealing with heavy infestations is to arrange for the correct use of herbicides e.g. use a spot spray or foliar spray correctly applied to the target plants, thus ensuring minimum soil disturbance and so reducing the chance of invader seeds germinating in the "seed bed" created by "weeding". In other instances, slash the plant down and return in a few months to foliar spray the re-growth e.g. reeds. Paint or spray the cut stumps of the larger and more difficult plants. Paint the lower stem or frill without disturbing the plant of really "difficult to kill" species like *Lantana camara* (WESSA – KZN, 2008).

Follow up control is essential and it requires a regular monitoring programme done on a regular basis to ensure early detection and removal of alien seedlings until the viable invasive seed bank is exhausted and indigenous plants once again are naturally re-established. The ultimate goal in the control and eradication of alien invasive plants must be the restoration and rehabilitation of the land. (WESSA – KZN, 2008).

6 Rehabilitation Plan

Rehabilitation action	***Method***
1. Removing alien invasive species	Section 5 describes a recommended alien invasive monitoring programme. Next to the drainage line and the residential units, a number of alien invasive species should be removed. Special attention should be given to the following list of alien and invasive plant species that was identified by a flora specialist: *Eucalyptus sp.* *Melia azedarach* *Morus alba* *Salix babylonica* *Solanum sisymbriifolium* *Paspalum dilatatum* *Campuloclinium macrocephalum* *Gomphrena celosioides* *Tagetes minuta* *Tribulus terrestris* *Verbena bonariensis* *Xanthium sp.* *Zinnia peruviana* *Lantana camara* Locations where large individuals are removed it should later in the rehabilitation programme be replaced by indigenous species.
2. Stabilization of watercourse where gully erosion occurred (if applicable)	Leveling of the existing drainage line will be done where it has eroded to form gullies or deep (steep) river banks. This will make the drainage line shallower by increasing the width of the stream, resulting in a decreased velocity of the stream and reducing the erosion ability. Hyson cells or Eco mats can be considered if the stability of the sloped area is in question. Leveling of the watercourse will be done in conjunction with nr. 3.
3. Regulate flow through the construction of small structures (if required)	Should there be areas where the fall is substantial in the drainage line, gabions could be introduced in order to stabilize the drainage line and limit erosion. Should there be a need to reduce the speed of water across a flat surface, a reno mattress should be implemented. The size and position of all gabion structures need to be assigned by engineers after the necessary calculations and analysis have been conducted. The contractor on site will be

	responsible to ensure temporary measures to prevent siltation, gully formation and water pollution during the rehabilitation process. These measures need to be approved by the Environmental Consultant or Landscape Architect before it is implemented.
4. Installation of silt traps	Water will be cleaned before it is transported to the downstream wetland/watercourse through the installation of silt traps. A silt trap needs to be constructed at all storm water outlet structures in order to ensure that no siltation takes place in the wetland area.
5. Storm water management	Storm water on the site will be directed to the drainage line via engineered storm water structures. It is extremely important that the implementation of storm water management measures (structures) are aligned with number 7 of this rehabilitation plan. Vegetative coverage should be established around the newly constructed/implemented storm water management structures in order to avoid erosion and siltation (downstream). The storm water management measures/ structures should also be verified during the monitoring programme as success and establishment of storm water measures can only be visible over a period of time. The storm water management plan would entail more detail on what has been done on the site as well as those measures that still need to be implemented. Please refer to the Storm Water Master Plan below. This has also been attached as an Appendix (Appendix G) to the Final Basic Assessment Report.



6. Wetland crossings	The areas where roads or paths cross the drainage line need to be rehabilitated and proper storm water management measures have to be implemented. Should it be necessary, gabions and reno mattresses need to be incorporated into these bridge structures in order to ensure the flow of water is regulated and erosion of the stream do not take place.
7. Re-vegetation to decrease erosion in the drainage line and surrounding area	Re-vegetation is a very important part of sloping and rehabilitation as it will make the soil more stable and create roughness. Suitable groundcover may include *Cynodon dactylon* and *Asystasia gangetica* (for an attractive, herbaceous groundcover). Aquatic vegetation should also be incorporated in the re-vegetation plan. These will include *Typha capensis, Crinum bulbispermum* and *Cyperus* species. However, the alien invasive species should be removed and replaced with large indigenous species such as *Acacia karroo* or *Searsia* species. This first need to be discussed with a flora specialist, wetland specialist and an engineer.

