Environmental Management Plan (EMP)

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Draft Environmental Management Plan (EMP) for the proposed Raslouw X15 Sewer pipeline, Gauteng Province

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1. Project Outline

1.1 Background

Bokamoso Environmental Consultants was appointed by **Purple Roof Developers (Pty) Ltd** to compile a Basic Assessment Report for the installation of the Raslouw X15 sewer pipeline. The EIA had been prepared to comply with Section 32 of the National Environmental Management Act (NEMA), 1998 (Act 107 of 1998).

The EMP will be a binding document for purposes of compliance.

1.2 Project description

The involved section of Raslouw X15 is approximately 2 km in length and falls within the area of jurisdiction of the City of Tshwane Metropolitan Municipality. ***Refer to figure 1, Locality Map***

Figure 1 – LocalityMap

Timeframe for construction:

This will be provided when/if the application for the proposed development is approved.

1.3 Receiving Environment

Refer to Figure 2, Sensitive issues Map

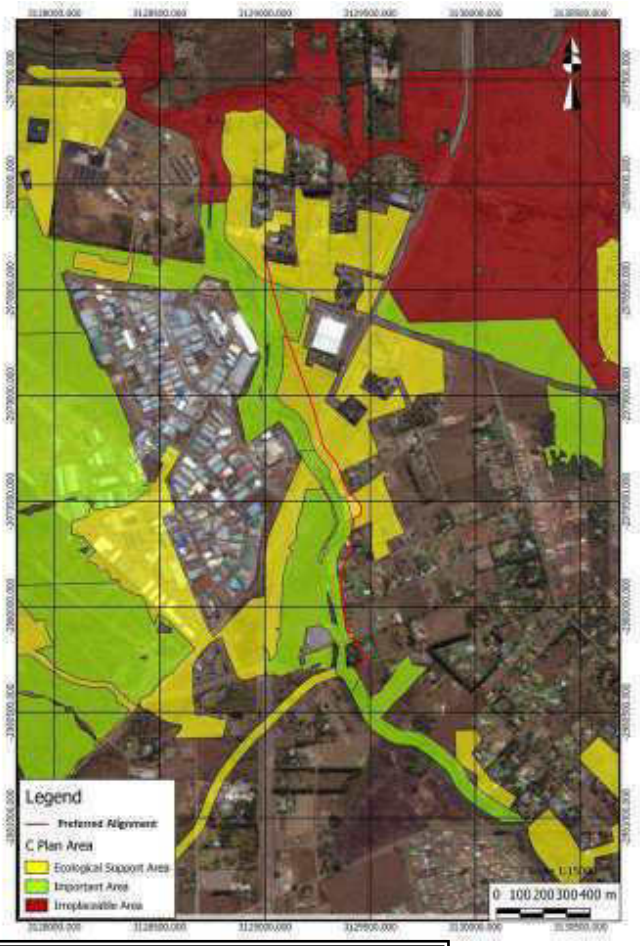


Figure 2 – Sensitive Issues Maps

Geology:

- The proposed sewer line is situated in an area comprising mainly of dolomite. Chert with shale and quartzite also occurs in the general area.

Fauna and flora:

- No red data flora species was found. Although a small section of the proposed sewer pipeline might possibly have some Orange Listed Plant species present

according to C-Plan data, but this will only be confirmed when a specialist study has been conducted. No fauna (both vertebrate and invertebrate) species was found on site, with no connectivity to any functional habitats. The proposed sewer pipeline traverses Natural grassland areas which were deemed sensitive; however it does not traverse any irreplaceable sites.

Hydrology:

- The proposed sewer pipeline is planned to mainly be aligned along the contours that is 5m or more above the **water** level of the Rietspruit and the sewer line will be between 15 and 130m away from the channel. It is also planned to run just outside the 1:100 year floodline, thus it will be less than 500 meters away from the river. However, the proposed sewer line does not transect the wetland or riparian zone at any point. The construction and operational phase of the proposed sewer pipeline could cause erosion, silitation and pollution of these water bodies if mitigation measures are not implemented. The wetlands and riparian vegetation are regarded as sensitive.

  The proposed sewer line runs outside of the wetland/riparian zone for its entire length.

Impact on agricultural land and agricultural holdings:

- The pipeline alignment cut through agricultural land and urban area. But the general agricultural potential of the soils traversed by the alignments of sewer pipeline are moderate to low and the study areas does not fall within a GDARD Agricultural Hub.

Noise Impact:

- Pro-active planning in the area should be considered around the sewer pipeline area especially for during construction. During the operational phase, there will be no noise impacts.

Blasting:

- Some blasting may be required during the construction of the sewer pipeline.

2. EMP Objectives and context

Objectives

The objectives of this plan are to:

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

EMP context

This EMP fits into the overall planning process of the project by carrying out the conditions of consent set out by the GDARD. In addition, all mitigation measures recommended in the EIA report are included in the EMP.

This EMP addresses the following phase of the development:

- Planning and Design phase.

3. Monitoring

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

These role players may include the Authorities (A), other Authorities (OA), Developer/proponent(D), Environmental Control Officer (ECO), Project Manager (PM), Contractors (C), Environmental Assessment Practitioner (EAP) and Environmental Site Officer (ESO). Landowners interested and affected parties and the relevant environmental and project specialists are also important role players.

3.8 Acts

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

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

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

Impact on proposed pipeline:
The Raslouw x 15 sewer pipeline will require a water license application in terms of section 21 (c) and (i) of the National Water Act (Act 36 of 1998).

3.8.2 National Environmental Management Act (Act 107 of 1998)

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

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

In terms of Section 24G of the National Environment Management Act, 1998 (Act No. 107 of 1998) an Environments Impact Assessment (EIA) as part of the application for rectification (Section 24G) must be submitted to the delegated authority for consideration. Section 24G (1) (b) (vii) lists all the items that must be included and discussed in the EIA Report to be compiled and submitted.

Impact on proposed pipeline:

The proposed section of the pipeline is listed under the activities as regulated under NEMA and therefore a Basic Assessment Process is being conducted.

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

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

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

On 29 November 2013 the Minister of Environmental Affairs and Tourism amended the list of waste management activities that might have a detrimental effect on the environment.

Impact on proposed pipeline:

No Waste Management License will be required during the construction phase of the proposed pipeline.

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

The National Heritage Resources Act legislates the necesity and heritage impact assessment in areas earmarked for development, which exceed 0.5ha. The Act makes provision for the potential destruction to existing sites, pending the archaelogist's recommendations through permitting procedures. Permits are administered by the South African Heritage Resources Agency (SAHRA).

Impact on proposed pipeline:
No cultural/historical significant areas were identified with in the application site and thus no areas of historical or cultural value will be affected. It is although important that if any such features are discovered during construction activities and clearing of the application site, the correct "procedures for an Environmental incident" (at the end of this EMP) must be followed.

3.8.5 The Municipal Systems Act (Act 32 of 2000)

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

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

Impact on proposed pipeline:
The proposed section of the pipeline will contribute to the Municipal system.

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

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

Impact on proposed pipeline:

According to the Gauteng Agricultural Potential Atlas (GAPA 3), the Raslouw X 15 sewer pipeline is located on land with high and low agricultural potential. However, it should be noted that the surrounding areas is in the process of being developed or already developed for industrial, residential or other land uses. Construction of the proposed section of the pipeline will possibly cause erosion and pollution of water sources if these impacts are not mitigated.

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

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

Impact on proposed pipeline:

No red data species were found on site.

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

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

Impact on proposed pipeline:

The pipeline does not affect any protected areas.

3.8.9 GDARD Draft Ridges Policy

The main purpose of the draft Red Data Policy is to protect red data plant species in Gauteng Province. This policy requires that red data species remain in situ and it gives priority ratings (based on where they occur) to the different Red Data species. If Red Data species are discovered on the study area this policy will have relevance and it should be described in detail as to how it is applicable to this application.

According to the GDARD C-Plan, the study area is not affected by ridges and the Draft Ridges Policy is therefore not applicable.

Impact on proposed pipeline:
The study area is not affected by any ridges.

3.8.10 GDARD Red List Plant Species Guidelines

The purpose of these guidelines is to promote the conservation or Red List Plant Species in Gauteng, which are species of flora that face risk of extinction in the wild. By protecting Red List Plant Species, conservation of diverse landscapes is promoted which forms part of the overall environmental preservation of diverse ecosystems, habitats, communities, populations, species and genes in Gauteng.

These Guidelines are intended to provide a decision-making support tool to any person or organization that is responsible for managing, or whose actions affect, areas in Gauteng where populations of Red List Plant Species grow, whether such person or organization be an organ of state or private entity or individual; thereby enabling the conservation of the Red List Plant Species that occur in Gauteng.

Impact on proposed pipeline:
No red data species were observed by specialist on the study area.

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

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

Impact on proposed pipeline:
No open fires will be allowed. It is important that a site development camp be located on a part of the application site that is already disturbed. The camp should not be located in close proximity of natural veld grass areas, areas that can be easily susceptible for fires, and the floodline zone area.

3.8.12 Environmental Conservation Act: Noise Regulations, 1989 (Act no.73 of 1989)

The purpose of this Act is to provide measures and management relating Noise levels. This Act enables Noise levels to be acceptable to standards within a specific area and community.

Impact on proposed pipeline:

The proposed development will include some noisy activities with the construction of the proposed section of the external sewer pipeline and but there will be no noise during the operational phase.

4. Project activities

4.1 Pre-Construction Phase

TYPE	*Environmental risk or issue*	*Objective or requirement*	*Mitigation measure*	*Performance indicator*	*Responsibility*
General	**Project contract**	To make the EMP enforceable under the general conditions of the contract.	The EMP document must be included as part of the tender documentation.	The EMP is included as part of the tender documentation.	Developer
Design and planning	**Stability of structures**	To ensure stability of structures and embankments.	Geotechnical constraints that must be taken into consideration during the planning and designing of the pipeline, i.e. collapsible sands, expansive clays, excavatability etc.	Geotechnical constraints had been taken into consideration during the planning and designing of the pipeline.	Engineer
			1) The dolomite stability along the pipeline should be investigated in detail by conducting a gravity survey and percussion boreholes. 2) More detailed foundation investigations should be conducted for structures such as bridges and culverts. 3) The granite is covered by collapsible material and will have to be pre-collapsed, possibly by impact rolling if the collapse potential is too high. 4) The low-density material encountered within the Oaktree Formation must be compacted with a vibrating or impact roller. In extremely poor conditions the material must be excavated and backfilled with granular material. 5) Embankments will only be required where structures such as bridges and culverts are constructed. 6) The NHBRC precautionary measures for development in dolomitic areas must be implemented.	More detailed foundation investigations done.	Engineer Individual Developer

TYPE	*Environmental risk or issue*	*Objective or requirement*	*Mitigation measure*	*Performance indicator*	*Responsibility*
			7) Stormwater management is extremely important and must be designed to prevent the concentrated ingress and ponding of water. 8) Wet surfaces such as water supply lines must preferably not run close to (within 10m) along the pipeline. Where such a service crosses the pipeline alignment, all due care should be taken to ensure that the pipe does not leak.		
			1) Special drainage designs will be required in areas with shallow ground water, especially for areas underlain by granite and syenite. 2) Precautionary measures to prevent seepage of groundwater into excavations should be implemented.	Special drainage designs and precautionary measures are implemented.	Engineer Contractor
	Storm water design	To prevent and restrict erosion, siltation and groundwater pollution.	1) A storm water management plan must be compiled for the construction and operational phases of the proposed pipeline. 2) The storm water design for the proposed development must be designed to: - Reduce and / or prevent siltation, erosion and water pollution - Improve the surface and ground water quality of the study area and the lower lying areas within the catchment area. and - Ensure that no ponding of water and concentrated ingress of water take place. 3) No storm water must be allowed to enter the natural drainage systems directly. The stormwater should be diverted through forms of storm water retension facilities for containing and releasing flood water in a way that simulate natural flow into the natural drainage systems to assuage associated erosion and siltation problems that may arise. 4) Due to the fact that most of the study area is	Compilation and approval of storm water management plan.	Engineer Individual Developer

TYPE	*Environmental risk or issue*	*Objective or requirement*	*Mitigation measure*	*Performance indicator*	*Responsibility*
			underlain by dolomite no natural channels will be allowed. All open channels and attenuation ponds must be lined with concrete. No grass lined channels will be permitted due to the geotechnical conditions. Concentrated surface drainage is also not permitted.		
Climate	**Damage to the environment during the rainy season**	To minimize damage to the environment and structures	It is recommended that the construction of pipeline next to stream crossings be scheduled for the dry season.	Construction of bridge structures scheduled for rainy season.	Engineers
Geology and soils	**Risk of sinkholes**	To prevent the reaction of a sinkhole after the construction of the pipeline.	1) Special precautionary measures for construction on dolomite must be implemented. 2) A dolomite risk management plan must be compiled to manage the pipeline.	Precautionary measures implemented.	Geotechnical Engineer Dolomite Risk manager
Fauna and flora	**Floral biodiversity and ecological health**	To ensure that the species introduced to the area, are compatible with the current and future quality of the ecologicalproces ses.	1) As many as possible of the mature indigenous trees that occur naturally in the vicinity of the proposed pipeline should be retained. These vegetation communities should be connected to natural vegetation on neighbouring properties to facilitate connectivity. This area should be properly managed throughout the lifespan of the project in terms of fire, eradication of exotics to ensure biodiversity. 2) No plants which are not indigenous to the area or exotic plant species, especially lawn grasses and other ground-covering plants should be used as soil-binding agents along new pipeline verges as they will drastically interfere with the nature of the area. 3) All category 1 declared weeds and other alien species must be removed from the vicinity of the proposed pipeline.	As many as possible of the mature trees are retained and exotics are eradicated	Landscape Architect Contractor
		To ensure protection of wetland system	1) A fence/ safety netting should be erected between the Riparian vegetation and the areas which may be affected for the planned pipeline	Fence erected	Contractor

TYPE	*Environmental risk or issue*	*Objective or requirement*	*Mitigation measure*	*Performance indicator*	*Responsibility*
		and river/drainage line	reserve. This will prevent entry into the drainage line by construction material and other waste in the drainage line. 2) Care must be taken to ensure that construction activities remain within the boundary of the planned pipeline. 3) Limited access to the water of the Rietspruit should be given to construction vehicles by fencing of all access points to the water, except at the predetermined water-intake point.		
			The edge of the wetland must be clearly demarcated in the field with poles, sticks, or any solid structure that will last for the duration of the development, colour-coded as follows: ○**Red –** Indicating the edge of the wetlands, or parts thereof; and no vehicles or building materials are allowed in this zone. (These should be put along the entire length of the property / site). ○**Orange** – Indicating the edge of the buffer zone (50m outside the urban edge). However, allowance must be made for sensitive species that require larger areas, e.g. Grass Owl, Giant Bullfrog, etc. ○**Green** – Indicating where the first structures will be built (e.g. stands / plots building, paving, wall fencing, etc.	Fence erected.	Contractor
Preparing Site Acess	**Environmental integrity**	To avoid erosion and Disturbance to indigenous vegetation.	Designated route shall be determined for the construction vehicles and designated areas for storage of equipment. Clearly mark the site access point and routes on site to be used by construction vehicle and pedestrians. Provide an access map to all contractors whom in tum must provide copies to the construction workers. Instruct all drivers to use access point	Access to site is erosion free. Minimum disturbance to surrounding vegetation. Vehicles make use of established routes.	Contractor

TYPE	*Environmental risk or issue*	*Objective or requirement*	*Mitigation measure*	*Performance indicator*	*Responsibility*
			and determined routes.		
	Waste storage	To control the temporary storage of waste.	Temporary waste points on site shall be determined. These storage points shall be accessible by waste removal trucks and these points should not be located in sensitive areas / areas highly visible form the properties of the surrounding land-owners / tenants / in areas where the wind direction will carry bad odours across the properties of adjacent tenants or landowners.		Contractor ESO
		Ensure waste storage area does not generate pollution.	Build a bund around waste storage area to stop overflow into storm water.		Contractor
	Cultural Resources	To ensure protection of cultural resources.	1) In terms of the South African Resources Act (Act 25 of 1999) Section 35 (4) no person may, without a permit issued by the responsible heritage resources authority destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or Palaeontological site or material. 2) Section 34 (1) of this act states that no person may alter or demolish any structure or part of a structure, which is older than 60 years without a permit, issued by the relevant provincial resources authority	No cultural resources destroyed or removed.	
	Servitudes		Servitudes must be indicated on engineering drawings.	Servitudes indicated on engineering drawings.	Engineer
	Expropriation of properties		The expropriation of properties must be finalized prior to the construction of the pipeline.		
	Impact on surrounding properties	To minimize impact on possible mining activities	1) The construction of the section of the pipeline that affects the nearby neighbors should be planned properly. 2) Should there be mined areas on the site, then they must be rehabilitated according to an EMP		Contractor

TYPE	*Environmental risk or issue*	*Objective or requirement*	*Mitigation measure*	*Performance indicator*	*Responsibility*
			prior to construction of the pipeline.		
		To access to surrounding properties.	1) The properties affected by the proposed sewer pipeline must be taken into consideration during the planning phases. 2) The design of the pipeline must make provision for access to local routes and properties as well as future routes.	Access provided to affected properties.	Engineer
	Impact on Waste Water Works	To prevent impact on sewage facility.	The design of the pipeline must take other existing pipeline facility into consideration. No pipes or outlet structures of the sewage facility may be affected by the new proposed sewer pipeline.	No pipes or outlet structures affected by the sewer pipeline.	Engineer

4.2 Construction Phase

Contractor's camp	**Vegetation and topsoil**	To minimize damage to and loss of vegetation and retain quality of topsoil.	1) Site offices, parking areas for construction vehicles, etc. should be confined to non-sensitive areas. 2) Site to be established under supervision of ECO. 3) Clearing and relocation of plants to be undertaken in accordance with site specific requirements.	Site erected in an area that is not sensitive. Minimal vegetation removed / damaged during site activities.	Contractor
	Surface and ground water pollution	To minimize pollution of surface and ground water resources.	1) Sufficient and temporary facilities including ablution facilities must be provided for construction workers operating on the site. 2) A minimum of one chemical toilet shall be provided per 10 persons. The contractor shall keep the toilets in a clean, neat and hygienic condition. Toilets provided by the contractor must be easily accessible and a maximum of 50m from the works area to ensure they are utilized. The contractor (who must use reputable toilet-servicing company) shall be responsible for the	Effluents managed effectively. No water pollution of water resources from site. Workforce use toilets provided.	Contractor ESO

			cleaning, maintenance and servicing of the toilets. The contractor (using reputable toilet-servicing company) shall ensure that all toilets are cleaned and emptied before the builders' or other public holidays. 3) No person is allowed to use any other area than chemical toilets. 4) No French drain systems may be installed. 5) No chemical or waste water must be allowed to contaminate the run-off on site. 6) Avoid the clearing of the site camp (of specific phase) or paved surfaces with soap.		
		To minimize pollution of surface and groundwater resources due to spilling of materials.	1) Drip trays and / or lined earth bunds must be provided under vehicles and equipment, to contain spills of hazardous materials such as fuel, oil and cement. 2) Repair and storage of vehicles only within the demarcated site area. 3) Spill kits must be available on site. 4) Oils and chemicals must be confined to specific secured areas within the site camp. These areas must be bunded with adequate containment (at least 1.5 times the volume of the fuel) for potential spills or leaks. 5) All spilled hazardous substances must be contained in impermeable containers for removal to a licensed hazardous waste site. 6) No leaking vehicle shall be allowed on site. The mechanic / the mechanic of the appointed contractor must supply the environmental officer with a letter of confirmation that the vehicles and equipment are leak proof. 7) No bins containing organic solvents such as paints and thinners shall be cleaned on site, unless containers for liquid waste disposal are placed for this purpose on site.	No pollution of the environment.	Contractor ESO
		To minimize pollution of	The mixing of concrete shall only be done at specifically selected sites, as close as possible to	No evidence of contaminated soil on the	Contractor ESO

		surface and groundwater resources by cement.	entrance, on mortar boards or similar structures to prevent run-off into drainage lines, streams and natural vegetation.	construction site.	
		To minimise pollution of surface and groundwater resources due to effluent.	No effluent including effluent from any storage areas) may be discharged into any water surface or ground water resource.	No evidence of contaminated water resources.	Contractor ESO
	Pollution of the environment	To prevent unhygienic usage on the site and pollution of the natural assets.	1) Weather proof waste bins must be provided and emptied regularly. 2) The contractor shall provide laborers to clean up the contractor's camp and construction site on a daily basis. 3) Temporary waste storage points on the site areas should be determined. THESE AREAS SHALL BE PREDETERMINED AND LOCATED IN AREAS THAT IS ALREADY DISTURBED. These storage points should be accessible by waste removal trucks and these points should be located in already disturbed areas / areas not highly visible from properties of the surrounding land-owners / in areas where the wind direction will not carry bad odours across the properties of adjacent landowners. This site should comply with the following: ♦ Skips for containment and disposal of waste that could cause soil and water pollution, i.e. paint, lubricants, etc. ♦ Small lightweight waste items should be contained in skips with lids to prevent wind littering. ♦ Bunded areas for containment and holding of dry building waste. 4) No solid waste may be disposed of on the site. 5) No waste materials shall at any stage be disposed of in the open veld of adjacent		

			properties. 6) The storage of solid waste on the site, until such time as it may be disposed of, must be in a manner acceptable to local authority and DWA. 7) Cover any wastes that are likely to wash away or contaminate storm water.		
		Recycle material where possible and correctly dispose of unusable wastes.	1) Waste shall be separated into recyclable and non-recyclable waste, and shall be separated as follows: ● General waste: including (but not limited to) construction rubble. ● Reusable construction material 2) Recyclable waste shall preferably be deposited in separate bins. 3) All solid waste including excess spoil (soil, rock, rubble, etc.) must be removed to a permitted waste disposal site on a weekly basis. 4) No bins containing organic solvents such as paints and thinners shall be cleaned on site, unless containers for liquid waste disposal are placed for this purpose on site. 5) Keep records of waste reuse, recycling and disposal for future reference. Provide information to ECO.	Sufficient containers available on site No visible signs of pollution.	Contractor ESO
	Increased fire risk to site and surrounding areas	To decrease fire risk	1) Fires shall only be permitted in specifically designated areas and under controlled circumstances. 2) Food vendors shall be allowed within specified areas. 3) Fire extinguishers to be provided in all vehicles and fire beaters must be available on site. 4) Emergency numbers / contact details must be available on site, where applicable.	No open fires on site that have been left unattended.	Contractor
Construction site	**Geology and soils**	To prevent the damaging of existing soils and geology.	1) The top layer of all areas to be excavated for the purpose of construction shall be stripped and stockpiled in areas where this material will not be damaged, removed or compacted.	Excavated materials correctly stockpiled. No signs of erosion.	Contractor

