CLINKER SUPPLIES (PTY) LTD

APPLICATION FOR ENVIRONMENTAL AUTHORISATION AND WASTE LICENCE FOR WITBANK ASH RECLAIMING PROJECT, MPUMALANGA PROVINCE

DARDLEA Reference No.: 1/3/1/16/1N-72

DRAFT EIA REPORT

June 2017

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PROJECT INFORMATION

Title:	Application for Environmental Authorisation and Waste Licence for Witbank Ash Reclaiming Project, Mpumalanga Province.
Competent Authority:	Mpumalanga Department of Agriculture, Rural Development, Land and Environmental Affairs (DARDLEA)- Nkangala District Municipality (NDM)
DARDLEA Reference No.:	1/3/1/16/1N-72
Applicant:	Clinker Supplies (Pty) Ltd
Compiled by:	Ntsanko Ndlovu (EAP at Afrimat (Pty) Ltd)
Reviewed By:	Victor Manavhela (Biogeotech Environmental Consultance)
Date:	June 2017

ABBREVIATIONS AND ACRONYMS

APA	Agricultural Pests Act of 1983 (Act No. 36 0f 1983)
ASQR	Air Quality Sensitive Receptors
BID	Background Information Document
DARDLEA	Mpumalanga Department of Agriculture, Rural Development, Land and Environmental Affairs
DEA	Department of Environmental Affairs
DSR	Draft Scoping Report
EA	Environmental Authorisation
EHS	Evraz Highveld Steel
EIA	Environmental Impact Assessment
ELM	eMalahleni Local Municipality
EMPr	Environmental Management Programme
GN	General Notice
HSA	Hazardous Substances Act of 1991 (Act No. 15 of 1973)
I&APs	Interested & Affected Parties
IDP	Integrated Development Framework
MBCP	Mpumalanga Biodiversity Conservation Plan
MBSP	Mpumalanga Biodiversity Sector Plan
NDM	Nkangala District Municipality
NEMA	National Environmental Management Act of 1998 (Act No. 107 of 1998)
NFEPA	National Freshwater Ecosystem Priority Area
NEM:AQA	National Environmental Management: Air Quality Act, 2004
NEM:BA	National Environmental Management Biodiversity Act (Act No. 10 of 2004)
NEM:WA	National Environmental Management Waste Act (Act No. 59 of 2008)
NVFFA	National Veld and Forests Fire Act 1998 (Act No. 101 of 1998)
NWA	National Water Act of 1998 (Act No. 36 of 1998)
NHRA	Natural Heritage Resources Act of 1999 (Act No. 25 of 1999)

OHSA	Occupational Health and Safety Act of 1993 (Act No. 85 of 1993)
SIA	Social Impact Assessment
WMA	Water Management Area

DEFINITION OF TERMS

Access Road: a road built exclusively for access to the ash dump

Clearing: means the clearing and removal of vegetation, whether partially or in whole, including trees and shrubs, as specified.

Environment: means the surroundings within which humans exist and that are made up of:

i) The land, water and atmosphere of the earth;
ii) Micro-organisms, plant and animal life;
iii) Any part or combination of i) and ii) and the interrelationships among and between them; and
iv) The physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being (i.e. the social environment).

Environmental Management Plan: A legally binding working document, which stipulates environmental and socio-economic mitigation measures that must be implemented by several responsible parties throughout the duration of the proposed project.

Heritage resource: as per the provisions of the National Heritage Resources Act (No 25 of 1999), means those heritage resources that are of cultural significance or other special value for present and future generations, and which are accordingly considered part of the national estate. In this regard, the national estate includes those items identified in terms of Section 2 of the Act.

Hazardous Substances: is a substance governed by the Hazardous Substances Act as well as the Hazardous Chemical and Substances Regulations.

Hazardous Waste: waste that may, by circumstances of use, quantity, concentration or inherent physical, chemical or infectious characteristics, cause ill-health or increase

mortality in humans, fauna and flora, or adversely affect the environment when improperly treated, stored, transported or disposed of.

Natural vegetation: means all existing species, indigenous or otherwise, of trees, shrubs, groundcover, grasses and all other plants found growing on the site.

Hazardous Waste: waste, other than radioactive waste, which is legally defined as hazardous in the state in which it is generated, transported or disposed of. The definition is based on the chemical reactivity or toxic, explosive, corrosive or other characteristics, which cause, or are likely to cause, danger to health or to the environment, whether alone or when in contact with other waste (Minimum Requirements (1998).

Hazardous Waste: waste, including radioactive waste, which is legally defined as "hazardous" in the state in which it is generated. The definition is based on the chemical reactivity or toxic, explosive, corrosive or other characteristics which cause, or are likely to cause, danger to health or to the environment, whether by itself or when in contact with other waste (White Paper on IP&WM)

Hazardous Waste: means any waste that contains organic or inorganic elements of compounds that may, owing to the inherent physical, chemical or toxicological characteristics of that waste, have a detrimental impact on health and the environment (NEMWA (2008))

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Interested and Affected Parties(I&APs): any person, group of persons or organization interested in or affected by an activity contemplated in an application, or any organ of state that may have jurisdiction over any aspect of the activity.

Mitigate: the implementation of practical measures to reduce adverse impacts Public Participation Process: is a process in which potential interested and affected parties are given an opportunity to comment on, or raise issues relevant to, specific matters.

Solid waste: means all solid waste, including construction debris, chemical waste, excess cement/ concrete, wrapping materials, timber, tins and cans, drums, wire, nails, food and domestic waste (e.g. plastic packets and wrappers).

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1 INTRODUCTION

1.1 Introduction and Background

Clinker Supplies (Pty) Ltd, a subsidiary of Afrimat Limited has applied for an Environmental Authorisation for Waste License application for the reclaiming of clinker from the old Witbank power station ash dump. Clinker is a product derived from the burning of coal. The ash dump resulted from the coal burning for power generation at the old Witbank power station. The project will also involve the construction of a new access road of approximately 1.06 km to connect to the R555. An alternative access road of 0.9km has been identified and will be investigated. The ash dump as well the associated access road and alternative are collectively referred to in the remainder of this report as the study area.

Clinker Supplies has reached an agreement with Eskom to reclaim the material. Clinker Supplies proposes to reclaim the clinker from the old Witbank power station ash dump, layer by layer, from the top of the dump by various construction machineries. The aim of Clinker Supplies is to reclaim the existing derelict dump consisting of clinker ash material into useful resources. The Witbank ash dump has four (4) million tonnes. It is anticipated that the dump will be fully reclaimed in 10 years - 15 years' time, this would however be dependent on market conditions and annual consumption of the aggregate. It is intended that all of the clinker ash will be cleared from the site with no residue remaining. Once the material has been fully removed, the property will revert to Eskom and can then be re-zoned for commercial purposes.

1.2 Description of Proposed Project

The proposed project will consist of two parts namely:

a) The reclamation of clinker from Eskom's ash dump at Witbank by Clinker Supplies (Pty) Ltd; and
b) The manufacture of clinker bricks on the same site by SA Block (Pty) Ltd.

Part A – reclamation of clinker

Clinker Supplies intends to erect a reclamation plant at Witbank ash dump. The operation will be closely similar to the reclamation plants operated by Clinker Supplies at Eskom's dumps in Gauteng. Clinker Supplies proposes to reclaim the clinker from the old Witbank power station ash dump, layer by layer, from the top of the dump by various construction machineries.

The ash reclamation will comprise two phases. **Phase 1** will include the excavation of ash on the southwest corner of the dump. Ash will be cooled down and kept moist by pumping 1000 m^3 water per day to the active area of the dump, from where it will be hauled via haul trucks

to a mobile screening plant where the ash will be screened and thereafter stockpiled before being sold as aggregate to concrete product manufacturers, such as brick factories. For **Phase 2** a fixed primary and secondary crushing plant will be constructed on the area that had been cleared during Phase 1, with conveyors used to feed the crusher with excavated ash from the top of the dump. See **Figure 1** for the two proposed reclamation plant location areas. The crushed product will be stockpiled using closed conveyors and then loaded to trucks for transport off-site (also using conveyors). Project operational activity will comprise the reclamation of 3000 tons per day of clinker from the dump.

The operation process is summarised as follows:

- load and haul the reclaimed clinker from the dump to the crushing and screening plant.
- crush and screen the recovered clinker in order to reduce it to various size fractions of -13mm and +13mm to -22mm
- stockpile the screened clinker at a stockpile area
- sell the screened clinker to Concrete Product Manufacturers (CMPs), such as brick factories etc

A weighing system, comprising of one or more weighbridges will be installed at the site entrance to weigh the aggregate being sold.

Figure 1: Picture showing the location of the reclamation plant for the two proposed reclamation phases

Part B – Brick manufacturing by SA Block (Pty) Ltd

SA Block (Pty) Ltd, which is Clinker Supplies' sister company, will install four brick making machines in an area located separately from Clinker's supply plant. This company will purchase the brick making material from Clinker Supplies. It is proposed that Four (4) brick making machines will be installed in an area located separately from Clinker Supply's plant by SA Block Pty Ltd. **Figure 2** shows the proposed crushing, screening and brick making areas.

Figure 2: Proposed crushing, screening and brick making areas

Water Supply on site

Clinker Supplies plans to get water supplied into the proposed site by tapping into the Evraz Highveld Steel (EHS) pipeline that through the dump. The pipeline is located 600m of the proposed screen and crushing plant. Clinker Supplies is currently in the process of finalising agreement for water-sourcing from the EHS pipeline. The water will be used for dust suppression as well as in the brick making factory. Water trucks will be used to suppress dust generated on site. Potable municipal water is readily available on site and Clinker Supplies will reach an agreement with Eskom on how the water bill be paid.

Clinker Supplies envisages that the surface infrastructure for the project will consist of the following:

New equipment to be brought to site

- Mobile Equipment
  - Excavators 2
  - Front-end loaders 3
  - Heavy duty trucks 3
  - Light vehicles 2
- Fixed Plant:
  - Heavy duty trucks 3
  - Light vehicles 2
- Fixed Plant:
  - Crushers, conveyors, screens, stockpiles and loading conveyors
  - Double weighbridge

Infrastructure already existing on site:

- Buildings:
  - Workshops
  - Change rooms and ablution blocks
  - Offices
- Parking area for visitors and site vehicles

A detailed site layout is provided in **Figure 3** below.

It is anticipated that approximately 70 people will be employed comprising plant operators, admin, quality, safety, and security staff: 20 people will be employed on the Reclaiming plant and 50 people will be employed on the brick making machines.

Figure 3: Pictures showing the location of dump and layout of the Witbank clinker dump

1.3 Project Location

The site is located in Eskom Park, farm Evkompark 319 portion 0, in the town of Witbank situated in the Emalahleni Local Municipality, Mpumalanga Province. The land where the ash dump is located is owned by Eskom Holdings SOC Ltd and will remain the property of Eskom Holdings SOC Ltd. It is situated about 2 kilometres south of the Witbank Central Business District (CBD) and Witbank's Golf course as well as the current Eskom Park known as Farm Evkompark 319-JS which is a highly industrialized area. The proposed access road, as well as alternative will run from the R555 to the Ash Dump (See **Figure 4** below the access road to site). The N4 is situated to the north of the study area. There agricultural fields to the south and west of the study area (**Figure 5**).

Figure 4: Location of the proposed access road to the site

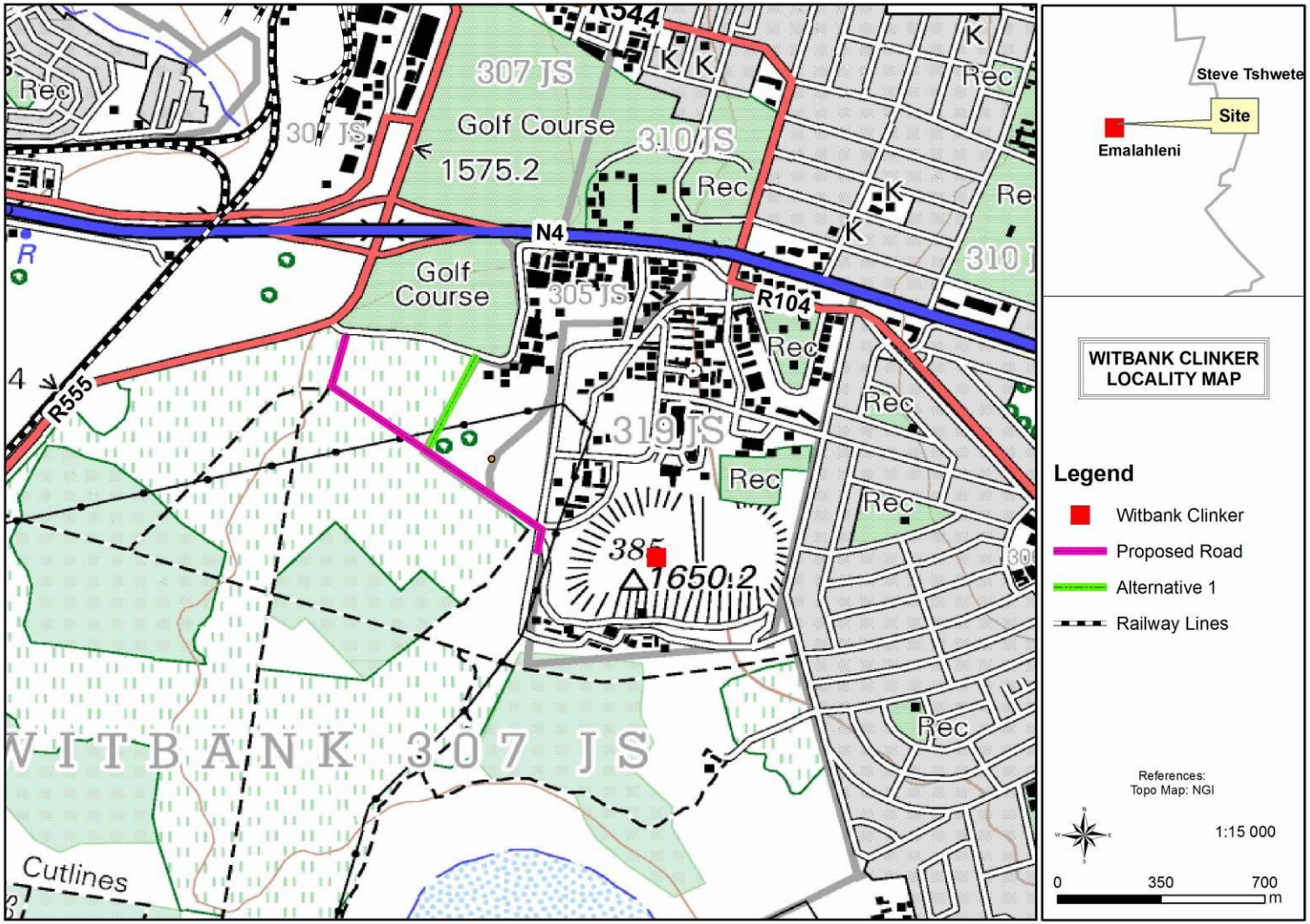


Figure 4: Locality Map illustrating the location of the project site within Witbank

1.4 Application details

The following section of the Draft Environmental Impact Assessment Report (DEIAR) provides the particulars, including contact details, of the key stakeholders (applicant, Environmental Assessment Practitioner and the relevant, Competent Authority) associated with the project.

