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Proposed Wildebosch Road Extension to Trumali Street

Draft Environmental Management Programme (EMPr)

(Appendix H of Draft BA Report)

DEA&DP Reference: 16/3/3/6/7/1/B4/45/1342/23

Stellenbosch Local Municipality

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EMPr: Wildebosch Road Extension to Trumali Street

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Department of Environmental Affairs and Development Planning (DEA&DP)	044 805 8600/01/02/11

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List of terms and abbreviations

Term	Description
APP	Approved Professional Person
BA	Basic Assessment
BAR	Basic Assessment Report
CA	Competent Authority
CARA	Conservation of Agricultural Resources Act (Act No. 43 of 1983)
DAFF	Department of Agriculture, Forestry and Fisheries
DEA&DP	Department of Environmental Affairs and Development Planning
DBAR	Draft Basic Assessment Report
DWS	Department of Water and Sanitation
EAP	Environmental Assessment Practitioner
EIS	Ecological Importance and Sensitivity
ECO	Environmental Control Officer
EMPr	Environmental Management Programme
ESA	Ecological Support Areas
FEN	Freshwater Ecological Network Consulting (Pty) Ltd (Member of the SAS Environmental Group of Companies)
GA	General Authorisation
GN	Government Notice
HWC	Heritage Western Cape
MAP	Mean Annual Precipitation
MSL	Mean Sea Level
NHRA	National Heritage Resources Act (Act No. 25 of 1999)
NEMA	National Environmental Management Act (No. 107 of 1998)
NEM:BA	National Environmental Management: Biodiversity Act (Act No. 10 of 2004)
NEMPAA	The National Environmental Management: Protected Areas Act, 2003 (Act. No. 57 of 2003)
NFA	National Forest Act (Act No.84 of 1998)
NWA	The National Water Act (Act No.36 of 1998)
OHSA	Occupational Health and Safety Act (Act No. 85 of 1998)
PES	Present Ecological State
PPP	Public Participation Plan
SARAH	South African Resources Agency
SE	Site Engineer
SPLUMA	Spatial Planning and Land Use Management Act (Act No. 16 of 2013)
WCG	Western Cape Government
WULA	Water Use Licence Application
WUL	Water Use Licence

Requirements of Environmental Management Programmes

Appendix 4 of the National Environmental Management Act (Act No 107 of 1998) (NEMA) Environmental Impact Assessment (EIA) Regulations 2014 specifies the requirements of an Environmental Management Programme (EMPr). The table below serves as a map of how the requirements detailed in Appendix 4 have been adhered to.

Table 1: Requirements of an EMPr as detailed in Appendix 4 of the NEMA EIA Regulations 2014 (as amended).

Requirement	Reference
Details of the EAP who prepared the EMPr and the expertise of the EAP, including a CV.	Appendix A
A detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description.	Section **Error! Reference source not found.** and Section **Error! Reference source not found.**
A map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers.	Appendix B for Layout and Sensitivity Plans.
A description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including: • Planning and design; • Pre-construction activities; • Construction activities; and • Rehabilitation of the environment after construction where applicable and post closure where relevant.	Section 7.1 to Section 7.2
A description of proposed impact management actions, identifying the manner in which the impact management outcomes will be achieved, and must, where applicable, include actions to: • Avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; • Comply with any prescribed environmental management standards or practices; • Comply with any applicable provisions of the legislation regarding closure, where applicable; and • Comply with any provisions of the legislation regarding financial provision for rehabilitation, where applicable.	Section 8, 9, 10 and 11
The method of monitoring the implementation of the impact management actions.	Section 8, 9, 10 and 11
The frequency of monitoring the implementation of the impact management actions.	Section 8, 9, 10 and 11
An indication of the persons who will be responsible for the implementation of the impact management actions.	Section 8, 9, 10 and 11
The time periods within which the impact management actions must be implemented.	Section 8, 9, 10 and 11
The mechanism for monitoring compliance with the impact management actions.	Section 8, 9, 10 and 11
A program for reporting on compliance, taking into account the requirements as prescribed by the Regulations.	Section 8, 9, 10 and 11
An environmental awareness plan describing the manner in which: (i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and	Section 8, 9, 10

(ii)	risks must be dealt with in order to avoid pollution or the degradation of the environment.	
Any specific information that may be required by the Competent Authority (CA).		None to date.

1 Introduction

1.1 Appointment

The Stellenbosch Local Municipality Department of Roads and Stormwater (hereinafter referred to as "Stellenbosch Municipality") appointed Zutari (Pty) Ltd for full professional services as the Design Engineer and Environmental Assessment Practitioner (EAP) for the Proposed Wildebosch Road Extension to Trumali Street (hereafter referred to as the "Project"). The project is situated within the suburb of Paradyskloof in Stellenbosch South, within the Stellenbosch Municipality of the Greater Cape Winelands District in the Western Cape.

1.2 Applicant

Stellenbosch is situated approximately 50 km east of Cape Town and bordered by the N1 and N2 national routes. Particularly, the N1 route lies on the north and N2 route on the south. The Stellenbosch town is the second largest town in the country with rich heritage, several tourist attraction sites, interesting natures offerings such as winelands and remarkable landscapes. The municipality is divided into 22 Wards and surrounded by various municipalities including the City of Cape Town on the south, Drakensburg Municipality on the north, Breede Valley Municipality lies on the northeast and Theewaterskloof Municipality on the southwest.

Further, in terms of the Municipal Systems Act, 2000 (Act No. 32 of 2000), primary functions of the Stellenbosch Municipality are to ensure the provision of services to communities within their jurisdiction in a sustainable approach, promote social and economic development, promote and enable a safe and healthy living environment. Part of its responsibility's entails drafting a spatial development plan and from this plan the needs and desirability for future developments are established, and these may include roads proclamation. Accordingly, the project stems from the need to provide an alternative road alignment to the recently developed Schuilplaats Road which aligns to the Western Cape Government (WCG) R44 Access Management where closure of several intersections onto the R44 have been and will be implemented.

2 Project Description

2.1 Project Scope

Stellenbosch Municipality proposes to extend the existing Wildebosch Road and the upgrade of Trumali Street. The extension of Wildebosch commences at Paradyskloof Road where a small portion of road reserve exists (Erf RE/16527) and traverses the farmland (RE/369) in a north-easterly direction to meet the existing Trumali Street, currently a surfaced narrow access road for the Paradyskloof Water Treatment Works.

2.2 Project Objective

The primary objective of the road development is to provide alternative road alignment to the recently upgraded Schuilplaats Road which aligns to the Western Cape Government's (WCG) R44 Access Management where closure of several intersections onto the R44 have been and will be implemented. This portion of the Wildebosch Road extension will provide another opportunity to access Trumali (and the R44) and ease pressure on Schuilplaats Road.

2.3 Road Network Context

The Wildebosch extension forms part of the Western Cape Government's Provincial Proclaimed Main Road 169 (MR00169) to provide alternative access into the Stellenbosch CBD.

In terms of regional access, the following is evident in the project area:

- The major function of the R44 is to serve as a north/south (regional mobility) route connecting Strand, Somerset West, Helderberg regions with areas to the north such as Paarl, Wellington and Malmesbury. Additionally, it will connect areas in the south with Stellenbosch.
- The dual function results in the R44 being one of the most congested roads in the Stellenbosch area.

While in terms of local access, the following is applicable:

- R44 and Trumali Street Intersection is a signalised intersection.
- The intersection of Paradyskloof Road approach of the R44 and Paradyskloof Road Intersection was recently converted to a left-in left-out access, with a right-turn for the R44 northbound approach.
- The Schuilplaats Road was extended to connect Paradyskloof Road to Trumali Street, to allow the community to easily access the full intersection.

The long term planning as per the WCG proposed Wildebosch extension (and Trumali Street upgrade) will be to provide a new link into Stellenbosch midtown as a supplement road to the R44 which in turn will reduce congestion of the R44 and create a new link road for users travelling in the Stellenbosch area. From a broader context, the phased implementation of the Paradyskloof-Trumali Street portion would also have immediate benefits due to access restrictions on the R44 and proposed residential developments in the area. This long-term planning could be constructed in several phases, namely:

- From R44 to Blaauwklippen Road
- From Paradyskloof Road to Trumali Street
- From Trumali Street to Van Rheede Street

3 Project Locality and Context

The proposed road alignment would commence at Paradyskloof Road and traverses Erf RE/16527 and the farmland (RE/369) in a north-easterly direction to meet the existing Trumali Street. As previously descried, the project footprint is situated within the jurisdiction of the Stellenbosch Local Municipality, part of the greater Cape Winelands District in the Western Cape. The surrounding land uses vary, but mainly residential and agricultural land uses dominate the area. Stellenbosch Central Business District (CBD) is situated approximately 2.5 km north of the project site, Stellenbosch Square lies 2.1 km southwest of the site, Stellenbosch Golf Club is roughly 600 m west of the site, and Techno Park lies 1.8 km southwest of the project area. Paradyskloof Waterfall (i.e., 3.0 km east of site) appears to be on the urban edge within the Hotten-Holland Mountain Catchment Area, and Jan Marais Nature Reserve located 2.4 km.

From a town planning perspective, the closest school in the vicinity of the site is located at Paradyskloof (i.e., Stellenbosch Montessori Pre-School), Pre-Primary School is located 560 m southwest, and Little Oaks Country School is approximately 1.3 km south of the project footprint. The nearest hospital is located 500 m (Mediclinic Stellenbosch Hospital) north of the site, and it can be accessed via Trumali Street and Ben du Toit Avenue. Stellenbosch Aerodrome and Flight Academy lies 4km southwest of the project footprint. Regional access roads in the area include R44 on the west, R310 further north, and several local roads include Paradyskloof Road, Florida Road, Schuilplaats Road, Ben du Toit Avenue, De Wet Road, Berry Road.

Residential areas surrounding the site include Harringtons Place, Die Boord, Krigeville and are situated approximately 500 m northwest of site. Davon Park and Kleinvallei lie 3.0 km north northwest of the site. Dezalze Golf Estate and Jamestown are situated 1.8 km (when travelling via R44) south of the project site.

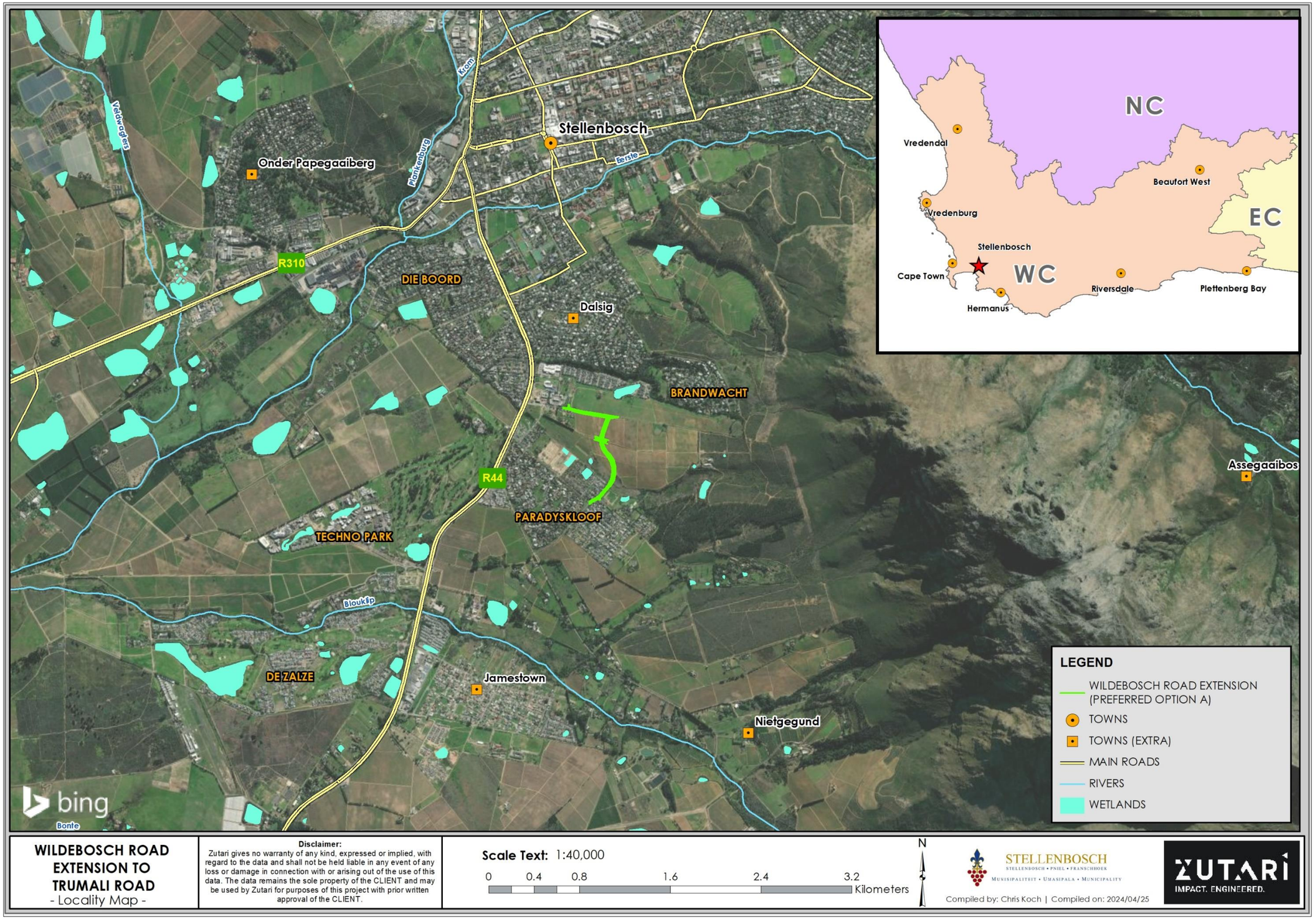

Figure 1: Proposed site Locality

4 Overview

This chapter provides a general overview of this Environmental Management Programme (EMPr) and a summary of the purpose of the document and its structure. Relevant legislation pertaining to this document is also briefly discussed.

4.1 Purpose of this EMPr

The purpose of this EMPr is to provide environmental management practices and recommendations to ensure that the impacts associated with the proposed road extension and related Infrastructure are avoided where it is feasible, managed, mitigated, and kept to an acceptable level. In this case acceptable level would mean adhering to a prescribed tool(s), strategy, procedure(s) or method(s) designed to reduce the impact significance and mitigate adverse environmental impacts. The recommendations included herein are applicable to the following stages of the proposed development:

- Planning and design;
- Pre-construction and construction;
- Operation; and
- Closure and decommissioning.

This EMPr aims for alignment and optimisation of environmental management processes with the conditions of Environmental Authorisation (EA) that may arise. Any conditions of authorisation contained in the EA that contradict the recommendations made in this EMPr, will supersede the recommendations of this document. The EMPr must be updated to address conditions of the EA that are relevant to environmental management (should this be a condition of authorisation).

A hard copy of the EMPr must always be in the site office and made available to government officials upon request.

4.2 Legal Requirements for an EMPr

4.2.1 General requirements for EMPrs

The content of EMPrs must meet the requirements in Section 24N (2) and (3) of NEMA and Appendix 4 of the NEMA EIA Regulations 2014 (as amended). Appendix 4 specifies the required contents of an EMPr.

The Department of Environmental Affairs & Development Planning (DEA&DP)'s[1] *Guideline for Environmental Management Plans* (2005) aims to inform and guide the preparation and implementation of EMPrs. The conditions of the guideline and requirements specified in Appendix 4 of the EIA Regulations 2014 have been considered in compiling this document. The DEA&DP guideline defines an EMPr as:

> *"an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction, operation and decommissioning of a project are prevented; and that the positive benefits of the project are enhanced"*

The EMPr must address the potential environmental impacts of the proposed activity on the environment throughout the project life cycle, including an assessment of the effectiveness of monitoring and management arrangements after implementation. EMPrs must be submitted together with the Environmental Impact Assessment Report so that they can be considered simultaneously.

[1] The DEA&DP's guideline is used even though the proposed project is based in the Mpumalanga Province, as there is no national EMPr guideline.

Section 24N (2) and (3) of the NEMA lists the requirements of an EMPr, these are presented in **Error! Reference source not found.** below.

Table 2: Requirements of an EMPr according to Section 24N (2) and (3) of the NEMA

24N.(2)	*the environmental management programme must contain-*
(a)	*information on any proposed management, mitigation, protection or remedial measures that will be undertaken to address the environmental impacts that have been identified in a report contemplated in subsection 24(1A), including environmental impacts or objectives in respect of –*
	(i) planning and design;
	(ii) pre-construction and construction activities;
	(iii) the operation or undertaking of the activity in question;
(iv)	*the rehabilitation of the environment; and*
(v)	*closure, where relevant.*
(b)	*details of –*
	(i) the person who prepared the environmental management programme; and
	(ii) the expertise of that person to prepare an environmental management programme
(c)	*a detailed description of the aspects of the activity that are covered by the draft environmental management plan;*
(d)	*information identifying the persons who will be responsible for the implementation of the measures contemplated in paragraph (a);*
(e)	*information in respect of the mechanisms proposed for monitoring compliance with the environmental management programme and for reporting on the compliance.*
(f)	*as far as is reasonable practicable, measures to rehabilitate the environment affected by the undertaking of any listed activity or specified activity to its natural or predetermined state or to a land use which conforms to the generally accepted principle of sustainable development; and*
(g)	*a description of the manner in which it intends to-*
	(i) modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;
	(ii) remedy the cause of pollution or degradation and mitigation of pollutants; and
	(iii) comply with any prescribed environmental management standards or practices.
(3)	*the environmental management programme must, where appropriate-*
(a)	*set out time periods within which the measures contemplated in the environmental management programme must be implemented;*
(b)	*contain measures regulating responsibilities for any environmental damage, pollution, pumping and treatment of extraneous water or ecological degradation as a result of prospecting or mining operations or related mining activities which may occur inside and outside the boundaries of the prospecting area or mining area in question; and*
(c)	*develop an environmental awareness plan describing the manner in which-*
	(i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and
	(ii) risks must be dealt with in order to avoid pollution or the degradation of the environment.

This EMPr addressed the mentioned legal requirements in **Error! Reference source not found.** above, while also aiming to meet the requirements of the DEA&DP guideline document for Environmental Management Plans[2].

This document should be seen in an iterative context, allowing for amendments throughout the life cycle of the project and adjustments as new information is made available, unforeseen situations arise or as conditions warrant adaptation.

[2] Lochner, P. 2005. *Guideline for Environmental Management Plans*. CSIR Report No ENV-S-C 2005-053 H. Republic of South Africa, Provincial Government of the Western Cape, Department of Environmental Affairs & Development Planning, Cape Town.

5 Legislation and responsibilities

5.1 Relevant Legislation

An overview of the relevant legislation is provided below in Table 3.

Table 3: Relevant legislation and the applicability thereof

Legislation considered	Relevant Organ of State / authority	Aspect of Project
The Republic of South Africa Constitution Act (Act No. 108 of 1996) ("the Constitution")	Parliament	The environmental right contained in Section 24 of the Constitution provides that everyone is entitled to an environment that is not harmful to his or her well-being.
National Environmental Management Act (Act No. 107 of 1998) (NEMA)	Competent Authority (CA) (DEA&DP)	NEMA establishes the principles for decision-making on matters affecting the environment. Section 2 of the Act sets out the National Environmental Management principles which apply to the actions of organs of state that may significantly affect the environment. Furthermore, Section 28(1) states that *"every person who causes 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".* If such pollution or degradation cannot be prevented, then appropriate measures must be taken to minimise or rectify such pollution or degradation. The applicant has the responsibility to ensure that the proposed activity and EIA process conform to the principles of NEMA. In developing the EIA process, Zutari has taken cognisance of this need, and accordingly the EIA process has been undertaken in terms of NEMA and the EIA Regulations[3]. Several listed activities in these regulations are triggered, as indicated in the application for Environmental Authorisation (EA). Application EA forms are submitted with this BAR and accompanying appendices.
National Water Act (Act No. 36 of 1998) (NWA)	Department of Water and Sanitation (DWS)	The NWA provides for the sustainable and equitable use and protection of water resources. It is founded on the principle that the National Government has overall responsibility for and authority over water resource management, including the equitable allocation and beneficial use of water in the public interest, and that a person can only be entitled to use water if the use is permissible under the NWA. Section 21 of the NWA specifies the water uses which require authorisation from The DWS in terms of the NWA before they may commence. It is expected that the proposed road extension would be situated within the 500m regulated area of a wetland, and road construction activities would trigger Section 21 (c & i) water uses. Therefore, these water uses would require authorisation in terms of the NWA before they may commence on site. The abstraction of water from a water resource is not anticipated nor the storage of water on site.

[3]GN No. R 982, 983, 984, and 985 in Government Gazette No.38282 of 4 December 2014.

Legislation considered	Relevant Organ of State / authority	Aspect of Project
National Heritage Resources Act (Act No. 25 of 1999) (NHRA)	South African Heritage Resources Agency (SAHRA)	In terms of the NHRA, any person who intends to undertake "any development which will change the character of a site exceeding 5,000 m^2 in extent, or involving three or more existing erven or subdivisions thereof", "the construction of a road powerline, pipeline exceeding 300 m in length" or "the rezoning of site larger than 10,000 m^2 in extent" must at the very earliest stages of initiating the development notify the responsible heritage resources authority, namely SAHRA or the relevant provincial heritage agency. These agencies will thereafter review the findings of a Phase 1 Heritage Impact Assessment (HIA) that would be undertaken by the specialist. Section 38(8) of the NHRA specifically excludes the need for a separate HIA where the evaluation of the impact of a development on heritage resources is required in terms of an EIA process. Heritage Western Cape concluded that there is no reason to believe that the proposed extension of Wildebosch Road from Paradyskloof Road to Trumali Road, as well as upgrading Trumali Road on Remainder of Erf 16527 and Remainder of Farm 369, Trumali and Paradyskloof Road, Stellenbosch, will impact on heritage resources. No further action under Section 38 of the National Heritage Resources Act (Act 25 of 1999) is required
Conservation of Agricultural Resources Act (Act No. 43 of 1983) (CARA)	Department of Agriculture	The CARA provides for the conservation of agricultural resources through limiting the sub-division of agricultural land, maintaining the production potential of land, combating and preventing erosion, preventing the weakening or destruction of water sources, protecting vegetation, and combating weeds and invader plants. As such, as part of the EIA process, recommendations should be made to ensure that measures are implemented to maintain the agricultural production of land (if possible).
National Environmental Management: Biodiversity Act (Act No. 10 of 2004) (NEM: BA)	Department of Forestry, Fisheries and the Environment (DFFE) and DEA&DP	The NEM:BA aims to conserve and manage the country's biodiversity through the protection of species and ecosystems, specifically those which are threatened or considered to be critically endangered. It also serves to regulate the management of alien vegetation. In terms of NEM:BA a list of endangered, critically endangered, vulnerable, and protected species has been promulgated (Section 6, Table 3 of the Act), which calls for an EIA process, should any of the listed species be identified on the site and need to be removed. A botanical assessment has been undertaken to determine if any listed species are located on the proposed site.
Spatial Planning and Land Use Management Act, 2013 (SPLUMA)	Stellenbosch Local Municipality	The land parcels on which the proposed Wildebosch road extension will be constructed, will need to be verified to confirm if the current land use according to the municipality's town planning scheme, is appropriate for the planned road construction.
National Forest Act (Act No. 84 of 1998) (NFA)	DFFE	The National Forests Act provides protection for forests, woodlands and several specified species of trees, which are protected across South Africa. The latest list of protected trees, dating from 2014, contains a total of 47 species, specimens of which may not be cut or damaged without a permit. Where protected species are encountered within the project footprint, permits from the relevant authority must be obtained for their removal and/or destruction prior to construction activities commencing.
The National Environmental Management: Protected Areas Act, 2003 (Act. No. 57 of 2003) (NEMPAA);	DFFE	The objective of this act is to provide for the protection and conservation of ecologically viable areas representative of South Africa's biological biodiversity and its natural landscapes and seascapes; for the establishment of a national register of all national, provincial and local protected areas; for the management of those areas in accordance with national norms and standards; for intergovernmental co-operation and public consultation in matters concerning protected areas.

5.2 Listed Activities in terms of NEMA

South Africa has rigorous and comprehensive environmental legislation aimed at preventing degradation of the environment. Section 28(1) of NEMA places a "*duty of care and remediation of environmental damage*" on every person who causes, has caused, or may cause, significant environmental degradation. This is a far-reaching obligation, and accordingly, those parties responsible for the degradation of the environment have a legal duty to avoid, minimise or mitigate such impacts.

This has resulted in a set of Listed Activities that can be triggered by developments taking place in sensitive environments, e.g. watercourses. If a development triggers a Listed Activity, it is required to undergo an Environmental Impact Assessment (EIA) thorough a Basic Assessment (BA) process or Scoping and Environmental Impact Reporting (SEIR) in terms of the EIA Regulations (GN R982, as amended). The following listed activities, as shown in Table 4, have been identified as being applicable to this proposed project.