			2) All surfaces that are susceptible to erosion, shall be protected either by cladding with biodegradable material or with the top layer of soil being seeded with grass seed / planted with a suitable groundcover.		
		To prevent the loss of topsoil	1) Stockpiling will only be done in designated places where it will not interfere with the natural drainage paths of the environment. 2) In order to minimize erosion and siltation and disturbance to existing vegetation, it is recommended that stockpiling be done / equipment is stored in already disturbed / exposed areas. 3) Cover stockpiles and surround downhill sides with a sediment fence to stop materials washing away. 4) Remove vegetation only in areas designated during the planning stage. 5) Rehabilitation / landscaping is to be done immediately after the involved works are completed. 6) All compacted areas should be ripped prior to them being rehabilitated / landscaped by the contractor as appointed by the individual erf owner. 7) The top layer of all areas to be excavated must be stripped and stockpiled in areas where this material will not be damaged, removed or compacted. This stockpiled material should be used for the rehabilitation of the site and for landscaping purposes. 8) Strip topsoil at start of works and store in stockpiles no more than 1,5 m high in designated materials storage area. 9) During the laying of any cables, pipelines or infrastructure (on or adjacent to the site) topsoil shall be kept aside to cover the disturbed areas immediately after such activities are completed.	Excavated materials correctly stockpiled. No visible signs of erosion and sedimentation. Minimal invasive weed growth. Vegetation only removed in designated areas.	Contractor of individual developer

	Erosion and siltation	To prevent erosion and siltation.	1) Cut-off of drains should be excavated up- and down-hill of denuded areas to reduce run-off across these areas. 2) Large exposed areas during the construction phases should be limited. Where possible areas earmarked for construction during later phases should remain covered with vegetation coverage until the actual construction phase. This will prevent unnecessary erosion and siltation in these areas. 3) Rehabilitate exposed areas immediately after construction in these areas is completed (not at the end of the project). 4) Unnecessary clearing of flora resulting in exposed soil prone to erosive conditions should be avoided. 5) All embankments must be adequately compacted and planted with grass to stop any excessive soils erosion and scouring of the landscape. 6) Storm water diversion measures are recommended to control peak flows during thunder storms. 7) The eradication of alien vegetation should be followed up as soon as possible by replacement with indigenous vegetation to ensure quick and sufficient coverage of exposed areas.	No erosion scars. No loss of topsoil. All damaged areas successfully rehabilitated.	Contractor ESO
	Stability of structures dueto geology	To ensure stability of structures.	The affected quarries must be filled and proper layer works undertaken to prevent damage to the pipeline structure.	Quarries filled by layerworksundertaken to the satisfaction of the engineer.	Engineers / Contractor
	Corrosivity of soils	To prevent potential damage to metallic elements placed underground due to corrosive soils	All metallic elements must be galvanized or protected by other anti-corrosive methods.	Metallic elements are galvanised or protected by anti-corrosive methods.	Engineers / Contractor

		in dolomitic areas.			
	Hydrology	To minimise pollution of soil, surface and groundwater.	1) Containment of run-off from construction areas should be implemented and the streams closed off from access by construction workers. 2) Cut-off drains should be trenched between the streams and the construction activities and hay bales should be stacked along the trenches where possible to contain siltation. 3) All spillages must be cleaned up and contaminated soil removed as hazardous waste. 5) Affected soil must be treated with DRIZIT or similar product.	No visible signs of erosion. No visible signs of pollution.	Contractor
		To ensure protection of wetlands and rivers	The wetland crossings should take place at 90 degree angles to the drainage line to minimize the length of the crossing within the wetland areas.	River and wetland crossings designed accordingly	Engineer
		To minimise impacts on wetland system	1) Compacted earth berms should be constructed at suitable intervals to reduce the volume and speed of runoff from construction areas into the storm water and wetland systems for the duration of the construction phase of the pipeline. The following guidelines should be used: - Where the area has a slope of less than 2%, berms every 50m should be installed. - Where the area slopes between 2% and 10% berms every 25m should be installed. - Where the area slopes between 10% - 15%, berms every 20m should be installed. - Where the area has a slope greater than 15% berms every 10m should be installed. 2) Reduce runoff from surface areas as far as possible. The storm water should be introduced into the system at a shallow angle to prevent erosion of the opposite bank of the system. 3) No vehicles should be allowed to indiscriminately drive through the wetland areas. A fence should be erected to prevent entry into	Berms constructed. NGL with vegetation coverage (dense) Constructed accordingly.	Contractor / Engineer

			the wetland areas and drainage line by construction vehicles and prevent storing or dumping of topsoil, construction material and other waste in the wetland / drainage line. 4) All areas affected by construction should be rehabilitated upon completion of the construction phase of the pipeline. Areas should be reseeded with indigenous grasses as required. 5) Upon completion of the construction in the area, the area should be rehabilitated to a level that will ensure that wetland vegetation can become re-established. In this regard special mention of the following is made: ♦ All areas of disturbed and compacted soils need to be compacted and reprofiled. ♦ Ongoing removal of alien vegetation from the area must take place after the completion of the structure to prevent the uncontrollable species. 6) Care must be taken to ensure that construction activities remain within the boundary of the planned sewer pipeline. 7) Limited access to the water of the Rietspruit should be given to construction vehicles by fencing off all access points to the water, except at the predetermined water-intake point.	Fence erected Affected areas continuously rehabilitated.	
		To minimise impact on river and wetland system during wet periods	Construction workers and construction vehicles and machinery must stay out of the soggy areas during the wet periods. Barrier tape should be used to demarcate the areas that are drenched with water (especially the ecologically sensitive wetland area and the areas covered with valuable topsoil) and it should only be removed when the appointed Environmental Control Officer (ECO) / site supervisor / project manager / main contractor regard the conditions in the affected areas as favourable.	Areas that are drenched with water (especially the ecologically sensitive wetland area and the areas covered with valuable topsoil) are demarcated with barrier tape.	Contractor / ESO
	Fauna and flora	To protect the existing fauna	1) No plants not indigenous to the area or exotic plant species, especially lawn grasses and other	Only indigenous plants used.	Contractor ESO

		and flora.	ground-covering plants should be used as soil-binding agents along new pipeline as they will drastically interfere with the nature of the area. 2) All Category Declared Weeds and other alien species must be removed from the vicinity of the proposed pipeline. 3) Ongoing removal of alien vegetation stands which show signs of dominance or active recruitment should take place throughout the construction and operational phase of the development. 4) All areas affected by construction should be rehabilitated upon completion of the construction phase of the pipeline. Areas should be reseeded with indigenous grasses as required. 5) Trees that are intended to be retained shall be clearly marked on site. 6) Snaring and hunting of fauna by construction workers on or adjacent to the study area are strictly prohibited and the Council shall prosecute offenders. 7) All mitigation measures for impacts on the indigenous flora of the area should be implemented in order to limit habitat loss as far as possible and maintain and improve available habitat, in order to maintain and possibly increase numbers and species of indigenous fauna. 8) Wood harvesting of any trees or shrubs on the study area or adjacent areas shall be prohibited. 9) Where possible work should be restricted to one area at a time. 10) Noise should be kept to a minimum and the developer should be done in phases to allow faunal species to temporarily migrate into the conservation areas in the vicinity. 11) The integrity of remaining wildlife should be upheld, and no trapping or hunting by construction personnel should be allowed.	All Category 1 Declared Weeds and other alien species removed	

			Caught animals should be relocated to the conservation areas in the vicinity. 12) Conservation-orientated clauses should be built into contracts of construction personnel complete with penalty clauses for non-compliance.		
Social	**Noise Impact**	To maintain noise levels below "disturbing" as defined in the national Noise Regulations.	1) Site workers must comply with the Provincial noise requirements as outlined in Provincial Notice No. 5479 of 1999: Gauteng Noise Control Regulations. 2) Noise activities shall only take place during working hours.	No complaints from surrounding residents and I & AP	Contractor
	Dust Impact	Minimise dust from the site	1) Dust pollution could occur during the construction works, especially during the dry months. Regular and effective damping down of working areas (especially during the dry and windy periods) must be carried out to avoid dust pollution that will have a negative impact on the surrounding environment. 2) When necessary, these working areas should be damped down in the mornings and afternoons. 3) Sweeping of the construction site, clearing of builders' rubble and debris are well as the regular watering of the construction site (storage areas, pipelines etc.) must take place at least once a day.	No visible signs of dust pollution No complaints from surrounding residents I & AP	Contractor
	Blasting	To ensure safety during blasting operations.	1) Surrounding residents must be informed of blasting exercises at least one week in advance. 2) Blasting operations should be carefully controlled and the necessary safety precautions must be implemented.	Surrounding residents informed. Safety precautions in place.	Engineer Project Manager
	Safety and security	To ensure the safety and security of the public.	1) Although regarded as a normal practice, it is important to erect proper signs indicating the operations of heavy vehicles in the vicinity of dangerous crossings and access routes or even in the development in the development site if necessary.	No incidences reported	Contractor ESO

			2) With the exception of the appointed security personnel, no other workers, friend or relatives will be allowed to sleep on the construction site (weekends included). 3) Construction vehicles and activities to avoid peak hour traffic times i.e. between 7am. and 9 am. and again between 4 pm. and 6 pm. On weekdays. Sewer pipeline should be well planned to avoid construction vehicles travelling through residential areas where possible. 4) Presence of law enforcement officials at strategic places must be ensured. 5) Following actions would assist in management of safety along the sewer pipeline area. ▪ Adequate pipeline marking ▪ Although regarded as a normal practice, it is important to erect proper signs indicating the danger of the excavation in and around the development site. Putting temporary fencing around excavations where possible. 6) It is important to erect warning signs on existing routes when impacted on by the construction of the pipeline (i.e. construction of intersections / bridges). 7) Traffic on existing routes should be controlled during construction activities impacting on these routes (i.e. construction works at intersections, construction of bridges).		
	Influx of people from other areas	In order to limit the influx of people from other areas.	It is recommended that (where possible) only people from the local communities in and around Centurion employed.	People from local community employed.	Contractor
	Infrastructure and services	Installation of services	Determine areas where services will be upgraded and relocated well in advance. Discuss possible disruptions with affected parties to determine most convenient times for services disruptions and warn affected parties well in advance of dates that service disruptions will take place	No complaints from I & AP	Contractor ESO

	Cultural Resources	To ensure the protection of cultural resources	1) If any graves or archaeological sites are exposed during construction work it would immediately be reported to a museum. The report from the archaeologist must be provided to SAHRA if any graves are recovered. 2) It should be noted that in terms of the South African Resources Act (Act 25 of 1999) Section 35(4) no person may, without a permit issued by the responsible heritage resources authority destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or material. 3) Also important is that Section 34(1) of this act states that no person may alter or demolish any structure or part of a structure, which is older than 60 years without a permit, issued by the relevant provincial heritage resources authority.	No destruction of or damage to graves or known archaeological sites.	Contractor ESO
	Visual impact	To minimize the visual impact of the proposed development.	Establish dense vegetation at strategic points to screen-off the most visible sections of the pipeline/ construction of berms adjacent to the pipeline / a combination of berms with vegetation.	Visual impact minimized	Architect
	Vegetation	Landscaping	1) The proposed planting materials for the areas to be landscaped should preferably be endemic and indigenous. 2) All new trees and shrubs to be planted on the study area shall be inspected for pests and diseases prior to them being planted. 3) The inspection shall be carried out by the maintenance contractor at property of the supplier and not on the study area. 4) All trees to be planted shall be in 20L containers with a height of approximately 1,8 metres and a main stem diameter of approximately 300 mm.	Landscaping done according to street master plan.	Landscape architect Contractor / individual Developer
		Loss of plants	1) Aerate compacted soil and check and correct pH for soils affected by construction activities.	Landscaping done according to landscape development plan.	Landscape architect Contractor /

			2) Make sure plant material will be matured enough and hardened of ready for planting. Water in plants immediately as planting proceeds. 3) Apply much to conserve moisture plant according to the layout and planting techniques specified by the Landscape Architect in the Landscape Development plans for the site.		Individual Developer
		Spread of weeds	Ensure that materials used for mulching and topsoil / fertilisers are certified weed free. Collect certifications where available. Control weed growth that appears during construction.	Weed growth controlled	Landscape architect Contractor / individual developer
		To ensure rehabilitation of the site	1) All areas affected by construction should be rehabilitated upon completion of the construction phase of the pipeline. 2) Compacted soils shall be ripped at least 200 mm. 3) All clumps and rocks larger than 30 mm diameter shall be removed from the soil to be rehabilitated. 4) The soil shall be leveled before seeding. 5) Areas should be reseeded with indigenous grasses as required. 6) Watering shall take place at least once per day for the first 14 days until germination of seeds have taken place. 7) Thereafter watering should take place at least for 20 minutes every 4 days until grass have hardened off.	Grass have hardened off	Landscape architect Contractor
			1) Upon completion of the construction in around the wetland area, the area should be rehabilitated to a level that will ensure that wetland vegetation can become re-established. In this regard special mention of the following is made: ♦ All areas of disturbed and compacted soils	Rehabilitation of wetland area	Contractor ESO

			need to be compacted and reprofiled. ♦ Ongoing removal of alien vegetation from the area must take place after the completion of the structure to prevent the uncontrollable recruitment of these species. 2) Ongoing removal of alien vegetation stands which show signs of dominance or active recruitment should take place throughout the construction and operational phase of the development.		

4.3 Operational Phase

Site clean up and prepared for use	**Storm water pollution**	Do not allow any materials to wash into the storm water system.	Remove erosion and sediment controls only if all bare soil is sealed, covered or re-vegetate.		Contractor
		Minimise waste	Decontaminate and collect waste in storage area ready for off-site recycling or disposal. Arrange for final collection and removal of excess and waste materials.		Contractor
Establishing plants	**Slow or no revegetation to stabilize soil, loss or degradation of habitat**	To ensure revegetation to stabilize soil	Agreed schedule for regular follow-up watering, weed control, mulch supplements and amenity pruning, if needed. Replace all plant failures within three month period after planting		Contractor
Drainage failure	**On-site and downstream drainage pollution or flooding**	Storm water management plan	Inspect all site drainage works and repair any failures. Confer with design engineer and to correct site problems as part of the Dolomite Risk Management Plan.		Contractor / Dolomite Risk manager
Site audit	**Eventual project failure**	Successful project establishment	Routinely audit the works and adjust maintenance schedule accordingly.		Contractor

General			Open fires and smoking during maintenance works are strictly prohibited.		Contractor
Geology	**Dolomite Risk Management**		1) A Dolomite Risk Management Plan must be established and adhered to at all times. 2) A monitoring plan must form part of the general maintenance plan for the pipeline and allowance must be made for stability problems to be addressed immediately.		Dolomite Risk manager
Hydrology	**Water pollution**	To prevent water pollution of river and wetland systems	1) All spillages must be cleaned up and contaminated soil removed as hazardous waste. 2) Affected soil must be treated with DRIZIT or similar product.		Contractor

5. Procedures for environmental incidents

5.1 Leakages & spills

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

5.2 Failure of erosion/sediment control devices

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

5.3 Bank/slope failure

- Stabilize toe of slope to prevent sediment escape using aggregate bags, silt fence, logs, hay bales, pipes, etc.
- Notify ECO.
- ECO to follow Incident Management plan.
- Divert water upslope from failed fence.
- Protect area from further collapse as appropriate.
- Restore as advised by ECO.
- Monitor for effectiveness until stabilized.

5.4 Discovery of rare or endangered species

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

5.5 Discovery of archeological or heritage items

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

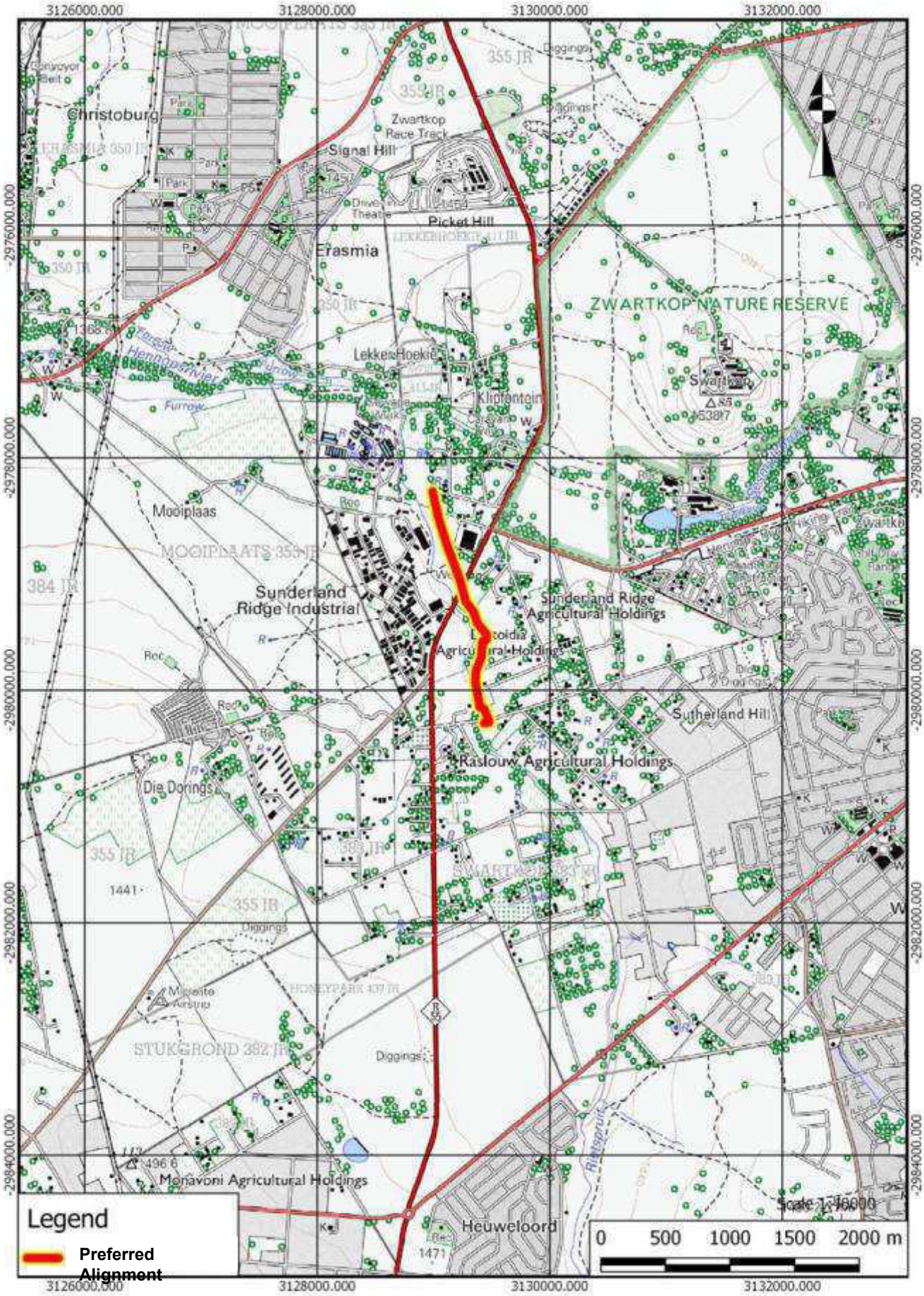
6. EMP review

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

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

Enlarged Figures

Locality Map
Figure 1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Christoburg
Zwartkop Race Track
Signal Hill
Picket Hill
Erasmia
ZWARTKOP NATURE RESERVE
Lekker Hoekie
Klipfontein
Mooiplaas
Sunderland Ridge Industrial
Sunderland Ridge Agricultural Holdings
Sutherland Hill
Raslouw Agricultural Holdings
Die Dorings
Monavoni Agricultural Holdings
Heuweloord
Legend
Preferred Alignment
0 500 1000 1500 2000 m
Scale 1:40000