1.4.1 Proponent

The project applicant is Clinker Supplies (Pty) Ltd, a subsidiary of Afrimat Limited. The details of the project applicants are as follows:

Table 1: Details of proponent

Representative	Davin Giles
Postal Address	P.O. Box 151 Alberton 1450
Physical Address	19 Dienst Street Alrode Extension 2 1451
Telephone Number	011 439 3260
Fax Number	011 439 3276
Cell Phone Number	082 891 4826
e-mail	davin.giles@afrimat.co.za and info.clinker@afrimat.co.za

1.4.2 Environmental Assessment Practitioner

This Draft Environmental Impact Assessment (DEIFR) Report was prepared by Ms Ntsanko Ndlovu. Ms Ntsanko Ndlovu has been assigned as the lead Environmental Practitioner to undertake the necessary environmental authorisation process. Ntsanko holds a Masters degree in Environmental Management from North-West University with six years of professional experience as an Environmental Scientist in the consulting industry. Ntsanko is currently Senior Environmental Specialist based at Afrimat. She has a wealth of experience in managing Environmental Impact Assessments (EIAs) with the required Public Participation Process (PPP), carrying out environmental audits and conducting environmental awareness, which she gained through the years.

Table 2: Details of Environmental Assessment Practitioner (EAP)

Environmental Assessment Practitioner Name	Ms Ntsanko Ndlovu
Postal Address	PO Box 768 Bellville Western Cape 7535
Physical Address	19 Dienst Street Alrode Extension 2 1451
Telephone Number	011 439 3260
Fax Number	086 607 1354
Cell Phone Number	082 728 8975
e-mail	ntsanko.ndlovu@afrimat.co.za

1.4.1.1 Independent Reviewer Details

The EAP who prepared this EMPr is employed by Afrimat (Pty) Ltd and is considered to have vested interests on the proposed project considering that Clinker Supplies is subsidiary to Afrimat. As a result, an independent external EAP was appointed to review all the EIA process including this reviewing EMPr as required by Regulation 13 (2) and 3 of the NEMA EIA Regulatins 2014. The details of the ecternal EAP are indicated below.

Table 3: Details of independent Reviewer

Consultant:	Biogeotech Environmental Consultance cc
Contact Person:	Victor Manavhela
Postal Address	04 Jasmyn Street Germiston 1401
Telephone:	072 130 2932
Facsimile:	086 607 1354

E-mail:	vmanavhela@biogeotech.co.za
Expertise:	• Bachelor of science: Environmental Sciences • Certificate of Environmental Law • Certificate: EIA Reviewers coarse Mr Manavhela has over 17 years in the field of environmental management and sustainability. Out of the 17 years, at least over 6 years were spent on EIA regulations which include review of EIA applications to advice on EIA decisions at government level. He has also worked as an Environmental specialist for Anglo American company in Pulp and Paper industry. In addition he also holds the vast experience in ISO standards implementation and has participated in global standard development for Aluminium mining and processing sector led by IUCN.

1.5 Structure of the EIA Report

The report has been structured to comply with the format required by the NEMA. The contents are as follows:

Table 4: Structure of the report

CHAPTER	CONTENT
Chapter 1 **Introduction**	Provides the project background, location, components of the Site and includes an overview of the different phases of development
Chapter 2 Approach to the Study	A detailed description provides the purpose of the authorisations required, EIA and an overview of the phases of an EIA and PP processes.
Chapter 3 **Project Motivation**	Provides the motivation for the project, and gives information on the needs and desirability of the project.
Chapter 4 Legislative Framework	Provides the legislative framework for the EIA process and the context of this development.
Chapter 5 Description of the study area	Details the specialist study baseline conditions identified for the project
Chapter 6 Project Alternatives	Description and comparative assessment of the alternatives that were considered

Chapter 7 Public Participation Process	Details the various steps and processes that were followed in the public participation process. It also summarises key outcomes of the process
Chapter 8 Potential Impacts Associated with the project	Describes the EIA methodology and impacts identified during the EIA process, provides a rating of the anticipated impacts during the various project phases. for the proposed reclamation of the ash
Chapter 9 Conclusion and Recommendations	Conclusion and Recommendations of the Environmental Impacts Assessment Study
Chapter 10 References	Outline of the References that were used in this report

2 APPROACH TO THE SUDY

2.1 Application for waste License authorisation

The environmental impacts associated with the proposed project require investigation in compliance with the EIA Regulations (2014) published in Government Notice Regulation (GNR) No. 982 read with Section 24 (5) of the NEMA (Act No. 107 of 1998) (as amended). The proposed project therefore requires to be assessed by conducting a Scoping and then the EIA (the latter of which is the current phase for which this report, together with the Environmental Management Programme [EMPr] is the product in final format).

The National Environmental Management: Waste Act – NEM: WA (Act No. 59 of 2008) (as amended) and Government Notice (GN) No. R 921 of 29 November 2013 must also be complied with for the application of a waste management licence (WML). Chapter 5 of the NEM: WA states that the application of a waste management licence and the decision making process of the issuing of a waste licence must be co-ordinated with Chapter 5 of the NEMA.

According to NEM: WA as amended, the operation of the Witbank ash reclamation project requires a Waste Management License as per the following Waste Management listed activity:

Category B

Activity 3: the recovery of waste including the refining, utilisation, or co-processing of the waste at a facility that processes in excess of 1oo tons of general waste per day or in excess of 1 ton of hazardous waste per day, excluding recovery that takes place as an integral part of the an internal manufacturing

Chapter 5 of the NEM: WA states that the application of a waste management licence and the decision making process of the issuing of a waste licence must be co-ordinated with Chapter 5 of the NEMA. Given that waste activities applied for are assessed according the NEMA (via the EIA or Basic Assessment process), the triggering of activities listed in GNR 921 Category B requires that a Scoping and Environmental Impact Assessment (EIA) be conducted for the undertaking of those waste activities specifically.

In terms of NEMA, the EIA Regulations of 2014, Government Notice No R. 983, the proposed licencing of the ash reclamation process is regarded as a listed activity which requires an environmental assessment (Basic Assessment process) prior to authorisation. However, a scoping and full EIA process was followed for this project as the listed waste activity falls under Category B. The competent authority is the Mpumalanga Department of Agriculture, Rural Development, Land and Environmental Affairs (DARDLEA) under the Nkangala District Municipality (NDM) office.

Listed Activities as per GN R. 983: 2014 (Listing Notice 1) associated with the proposed development

Activity 26: Residential, retail, recreational, tourism, commercial or institutional development of 1000 square metres or more, on land previously used for mining or heavy industrial purposes;

Activity 27: The clearance of an area of 1 hectare or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is requires for-

(i) the undertaking of a linear activity

(ii) maintenance purposes undertaken in accordance with a maintenance management plan

2.2 The Purpose of this EIA Report

During the Scoping phase of the application, potentially significant impacts associated with the proposed Witbank ash reclamation project were identified. Based on the potentially significant impacts identified, alternative means of meeting the general requirements of the activity were also be identified (the general requirements being the effective management of hazardous waste).

The alternatives which have been included in the application are those which were found, upon investigation during the Scoping phase, to be reasonable and feasible alternatives for meeting the general purpose of the activity.

The purpose of the EIA phase of the process is to assess the impacts associated with the identified alternatives, and to establish which alternatives would have the most benefit and/or cause the least harm to the receiving environment.

2.3 Purpose and Objectives of the Waste Management Licence

The requirement for obtaining a waste management licence (WML) is to license listed waste management activities and in doing so regulate the management of waste in order to protect the health of people as well as the environment. This is achieved by obtaining authorisation from the relevant authorities for undertaking certain listed waste management activities, which have or are likely to have a detrimental effect on the environment. The process of obtaining a WML applies to any person who undertakes a waste management activity and includes the storage, transportation, processing, reuse, recycling, treatment and recovery of waste.

The process of obtaining a WML for undertaking listed waste management activities is intended to control these activities and to ensure that they do not impact on human health

and the environment. The process of obtaining a WML is integrated with an environmental assessment process, and therefore the objectives of the EIA process as listed above are also applicable from a WML perspective.

2.4 Environmental Impact Assessment Process

The EIA process for both environmental authorisation and a waste management licence is being undertaken in two phases:

(a) Phase 1 - Environmental Scoping Study (ESS) including Plan of Study for EIA
(b) Phase 2 - Environmental Impact Assessment (EIA) and an Environmental Management Programme (EMPr)

2.4.1 Phase 1 – Environmental Scoping (complete)

Scoping is the process of determining the spatial and temporal boundaries (i.e. extent) and key issues to be addressed in an environmental assessment. The main purpose of scoping is to focus the environmental assessment on a manageable number of important questions. Scoping should also ensure that only significant issues and reasonable alternatives are examined. The environmental scoping study (ESS) provides a description of the receiving environment and how the environment may be affected by the development of the proposed project. Desktop studies making use of existing information will be used to highlight and assist in the identification of potential significant impacts (both social and biophysical) associated with the proposed project.

Additional issues for consideration will be extracted from feedback from the public participation process, which commenced at the beginning of the Scoping phase, and will continue throughout the duration of the project. All issues identified during this phase of the study have been documented within this final version of the Environmental Scoping Report and have been highlighted on the issues and response report for easy reference **(Appendix B9)**. Thus, this final Environmental Scoping Report (document at hand) hereby provides a record of all issues identified as well as any fatal flaws, in order to make recommendations regarding the project and further studies required to be undertaken within the EIA phase of the proposed project.

2.4.2 Phase 2 - Environmental Impact Assessment (EIA) and an Environmental Management Programme (EMPr)

The EIA phase has aimed to achieve the following:

- To provide an overall assessment of the social and biophysical environments of the affected area by the proposed project;

- To undertake a detailed assessment of the preferred alternatives in terms of environmental criteria including the rating of significant impacts;
- To identify and recommend appropriate mitigation measures (to be included in an EMPr) for potentially significant environmental impacts; and
- To undertake a fully inclusive public participation process (including the review of the document at hand) so as to ensure that I&AP issues and concerns are recorded and commented on and addressed in the EIA process
- Integrate these measures into the design, engineering, planning and execution of the proposed Site; and
- Include an evaluation and assessment of project alternatives, including an assessment of the "no Project" alternative.

The technical specialist studies identified at Scoping phase for further investigation during the Impact Assessment phase included the following:

- Ecology;
- Air quality;
- Geology;
- Traffic;
- Noise;
- Social; and
- Heritage.

Details regarding the baseline studies, impacts and mitigation of these specialist studies are discussed at the end of this FEIAR.

3 PROJECT NEED AND DESIRABILITY

3.1 Demand for clinker bricks

Clinker Supplies currently owns a similar site in Vaal where it currently has customers from the Mpumalanga area. The operation of the Witbank ash reclamation project will reduce the costs incurred by the customers from Mpumalanga as they will access the material at a closer area.

3.2 Environmental benefit for the community

The ash dump as it is pose and environmental risk to its surrounding environment. Full combustion has not occurred due to insufficient historic incineration technologies. Due to poor incineration, there remains sufficient carbonaceous content within the ash for long-term smouldering to occur. There could be possible leachate to the surrounding to surrounding ground water resources. The community also indicated that the dump is currently posing a serious health and environmental threats to them and it is not visually appealing. They have stated that it would be good to have it removed from the area.

It is intended that all of the clinker ash will be cleared from the site with no residue remaining. In addition, the overall visual value of the area is set to be restored at the end of the project lifespan as the ash dump will be completely removed. Once the material has been fully removed, the property will revert to Eskom and can then be re-zoned for commercial purposes.

3.3 Creation of employment of opportunities

It is anticipated that the ash dump will be fully reclaimed in 10 years – 15 years' time in which a total of ± 95 employment opportunities will be created in the brick manufacturing and clinker reclamation process itself. Creation of permanent employment and skills development opportunities for members from the local community. The proposed ash dump reclamation project will unlock some socio-economic opportunities in the area.

3.4 Waste Disposal Reduction

Finding suitable land for the establishment of landfills is becoming increasingly difficult and existing landfills are under pressure to comply with progressively stringent legislation and has to manage space carefully to extend the life of the landfills, and to cope with increasing volumes. In terms of the waste hierarchy, recovery and treatment of waste is encouraged as an alternative to disposal

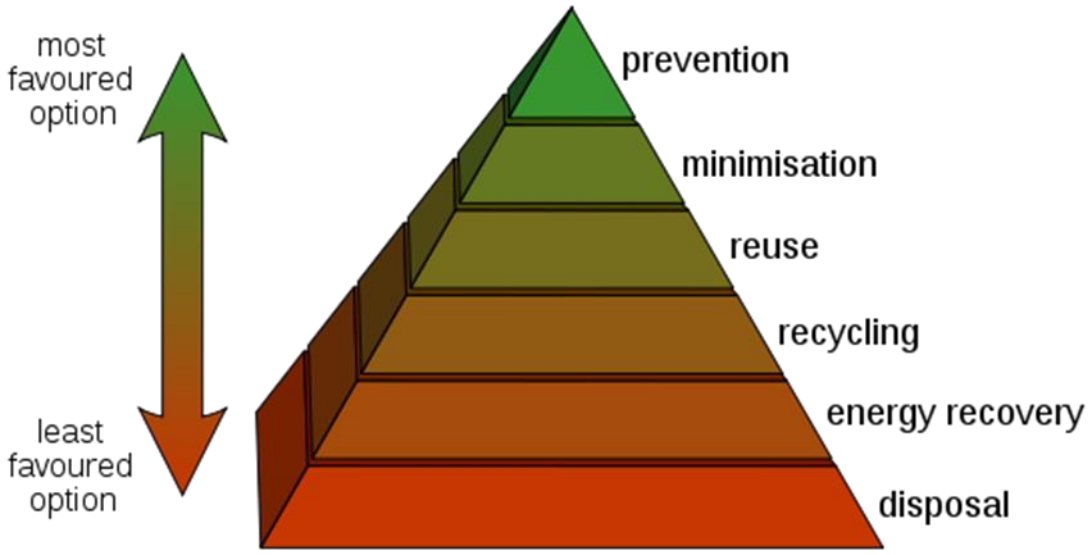


Figure 5: The Waste Hierarchy

Therefore the responsible use of waste is encouraged if it has the potential to reduce impacts on the on the surrounding environment it would have had if it was disposed to landfill, or directly into the environment. The reclamation and processing of ash to a useful resource in a controlled environment, where monitoring and reporting to authorities are taking place, is therefore deemed to reduce the probability of long term and potentially latent impacts on the environment associated with disposing the ash in a hazardous landfill site or leaving the ash dump as it is. In addition, waste reduction to landfill will save valuable landfill space and assist in increasing the life-span of hazardous landfill sites.