Table 4: Potential listed activities and motivation in reference to potential applicability

Activity No(s):	Provide the relevant Basic Assessment Activity(ies) as set out in Listing Notice 1	Describe the portion of the proposed development to which the applicable listed activity relates.
12	The development of— (i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres; or (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs— (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; — excluding— (aa) the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour; (bb) where such development activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies; (cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies; (dd) where such development occurs within an urban area; (ee) where such development occurs within existing roads, road reserves or railway line reserves;	It is proposed that a small section of the Wildebosch road extension will traverse an unchanneled valley bottom wetland (UVBW). The development footprint of the culvert crossing (including foundation of the road and installation of the pipe culverts) will be more than 100 square metres .
19	The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from – (i) a watercourse; (ii) the seashore; or (iii) the littoral active zone, an estuary or a distance of 100 metres inland of the high-water mark of the sea or an estuary, whichever distance is the greater but excluding where such infilling, depositing , dredging, excavation, removal or moving- (a) will occur behind a development setback; (b) is for maintenance purposes undertaken in accordance with a maintenance management plan.	A small section of the Wildebosch road extension will traverse an unchanneled valley bottom wetland (UVBW). It is likely that proposed works relating to the development of the culvert crossing (including foundation of the road and installation of the pipe culverts) will result in more than 5 m^3 of material being excavated and backfilled within the UVBW.
24	The development of a road—	Erf RE/16527 is zoned as public road with a road reserve width of

Activity No(s):	Provide the relevant Basic Assessment Activity(ies) as set out in Listing Notice 1	Describe the portion of the proposed development to which the applicable listed activity relates.
	(i) for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Government Notice 545 of 2010; or (ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres; but excluding a road— (a) which is identified and included in activity 27 in Listing Notice 2 of 2014; (b) where the entire road falls within an urban area; or (c) which is 1 kilometre or shorter	approximately 25 m. While RE/369 is currently used for agriculture and there is no existing road reserve forming part of the Wildebosch extension.
56	The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre— (i) where the existing reserve is wider than 13,5 meters; or (ii) where no reserve exists, where the existing road is wider than 8 metres; excluding where widening or lengthening occur inside urban areas	The length of the Wildebosch road extension commencing at the intersection with Paradyskloof Road and proceeding northward towards Trumali Street will be less than 1km. The road reserve over Erf RE/16527 has a width of approximately 25 m, while over RE/369 a road reserve not been determined. A new road reserves of 30 m over the RE/369 will be applied for.
Activity No(s):	Provide the relevant **Basic Assessment Activity(ies)** as set out in **Listing Notice 3**	Describe the portion of the proposed development to which the applicable listed activity relates.
12	The clearance of an area of 300 square meters or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan. i. Western Cape i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004; ii. Within critical biodiversity areas identified in bioregional plans; iii. Within the littoral active zone or 100 metres inland from high water mark of the sea or an estuarine functional zone, whichever distance is the greater, excluding where such removal will occur behind the development setback line on erven in urban areas; iv. On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning; or v. On land designated for protection or conservation purposes in an Environmental Management Framework adopted in the prescribed manner, or a Spatial Development Framework adopted by the MEC or Minister.	The site falls within the Critically Endangered" (Swartland Shale Renosterveld) ecosystem, as well as within an "Endangered" (Swartland Granite Renosterveld) ecosystem, and these ecosystems require protection under the NEMBA. Another small part of the Wildebosch Road extension on Erf RE/16527 is located within an Ecological Support Area (ESA). ESAs are areas intended to support the functionality of both Protected Areas and Critical Biodiversity Areas (CBAs). Very small areas along Trumali Street have been mapped as CBA 1. Areas designated CBA1 are areas deemed likely to be in natural condition. It is unlikely that these CBAs are still intact and in pristine conditions as they may be impacted by the development of Trumali Street in the past. More than 300 m^2 of indigenous vegetation (i.e, Swartland Granite Renosterveld) will be removed on the most southern part of the site. During Trumali Street upgrades indigenous vegetation in excess of 300 m^2 will be removed within a

Activity No(s):	Provide the relevant Basic Assessment Activity(ies) as set out in Listing Notice 1	Describe the portion of the proposed development to which the applicable listed activity relates.
		CBA 1 or Swartland Shale Renosterveld. Therefore, a total of more than 300 m^2 of indigenous vegetation will be removed for the project.
14	The development of— (i) dams or weirs, where the dam or weir, including infrastructure and water surface area exceeds 10 square metres; or (ii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs— (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse; excluding the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour. **I. Western Cape** i. Outside urban areas: (aa) A protected area identified in terms of NEMPAA, excluding conservancies; (bb) National Protected Area Expansion Strategy Focus areas; (cc) World Heritage Sites; (dd) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; (ee) Sites or areas listed in terms of an international convention; (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (gg) Core areas in biosphere reserves; or (hh) Areas on the estuary side of the development setback line or in an estuarine functional zone where no such setback line has been determined.	The small footprint of the wetland crossing (including foundation of the road and installation of the pipe culverts) falls within a "Critically Endangered" (i.e. remnant of the Swartland Granite Renosterveld) ecosystem type. This ecosystem requires protection in terms of the GN No. 2747 of 2022 under the NEMBA. This area also corresponds to the location of a population of Wachendorfia brachyandra, a species of conservation concern.
18	The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre. i. Western Cape i. Areas zoned for use as public open space or equivalent zoning; ii. All areas outside urban areas: (aa) Areas containing indigenous vegetation; (bb) Areas on the estuary side of the development setback line or in an estuarine functional zone where no such setback line has been determined; or iii. Inside urban areas: (aa) Areas zoned for conservation use; or (bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority.	The proposed Trumali Street upgrades fall within the Swartland Shale Renosterveld ecosystem containing indigenous vegetation. It is anticipated that the widening of Trumali Street may exceed 4 m during the upgrades where indigenous vegetation is present.

5.3 National Water Act (NMW, 1998)

The Department of Water & Sanitation (DWS) is the custodian of South Africa's water resources and therefore assumes public trusteeship of water resources, which includes watercourses, surface water, estuaries, or aquifers. The National Water Act, 1998 (Act No. 36 of 1998) (NWA) aims to protect water resources, through:

- The maintenance of the quality of the water resource to the extent that the water resources may be used in an ecologically sustainable way;
- The prevention of the degradation of the water resource; and
- The rehabilitation of the water resource.

In terms of the NWA a watercourse means:

- A river or spring;
- A natural channel in which water flows regularly or intermittently;
- A wetland, lake or dam into which, or from which, water flows; and
- Any collection of water which the Minister may, by notice in the Gazette, declare to be
- A watercourse, and a reference to a watercourse includes, where relevant, its bed and banks.

No activity may take place within a watercourse unless it is authorised by the Department of Water and Sanitation (DWS). According to Section 21 (c) and (i) of the NWA, a Water Use Licence (WUL) is required for any activities that impede or divert the flow of water in a watercourse or alter the bed, banks, course or characteristics of a watercourse. The regulated area of a watercourse for section 21(c) or (i) water uses means:

a. *The outer edge of the 1 in 100-year flood line and/or delineated riparian habitat, whichever is the greatest distance, measured from the middle of the watercourse of a river, spring, natural channel, lake or dam;*

b. *In the absence of a determined 1 in 100-year flood line or riparian area the area within 100m from the edge of a watercourse where the edge of the watercourse is the first identifiable annual bank fill flood bench (subject to compliance to section 144 of the Act); or*

c. *A 500 m radius from the delineated boundary (extent) of any wetland or pan.*

In relation to the project, the proposed Wildebosch Road extension would cross a delineated wetland (i.e., Unchanneled Valley Bottom Wetland). The construction activities will entail dewatering of a portion of the wetland in the vicinity of the proposed road extension area, and the construction of road foundation and installation of the pipe or concrete culverts.

The road construction and installation of pipe/concrete culverts within the wetland as well as the entire project footprint occurring within the 500m regulated area of the wetland will trigger Section 21 (c & i) water uses in terms of the NWA. Section 21 (c & i) water uses relate to: Impeding or diverting the flow of water in a watercourse, and altering the bed, banks, course or characteristics of a watercourse. The Wildebosch road extension will cross the delineated wetland, and the entire road development footprint is situated within the 500m regulated area of a wetland.

Dewatering a portion of the wetland for construction purposes will trigger Section 21 (j) water use in terms of the NWA. Section 21 (j) refers to: Removing, discharging or disposing of water found underground if it is necessary of the efficient continuation of an activity or for the safety of the people.

Moreover, the DWS risk assessment (undertaken by Freshwater Ecological Network (FEN) Consulting (Pty) Ltd during December 2023) indicated that the impacts associated with road construction and installation of the culvert within the wetland showed a moderate risk significance. The risk score was above the threshold value (80), and therefore could not be manually down adjusted to realise a low-risk significance score (55), considering that General Notice 509 allows for a maximum down adjustment of 25 points. Therefore, the proposed construction activities within the wetland crossing and within the 500m regulated area of the wetland would require authorisation. A separate WULA is undertaken by Zutari as part of the appointment.

5.4 Applicant contact details

Table 5: Applicant contact details

Contact Details	
Name of Company	Stellenbosch Local Municipality
Postal address	PO. Box 17 7600 Stellenbosch 7600
Telephone Number	(021) 21 808 8203/7
Fax Number	Not applicable
Senior Manager	
Name	Mr. Johan Fullard
Position	Senior Project Manager
Email Address	Johan.Fullard@stellenbosch.gov.za
Project Leader	
Name	Mr. Lehlohonolo Moreki
Position	Project Leader
Email Address	Lehlohonolo.Moreki@stellenbosch.gov.za

5.5 Environmental Assessment Practitioner

Stellenbosch Municipality appointed Zutari (Pty) Ltd as an independent Environmental Assessment Practitioner (EAP) to undertake the requisite Environmental Authorisation (EA) processes required in terms of the National Environmental Management Act, 1998 (Act no 107 of 1998) (NEMA), and the Environmental Impact Assessment (EIA) Regulations (Government Notice [GN] No. 982 of 2014). Based on the triggered listed activities a Basic Assessment (BA) process must be undertaken to determine the potential impacts that the proposed road extension project may have on the environment.

As such, Stellenbosch Municipality is in the process of applying for Environmental Authorisation (EA) from the Department of Environmental Affairs and Development Planning (DEA&DP), the Competent Authority (CA) with the intention of obtaining EA to commence with the scope of work for the road extensions. The scope of work also triggers the need for a Water Use Licence (WUL) for water use activities in terms of the National Water Act 1998 (Act No.36 of 1998) (NWA), which is administered by the Department of Water and Sanitation.

In addition, the requirement for independence of the EAP is aimed at reducing the potential for bias in the environmental process. Neither Zutari nor any of its sub-consultants are subsidiaries of

Stellenbosch Municipality, nor is a subsidiary to Zutari. Furthermore, Zutari does not have any interests in secondary or downstream developments that may arise from of the authorisation of the Wildebosch Road Extension to Trumali Street.

5.6 EAP contact details

Table 6: EAP contact details

Independent EAP:	**Zutari (Pty) Ltd**
Responsible person:	Xanté Eberhardt
Physical address:	1 Century City Dr Century City Cape Town 7446
Postal Address:	PO Box 494 Cape Town 8000
Telephone:	+27 21 526 9400
E-mail:	Xante.Eberhardt@zutari.com
Professional affiliation:	Registered EAP with the Environmental Assessment Practitioners Association of South Africa (EAPASA)

5.7 Expertise of EAP

Section 33 of EIA Regulations and Section 24N (2) and (3) of the NEMA requires that an EMPr must include the details of the person(s) who prepared the EMPr, and the expertise of that person to prepare an EMPr. Zutari has selected a team of highly experienced specialists and multi-disciplinary practitioners to execute this project in a professional and unbiased manner. A synopsis of the qualifications and experience of Zutari's environmental assessment team for this project is provided hereunder. Full Curriculum Vitae (CVs) can be found in Appendix A

The EAP and senior reviewer, **Ms Xanté Eberhardt,** is a senior environmental practitioner and project manager at Zutari, with extensive experience in project management and environmental management over the past thirteen years.

Xanté plays an integral role in the project management of several projects which includes report writing, client liaison, budget and resource management, as well as time management. She has successfully applied for environmental authorisations for several projects, as well as assisted with the motivation for non-environmental impact assessment (EIA) letters form the relevant authorities. She has completed numerous project management courses to enhance her project management skills as well as a course in procurement. Xanté handled all procurement for Zutari's North West offices, where her duties include tender compilation and evaluation for clients, as well as tendering for new projects. During 2013, Xanté was elected to be on Zutari's Skills Development and Employment Equity Forum.

Xanté obtained a Bachelor of Science (Honours) in 2010, and Bachelor of Science in 2009 both from the North West University in South Africa. She is registered as an Environmental Assessment Practitioner (EAP) with the Environmental Assessment Practitioners Association of South Africa (EAPASA) and a member of International Association for Impact Assessment South Africa (IAIAsa).

The author and supporting EAP, **Mr. Siphamandla Mzolo,** is a junior environmental consultant with a broad knowledge and practical application of environmental management tools across various sectors. His key duties include undertaking pre-feasibility studies, authoring, compiling, and finalising Environmental Impact Assessments (EIAs) and Environmental Management Programmes (EMPrs) for construction and operation of various projects, such as roads, bio-gas plants, solar energy plants, wind farms, tourist attraction site, water, balancing dams, mixed land-use developments, and mining operations. Moreover, he is instrumental in conducting water use license applications for various operations or projects, and environmental due diligence studies for business acquisition.

He is skilled in conducting NEMA compliance audits, water use licence audits, GN R704 compliance audits, and environmental performance assessments. He supported the implementation of ISO14001 EMS and undertook internal compliance audits in terms of ISO14001:2015 for various operations. He conducted continuous environmental inspections as a mine environmental control officer (ECO), authoring environmental operational procedures, providing environmental performance improvement strategies, investigating various environmental incidents, as well as developing short term, and long-term remedial action plans. He also led and managed rehabilitation projects from planning phase to execution, coordinated stakeholder engagements, authored, and finalised Mine Closure Liability Assessments for various mining operations. With 6 years in the mining industry, from operations and being seconded to project management, he has developed an understanding of the companies' short-term and long-term liabilities.

Siphamandla holds a Bachelor of Science (Honours) in Environmental Management from the University of South Africa (UNISA) as well as a Bachelor of Science in Geology and Environmental Management from the University of Johannesburg (UJ), South Africa. He also completed a short course in Environmental Law from the North West University in 2015. He is registered as a Professional Natural Scientist with the South African Council for Natural Scientific Professions (SACNASP) and is a member of the International Association for Impact Assessment South Africa (IAIAsa).

Company/Consultant Name	**Zutari (Pty) Ltd**	
Responsible Person	Xanté Eberhardt	
Company Registered address	1 Century City Dr Century City Cape Town 7446	
Postal Address	PO Box 494 Cape Town 8000	
Telephone	+27 21 526 9400 +27 83 292 3766	
Facsimile	Not applicable	
Email	Xante.Eberhardt@zutari.com Siphamandla.Mzolo@zutari.com	
Professional Affiliation	Xanté Eberhardt	• Environmental Assessment Practitioner (EAP), Environmental Assessment Practitioners Association of South Africa (EAPASA) • Member, International Association for Impact Assessment South Africa (IAIAsa)
	Siphamandla Mzolo	• Professional Natural Scientist (*Pr.Sci.Nat),* South African Council for Natural Scientific Professions (SACNASP) • International Association for Impact Assessment South Africa (IAIAsa)

5.8 Appointed specialists

The specialists appointed to assess the potential impacts associated with the project are shown in the table below.

Table 7: Appointed specialists

Study	Specialist	Organisation	Professional Registrations and Affiliations
Wetland and Aquatic Assessment	Cole Grainger Paul Da Cruz	Freshwater Ecological Network (FEN) Consulting (Pty) Ltd, a Member of SAS Group of Companies	Professional Natural Scientist, South African Council for Natural Scientific Professions (SACNASP)
Botanical Assessment	David J. McDonald Adam Labuschagne	Bergwind Botanical Surveys & Tours CC	Professional Natural Scientist, South African Council for Natural Scientific Professions (SACNASP)
Agricultural Site Sensitivity Verification	Johann Lanz	Johann Lanz	Professional Natural Scientist, South African Council for Natural Scientific Professions (SACNASP)
Landscape and Visual Impacts Assessment	Elmie Weideman	Create Landscape Architecture and Consulting	South African Council for the Landscape Architectural Profession (SACLAP)
Socio-Economic Site Sensitivity	Marcel Theron	Urban-Econ Development Economists (Pty) Ltd	Not applicable
Traffic Impact Assessment	Not applicable	Imodie Projects	Not applicable
Wetland Rehabilitation and Management Plan	Bianca Bleuler Cole Grainger	Freshwater Ecological Network (FEN) Consulting (Pty) Ltd, a Member of SAS Group of Companies	Professional Natural Scientist, South African Council for Natural Scientific Professions (SACNASP)

6 Project Phasing

6.1.1 Pre-construction Phase/Activities

6.1.2 Planning and Design Phase

This phase includes applications for environmental, town planning and other relevant authorisations. The planning and design phase investigate the possible impact of the proposed development on the receiving environment and recommend mitigation measures. This phase would have been concluded once the contractor views this document.

6.1.3 Pre-Construction Phase/Activities

The pre-construction phase includes activities such as appointment of an Environmental Control Officer (ECO), pre-construction environmental workshop/induction training (conducted by the ECO), site demarcation, establishment of a site camp, demarcation of areas such as fuel storage and plant and animal rescue. Specifications for these activities are included in this EMPr. This phase also includes the application processes to obtain permits for e.g., permits required to remove any protected tree(s) or plant/animal species of conservation concern.

6.1.4 Construction Phase

The construction phase commences with earthworks and all activities relating to the construction of the proposed road extension and upgrades.

6.1.5 Operational Phase

The operational phase commences when the proposed development is being used for its intended purpose. It is possible that there will be a period in the project life cycle where the construction and operational phase will overlap. This phase will include ongoing operation, monitoring, and maintenance of the road, and continuing environmental management requirements (e.g., removal of alien and invasive plant species, and monitoring of the wetland crossing).

7 Environmental Impacts and Mitigations

7.1 Impacts assessed as part of the BAR

During the Draft BAR various specialists identified a number of impacts to be assessed and proposed mitigation measures. The outcome, and intent of impact mitigation is to reduce the level of an impact on the environment to acceptable levels. The preferred method would be to avoid impacts; however, this is not always possible.

The identified impacts were assessed as part of the Draft BAR and were assigned with an anticipated impact rating (significance) for both pre- and post-mitigation. The significance ratings are summarised according to environmental impact and project phase in **Error! Reference source not found.** below.

Table 8: Summary of potential impacts identified. The impact of each impact pre- and post-mitigation is also provided

Aspect		Impact	Pre-mitigation	Post-mitigation
Pre-construction				
No impacts have been identified for the pre-construction phase.				
Construction				
Botanical	Scenario 1 (Original)	Loss of Remnant Swartland Shale Renosterveld and Swartland Granite Renosterveld (Loss of natural vegetation and habitat)	**High (-)**	**Moderate (-)/ Medium (-)**
	Scenario 2 (preferred)	Loss of Remnant Swartland Shale Renosterveld and Swartland Granite Renosterveld (Loss of natural vegetation and habitat)	**low (-)**	**Negligible (-)/ Very low (-)**
Freshwater Aquatic Ecology		Site preparation for civil works	**Moderate (-)/ Medium (-)**	**Negligible (-)/ Low (-)**
		Construction of the Wildebosch road through the wetland	**Moderate (-)/ Medium (-)**	**Negligible (-)/ Low (-)**
		Rehabilitation of the UCVBW	**Moderate (-)/ Medium (-)**	**Negligible (-)/ Low (-)**
Operation				
Freshwater Aquatic Ecology		Operation of the culvert crossing	**Negligible (-)/ Very low (-)**	**Negligible (-)/ Very low (-)**
		Operation of the roadside drains	**Negligible (-)/ Very low (-)**	**Negligible (-)/ Very low (-)**
		Monitoring of structural integrity of the road culvert crossings	**Negligible (-)/ Very low (-)**	**Negligible (-)/ Very low (-)**
		Future maintenance of the road culvert crossings	**Moderate (-)/ Medium (-)**	**Negligible (-)/ Low (-)**
		Ongoing alien and invasive vegetation removal (if required)	**Moderate (-)/ Medium (-)**	**Negligible (-)/ Low (-)**

7.2 Summarised mitigation measures

Through the Draft BAR process, there has been the detailed analysis of all potential impacts of the proposed project. According to the assessments conducted on site with the assistance of relevant specialist, the overall impact of the project results in a low environmental impact. This was however aided by certain management and mitigation measures as suggested in the Draft BAR, specialist reports and this EMPr.

Based on these findings, it is suggested that the proposal be approved, with the implementation of the following mitigation measures:

Construction Phase Mitigation Measures:

- The construction period should be minimized to the minimum extent possible in order not to cause unnecessary and ongoing visual intrusion for nearby communities.
- A phased approach should be taken with regards to landscape rehabilitation efforts, i.e., landscape rehabilitation should start once sections of the road has been completed.
- The row of street trees along the existing section of Wildebosch Road must be extended into the new section to allow for visual unity whilst driving (enhancing the visual experience) and to soften the “road line” if viewed from a distance.
- Construction signage should not be obtrusive and must be placed with caution in strategic locations as required.
- Make use of existing access roads so that it minimizes modification of the topography and additional clearing of vegetation.
- Should any fossils, coins, human remains, articles of value or antiquities and other items of archaeological or paleontological significance, be uncovered during construction the Heritage Authority of the Western Cape shall be contacted immediately.
- Forum for complaints to be raised (via complaints register) should be provided.
- No surface water, ground or storm water shall be abstracted or polluted as a result of any activities on the site.
- The applicant shall ensure that effluent will be managed and disposed of in a manner that complies with the National Water Act, 1998 (Act 36 of 1998).
- All requirements of the National Water Act, 1998 (Act 36 of 1998) will always be adhered to.
- Search and Rescue of Wachendorfia brachyandra to be placed in suitable habitat nearby.
- Construction camp to be located in previously disturbed areas, such as agricultural fields.
- Installation of culverts or raised roadway to allow for movement of water through the wetland.
- Removal of alien and invasive species in the vicinity of proposed construction sites must be carried out in order to prevent establishment of these species in any disturbed areas.
- Minimize the construction footprint, in particular in the vicinity of wetland habitat as these soils are highly sensitive to compaction and disturbance.
- The re-establishment of vegetation on watercourse banks and in areas disturbed by construction activities.
- It is imperative that construction occurs during the drier summer months (between January and April) using as much manual labour (not machinery) as possible to minimise the wetland disturbance footprint in terms of soil disturbance and vegetation trampling, and further to minimise hydrocarbon and oil spillages.
- Only authorised maintenance personnel may be permitted to enter the wetland as part of the clearing activities to prevent unnecessary disturbance to this wetland.
- Contractor laydown areas (if applicable) are to be established at least 32 m outside of the delineated extent of the wetland.

- The outer boundary of the wetland must be demarcated using a weather resistant material by an ECO and marked as a 'no-go' area where no construction activities are planned and all construction footprint areas must remain as small as possible.
- Vegetation clearing must be limited to what is essential within the proposed road extension area.
- Alien vegetation must be managed throughout the construction phase.
- All alien and invasive vegetation species, debris and litter removed from the crossing must be removed from site (no stockpiling allowed).
- Vehicle servicing and re-fuelling must occur off-site.
- Stockpiles as a result of the removal of wetland soil may not exceed 2.0 m in height and must be placed outside of the delineated extent of the wetland.
- Stockpiles must not be contaminated with hydrocarbons and oils.
- The top organic layer of the soil stockpile must be separated from the lower layers and protected from moisture loss and alien vegetation encroachment, using a geotextile such as hessian sheeting, for use during the rehabilitation phase of this project.
- Similarly, the imported road construction material must also be protected from alien vegetation encroachment using hessian sheeting, thereby also preventing deposition into the wetland by wind action.
- Water must be allowed to flow to the downstream reach at all times and rip-rap or a similar erosion protection structure must be placed at the outlet to the diversion pipe to prevent erosion of the wetland floor.
- Suitable sediment traps such as geotextile wrapped hay bales or geotextile nets must be installed downstream of the proposed road extension to prevent potential sedimentation of the downstream reach of the wetland during unforeseen rainfall events due to bare ground.
- Soil surrounding the repair works must be suitably loosened on completion of construction activities and revegetated to prevent erosion.
- Avoid unnecessary trampling of vegetation irrespective of the vegetation being associated with the wetland or the surrounding terrestrial area.
- The duration of impacts within the wetland must be minimised as far as possible by ensuring that the duration of time in which flow alteration will take place is minimised. The construction period must be kept as short as possible.
- Rehabilitation works must be undertaken just before the wet season (preferably within April/May) to ensure survival of new vegetation species and prevent proliferation of alien and invasive plants.
- The stormwater channel that runs along the southern boundary of the UCVBW must be infilled upstream to promote the diffuse spread of water (albeit interflow) through the wetland.
- All areas to be cleared of vegetation must be done so in a phased approach, to reduce the risk of proliferation of alien vegetation to retain a level of protection to the freshwater ecosystem during construction.
- All cleared vegetation must be disposed of at a licensed refuse facility and may not be mulched or burned on site.
- Bare soil must ideally be restocked with indigenous vegetation immediately after the removal of alien invasive vegetation, and in cases where the soil will remain unplanted for a few days it must be covered with a hessian net to retain moisture and prevent soil desiccation.