Aerial Map
Figure 2


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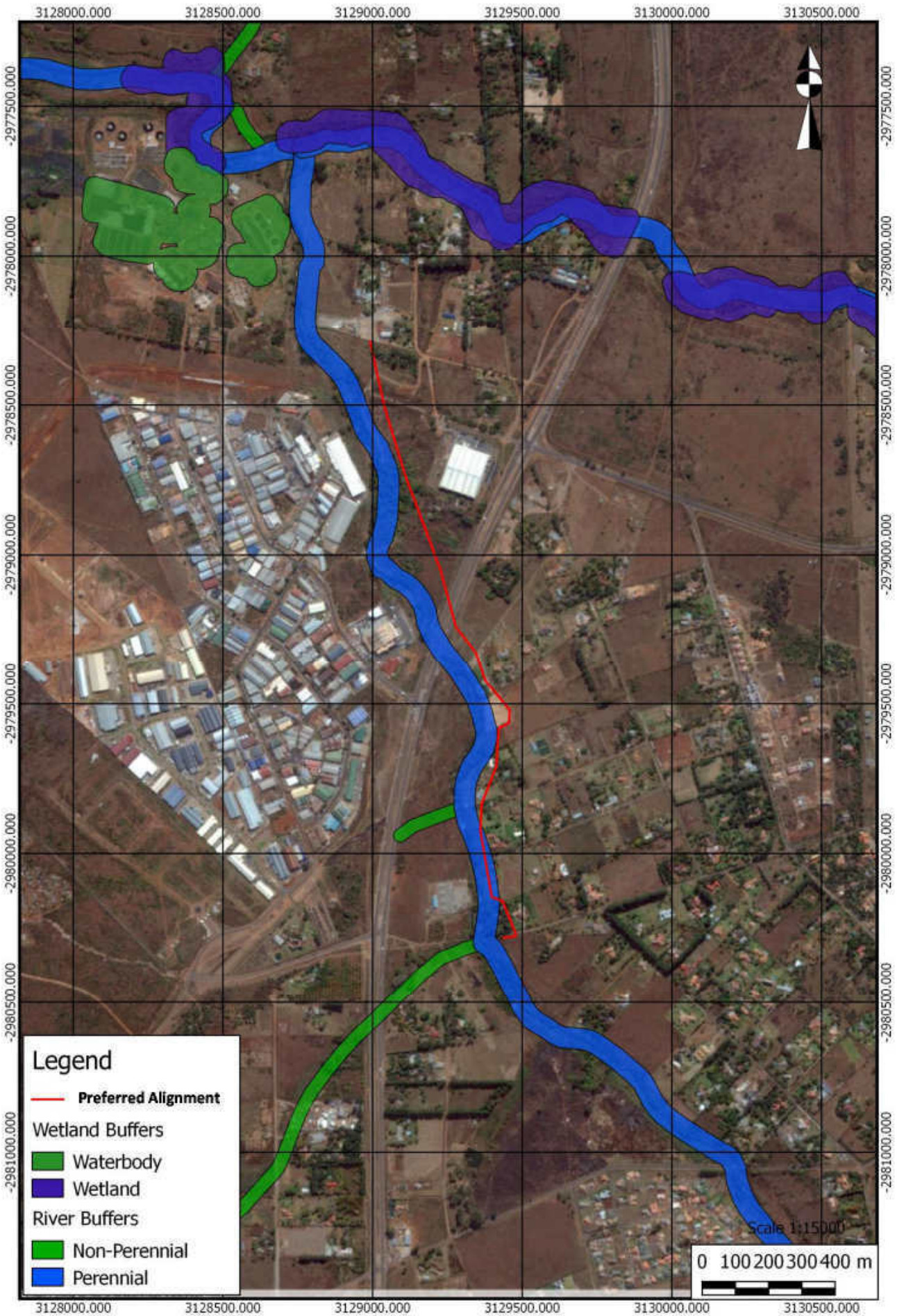
Hydrology Map
Figure 3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Preferred Alignment
Wetland Buffers
Waterbody
Wetland
River Buffers
Non-Perennial
Perennial
Scale 1:15000
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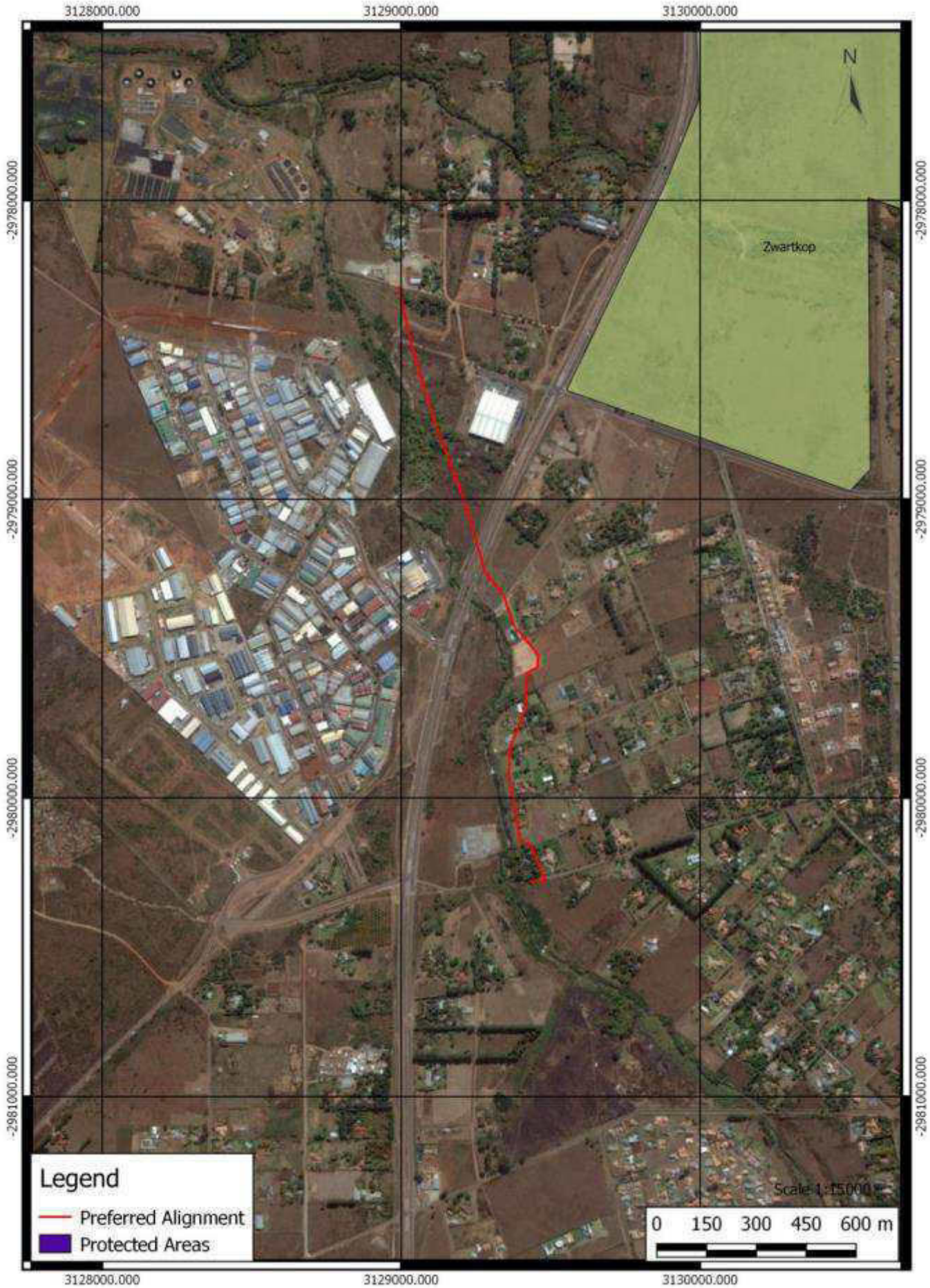
Protected Areas
Figure 4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Protected Areas
Scale 1:15000
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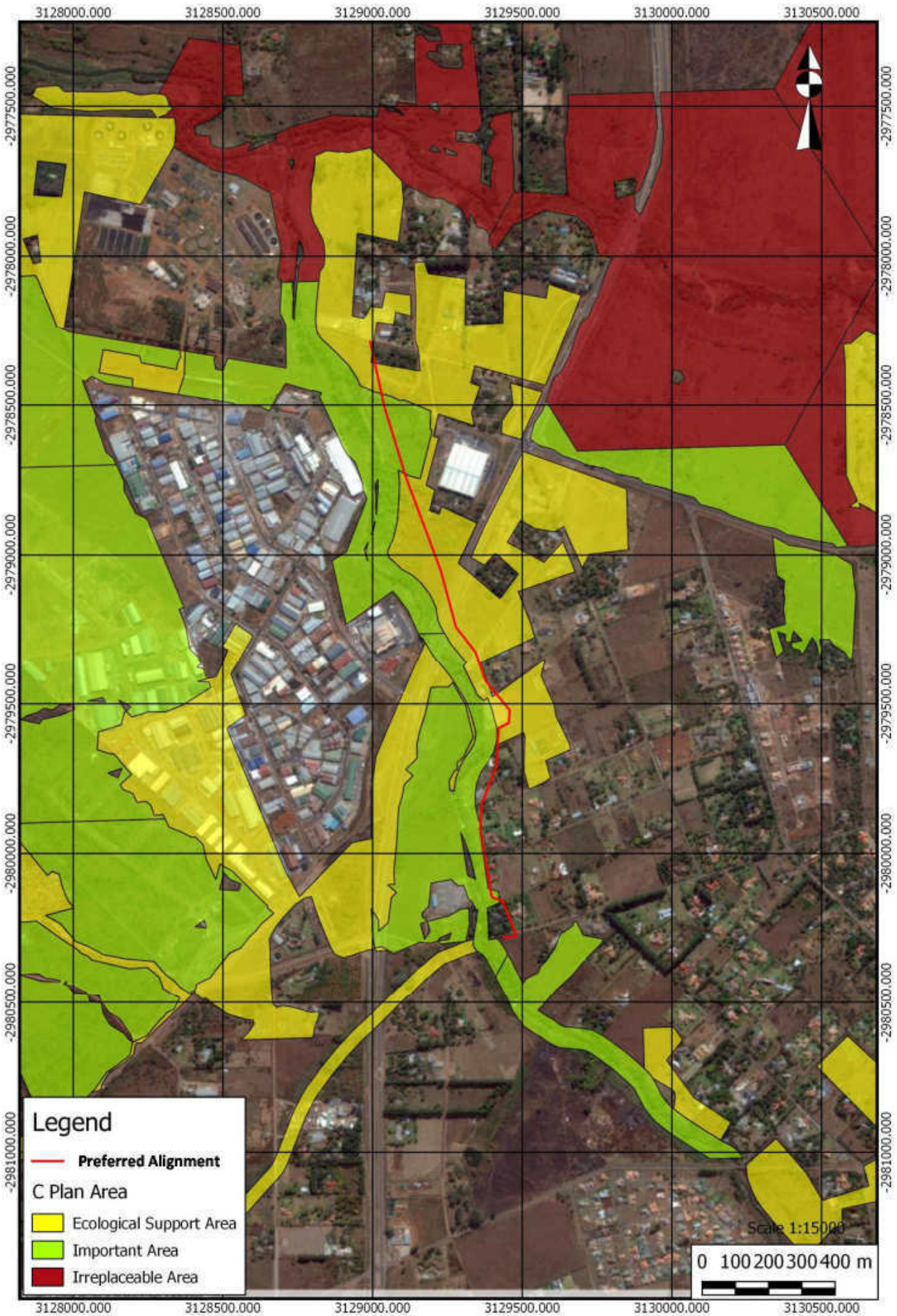
Irreplaceable Map
Figure 5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Preferred Alignment
C Plan Area
Ecological Support Area
Important Area
Irreplaceable Area
Scale 1:15000
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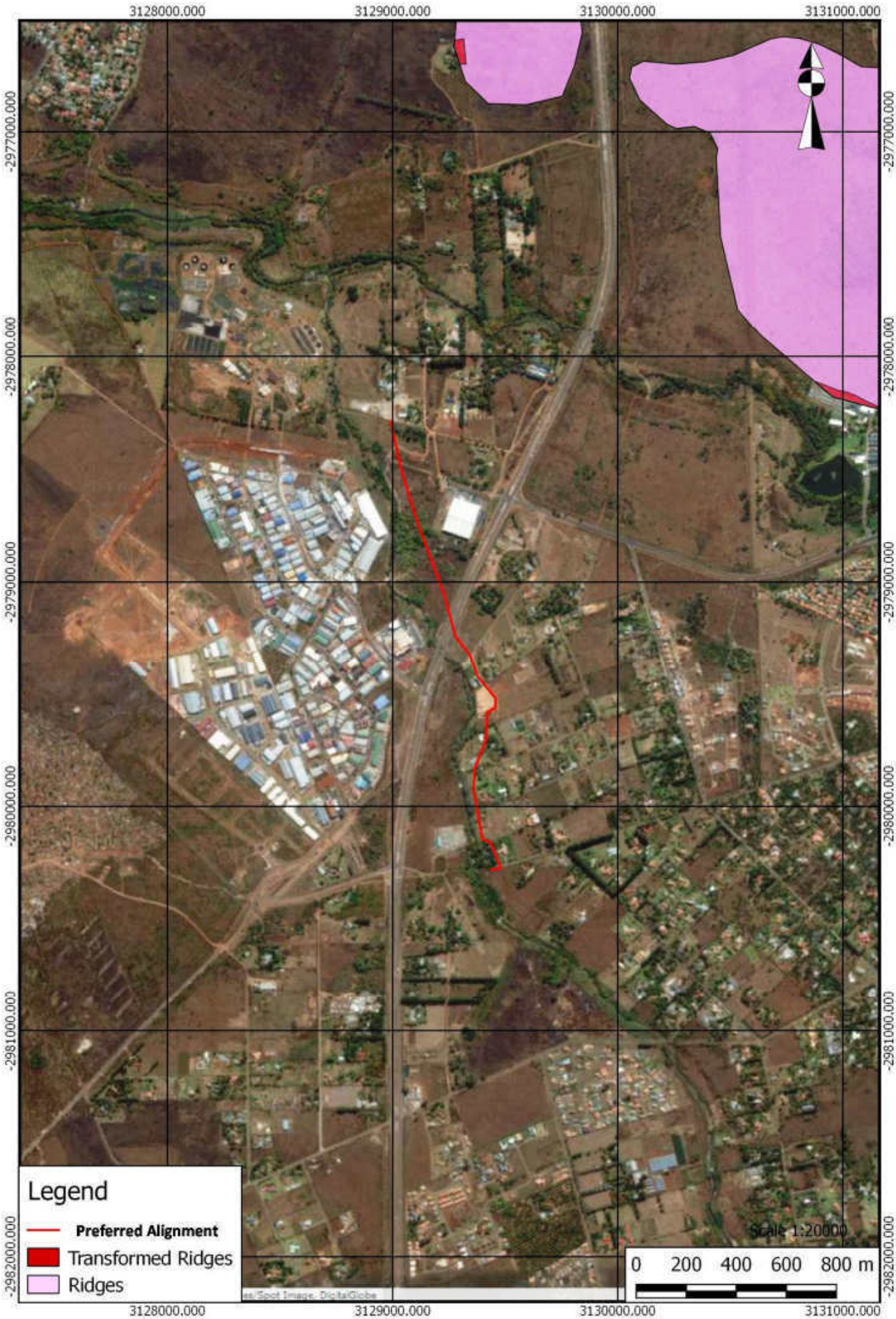
Ridges
Figure 6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Preferred Alignment
Transformed Ridges
Ridges
SCALE 1:20000
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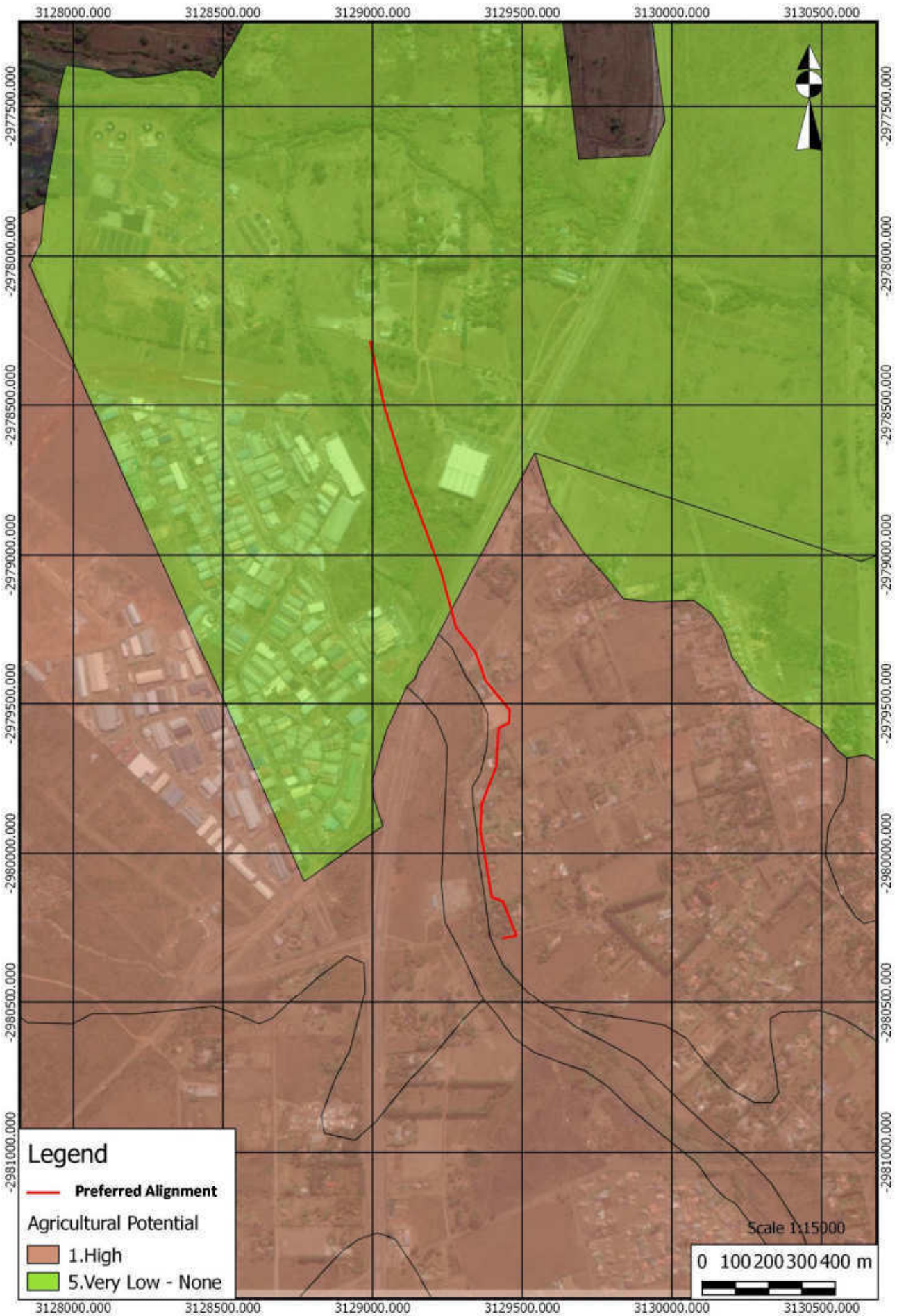
Agricultural Potential
Figure 7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Agricultural Potential
1.High
5.Very Low - None
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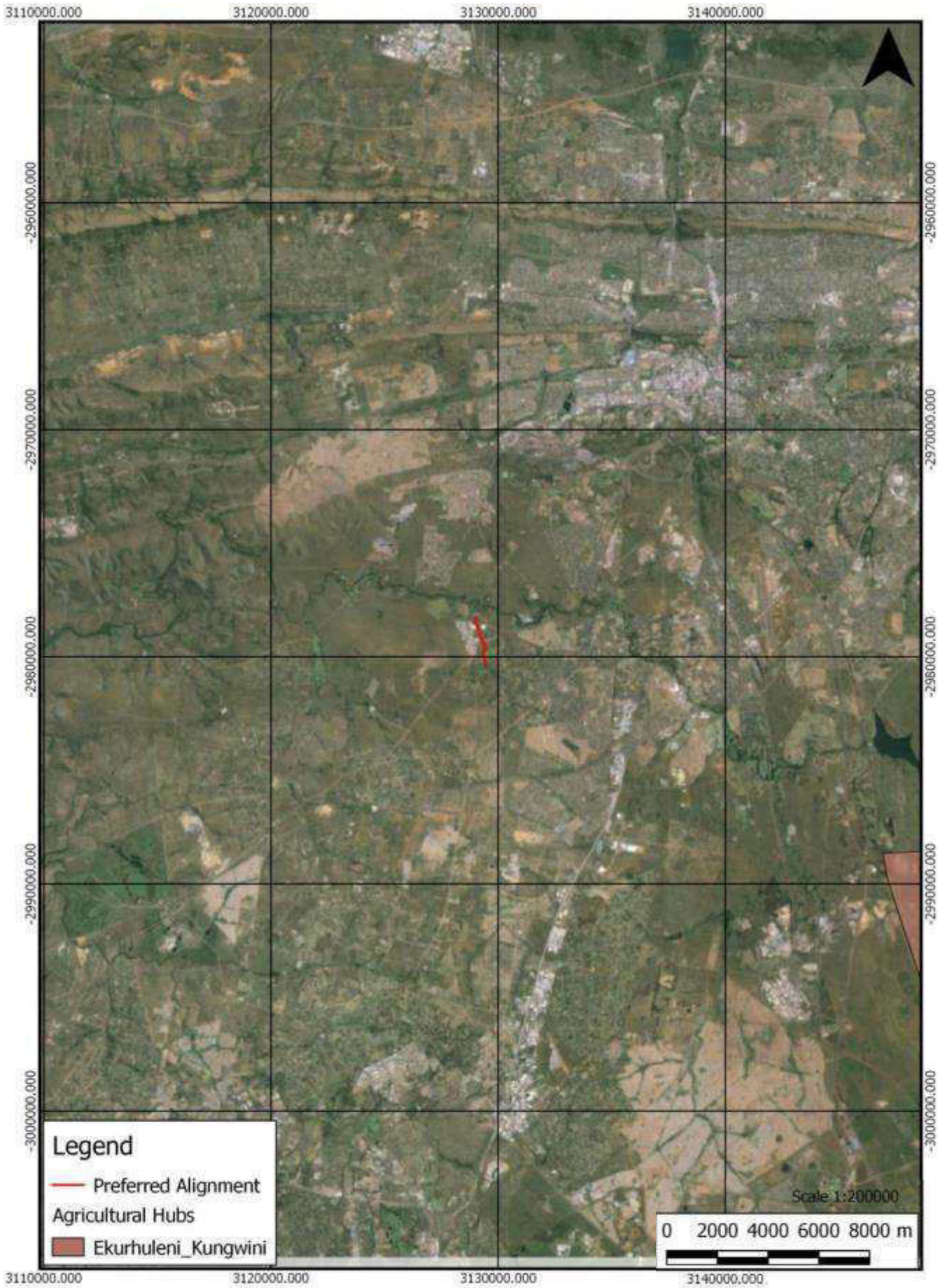
Agricultural Hubs
Figure 8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Preferred Alignment
Agricultural Hubs
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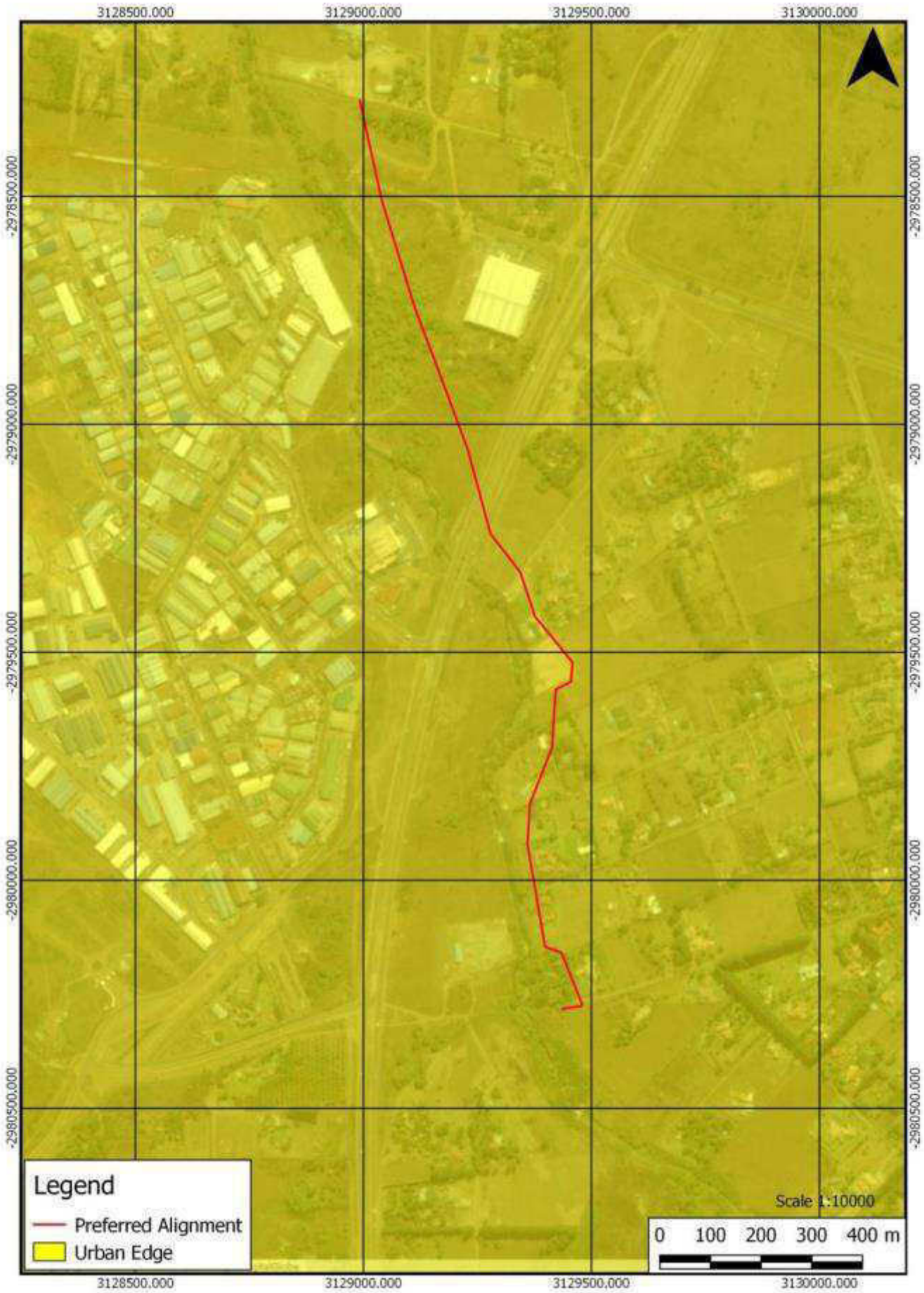
Urban Edge
Figure 9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Preferred Alignment
Urban Edge
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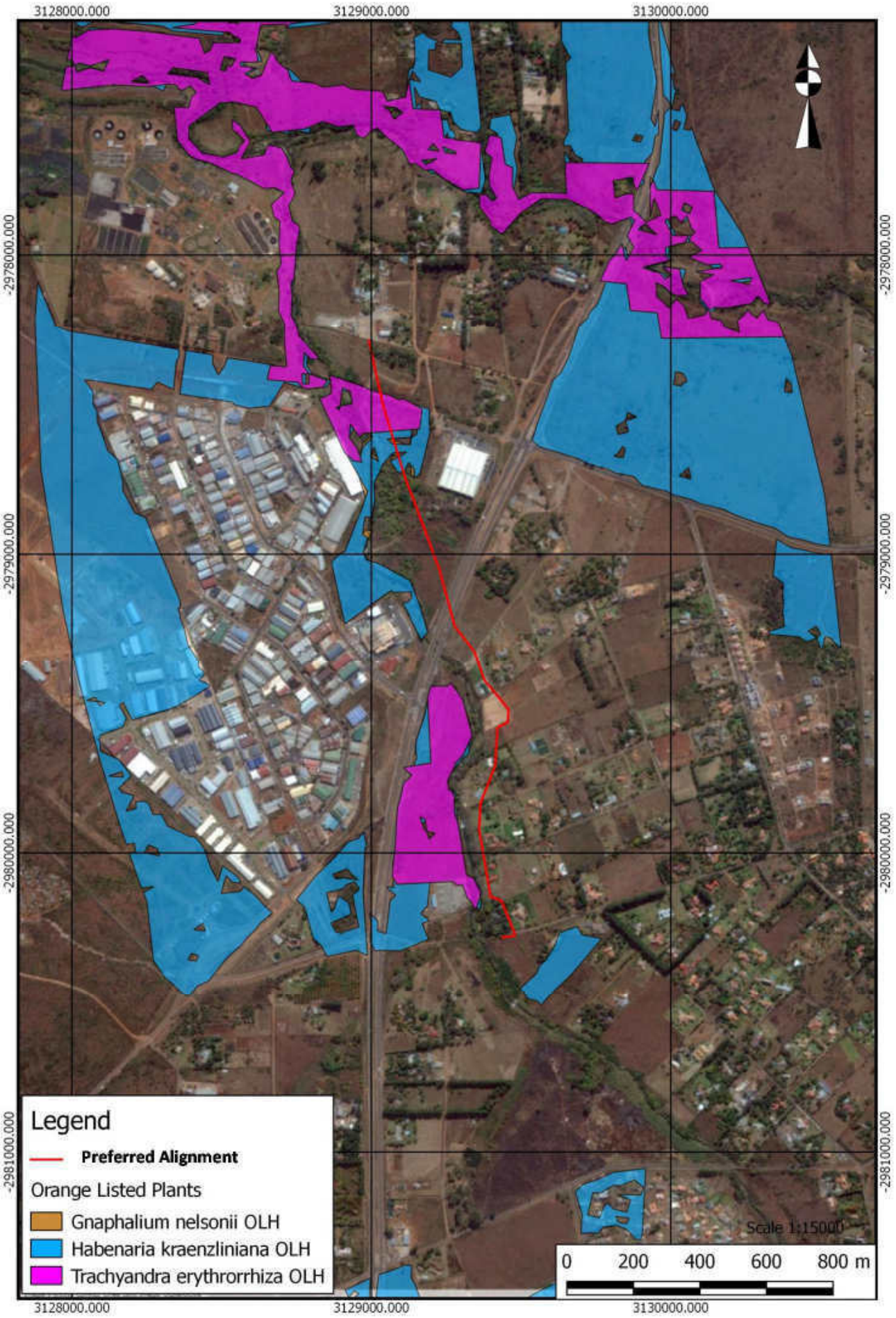
Orange Listed Plants
Figure 10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Orange Listed Plants
Gnaphalium nelsonii OLH
Habenaria kraenzliniana OLH
Trachyandra erythrorrhiza OLH
Scale 1:15000
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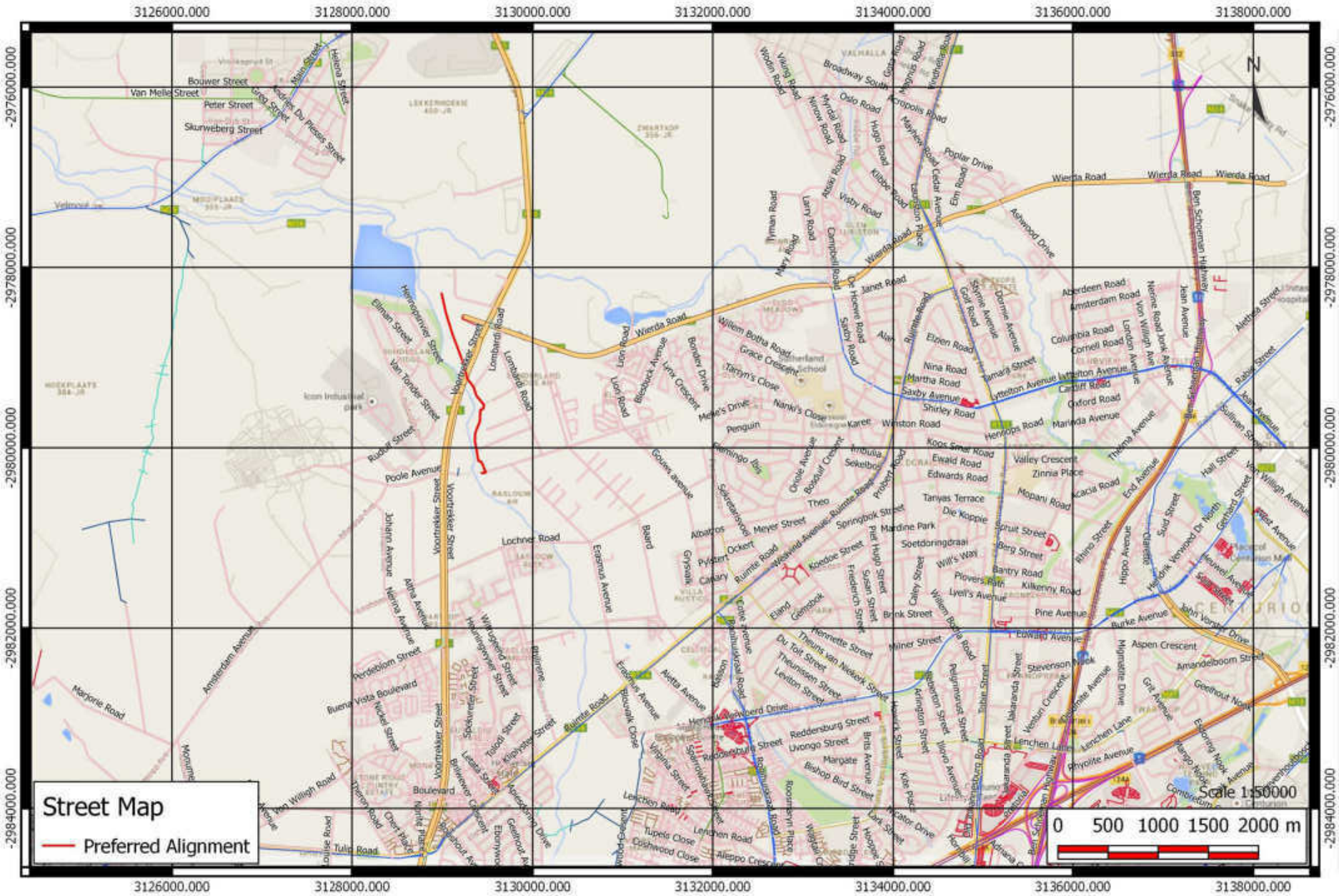
400
600
800 m