3.5 Sustainable and economic operations

From an economic perspective, the use of clinker for brick making is much less as the production of clinker bricks uses less cement when compared to normal brick production. Bricks made of clinker are much lighter than those of cement, as a result, it is easier to produce more bricks a day and trucks can load more bricks in a single load compared to normal bricks.

4 LEGISLATIVE REQUIREMENTS

This section of the EIA Report discusses applicable legal provisions and the legal context for the Environmental Impact Assessment process. It provides a review of relevant legislation, regulations, policies and guidelines, which are applicable to (or have implications for) the proposed project. The contents of this report are based on a review of the information that was available at the time. The discussion in this chapter is by no means an exhaustive list of the legal obligations of the applicant in respect of environmental management for the Witbank Clinker ash reclaiming project.

4.1 National Legislation

2.1.1 The Constitution of the Republic of South Africa, 1996 (Act 108 of 1996)

The Constitution is the most important piece of legislation that provides a framework for environmental management in South Africa. There are various sections that have implications for environmental management, hence for sustainable development. The Bill of Rights is fundamental to the Constitution of South Africa and in, section 24 of the Act, it is stated that:

"*Everyone has the right-*

- *to an environment that is not harmful to their health or well-being; and*
- *to have the environment protected, for the benefit of present and future generations, thorough reasonable legislative and other measures that-*
    - *prevent pollution and ecological degradation;*
    - *promote conservation; and*
    - *secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development."*

This section of the Constitution provides the framework for the formulation and interpretation of other legislation which control environmental management. The Constitution therefore recognises that the environment is a functional area of concurrent national and provincial legislative competence, and all spheres of government and all organs of state must cooperate with, consult and support one another if the State is to fulfil its constitutional mandate.

2.1.2 National Environmental Management Act, 1998 (Act No. 107 of 1998) (as amended)

The National Environmental Management Act (Act 107 of 1998) generally known as "NEMA" is South Africa's overarching framework for environmental legislation. The NEMA Act sets out

the principles of Integrated Environmental Management (IEM). NEMA aims to promote sustainable development, with wide-ranging implications for national, provincial, and local government. Included amongst the key principles is that all development must be environmentally, economically and socially sustainable and that environmental management must place people and their needs at the forefront, and equitably serve their physical, developmental, psychological, cultural and social interest. Section 2 of NEMA, sets out a range of environmental principles that are to be applied by all organs of state when taking decisions that may significantly affect the environment. Section 24 (as amended), states that the activities that may significantly affect the environment and require authorisation or permission by law must be investigated and assessed prior to approval.

"Environment" is widely defined as "the surroundings within which humans exist and that are made up of- (i) the land, water and atmosphere of the earth; (ii) micro-organisms, plant and animal life; (iii) any part or combination of (i) and (ii) and the interrelationships among and between them; and (iv) the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being".

Section 2 of NEMA provides that all organs of state are required to apply certain principles when undertaking any actions, including the making of decisions that may significantly affect the environment. The key principles (which are quoted in more detail herein below), include the provisions that all "actions" that they approve must be socially, environmentally and economically sustainable, and that "people and their needs" must be at the forefront of "its concern" and their interests must be served equitably. NEMA further states that the public must be actively involved with regard to decisions taken relating to specific identified activities. Public participation is thus an essential part of the development planning process.

Section 28 of NEMA creates a general duty of care on every person, and "person" is very widely defined, to take reasonable measures to prevent significant pollution or degradation of the environment from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment.

Section 23 of NEMA provides *inter alia* that the general objective of integrated environmental management is to identify and employ the modes of environmental management best suited to ensuring that a particular activity is pursued in accordance with the principles in Section 2 of NEMA. This section therefore refers to management plans for construction and operational phases of the project.

Some of the national environmental management principles contained in NEMA that are relevant to this project:

- Environmental management must place people and their needs at the forefront of its concern.
- Development must be socially, environmentally and economically sustainable.
- Sustainable development requires the consideration of all relevant factors including the following:

  (i) that the disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied;

  (ii) that pollution and degradation of the environment are avoided, or, where they cannot be altogether avoided, are minimised and remedied;

  (iii) that the disturbance of landscapes and sites that constitute the nation's cultural heritage is avoided, or where it cannot be altogether avoided, is minimised and remedied;

  (iv) that waste is avoided, or where it cannot be altogether avoided, minimised and re-used or recycled where possible and otherwise disposed of in a responsible manner;

  (v) that the use and exploitation of non-renewable natural resources is responsible and equitable, and takes into account the consequences of the depletion of the resource;

  (vi) that the development, use and exploitation of renewable resources and the ecosystems of which they are part do not exceed the level beyond which their integrity is jeopardised;

  (vii) that a risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions; and

  (viii) that negative impacts on the environment and on people's environmental rights be anticipated and prevented, and where they cannot be altogether prevented, are minimised and remedied.

4.1.1 National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) as amended

A specific environmental management act was promulgated on 10 March 2009 to govern waste management activities. This Act aims to reform the law regulating waste management in order to protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development.

The National Environmental Management Waste Act (Act No. 59 of 2008) establishes institutional arrangements and planning matters; provides for national norms and standards

for regulating the management of waste by all spheres of government; makes provision for specific waste management measures; establishes the procedures for the licensing and control of waste management activities; provides for the remediation of contaminated land; provides for the establishment of the national waste information system; and provides for compliance and enforcement of waste management activities.

Section 16(1) of the Waste Act states that "A holder of waste must, within the holder's power, take all reasonable measures to—

(a) "(a) avoid the generation of waste and where such generation cannot be avoided, to minimise the toxicity and amounts of waste that are generated;

(b) reduce, re-use, recycle and recover waste;

(c) where waste must be disposed of, ensure that the waste is treated and disposed of in an environmentally sound manner;

(d) manage the waste in such a manner that it does not endanger health or the environment or cause a nuisance through noise, odour or visual impacts;

(e) prevent any employee or any person under his or her supervision from contravening this Act; and

(f) prevent the waste from being used for an unauthorised purpose."

Also, section 19(1) of the act gives the minister power to gazette certain activities as "listed waste management activities" for which either a Basic Assessment or an Environmental Impact Assessment must be carried out and an Environmental Authorisation and a Waste Management License issued, before such activities may be undertaken.

2.1.2.1 Specific Waste Management Legislation

The term "*Specific waste management legislation*" refers to a range of specific laws and guidelines that have been formulated with the aim of dealing with various aspects of waste management, and should be considered in conjunction with NEMWA. Some specific Environmental Management Legislation is discussed in the following sections.

- **Minimum requirements for the handling, classification and disposal of hazardous waste**

The minimum requirements for handling, classification and disposal of hazardous waste guideline sets out the waste classification system, in which waste is placed in two classes i.e. general or hazardous. The classification of the waste is based on their inherent toxicological

properties. Hazardous waste, however, is further subdivided based on the risks the waste poses. The requirements for pre-treatment and disposal of hazardous waste are appropriately set in accordance with the waste classification, and are provided for within the guideline document. Hazardous waste prevention and minimisation as well as the handling, transportation and storage is also briefly addressed. Co-disposal of sewage sludge as well as protocols for evaluating downstream uses of waste, sampling, risk-based modelling and risk assessment are included.

- **NEMWA: National Norms and Standards for the Storage of Waste**

The National Norms and Standards for the Storage of Waste was promulgated in terms of the provision stipulated in the NEMWA, and came into effect on the 23 November 201, GN No. 926. The National Norms and Standards for the Storage of Waste aims to regulate both the storage of general and hazardous waste. The schedule provides standards for the location, construction and design as well as the operation of waste management facilities. Furthermore, the schedule provides the minimum requirements for the both above ground and underground waste storage facilities and containers.

4.1.2 National Water Act, (Act No. 36 of 1998) as amended

The National Water Act, 1998 (Act No. 36 of 1998) aims to provide for management of the national water resources in order to achieve sustainable use of water for the benefit of all water users. This act requires that the quality of water resources is protected as well as the integrated management of water resources with the delegation of powers to institutions at the regional or catchment level. The purpose of the Act is to ensure that the nation's water resources are protected, used, developed, conserved and managed in ways which take into account:

- Meeting basic human needs of present and future generations;
- Promoting equitable access to water;
- Redressing the results of past racial discrimination;
- Promoting the efficient, sustainable and beneficial use of water in the public interest; facilitation social and economic development;
- Providing for the growing demand for water use;
- Protecting aquatic and associated ecosystems and their biological diversity;
- Reducing and preventing pollution and degradation of water resources;
- Meeting international obligations;
- Promoting dam safety; and

- Managing floods and drought.

Section 19 of the Act makes provision for the prevention of pollution. A landowner or occupier is responsible for the prevention, control and clean-up of water pollution occurring because of activities on his land. If the responsible person fails undertake remediation (prevention, containment, clean-up), the catchments management agency may take the measures it considers necessary, and recover the costs from the responsible person.

Chapter 4 of the act regulates water use, while Section 21 lists eleven water use types that are regulated [Section 21 (a) – (k)]. Watercourses and wetlands are protected in terms of this section, as both are regarded as water resources. Should there be any wetlands located within 500m of the watercourse or with the flood line, a Water Use Licence Application will be undertaken in terms of this Act.

4.1.3 National Environmental Management: Air Quality Act (No. 39 of 2004)

The main objectives of the National Environmental Management: Air Quality Act, 2004 (NEM:AQA) is generally to give effect to section *24(b)* of the Constitution in order to enhance the quality of ambient air for the sake of securing an environment that is not harmful to the health and well-being of people, and to bring about air quality that is not harmful to the citizen's health.

The NEM:AQA makes provision for the establishment of ambient air quality and emission standards at a national, provincial and local level.

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

The National Environmental Management Biodiversity Act (Act No. 10 of 2004) (NEM:BA) regulates South Africa's laws relating to biodiversity. The overall purpose of the act is:

- The management and conservation of South Africa's biodiversity and it's components;
- The protection of species and ecosystems that warrant national protection;
- The sustainable use of indigenous biological resources;
- The fair and equitable sharing of benefits arising from bioprospecting including indigenous biological resources; and
- The establishment of a South African National Biodiversity Institute.

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

The objective of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) is to introduce an integrated system for the management of national heritage resources. The identification, evaluation and assessment of any cultural heritage site, artefact or find in South Africa is required by this Act.

Section 38(1) of this Act states that: "...any person who intends to undertake a development categorised as...any development or other activity which will change the character of a site-

(i) Exceeding 5 000 m2 in extent; or

(ii) Involving three or more existing erven or subdivisions thereof; or

(iii) Involving three or more erven or divisions which have been consolidated within the past 5 years; or

(iv) The costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;

(v) The rezoning of a site exceeding 10 000m2 in extent; or

(vi) *Any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority, must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development".*

Section 38(3) further states that the responsible heritage resources authority must specify the information to be provided in a report required in terms of subsection (2)(a).

The Act stipulates that cultural heritage resources may not be disturbed without authorisation from the relevant heritage authority. Section 34(1) of the 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…"

4.1.6 eMalahleni Local Municipality (EML) Solid Waste Management By-laws

By-laws are legislations passed by the municipality's Council which are binding to persons who reside within, visiting the area of authority of the municipality or using municipal services. They give effect to the right contained in section 24 of the Constitution by regulating waste management within the area of the municipality's jurisdiction.

The EML waste management by-law's main objectives are among others, to promote and ensure an effective delivery of waste services; enhance sustainable development; and ensure that waste is avoided, or where it cannot be altogether avoided, minimised, re-used, recycled, recovered and disposed of in an environmentally sound manner.

4.2 Other Applicable Environmental Legislation

Other relevant environmental legislation, which must be considered or which is applicable to the maintenance and operation of the transmission line, are summarised below.

Environmental Legislation	Description of Activity
Hazardous Substances Act, 1973 (Act No. 15 of 1973) and relevant Regulations	The storage and/or use of substances which may cause injury or ill-health to or death of human beings by reason of their toxic, corrosive, irritant, strongly sensitizing or flammable nature or the generation of pressure thereby in certain circumstances, and for the control of certain electronic products and radioactive material.
Water Services Act, 108 Of 1997 And Relevant Regulations	The use of water and sanitation services of a water services provider.
Occupational Health and Safety Act (No 85 of 1993)	The Occupational Health and Safety Act (OHSA) provides for the health and safety of persons at work and for the health and safety of persons in connection with the use of plant and machinery; the protection of persons other than persons at work, against hazards to health and safety arising out of or in connection with the activities of persons at work.
National Veld and Forest Fire Act 101 of 1998	Any activities that could result in the start of veld fires.
Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983);	Weeds and the tolerance thereof, which applies in both urban and other areas

5 DESCRIPTION OF THE STUDY AREA

This chapter serves to describe the environmental setting of the area identified whilst the environmental issues that were identified to be of significance are discussed in Chapter 7 of this report. The chapter will also provide a description of the overall character and other sensitivities that were identified in the surrounding environment.

5.1 Temperature

Diurnal and average monthly temperature trends are presented in **Figure 5**. Period average, maximum and minimum temperatures were 17°C, 41°C and -5°C respectively. The months with the highest average temperature was January and February (22°C) while the coldest months were June and July (10°C). Maximum daytime temperatures reached 41°C in August, while the coldest temperature recorded was almost -5 °C in July and August.

Annual average maximum, minimum and mean temperatures for eMalahleni are given as 34.8°C, -1.4°C and 17.5°C, respectively, based on the 2011 to 2014 measured data. Average daily maximum temperatures range from 25.5°C in October to 13.3°C in July, with daily minima ranging from 17.4°C in January to 3.7°C in June.