Operational Phase Mitigation Measures:

- Long-term management of alien and invasive plant species.
- Indigenous vegetation must be retained as far as possible and used during the rehabilitation phase of this wetland.

- The pipe culverts must be designed in a manner to preserve the natural hydrology of the delineated UCVBW, and flows must not be concentrated downstream of the pipe culvert.
- Any loss in wetland longitudinal connectivity due to a failed culvert design must be remedied as soon as possible to reduce the duration of impact.
- An erosion protection structure must be installed at the discharge point of the side drains into the wetland and all stormwater must collect into an attenuation facility that is operated according to Sustainable Urban Drainage System principles in terms of the quantity and quality of stormwater discharging into the wetland.
- The erosion protection structures must be monitored bi-annually to ensure that these structures are still intact and can continue to safeguard the wetland against erosion.
- Hot spots for the build-up of debris and excess sediment must be identified and when necessary, debris/excess sediment must be removed by hand to prevent future flooding and potential damage to infrastructure. In this regard, special mention is made of periods following high rainfall and subsequent high instream water volumes. Removal of debris must be undertaken in line with the above listed construction mitigation measures.
- Any erosion must be identified on an ongoing basis and re-profiled and revegetated accordingly.
- Existing access roads must be used for monitoring purposes to minimise the compaction of soils and loss of riparian and instream habitat.
- The wetland must be monitored for alien and invasive vegetation encroachment and all alien vegetation/weeds must be removed according to a suitable alien vegetation control plan.
- Where applicable for the eradication of alien and invasive vegetation, care should be taken with the choice of herbicide to ensure that no additional impact and loss of indigenous plant species occurs due to the herbicide used and water contamination is avoided.

7.3 Environmental statements

7.3.1 Freshwater Statement

The proposed Wildebosch extension would cross a delineated UCVBW as indicated in the Draft BAR. The installation of the drainage culvert over the wetland and road construction within the 500m regulated area of the wetland will trigger Section 21 (c & i) water uses in terms of NWA. Section 21 (c & i) water uses relate to: Impeding or diverting the flow of water in a watercourse Altering the bed, banks, course or characteristics of a watercourse.

The construction activities will entail dewatering of a portion of the wetland in the vicinity of the proposed road extension area, the construction of the foundation of the road and installation of the drainage culvert.

The DWS risk assessment undertaken by an aquatic specialist indicated that the impacts associated with construction and installation of the culvert within the wetland showed a moderate risk significance. The determined moderate risk scores are above the threshold value (80), and therefore could not be manually down adjusted to realise a low-risk significance score (55), considering that GN509 allows for a maximum down adjustment of 25 points. Therefore, the proposed construction activities within the wetland and 500m regulated area of a wetland would require authorisation through a full Water Use Licence Application (WULA). Zutari is currently undertaking a WULA to authorise the proposed water uses.

It is strongly recommended that the proponent must make provision for the recommended mitigation measures, which include construction during the summer dry season, preserving the flow between the upstream and downstream areas during construction, and designing the road culverts in such a manner that the hydrology of the wetland is not altered during the construction phase are most pertinent.

7.3.2 Botanical Statement

Very small areas along Trumali Street have been mapped as CBA 1, and there are several parts of the study area that have been mapped as ESA 2, along the watercourse in the vicinity of Wildebosch Road.

The vegetation across most of the proposed roads project is classified as Swartland Shale Renosterveld, with Swartland Granite Renosterveld in the southern portion of the site. The outcome of the assessment has determined that large portions of the sites investigated have undergone significant transformation and disturbance, preserving little to no original vegetation. One species of conservation concern, Wachendorfia brachyandra, was documented in a wetland habitat. If the recommended mitigation measures are implemented, it is estimated that the proposed project should result in a Low Negative impact and the implementation of the upgrade of Trumali Street and extension of Wildebosch Road on condition that the recommended mitigation measures are applied.

7.3.3 Agricultural Statement

The site falls outside of an area that is classified as a Protected Agricultural Area (PAA). A PAA is a demarcated area in which the climate, terrain, and soil are generally conducive for agricultural production and which, historically, has made important contributions to the production of the various crops that are grown across South Africa. Within PAAs, the protection, particularly of arable land, is considered a priority for the protection of food security in South Africa, but the protection of land outside of these areas is generally not considered a food security priority.

The land along the road route is high potential vineyard land. A detailed soil map and the identification of whether soils are Pinedene or Tukulu or Kroonstad is of little relevance to this assessment. What matters is that the impacted land is high potential vineyard.

7.4 Socio-economic Statement

Based on the socio-economic site sensitivity report, the extension of the proposed Wildebosch Road to Trumali Street may be considered beneficial to the area in terms of an increase in accessibility and transport mechanisms, job creation, and household income.

The local as well as broader provincial municipality will likely experience a positive injection resulting from the Gross Domestic Product and production generated due to the capital and operational spend. However, considering the proximity of the proposed Wildebosch Road to Trumali extension to Brandwacht and Paradyskloof, consideration must be given as whether these areas will be negatively impacted in terms of sense of place and property values.

The preliminary socio-economic impact assessment of the proposed Wildebosch Road to Trumali Street extension indicates that, at this stage, there are no significant implications or flaws identified from a socio-economic perspective. The overall net positive impacts outweigh the net negative impacts, showcasing the potential benefits of the project. While the initial analysis presents potential negative impacts, it should be noted that these can be mitigated or improved through suitable measures. A comprehensive Socio-Economic Impact Assessment will further investigate and provide in-depth information on both the baseline and potential impacts, ensuring a thorough understanding of the project's socio-economic implications.

7.5 Landscape and Visual Statement

During construction the landscape and visual impacts remains minor as the overall duration is expected to be limited, however the intensity of the anticipated landscape and visual impacts is expected to be highest during the peak construction phase of the project.

Landscape and visual impact are expected to be negligible during the operational phase (except for the anticipated impact caused by the change in visual character from an 'open' rural type of unbuilt landscape to a built landscape which are rated as moderate but can be reduced to minor if mitigation guidelines are implemented).

From a visual perspective the proposed project does not heavily impact on landscapes of significant symbolic, aesthetic, cultural and historical value, however every possible effort should be made to make the road blend in with the existing environment. With reference to the existing layout, the topographical form has been respected and the organically shaped alignment integrate well with the existing contours. Considering this, the implementation of all other mitigation guidelines will lower the intensity of the landscape and visual impacts, but will in most cases, not lower the overall impact significance.

7.6 Traffic Statement

According to the findings contained in the Traffic Impact Study, it is recommended that the implementation of the section of link road between Paradyskloof Road and Trumali Street be implemented, as it does not have any negative impact on the traffic conditions in the area and in fact has a long-term benefit of improving the traffic conditions once the full Bypass has been implemented.

8 Implementation of the EMPr

8.1 Roles and responsibilities during the construction phase

This Chapter provides a description of the roles and responsibilities of the various parties involved with the construction of the proposed development.

8.1.1 Contractor

The Contractor must ensure that all of its sub-contractors, employees, etc., are fully aware of the environmental issues detailed in this EMPr. The Contractor shall liaise closely with the Site Engineer (SE), Environmental Officer (EO) and the Environmental Control Officer (ECO) and must ensure that the works on site are conducted in an environmentally sensitive (prevent actions that may cause environmental harm) manner and fully in accordance with the requirements of the EMPr, at all times.

The contractor must ensure compliance of all site personnel/visitors to the EMPr and other conditions of approval where relevant.

8.1.2 Developer

Generally, the developer or applicant would refer to the holder of the Environmental Authorisation (EA), in this case the Stellenbosch Municipality, who would assume overall responsibility for the administration and implementation of the EA and EMPr.

The developer will be responsible for the following tasks amongst others:

- Impact on landscape character and sense of place;
- Ensure that all conditions of approval as contained in the EA are adhered to;
- Ensure that the requirements as set out in this EMPr are adhered to and implemented;
- Ensure all authorisations, permits, consents are in place and any other legal requirements are settled before construction commences;
- Allocate the responsibilities assigned to the Environmental Control Officer to an independent suitably qualified individual prior to the start of construction activities on site; and
- Provide all principal contractors working on the project with a copy of this EMPr as part of tender contract documentation to allow the contractors to cost for its requirements within their respective construction contracts.

8.1.3 Site Engineer (SE)

The SE is responsible for ensuring that the contract is carried out on time, in budget and that each Contractor fulfils his obligations in terms of conditions contained in the EA.

8.1.4 Environmental Control Officer (ECO)

The Developer shall appoint a suitably qualified ECO to monitor the Contractor's compliance in terms of this EMPr and the conditions contained in the EA, as well as address environmental site issues. The ECO shall work in close relation with the Contractor's appointed Environmental Officer. The designation is reserved for a suitably qualified (National Diploma / Degree in Natural Science or an equivalent

qualification), independent, environmental manager, with adequate environmental knowledge to understand and implement the EMPr.

The duties of the ECO include but are not limited to:

- Liaison with the Developer, Project Manager and/or Engineer and Department of Environmental Affairs and Development Planning (DEA&DP).
- Update the EMPr to include relevant conditions of approval contained in the EA (if applicable).
- Conduct environmental induction training with the contractor prior to commencement of work.
- Undertake ECO site inspections. The frequency of site inspections can be determined between the ECO, SE, Environmental Site Agent (ESA) or any specific conditions of authorisation contained in the EA. It is recommended that the ECO be supported by a full-time ESA during the initial construction period/activities and that the ECO undertake monthly ECO inspections with the ESA. The ECO must attend/arrange a site meeting with the engineer, contractor and other relevant project team members during his/her site inspection to discuss any environmental matters.
- Compilation of ECO Reports must be submitted to the project team, DEA&DP, and developer (or any other authority/body deemed necessary by the project team). The ECO must liaise with the ESA to ensure that action items are carried out.
- Review ESA weekly compliance monitoring reports and include information in monthly ECO Reports.
- Monitoring compliance with the various environmental conditions/requirements contained in the EA and EMPr.
- Assist the ESA in reviewing of the Contractor's method statements.
- Ensuring that the requisite remedial action is implemented in the event of non-compliance.
- Ensuring the proactive and effective implementation and management of environmental protection measures.
- Ensuring that a register of public complaints is maintained by the Contractor and that any and all public comments or issues are appropriately reported and addressed.
- Attend monthly site meetings.
- Recording and reporting of environmental incidents.

8.1.4.1 Environmental Induction/Awareness Training

The ECO shall arrange with the Engineer and Contractor to conduct environmental induction training with personnel and must address, amongst others:

- Explanation of the environmental process that preceded the EA and why it was important to conduct the environmental process.
- Explanation of the conditions of authorisation contained in the EA.
- The sensitive environmental features located within and around the site.
- The reasons why mitigation measures are required and the benefits of implementing these measures.
- The EMPr and its contents (e.g. no-go areas, flora, fauna, littering etc.); and
- The role of the ECO and ESA.

8.1.4.2 Permits and Authorisations

Apart from the EA which needs to be in place prior to commencement of construction activities, the WUL must also be obtained from the Department of Water and Sanitation (DWS) before construction commences. The ECO must be knowledgeable of licencing and permitting requirements (issued and required) for the project and can assist the contractor with obtaining such permits.

8.2 Environmental Site Agent (ESA)

It is recommended that an independent ESA be appointed for the duration of construction (appointment must take place prior to commencement of any construction activities). The ESA will assist the ECO with day-to-day on-site monitoring of construction activities, compliance with this EMPr and specific conditions contained in the EA. The ESA's terms of reference include, but are not limited to:

- Day to day monitoring of implementation of this EMPr.
- It is recommended that the ESA be on site daily when work is being undertaken in sensitive environments e.g. watercourses, vegetation and during the initial construction activities which include amongst others site demarcation, identification of no-go areas, relocation of vegetation, vegetation clearance, site camp establishment and vegetation replantation.
- The ESA must assist the contractor with environmental training of any new staff members or staff which did not attend the ECO's environmental induction training. On-going environmental awareness also falls within the responsibilities of the ESA.
- Submit weekly compliance reports to the ECO.
- Attend contractor and engineering site meetings where relevant or where attendance is requested.
- Maintain a detailed photographic record of construction activities.
- Maintain a register of site instruction, non-compliances and action items and submit weekly to the ECO.
- Keep all approved method statements on record/file.
- Liaise with the public should there be any complaints, keep a register of any complaints and report to the ECO on weekly basis.
- The ESA must immediately consult with the SE and ECO should any non-compliances meriting a 'stop-work' instruction be observed.

8.3 Environmental Authority

The DEA&DP is the competent authority responsible for issuing the EA and enforcing compliance with the conditions of authorisation contained in the EA and relevant environmental legislation. It has the following powers with respect to the project:

- Overall enforcement of the EA and its conditions of authorisation.
- Review the EMPr and any required updates or revisions.
- Compliance inspection site visits.
- Review ECO and audit reports (if required by the EA).
- Review incident reports (if required by the EA).
- Enforcement in the event of contraventions of the EMPr or EA.

8.4 Working Area

The working area is regarded as the land and any other place on, under, over, in or through which the works are to be executed or carried out, and any other land or place made available by the developer in connection with the road works. The Working Area shall include the site office, construction camp, stockpiles, batching areas, the construction area, all access routes (from the point where it leaves the nearest public road) and additional areas to which the Engineer permits access. The construction footprint must be kept to a minimum.

The site must be clearly, and appropriately demarcated and no-go areas must be clearly identified with appropriate signage. The no-go areas refer to the outer boundary of the wetland and must be demarcated using a weather resistant material by an independent ECO and marked as a 'No-Go' area

where no construction activities are planned, and all construction footprint areas must remain as small as possible. The ECO must brief contractor staff regarding the requirements of no-go areas.

All works must be kept within the authorised footprint of the site. Areas disturbed outside of the site footprint must be rehabilitated through consultation with the ECO.

9 Summary of Impacts and Associated Mitigation Measures

The following tables cover the construction activities and associated environmental impacts that will occur during the proposed project.

The tables consider the expected impacts on-site during the different phases of the project, as well as the mitigation measures and environmental management procedures required to effectively manage the expected impacts. The following sections are dealt with in the table:

Section 9.1	:	Pre-construction and construction site environmental management
Section 9.2	:	Materials
Section 9.3	:	Waste
Section 9.4	:	Surrounding properties
Section 9.5	:	Flora, fauna, air quality, noise, water and other
Section 9.6	:	Rehabilitation
Section 9.6	:	Planning and engineering considerations

9.1 Pre-Construction and Construction Site Environmental Management

Table 9: Pre-construction and construction site environmental management

ACTIVITY	ASPECT	POTENTIAL IMPACT	IMPLEMENTATION			MONITORING		
			RESPONSIBLE PERSON	MITIGATORY MEASURE (OBJECTIVES AND TARGET)	TIMEFRAME	RESPONSIBLE PERSON	FREQUENCY	PERFORMANCE INDICATOR
9.1.1 Engineering Design	All aspects listed in the EMPr	Incompatibility between the design and the receiving environment	Developer	**Objective:** To ensure the design of the Proposed Wildebosch Road Extension to Trumali Street takes into account the environmental sensitivities. **Target:** Assimilate requirements of the EMPr in the design and construction management giving special attention to the environmental sensitivities identified by the EIA specialists.	During tender, design and design review stages	Stellenbosch Municipality in consultation with appointed engineers.	Throughout design phase	Design meets objectives and does not degrade the receiving environment.
9.1.2 Establishment of the construction site	Construction site	Construction activities infringing on no-go areas.	Developer, Contractor and ESA with the inputs from appointed specialists	**Objective:** To ensure the establishment of the construction site does not infringe on or damage/pollute the no-go areas. **Target:** • Adequately dermacate all no-go areas according to the specialist reports conducted as part of the EIA process. • Erect no-go area signage. • Ensure all appointed staff and visitors are aware of these areas.	Pre-construction phase	Developer, Contractor and ECO in consultation with appointed specialists.	Throughout pre-construction phase until targets are met. Monitor during construction phase.	No trespassing within or damage to the no-go areas.
9.1.3 Establishment of the construction site	Construction site	Undue damage to or loss of vegetation	Stellenbosch Municipality and ESA	**Objective:** To prevent and mitigate the undue damage or loss of natural vegetation outside the boundaries of the roads. **Targets:** • Site establishment shall take place in an orderly manner and all amenities shall be installed or be available before the onset of	Pre-construction phase	Engineer and ECO	Once off, unless the site area changes in which case the method statement and layout plan must be updated.	Establishment of construction site in compliance with objectives and no evidence of environmental degradation.

ACTIVITY	ASPECT	POTENTIAL IMPACT	IMPLEMENTATION			MONITORING		
			RESPONSIBLE PERSON	MITIGATORY MEASURE (OBJECTIVES AND TARGET)	TIMEFRAME	RESPONSIBLE PERSON	FREQUENCY	PERFORMANCE INDICATOR
				construction. Where such amenities are not available, chemical toilets shall be provided. • A method statement is required from the Contractor that includes the layout of the site, management of facilities and wastewater management. • A site plan of the construction site must be provided indicating waste areas, storage areas and placement of facilities • The Contractor shall inform all site staff to the use of supplied ablution facilities and under no circumstances shall indiscriminate excretion and urinating be allowed other than in supplied facilities. • The Contractor shall supply sealable waste collection bins and all solid waste collected shall be disposed of at a registered waste facility. • Certificates of disposal shall be obtained by the Contractor and kept on file. • Where a registered waste site is not available close to the construction site, the Contractor shall provide a method statement with regard to waste management. Under no circumstances may solid waste be burned on site or illegally dumped. • Refuse bins will be emptied and secured. • The construction site office and other areas must be placed on already disturbed land as far as possible. • Fences and security access must be maintained, throughout the project. • Emergency and contact numbers of the contractors must be available and				

ACTIVITY	ASPECT	POTENTIAL IMPACT	IMPLEMENTATION			MONITORING		
			RESPONSIBLE PERSON	MITIGATORY MEASURE (OBJECTIVES AND TARGET)	TIMEFRAME	RESPONSIBLE PERSON	FREQUENCY	PERFORMANCE INDICATOR
				prominently displayed on a signage board that is clearly visible.				
9.1.4 Establishment of the construction site	Construction site	Loss of soil fertility	Contractor and ESA	**Objective:** Whilst establishing the construction site the footprint of disturbance is to be minimised thereby preventing the undue degradation and loss of soil. **Targets:** • Protect stockpiles of topsoil and subsoil material with silt fences that should be maintained during the entire construction phase on site. • Locate stockpiles outside of any buffer zones as indicated in the specialist reports and not on slopes with a gradient greater than 1:3. • Identify and clearly demarcate existing infrastructure within the study area in order to avoid damage throughout the construction phase.	Design phase and site establishment	Engineer and ECO	Once-off	Established construction camp in compliance with objectives and no evidence of environmental degradation
9.1.5 Temporary closure of the construction site	Construction site	Potential impacts associated with the closure of the construction site.	Contractor and ESA	**Objective:** To limit potential impacts on the environment for periods during which the construction site is closed. **Targets:** Should the construction site be closed for a period of more than one week, a report on compliance will be lodged with the Engineer and Project Manager confirming the following: • No persons allowed other than project employees; • Minimal materials kept stored. • Materials will be stored in leak-proof, sealable containers or packaging.	Closure of construction site (for example - over holiday breaks)	Engineer and ECO	Whenever the construction camp is closed for longer than a week.	Closure of the construction camp in line with the requirements of the EMPr.

ACTIVITY	ASPECT	POTENTIAL IMPACT	IMPLEMENTATION			MONITORING		
			RESPONSIBLE PERSON	MITIGATORY MEASURE (OBJECTIVES AND TARGET)	TIMEFRAME	RESPONSIBLE PERSON	FREQUENCY	PERFORMANCE INDICATOR
				• The store area is secure and locked. • Fire extinguishers will be serviced and accessible. • The area is secure from accidental damage through vehicle collision, etc. • Emergency and contact numbers of the contractor will be available and prominently displayed. • Chemical toilets are emptied, kept hygienically clean and secured. • 24 hour security will be on site during this period should it be required.				
9.1.6 Construction of site buildings	Materials used to construct site buildings	Soil pollution and permanent alternation to the receiving environment	Contractor and ESA	**Objective:** To ensure the material for site buildings, used by the Contractor during the construction of the project, are removable and to minimise the impacts of the construction of the buildings on the environment. **Targets:** • No permanent structures will be permitted at the construction site. • Temporary structures shall be founded on a platform, either subsoil or screed slab. • Buildings should preferably be prefabricated or constructed of re-usable/recyclable materials. • All temporary structures must be soundly built and not pose a danger to workers. • All structure footprints to be rehabilitated and landscaped after construction is complete.	Pre-construction and site establishment	Engineer and ECO	Once off, unless the site area changes and/or new buildings are required, in which case additional inspections will be required.	On site buildings constructed according to the requirements of the EMPr.
9.1.7 Operation of sanitation systems	Sanitation systems	Unpleasant odours on site.	Contractor and ESA	**Objective:** To ensure good sanitation systems and management throughout the construction period.	Pre-construction	Engineer and ECO	Once off, unless the site area changes	Adequate toilets will be positioned at the right places

ACTIVITY	ASPECT	POTENTIAL IMPACT	IMPLEMENTATION			MONITORING		
			RESPONSIBLE PERSON	MITIGATORY MEASURE (OBJECTIVES AND TARGET)	TIMEFRAME	RESPONSIBLE PERSON	FREQUENCY	PERFORMANCE INDICATOR
		Inadequate number of mobile/chemical toilets on site. Position of mobile/chemical toilets. Mismanagement of waste water.		**Targets:** • Adequate number toilets must be provided for all staff. • Chemical toilets must be emptied / serviced on a regular basis to prevent them overflowing. Proof of this must be provided to the ECO. • A minimum of one toilet must be provided per 15 persons.	and site establishment		and/or new buildings are required, in which case additional inspections will be required.	as per the EMPr and ECO recommendations. Absence of odours, erosion and build-up of detergents.
9.1.8 **Vehicle parking.** **Storage of equipment**	Vehicle parking and parking area(s). Storage of equipment.	Pollution of soils. Disturbance of soils due parking of vehicles outside of designated areas.	Contractor and ESA	**Objective:** To ensure vehicles are parked according to the specifications in the EMPr and that equipment is handled appropriately. **Targets:** • No storage of vehicles or equipment will be allowed outside of the designated area. • Drip trays or any form of oil absorbent material must be placed underneath vehicles and equipment when not in use.	Throughout the construction period. Planning to be done during site establishment phase.	Engineer and ECO	Whenever there are stationary vehicles or equipment present on site.	No incidents of soil pollution due to spills from stationary vehicles and equipment. No undue disturbance of soils. No incidents of vehicles being parked outside the designated parking area.
9.1.9 **Servicing and washing of vehicles and machinery**	Workshop and equipment storage areas	Water contamination. Soil contamination. Noise pollution.	Contractor and ESA	**Objective:** To ensure that the environment is not polluted by ensuring that service areas and wash bays for vehicles and machinery are made available and utilised. **Targets:** • No servicing of equipment on site. • Leaking equipment shall be repaired immediately or be removed from site to facilitate repair elsewehere (such as workshop).	Whenever servicing or maintaining of vehicles or equipment throughout the construction period.	Engineer and ECO	Daily monitoring by CER and weekly inspections by ECO.	Evidence of prescribed servicing and washing services. No incidents of soil or water contamination. No complaints of noise pollution due to servicing and washing of vehicles.