	 *Acacia karroo*  *Crinum bulbispermum*
8. Re-vegetation of the rehabilitated drainage line and along storm water structures	A groundcover should be established along the storm water channels (open channels) to avoid sedimentation in the drainage line and wetlands downstream. Groundcover will also be necessary as the rehabilitated area need to have a vegetation cover of at least 75%. *Cynodon dactylon* (couch grass or kweek) is recommended for the areas especially around the residential areas. It is an adaptable grass that forms a thick mat and is able to grow in wet and dry land conditions. A Potch mixture can be used in areas that are more natural. Planting method suggested for the larger open areas is hydroseeding as it is known to be a successful method. Hydroseeding is the establishment of vegetation using a slurry water and seed mixture which is sprayed over a prepared surface. This is the most cost effective method for rehabilitation

	of large areas as all surfaces are covered and vegetation quality is high. Potch mixture seeds as well as *Cynodon dactylon* seeds can be sown in areas where there is no coverage.  *Cynodon dactylon* Alongside the water channel, *Typha capensis* should be planted to add roughness to the stream. This aquatic plant provides nesting opportunities and shelter for various bird species as well as habitat for frogs, toads and other aquatic organisms. Between the *Cynodon dactylon* on the embankments and the aquatic vegetation along the watercourse, a seed mix suitable for moist conditions should be sown should there be any open areas that are prone to erosion.  *Typha capensis*
10. Clean up litter	For the health of the wetland, a programme is suggested to clean up the litter especially near the streams and in storm water channels. Litter in the streams allows chemicals into the

	wetland, decreasing the health in the wetland which will lead to lower biodiversity. The programme may include the occasional day job for previously disadvantaged individuals.
11. Remove silt	Silt buildup throughout the site should carefully be removed. Silt gathers downstream when storm water management has not yet been properly implemented, such as the areas where construction currently takes place.

7 Procedures for environmental incidents

7.1 Leakages & spills

- Identify source of problem.
- Stop goods leaking, if safe to do so.
- Contain spilt material, using spills kit or sand.
- Notify Environmental Control Officer
- Remove spilt material and place in sealed container for disposal (if possible).
- Environmental Control Officer to follow Incident Management Plan.

7.2 Failure of erosion/sediment control devices

- Prevent further escape of sediment.
- Contain escaped material using silt fence, hay bales, pipes, etc.
- Notify ECO.
- Repair or replace failed device as appropriate.
- Dig/scrape up escaped material; take care not to damage vegetation.
- Remove escaped material from site.
- ECO to follow Incident Management plan.
- Monitor for effectiveness until re-establishment.

7.3 Bank/slope failure

- Stabilize toe of slope to prevent sediment escape using aggregate bags, silt fence, logs, hay bales, pipes, etc.

- Notify ECO.
- ECO to follow Incident Management plan.
- Divert water upslope from failed fence.
- Protect area from further collapse as appropriate.
- Restore as advised by ECO.
- Monitor for effectiveness until stabilized.

7.4 Discovery of rare or endangered species

- Stop work.
- Notify ECO.
- If a plant is found, mark location of plants.
- If an animal, mark location where sighted.
- ECO to identify or arrange for identification of species and or the relocation of the species if possible.
- If confirmed significant, ECO to liaise with Endangered Wildlife Trust.
- Recommence work when cleared by ECO.

7.5 Discovery of archeological or heritage items

- Stop work.
- Do not further disturb the area.
- Notify ECO.
- ECO to arrange appraisal of specimen.
- If confirmed significant, ECO to liaise with National, Cultural and History Museum
  P.O. Box 28088
  SUNNYSIDE
  0132
  Contact Mr. J. van Schalkwyk
  or
  Mr. Naude

- Recommence work when cleared by ECO.

8 EMPr review

1. The Site Supervisor is responsible for ensuring the work crew is complying with procedures, and for informing the work crew of any changes. The site supervisor is responsible for ensuring the work crew is aware of changes that may have been implemented by GDARD before starting any works.