Roads and Railways
Figure 11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Street Map
Preferred Alignment
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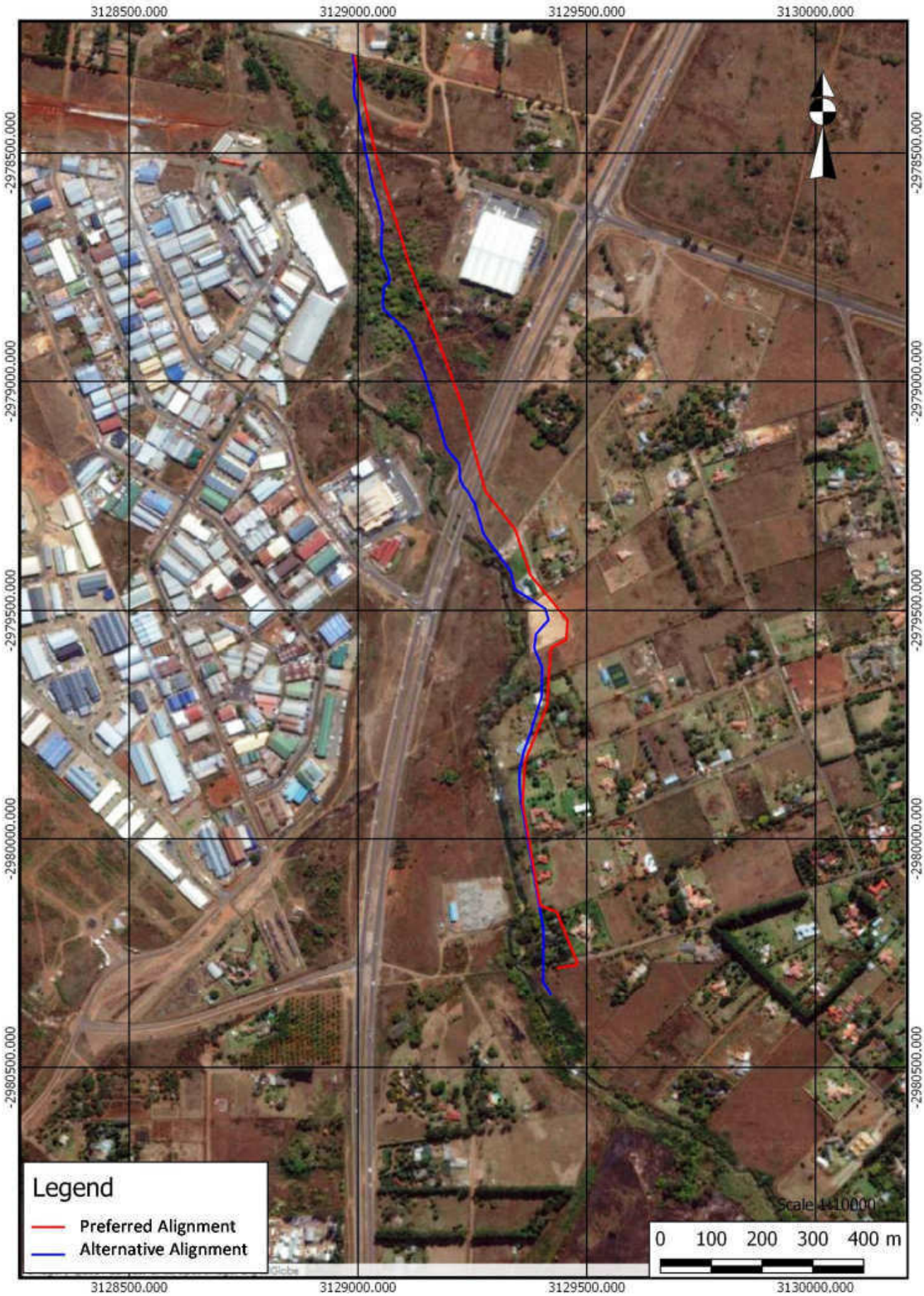
Proposed and Alternative Alignments
Figure 12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Alternative Alignment
Scale 1:10000
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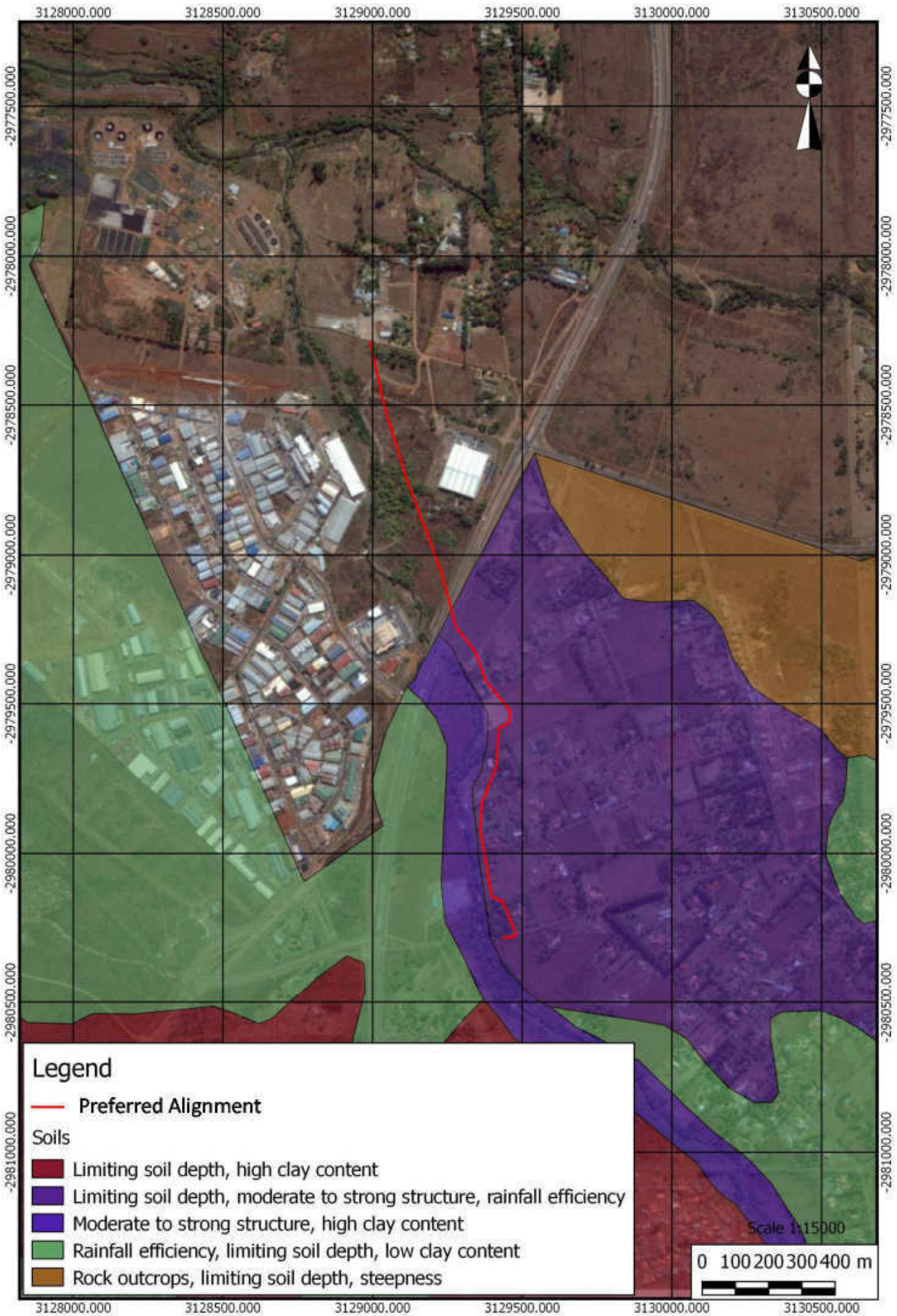
Soils
Figure 13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Legend
Preferred Alignment
Soils
Limiting soil depth, high clay content
Limiting soil depth, moderate to strong structure, rainfall efficiency
Moderate to strong structure, high clay content
Rainfall efficiency, limiting soil depth, low clay content
Rock outcrops, limiting soil depth, steepness
Scale 1:15000
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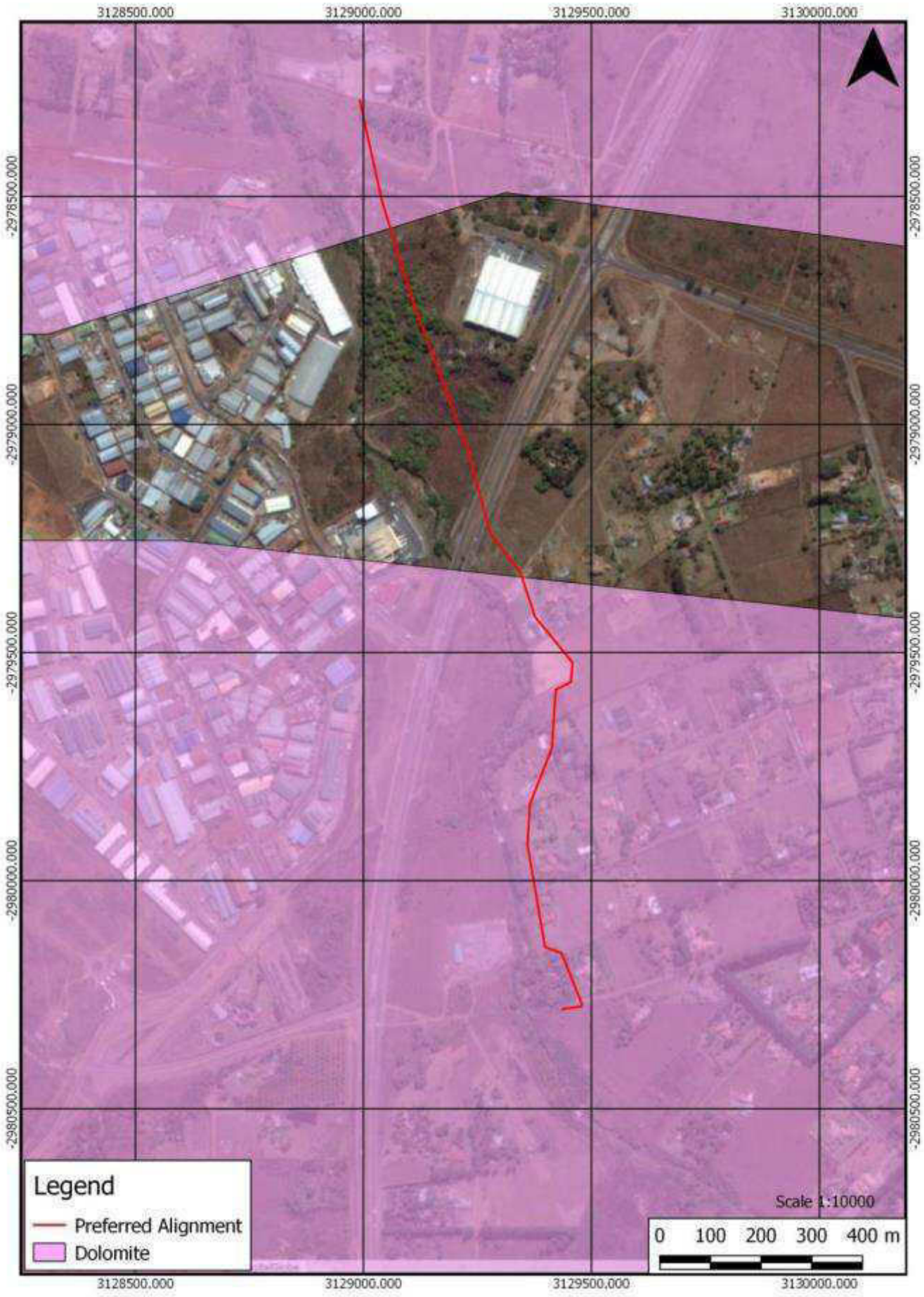
Dolomite
Figure 14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Legend
Preferred Alignment
Dolomite
Scale 1:10000
0 100 200 300 400 m

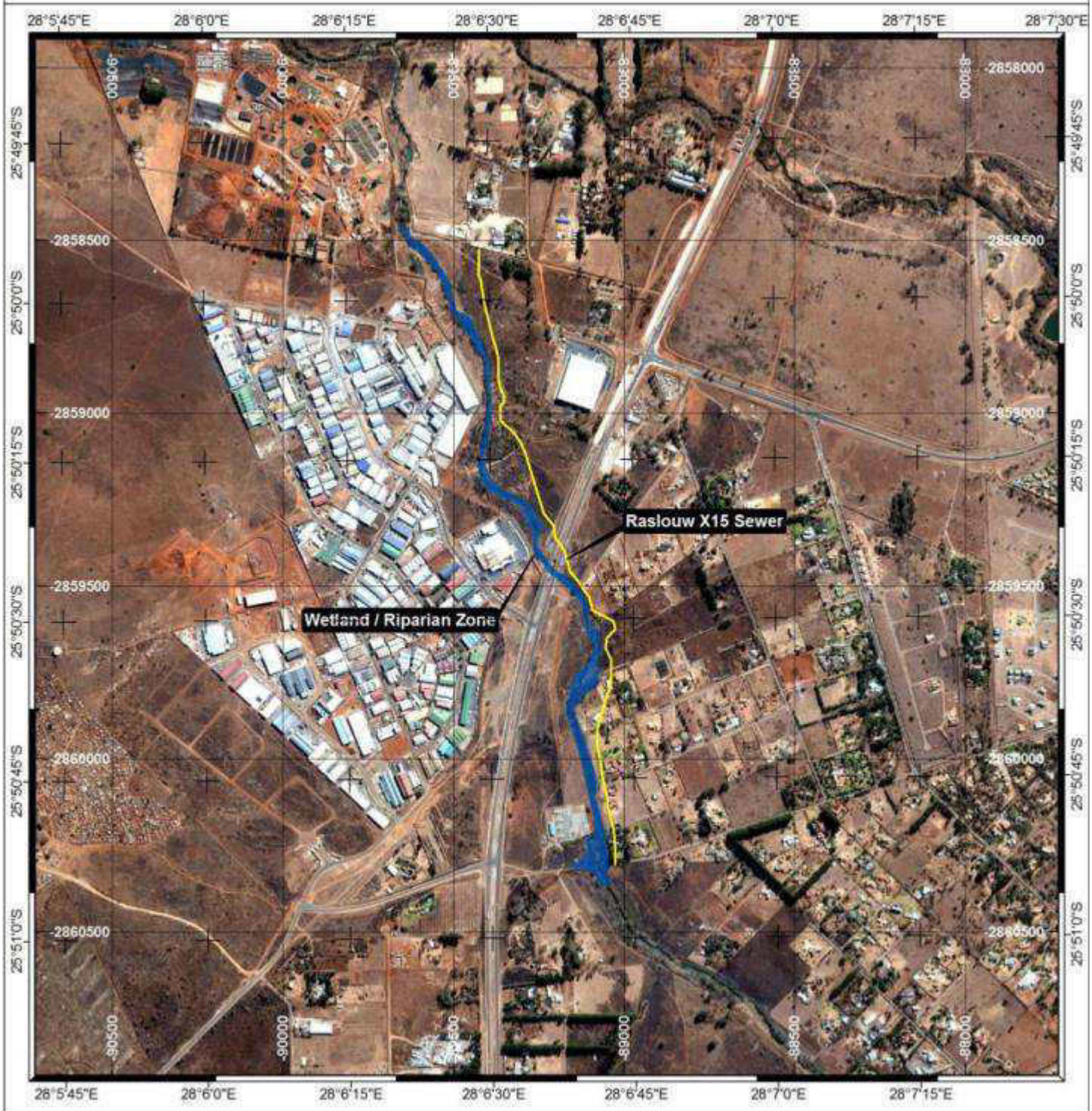
Wetland/River Boundary
Figure 15

Lourens G van Zyl
(Mobile) +27 (0)76 371 1151
(Website) www.terragis.co.za
(Email) lourens@terragis.co.za