ACTIVITY	ASPECT	POTENTIAL IMPACT	IMPLEMENTATION			MONITORING		
			RESPONSIBLE PERSON	MITIGATORY MEASURE (OBJECTIVES AND TARGET)	TIMEFRAME	RESPONSIBLE PERSON	FREQUENCY	PERFORMANCE INDICATOR
				• All potentially hazardous and non-degradable waste shall be collected and removed to a registered waste site • The Contractor shall be in possession of an emergency spill kit that must be complete and available at all times on site • Only emergency repairs shall be allowed on site and a drip tray shall be used to prevent oil spills • The contractor must ensure that delivery drivers and plant operators are informed of all relevant procedures and restrictions required ensuring compliance with this document • All vehicles and equipment must be well maintained to ensure that there are no oil or fuel leakages. • The following shall apply: ○ All contaminated soil / yard stone shall be removed and be placed in containers. ○ Contaminated material can be taken to one central point where bioremediation can be done. ○ A specialist Contractor shall be used for the bioremediation of contaminated soil where the required remediation material and expertise is not available on site. ○ All spills of hazardous substances must be reported to the ECO.				
9.1.10 Personnel conduct	Personnel	Infringement of the EMPr requirements by personnel on site.	Contractor, ESA and labourers.	**Objective:** To ensure that personnel are adhering to the EMPr requirements.	Approved PPE must be issued to all employees pre-construction but must be	Engineer and ECO	Daily monitoring by ESA and Safety Officers.	Personnel wearing proper safety uniform. Absence of trespassers on site

ACTIVITY	ASPECT	POTENTIAL IMPACT	IMPLEMENTATION			MONITORING		
			RESPONSIBLE PERSON	MITIGATORY MEASURE (OBJECTIVES AND TARGET)	TIMEFRAME	RESPONSIBLE PERSON	FREQUENCY	PERFORMANCE INDICATOR
				Targets: • The Contractor will adhere to all requirements of the Occupational Health and Safety Act (Act 56 of 2004), including the drafting of a suitable Health and Safety Plans, risk assesments, and safe work procesures which will be implemented during the construction phase. • All personnel and contractors to undergo Environmental Awareness Training. A signed register of attendance must be kept for proof. • Toolbox talks to include aspects of the EMPr, especially specialist mitigation measures. • Warning signs must be placed on and around the site as per the Occupational, Health and Safety requirements. • Adequate first aid services must be provided by the contractor. • The contractor will be responsible for his own security arrangements and shall comply with all site security instructions. • Basic fire-fighting equipment must be available on site. • PPE to be provided and well maintained. • All incidents should be reported to ECO, investigated, documented and kept in safety file.	used for the duration the construction phase			

9.2 Materials

Table 10: Handling Materials

ACTIVITY	ASPECT	POTENTIAL IMPACT	IMPLEMENTATION			MONITORING		
			RESPONSIBLE PERSON	MITIGATORY MEASURE (OBJECTIVES AND TARGET)	TIMEFRAME	RESPONSIBLE PERSON	FREQUENCY	PERFORMANCE INDICATOR
9.2.1 Transportation of materials	Material transport	Traffic congestions. Production of dust during transportation. Excessive noise.	Contractor and ESA.	**Objective:** To ensure that whilst material is transported, it cannot be of negative influence to the surrounding environment. **Target:** • The contractor should note that existing roads are sufficient to facilitate access to the new office site and that the following should be adhered to: • Adequate and appropriate traffic warning signage must be erected where applicable, along transport routes and access roads. • The Contractor shall take preventative measures e.g. screening, muffling (where possible), timing, pre-notification of affected parties to minimise complaints regarding noise and vibration nuisance from construction activity sources. • Fine materials such as sand must be covered during transportation. • Appropriate response plans must be prepared by the contractor to ensure the fastest possible reaction to spills or accidents. • Deliveries must be scheduled for off-peak hour traffic times. • All trucks and vehicles removing spoil from the site must have load areas and must be covered by a tarpaulin (plastic / synthetic sheets / covers) to prevent rocks and spoil falling onto the road surfaces.	Targets to be implemented prior to start of construction and continually implemented throughout construction phase.	Engineer and ECO	Throughout construction phase	Covering of material during transportation. No complaints received. Emergency reaction plan (for spills/accidents) must always be readily available on site.

ACTIVITY	ASPECT	POTENTIAL IMPACT	IMPLEMENTATION			MONITORING		
			RESPONSIBLE PERSON	MITIGATORY MEASURE (OBJECTIVES AND TARGET)	TIMEFRAME	RESPONSIBLE PERSON	FREQUENCY	PERFORMANCE INDICATOR
				• Vehicle speeds on site should not exceed 20 km/h. • All drivers are to have licences for driving and operating plant on site. • All road vehicles to be road worthy.				
9.2.2 **Storage and handling of hazardous materials.**	Hazardous material handling and storage.	Contamination of soil, water and groundwater by hazardous material. Inadequate remediation measures for spills.	Contractor and ESA	**Objective:** To ensure adequate protection of soil and soil remediation measures in case of spills. **Targets:** • Hazardous materials – such as paint, cement, fuels, bitumen, fuel, oil, herbicides, or detergents – must be stored in sealed, lockable containers when not in use. • A register shall be kept of all substances and be available for inspection at all times. Areas shall be monitored for spills and any spills shall be contained, cleaned and rehabilitated immediately. • No decantation into unmarked containers or containers with incorrect labels. • No decanted fuel to be left unattended in the sun. • When handling hazardous materials, manufacturer's specifications must be complied with. The 16 point Material Safety Data Sheet is available on site. • Driptrays must be used when handling hazardous substances. No hazardous substance containers may be placed on soil. • All spills (minor and major) must be cleaned and remediated to the satisfaction of the ECO and CER within 24 hours of occurrence. • The contractor must ensure that there is a supply of absorbent material (e.g. Drizit)	Construction period	Engineer and ECO	For the duration of the construction period dependent on the presence of hazardous material on site.	Storage of hazardous materials in sealed and lockable containers. No evidence of spills on site. Absorbent and clean-up material readily available on site.

ACTIVITY	ASPECT	POTENTIAL IMPACT	IMPLEMENTATION			MONITORING		
			RESPONSIBLE PERSON	MITIGATORY MEASURE (OBJECTIVES AND TARGET)	TIMEFRAME	RESPONSIBLE PERSON	FREQUENCY	PERFORMANCE INDICATOR
				and clean-up materials readily available to absorb, breakdown and, where possible, encapsulate minor hazardous material spillages. • No material may be stacked higher than 2m. • All products are to be stored with compatibility in mind. • Storage areas shall display the required safety signs depicting “No smoking”, “No naked lights” and “Danger”. Containers shall be clearly marked to indicate contents as well as safety requirements. • The contractor shall supply a method statement to the engineer for approval for the storage of hazardous materials prior to site preparation. • Appoint appropriate contractors to remove any residue from spillages from site. Handling, storage and disposal of excess or containers of potentially hazardous materials shall be in accordance with the requirements of pertinent Regulations and Acts (e.g. Hazardous Substances Act, Number 15 of 1973; National Water Act, Number 36 of 1998.				
9.2.3 **Storage of fuel**	Storage areas	Contamination of soil by fuel. Inadequate remediation measures for spills.	Contractor and ESA	**Objective:** To ensure that there is optimum environmental protection (especially soil) from fuel spills. **Targets:** • Fuel must be stored in above ground storage tanks or sealed containers, contained within a bunded area with sump drainage. • All bunds must be designed to contain at least 110% of the tank or drum storage	Pre-construction phase and site establishment.	ECO	Once-off	Established fuel storage areas in compliance with the objectives of the EMPr.

ACTIVITY	ASPECT	POTENTIAL IMPACT	IMPLEMENTATION			MONITORING		
			RESPONSIBLE PERSON	MITIGATORY MEASURE (OBJECTIVES AND TARGET)	TIMEFRAME	RESPONSIBLE PERSON	FREQUENCY	PERFORMANCE INDICATOR
				capacity (this shall apply to above ground storage, and include fuels). • No drainage from fuel storage areas shall be permitted. • Any other hazardous substances stored in bulk will require bunding.				

9.3 WASTE

Table 11: Handling Waste

ACTIVITY	ASPECT	POTENTIAL IMPACT	IMPLEMENTATION			MONITORING		
			RESPONSIBLE PERSON	MITIGATORY MEASURE (OBJECTIVES AND TARGET)	TIMEFRAME	RESPONSIBLE PERSON	FREQUENCY	PERFORMANCE INDICATOR
9.3.1 **Storage, removal and disposal of construction waste**	Construction waste	Land pollution. Compaction of soil by rubble. Decreased aesthetic integrity of the site.	Contractor and ESA.	**Objective:** To ensure that waste is correctly stored and disposed of, decreasing the visual impact during the construction and post construction period. Disposal of rubble and refuse in an appropriate manner. Minimise litigation. Minimise public complaints. **Target:** • Surplus concrete, road stone, sludge, silt, rubble or any other construction waste may not be dumped indiscriminately on site but shall be disposed of in a registered waste landfill site or recycled as per the approved contractor's **Waste Management Plan.** • Concrete, agregate, bitumen trucks shall not be washed on site after depositing concrete unless it is within an appropriate wash bay. • Any spilled concrete, aggregate, bitumen, warm mix asphalt shall be cleaned up immediately. • Bins and containers/skips must be made available by the contractor for the storage of construction waste and the bins to be removed from site as required. • Temporary storage of construction waste will take place within the site, and within areas designated by the ECO and the Contractor according to the approved site layout plan.	Waste bins/ skips must be available prior to construction. Removal of waste throughout the construction period.	ECO	Throughout construction phase and at a frequency agreed upon in the approved waste management plan.	Construction waste stored, collected and disposed of as per the requirements of this EMPr.

ACTIVITY	ASPECT	POTENTIAL IMPACT	IMPLEMENTATION			MONITORING		
			RESPONSIBLE PERSON	MITIGATORY MEASURE (OBJECTIVES AND TARGET)	TIMEFRAME	RESPONSIBLE PERSON	FREQUENCY	PERFORMANCE INDICATOR
				• The Contractor will be responsible to remove and transport all construction waste material off site to a registered waste disposal or recycling facility (proof of this as well as a copy of the sites Registration Permit, must be provided by the Contractor to the ECO). • No burning of waste is permitted on site. • No waste is permitted to pollute the watercourses.				
9.3.2 **Storage, removal and disposal of domestic waste.**	Domestic waste	Land pollution. Unpleasant odours. Decreased aesthetic integrity of the site.	Contractor and ESA	**Objective:** To ensure that waste is correctly stored and disposed of, decreasing the visual and possible environmental impact during the construction and post construction period. **Targets:** • The Contractor must supply sealable waste bins at the construction camp for the storage of domestic waste. • Clearly marked waste bins are to be provided for the separation of waste according to the WMP. • Recyclable waste, including glass, paper and plastic must be separated at the construction camp, stored and recycled, where economically feasible. • Personnel must be informed about the necessity of using the difference waste drums. • The Contractor must do site clean-ups of litter other than construction waste on a daily basis, and dispose of it in the designated refuse bins provided. • The contractor must ensure that general site-wide litter clean-up will occur at least once a week.	Waste bins/ skips must be available prior to construction. Removal of waste throughout the construction period. Regular removal of waste from waste storage area to registered disposal site.	Engineer and ECO	Waste bins/ skips must be available prior to construction. Throughout construction phase and at a frequency agreed upon in the approved waste management plan.	Evidence of domestic waste stored, removed and disposed of according to the requirements indicated in this EMPr.

ACTIVITY	ASPECT	POTENTIAL IMPACT	IMPLEMENTATION			MONITORING		
			RESPONSIBLE PERSON	MITIGATORY MEASURE (OBJECTIVES AND TARGET)	TIMEFRAME	RESPONSIBLE PERSON	FREQUENCY	PERFORMANCE INDICATOR
				• The Contractor must dispose of all domestic refuse generated by his staff and Sub-Contractors on a weekly basis at a registered waste disposal facility. The Contractor must provide proof of this to the ECO in the form of a safe disposal certificate. • Sealable waste drums should be provided in close proximity to all working areas during the construction of the new office building. • The waste storage area must not be allowed to overflow with waste.				
9.3.3 **Storage, removal and disposal of hazardous waste**	Hazardous waste	Soil and water pollution	Contractor and ESA	**Objective:** To ensure that soil and the rest of the surrounding environment on site is protected from hazardous waste. **Targets:** • The Contractor is required to refer to the Hazardous Substances Act No 15 of 1973 act to determine whether any substance (new or waste) stored on site is subject to controls contained within the act. • All hazardous waste must be stored in sealed and suitably marked containers for removal to a registered hazardous waste disposal facility. • Any oil spillage on site will be excavated to a depth of 150 mm and disposed of for removal to a registered hazardous waste disposal site. Excavated areas are to be refilled with suitable replacement material. Alternative in-situ remediation techniques could be used, if approved by the ECO.	Throughout construction phase.	ECO	Old hydrocarbons and other hazardous materials must be removed on a regular basis (at least every 30 days).	All mitigation measures with regards to Hazardous waste mentioned in the EMPr are implemented.

ACTIVITY	ASPECT	POTENTIAL IMPACT	IMPLEMENTATION			MONITORING		
			RESPONSIBLE PERSON	MITIGATORY MEASURE (OBJECTIVES AND TARGET)	TIMEFRAME	RESPONSIBLE PERSON	FREQUENCY	PERFORMANCE INDICATOR
				• Contaminated water must be stored in sealable marked containers and disposed of with other waste water from the construction works. • Refer and adhere to the approved Waste Management Plan as compiled by the Contractor and approved by the ECO.				

9.4 Surrounding Properties

Table 12: Surrounding Properties

ACTIVITY	ASPECT	POTENTIAL IMPACT	IMPLEMENTATION			MONITORING		
			RESPONSIBLE PERSON	MITIGATORY MEASURE (OBJECTIVES AND TARGET)	TIMEFRAME	RESPONSIBLE PERSON	FREQUENCY	PERFORMANCE INDICATOR
9.4.1 **Use of existing roads**	Access roads	Damage to access roads. Damage to environment Erosion.	Contractor and ESA	**Objective:** To minimise damage to existing roads. **Target:** • Care to be taken to prevent damage to existing access roads. • Adhere to traffic signs and road markings. • Ensure that open trucks are covered with tarpaulins (plastic liners) to ensure no transported materials fall onto the road surface (such as asphalt, gravel, aggregate, concrete, bitmen and warm mix asphalt).	Implement during site establishment and monitor throughout construction phase.	ECO	Daily	No claims from Landowners due to further damage on existing access roads. No damage visible on access roads

9.5 Fauna, Flora, Air Quality, Noise, Water and Other Environmental Aspects

Table 13: Flora, fauna, air quality, noise, water and other

ACTIVITY	ASPECT	POTENTIAL IMPACT	IMPLEMENTATION			MONITORING		
			RESPONSIBLE PERSON	MITIGATORY MEASURE (OBJECTIVES AND TARGET)	TIMEFRAME	RESPONSIBLE PERSON	FREQUENCY	PERFORMANCE INDICATOR
9.5.1 Vegetation clearing	Vegetation	Damage to vegetation. Erosion and sedimentation.	Contractor and ESA.	**Objective:** Minimise damage to vegetation. **Target:** • The objective of vegetation clearing is to trim, cut or clear the minimum number of trees and vegetation necessary for safe construction and operation of the roads. • No vegetation shall be pushed into heaps or left lying on the site. • Where possible, do not clear vegetation in areas where construction activities are only planned for a later period (i.e. implement a phased approach). • All topsoil removed to be stored for future use during rehabilitation.	Plan vegetation clearing according to construction timeframes during pre-construction phase. Clearing to be done during construction phase as required.	ECO	Weekly monitoring	No unnecessary loss of vegetation.
9.5.2 Vegetation clearing	Conservation and protection of flora	Unnecessary removal of flora. Removal of vegetative matter for firewood.	Contractor and ESA.	**Objective:** Minimise extent of vegetation removal. **Target:** • Only eradicated or trimmed-down vegetation matter may be removed from site. • No vegetative matter may be removed for firewood – this is strictly prohibited. • No open fires are permitted. • No material storage or lay down is permitted under trees.	During the establishment of the construction site.		Weekly monitoring	No unnecessary loss of vegetation.
9.5.3 Protection and handling	Protection of fauna	Intentional or unintentional killing of fauna on site.	Contractor and ESA.	**Objective:** To ensure that fauna found on site are protected and not interfered with.	Throughout the construction and post	ECO	Continuous	No evidence of domestic animals on site.

of possible fauna on site.		Loss of fauna due to habitat disturbance.		**Target:** • The contractor must ensure that the site is kept clean and free of rubbish that could potentially attract animal pests, and that rubbish bins are scavenger proof. • The contractor must report problem animals or vermin to the ECO. • Ensure that domesticated animals belonging to the local community are kept away from the construction works. • The contractor may under no circumstances make use of pesticide or poison to control unwanted animals. • Animals (incl. snakes, tortoises and lizards) must be removed from the site should they be directly threatened by the vegetation clearance or construction activities. The ESA or ECO must be contacted for assistance in this regard. Snake handling must be done by an appropriately trained individual. • Excavations and trenches must be inspected daily (first thing in the morning) to check whether any animals have been trapped. Any trapped animals must be removed and relocated to a safe location outside of the development footprint. • In terms of fencing and movement of fauna, the following must be implemented: • Small ground level openings, 20-30 cm in height, should be kept clear in electrical fencing, at least at strategic places, to facilitate the movement of small mammals and reptiles to move through the site; • Fencing (e.g. palisade) must provide appropriate opening for animals to pass through – bars placed 20cm apart should provide sufficient space for the movement of small animals whilst deterring human; and • If not electrified, the bottom wire of perimeter fence must be at least 15cm from the ground,	construction period.			The site is kept clean and does not attract pests or local fauna.

				20cm if electrified (tortoises retreat into shell when shocked).				
9.5.4 **Earthworks**	Dust control	Air pollution	Contractor and ESA.	**Objective:** To reduce the generation of dust on the construction site. **Target:** • Dust suppression is to be conducted during construction, or as complaints are received. • The Contractor is to take appropriate measures to minimise the generation of dust as a result of excavation works (such measures include frequent water spraying during low rainfall periods or by using chemical dust binding agents approved by the ECO).	Throughout construction period.	ECO	During periods of low rainfall or as required by the ECO.	Dust is kept at its lowest level on site.
9.5.5 **Use of construction vehicles and equipment**	Construction vehicles, plant and machinery.	Noise and vibration.	Contractor and ESA.	**Objective:** Noise levels are kept to a minimum on site. **Target:** • Should construction have to continue after hours, all affected stakeholders must be notified. • All machinery and equipment must be maintained in good working order, and fitted with approved and specified muffler systems (where possible). • The contractor shall have an updated complaints register on site.	Throughout the construction period.	Engineer and ECO	Continuous	No complaints received from affected communities / stakeholders.
9.5.6 **Water use and protection of the watercourse**	Water management	Water wastage. Pollution of the watercourse. Degradation of the downstream water resource.	Contractor and ESA.	**Objective:** To prevent the pollution of water, any long-term degradation of the area's watercourses and the unnecessary wastage of water. **Target:** • Comply with all requirements of the approved WUL and aquatic assessments. • Maintain all required buffer zones as per specialist assessments.	Construction phase	Engineer and ECO	Continuous when these activities are taking place.	Activities undertaken near watercourses must be in-line with and consider the specified environmental controls.

				• During the execution of the works, appropriate measures to prevent pollution and contamination of the riparian environment must be implemented e.g. including ensuring that construction equipment is well maintained and driptrays must be used at all times. • The use of silt fences are more important during summer months (rainy seasons) and would require more regular maintenance during this time. • Where earthwork is being undertaken in close proximity to any watercourse, slopes must be stabilised using suitable materials, i.e. sandbags or geotextile fabric, to prevent sand and rock from entering the watercourses. • Appropriate rehabilitation and re-vegetation measures for the watercourse banks must be implemented timeously. In this regard, the banks should be appropriately and incrementally stabilised as soon as development allows. • All water used on site must be done so sparingly. Toolbox talks must include the conservation of water. • Avoid unnecessary vehicle crossings and access into the watercourse. • Any dewatering that needs to be done from excavated areas during the construction phase should be released into a silt bay that is maintained in order to trap and remove sediments before they enter watercourse habitat.				
9.5.7 **Protection of heritage resources**	Heritage resources	Damage to heritage resources on site.	Contractor and ESA.	**Objective:** To prevent any damage to heritage resources on site. **Target:** • In the event that any sub-surface heritage resources or graves are unearthed all work has to be stopped until an assessment as to the significance of the site (or material) in	Continuous monitoring throughout the construction phase.	ECO	Daily monitoring by ESA and weekly inspections by ECO	No damage to heritage resources on site.

				question has been made by a heritage practitioner. • No archaeological material that has been uncovered may be removed. This applies to graves and cemeteries as well. In the event that any graves or burial places are located during the development, the procedures and requirements pertaining to graves and burials will apply. If human remains are uncovered, or previously unknown graves are discovered, a qualified archaeologist needs to be contacted and an evaluation of the finds made. If the remains are to be exhumed and relocated, the relocation procedures as accepted by Heritage Western Cape/ South African Heritage Resources Agency (SAHRA) need to be followed. • If any archaeological material is uncovered during the course of development, then work in the immediate area should cease. The find will need to be immediately reported to Heritage Western Cape. • If any area that contains stone artefacts in reasonable numbers (e.g. more than 10 within a few metres of one another) or in high concentrations is noted during the proposed developments this should be inspected by an archaeologist prior to any disturbance.				

9.6 Rehabilitation

Table 14: Rehabilitation

ACTIVITY	ASPECT	POTENTIAL IMPACT	IMPLEMENTATION			MONITORING		
			RESPONSIBLE PERSON	MITIGATORY MEASURE (OBJECTIVES AND TARGET)	TIMEFRAME	RESPONSIBLE PERSON	FREQUENCY	PERFORMANCE INDICATOR
9.6.1 Rehabilitation of disturbed areas	Rehabilitation	Visual impact of construction site due to poor or no rehabilitation. Risks of erosion and sedimentation of watercourse due to poor or no rehabilitation. Potential dust impact due to poor or no rehabilitation.	Contractor and ESA.	**Objective:** To ensure adequate rehabilitation of the entire construction site upon completion of construction activities. **Target:** • Completed areas are to be rehabilitation as soon as possible by following a phased approach. • Rehabilitated areas are to be fenced off to prevent further disturbance during the construction phase. • Indigenous species are to be used where feasible, especially when considering the planting of new trees. • Where indigenous species are not considered, the contractor shall ensure that, at a minimum, the area is rehabilitated back to its original state. • All waste, storage areas, bunds, toilets, temporary roads, buildings, etc. shall be removed from site and legally and appropriately disposed of.	Implement during construction phase as and when sections of the works are completed.	Engineer and ECO	Daily	Proposed Wildebosch Road Extension to Trumali Street is adequately rehabilitated after construction completion. No complaints from the Employer or stakeholders.

9.7 Planning and Engineering Considerations

Table 15: Planning and Engineering Considerations

ACTIVITY	ASPECT	POTENTIAL IMPACT	IMPLEMENTATION			MONITORING		
			RESPONSIBLE PERSON	MITIGATORY MEASURE (OBJECTIVES AND TARGET)	TIMEFRAME	RESPONSIBLE PERSON	FREQUENCY	PERFORMANCE INDICATOR
9.7.1 Construction activities	Existing infrastructure	Disruption of services, damage to installations, damage or loss of plant.	Contractor and ESA.	**Objective:** To prevent disruption or damage to existing infrastructure or services. **Target:** • Telephone line, power lines and fibre lines shall be identified during the construction operations. • Possible known pipelines must be considered during planning and construction. • Where pipelines are found, the depth of the pipes under the surface shall be determined to ensure that proper protection is afforded to such structures. • Any damage to pipelines shall be repaired immediately. • All existing access roads used for construction purposes, shall be maintained at all times to ensure that neighbours have free access to and from their properties. • Speed limits shall be enforced in such areas and all drivers shall be sensitised to this effect.	Prior to construction and during construction.	Engineer and ECO	Continuous	No unplanned disruptions of services. No damage to any plant or installations. No complaints from authorities or Landowners regarding disruption of services. No litigation due to losses of plant, or installations.

10 Non-Compliance and Penalties

Non-compliance with this EMPr must be monitored by the ECO and reported in the monthly ECO Reports. Any non-compliance must be reported to the CA.

Penalties or fines must be issued at the discretion of the Engineer as per the penalties agreement between the Engineer and Contractor. The ECO to take up any non-compliance issues that may result in a fine or penalty with the Engineer.

It should however be noted that the nature of the activities associated with the project, even with the best of intentions, will inevitably cause some form of environmental degradation. The costs of having to make good on such environmental degradation is usually sufficient punishment without the need to look to other punitive measures. The implementation of a penalty system therefore requires careful consideration:

- Penalties would typically be warranted by persistent negligence on the part of the Contractor or failure to respond adequately to environmental considerations.
- Removal from site would typically be warranted where a particular staff member or piece of equipment is the cause of persistent environmental damage following previous warnings.
- Suspension of the road works would only be warranted under rare circumstances where the Contractor's actions have caused or are likely to cause significant environmental degradation.

The type and extent of the corrective measures required to address non-compliance would depend on the nature of the transgression and the Contractor's history in terms of compliance with their environmental obligations. When deciding on the nature of any punitive actions, however, it is important to recognise that the effective implementation of the EMPr is highly dependent on the quality of the working relationships that develop between the key role-players. Accordingly, an excessive response to non-compliance, particularly for a minor or unintentional transgression, may cause significant environmental degradation in the long term due to its effect in eroding the Contractor commitment to meeting their environmental responsibilities. Moreover, other mechanisms, such as an expanded environmental induction programme, may prove more effective than purely punitive measures in controlling non-compliance in the long-term. This is an important consideration that must be borne in mind by the Engineer and the Contractor when responding to non-compliances on site.

11 Operational Phase

The operational phase commences when the proposed development is being used for its intended purpose i.e., road extension and upgrades. It is possible that there will be a period in the project life cycle where the construction and operational phase will overlap. This phase will include ongoing operation, monitoring and maintenance of the roads, as well as continuing environmental management requirements (e.g., removal of alien and invasive vegetation).