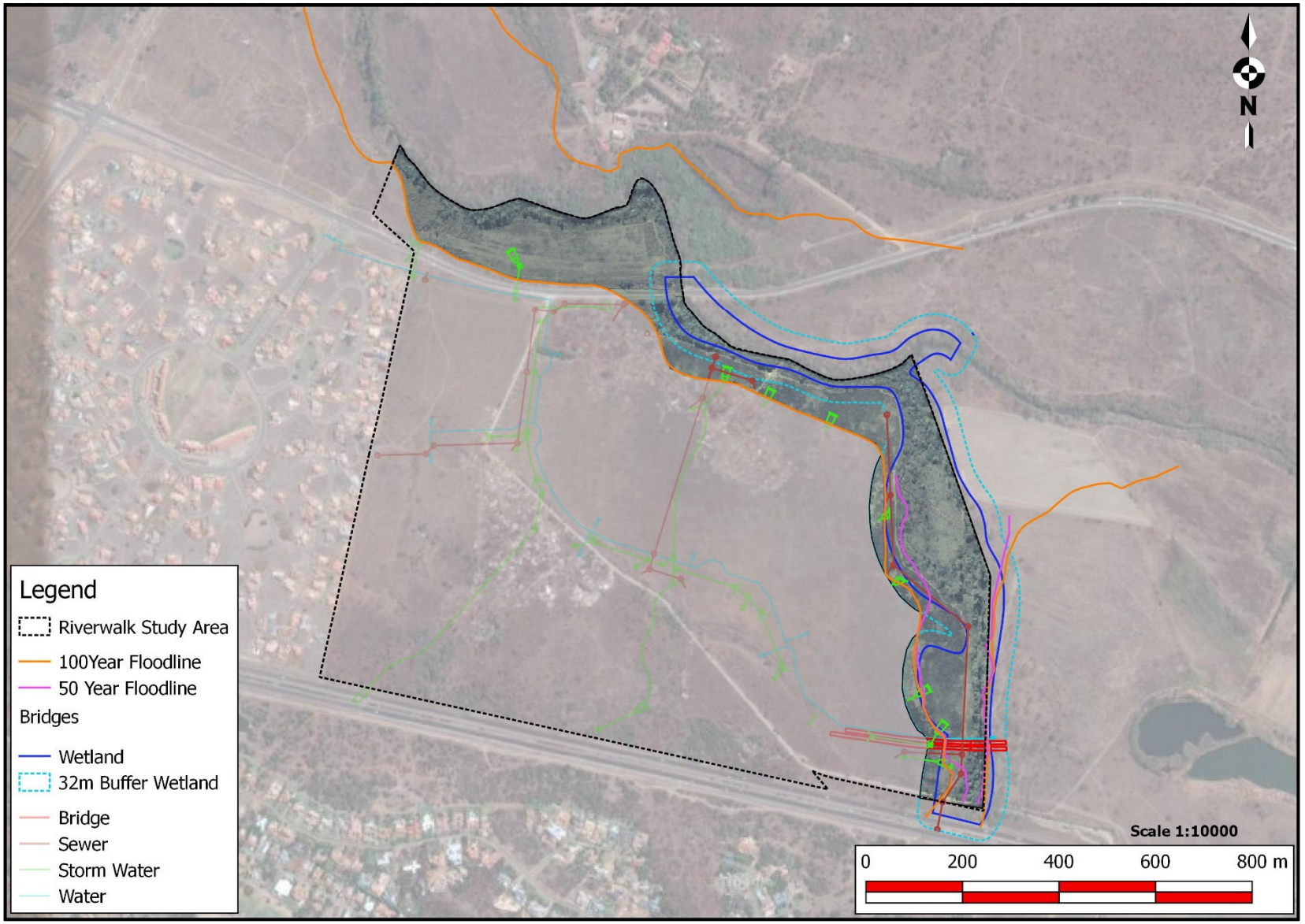
2. If the contractor cannot comply with any of the activities as described above, they should inform the ECO with reasons within 7 working days.