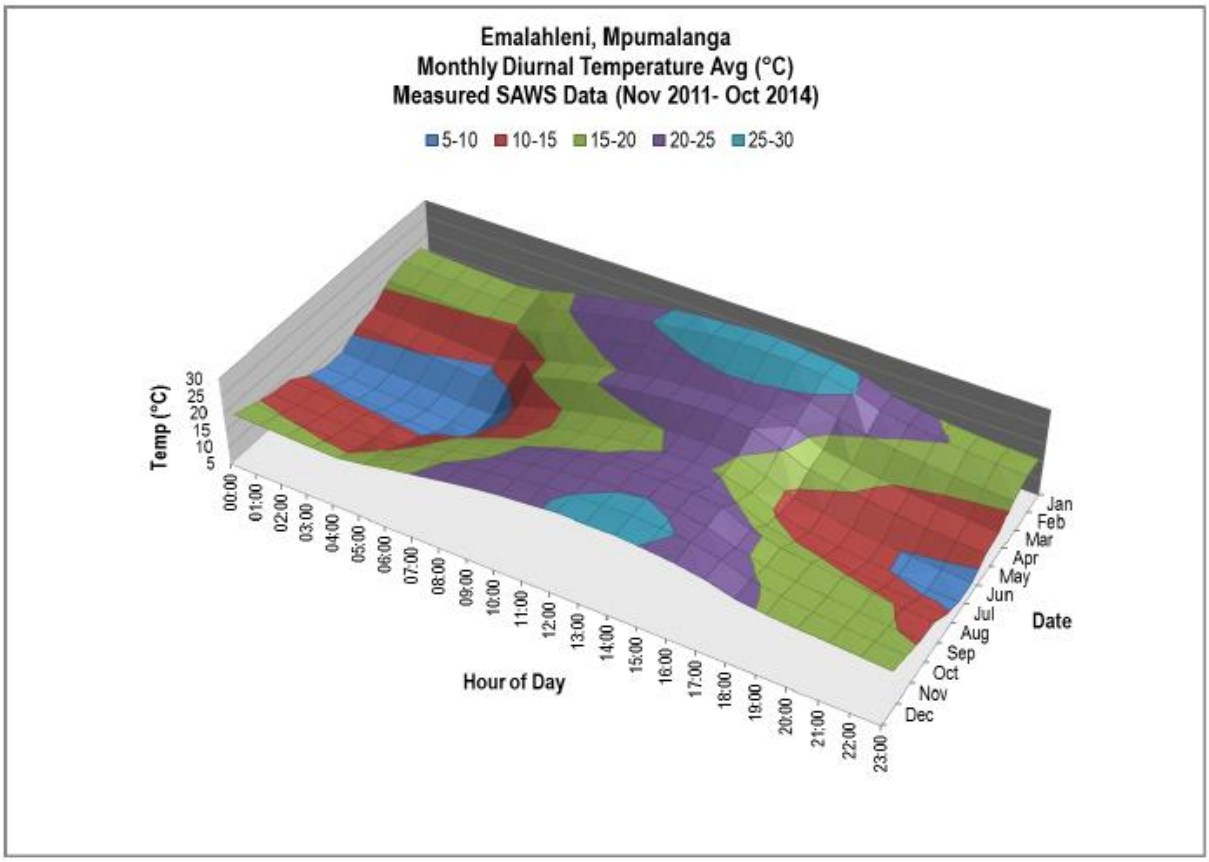
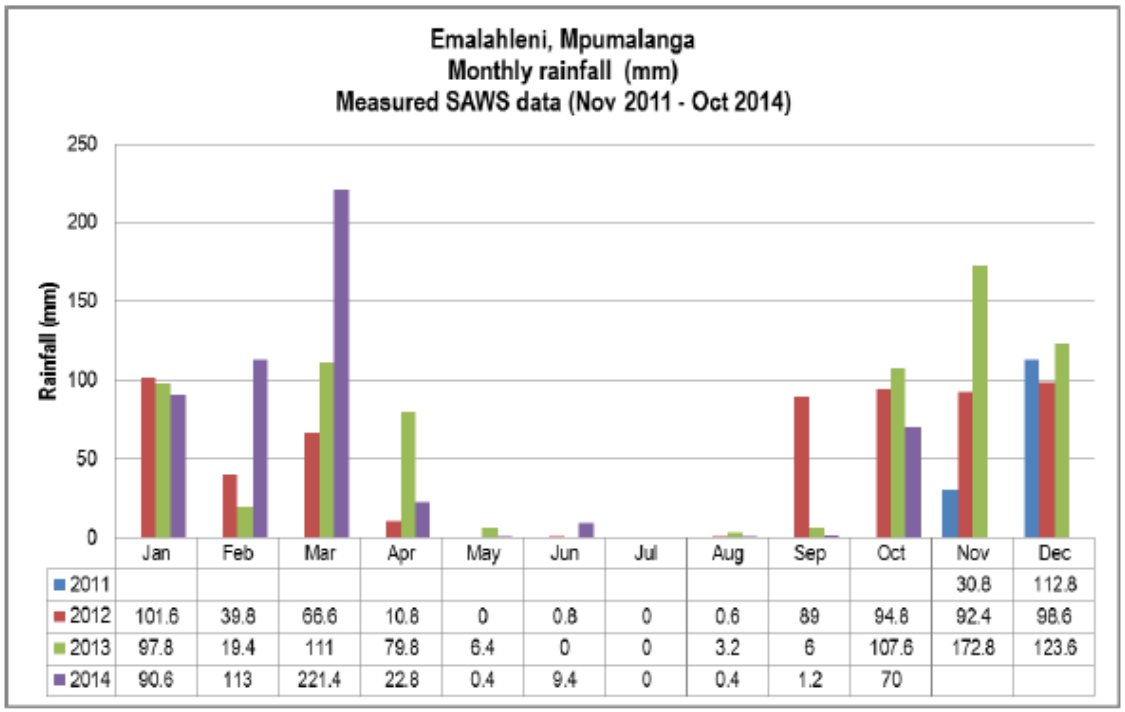


Figure 5: Diurnal temperature profile (SAWS eMalahleni data, 2011 - 2014)

5.2 Rainfall

Monthly rainfall as obtained from SAWS Springs data is presented in **Figure 6**. Months wherein the most rain occurred stretched from October to April. The most rain was received during the months of December for 2011 and 2013 and December and January for 2012.



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2011											30.8	112.8
2012	101.6	39.8	66.6	10.8	0	0.8	0	0.6	89	94.8	92.4	98.6
2013	97.8	19.4	111	79.8	6.4	0	0	3.2	6	107.6	172.8	123.6
2014	90.6	113	221.4	22.8	0.4	9.4	0	0.4	1.2	70		

Figure 6: Monthly rainfall (SAWS eMalahleni data, 2011 - 2014)

5.3 Topography and drainage

The ash facility is located towards the upper portion of a broad, low-gradient plateau described in the South African Atlas of Agrohydrology and Climatology as having moderate relief comprising plains and pans. The dominant slope form is both concave and convex, with low-medium drainage density (0-2km/km2) and stream frequency (0-6 streams/km2). Over 80% of the surface area in this morphological type has a surface gradient <5°.

The site is approximately 1600m above mean sea level (amsl) with a peak spot height on the ash facility at 1650.2m amsl. The underlying natural topography has an approximate gradient of 1° (1:57.5) towards the southwest (i.e. essentially neutral aspect).

Overland flow over significant distances is unlikely to occur due to the shallow regional topographic gradient. During heavy rainfall, however, run-off originating from the ash facility most likely follows topography to the north westerly and southerly direction.

Subsiding ground which has resulted in a non-perennial water body is located one kilometre due south of the facility.

5.4 Geology and Soils

5.4.1 Understanding of the underground mine

A geotechnical study was conducted for the ash dump by D.S. Minney CC in November 2016. The study was conducted to understand the positioning of the dump and the proposed access road over old Coal mine workings. The geologist used an underground plan indicating the extent and disposition of the mine workings to discern the detail of the mine workings. The plan was obtained from South32, the responsible owners of the defunct Witbank Colliery. The plan is indicating in **Figure 7** below.

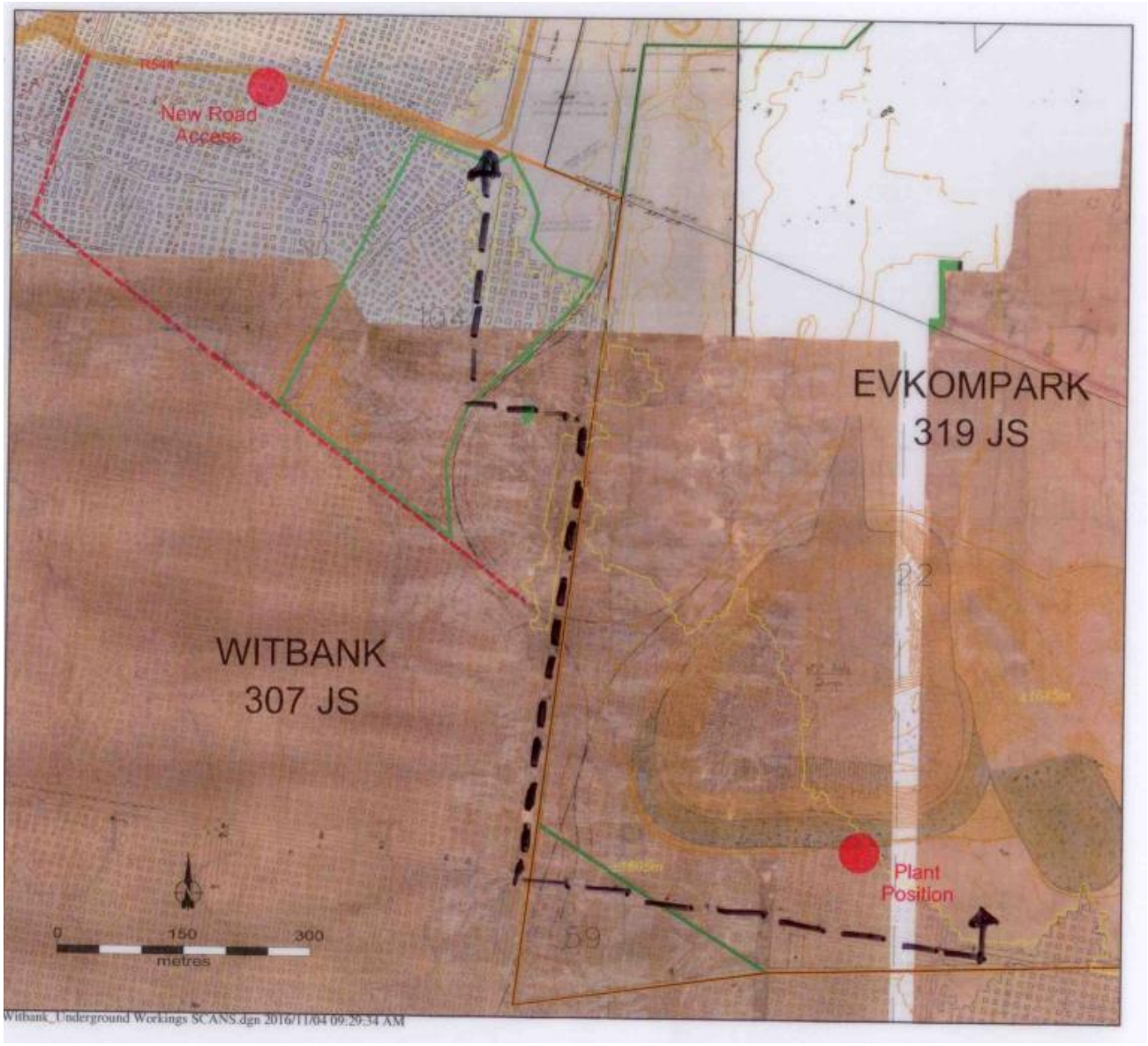


Figure 7: Plan indicating workings of the underground mine

The following information about the underground mine is drawn from the above mentioned plan:

- From the plan it was ascertained that the pillars centres were 8.1m, with pillar widths of 3.5m, approximately square while the bords were 4.6m wide. An aerial (plan view) extraction rate of 81%, that exceeds current best practise (<75%) for bord and pillar layouts.
- A possible mining depth of 117 feet (39m) is indicated in the absence of any geological borehole data.
- An 81% extraction is indicated for this portion.

- It is also noted that the tar road (indicated as the R544) also passes over these workings.
- Most Recent underground mining activity took place in 1948
- These workings occur in a more regular geometrical pattern and provide some long pillars within in the layout. These pillars provide the best surface positions for the access road.
- From the plan, these workings were mined on a 12m (40 feet) centres, with 6.4m wide bords and 5.6m square pillars, indicating a slightly more conservative areal extraction rate of 78.2% (see **table 4** below).

Table 5: Mine workings obtained from the underground mine plan provide by South 32

Date	Depth	Centres m	Bord width m	Pillar width m	Mining height	% Extraction	FOS	H:W Ratio
1916	39m	8.1m	4.6m	3.5m	3.0m	81.0%	3.2 SM 1967 2.5vdM 2003	1:1.2
1948	30m	12.0m	6.4m	5.6m	3.0m	78.2%	7.8 SM 1967 6.7 vdM 2003	1:1.9

SM refers to the Salamon and Munro calculation method, **vdM r**efers to vd Merwe method 2003.

Modern designs do not exceed 75% extraction, with a H:W ratio exceeding 1:2.5; so it can be seen that the old mine design does not comply to current good practice.

5.4.2 Stability of the site

The geologist visited the Witbank Golf Course visited and held a meeting held with the management and staff to ascertain if any collapses have occurred within their property. According to his observations, there is evidence of subsidence on the 12th hole as depicted in **Figure 8** below.

Figure 8: View looking east, towards the 12th Tee, depicting an undulating surface profile, possibly includes both pillars and bords.

Settlement of between 1.0m to 1.5m below natural ground level has occurred. This area was undermined in 1913. The good news from the Golf Course observations indicates that the subsidence was “gentle and controlled”, with no catastrophic sink holes.

The geotechnical study further indicates that despite the provincial road being positioned on an oldest part of the underground workings, it is incumbent on all parties concerned to position any access road on that part of the workings posing the minimum risk of a bord collapse (sinkhole) or a pillar collapse (general subsidence), providing access to the provincial road is acceptable to the roads authority. The possible threats to the stability of any surface infrastructure over undermined ground are:

- Intersection failure (this is where 4 excavations intersect to create the largest span). This creates a sinkhole if it reaches surface. A mitigating factor to this type of failure is that it occurs relatively slowly and the failed material bulks, going from an insitu density of 2.5t/m3 to approximately 1.8t/m3.
- Pillar(s) fail. It is unusual for a single pillar to fail and they fail as a group and this is a sudden, dynamic event with no bulking of the material. The subsidence is a function of the void created by the mining.