11.1 Alien and Invasive Plant Management Plan

The Alien and Invasive Plant (AIP) Management Plan must be drafted for implementation, covering all phases of the project from construction to operation.

11.2 Erosion Control Structures

The areas surrounding the sites, particularly the watercourses (i.e. UCVBW) must be monitored for signs of erosion and remedial actions implemented where required. The erosion management methods described under the construction phase and in the freshwater assessment report must be fully implemented.

12 Decommissioning

The decommissioning phase refers to the discontinuation of the Wildebosch road extension and removal of all associated infrastructure such as the wetland crossing. Rehabilitation of the site to a suitable end use would also form part of the decommissioning phase. However, it is highly unlikely that the road would be removed and return the site to pre-construction conditions. The intention is to continue with the project for as long as the road extension and upgrade is sustainable.

A Closure Plan is not applicable to this project as it is not anticipated that the proposed project will be closed. In case that there is a need to close the development, a closure plan should be developed at the time of closure. This would likely take place during the closure of the entire road extension footprint, comprising of all infrastructure. All the relevant authorisations relating to closure should be granted before closure activities commences.

13 Plans, Permits and Programmes

Several plans, permits and programmes may be required through the duration of the project lifecycle. The requirements for these will be determined throughout the environmental impact assessment process through consultation with the authorities and may require amendments as the project proceeds. These have been briefly described below as follows.

13.1 Permits

13.1.1 Water Use Authorisation

As discussed above and in the Freshwater Assessment Report, the DWS risk assessment undertaken by FEN indicated that the impacts associated with road construction and installation of the culvert within the wetland showed a moderate risk significance. The risk score was above the threshold value, and therefore could not be manually down adjusted to realise a low-risk significance score. Therefore, as per GN509, the proposed construction activities within a wetland and regulated area of a wetland would require authorisation through a full Water Use Licence Application. Zutari is currently undertaking the WULA for this proposed road development.

The commencement of the construction activities within the wetland and regulated area of a wetland must not be permitted on site until an approved WUL is in place for the project.

14 Conclusion

The EMPr must be regarded as a living document and changes must be made to this EMPr as required as when the project evolves, while retaining the underlying principles and objectives on which the document is based. The compilation of the EMPr has incorporated environmental management best practice principles, impacts and mitigation measures from the draft Environmental Impact Assessment Report and all environmental specialist assessment reports (i.e., included as Annexure D of the Basic Assessment Report).

15 Reference List

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Appendix A: EAP details

Xanté Eberhardt

Environmental Specialist

Summary

Xanté is an environmental practitioner and project manager at Zutari, gaining extensive experience in project management and environmental management over the past twelve years.

Xanté plays an integral role in the project management of several projects which includes report writing, client liaison, budget and resource management, as well as time management. She has successfully applied for environmental authorisations for several projects, as well as assisted with the motivation for non-environmental impact assessment (EIA) letters form the relevant authorities. She has completed numerous project management courses to enhance her project management skills as well as a course in procurement. Xanté handled all procurement for Zutari's North West offices, where her duties include tender compilation and evaluation for clients, as well as tendering for new projects. During 2013, Xanté was elected to be on Zutari's Skills Development and Employment Equity Forum.

Qualifications
BSc (Hons) Environmental Sciences and Management
BSc Environmental and Biological Sciences

Professional registrations
Environmental Assessment Practitioner (EAP), Environmental Assessment Practitioners Association of South Africa (EAPASA)
Member, International Association for Impact Assessment South Africa (IAIAsa)

Specialisation
Project and environmental management

Years in industry
14

Relevant experience

Business planning for the City of Cape Town's Transport Directorate, South Africa, Western Cape, City of Cape Town, 12/2019 - 12/2027, Environmental Assessment Practitioner

Zutari was appointed for the transport planning, urban design, business case development, and project management for projects and tasks undertaken by the City of Cape Town's Transport Directorate. Each project, task, and transversal project was assigned technical specialists in the transport, planning, contractual, business, and strategic management arenas. The projects undertaken included projects in business planning, contract management, operations, industry transition and regulations, fleet and facilities management, and infrastructure projects. The transversal projects related to human settlements, strategic assets, and urban planning and design. These included an urban renewal framework for the Bellville central business district (CBD) under Urban Catalytic projects, economic forecasting for the 2040 land use model for urban planning, known as OneCape2040, business case for various city-owned facilities, and a feasibility study of the city's inclusionary housing policy for human settlements. Responsible to acquire environmental authorisations.

Upgrading of Road D327 from Ganyesa to Vragas - Phase 1, 2 and 3, South Africa, North West, North West Department of Public Works and Roads (DPWR), 09/2012 - 09/2023, Environmental Control Officer (ECO)/Project Administrator

The project involved the upgrading of 57 km of Road D327, from Ganyesa to Vragas to Madinonyane, from gravel to surfaced standards. Services included a scoping report, preliminary design, detailed design, contract documentation and site supervision. Responsible for general project administration and management and environmental control officer (ECO) duties.

Diversion study for Lourens River Diversion, South Africa, Western Cape, City of Cape Town, 11/2021 - 06/2023, Environmental Assessment Practitioner

Zutari was appointed to undertake a diversion study for the Lourens River Diversion. Responsible to acquire environmental authorisations.

Rehabilitation of Kleinplaas Dam, South Africa, Western Cape, City of Cape Town, 03/2022 - 09/2022, Environmental Assessment Practitioner

Zutari was appointed as the engineering consultant for the reseal of the Kleinplaas Dam. Responsible to acquire environmental authorisations.

Zeerust wastewater treatment works (WWTW), South Africa, North West, Ngaka Modiri Molema District Municipality (NMMDM), 08/2009 - 07/2022, Environmental Advisor/Project Administrator

Zutari has been appointed to assess the current and future state of the Zeerust wastewater treatment works (WWTW) after concerns were raised concerning the plant's non-compliance with the statutory standards. The upgrading strategy was divided into an immediate, medium-term and long-term strategy. The upgrading strategy involves refurbishing the existing WWTW, constructing a new activated sludge (AS) biological reactor and associated secondary settling tanks (SSTs) beside the existing Orbal biological reactor and constructing a new biological reactor with a capacity of 5 Ml/d in the place of the existing Orbal reactor. Responsible for the evaluation/review of environmental reports for further authorisation as well as general project administration and management.

Sannieshof wastewater treatment plant (WWTP), South Africa, North West, Ngaka Modiri Molema District Municipality (NMMDM), 03/2018 - 06/2022, Environmental Consultant and Advisor/Project Administrator

The project involves the extension of the wastewater treatment capacity in Sannieshof and surrounding areas to address future treatment requirements. This includes the new Agisanang pump station which will address future treatment and conveyance requirements. It comprises the construction of a new inlet works, a biological reactor, secondary settling tanks, wash-water pump station, sludge recycle pump station and the refurbishment of the Agisanang raw sewage pump station. It also entails a treated effluent outfall pipeline, MCC building, flow diversion and collection chambers, interconnecting pipework, internal roads, stormwater, fencing and minor modifications to existing structures. Responsible for the evaluation/review of environmental reports for further authorisation as well as acquiring non-listed activity confirmation from READ and general project administration and management.

Upgrading of Road D933 from Lichtenburg to Gelukspan, South Africa, North West, North West Department of Public Works and Roads (DPWR), 08/2013 - 06/2022, Environmental Advisor/Project Administrator

Zutari was appointed as the engineering consultant for the upgrading of the road network near Sephaku Cement's new factory. The project entailed the construction of Road D933 and the connecting Road D2095 in the Ngaka Modiri Molema district. The scope of works comprised formalising the horizontal alignment, incorporating minor improvements to the road geometry and vertical alignments to ensure acceptable safety standards at the required design speeds for the road users. This included constructing pavement layers, surfaced lanes and gravel shoulders as well as stormwater drainage structures, road markings and signage. Responsible for general project administration and management as well as for the evaluation/review of environmental reports for further authorisation.

Upgrading of Road D53, South Africa, North West, North West Department of Public Works and Roads (DPWR), 10/2019 - 10/2021, Environmental Advisor/Project Administrator

Zutari was appointed as the engineering consultant for the upgrading of Road D53 - Dwarsberg to Derdepoort. Responsible for general project administration and management as well as for the evaluation/review of environmental reports for further authorisation.

Upgrading of the water supply scheme in Madibogo, South Africa, North West, Ngaka Modiri Molema District Municipality (NMMDM), 09/2009 - 12/2019, Environmental Advisor/Project Administrator

The project involves investigating options to upgrade the bulk water supply in Madibogo and address the bulk conveyance, storage and treatment of water sourced from boreholes as well as verifying the yield of existing and new boreholes, gathering detailed water quality data to refine the treatment process and a geotechnical investigation. Zutari identified supply zones and finalised pipeline routes, pump duties, pipe diameters and placement of isolating valves for system flexibility as well as determined the electrical installation and control philosophy of the borehole wellfields and designed three new reservoirs of 2 000 m^3 to allow for power outages and maintenance on the borehole pumps. Responsible for evaluation/review of environmental reports for further authorisation. Also responsible for general project administration and management.

P124-1 Road construction Phase 2, South Africa, North West, Department of Public Works, Roads and Transport (DPWRT), 03/2017 - 10/2019, Project Administrator/Environmental Advisor

Zutari was appointed to preliminary investigation (scoping report), preliminary design, detailed design, tender documentation and supervision of the development of phase 2 of road P124-1 between Mabeskraal and Derdepoort, comprising approximately 19 km of road P124-1 from Dwarsberg to the Limpopo Provincial border. Responsible for general project administration and management. Also responsible for evaluation/review of environmental reports for further authorisation.

Municipal Infrastructure Support Agent (MISA) water conservation and demand management plans, South Africa, North West, Municipal Infrastructure Support Agent (MISA), 11/2018 - 07/2019, Project Administrator

Zutari was appointed to develop water conservation and demand management (WC&DM) plans for the Ngaka Modiri Molema District Municipality (NMMDM). Responsible for project administration and management.

Zeerust police station repairs, South Africa, North West, North West Provincial Government Department of Public Works, 10/2007 - 07/2019, Project Administrator

Zutari was appointed to undertake repairs to the Zeerust police station. Responsible for general project administration and management.

North West Province aviation master plan, South Africa, North West, Department of Community Safety & Transport Management (DCS&TM), 04/2017 - 07/2019, Project Administrator

The project entailed master planning for the network of airports and airfields in the North-West Province. The environmental scope of work involved screening of each airport to determine the environmental opportunities and constraints regarding potential expansion at each of these airports or airfields. Responsible for general project administration and management.

Matlosana mining town human settlements transformation plan, South Africa, North West, Housing Development Agency (HDA), 08/2018 - 03/2019, Environmental Advisor

Zutari was appointed for the diagnostic analysis of the human settlements distresses of the mining towns in the City of Matlosana Municipality and development of a Human Settlements Spatial Transformation Plan with transformation interventions and an integrated project pipeline. Responsible for acquiring environmental data for KOSH mine towns with town planners.

Ellaton housing development, South Africa, North West, Manapendlo Social Housing Institution, 11/2014 - 12/2018, Environmental Consultant/Project Administrator

Zutari was appointed for the planning, design and construction monitoring services for the low cost/economical housing development in Ellaton. The scope works also included the design of sewer, potable water and electricity reticulation systems. Responsible for general project administration and management as well as environmental authorisation application, public participation, basic assessment report (BAR) and environmental management plan (EMP).

Basic assessment report (BAR) for the Matlosana Substation, South Africa, North West, City of Matlosana, 05/2016 - 12/2017, Project Leader/Environmental Consultant

Zutari was appointed for the environmental authorisation and basic assessment report (BAR) for the new 88/11 kV substation in Manzilpark, Klerksdorp. Responsible for acquiring non-listed activity confirmation from READ, as well as general project administration and management.

Vuk'Uphile contractor development programme, South Africa, North West, North West Department of Public Works and Roads (DPWR), 09/2013 - 09/2017, Project Administrator

As part of the Expanded Public Works Programme (EPWP), the Department of Public Works (DPW) initiated the Vuk'uphile learnership programme, aimed at developing emerging contractors into skilled contractors able to execute labour-intensive projects. Zutari was appointed for the project management and implementation of the programme for contractor and supervisor development, including for the planning, implementation and close-out of the projects on which the contractors/supervisors were developed. The contractors/supervisors were developed in civil engineering; general building; road marking and signage; landscaping, irrigation and horticultural work and mechanical and electrical maintenance. Responsible for project administration, including meeting minutes and document control.

Technical assessment of Housing Development Agency (HDA) catalytic projects, South Africa, North West, Housing Development Agency (HDA), 09/2015 - 11/2016, Environmental Advisor

The project comprised a technical assessment of specific human settlement projects for the Housing Development Agency (HDA). The assessment included a technical, institutional, financial and legal assessment of 30 catalytic projects. Responsible for the evaluation/review of environmental reports for further decision making.

Fibre optic cable installations in Orkney, Potchefstroom and Klerksdorp, South Africa, North West, Dark Fibre Africa (DFA), 06/2011 - 05/2016, Project Administrator

Zutari was appointed in a joint venture (JV) with PH Bagale for the installation of underground and overhead optic fibre cabling, wayleave applications and undertaking fibre optic cable route surveys. Responsible for project administration, including project plan, meeting minutes, invoicing and report writing.

Construction of Jouberton Police Station, South Africa, North West, Department of Public Works (DPW), 03/2007 - 03/2016, Project Administrator

Zutari was appointed for the design and site supervision of a new police station and single quarters in Jouberton, Klerksdorp. Responsible for project administration, including project plan, meeting minutes, invoicing and report writing.

Water supply line to Muranti reservoir, South Africa, North West, City of Matlosana, 03/2010 - 12/2015, Project Administrator

The project comprised a water supply line from Endpoint to Muranti Reservoir, Phase 2. Responsible for project administration, including project plan, meeting minutes, invoicing and report writing.

Design and construction of a new solid waste landfill site north of Bloemhof, South Africa, North West, Dr Ruth Segomotsi Mompati District Municipality, 03/2011 - 10/2015, Environmental Advisor/Project Administrator

There was a lack of a proper solid waste landfill site for the inhabitants under the jurisdiction of the Lekwa Teemane Local Municipality. Zutari was appointed to perform a baseline geohydrological study at a location reserved for the construction of the new solid waste landfill site, 2 km north of Bloemhof. The investigation formed part of several specialist studies required for inclusion in the documentation for obtaining environmental authorisations (EAs); and was carried out according to guidelines published in the Minimum Requirements for Waste Disposal by Landfill, Second Edition (1998). Responsible for project administration, including project plan, meeting minutes, invoicing and report writing. Also responsible for performing field work.

Design and construction of a new solid waste landfill north of Christiana, South Africa, North West, Dr Ruth Segomotsi Mompati District Municipality, 03/2011 - 10/2015, Environmental Advisor/Project Administrator

There was a lack of a proper solid waste landfill site for the inhabitants under the jurisdiction of the Lekwa Teemane Local Municipality. Zutari was appointed to perform a baseline geohydrological study at a location reserved for the construction of the new solid waste landfill site, 1.3 km north of Christiana. The investigation formed part of several specialist studies required for inclusion in the documentation for obtaining environmental authorisations (EAs); and was carried out according to guidelines published in the Minimum Requirements for Waste Disposal by Landfill, Second Edition (1998). Responsible for project administration, including project plan, meeting minutes, invoicing and report writing. Also responsible for performing field work.

Environmental impact assessment (EIA) for red meat abattoirs, South Africa, North West, Department of Agriculture, Conservation, Environment and Rural Development (DACERD), 10/2013 - 03/2015, Project Leader/Environmental Specialist

The project comprised a basic assessment report (BAR) for the Department of Agriculture, Conservation, Environment and Rural Development (DACERD) to establish three red meat abattoirs. Responsible for the environmental authorisation application, public participation, BAR and environmental management plan (EMP).

Ablution facilities for Kopanang gold mine, South Africa, North West, AngloGold Ashanti, 09/2009 - 02/2015, Project Administrator

Zutari was appointed for the compilation of specifications and construction supervision of structural repairs at Kopanang Residences. Responsible for project administration, including project plan, meeting minutes, invoicing and report writing.

Basic assessment report (BAR) for the Sebele rare species breeding project, South Africa, North West, North West Parks and Tourism Board, 05/2014 - 12/2014, Project Leader/Environmental Specialist

Zutari was appointed to undertake a basic assessment report (BAR), public participation process (PPP) and environmental management plan (EMP) for the environmental authorisation of the proposed Sebele rare species breeding camp and lodge. Responsible for the environmental authorisation application, public participation, BAR and EMP.

Sannieshof wastewater treatment plant (WWTP), South Africa, North West, Ngaka Modiri Molema District Municipality (NMMDM), 07/2009 - 12/2014, Environmental Consultant and Advisor/Project Administrator

Zutari was appointed to design, procure and manage the construction of a new wastewater treatment plant (WWTP) to replace the existing oxidation pond system at Sannieshof. Responsible for the evaluation/review of environmental reports for further authorisation as well as acquiring non-listed activity confirmation from READ and general project administration and management.

Upgrading of the Benji Oliphant and Meteor Roads, South Africa, North West, City of Matlosana, 01/2010 - 07/2014, Project Administrator

Zutari was appointed the design and construction supervision for the upgrading of the Benjy Oliphant and Meteor Road including the National Route 12 (N12) intersection. The existing intersection was not capable of handling the existing traffic volumes and was in a state of deterioration. The upgrading has ensured better traffic flow and the capability to handle higher volumes of traffic flow. Responsible for project administration, including project plan, meeting minutes, invoicing and report writing.

Refurbishment and upgrading of the Mmabatho College of Nursing (MMACON), South Africa, North West, North West Department of Health, 11/2011 - 06/2014, Project Administrator

The project entailed the refurbishment and upgrading of the Mmabatho College of Nursing (MMACON) due to the influx of nursing students. The nursing college in Mahikeng only provided for the training of 600 nurses, but needed to train 1 200. The work included the provision of lecture halls, a library, simulation rooms, administration offices, a kitchen, a dining hall, student accommodation and services. Zutari's scope of works included project management; design of civil, structural, electrical, wet services, and information and communications technology (ICT) and quantity surveying (QS) services. Responsible for Sciforma and assisting with project planning and budgeting.

Link roads for the West Rand District Municipality (WRDM), South Africa, Gauteng, West Rand District Municipality (WRDM), 09/2008 - 05/2013, Environmental Advisor/Project Administrator

Zutari was appointed for the design, procurement process and supervision for the construction of roads

between Rietvallei 241 IQ and Rietvallei Extension 2 and between Toekomsrust and Rietvallei Extension 3. Responsible for project administration, including project plan, meeting minutes, invoicing and report writing. Also responsible for the evaluation/review of environmental reports for further authorisation.

Ablution facilities for the Great Noligwa gold mine, South Africa, North West, AngloGold Ashanti, 04/2011 - 04/2013, Project Administrator

Zutari was appointed for the compilation of specifications and construction supervision of structural repairs at Noligwa Residences. Responsible for project administration, including project plan, meeting minutes, invoicing and report writing.

Pipeline from the African Explosives Limited (AEL) reservoir to Noligwa bridge, South Africa, North West, AngloGold Ashanti, 06/2010 - 11/2012, Project Administrator

The project entailed the installation of a new 600 mm diameter glass-fibre reinforced polyester (GRP) potable water pipeline, connecting the African Explosives Limited (AEL) reservoir to the existing Noligwa bridge pipeline near the Great Noligwa gold mine. Zutari was appointed for the design and site supervision. Responsible for project administration, including project plan, meeting minutes, invoicing and report writing.

AngloGold Vaal Reefs stormwater plan, South Africa, North West, AngloGold Ashanti, 10/2010 - 04/2012, Project Administrator/Environmental Specialist

Zutari was appointed to do a clean surface water evaluation in both the West Wits and Vaal River mine lease areas. This study formed part of an integrated stormwater master plan in which both clean and dirty runoff would eventually be addressed to comply with Regulation 704. Responsible for project administration, including project plan, meeting minutes, invoicing and report writing. Also responsible for performing field work and data capturing.

Upgrading of Road D53 to bituminous standards, South Africa, North West, Department of Transport and Community Safety, 06/2008 - 04/2012, Project Administrator/Environmental Advisor

The project entailed the upgrading of 9.4 km of Road D53 between P124-1 and Molatedi from gravel to bituminous standards by means of labour-intensive construction (LIC) methods. Zutari's scope of works included the compilation of a scoping report (assessment) followed by the detailed design, tender documentation and supervision. Sub-consultants have been engaged for survey, environmental impact assessment (EIA) and geotechnical investigations. Responsible for general project administration and management as well as reviewing environmental legislative requirements.

Construction of the Jouberton main stormwater channel, Phases 1 and 2, South Africa, North West, City of Matlosana, 01/2010 - 07/2011, Project Administrator

Zutari was appointed for the construction of a main stormwater channel in Jouberton. The first phase of the project entailed the construction of 1 000 m of the 3 000 m open stormwater channel. Phase 2 of the project entailed the completion of the project, namely the construction of the final 2 000 m of the stormwater channel. Responsible for project administration, including project plan, meeting minutes, invoicing and report writing.

Consulting engineering services for Road P124-1: Mabeskraal to Derdepoort, South Africa, North West, North West Department of Public Works and Roads (DPWR), 07/2004 - 04/2010, Environmental Advisor/Project Administrator

The project entailed the preliminary investigation (scoping report), preliminary and detailed design, tender documentation and supervision of the development of Phase 2 of Road P124-1 between Mabeskraal and Derdepoort, comprising approximately 19 km of Road 124-1 from Dwarsberg to the Limpopo provincial border. Responsible for general project administration and management as well as for the evaluation/review of environmental reports for further authorisation.

Rehabilitation of a section of National Route 12 (N12) at Broadbend Street in Wolmaranstad, South Africa, North West, Dr Kenneth Kaunda District Municipality, 11/2008 - 06/2009, Project Administrator

Zutari was appointed for the rehabilitation of a 2 km x 17 m section of Broadbend Street along National Route 12 (N12) in Wolmaranstad, from conception to close-out. Zutari also capacitated a firm, King & Associates, who was brought on board to benefit from skills transfer in terms of the rehabilitation of national roads. Responsible for project administration, including project plan, meeting minutes, invoicing and report writing.

Siphamandla Mzolo

Junior Environmental Consultant

Summary

Siphamandla is a junior environmental consultant with a broad knowledge and practical application of environmental management tools across various sectors. His key duties include undertaking pre-feasibility studies, authoring, compiling, and finalising Environmental Impact Assessments (EIAs) and Environmental Management Programmes (EMPrs) for construction and operation of various projects, such as roads, bio-gas plants, solar energy plants, wind farms, tourist attraction site, water, balancing dams, mixed land-use developments, and mining operations. Moreover, he is instrumental in conducting water use license applications for various operations or projects, and environmental due diligence studies for business acquisition.

He is skilled in conducting NEMA compliance audits, water use licence audits, GN R704 compliance audits, and environmental performance assessments. He supported the implementation of ISO14001 EMS and undertook internal compliance audits in terms of ISO14001:2015 for various operations. He conducted continuous environmental inspections as a mine environmental control officer (ECO), authoring environmental operational procedures, providing environmental performance improvement strategies, investigating various environmental incidents, as well as developing short term, and long-term remedial action plans. He also led and managed rehabilitation projects from planning phase to execution, coordinated stakeholder engagements, authored, and finalised Mine Closure Liability Assessments for various mining operations. With 6 years in the mining industry, from operations and being seconded to project management, he has developed an understanding of the companies' short-term and long-term liabilities.

He is an abstract and "outside the box" thinker with a passion for practical solutions in the sustainable development space. He enjoys finding linkages in elements which seem unrelated, he uses his creative intelligence to integrate these elements.

Qualifications
BSc (Hons): Environmental Management, University of South Africa (2019).
BSc: Geology and Environmental Management, University of Johannesburg (2013).
Certificate: Environmental Law for Managers, North West University (2015).

Professional registrations
Professional Natural Scientist, South African Council for Natural Scientific Professions (SACNASP).
Member, International Association for Impact Assessment South Africa (IAIAsa).

Specialisation
Environmental Management, Environmental Impact Assessment, Environmental Audit.

Years in industry
10

Proficiency
- MS Office
- Report Compilation
- Presentation
- ISO 14001
- ISO 14004
- ISO 14015
- Quantum GIS
- Google Earth Pro
- Planet GIS

Relevant experience

Planning for the Lucullus Road Alignment, Maroela Road Alignment, Waarburgh Road Alignment and Amadeus Drive Alignment, Joostenberg Vlakte, South Africa, City of Cape Town, 02/2024 – 06/2025, *Environmental ConsultantS*

The City of Cape Town requires the conceptual planning for the upgrading and extension of several roads (i.e. Lucullus Road, Maroela Road, Waarburgh Road and Amadeus Drive) in the Joostenberg Vlakte, Drie Heuwel and Fisantkraal area, within the jurisdiction of the City of Cape Town in the Western Cape. Zutari (Pty) Ltd was appointed for full professional services as the Design Engineer and Environmental Assessment Practitioner (EAP).