Enlarged Figures

Appendix I

Bokamoso Environmental Consultants
Website: www.bokamoso.net
E-Mail: info@bokamoso.net

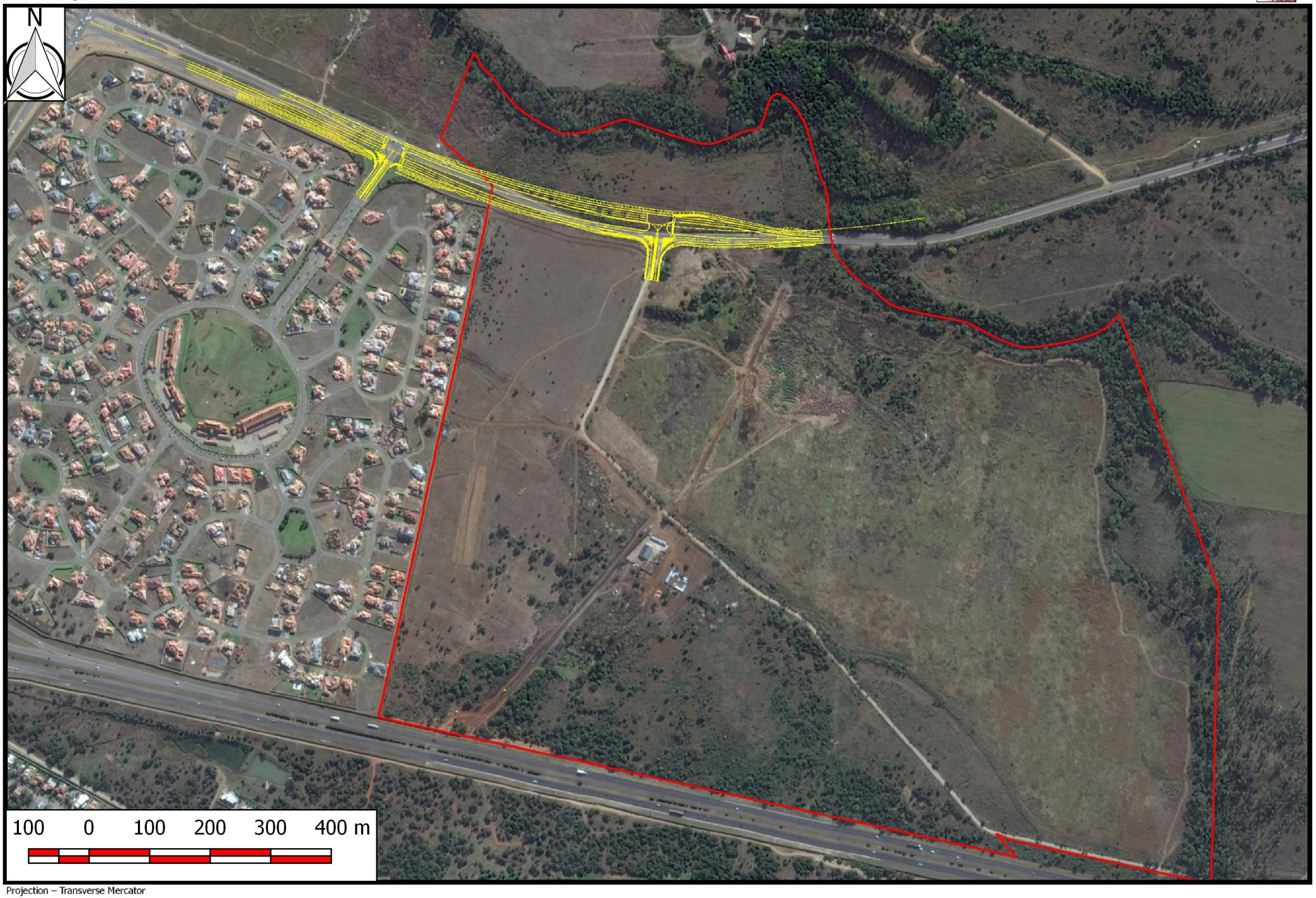
Riverwalk



Projection – Transverse Mercator
Datum- Hartebeeshoek 1994
Reference Ellipsoid –WGS 1984
Central Meridian -29

Bokamoso Environmental Consultants
Website: www.bokamoso.biz
E-Mail: Lizelleg@mweb.co.za