According to information obtained by the Geologist, South32 have dewatered the workings below the area of interest. This is good information with regard to the stability of failed material as it is less likely to slump or be washed away, i.e., the workings fail towards stability. The geologist concludes by stating that from the evidence currently available, the area of interest, although being undermined is probably stable for construction of an access road.

5.4.3 Soils

Witbank is located in Soil Zone 9 of the Broad Natural Homogeneous Soil Zone Regions. Typically, this soil ranges in depth from 750-1000mm and comprises 10% or less rocky within a clayey, silty, sandy or loamy matrix. Soil forms present typically include Hutton (45%), Avalon (35%), Mispah (10%) and Clovelly (10%). Permeabilities can be expected to range from 10-5 to 10-6m/s.

Soils are regarded as having a slow drainage rate index. Soil water stress is high year-round at 50-60% of days in January and >90% in July. Residual soils are likely to have deeply weathered profiles due to low topographic gradients with low transportation potentials.

5.5 Archaeological Features

According to the Heritage Impact Assessment study conducted by Mbviseni Sustainable Environmental Management Initiative (MSEI) (2016), there are several buildings and structures older than 60 years, which are on record in the project area. The recorded historical buildings are still used by Eskom within the project area. Clinker Supplies intends to preserve the structures *in situ* and use them for their various functions such as site offices, etc. The study further indicates that no sites, features or objects of cultural heritage significance are found on site. The proposed development lies on disturbed ground that is within a highly industrialized zone. Desktop research intimated that the rich history and archaeology of the general area prior to several industrial and residential developments after the mid-20th century but field surveys on and around the proposed area did not yield any heritage material. The potential for chance finds, still remains and the developer and his contractors are advised to be diligent and observant during construction of the land site. The specialist recommend that if archaeological sites or graves are exposed during development activities, it should immediately be reported to a museum, preferably one at which an archaeologist is available, so that an investigation and evaluation of the finds can be made.

5.6 Land Use

The study area is situated within the industrial to light industrial areas of Emalahleni Local Municipality and the surrounding land. Eskom Park is situated to the north and residential areas to the east of the study area. The ash dump site is in very close proximity to residential

areas, which are less than 100 m away. The Witbank Golf Club is also situated to the north of the study area. Land use the south and west of the study area is mostly utilised for agriculture more specifically crop cultivation. Price road runs between the study area and the Witbank Golf Club. The R544 runs to the west of the study area and the N4 is situated approximately 400 meters to the north of the study area (**Figure 9 and 10**). Currently the area is transformed by existing tar and / or gravel / dirt roads, mining industries, buildings and storage stock piles. As a result, the proposed road development and area for infrastructure development constituting the project area has experienced severe habitat transformation.

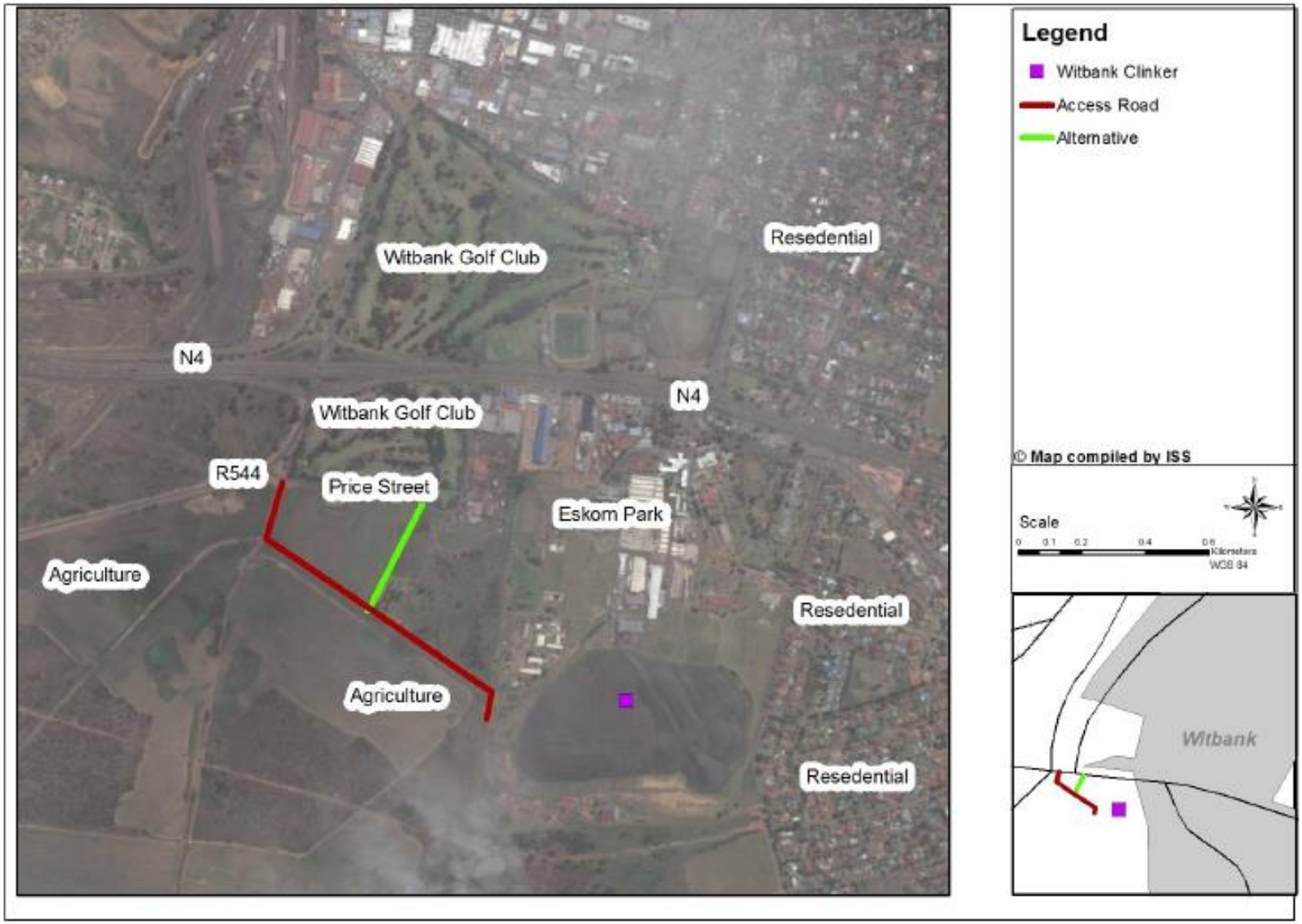


Figure 9: Land uses surrounding the study area (Google Earth image, 2016)

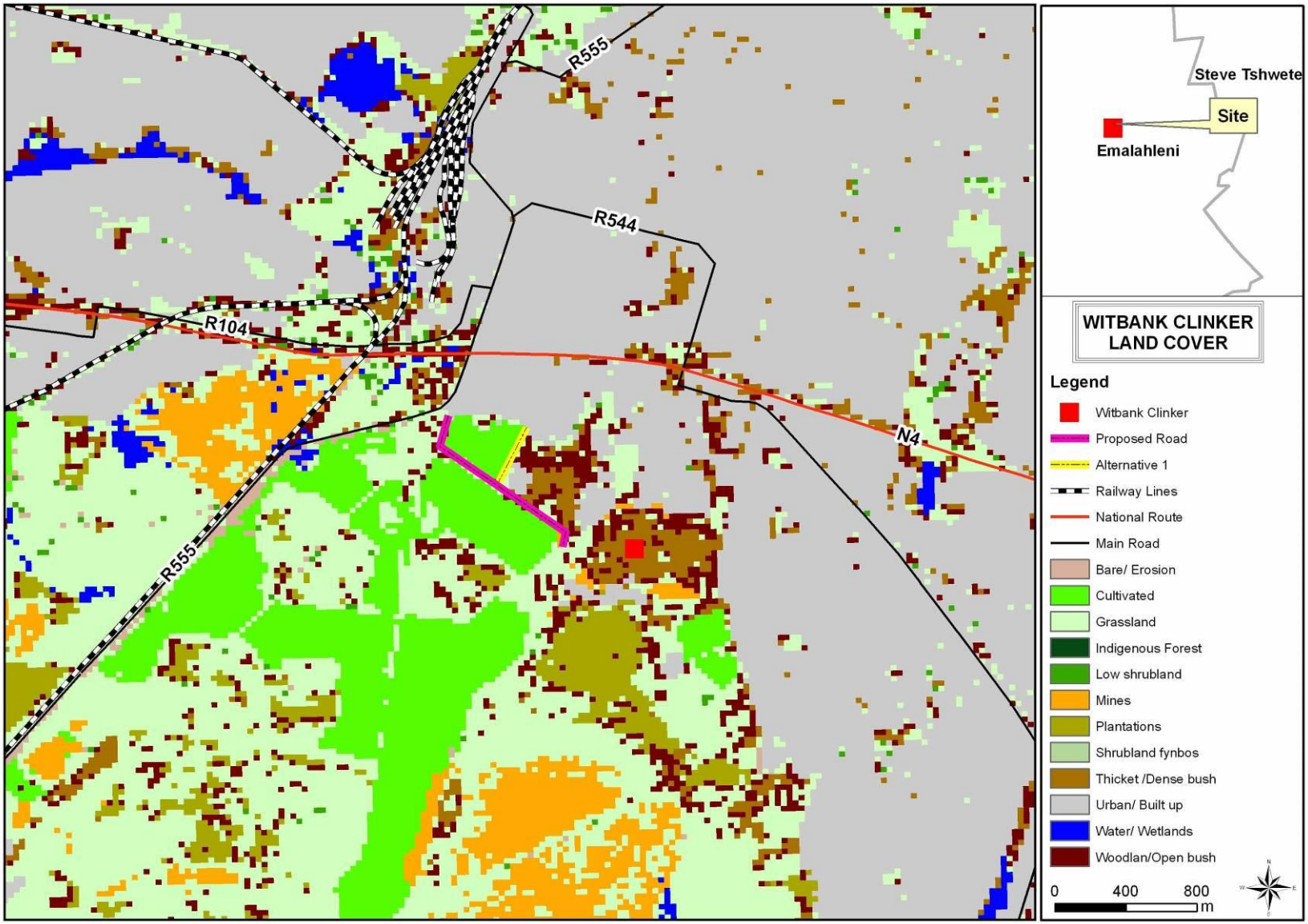


Figure 10: Land cover map showing the site and surrounding area

5.7 Expected Vegetation

The study area is situated in the Grassland Biome. The Grassland Biome experience summer rainfall and dry winters with frost (and fire), which are unfavourable to tree growth. Therefore, grasslands comprise mainly of grasses and plants with perennial underground storage organs, for example bulbs and tubers and suffrutex species. In some grassland areas, the surface topography (e.g. rocky hills and protected valleys) creates habitats that are favourable to shrublands and trees (Mucina & Rutherford, 2006). Generally, the higher the surface rock cover, the higher the occurrence of woody vegetation such as trees and shrubs, relative to herbaceous vegetation (Mucina & Rutherford, 2006). The Grassland Biome comprises a number of vegetation types of which one (1) is traversed by the proposed study area (Mucina & Rutherford, 2006) (**Table 6**).

Table 6: Summary of the regional vegetation types traversed by the proposed study area (adapted from Mucina & Rutherford, 2006)

Biome	Vegetation Type	Description	Conservation Status (Mucina & Rutherford, 2006)	Threatened Ecosystems Status (RSA 2011)
Grassland	Eastern Highveld Grassland (Gm 12)	The Eastern Highveld Grassland (Gm12) is dominated by Highveld grasses (*Aristida, Digitaria, Eragrostis, Themeda, Tristachya*) with small, scattered rocky outcrops with wiry, sour grasses and some woody species (*Senegalia caffra, Celtis africana, Diospyros lycioides subsp lycioides, Parinari capensis, Protea caffra, P. welwitschii* and *Searsia magalismontanum*). Almost half (44%) of the land has been transformed primarily by cultivation, plantations, mines, urbanisation and building of dams	Endangered	Vulnerable

The grassland biome is under severe threat from urbanisation, industrialisation, mining and agriculture, especially in Gauteng and Mpumalanga. The vegetation assessment therefore aimed to determine the state of the grassland vegetation along the proposed route to determine how much of the vegetation is still in a largely natural condition that should be regarded as sensitive.

5.7.1 Provincial Biodiversity Conservation Planning Initiatives: MBCP and MBSP

According to the Mpumalanga Biodiversity Conservation Plan (MBCP), the study area transverses both *natural area remaining* as well as *least concern* categories of the MBCP

(Ferrar & Lötter, 2007; **Figure 11**). According to the Mpumalanga Parks and Tourism Agency developed the Mpumalanga Biodiversity Sector Plan (MBSP), the study areas transverses two categories namely, heavily or moderately modified areas as well as other natural areas (MTPA 2014). The study area has therefore not been earmarked to reach any conservation targets for the Mpumalanga Province (Ferrar & Lötter, 2007 and MTPA, 2014; **Figure 12**).

Figure 11: The study area in relation to the Mpumalanga Biodiversity Conservation Plan (Ferrar & Lötter, 2007)

Figure 12: The study area in relation to the Mpumalanga Biodiversity Sector Plan (MTPA, 2014)

5.8 Fauna Habitat Types

According to the faunal assessment study conducted for the site by Classical Environmental Management Services (2016), two types of faunal habitat were observed and grouped according to type, i.e. Hydrophillic Vegetation and Disturbed Grassland (**Figure 13**).