RASLOUW X15 SEWER

Wetland / Riparian Boundary

Cartography & Spatial Analysis
TERRAGIS

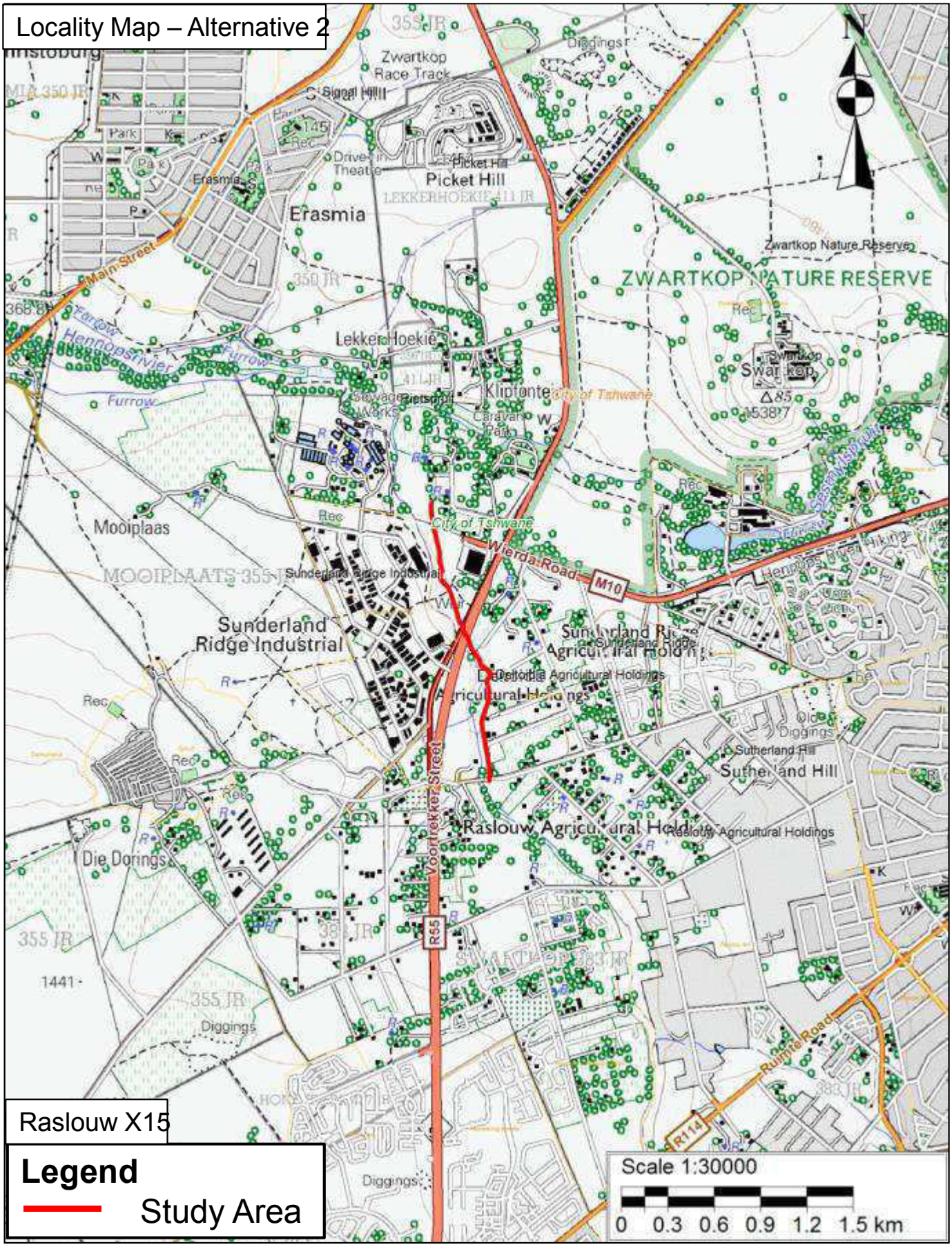


Projection - Transverse Mercator
Datum - Hartebeeshoek 1994
Reference Ellipsoid - WGS 1984
Central Meridian - 29

0 200 400 600 800 1 000
Meters

Locality Map for Alternative 2
Figure 16

Locality Map – Alternative 2

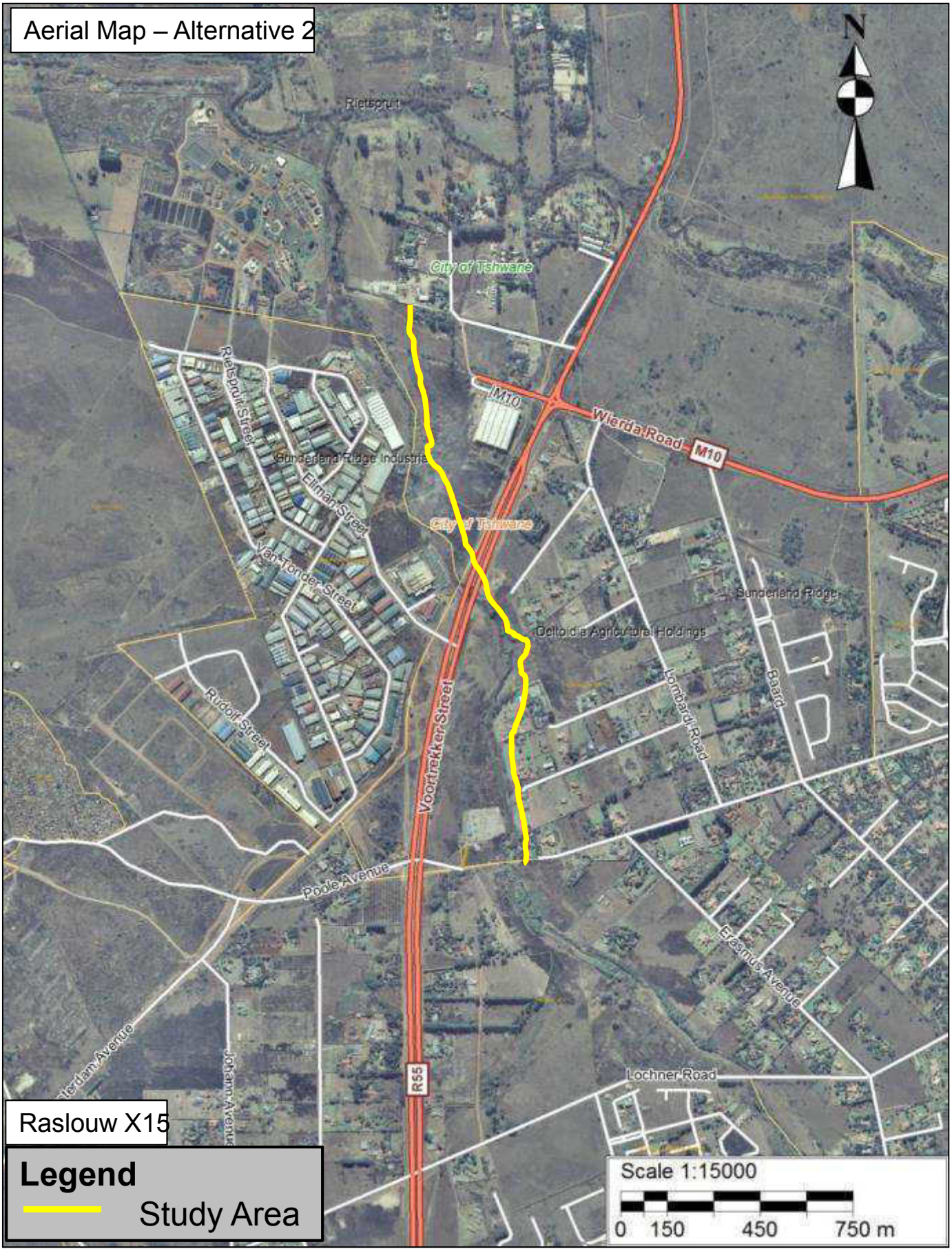


Raslouw X15

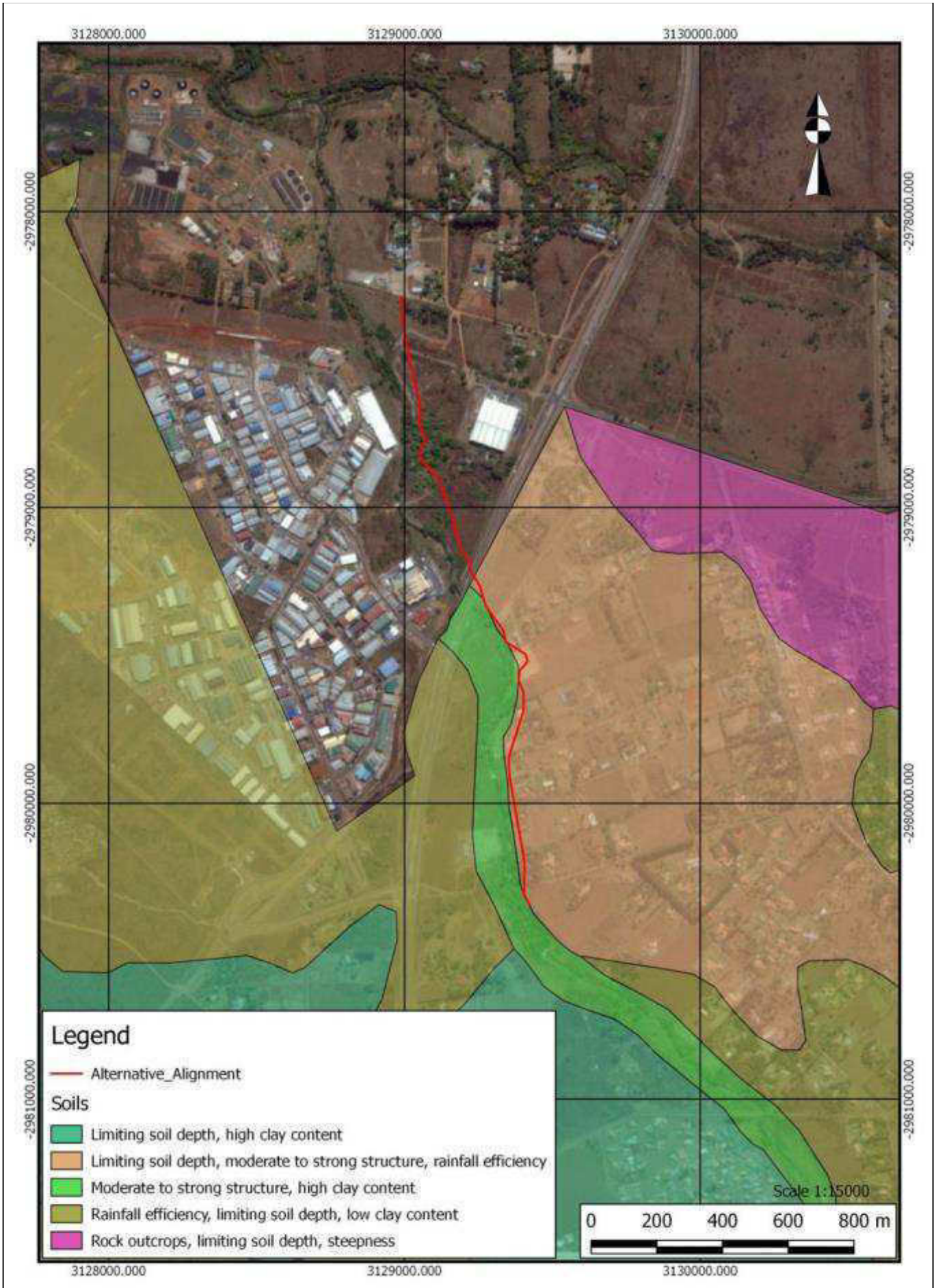
Legend

Study Area

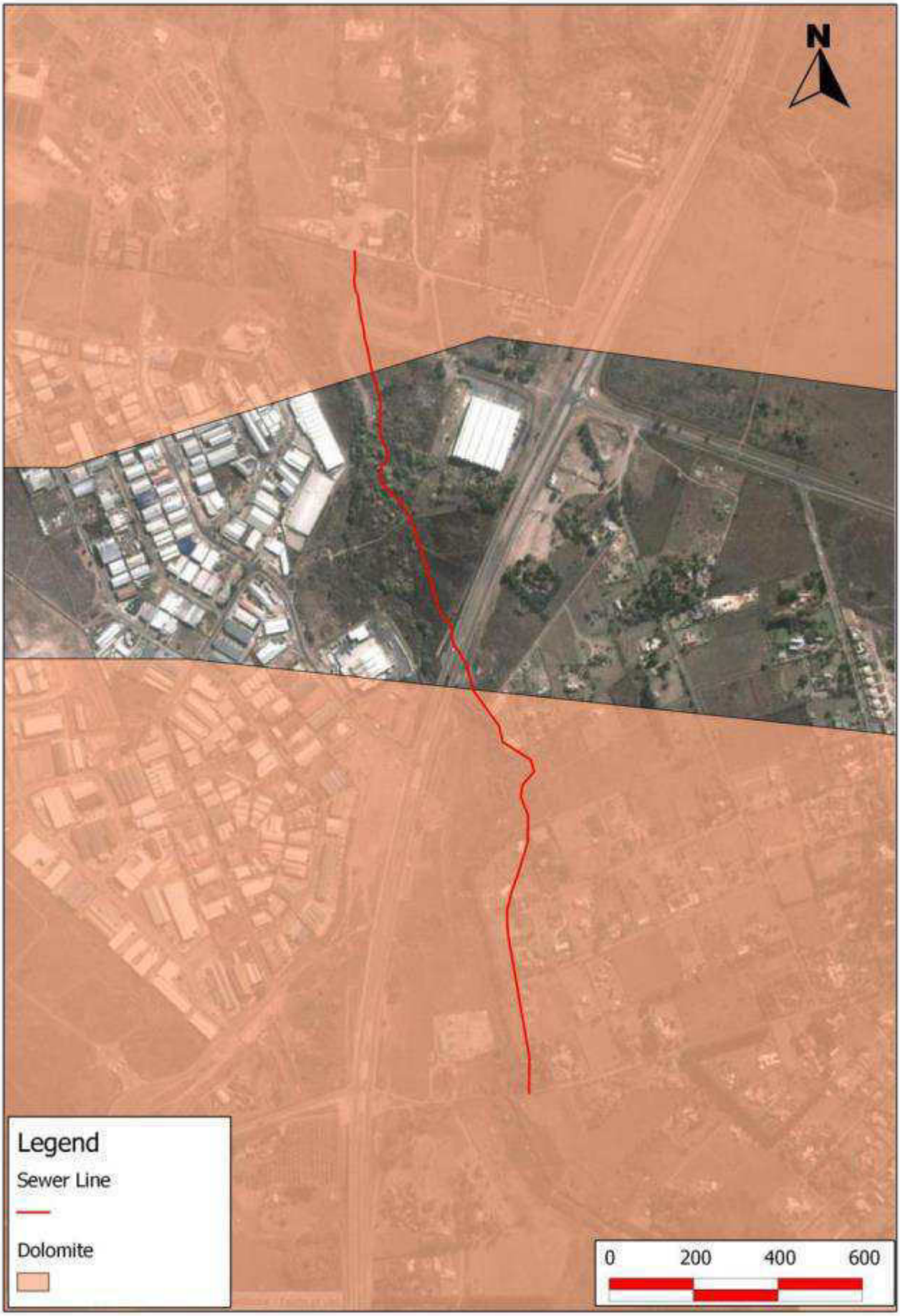
Aerial Map for Alternative 2
Figure 17


Aerial Map – Alternative 2
N
Rietspruit
City of Tshwane
M10
Wierda Road
M10
Rietspruit Street
Sunderland Ridge Industria
Elman Street
City of Tshwane
Van Tonder Street
Sunderland Ridge
Oelofse Agricultural Holdings
Voortrekker Street
Lombard Road
Baard
Rudolf Street
Poole Avenue
Erasmus Avenue
Johann Avenue
R55
Lochner Road
Raslouw X15
Legend
Study Area
Scale 1:15000
0 150 450 750 m

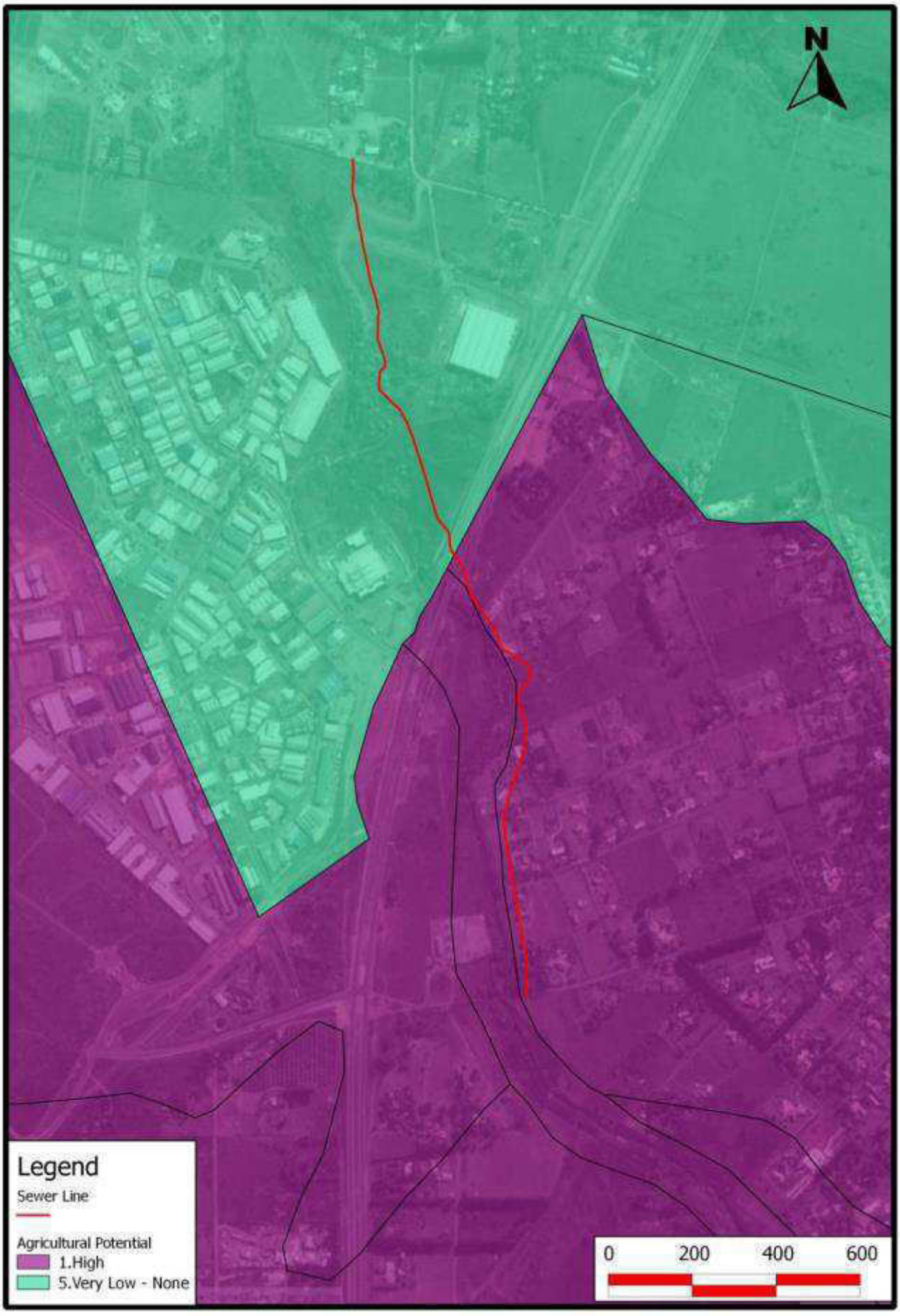
Alternative 2 Soils
Figure 18


3128000.000
3129000.000
3130000.000
-2978000.000
-2979000.000
-2980000.000
-2981000.000
Legend
Alternative_Alignment
Soils
Limiting soil depth, high clay content
Limiting soil depth, moderate to strong structure, rainfall efficiency
Moderate to strong structure, high clay content
Rainfall efficiency, limiting soil depth, low clay content
Rock outcrops, limiting soil depth, steepness
Scale 1:15000
0 200 400 600 800 m