Road upgrades



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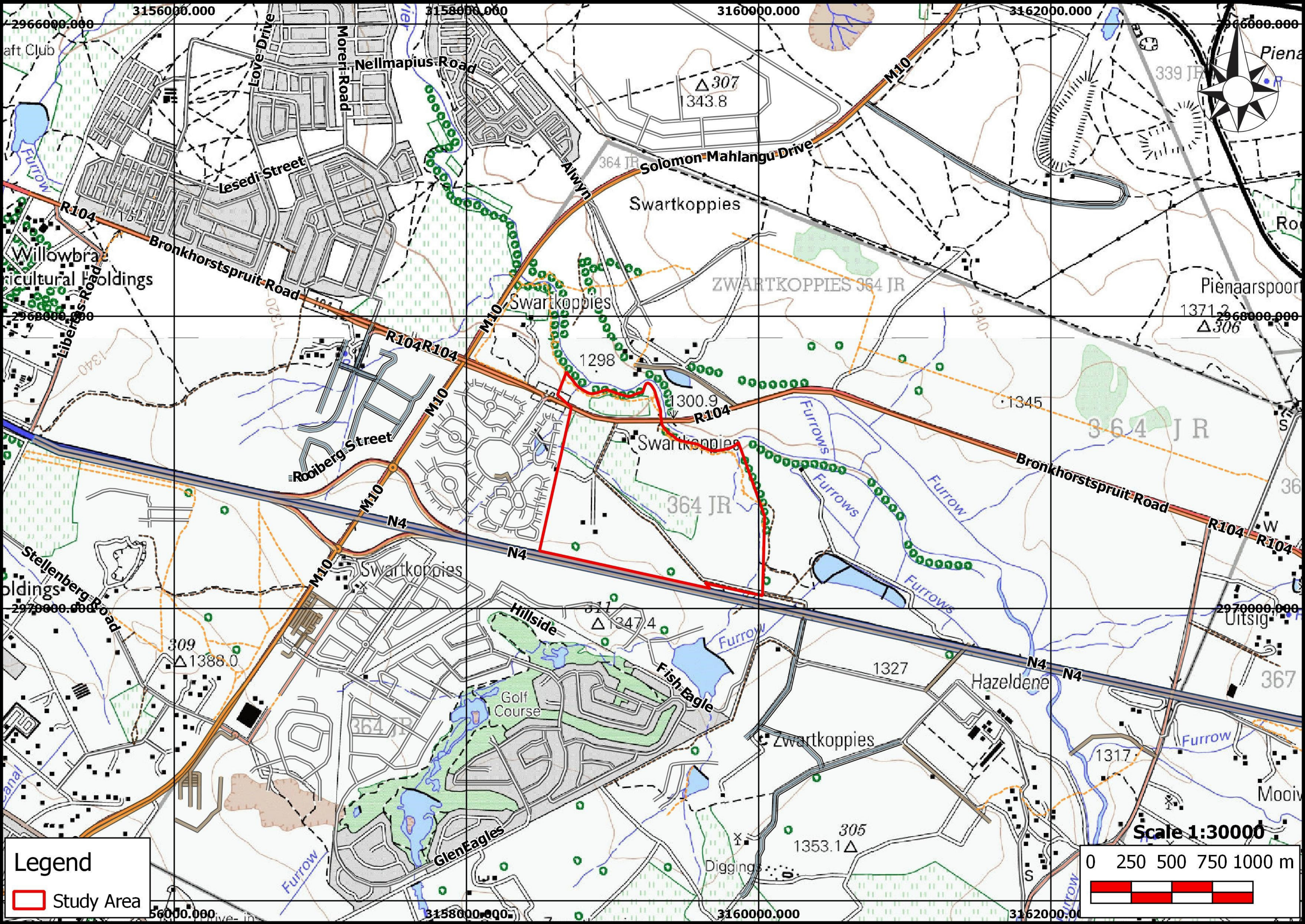
Reference Ellipsoid –WGS 1984
Central Meridian -29