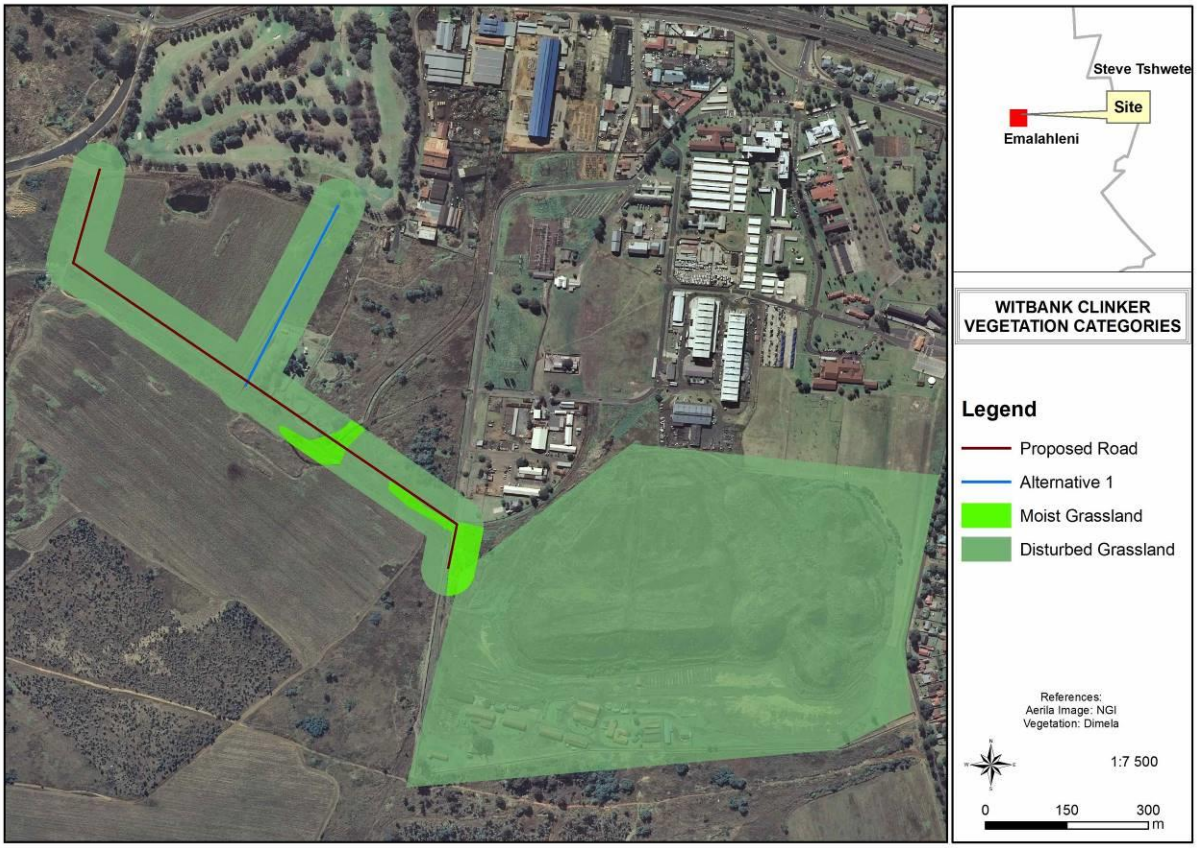


Figure 13: Fauna Vegetation Assessment

5.8.1 Hydrophillic Vegetation

The project area does not contain any rivers or wetlands but small pockets of hydrophilic vegetation occur along the proposed entrance road (Photographs in **Figure 14 and 15**). These are likely man made areas that accumulate and retain some water during the wet season. These small pockets are not viable in terms of providing ecological areas for fauna species and are considered of low importance.

Figure 14: Photo indicating Hydrophilic vegetation found along the proposed access route

Figure 15: Photo indicating Hydrophilic vegetation found within the study area alongside the ash dump

5.8.2 Disturbed Grassland

Disturbed areas include areas that are urbanised, industrialised, mined or cultivated for crops or other agricultural practises (GDARD, 2012), i.e. vegetation that is different in species composition and or structure than an area of untransformed vegetation/the perceived natural state. However, in these transformed areas biodiversity and hydrological linkages may continue to function and this includes fauna species.

The entire study area is comprised of disturbed grassland areas that have undergone severe transformation and are not representative of a vegetation type (**Figure 16 and 17**). These areas hold little value in terms of ecological importance for fauna species especially those of conservation concern. Fauna species that are common and hardy may utilise these areas for minimal foraging and as distribution corridors to more suitable areas.

However, the study area is fenced in which additionally reserves the use of the site to small fauna species.

Figure 16: Photo showing disturbed grassland found along the proposed access route

Figure 17: Photo showing disturbed grassland found within study area

5.9 Hydrology and Landscape

The position of hydrological features were obtained from the National Freshwater Ecosystem Priority Area (NFEPA) data. Existing spatial layers indicated that there are no hydrological features within the study area. No wetland areas or rivers are located within the study area but a small non-perennial river is located to the North West. There are also wetlands to the south as well as the east of the study area (**Figure 18**).

The ash dump is located in the Upper Olifants catchment, which is approximately 15 158 km^2 and falls within the B11K Quaternary catchment under the larger Olifants Water Management Area (WMA 4).This catchment falls within the Limpopo River Basin, which is shared by South Africa, Botswana, Zimbabwe and Mozambique.

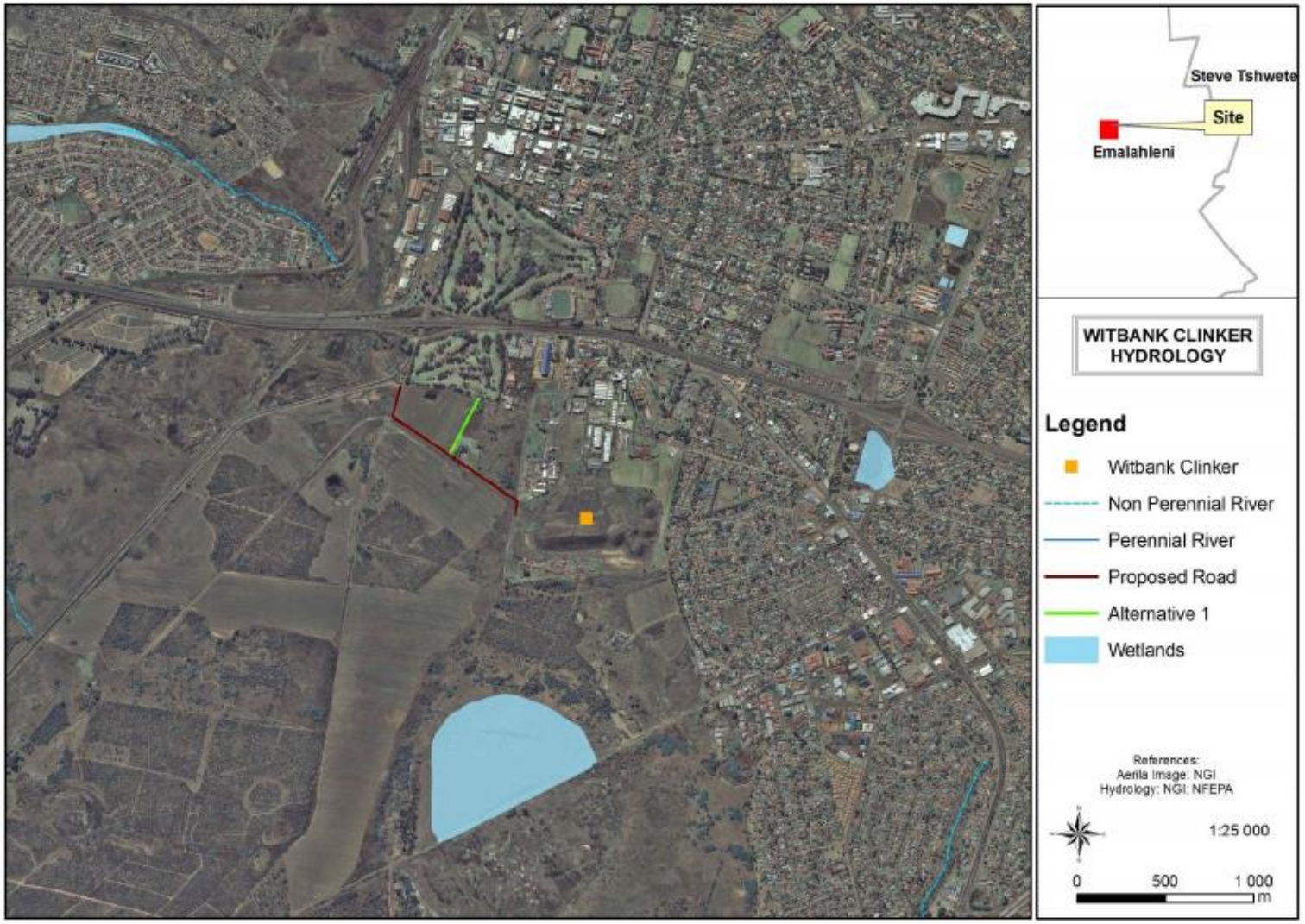


Figure 18: Hydrology of the study area

5.10 Environmental Noise

Noise is defined as an undesired/ unpleasant or unwanted sound, which may have a damaging effect on human hearing mechanisms if noise exposure is excessive.

Noise or unwanted sound is one of the most widely and frequently experienced problems of an environment surrounded by industrial activities. It can be annoying, interfere with communication, cause fatigue, and reduce work efficiency. Annoyance is in general a negative reaction of the community or person to a condition, which threatens the general wellbeing, either by creating displeasure and/ or interference with specific activities.

Ambient sound level measurements were undertaken at various positions on the site and at surrounding offsite locations. Noise measurements were taken on the 24th of June 2016 during the daytime and night-time respectively, with daytime commencing at 06:00 and ending at 22:00 and night-time commencing at 22:00 and ending at 06:00 as prescribed in SANS 10103:2008 - The measurement and rating of environmental noise with respect to annoyance and to speech communication.

Measurements were carried out at four locations, for each point as described below. These locations were chosen for the following reasons:

- Sensitive receptors identified;
- Most likely to continue to exist until decommissioning of the site;
- Easily identifiable and with easy access in case of need for future measurements;
- In close proximity to any affected residences; and
- On the roads most likely to be affected by future traffic noise changes.

All sound level measurement procedures were undertaken according to the relevant South African Code of Practice SANS 10103:2008. This included; selection of monitoring locations, microphone positioning, and equipment specifications among others. Sound level measurements were taken with an SABS-calibrated Type 1 Integrating Sound Level Meter.

The monitoring points are indicated in the figure below; the monitoring points are labelled from WD01 – WD04.

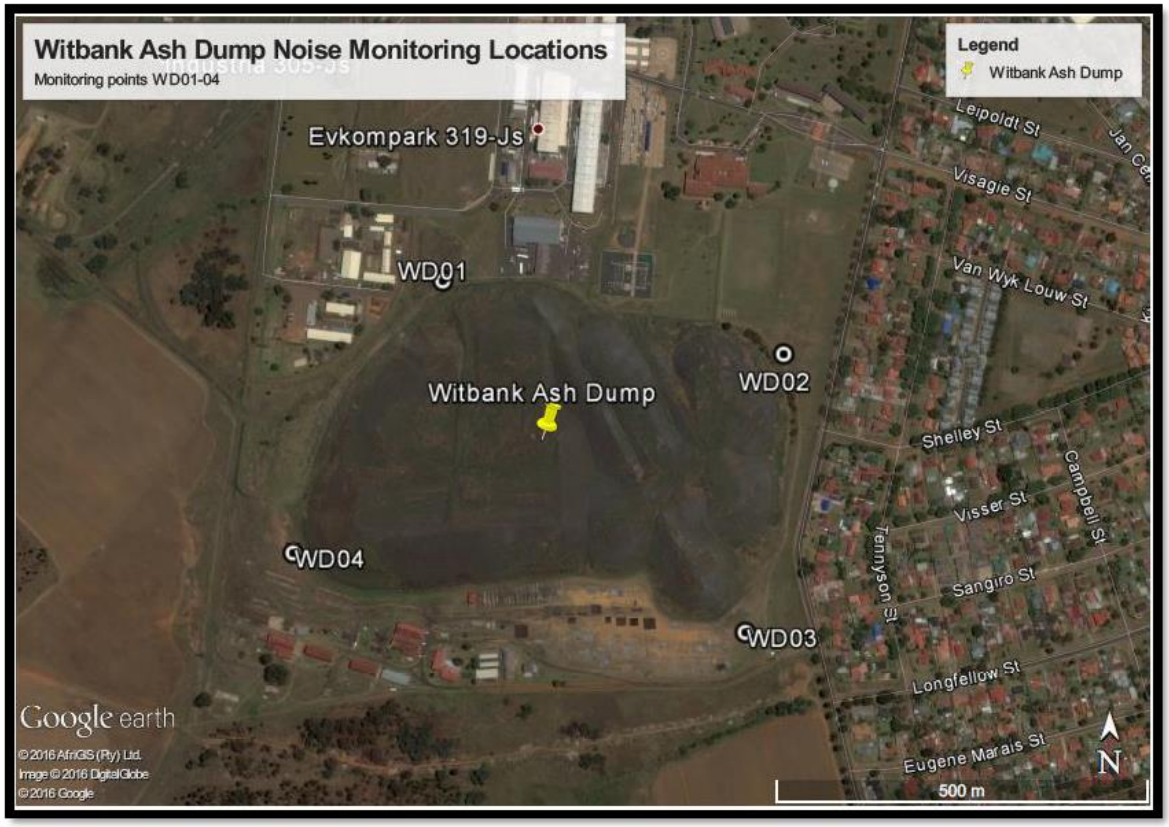


Figure 19: Witbank Ash Dump noise measurement points

The risk of negative reaction escalates with increasing noise levels and duration of noise exposure. It also depends on the characteristic of the offending sound (therefore referred to as noise), such as its frequency and whether it is impulsive or continuous. Over and above these mentioned above, it should be noted that some individuals are more susceptible to noise Based on the day and night-time results from the baseline environmental noise measurements undertaken by Eco Elementum (Pty) Ltd (June, 2016), it is noted that the A-weighted equivalent sound pressure levels (LAeq level) at day and night at almost all the locations measured above the SANS guidelines for the maximum allowable outdoor night-time parameters for ambient noise in industrial and urban districts (**Table 7**). Only at WD02 was the daytime measurement slightly below the limit and at WD04 was the night-time measurement slightly below the standard.

Table 7: Results of the ambient noise measurements

Witbank Ash Dump Baseline Noise Measurements						
Reference	**Location** Description	**Day time/ Night time**	**Acceptable rating level dB(A)**	**Results Leq**	**Time**	**Comments**
WD01	North West Boundary	D	70	70.4	12:56	Higher than standard
		N	60	64.2	05:26	Higher than standard
WD02	North East Boundary	D	70	69.5	13:05	Acceptable

		N	60	62.1	05:34	Higher than standard
WD03	South East Boundary	D	70	72.3	13:11	Higher than standard
		N	60	61.4	05:42	Higher than standard
WD04	South West Boundary	D	70	73.4	13:20	Higher than standard
		N	60	59.6	05:54	Acceptable

Based on the day and night-time results from the baseline environmental noise measurements it is noted that the LAeq levels at day and night at almost all the locations measured above the SANS guidelines for the maximum allowable outdoor night-time parameters for ambient noise in industrial and urban districts. Only at WD02 was the daytime measurement slightly below the limit and at WD04 was the night-time measurement slightly below the standard.