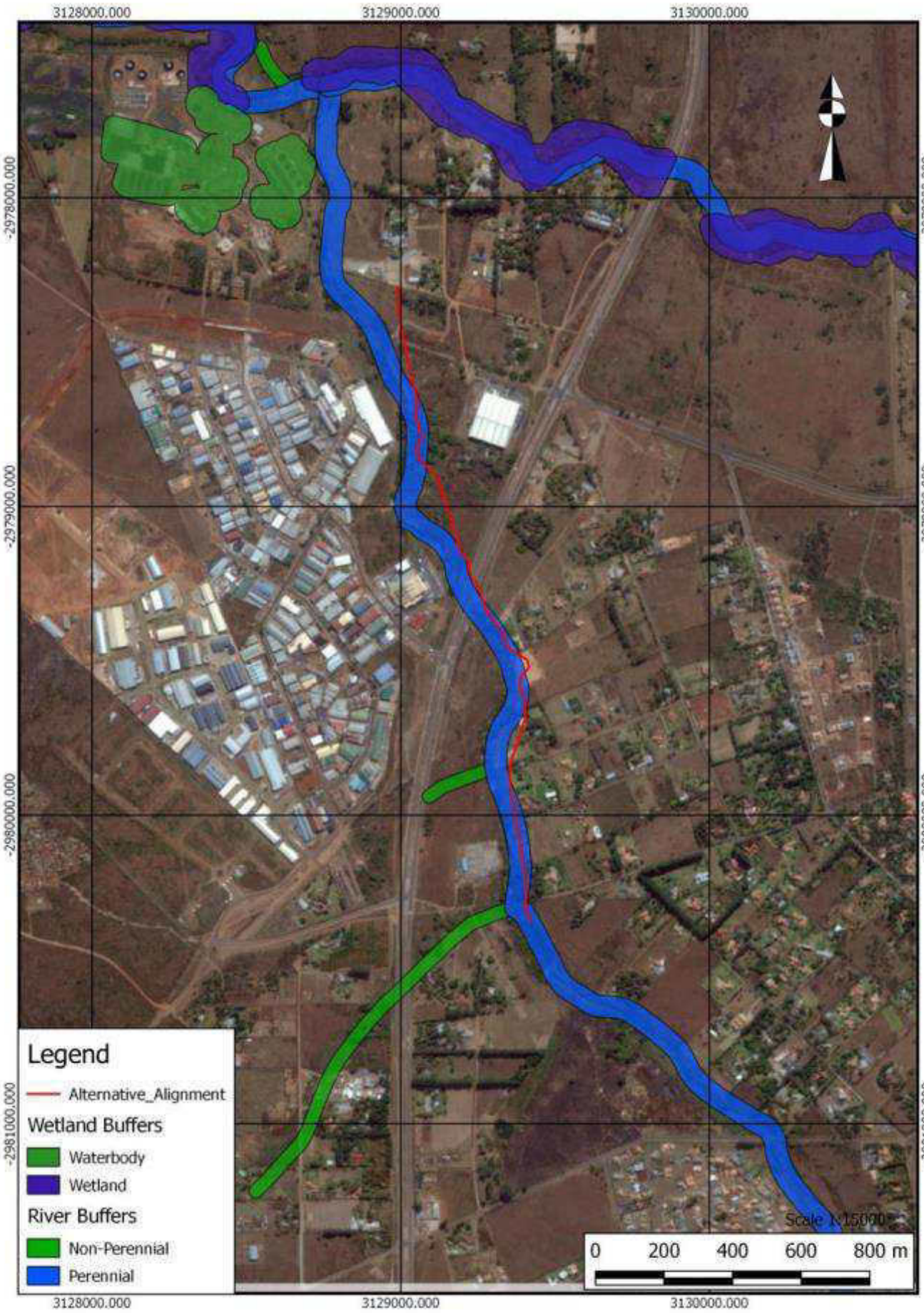
Alternative 2 Dolomite
Figure 19


N
Legend
Sewer Line
Dolomite
0
200
400
600

Alternative 2 Agricultural Potential
Figure 20


N
Legend
Sewer Line
Agricultural Potential
1.High
5.Very Low - None
0
200
400
600

Alternative 2 Rivers
Figure 21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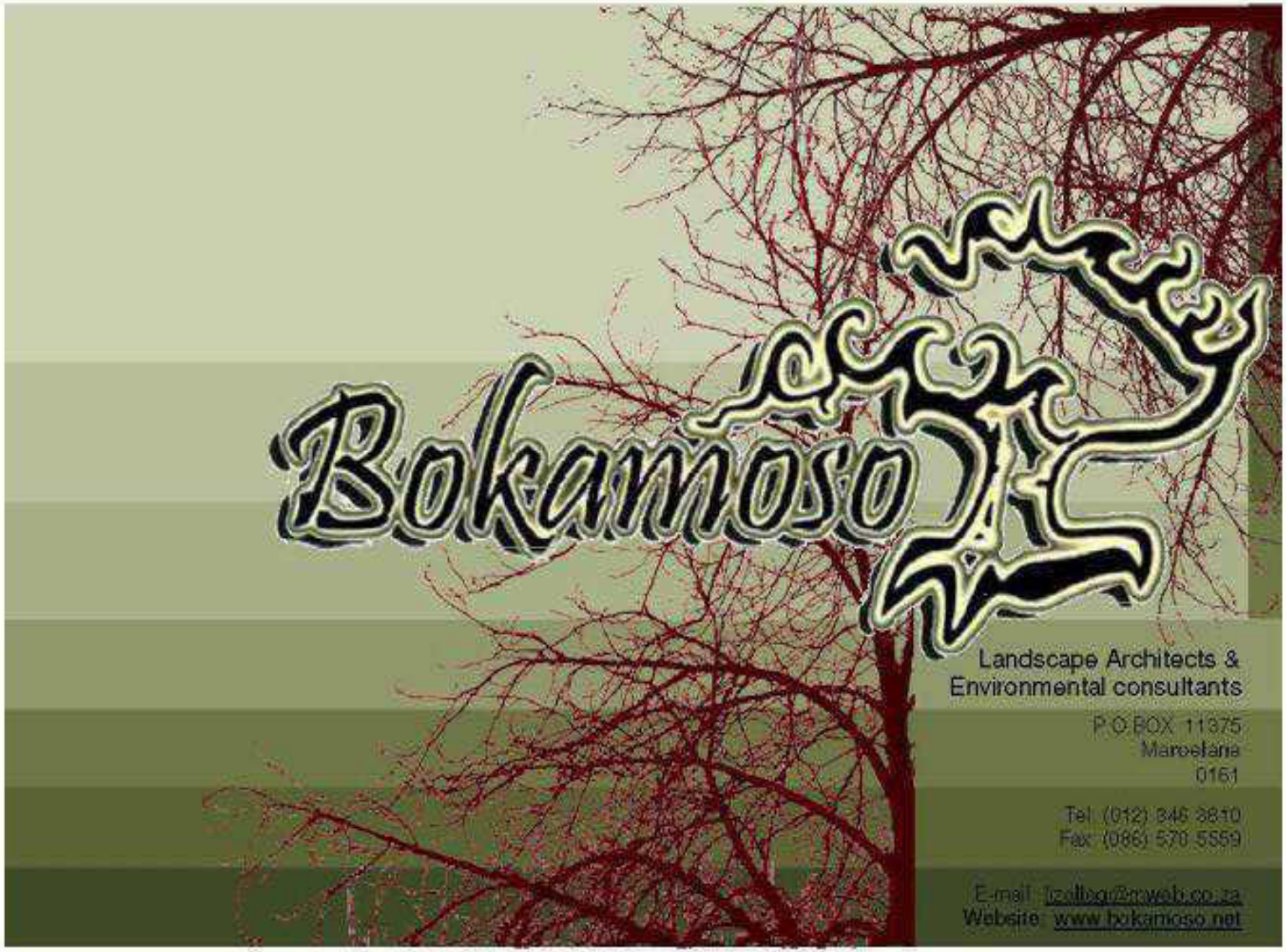
3130000.000
-2978000.000
-2979000.000
-2980000.000
-2981000.000
Legend
Alternative_Alignment
Wetland Buffers
Waterbody
Wetland
River Buffers
Non-Perennial
Perennial
Scale 1:15000
0
200
400
600
800 m

Company Profile & CV of Lizelle Gregory (Environmental Assessment Practitioner)


Bokamoso
Landscape Architects &
Environmental consultants
P.O.BOX 11375
Maroelana
0161
Tel (012) 346 3810
Fax (086) 570 5559
E-mail tpalbog@mweb.co.za
Website www.bokamoso.net

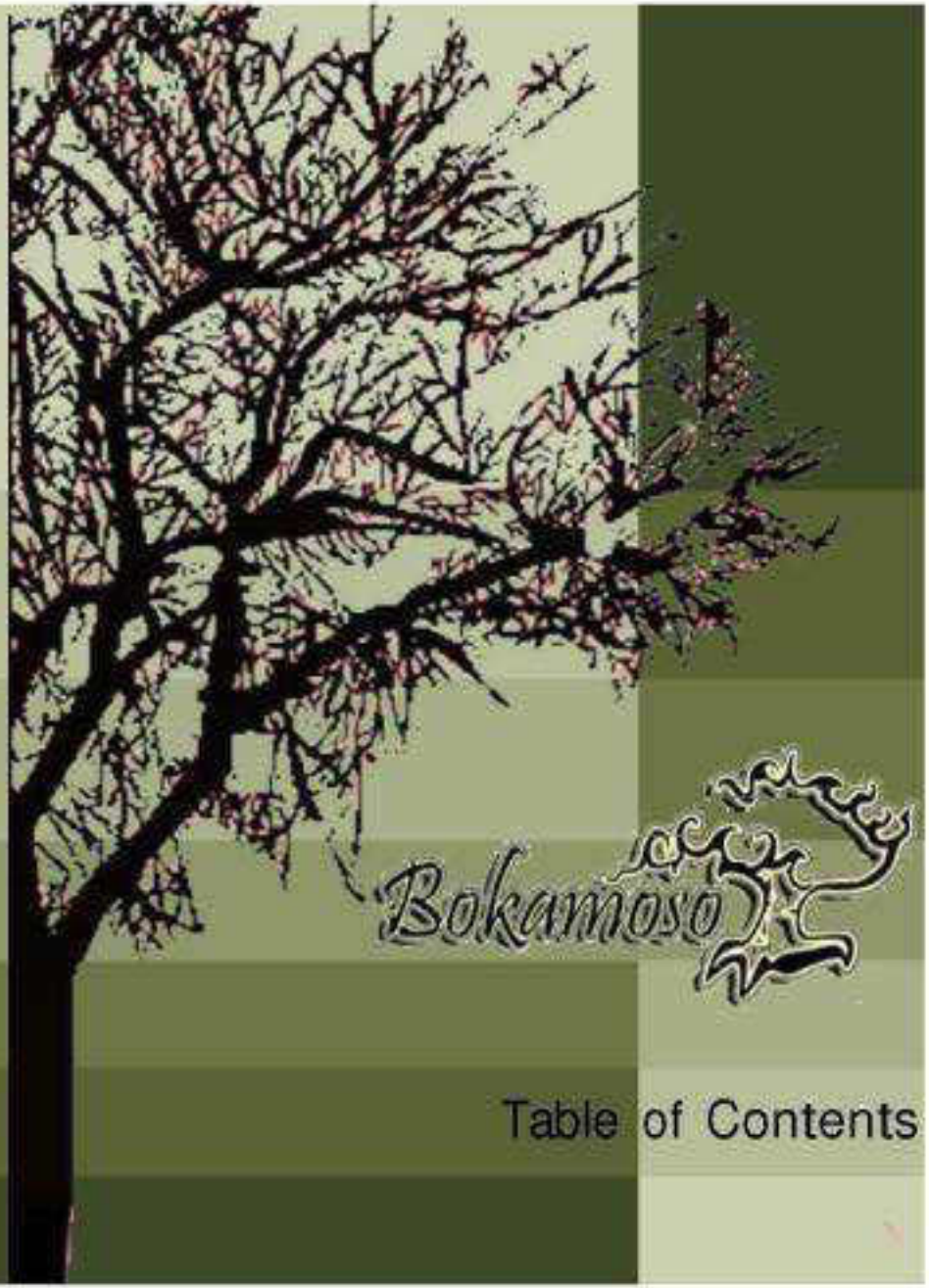


Table of Contents

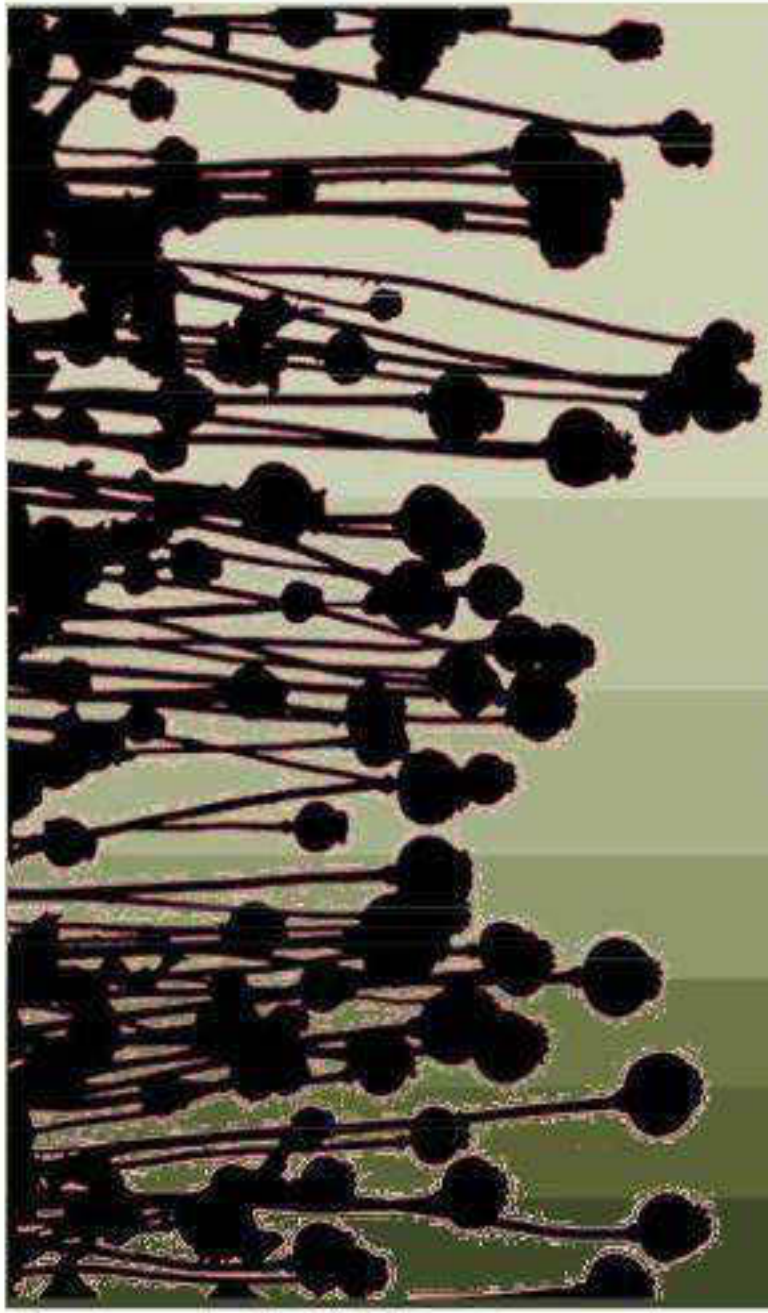
Bokamoso specialises in the fields of Landscape Architecture and all aspects of Environmental Management and Planning. Bokamoso was founded in 1992 and has shown growth by continually meeting the needs of our clients. Our area of expertise stretches throughout the whole of South Africa. Our projects reflect the competence of our well compiled team. The diversity of our members enables us to tend to a variety of needs. Our integrated approach establishes a basis for outstanding quality. We are well known to clients in the private, commercial as well as governmental sector.

At Bokamoso we stand on a firm basis of environmental investigation in order to find unique solutions to the requirements of our clients and add value to their operations.

Bokamoso

01 Executive Summary

011 Company Overview



Vision:

At Bokamoso we strive to find the best planning solutions by taking into account the functions of a healthy ecosystem. Man and nature should be in balance with each other.

Mission:

We design according to our ethical responsibility, take responsibility for successful completion of projects and constitute a landscape that contributes to a sustainable environment. We add value to the operations of our clients and build long term relationships that are mutually beneficial.

Values:

Integrity

Respect

Bokamoso

Bokamoso stands on the basis of fairness. This include respect within our multicultural team and equal opportunities in terms of gender, nationality and race.

We have a wide variety of projects to tend to, from complicated reports to landscape installation. This wide range of projects enables us to combine a variety of professionals and skilled employees in our team.

Bokamoso further aids in the development of proficiency within the working environment. Each project, whether in need of skilled or unskilled tasks has its own variety of facets to bring to the table.

We are currently in the process of receiving our BEE scorecard. We support transformation in all areas of our company dynamics.

Bokamoso

03 Human Resources

031 Employment Equity

Lizelle Gregory (100% interest)

Lizelle Gregory obtained a degree in Landscape Architecture from the University of Pretoria in 1992 and passed her board exam in 1995.
Her professional practice number is PrLArch 97078.

Ms. Gregory has been a member of both the Institute for Landscape Architecture in South Africa (ILASA) and South African Council for the Landscape Architecture Profession (SACLAP), since 1995.

Although the existing Environmental Legislation doesn't yet stipulate the academic requirements of an Environmental Assessment Practitioner (EAP), it is recommended that the Environmental Consultant be registered at the International Association of Impact Assessments (IAIA). Ms Gregory has been registered as a member of IAIA in 2007.

Ms. Gregory attended and passed an International Environmental Auditing course in 2008.
She is a registered member of the International Environmental Management and Assessment Council (IEMA).

She has lectured at the Tshwane University of Technology (TUT) and the University of Pretoria (UP). The lecturing included fields of Landscape Architecture and Environmental Management.

Ms. Gregory has more than 18 years experience in the compilation of Environmental Evaluation Reports:
Environmental Management Plans (EMP);
Strategic Environmental Assessments;
All stages of Environmental input;
EIA under ECA and the new and amended NEMA regulations and various other Environmental reports and documents.

Ms. Gregory has compiled and submitted more than 600 Impact Assessments within the last 5-6 years. Furthermore, Ms. L. Gregory is also familiar with all the GDARD/Provincial Environmental policies and guidelines. She assisted and supplied GAUTRANS/former PWV Consortium with Environmental input and reports regarding road network plans, road determinations, preliminary and detailed designs for the past 12 years.

Consulting

Mientjie Coetzee	**MSc Medical Sciences (US)** **BSc (Hons) Medical Sciences (US)** More than 8 years experience in the compilation of various environmental reports
Ane Agenbacht	**Introduction to Sustainable Environmental Management—An overview of Principles, Tools,& Issues (Potch 2006)** **Leadership Training School (Lewende Woord 2010)** **BA Environmental Management (UNISA 2011)** **PGCE Education (Unisa 2013)** Project Manager More than 10 years experience in the compilation of various environmental reports
Qiqa Nkangana	**BA Environmental Management (UNISA)** Specialises in compiling various environmental reports.
Nicolene Lotter	**BSc (Hons) Environmental Science (NWU)** **BSc Tourism (NWU)** 1 year 4 months experience in the field of Environmental Sciences. Specialises in Water Use License Applications
Ben Bhukwana	**BSc Landscape Architecture (UP)** More than 4 years experience in the field of Landscape Architecture. Specialises in Landscape Design, ECO,& Environmentalist in training.
Marli Burger	**B-Tech Nature Conservation (TUT)** **N. Dip.Nature Conservation (TUT)** EMI Training (GDARD/University of Pretoria) 5years Biodiversity Enforcement& Awareness Training experience Specialises in Water Use Licences

Bokamoso

Anton Nel	B-Tech Landscape Technology (TUT) N Dip Landscape Technology (TUT) 1 year experience in ECO Specialises in Basic Assessment Reports.
Juanita de Beer	Events Management and Marketing (Damelin) Specializes in Public relations and public participation processes
Mary-Lee Potgieter	Msc Plant Science (UP) BSc (Hons) Plant Science (UP) BSc Ecology (UP) 1year 5months working experience in the Environmental field Specialises in ECO works, Basic Assessments, EIA's, and Flora Reports
Alfred Thomas	CIW Foundation& Internet Marketing (IT Academy) 12 years experience in GIS and IT in general. GIS Operator and Multimedia Specialist.
Maretha Roux	Effective People Management (UCT) 18 years management experience Specializes in AutoCAD, Visio, Accounting, and Administration Compiling of various Environmental Reports/ Assisting Project Management Photographer

Elsa Viviers	**Interior Decorating (Centurion College)** (Accounting/ Receptionist) and Secretary to Lizelle Gregory
Loura du Toit	**N. Dip. Professional Teacher (Heidelberg Teachers Training College)** Librarian and PA to Project Manager
Merriam Mogalaki	Administration Assistant with in-house training in bookkeeping

Landscape Contracting

Elias Maloka	Site manager overseeing landscape installations. Irrigation design and implementation. Landscape maintenance 18 years experience in landscape contracting works.

The contracting section compromises of six permanently employed black male workers. In many cases the team consists of up to 12 workers, depending on the quantity of work.