Responsible for undertaking an environmental gap analysis, compiling the screening report, and needs and desirability report. Authoring and finalising the Basic Assessment Report (BAR), Environmental Management Programme (EMPr), completing environmental authorisation application, and compiling Background Information Document (BID) and other public participation documents, including stakeholder notification letter, newspaper advertisement, and site notice.

Also responsible for undertaking the Integrated Water Use Licence Application for the project. Authoring, compiling, and finalizing the Section 27 National Water Act (NWA) Motivation Report and Water Use Technical Report. Completing water use license application forms online and submission of Water Use Licence Application (WULA) to the Department of Water and Sanitation (DWS).

Wynberg Sports Precinct, South Africa, City of Cape Town, 05/2024 – 07/2024, *Environmental Consultant*

The City of Cape Town (CCT) through the Community Services and Health Directorate (CS&H) has approached Zutari to formulate a Development Framework and acquire land use approval to realise the vision for the Wynberg Sports Precinct.

The Wynberg Sports Precinct is an Optimisation and Rationalisation project endorsed by the City's Executive Management Team and Mayoral Committee.

As part of the appointment, Zutari conducted as environmental due diligence study for the proposed precinct.

Responsible for identifying fatal flaws, no-go zones, sensitive areas, watercourses, potential water uses, and risks associated with the area of the proposed precinct. I was also responsible for authoring and finalising the Water Use Licence Application (WULA) Screening Report for the project.

Planning for the Wildebosch Road Extension to Trumali Street, Stellenbosch, South Africa, Stellenbosch Local Municipality, 04/2023 – 12/2024, *Environmental Consultant*

The Stellenbosch Local Municipality Department of Roads and Stormwater appointed Zutari (Pty) Ltd for full professional services as the Design Engineer and Environmental Assessment Practitioner (EAP) for the Proposed Wildebosch Road Extension to Trumali Street**.**

Responsible for authoring and finalising the Basic Assessment Report (BAR), Environmental Management Programme (EMPr), completing environmental authorisation application, and compiling Background Information Document (BID) and other public participation documents, including stakeholder notification letter, newspaper advertisement, and site notice.

Responsible for undertaking the Water Use Licence Application for the project. Authoring, compiling, and finalizing the Section 27 National Water Act (NWA) Motivation Report and Water Use Technical Report. Completing water use license application forms online and submission of Water Use Licence Application (WULA) to the Department of Water and Sanitation (DWS).

Proposed Outeniqua Precinct at George in the Western Cape, George Local Municipality, 09/2023 – 02/2024, *Environmental Practitioner*

George Local Municipality proposes to make land available within the urban development boundary for a development of a mixed-use precinct known as "Outeniqua Precinct". The project is located on an undeveloped area, within the urban edge between the suburb of Groeneweide to the south and the Kingswood Golf Estate to the north. Zutari was appointed to undertake the environmental screening assessment for the proposed precinct and derisk the earmarked site.

Responsible for identifying fatal flaws, no-go zones, sensitive areas, and environmental risks associated with the area of the proposed Outeniqua Precinct, including what legal permitting is required for it, and to outline the processes for such permitting. I was also responsible for authoring and finalising the Environmental Screening Report for the project.

Olifants Management Model (OMM) Bulk Raw Water Study Phase, South Africa, Lebalelo Water User Association (LWUA), 02/2023 - 06/2024, *Environmental Consultant*

Zutari Ndodana Joint Venture (ZNJV) was appointed by the Lebalelo Water User Association (LWUA) for the provision of professional services for the Olifants River Water Resources Development Project Phase 2 (ORWRDP-2). The portion of the works comprises of Sub-Phase 2B+ Mokopane Water Treatment Works (WTW).

Responsible for authoring and finalising the Basic Assessment Report (BAR), Environmental Management Programme (EMPr), completing environmental authorisation application, and compiling Background Information Document (BID) used in the Public Participation Process (PPP). Ad hoc engagements with the competent authority regarding the application.

Further, the valid Environmental Authorisation (EA) contained several administrative changes which relates to the "Activities Authorised" for the WTW. Therefore, a part 1 amendment application was required to authorise the recommended administrative changes. Responsible for undertaking the Part 1 Amendment Application in terms of (Regulation) 29 of Chapter 5 of the Environmental Impact Assessment (EIA) Regulations (GN R 982 of 2014), National Environmental Management Act, 1998 (Act No. 107 of 1998).

Application for Environmental Authorisation (EA) for the Change in Layout and Footprint of the Mogalakwena 120MW Photovoltaic Solar Energy Facility for the Mogalakwena Mine on the Remainder of Portion 3 of the Farm Armoede 823 LR within the Mogalakwena Local Municipality, Limpopo Province, Pele Green Energy (Pty) Ltd. *Environmental Consultant*

After the EA was issued, Mogalakwena Mine Solar Power (Pty) Ltd appointed Pele Green Energy (PGE) and EDF Renewables, a consortium known as PGE-EDFR, as the Independent Power Producer (IPP) to develop the proposed project. To meet the energy demand of the mine, PGE-EDFR has provided a design that changes the authorised project footprint for the development and as such the authorization is required through a Part 2 Amendment Application process.

Responsible for compiling and finalizing the EA Part 2 Amendment Report. Responsible for compiling and finalizing the Part 2 Amendment Report as per the National Environmental Management Act (NEMA) Environmental Impact Assessment Regulations (EIA), Government Notice (GN) R982.

Cato Ridge Environmental Impact Assessment (EIA) and Water Use Licence Application, KwaZulu-Natal Province, Cato Ridge Development Company Ltd, 07/2021 – Present*. Land Identification Agent and Environmental Consultant.*

The Cato Ridge Development is an initiative of the land holder to strategically release land on commercial terms to end users and developers for the development of a large-scale logistics hub and intermodal transport facility. The land holdings comprise 1885 ha of land that is strategically located with high potential for development.

Responsible for facilitating engagements with Tribal Leaders. As part of the land identification process to conserve the critically endangered KZN Sandstone Sourveld Grasslands, carried out site visits within the tribal areas in KZN and had preliminary meetings with various Headman of the respective Traditional Authorities to discuss terms and conditions of releasing land and quantifying the cost of the conditions. In order to develop a resolution to be concluded with the Traditional Leaders, to subsequently submit the resolution to the Ingonyama Trust Board to secure the lease on the identified land parcels.

Responsible for reviewing the Section 27 National Water Act (NWA) Motivation Report and Water Use Technical Report and authoring the Integrated Water and Waste Management Plan (IWWMP). Completing water use license application forms online and submission of Water Use Licence Application (WULA) to the Department of Water and Sanitation (DWS).

Proposed Ilanga Emoyeni PV Solar Energy Facility on the Remainder of Farm Schietkuil No. 3 in the Beaufort West Municipality of the Western Cape Province, 01/11/2022 to 11/11/2022. Environmental Consultant

Windlab is applying for Environmental Authorisation (EA) for three solar energy facilities (SEF) and an overhead powerline (OHPL) or “gridline” to connect with the National Grid. These projects are situated within a Renewable Energy Development Zone (REDZ) and the strategic transmission corridor or Electrical Grid Infrastructure (EGI) corridor and must undergo an expedited Basic Assessment (BA) process provided for in Government Notice 145 of 2021 (GN145/2021) .

Responsible for authoring and compiling Environmental Management Programme (EMPr) Reports. The applicant is applying for Environmental Authorisation (EA) for three solar energy facilities and an overhead powerline (or gridline) to connect to the National Grid. A total of eight EMPrs were compiled to support the EA application.

God's Window Skywalk, South Africa, Motsamayi Tourism Group (Pty) Ltd, 08/2021 - 12/2024. *Environmental Consultant*

Zutari was appointed to conduct an environmental impact assessment (EIA) and water use licence application (WULA) for the proposed construction of a skywalk and skybridge at God’s Window in the Mpumalanga Province. These services are to ensure compliance with the National Environmental Management Act (Act No. 107 of 1998) (NEMA), National Water Act, 1998, as well as other associated or required environmental authorisations.

Responsible for authoring and finalising the Section 27 (NWA) Motivation Report, and Water Use Technical Report. Completing water use license application forms online and submission of WULA to DWS. Also responsible for compiling and finalising the Draft Environmental Management Programme (EMPr) Report. Ad hoc engagements with the DWS and applicant, presenting water uses, conducting Section 21 (c & i) presentation to DWS, as well following up with the competent authority (DWS) regarding the application.

God's Window Skywalk, South Africa, Motsamayi Tourism Group (Pty) Ltd, 03/2022 - 06/2022. *Environmental Consultant*

Zutari was appointed to conduct an environmental impact assessment (EIA) and water use licence application (WULA) for the proposed construction of a skywalk and skybridge at God’s Window in the Mpumalanga Province. These services are to ensure the General Authorisation is granted to allow the geotechnical investigations to take place.

Responsible for authoring and finalising the General Authorisation (GA) Technical Report, Section 27 (NWA) Motivation Report (i.e., for geotechnical investigations) and completing the general water use authorisation forms online and submission of GA application to DWS. Ad hoc engagements with DWS and applicant and following up with the competent authority (DWS) to ensure the GA is approved. GA was granted.

Support Services for Water Use Licence Application for Proposed Photovoltaic Energy Facility for Mogalakwena Mine Solar Power (Pty) Ltd, Limpopo, Limpopo Province, South Africa, PGE-EDFR Consortium, 03/2022 - 09/2022. *Environmental Consultant*

Zutari was appointed to conduct the Water Use License Application (WULA) for the Mogalakwena Mine Solar Energy Facility (SEF) and provide the required supporting documents during the application process. The application also includes the necessary engagements with the relevant Authorities.

Responsible for authoring and finalizing the General Authorisation (GA) Technical Report, Section 27 (NWA) Motivation Report and completing the general water use authorization forms online and submission of GA application to DWS. Ad

hoc engagements with DWS and applicant, preparing and presenting the GA motivation over a full WULA to DWS, and following up with the competent authority (DWS) to ensure the GA is approved. GA was granted.

30ML Raw water balancing dam in George, George Local Municipality, Western Cape, 02/2022 - 02/2025. *Environmental Consultant*

Design, procurement and construction supervision of a new 30 Ml balancing dam adjacent to the existing George Water Treatment Works.

Responsible for compiling the Determination of Environmental Authorisation (EA) Applicability Report for the proposed balancing dam and working with geo-spatial data to compile environmental sensitivity maps and cartographic maps.

Simba CM Project, Integrated Environmental Authorisation, Gauteng, South Africa, 01/2022 – 07/2022. *Environmental Consultant*

Zutari was appointed to undertake an environmental impact assessment for the proposed. Zutari was appointed to undertake a Basic Assessment Process and Waste Management License application for the Simba Isando biogas plant. This process aims to identify, assess and report on any potential impacts that the proposed project may have on the receiving environment, if implemented. The investigation outcome described how impacts on the biophysical and socio-economic environment can be, as far as possible, enhanced or mitigated and managed as the case may be.

Responsible for authoring and finalising the Basic Assessment Report (BAR), Environmental Management Programme (EMPr), completing environmental authorisation application, and compiling Background Information Document (BID) used in the Public Participation Process (PPP). Ad hoc engagements with the competent authority regarding the application. Supported the waste management licence application process. The application required an Integrated EA (consisting of Waste Management and Environmental Authorisation application) since the proposed activities triggered a Waste Management Licence the Basic Assessment Process was also triggered. Responsible for the Basic Assessment Process component and consolidating the two applications.

Water feasibility study for a combined treatment plant at Arnot Coal Mine closed colliery, Mpumalanga Province, South Africa, Seriti Coal (Pty) Ltd, 01/2020 - 10/2022. *Environmental Consultant*

Zutari was appointed to undertake a feasibility study for further definition of the integrated water management plan (IWMP) for the collection of excess water and the treatment and discharge of reclaimed water from the Arnot mining area, as well as the management of all waste material produced due to the implementation of the IWMP.

Responsible for water use licence application (including application forms), assisted in compiling the Water Use Summary Technical Report, finalising, and submission of WULA to DWS. Ad hoc engagements with the DWS, applicant and following up with the competent authority (DWS) regarding the application.

Engineering services for the Cresco De Beers photovoltaic (PV) project, Limpopo Province, South Africa, Cresco Project Finance (Pty) Ltd, 04/2021 - 04/2022. *Environmental Consultant*

De Beers Venetia Mine (hereto referred to as De Beers) proposes the development of a Photovoltaic (PV) solar energy facility (SEF) to reduce its consumption of grid-supplied power by using solar power. The solar energy facility will be constructed and operated by an independent power producer or contracted development partner. De Beers Group has established a Special Purpose Vehicle (SPV) company under which permitting activities will be conducted. This SPV is owned by De Beers, however ownership will be transferred to the independent power producer or development partner, once appointed.

Responsible for the water use licence application (including completing online application forms), site visit and ad hoc engagements with the regional DWS

Constantia Kloof stormwater management, Gauteng Province, South Africa, Growthpoint Properties, 09/2019 - 06/2021. *Environmental Consultant*

Growthpoint Properties has been experiencing pollution issues at their Constantia Office Park. Zutari was appointed to carry out a complete study to develop a stormwater solution to lower the annual clean-up cost of removing silt and litter at the office park and to improve the aesthetics. It includes all investigations, water use license application (WULA), environmental approvals and feasibility design.

Responsible for the water use licence application (including completing application forms online), finalising and submission of WULA to DWS. Ad hoc engagements and following up with the competent authority (DWS) regarding the application.

Environmental authorisation for the Mogalakwena solar photovoltaic (PV) facility, Limpopo Province, South Africa, 06/2021. *Public Participation Agent*

Zutari was appointed to conduct the environmental authorisation for the development of a solar photovoltaic (PV) facility of up to 90 MW close to Anglo American Platinum's Mogalakwena Mine to reduce the mine's consumption of grid-supplied power by procuring locally generated solar power.

Responsible for recording, writing up meeting minutes, compiling the Comments and Responses Report, facilitating public meetings and placing site notices across 53 villages as part of the Public Participation Process for the EA application.

Sibanye employee housing, South Africa, Western Platinum, 09/2020 - 08/2021. *Survey Agent*

Zutari has been appointed to assist Sibanye Stillwater with the compilation of housing strategies for six of their operations under their gold and platinum segments. Zutari was also approached to compile the housing and living conditions plan as per the Mining Charter III for seven operations.

Responsible for working with large geo-spatial data, management, editing, updating, and validating as well as importing and exporting of datasets and calculations. Conducting Local Municipality Capacity Assessment (LMCA) for the Madibeng Local Municipality, authoring and documenting results of the capacity assessment. The capacity assessment was undertaken to gauge readiness of the municipality for farming related initiatives. Leading survey discussions and conducting key informant interviews with employees.

Engineering and design for Grande Cote Operations SA fire suppression, Ghana, Africa, 08/2020 – 08/2021. *Asset Transformation Practitioner*

The client required a fire protection system for a plant used to mine sand. It also required the re-design of a fire protection system for a tank farm. Zutari was appointed by Grande Cote Operations to provide services to execute basic engineering and detail design for the installation of the Wet Concentrator Plant (WCP) and Tank Farm Fire Suppression Systems. The objective of the project was to address the associated fire risks at the Floating modules by installing a fully automated fire protection and detection systems. This project included electrical, control and instrumentation engineering, mechanical engineering, and civil engineering designs, as well as 3D modelling of the integrated plant fire systems.

Responsible for eliminating barriers, mapping pipeline, handling, and editing geo-spatial data and creating various cartographic maps.

Technical due diligence to acquire Hazeldean Retail Square, Gauteng , South Africa, 10/2021 – 12/2021. *Environmental Consultant*

Broll Property Group (Pty) Ltd appointed Zutari as an independent environmental assessor to carry out a Level 1 Environmental Site Assessment (ESA) for the property. Broll aims to acquire the Hazeldean Retail Square situated in Hazeldean, City of Tshwane Metropolitan Municipality, Pretoria, Gauteng. The square comprises of a suite of retail shops including an Engen petrol filling station adjacent to the retail square (both referred to as the site). The filling station is leasing the land from Redefine Properties Ltd. As part of the process to purchase the property, Broll has commissioned a technical due diligence exercise to assess the property for any environmental “fatal flaws” prior to the acquisition.

Responsible for conducting the Level 1 Environmental Site Assessment (ESA) according to ISO 14015: 2003 (South African National Standard: Environmental management: Environmental assessment of sites and organisations), creating cartographic maps, authoring, and finalising the ESA report.

Rietspruit Closure Pre-feasibility Study, Mpumalanga Province, Souths Africa, 06/2020 - 02/2021. *Asset Transformation Practitioner*

Zutari was appointed by SAEC to conduct a Pre-Feasibility Study on their dormant Rietspruit Colliery in order assess all reasonable value-creating opportunities and select the optimal investment alternative. And ensure the technical and commercial viability of the selected investment prior to further study and optimisation in the Feasibility phase. Zutari is required to review and address knowledge gaps, develop the closure roadmap, undertake a sustainability assessment; assist in the selection of the land use alternatives and manage the project. Zutari shall produce post-mining land use options identification report; sustainability assessment report of identified post-mining land use options; rehabilitated area status quo report; conceptual land use layouts (three options) with semi-detailed cost estimates; closure roadmap and the Pre-Feasibility study report. The purpose of the Pre-Feasibility study is to inform and facilitate decision-making in terms of the final sustainable land use options and whether to pursue further studies.

Involved in identifying post-mining land use options. Also tasked to assist in developing conceptual land use layout maps and co-author the Mine Closure Pre-feasibility Study Report.

Bokamoso Ba Rona Programme, Gauteng Province, South Africa, Talmar RSA (Pty) Ltd, 06/2020 – 11/2020. *Asset Transformation Practitioner*

The Bokamoso Ba Rona (BBR) Agri-Industrial Programme is a multi-stakeholder programme aimed at promoting sustainable economic activity through the development of a large-scale agri-industrial and energy hub on 30 000 ha of

ground in the West Rand of Johannesburg. The key objective of the programme is to build a globally competitive, inclusive, environmentally sustainable and diversified economy with the people of the West Rand through facilitating large-scale, socio-economic empowerment. This will be done by the development of the programme area for agri-industrial and commercial purposes. The programme was conceived by founding partners Sibanyes Stillwater, GIFA, WRDA and FWRDWA. Zutari is part of the Programme Manager, under the leadership of Talmar and working with Cliffe Decker Hofmeyr Incorporated (CDH) Attorneys. Zutari is assisting with developing a post-mining economy in the West Rand, offering innovative solutions across the project lifecycle (including advisory, design, delivery and asset management).
Responsible for working with large datasets and cartography using QGIS Software, Geo-spatial data management, editing, updating, and validating as well as importing and exporting of datasets and calculations within attributes. Authored and finalised a GIS Training Manual for Non-GIS personnel.

Responsible for working with large datasets and cartography, geo-spatial data management, editing, updating, and validating as well as importing and exporting of datasets and calculations within attributes. Authored and finalised a GIS Training Manual for Non-GIS personnel.

Detailed design and execution (FEL 4) for Klipspruit Extension Project (KPSX), including procurement and construction management, Mpumalanga, South Africa, 04/2018 – 09/2021, South32 SA Coal Holdings. *Asset Transformation Practitioner*

Zutari was appointed to perform the detailed design and execution (FEL 4) for the Klipspruit Extension Project (KPSX), including procurement and construction management. The project involved the design of non-process infrastructure and bulk materials handling (BMH) facilities, as well as undertaking geotechnical investigations and interpretive reporting for all mine related infrastructure for extensions to the mine. The infrastructure includes a run-of-mine (ROM) stockpile and tip with 11.5 m wall and semi-mobile crusher, 9 km of conveyors, roads, and three bridges. Zutari provided value engineering by designing a fit-for-purpose solution.

Responsible for the application (including facilitating public participation) for Proclamation of Realignment of D432 Northern Access Road and De-proclamation of D432 Road

Proposed Chicken-egg Laying Poultry farm on 84 Hollgate Agricultural Holdings, Lesedi Municipality, Gauteng, Draft Basic Assessment, ESGiA (Pty) Ltd, 12/2019 – 03/2020. *Environmental Consultant*

Phola Poultry (Pty) Ltd intends to build and operate an Egg Laying Facilities in Hallgate Agricultural Holdings (AH) on the East Rand in Gauteng. The owner of the company has been successfully rearing egg laying chickens on a smaller scale for some time. Based on this success, the proposed development site in was purchased and the owner has been self-funding the development of this farm.

Responsible for authoring and finalising the Basic Assessment Report (BAR), Environmental Management Programme (EMPr), completing environmental authorisation application, and compiling BID to be used in the Public Participation Process (PPP).

Rehabilitation of the Land Disturbed by Illegal Sand Mining activities on Portion 55 of the Farm Pienaarspoort 339 JR, Gauteng, 02/2018 – 12/2019. *Project Manager*

During the past years illegal mining activities took place on the property owned by Afrimat. These illegal sand mining activities elevated significant concerns for the landowner, other affected stakeholders, and threated public safety.

Leading and managing the rehabilitation project. Responsible for conducting a community awareness campaign - to educate community regarding dangers associated with mining under the high voltage Eskom power transmission lines and benefits of reporting illegal mining activities to the relevant authorities. The campaign was carried out in collaboration with Eskom, Tshwane Disaster Management and Tshwane Metropolitan Municipality. Authoring letters and emails to inform all affected stakeholders concerning the illegal mining activities. Authored and compiled a rehabilitation plan and monitoring programme of the land disturbed by illegal mining activities. Involved in volumetric calculations/estimations to determine the required fill material using Studio Open Pit by Datamine software. Liaised with Eskom and other stakeholders concerning the progress of rehabilitation and persisting challenges. Compiling scope of work of aerial survey work and digital terrain model. Chaired ad hoc meetings with the specialists and the contractor to monitor rehabilitation progress, and compile status progress reports. Planning, supervising and overseeing site rehabilitation work. Ongoing monitoring of progress and compiling status progress reports for the Group Operations Manager.

Rehabilitation of a Mined-out Silica Sand Mine Located on Portion 10 of Farm Pienaarspoort 339 JR, Gauteng, 09/2017 – 12/2019. *Project Assistant subsequently in 2019 assumed the Project Manager role*

Delf Sand wholly owned by Afrimat Ltd ceased operations during 2017 and since then undertaken rehabilitation activities in preparation for the closure of the silica sand mine as part of the environmental legal obligation as per environmental authorisation and mining rights.

Leading and managing the rehabilitation project. Responsible for planning, authoring, and compiling a preliminary and subsequently a comprehensive rehabilitation plan as well as determining the cost of rehabilitation of the Delf Sand Mine. Prepared correspondence to inform affected stakeholders regarding the intent of the Mine to undertake rehabilitation in preparation for decommissioning and closure of the mine. Coordinating stakeholder engagements with the assistance of stakeholder and communications team. Facilitating meetings regarding the involvement of local Small, Medium and Micro Enterprises (SMMEs) and advising the project funder and main contractor. Providing advice to the Operations Manager to make decisions on appointing specialists. Prepared and compiled rehabilitation programme/schedule. Coordinated contractor and specialist work (including groundwater, soil and land capability, terrestrial ecology, noise, air quality, watercourses and flood line determination). Authored an Alien Eradication Programme reviewed by an independent specialist (i.e., Ecologist). Planned, prepared, and coordinated alignment meetings to ensure the project is executed according to the rehabilitation plan, specialists' recommendations, and schedule. Ensured the protection of watercourse (streams/rivers) running adjacent the site boundary. Supervising and overseeing site rehabilitation work. Ongoing monitoring of progress and compiling status progress reports for the Group Operations Manager. Responsible for reporting (including authoring the report) the presence of graves to the South Africa Heritage Resources Agency (SAHRA). Ensured the protection of the grave site (approximately 40 graves). Engaged relatives (including their legal representatives) and held meetings to recommend protection of graves which were found within the mining right area.

Renewal of an Air Emissions License for Afrimat Silica Drying Plant at Cullinan, Afrimat Ltd, Gauteng, South Africa, 02/2019 – 09/2019. *Project Manager*

Afrimat Silica is wholly owned by Afrimat Ltd. The company had to renew an expired Air Emissions Licence for their Silica Sand drying plant. The operation continued to run the drying plant despite the expired licence. The Tshwane Department of Environmental and Agriculture fined Afrimat Silica for operating without a valid AEL. The business was under pressure to rectify and apply for a new AEL to resume silica drying activities on site.

Responsible for the AEL application and completion of the application process (i.e., includes completing the AEL application form). Collecting and quantifying throughput and output data from the drying plant and washing plant. Preparing and drafting newspaper advertisement and site notices to inform interested and affected parties regarding the intent of the mine to renew the AEL as part of the PPP. Providing advice in appointing an Air Quality Specialist to conduct stack emissions tests and recommend abatement methods. Ensured the preparations for the stack emissions tests have been completed prior to the test date. Authoring external and internal environmental issue register. Preparing engagements and liaise with officials from the competent authority and scribe meeting minutes. AEL was granted.