The noise specialist indicate that it should however be noted that the measurements taken is only applicable to the time and date which sampling was undertaken and that results would differ as more measurements are taken. Therefore, the importance of ensuring a monitoring programme to be implemented during the operation of the proposed project. The results that measured too high were also only slightly above the allowable limits and are not unique to character of the surrounding environment from previous sampling Eco Elementum (Pty) Ltd have undertaken in the region over the past 10 years.

Various noise influencing factors and sources exists in the region including;

- The N4 highway and supporting regional roads
- General vehicle noise on auxiliary roads in close proximity to the site
- Mining in the region
- Other industrial activities resulting in noise being generated

The noise sources that were audible during the ambient measurements at the time of the noise survey and that were responsible for the day/night time level are summarised in the table below.

Table 8: Summary of noise sources influencing ambient noise levels at noise sensitive receivers around the proposed site

Noise Source Descriptions			
Daytime	**Exposure**	**Night Time**	**Exposure**
Mining activities	Intermittent	Mining activities	Intermittent
Domestic animals - dogs	Intermittent	Domestic animals - dogs	Intermittent

Vehicle movement on main and auxiliary roads in close proximity to the study area	Continuous	Vehicle movement on main and auxiliary roads in close proximity to the study area	Continuous
Birdsong	Continuous	Birdsong	Limited to dusk and dawn

The ambient noise levels emitted were primarily due to the **main and auxiliary roads in close proximity to the study area**.

- Almost all of the noise measurements sampling points was above the allowable limit as per SANS 10103:2008, although it only transgressed slightly.

5.11 Traffic

For the purpose of this project, the appointed Traffic Impact Assessment specialist, Malani Padayachee & Associates (MPA) (Pty) Ltd conducted traffic analysis study for the proposed development. Eight nearby intersections were analysed using SIDRA Intersection 7.0 software for a better understanding of the existing scenario. These intersections were analysed (also see **Figure 19**):

- C1: Walter Sisulu Dr-Price St.
- C2A: Walter Sisulu Dr-N4
- C2B: Walter Sisulu Dr-N4
- C3: Walter Sisulu Dr-Colliery St.
- C4: Jellico St.-Van der Byl St.
- C5: Langenhoven St.-Watermeyer St.
- C6: Langenhoven St.-Visagie St.
- C7: Langenhoven St.-Sherly St.
- C8: Langenhoven St.-Longfellow St.

Figure 20: Labelled Surrounding Road Network

The following tables show the AM and PM SIDRA Results for the AM and PM analysis of the existing traffic with the existing intersection layouts.

Table 9: 2016 AM Original Traffic Volumes; Existing Layout

Original 2015 AM SIDRA Results										
Peak	ID	Intersection	OPERATIONAL CONDITIONS							
				Approach				Intersection		
			Approach	Demand	V/C	Delay	LOS	V/C	Delay	LOS
AM	C1	Walter Sisulu-Price	South	610	0.24	2	A	**0.35**	18	B
			East	247	1.00	96	F			
			North	609	0.21	3	A			
			West							
	C2A	Walter Sisulu-N4 (Southern Terminal)	South	643	0.331	1	A	**1.25**	640	F
			East	253	6.339	4951	F			
			North	1069	0.60	6	A			
			West							
	C2B	Walter Sisulu-N4 (Northern terminal)	South	769	0.429	1	A	**5.56**	868	F
			East							
			North	1176	0.54	2	A			
			West	1273	13.31	2193	F			
	C3	Walter Sisulu-Colliery (Signalised)	South	1737	1.05	103	F	**0.83**	69	E
			East							
			North	749	0.55	13	B			
			West	507	0.49	34	C			
	C4	Jellico-Van der Byl (Signalised)	South	33	0.05	26	C	**0.94**	157	F
			East	1194	1.32	331	F			
			North	1085	0.64	13	B			
			West	367	0.66	34	C			
	C5	Langenhoven-Watermeyer (Signalised)	South	434	1.124	174	F	**0.96**	133	F
			East	837	1.289	308	F			
			North	3	0.02	38	D			
			West	1382	0.71	14	B			
	C6	Langenhoven-Visagie	South	475	0.806	32	D	**0.71**	30	D
			East	147	0.644	48	E			
			North	435	0.65	21	C			
			West	25	0.17	35	D			
	C7	Langenhoven-Sherly	South	455	0.245	0	A	**0.22**	1	A
			East	47	0.083	12	B			
			North	365	0.20	1	A			
			West							
	C8	Langenhoven-Longfellow	South	443	0.236	0	A	**0.21**	1	A
			East	37	0.069	13	B			
			North	358	0.19	0	A			
			West							

It should be noted that traffic officers were undertaking point-duty at both the N4 terminals and during the AM peak the N4 eastbound off ramp was backed up onto the N4 for a significant length of queue. This means that the volumes observed were the volumes measured actually being processed. The V/C indicates that especially for the N4 terminals the demand is significantly higher.

These pointsmen were also on duty during the afternoon peak. The results show similar high demands for the off-ramps as the points-men are favouring the high right turn from the north at the southern terminal (C2A). The V/C noted was of the same order of magnitude as during the AM peak.

Table 10:

Original 2015 PM SIDRA Results										
Peak	ID	Intersection	OPERATIONAL CONDITIONS							
				Approach				Intersection		
			Approach	Demand	V/C	Delay	LOS	V/C	Delay	LOS
PM	C1	Walter Sisulu-Price	South	692	0.33	5	A	**0.98**	468	F
			East	366	3.42	2240	F			
			North	702	0.36	1	A			
			West							
	C2A	Walter Sisulu-N4 (Southern Terminal)	South	815	0.445	2	A	**1.38**	713	F
			East	233	7.951	6443	F			
			North	1069	0.67	7	A			
			West							
	C2B	Walter Sisulu-N4 (Northern terminal)	South	832	1.509	319	F	**5.99**	675	F
			East							
			North	1624	0.78	1	A			
			West	908	19.41	2206	F			
	C3	Walter Sisulu-Colliery (Signalised)	South	1522	1.05	101	F	**0.93**	73	E
			East							
			North	1400	0.97	55	D			
			West	412	0.37	29	C			
	C4	Jellico-Van der Byl (Signalised)	South	114	0.16	26	C	**0.72**	21	C
			East	798	0.80	31	C			
			North	1065	0.75	10	A			
			West	319	0.62	35	D			
	C5	Langenhoven-Watermeyer (Signalised)	South	414	0.699	30	C	**0.55**	14	B
			East	509	0.298	14	B			
			North	16	0.10	40	D			
			West	1178	0.61	9	A			
	C6	Langenhoven-Visagie	South	374	0.72	26	D	**0.69**	44	E
			East	22	0.139	33	D			
			North	437	0.62	19	C			
			West	108	0.99	205	F			
	C7	Langenhoven-Sherly	South	342	0.187	1	A	**0.21**	1	A
			East	49	0.094	12	B			
			North	433	0.24	0	A			
			West							
	C8	Langenhoven-Longfellow	South	348	0.19	1	A	**0.21**	1	A
			East	34	0.052	11	B			
			North	424	0.23	1	A			
			West							

C1- Walter Sisulu Dr. and Price St.

This is a priority controlled junction that operates at LOS B during the morning and LOS F during the afternoon. This is probably because C4 has such high traffic volumes and therefor Price Street is being used as an alternative.

C2a- Walter Sisulu Dr. and N4W (Southern Terminal)

This is a priority controlled intersection that operates at a LOS F during the morning and afternoon peak hours. Currently a traffic points-man controls the intersection during the peak hour.

C2b- Walter Sisulu Dr. and N4E (Northern Terminal)

This is a priority controlled intersection that operates at a LOS F during the morning and afternoon peak hours. Currently a traffic points-man controls the intersection during the peak hour.

C3- Walter Sisulu Dr. and Colliery St.

This is a signalised intersection that operates at a LOS E during the morning and afternoon peak hours.

C4- Jellico St. and Van der Byl St.

This is a signalised intersection that operates at a LOS F during the morning and afternoon peak hours. The Jellico Street N4-underpass causes a bottleneck at this intersection. Upgrades to this intersection will not be sufficiently effective unless the capacity restraint caused by the width of the underpass is relieved.

C5- Langenhoven St. and Watermeyer St.

This is a signalised intersection that operates at a LOS F during the morning period due to the high volumes of vehicles on Langenhoven St. the intersection has an acceptable LOS B during the afternoon peak hours..

C6- Langenhoven St. and Visagie St.

This is a priority controlled intersection (4-way stop) that operates at an unsatisfactory LOS E during the afternoon peak hour.

C7- Langenhoven St. and Sherly St.

This is a priority controlled junction (stop line on Sherly St.) that operates at a satisfactory LOS A during the morning and afternoon peak hours.

C8- Langenhoven St. and Longfellow St.

This is a priority controlled junction (stop line on Longfellow St.) that operates at a satisfactory LOS A during the morning and afternoon peak hours.

According to Malani Padayachee & Associates, all of the intersections that provide crossings over or under the N4 are currently operating at an unacceptable level of service. These crossings are also limited by their current structural designs and road width. Upgrading any of the nearby intersections may have a limited effect because of the bottlenecks caused at the N4 crossings. The nearby crossings are shown in the following diagrams below **(Figure 20 and 21)**.

Figure 21: N4/Walter Sisulu Interchange

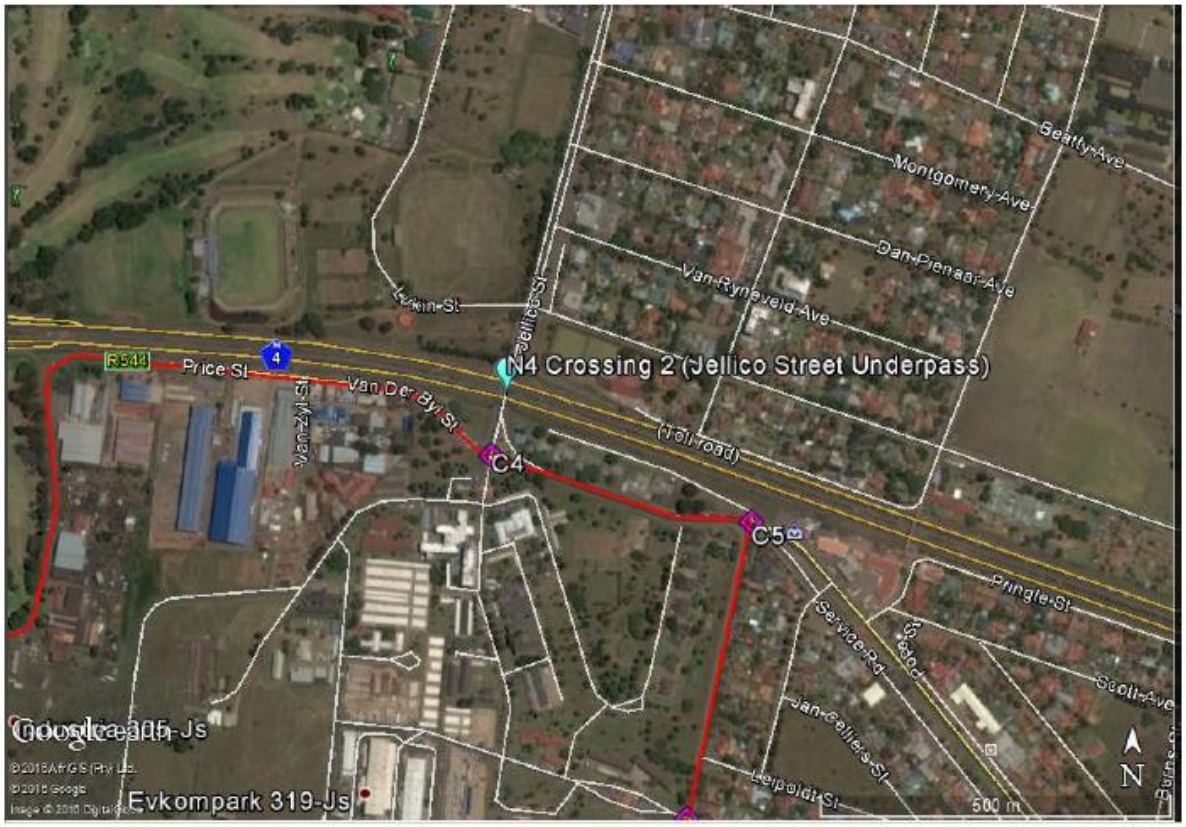


Figure 22: Jellico Street N4 Underpass

The Traffic specialist indicates that even with just the current traffic, additional N4 crossings and/or widened existing capacity needs to be provided if these capacity problems are to be solved. However, this is an existing problem and is considered to be outside the detailed scope of the traffic impact assessment for this development. The development traffic at C4 and C5 will not significantly worsen this problem.

The intersections significantly affected by the N4 limited crossings are:

- C2a: Walter Sisulu Drive and the N4W
- C2b: Walter Sisulu Drive and N4E
- C4: Jellico Street and Van der Byl Street

The only other intersection that operates at an unsatisfactory LoS is the intersection of C6-Langenhoven and Visagie Street. If this intersection is changed to a two-way priority controlled intersection then it will operate at an acceptable level of service. The north-south direction would be the major road (Langenhoven Street).

5.11.1 Existing Observations- Google Traffic

Some of the intersections surrounding the N4 near Walter Sisulu Drive can already be seen to operate near or over capacity as shown in the following Google Maps Typical Traffic Images. The 17: 00 PM Peak traffic was viewed.