Bokamoso

01 Environmental Management Services

- Basic Assessment Reports
- EIA & Scoping Reports
- Environmental Management Plans
- Environmental Scans
- Strategic Environmental Assessments
- EMP for Mines
- Environmental Input and Evaluation of Spatial Development Frameworks
- State of Environmental Reports
- Compilation of Environmental Legislation and Policy Documents
- Environmental Auditing and Monitoring
- Environmental Control Officer (ECO)
- Visual Impact assessments
- Specialist Assistance with Environmental Legislation Issues and Appeals
- Development Process Management
- Water Use License applications to DWA
- Waste License Application

Bokamoso

04 Services

041 Consulting Services

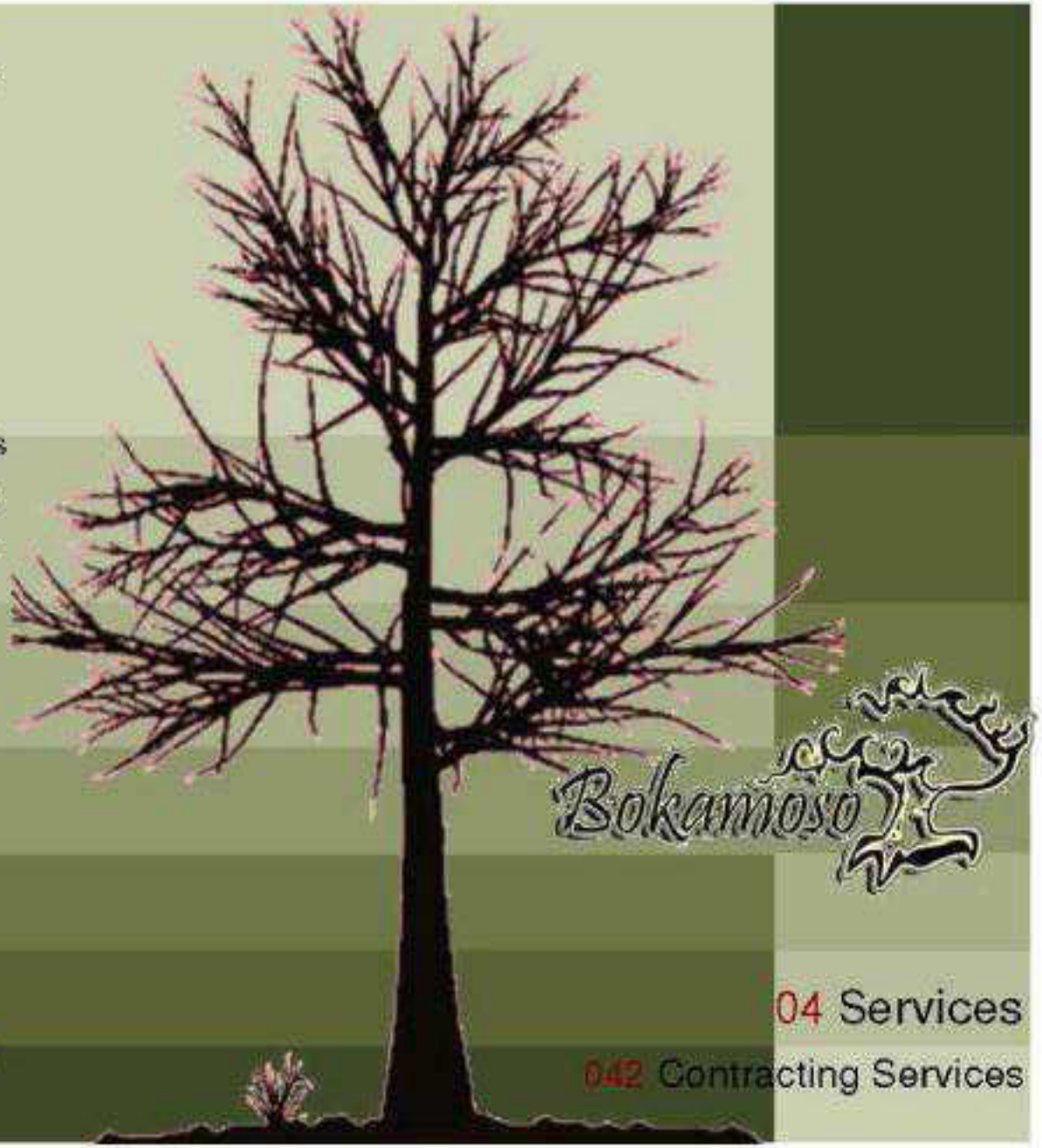
02 Landscape Architecture

- Master Planning
- Sketch Plans
- Planting Plans
- Working Drawings
- Furniture Design
- Detail Design
- Landscape Development Frameworks
- Landscape Development Plans (LDP)
- Contract and Tender Documentation
- Landscape Rehabilitation Works

03 Landscape Contracting

Implementation of Plans for:

- Office Parks
- Commercial/ Retail / Recreational Development
- Residential Complexes
- Private Residential Gardens
- Implementation of irrigation systems



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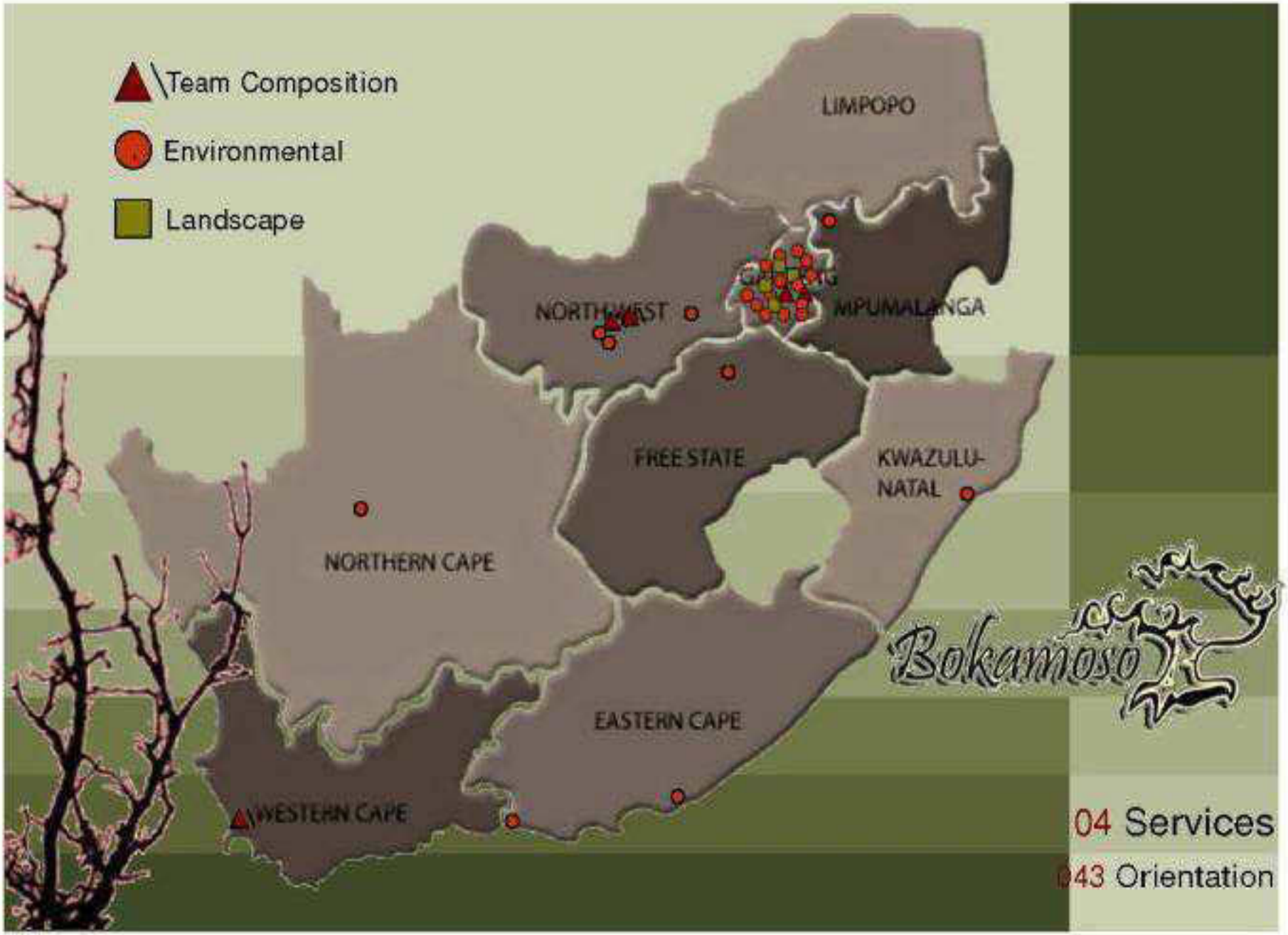
04 Services

042 Contracting Services


Team Composition
Environmental
Landscape
LIMPOPO
NORTHWEST
MPUMALANGA
FREE STATE
KWAZULU-
NATAL
NORTHERN CAPE
EASTERN CAPE
WESTERN CAPE
Bokamoso
04 Services
043 Orientation


01 Valpre Bottling Plant, Heidelberg
project
shelter- site plan
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05 Landscape Projects- Current
051 Commercial

01 Valpre Bottling Plant, Heidelberg

Bokamoso

05 Landscape Projects– Current

051 Commercial

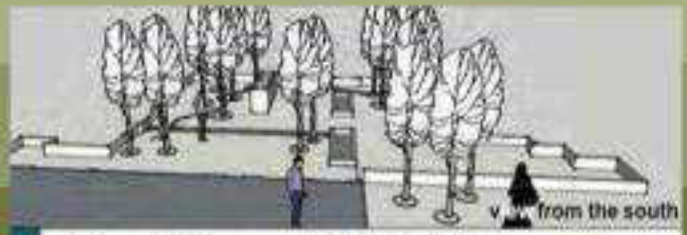
01 Valpre Bottling Plant,Heidelberg

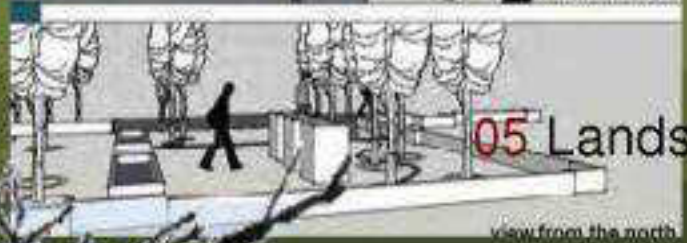
Bokamoso

05 Landscape Projects– Current

051 Commercial

01 Valpre Bottling Plant, Heidelberg





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05 Landscape Projects- Current

051 Commercial

02 Melodie Waters, Hartebeespoortdam

Spatial Planning

Streetscape

Indigenous Planting

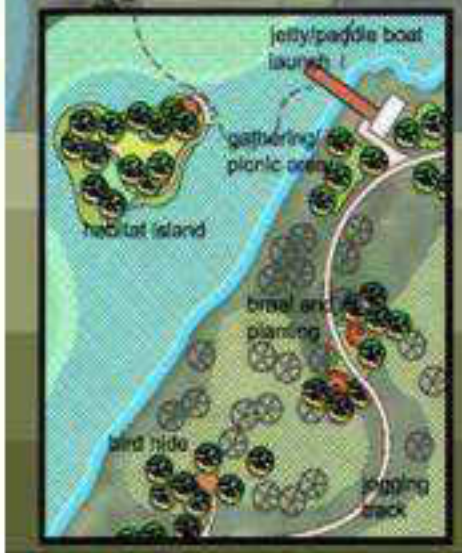
Bokamoso

05 Landscape Projects – Current

052 Commercial/Recreational

02 Melodie waters, Hartebeestpoortdam

Development Framework



Rehabilitation

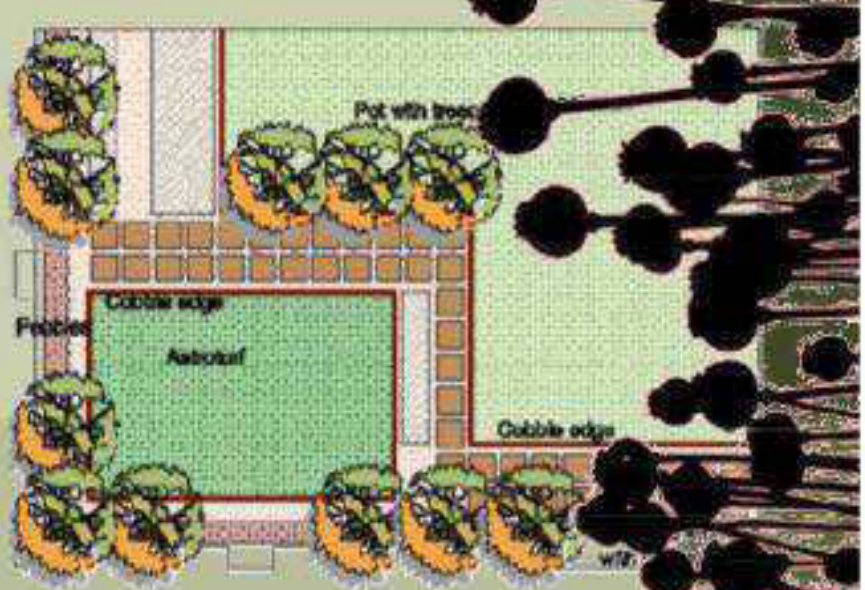
Area Layout

Bokamoso

05 Landscape Projects- Current

052 Commercial/Recreational

03 Grain Building, Pretoria

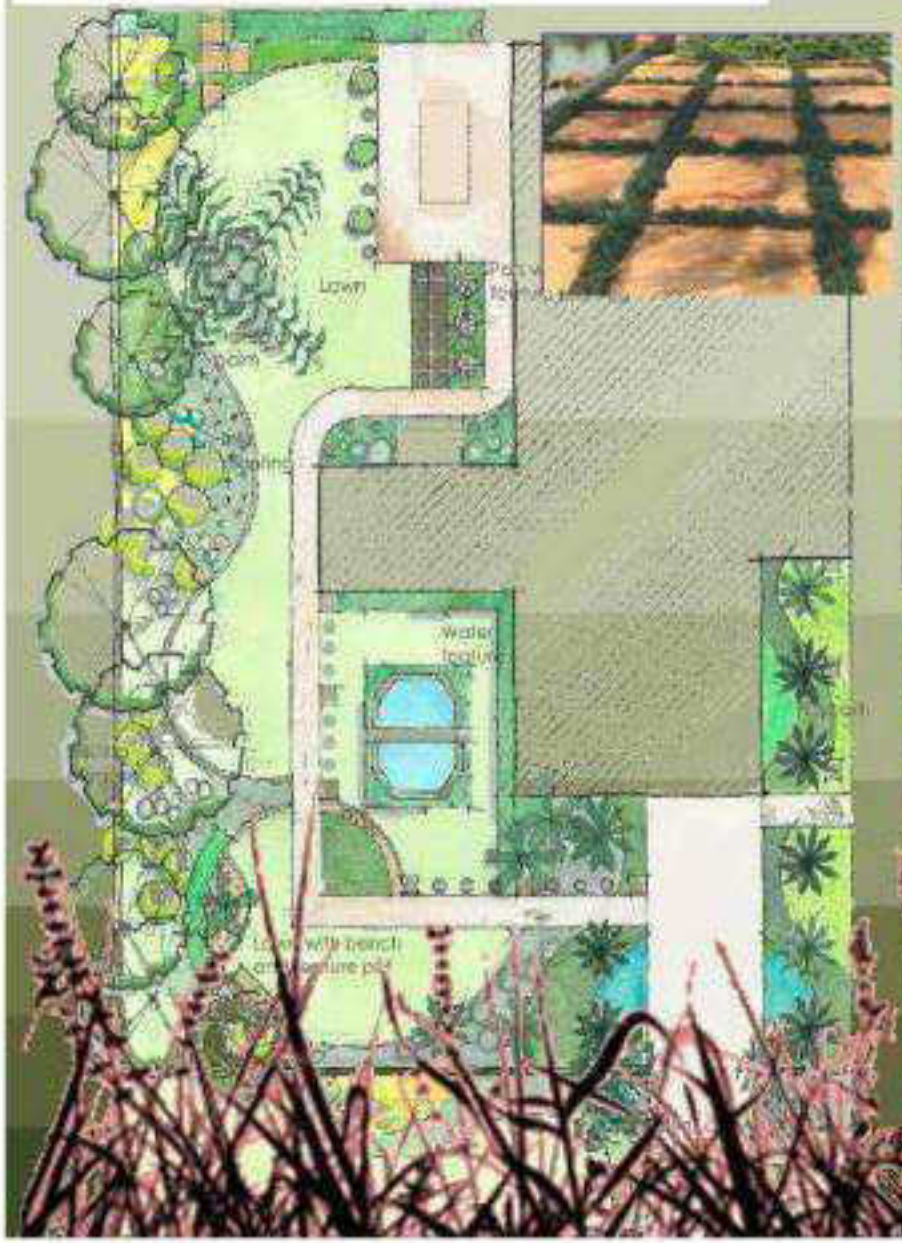


Bokamoso

05 Landscape Projects- Completed

053 Offices

04 Ismail Dawson offices, Pretoria

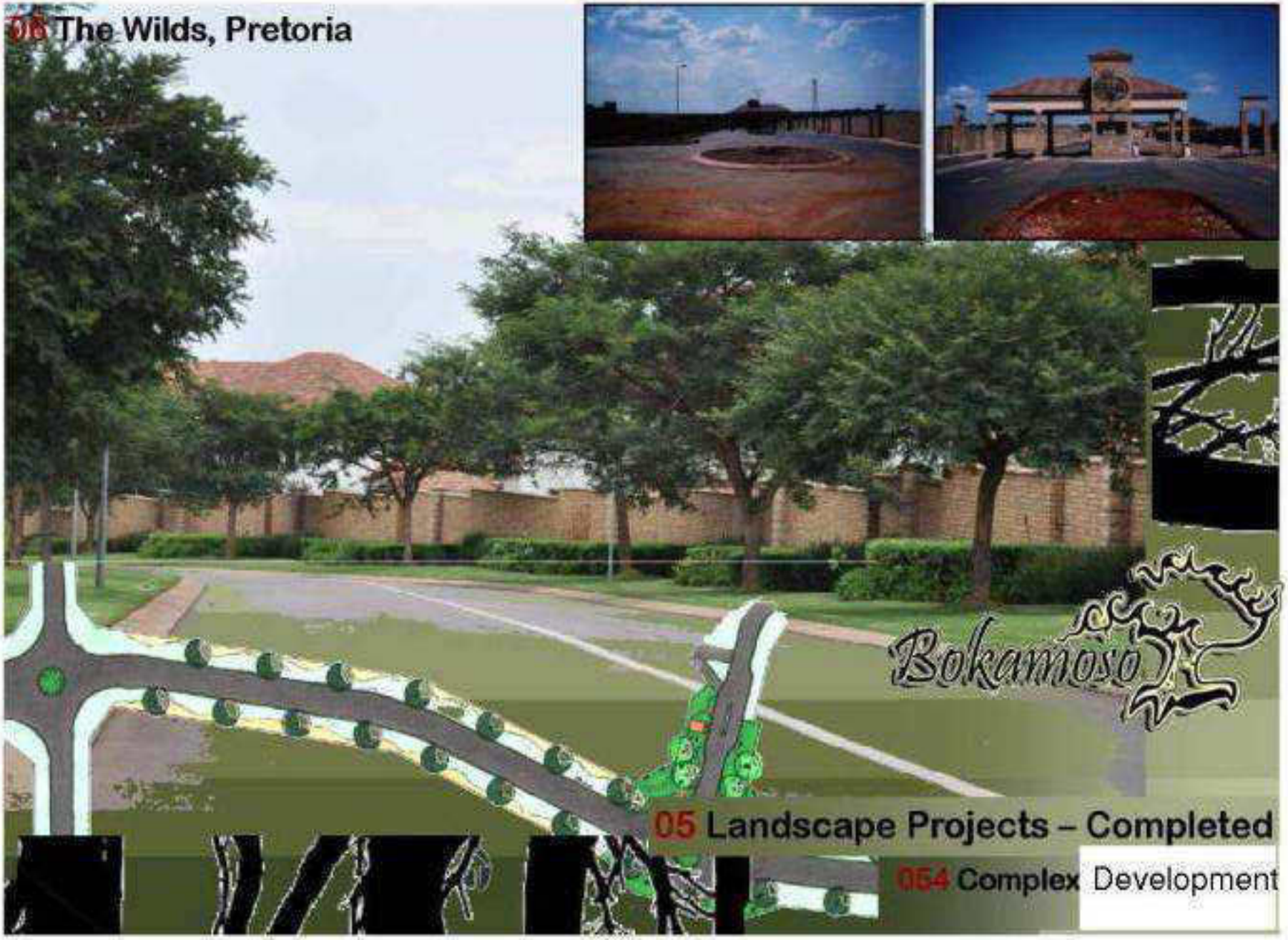


Bokamoso

05 Landscape Projects – Conceptual

053 Offices


05 Celtic Manor, Pretoria
Bokamoso
05 Landscape Projects -Completed
054 Complex Development


016 The Wilds, Pretoria
Bokamoso
05 Landscape Projects – Completed
064 Complex Development

07 The Wilds, Pretoria

05 Landscape Projects – Completed

055 Residential

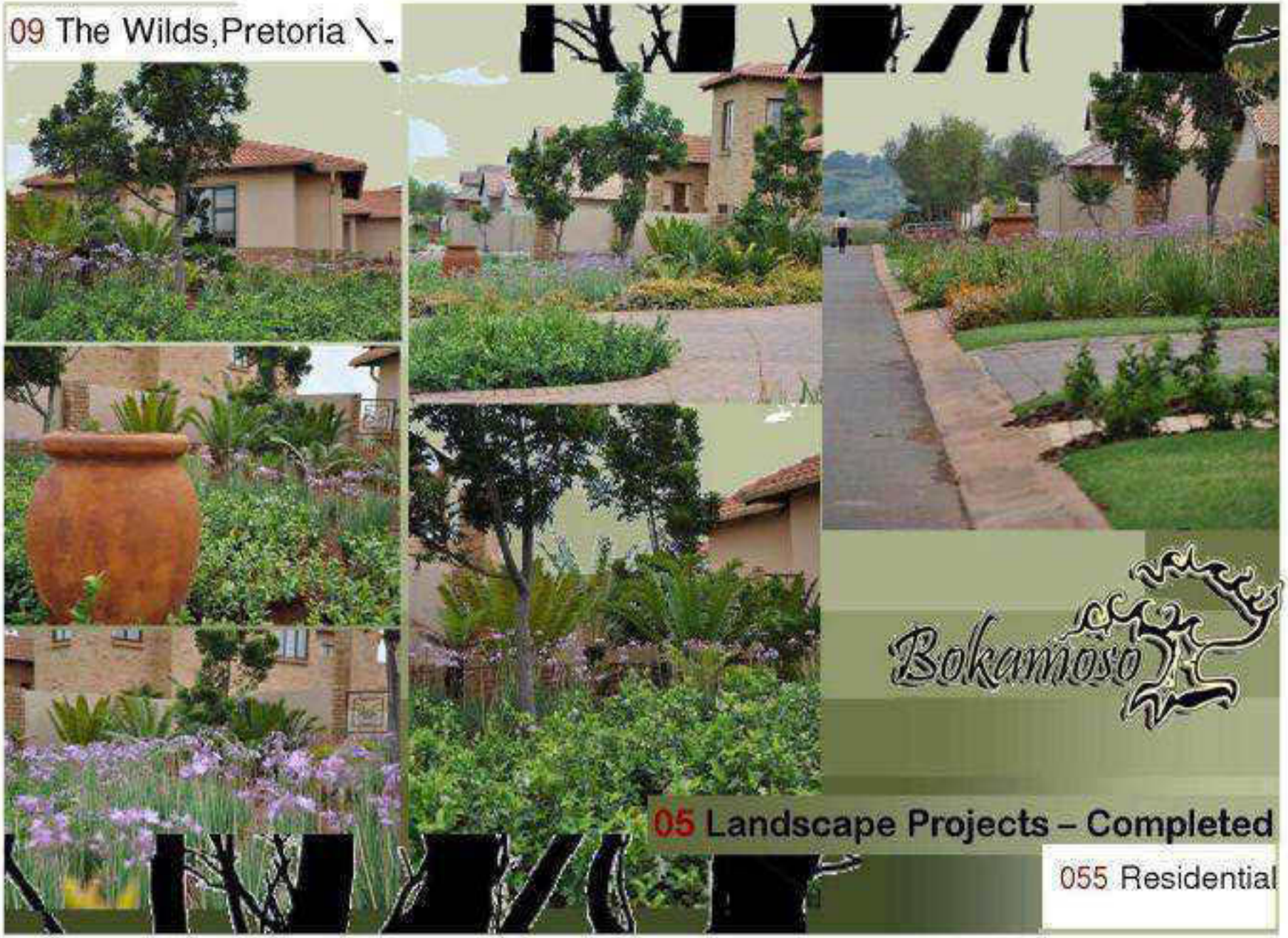
08 The Wilds, Pretoria

Bokamoso

05 Landscape Projects – Completed

055 Residential

09 The Wilds,Pretoria \



Bokamoso

05 Landscape Projects – Completed

055 Residential

010 The Wilds, Pretoria

Bokamoso

05 Landscape Projects Completed

05 Residential

011 Governor of Reserve Bank's Residence, Pretoria

Plant Palette

Option 1

Option 2

Bokamoso

012 House Ismail, Pretoria

Front Garden

Back Garden

Bokamoso

05 Landscape Projects - Conceptual

055 Residential

013 Forest Garden, Pretoria

Bokamoso

05 Landscape Projects – Completed

065 Residential

016 Forest Garden,Pretoria

Bokamoso

05 Landscape Projects -Completed

055 Residential

01 Safari Garden Expo

Received a Silver Certificate at the SafariGarden Expo, 2010

Bokamoso

06 Corporate Highlights

061 Awards

02 UNISA Sunnyside Campus, Pretoria

Best Commercial Paving Plan in Gauteng, 1997

Bokamoso

06 Corporate Highlights

061 Awards

Project Name	Status	Project
Environmental Impact Assessment(EIA) and Scoping Report		
Junction 21	ROD	EIA
5 O'clock site access	In Progress	EIA
Bokamoso X1	In Progress	Scoping & EIA
Doornvallei Phase 6 & 7	In Progress	EIA
Engen Interchange	In Progress	Scoping & EIA
Erasmia X15	In Progress	EIA
Franschkloof	In Progress	EIA
K113	Amendment of ROD	EIA
K220 East	ROD	EIA
K220 West	ROD	EIA
K54 ROD conditions	In Progress	EIA
Knopjeslaagte 95/Peachtree	ROD	EIA
Knopjeslaagte portion 20 & 21	ROD	EIA
Lilliesliet/Nooitgedacht	In Progress	EIA
Mooiplaats 70 (Sutherland)	In Progress	EIA
Naauwpoort 1 - 12/Valley View	In Progress	EIA
PeachTree X5	In Progress	EIA
Strydfontein 60	In Progress	EIA
Thabo Motswere	In Progress	Scoping & EIA
Vlakplaats	In Progress	EIA
Waterval Valley	In Progress	EIA
Environmental Opinion		
Doornkloof 68 (Ross)	In Progress	Opinion
Monavoni X 53	In Progress	BA & Opinion
Mooikloof (USN)	In Progress	Opinion
Norwood Mall/Sandspruit	In Progress	Opinion
Riversong X 9	In Progress	Opinion
Sud Chemie	In Progress	Opinion
USN Bench Fishing Resort	In Progress	Opinion