Requirements of the Location, Construction, and Operation of the Salvage Yard Facility for Afrimat sites across South Africa, 06/2018 – 10/2018. *Environmental researcher and report author*

These standards have been prepared to protect human health and the environment by ensuring the safe, adequate and sustainable operation of salvage yard in Afrimat operations. These standards apply to person or persons who operates a salvage yard. To safeguard the operation with the duty of care, describe the requirements for the location, construction, and operation of the salvage yard facilities. Moreover, there is no legislation in South Africa regulating the location, construction and operation of a salvage yard facility. Therefore, the guide makes use of the international guides and standards to compile and implement the salvage yard requirements.

Responsible for conducting research, literature review and gathering site-specific information and data. Consulted environmental personnel from other Afrimat mining sites to establish persistent environmental issues relating to salvage yards development and operation. Authored, compiled, and finalised a guide for the "Requirements of the Location, Construction, and Operation of the Salvage Yard Facility for Afrimat sites across South Africa". This guide has been prepared to protect the environment and human health by ensuring the safe, adequate and sustainable operation of salvage yards within Afrimat operations.

Guide to Compile a Site-Specific Waste Management Plan for Afrimat mining sites, South Africa, 05/2018 – 09/2018. *Environmental researcher and report author*

Waste separation, control and handling have proven to be ineffective on many Afrimat operations. Firstly, an operating standard procedure for separating waste is not implemented. Therefore, waste cannot be separated into various waste streams. The solution was to develop a Guide to Compile a Site-Specific Waste Management Plan.

Responsible for conducting, research, literature review and gathering site-specific information. Consulted environmental personnel from other Afrimat sites to establish persistent environmental issues associated with waste control and management, analysed this data in terms of incident frequency. Authored, consolidated information, and finalised a guide to be used across Afrimat. Eventually, developed a template to be tailored to site-specific conditions/requirements.

The impact of changes in the 2015 Financial Provisioning Regulations for Afrimat Ltd, South Africa, 03/2019 – 05/2019. *Speaker*

Conducted literature review and face-to-face interviews, collected, consolidated, and analysed critical data regarding the anticipated impact that would be created by the changes in the NEMA Financial Provisioning (FP) Regulations, 2015. Seconded to present the changes in the FP Regs 2015 and their impact on "business as usual". Demonstrated and analysed how the changes will significantly affect business practice. Highlighted and compared changes between the FP Regs 2015 and Proposed FP Regs, November 2017. Determined significant changes in the recent regulations, and how the changes would affect annual rehabilitation, mine closure, reporting and legal compliance. Presented findings at the Annual Afrimat Sustainability Conference in 2019.

Guide to compile dust fall report for Afrimat Ltd, South Africa, 11/2017. *Environmental researcher and report author*

Responsible for authoring a template to be used across Afrimat Ltd. Template developed in terms of the Standard Test Method for Collection and Measurement of Dustfall (Settelable Particulate Matter) (i.e., ASTM D1739-98: 2017). Presented the guide and its usage at the Annual Afrimat Sustainability Conference in 2018.

Carbon Footprint Reporting (Annual) for various Afrimat Ltd mining sites, 2017, 2018 & 2019. *Data collector and analyst*

Responsible for collecting 2017 and 2018 data. The data Included paper for office printing, employee commute (i.e., private car, car hire and flights), type of vehicle used, diesel/petrol/oil utilisation, number of stationary air conditioners and types, total waste disposed to municipal landfill, company owned vehicles, generators, electricity consumption and flights invoices, drilled and blasted overburden, total production tons and product sold. Classifying and quantifying GHG emissions in terms of Scope 1, 2 and 3 in accordance to the UK Department for Environment, Food & Rural Affairs GHG conversion Factors for Company Reporting, 2018

Internal NEMA Audit in fulfilment of Environmental Authorisation for various Mining Rights for Afrimat Ltd, South Africa, 2018 – 2019. *Environmental Auditor*

Legal requirement for all mining right holders, Afrimat Ltd had to honour the directive.

Responsible for conducting (annual) site and document audits to verify the level of compliance with the conditions of the approved EMPr and EA. The audit was undertaken in terms of regulation 34 and in accordance with Appendix 7 of the 2014 NEMA EIA regulations. Compiled the Environmental Audit Report and reviewed by an Independent Environmental Auditor and submitted it to the competent authority as required by EA conditions.

Internal GN R704 compliance audit in fulfilment of GN R704 requirements for various Mining Rights under Afrimat Ltd, South Africa, 2018 – 2019. *Environmental Auditor*

Responsible for conducting site and document audit to verify compliance with the requirements of the GN R704 (Regulations on Use of Water for Mining and Related Activities Aimed at The Protection of Water Resources).

Afrimat adopting Environmental Management System (EMS) as per ISO 14001 protocol to improve environmental performance and legal compliance, 2016 - 2019. *EMS Implementor and Audit Preparer*

Afrimat Ltd took a business decision to appoint an ISO 1400 Auditor to perform an audit on their Environmental Management System once in two years as part the strategy to improve environmental performance across their operations.

Responsible for developing and implementing EMS documentation (included authoring and compiling environmental operational procedures, risk assessments, water usage guides, waste management methods, energy efficiency strategies, cartographic maps reflecting scope of mine, annual environmental compliance reports, internal monthly environmental inspection reports, environmental performance reports, concurrent rehabilitation etc). Preparing for an external independent ISO 14001 audit by conducting an internal/mock audit. This involved auditing the site as well as documentation to verify and test level of compliance with the EMS requirements as per the ISO14001: 2015 standard.

Annual Financial Provision Reports for various Afrimat Ltd mining sites, South Africa, 2015 – 2019. *Mine Closure Assessor and report author*

Legal reporting requirement for the mining right holder as per Financial Provisioning Regulations.

Responsible for undertaking closure liability assessments. This included authoring and finalising various Annual Rehabilitation Plans and Mine Closure Plans, Environmental Risk Assessments and Determination of Quantum for Financial Provision for Mine Closure. Determination of Quantum for financial provision for Mine Closure was compiled using the Guideline for the Evaluation for the Quantum of Closure Related to Financial Provision Provided by a Mine, developed by the DMR, September 2004 (i,e, DMR template).

Investigation of various environmental incidents in Afrimat Ltd mining sites, South Africa, 2015 – 2019. ***Incident investigator***

Authoring and finalising environmental incident and corrective action (including immediate and long-term mitigations measures) reports.

Responsible for conducting environmental incident investigations on various areas such as ready-mix plants, mine workshops, waste storage areas, hydrocarbon storage areas, water storage areas, plant areas, mining areas, open pits, watercourses, and stormwater channels etc.

Annual Mining Works Programme Reporting for various Afrimat Ltd mining sites, South Africa, 2018 – 2019. ***Environmental Assessor and report author***

Environmental compliance reporting requirement as per Environmental Authorisation.

Compiled and finalised Mining Works Programme annual reports (i.e., detailing mined tons, mining methods and equipment, technical skills, exploration results, cashflow & evaluation, and future capital expenditure).

EMPr Audit in fulfilment of Environmental Authorisation for various Mining Rights, **Afrimat Ltd, 2015 – 2019.** ***Environmental Assessor and report author***

Legal reporting requirement as per Environmental Authorisation of the mining right holder.

Conducted site and documentation audit to verify environmental compliance with the conditions of the EMPr. Compiled the Audit report to be reviewed by an Independent Auditor. Audit undertaken in terms of regulation 34 and in accordance to Appendix 7 of the 2014 NEMA EIA regulations.

Estimate annual remaining Mineral Resources and Reserves (Industrial Minerals) for various Afrimat Ltd sites, South Africa, 2015 – 2019. ***Estimator and Report Compiler***

Reporting requirement as per the environmental authorisation and mining rights.

Responsible for calculating and estimating Mineral Resources and Mineral Reserves and reporting in accordance with the guidelines defined in the 2007 version of the South African Code for Reporting of Mineral Resources and Mineral Reserves(the SAMREC Code), as amended in July 2009.

Water sampling activities for Afrimat Silica and Delf Sand Mine, Gauteng, South Africa, 2014 – 2015. ***Data Collector***

Assisted in borehole yield tests. Responsible for measuring borehole levels to be provided to the ECO as per the EMPr requirements.

Aggregate and Silica Sand Grading for Lyttleton Dolomite and Delf Silica Sand, Afrimat Ltd, 2014 -2015, ***Lab Assistant***

Product Quality control as part of operation, including sampling, conducting test, and analysing aggregate material & foundry Silica Sand.

Assisted in sampling from a conveyor belt, stockpile, preparing test samples, carrying out tests and analysing aggregate in accordance with SANS 195:2006, SANS 197:2006 SANS 201:2008. Assisted in collecting samples from a conveyor belt, stockpile and preparing test samples. Undertaking tests and analysing product as per the American Foundry Society (AFS) Method test to ensure the product meets specification and quality upon despatch.

Application for Water Use Licences for various mining sites owned by Afrimat Ltd, South Africa, 2014 – 2019. ***Project Assistant***

Assisting in completing water use licence applications and liaising with the competent authority. Responsible for collecting water usage data from the plants and water used for dust suppression. Drawing up a water balance diagram and approved by the Mine Engineer/Civil Engineer/Environmental Specialist. Preparing engagements and liaising with officials from the competent authority and drafting meeting minutes.

Application for Prospecting Permits for various sites owned by Afrimat Ltd, South Africa, 2014 – 2016. ***Project Assistant***

Assisted in compiling the Prospecting Works Programme and completing the application form. Assisted in compiling the Annual Rehabilitation Plan, Determination of Quantum for Financial provision for mine closure rehabilitation (Using the Guideline Document for the Evaluation for the Quantum of Closure Related to Financial Provision compiled by the DMR) and Environmental Risk Assessment report.

Upgrade of a River Crossing at Mposa, Richards Bay, Kwa-Zulu Natal, Transnet SOC Ltd, 02/2013 – 06/2013. ***Project Assistant***

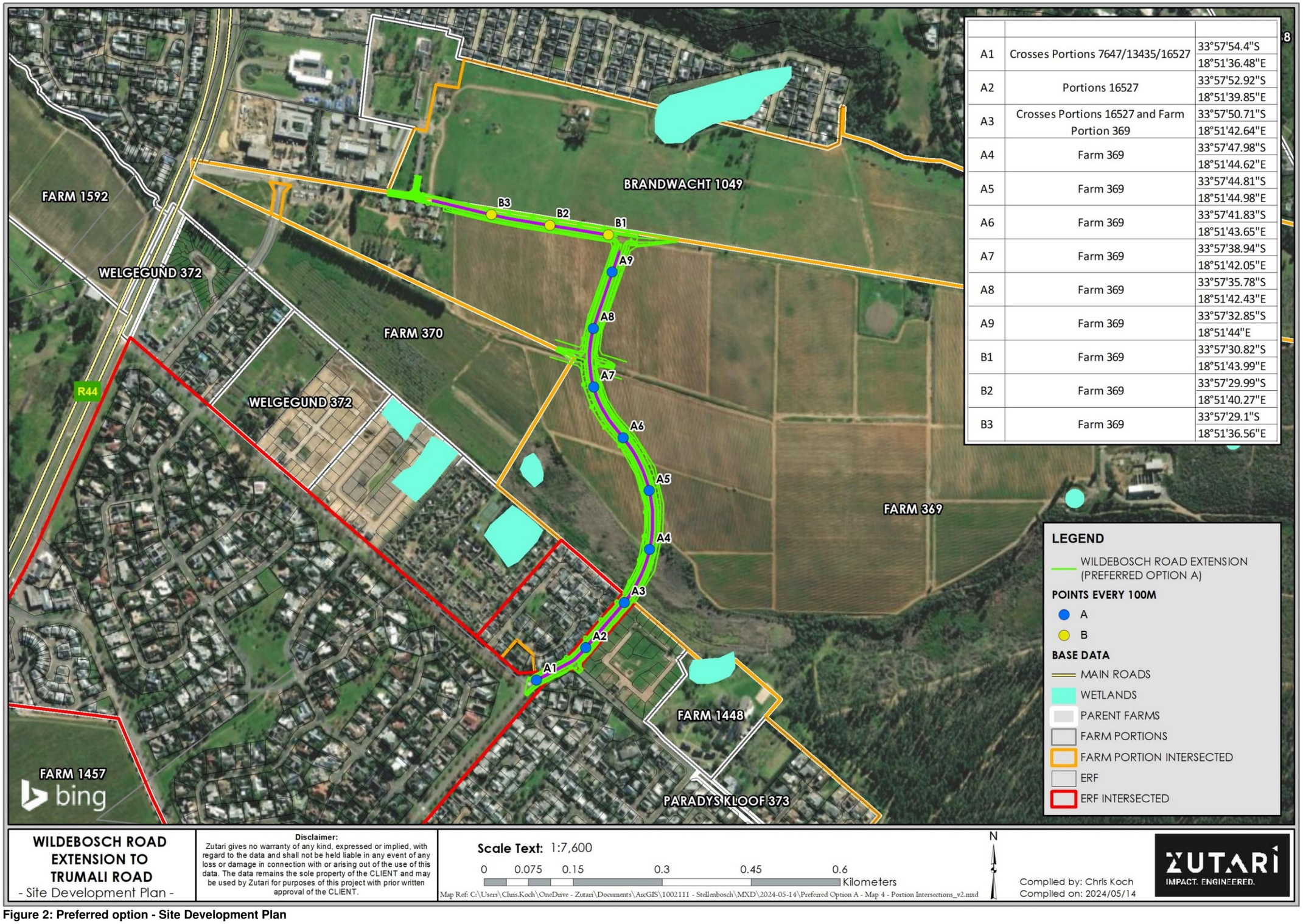
Transnet SOC Ltd appointed H & H Environmental Consulting cc to undertake an Environmental Impact Assessment (EIA) process in an effort to obtain environmental authorisation for the proposed Upgrade of a River Crossing at Mposa, Richards Bay, Kwa-Zulu Natal.

Assisted in writing environmental screening report, collected traffic data adjacent to the river crossing (supervised by a Traffic Engineer). Also assisted in compiling letters (correspondence) and distributing them to the competent authority and other interested and affected parties. Responsible for compiling public participation meeting minutes.

Development of Cultural Lounge and Conference Club at Escort, Kwa-Zulu Natal, South Africa, 02/2013 – 06/2013 Assessment Process, ***Project Assistant***

Assisted in writing up and compiling the BAR and EMPr reports and assisted in authority liaison.

Appendix B: Site Development Plans



A1	Crosses Portions 7647/13435/16527	33°57'54.4"S 18°51'36.48"E
A2	Portions 16527	33°57'52.92"S 18°51'39.85"E
A3	Crosses Portions 16527 and Farm Portion 369	33°57'50.71"S 18°51'42.64"E
A4	Farm 369	33°57'47.98"S 18°51'44.62"E
A5	Farm 369	33°57'44.81"S 18°51'44.98"E
A6	Farm 369	33°57'41.83"S 18°51'43.65"E
A7	Farm 369	33°57'38.94"S 18°51'42.05"E
A8	Farm 369	33°57'35.78"S 18°51'42.43"E
A9	Farm 369	33°57'32.85"S 18°51'44"E
B1	Farm 369	33°57'30.82"S 18°51'43.99"E
B2	Farm 369	33°57'29.99"S 18°51'40.27"E
B3	Farm 369	33°57'29.1"S 18°51'36.56"E

Figure 2: Preferred option - Site Development Plan

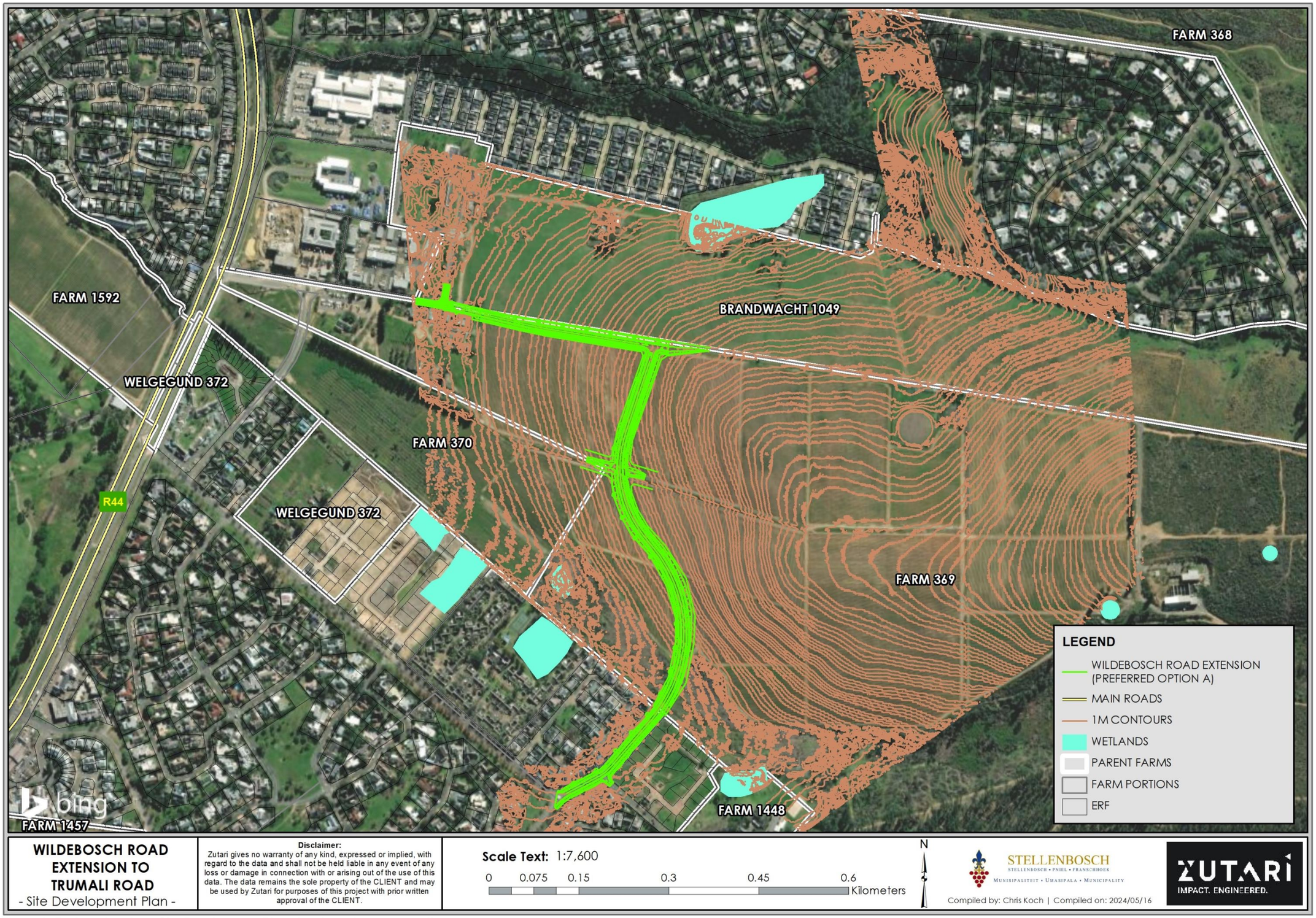


Figure 3: Preferred option - Site Development Plan showing minor contour lines

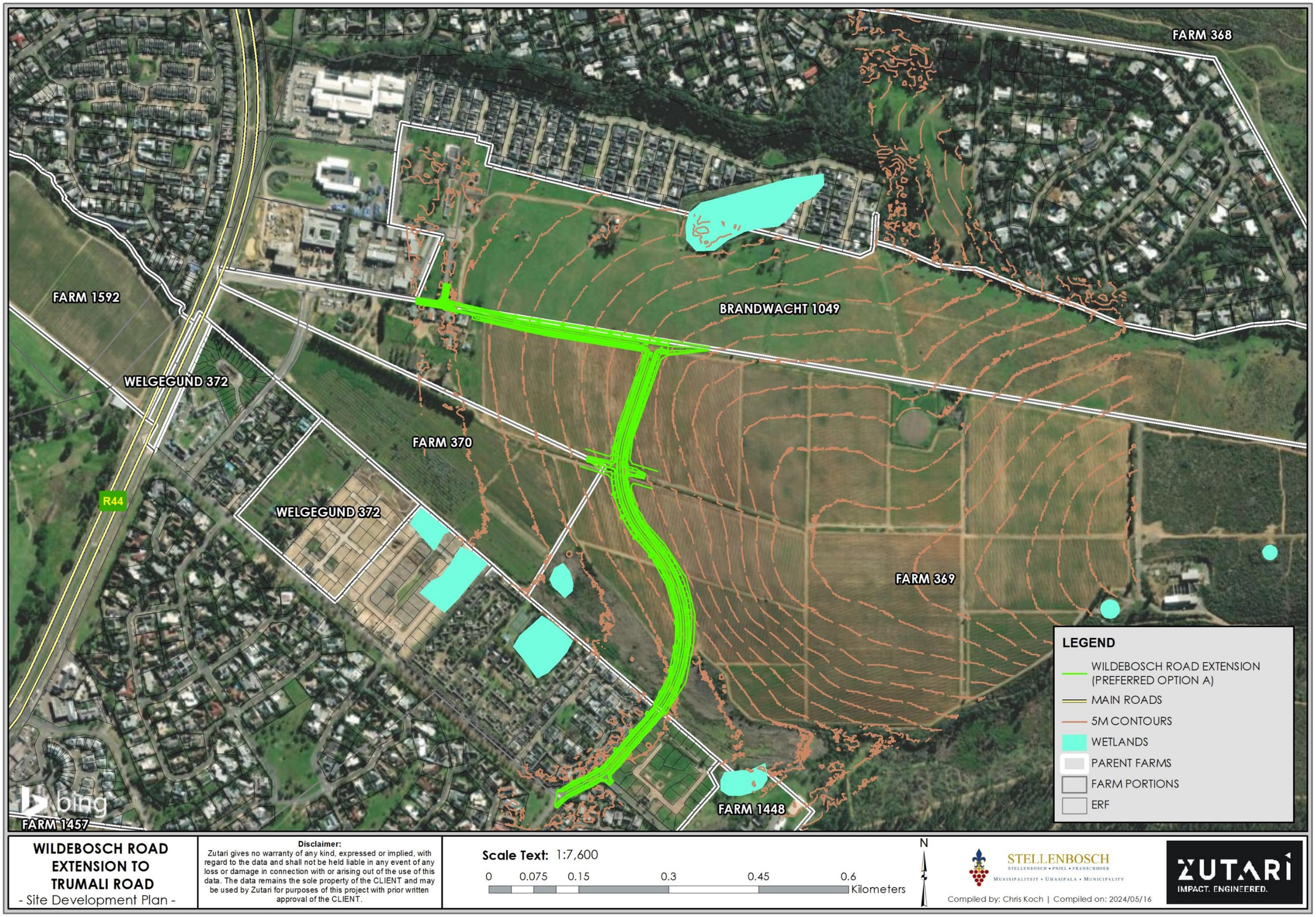
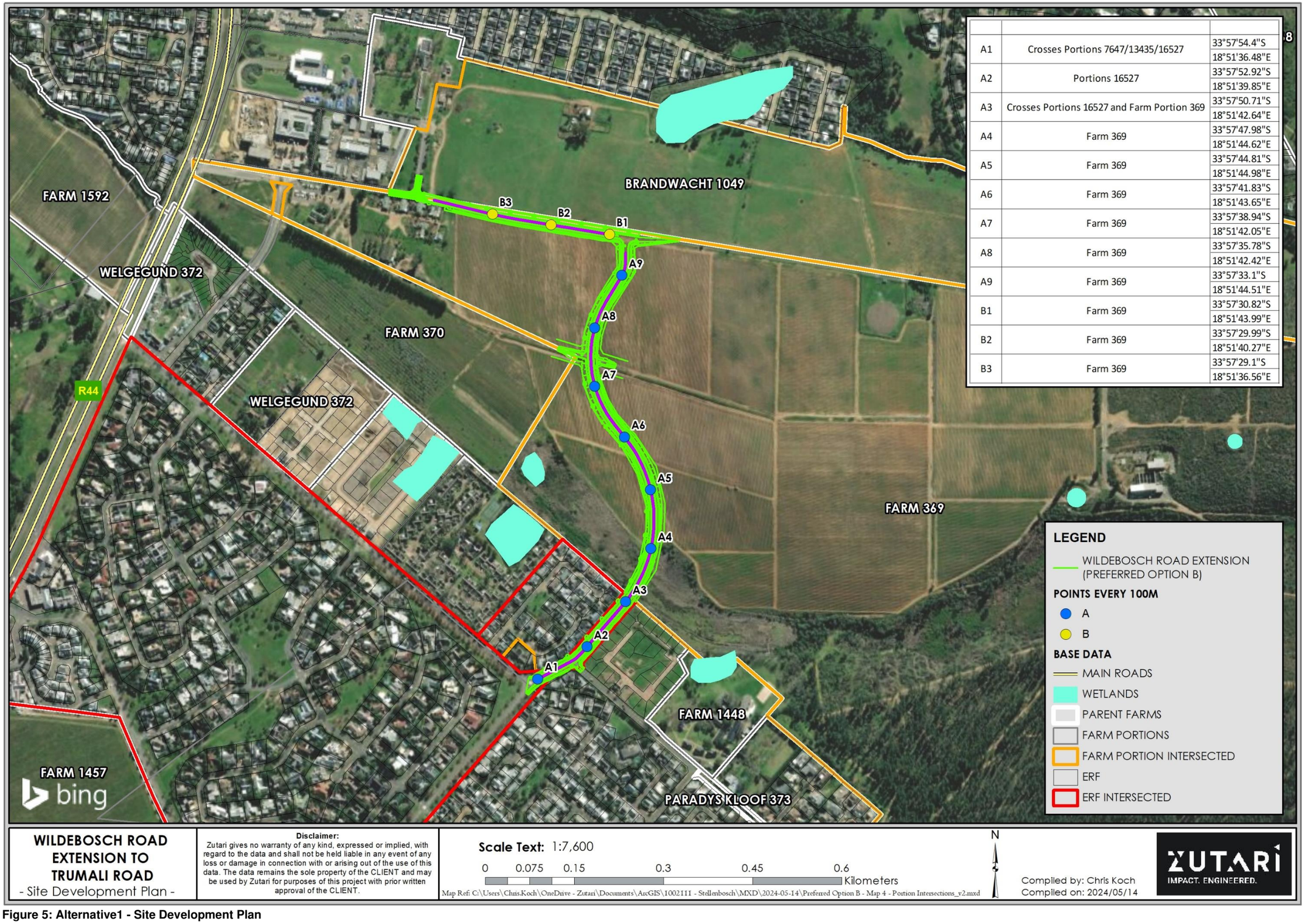