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Solomon Mahlangu Drive
Alwyn
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R104
Bronkhorstspruit Road
Swartkoppies
ZWARTKOPPIES 364 JR
Pienaarspoort
364 JR
Willowbrae
Agricultural Holdings
Libertas Road
Rooiberg Street
N4
Stellenberg Road
Hillside
Fish Eagle
Golf Course
GlenEagles
Hazeldene
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Furrows
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Diggings
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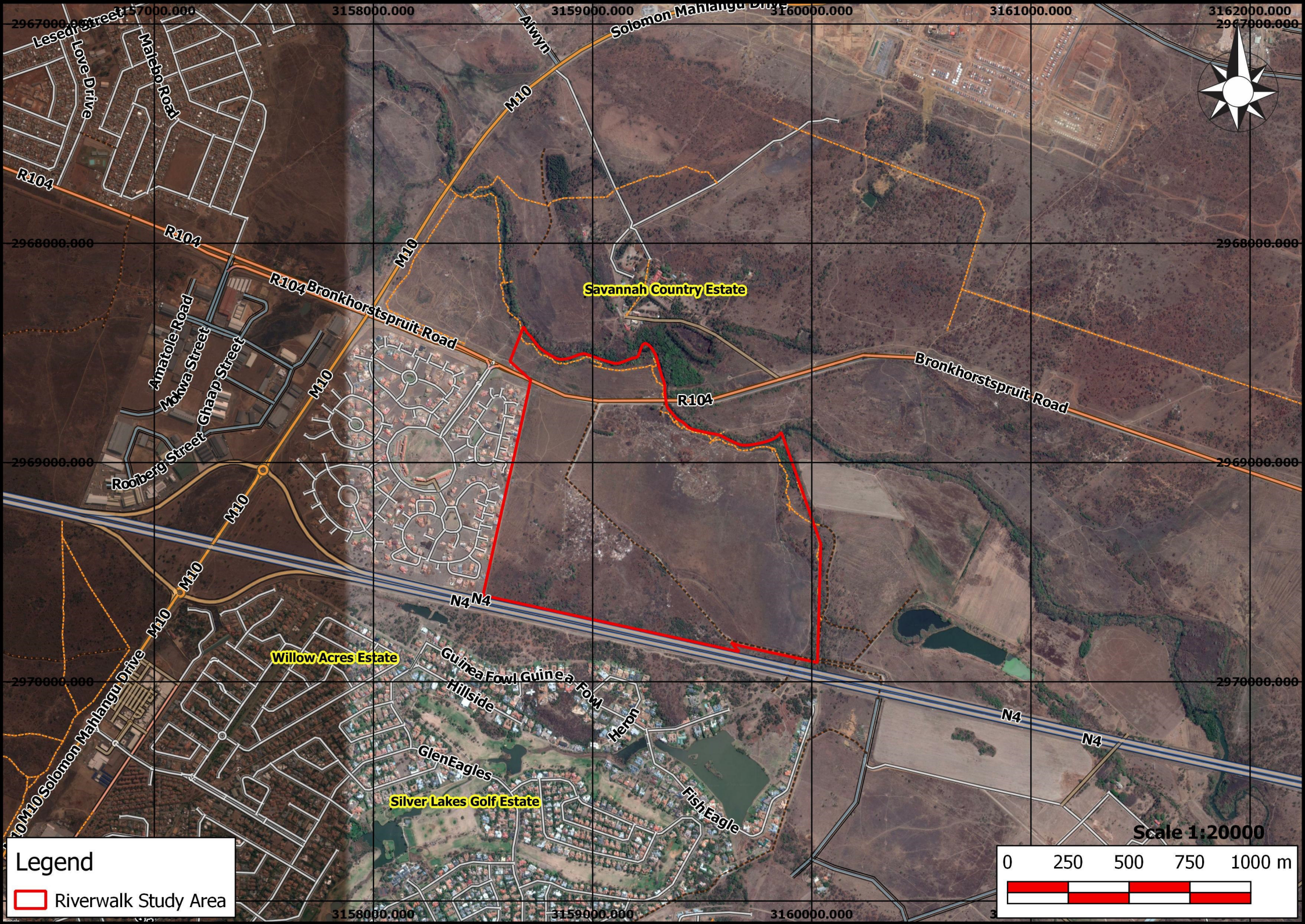
Study Area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R104 Bronkhorstspruit Road
Savannah Country Estate
Amatole Road
Mokwa Street
Ghaap Street
Rooiberg Street
Bronkhorstspruit Road
N4
Willow Acres Estate
Guinea Fowl
Hillside
Heron
GlenEagles
Silver Lakes Golf Estate
Fish Eagle
Legend
Riverwalk Study Area
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