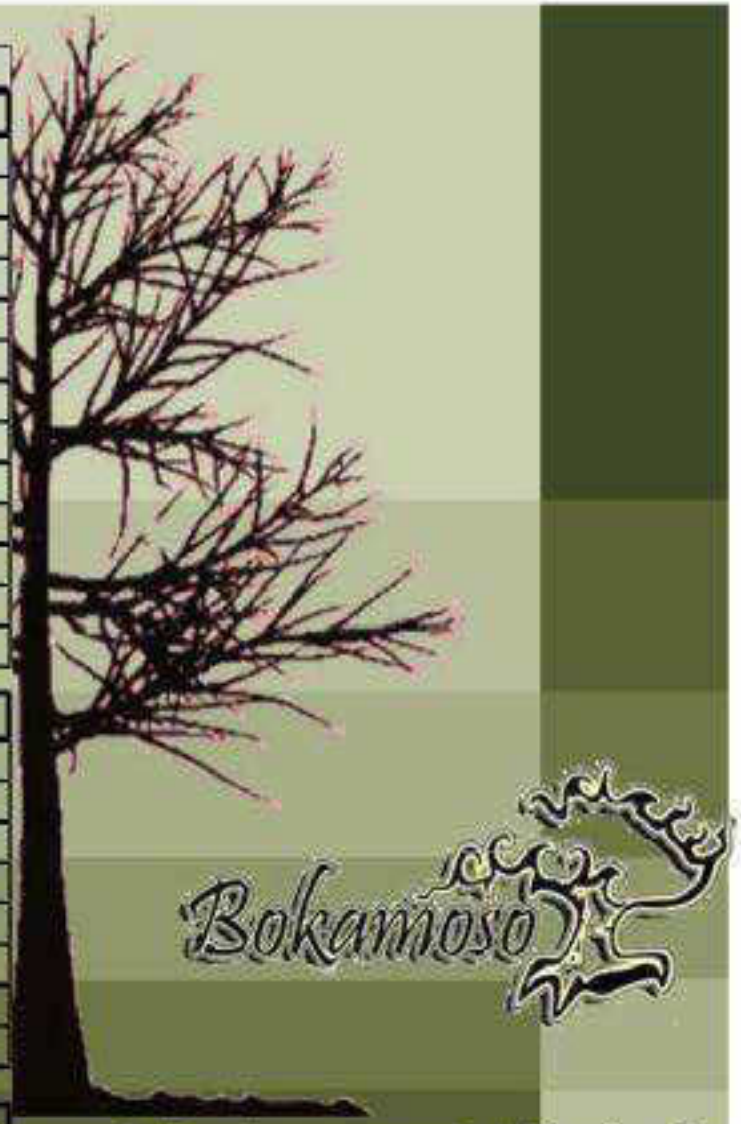
The adjacent list host the status of our current projects. Only a selected amount of projects are displayed.

Bokamoso

07 Current Environmental Projects

071 EIA, Scoping & Opinion

Project Name	Status	Project
Basic Assessment(BA)		
Annlin X 138	In Progress	BA
Clubview X 29	ROD	BA
Darrenwood Dam	In Progress	BA
Durley Holding 90 & 91	In Progress	BA
Elim	In Progress	BA
Fochville X 3	In Progress	BA
Hartebeeshoek 251	In Progress	BA
Klerksdorp (Matlosana Mall)	In Progress	BA
Monavoni External Services	ROD	BA
Monavoni X 45	Amendment of ROD	BA
Montana X 146	In Progress	BA
Rooihuiskraal X29	In Progress	BA
Thorntree Mall	In Progress	BA
Environmental control officer (ECO)		
Grace Point Church	In Progress	ECO
R 81	In Progress	ECO
Highveld X 61	In Progress	ECO
Mall of the North	In Progress	ECO
Olievenhoutbosch Road	In Progress	ECO
Orchards 39	In Progress	ECO
Pierre van Ryneveld Reservoir	In Progress	ECO
Project Shelter	In Progress	ECO
S24 G		
Wonderboom	In Progress	S24 G
Mogwasi Guest houses	Completed	S24 G

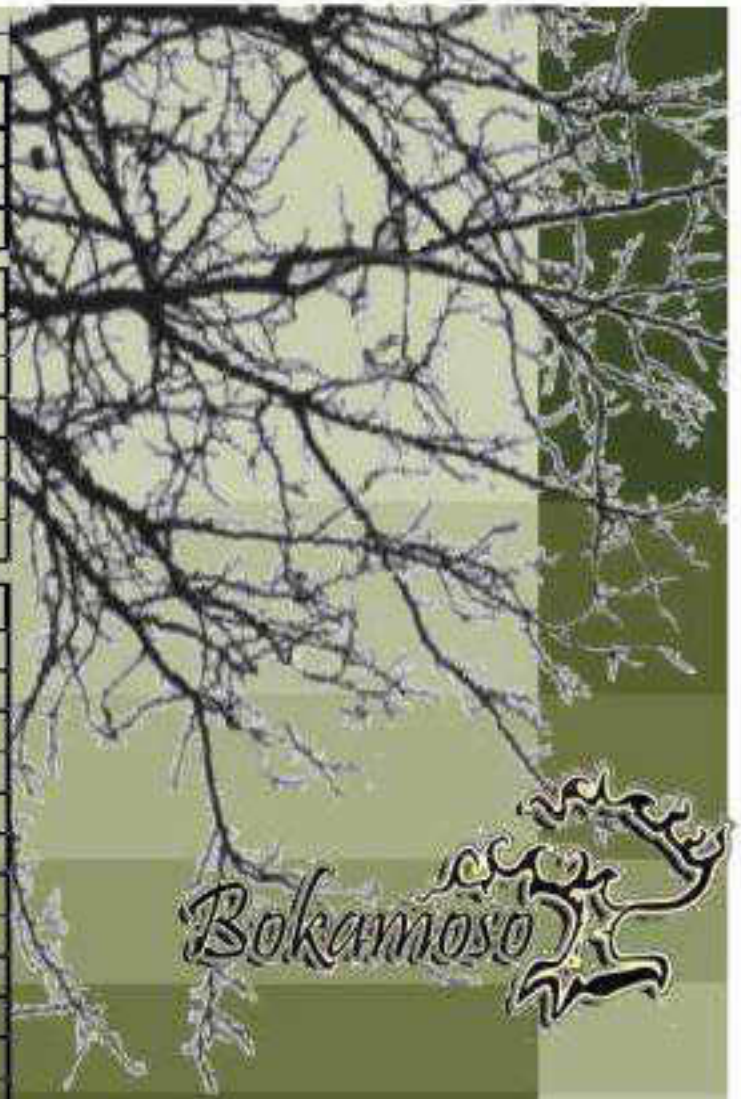


Bokamoso

07 Current Environmental Projects

072 BA, ECO & S24 G

Project Name	Status	Project
Objection		
Colesberg WWTW	In Progress	Objection
Nigel Steelmill	Completed	Objection
Chantilly Waters	Completed	Objection
Development facilitation Act- Input (DFA)		
Burgersfort	In Progress	DFA & BA
Doornpoort Filling Station	In Progress	DFA & EIA & Scoping
Eastwood Junction	In Progress	DFA
Ingersol Road (Erf 78, 81 - 83)	In Progress	DFA
Roos Senekal	In Progress	DFA & EIA & Scoping
Thabe Meetse 1	In Progress	DFA & EIA & Scoping
Water Use License Act (WULA)		
Britstown Bulk Water Supply	In Progress	WULA
Celery Road / Green Channel	In Progress	WULA
Clayville X 46	In Progress	WULA
Dindingwe Lodge	In Progress	WULA
Doornpoort Filling Station	In Progress	WULA+DFA+EIA+SC
Eco Park Dam	In Progress	WULA
Groote Drift Potch	In Progress	WULA
Jozini Shopping Centre	In Progress	WULA+BA
K60	Completed	WULA
Maloto Roads	In Progress	WULA
Kwezele Sewage Works	In Progress	WULA
Monavoni External Services	In Progress	WULA+BA
Nyathi Eco Estate	In Progress	WULA
Prairie Giants X 3	In Progress	WULA
Waveside Water Bottling Plant	Completed	WULA



07 Current Environmental Projects

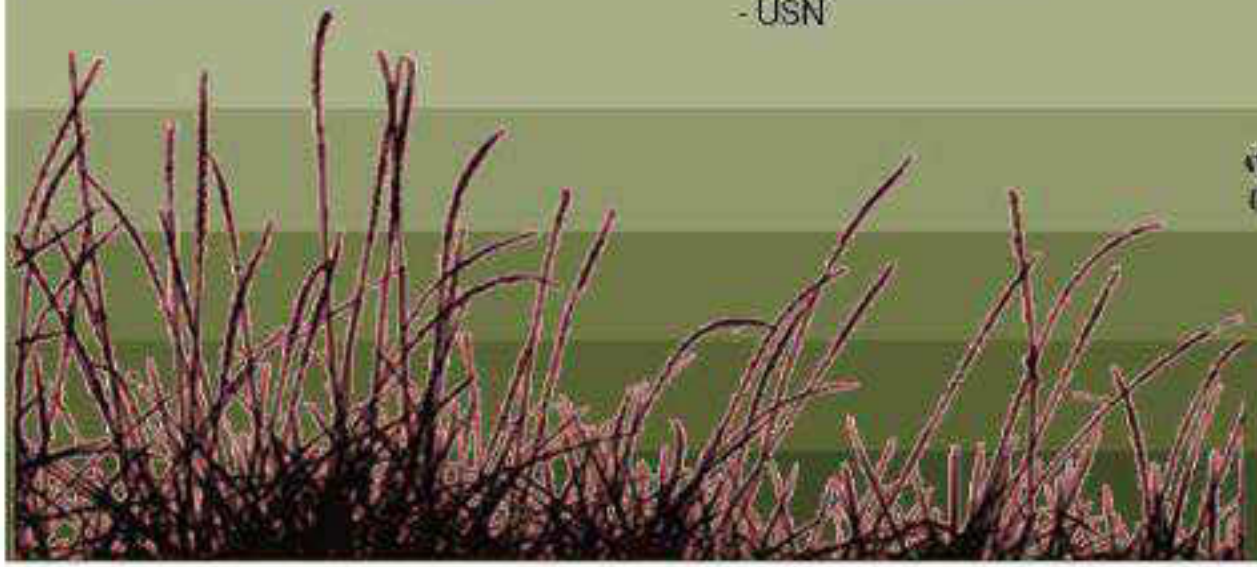
073 Objection, DFA & WULA

Project Name	Status	Project
Environmental Management Plan(EMP)		
Heidelberg X 12	ROD	EMP
Monavoni Shopping Centre	Completed	EMP
Forest Hill Development	Completed	EMP
Weltevreden Farm 105KQ	Completed	EMP+EIA
Raslouw Holding 93	Completed	EMP+BA
Durley Development	Completed	EMP+BA
Rooihuiskraal North X 28	Completed	EMP
Rehabilitation Plan		
Norwood Mall/Sandspruit	In Progress	Rehabilitation
Project Shelter Heidelberg	In Progress	Rehabilitation
Sagewood Attenuation Pond	ROD	Rehabilitation
Velmore Hotel	Completed	Rehabilitation
Grace Point Church	Completed	Rehabilitation
Mmamelodi Pipeline	Completed	Rehabilitation
Visual Impact Assessment		
Swatzkop Industrial Developme	Completed	Assessment +DFA
Erasmia	Completed	Assessment
Signage Application		
Merlyn Advertising	Completed	Signage
The Villa Mall	Completed	Signage+EMP+BA

07 Current Environmental Projects

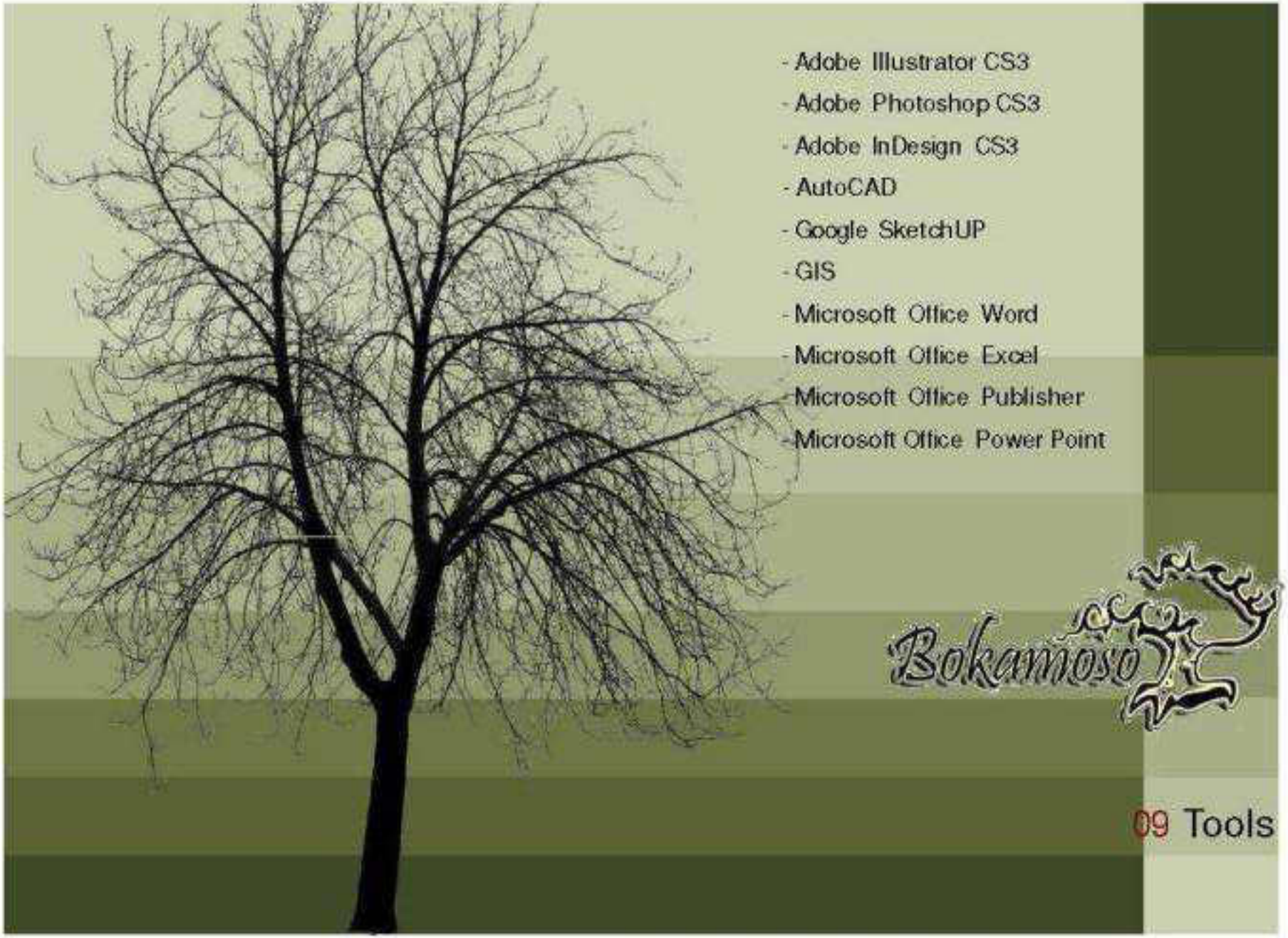
074 EMP, Rehabilitation , Waste Management & Signage Application

- Billion Property Group
- Cavaleros Developments
- Centro Developers
- Chaimberlains
- Chieftain
- Century Property Group
- Coca Cola
- Elmado Property Development
- Flanagan & Gerard
- Gautrans
- Hartland Property Group
- Moolman Group
- MTN
- M&T Development
- Old Mutual
- Property Investment Company
- Petroland Developments
- RSD Construction
- SAND
- Stephan Parsons
- Twin City Developments
- Urban Construction
- USN



Bokamoso

08 Indicative Clients


- Adobe Illustrator CS3
- Adobe Photoshop CS3
- Adobe InDesign CS3
- AutoCAD
- Google SketchUP
- GIS
- Microsoft Office Word
- Microsoft Office Excel
- Microsoft Office Publisher
- Microsoft Office Power Point
Bokamoso
09 Tools

Qualifications And Experience In The Field Of Environmental Planning And Management (Lizelle Gregory (Member Bokamoso)):

Qualifications:

-Qualified as ***Landscape Architect*** *at UP 1991;*
-Qualified as ***Professional Landscape Architect in 1997****;*
-A Registered Member at The ***South African Council for the Landscape Architect Profession (SACLAP)*** *with Practise Number:* ***PrLArch97078****;*
- A Registered Member at the ***International Association for Impact Assessment Practitioners (IAIA)****;*
- Qualified as an ***Environmental Auditor in July 2008*** *and also became a Member of the International Environmental Management Association (IEMAS) in 2008.*

Working Experience:

-Worked part time at Eco-Consult – 1988-1990;
-Worked part time at ***Plan Associates as Landscape Architect in training*** *– 1990-1991;*
-Worked as Landscape Architect at ***Environmental Design Partnership (EDP)*** *from 1992 - 1994*
-Practised under ***Lizelle Gregory Landscape Architects*** *from 1994 until 1999;*
*-****Lectured*** *at Part-Time at* ***UP*** *(1999) – Landscape Architecture and* ***TUT*** *(1998- 1999)- Environmental Planning and Plant Material Studies;*
-Worked as ***part time Landscape Architect and Environmental Consultant at Plan Associates*** *and* ***managed their environmental division for more that 10 years*** *– 1993 – 2008 (assisted the* ***PWV Consortium*** *with various road planning matters which amongst others included environmental Scans, EIA's, Scoping reports etc.)*
-Renamed business as ***Bokamoso in 2000*** *and is the only member of Bokamoso Landscape Architects and Environmental Consultants CC;*
*-****More than 20 years experience in the compilation of Environmental Reports,*** *which amongst others included the compilation of various* ***DFA Regulation 31 Scoping Reports****, EIA's for EIA applications in terms of the applicable environmental legislation, Environmental Management Plans, Inputs for Spatial Development Frameworks, DP's, EMF's etc. Also included EIA Application on and adjacent to mining land and slimes dams (i.e. Brahm Fisherville, Doornkop)*

Qualifications And Experience In The Field Of Landscape Architecture (Lizelle Gregory (Member Bokamoso)):

Landscape Architecture:

-Compiled landscape and rehabilitation plans for more than 22 years.

The most significant landscaping projects are as follows:
-Designed the Gardens of the Witbank Technicon (a branch of TUT). Also supervised the implementation of the campus gardens (2004);
-Lizelle Gregory was the Landscape Architect responsible for the paving and landscape design at the UNISA Sunnyside Campus and received a Corobrick Golden Award for the paving design at the campus (1998-2004);
-Bokamoso assisted with the design and implementation of a park for the City of Johannesburg in Tembisa (2010);
-The design and implementation of the landscape gardens (indigenous garden) at the new Coca-Cola Valpre Plant (2012-2013);
-Responsible for the rehabilitation and landscaping of Juksei River area at the Norwood Shopping Mall (johannesburg) (2012-2013);
-Designed and implemented a garden of more than 3,5ha in Randburg (Mc Arthurpark). Bokamoso also seeded the lawn for the project (more than 2,5 ha of lawn successfully seeded) (1999);
-Bokamoso designed and implemented more than 800 townhouse complex gardens and submitted more than 500 Landscape Development Plans to CTMM for approval (1995 – 2013);
-Assisted with Landscape Designs and the Masterplan at Eco-Park (M&T Developments) (2005-2011);
-Bokamoso designed and implemented an indigenous garden at an office park adjacent to the Bronberg. In this garden it was also necessary to establish a special garden for the Juliana Golden Mole. During a recent site visit it was established that the moles are thriving in this garden. Special sandy soils had to be imported and special indigenous plants had to be established in the natural section of the garden.

-Lizelle Gregory also owns her own landscape contracting business**. For the past 20 years she trained more than 40 PDI jobless people (sourced from a church in Mamelodi)** to become landscape contracting workers. All the workers are (on a continuous basis) placed out to work at nurserys and other associated industries;
-Over the past 20 years the Bokamoso team compiled more than 800 landscape development plans and also implemented most of the gardens. Bokamoso also designed and implemented the irrigation for the gardens (in cases where irrigation was required). Lizelle regarded it as important to also obtain practical experience in the field of landscape implementation.