Figure 4: Preferred option - Site Development Plan showing major contour lines



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B2	Farm 369	33°57'29.99"S 18°51'40.27"E
B3	Farm 369	33°57'29.1"S 18°51'36.56"E

Figure 5: Alternative1 - Site Development Plan

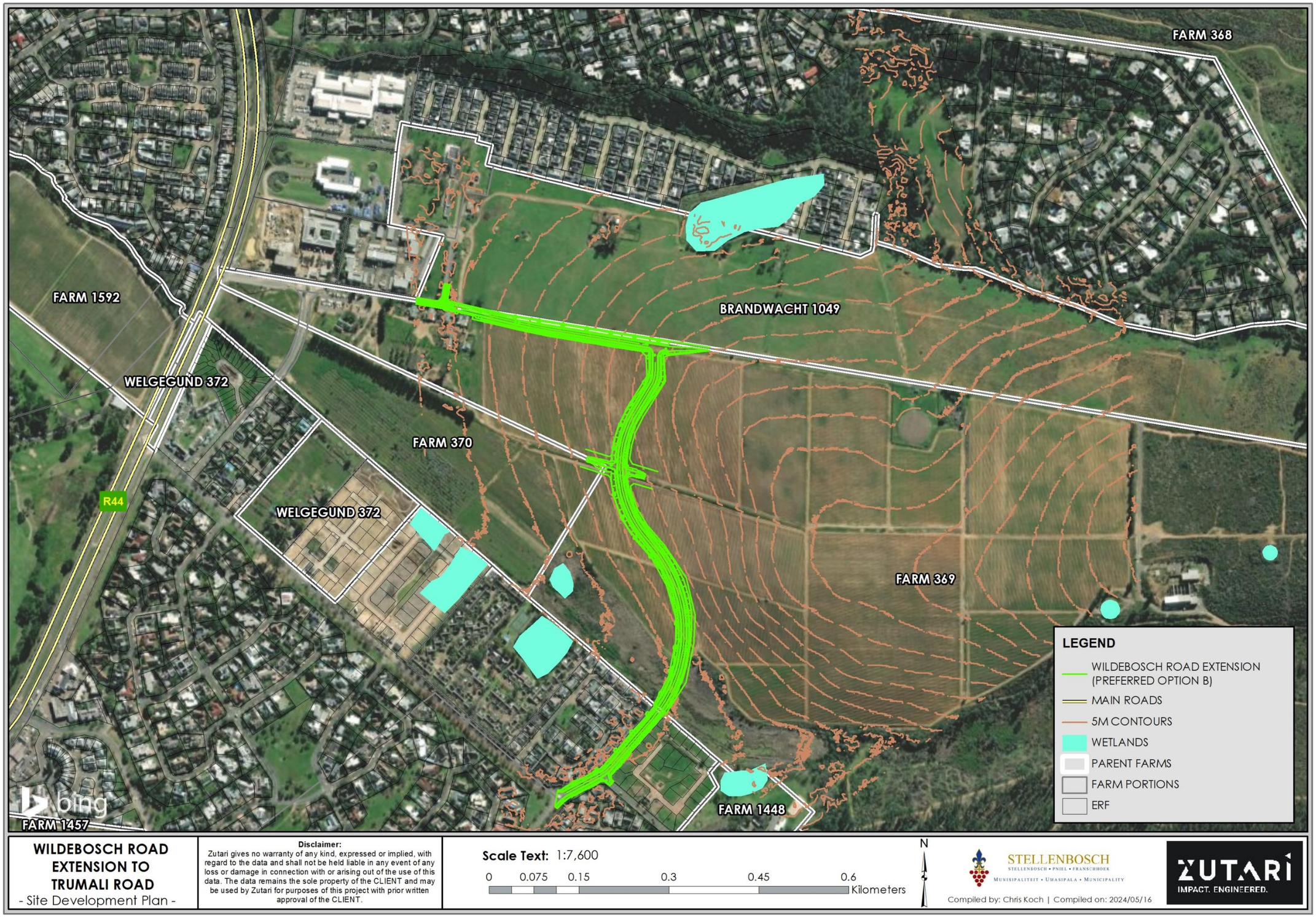
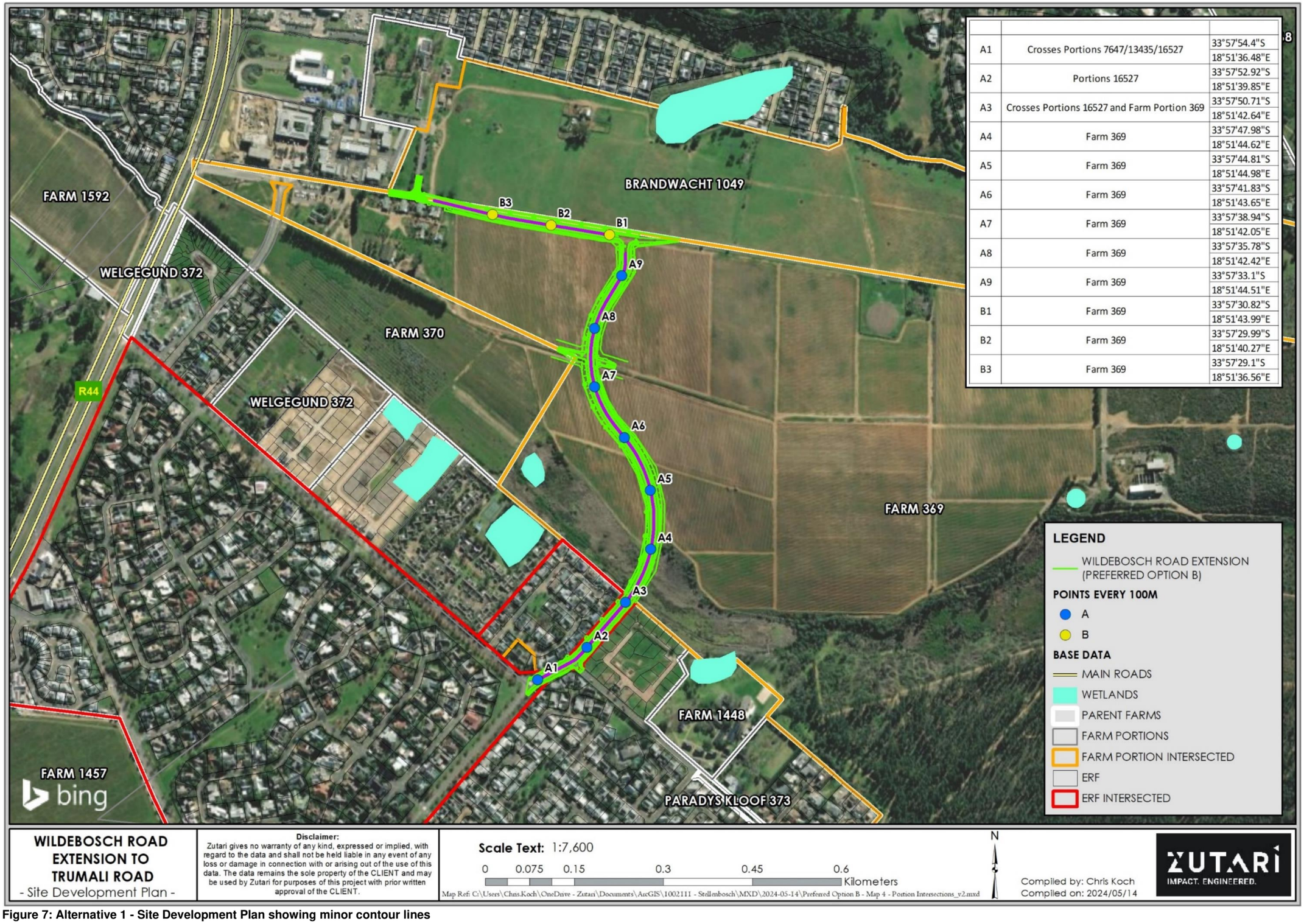


Figure 6: Alternative1 - Site Development Plan showing major contour lines



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B3	Farm 369	33°57'29.1"S 18°51'36.56"E

Figure 7: Alternative 1 - Site Development Plan showing minor contour lines

Appendix C: Site Locality Maps

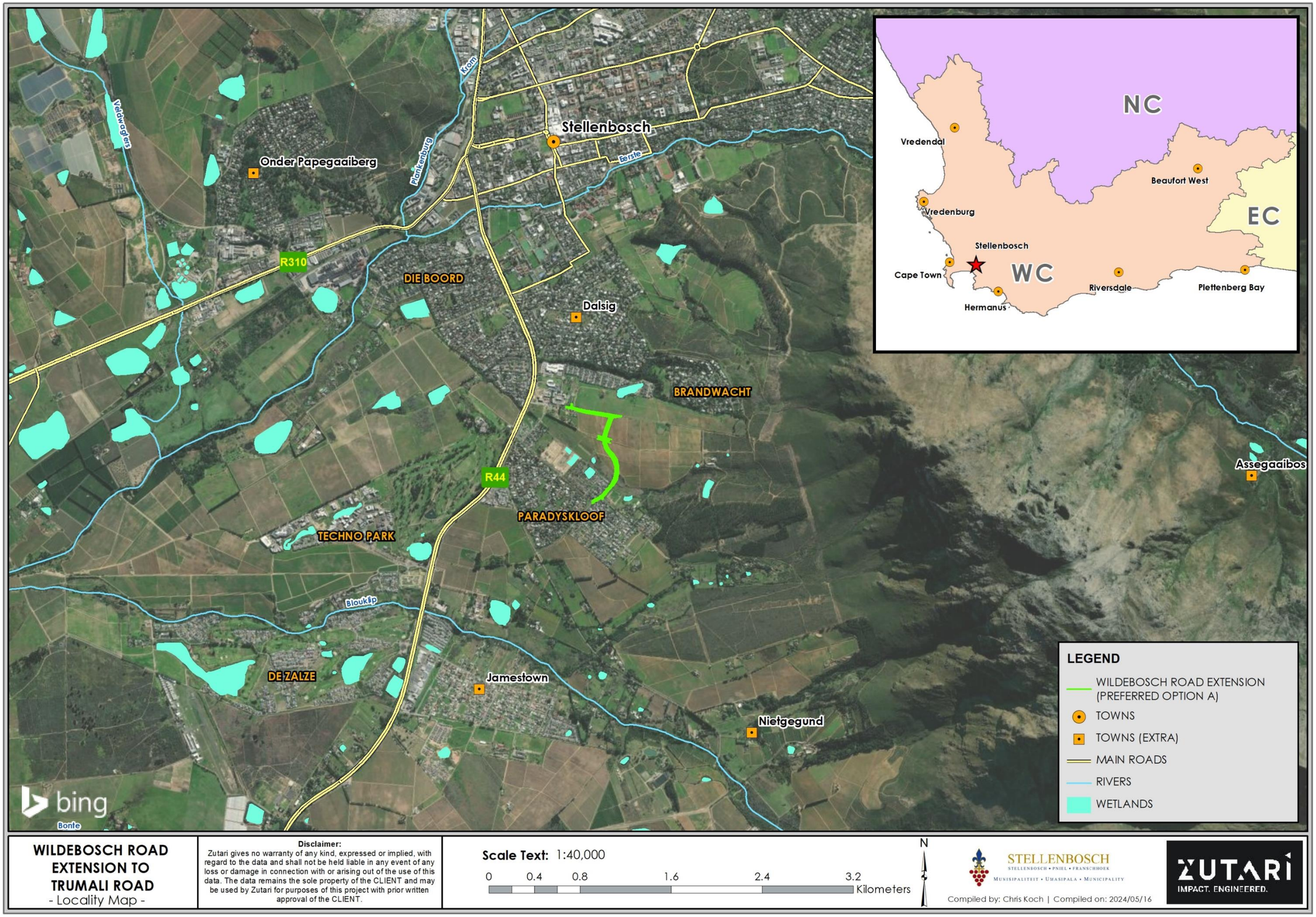

Figure 8: Preferred option - Site Locality Map

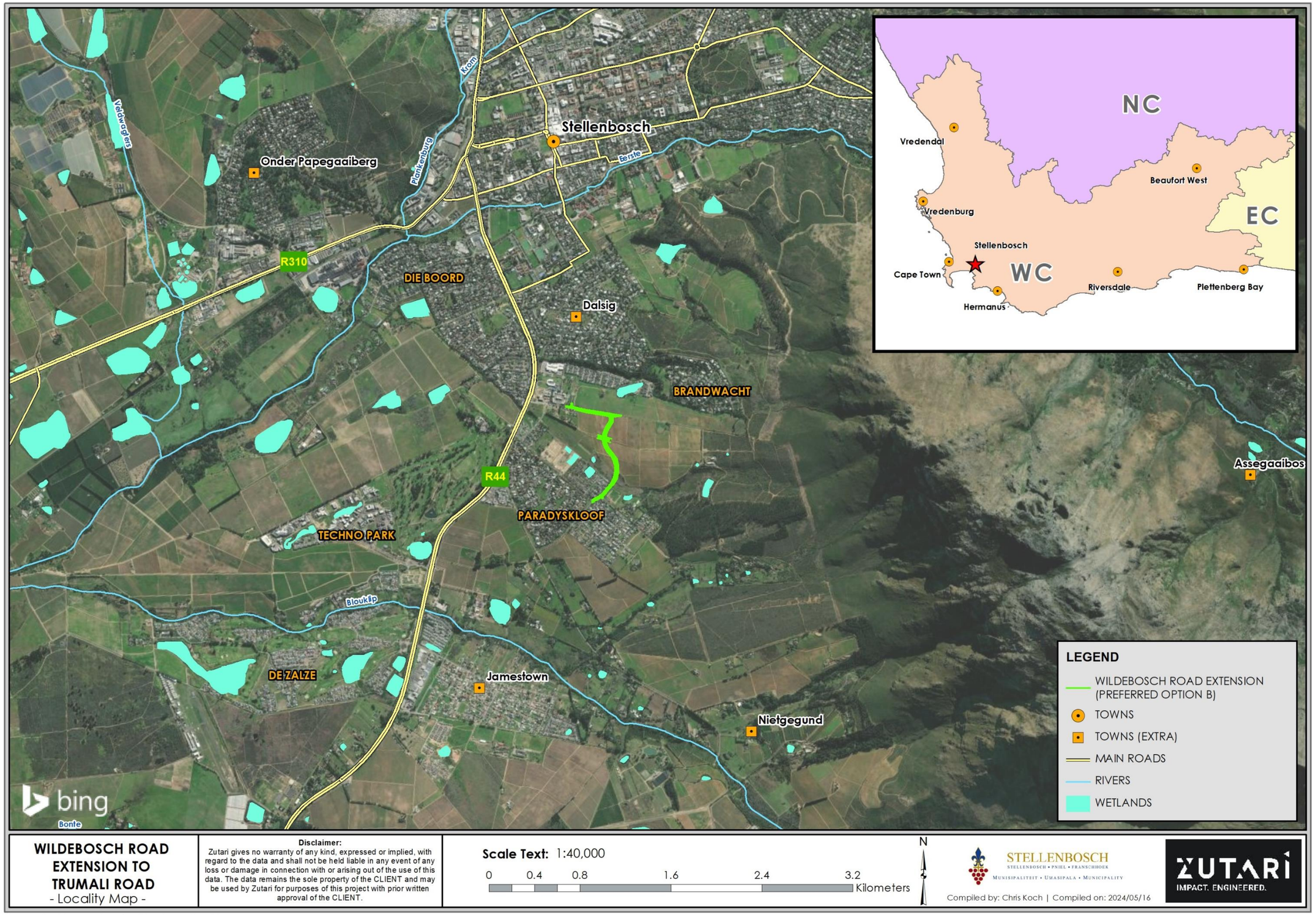

Figure 9: Alternative 1 - Site Locality Map

Appendix D: Watercourse Map

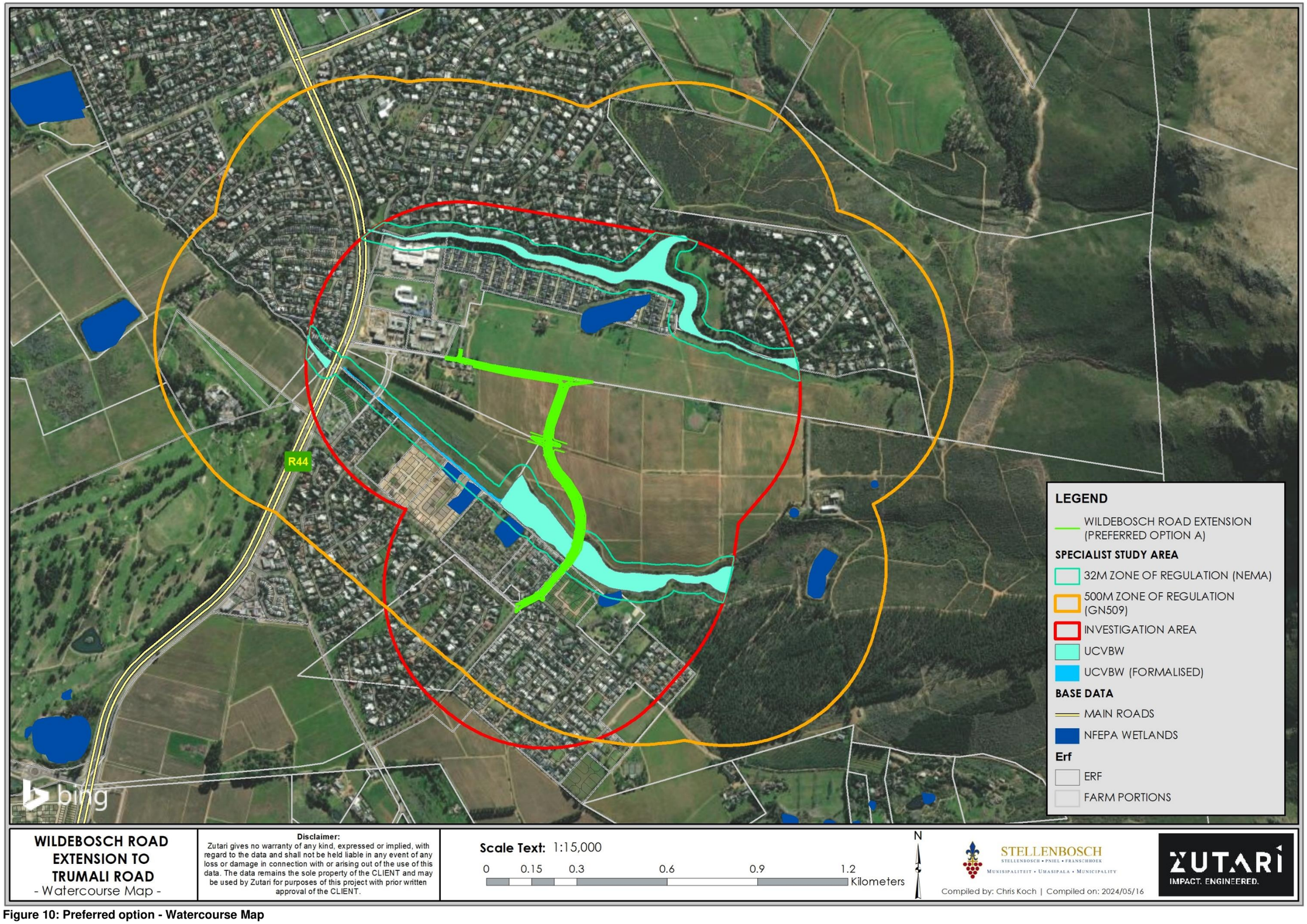

Figure 10: Preferred option - Watercourse Map

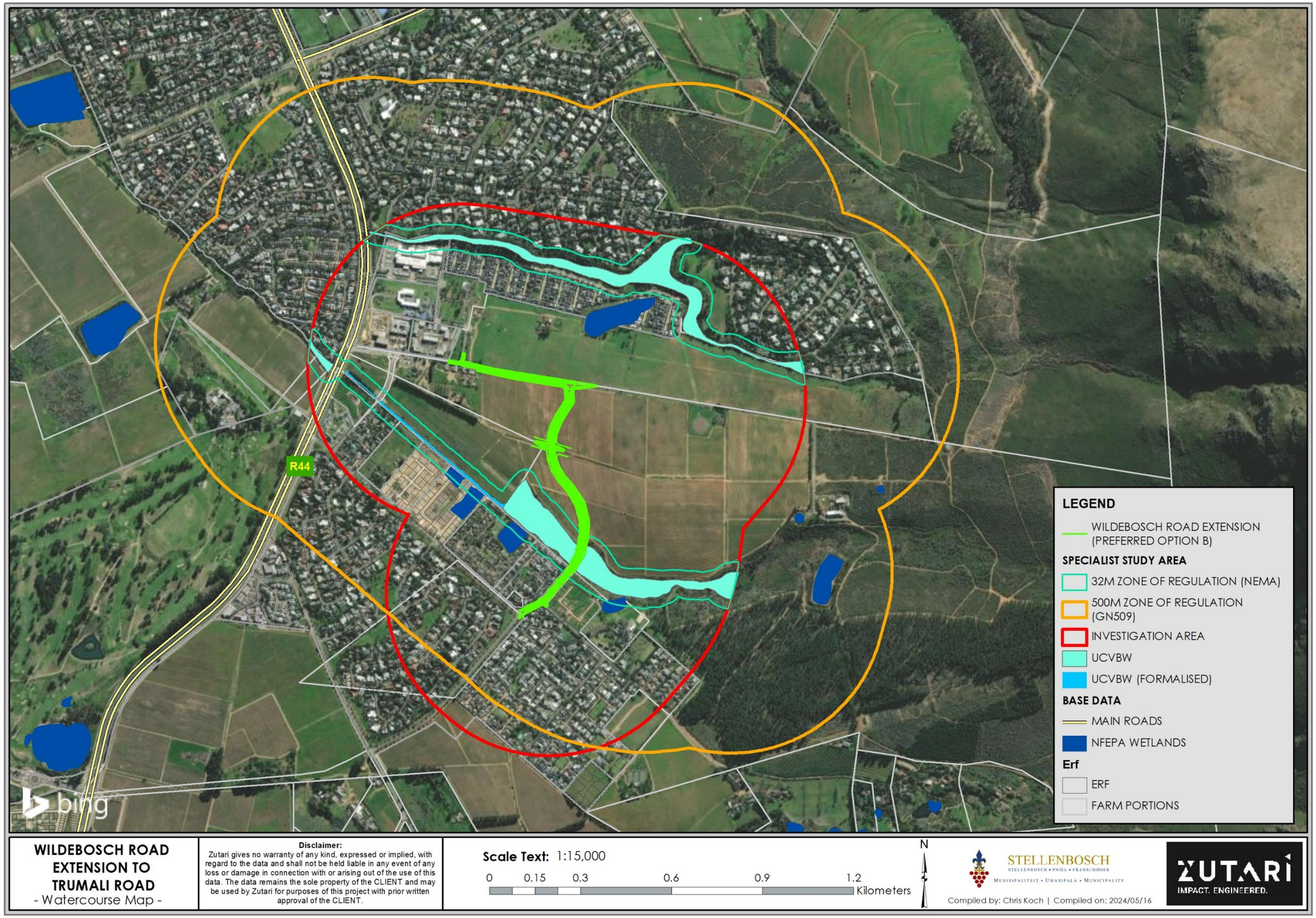

Figure 11: Alternative 1 - Watercourse Map

In diversity there is beauty and there is strength.

MAYA ANGELOU

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