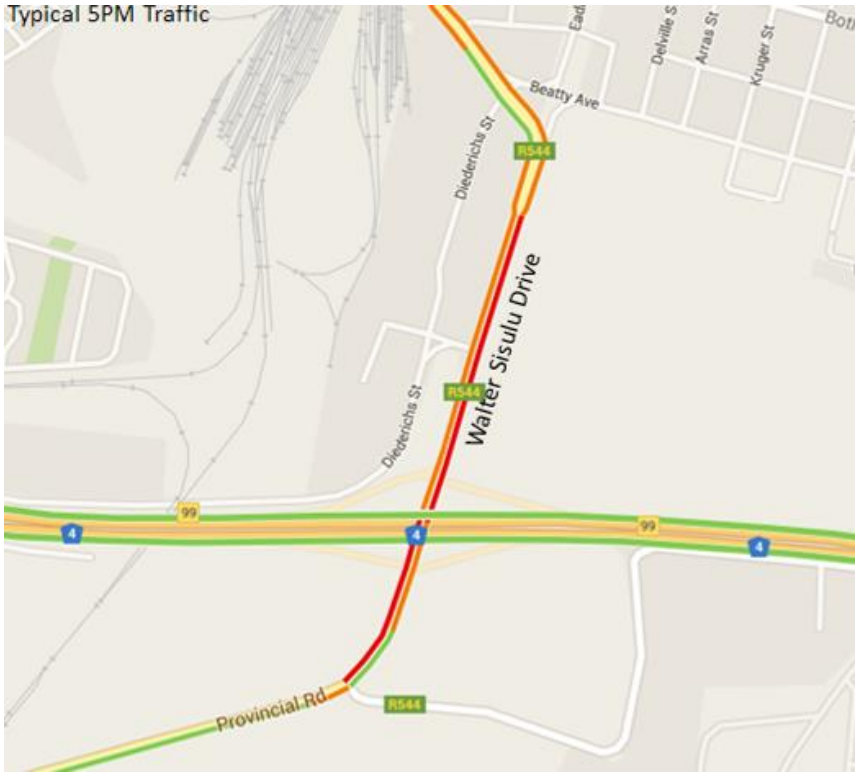


Figure 23: Typical 17:00 Traffic

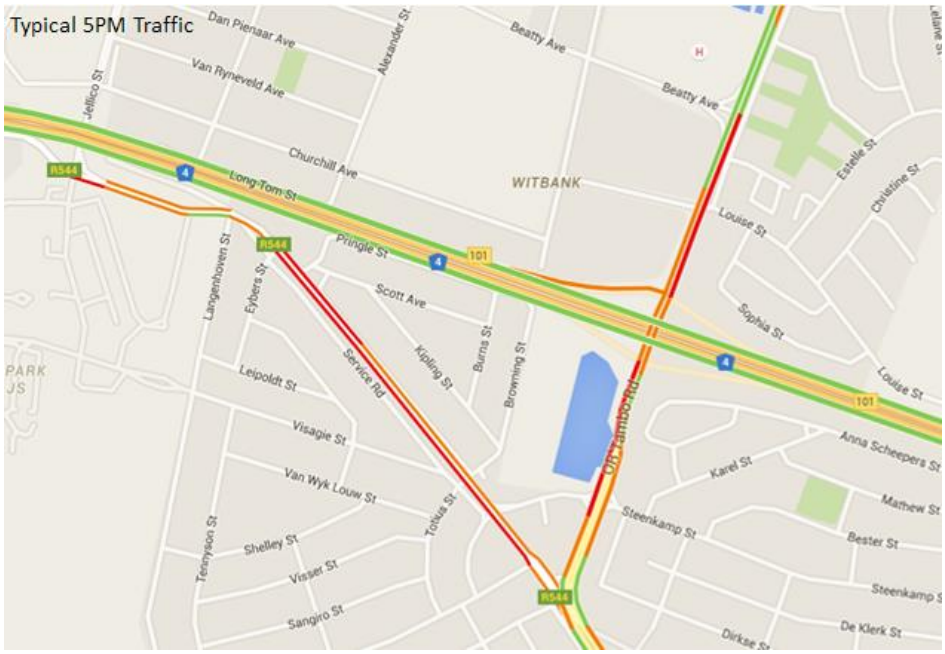


Figure 24: Typical 17:00 Traffic

As can be seen in the above images, Walter Sisulu Drive (Figure 23) and the Service Road (Figure 24) are not operating at an acceptable level but backups are occurring outside the scope of the study. This means that even with upgrades of some analysed intersections, bottlenecks are forming at other areas which means the traffic at these intersections will not be improved. The intersections of Walter Sisulu Drive and Colliery as well as Jellico Street and Van der Byl should not be upgraded because the problems are caused outside the traffic impact of Option 2 of this study. Furthermore these are existing problems on which the development will have a negligible effect.

5.11.2 Proposed Intersection Upgrades to address Existing Capacity Problems

The intersections of C2a and C2b need to be signalised. The condition for a signal is that the average queue for a lane exceeds 4 vehicles during any hour during a normal day. The PM Peak hour was used for C2a while the AM peak hour was used for C2b. As can be seen in the tables, the average queue length for the east approach of C2a is 412 which is well over 4 and the average queue length for the west approach of C2b is 388. 4-way stops were considered but found to be unsatisfactory because of the high volumes on all approaches of the intersections. Roundabouts were considered but also rejected because of the nearby signalized intersection spacing of Colliery/Walter Sisulu. It is far more acceptable to provide signalization for intersections C1, C2A, C2B and C3 and achieve platoon co-ordination.

The intersection of Walter Sisulu Drive and Price Street should be signalised, not only because a signal is warranted, but because there are safety concerns as vehicles approaching from the south (Walter Sisulu Drive) and turning right into Price Street have limited/poor sight distance. In the warrant it can be seen that the east approach has an average queue of 114 vehicles during the PM peak hour. A roundabout would solve the capacity problems at the intersection; however, as the intersection is so close to C2a which should be signalised, a signal is advised to provide consistency in processing vehicle platoons generated form a traffic signal. A 4-way stop was considered but found to be unsatisfactory because of the high volumes on all approaches of the intersections.

It should also be noted that if the N4 interchange terminals are upgraded to cater for the demand traffic that the capacity constraint will move to the Colliery intersection (C3) on Walter Sisulu as well as the Price intersection (C1)

5.12 Air Quality

An Air Quality was conducted for the proposed project by Airshed Planning Professionals (Pty) Ltd (Airshed) in October 2016. The following information has been extracted from the Baseline Air Quality Report undertaken by Airshed.

5.12.1 Air Quality Sensitive Receptors

Air Quality Sensitive Receptors (AQSR) primarily refer to places where humans reside. Ambient air quality guidelines and standards, as discussed under section 2, have been developed to protect human health. Ambient air quality, in contrast to occupation exposure, pertains to areas outside of an industrial site boundary where the public has access to and according to the Air Quality Act, excludes areas regulated under the Occupational Health and Safety Act (Act No 85 of 1993).

AQSRs located around the Project site include Lynnville (located ~2.5 km to the northwest); Schoongezicht (located ~3.2 km to the northwest); Ackerville (located ~4 km to the northwest); Highveld Single Quarters (located ~0.1 km to the southeast). Other sensitive receptors in the region include Tasbet Park, Reyno Ridge, Ben Fleur, Clewer and Hoëveldpark (**Figure 22**).

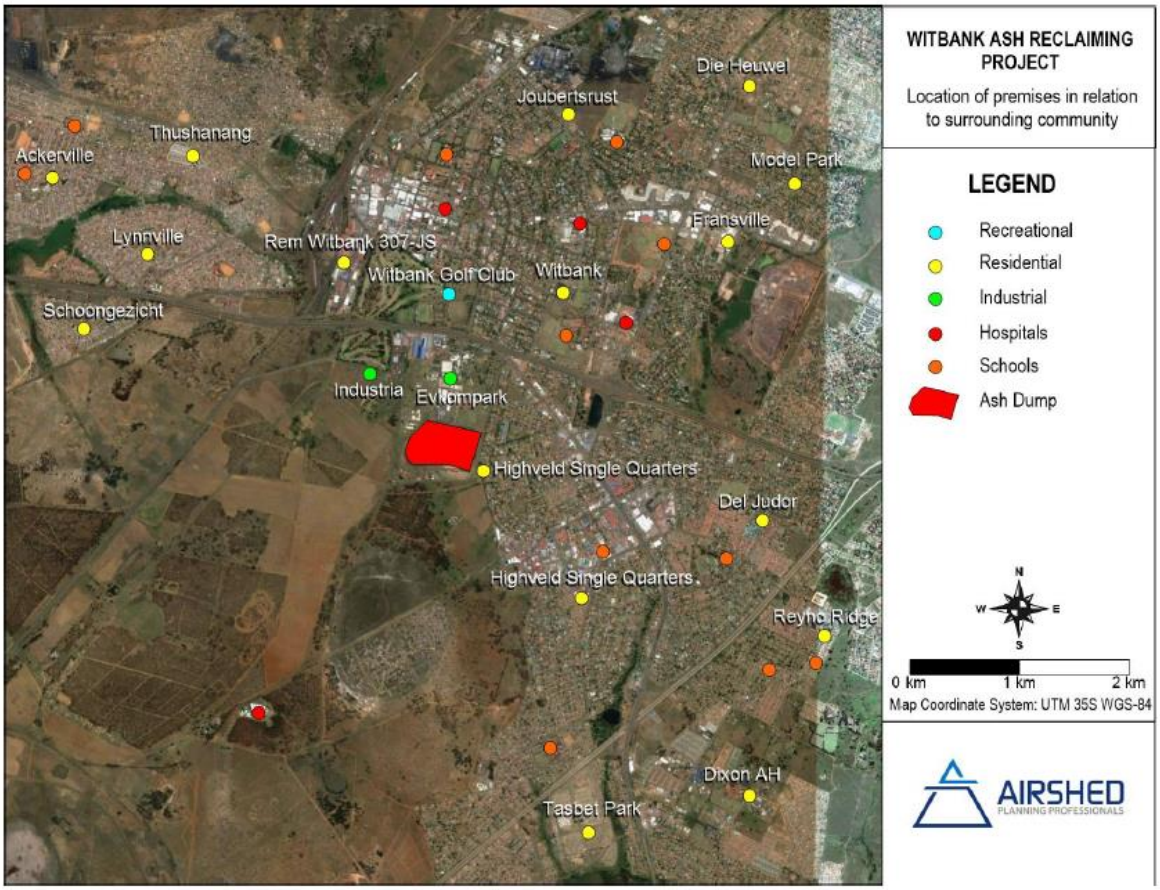


Figure 25: AQSRs surrounding the Project area

5.12.2 Surface Wind Field

The horizontal dispersion of pollution is largely a function of the wind field. The wind speed determines both the distance of downwind transport and the rate of dilution of pollutants. The generation of mechanical turbulence is similarly a function of the wind speed, in combination with the surface roughness. Period and diurnal wind roses drawn from SAWS data for the period January 2011 to October 2014 are shown in **Figure 23**. Seasonal variations in the wind field are shown in **Figure 24**. Wind roses comprise 16 spokes, which represent the directions from which winds blew during a specific period. The colours used in the wind roses below, reflect the different categories of wind speeds; the yellow area, for example, representing wind speeds between 4 and 5 m/s. The dotted circles provide information regarding the frequency of occurrence of wind speed and direction categories. The frequency with which calms occurred, i.e. periods during which the wind speed was below 1 m/s are also indicated.

The air quality study conducted by Air Shed (2016) indicates that eMalahleni period wind rose depicts the predominance of the north, east and east-south-east sectors with wind speeds of greater than 5 m/s. An average wind speed of 2.9 m/s was recorded over the period. The day-

time wind rose shows an increase in winds from the north-westerly sector, whereas the night-time wind rose shows a decrease in the northerly and the north-westerly winds and an increase in the easterly and east-south-easterly winds. The night time is also characterised by an increase in the frequency of calm conditions. The wind field during summer and autumn is dominated by winds from the south-east, east and moderate winds from the north-west. Wind direction in winter is variable with no single dominant wind direction. Spring is characterised by a greater frequency of winds from the north and easterly sectors.

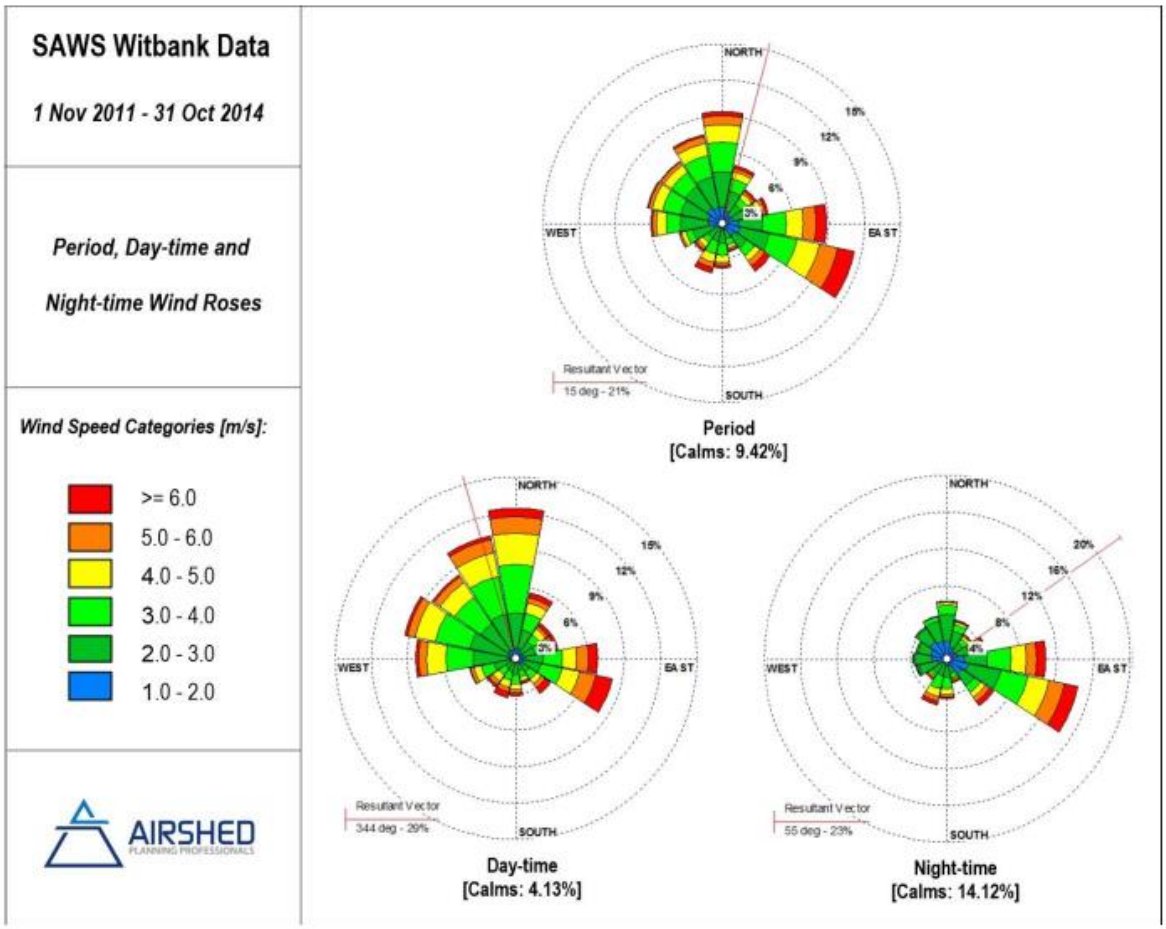


Figure 26: Air Quality Specialist Report for the Ash Reclamation Project at Witbank, Mpumalanga

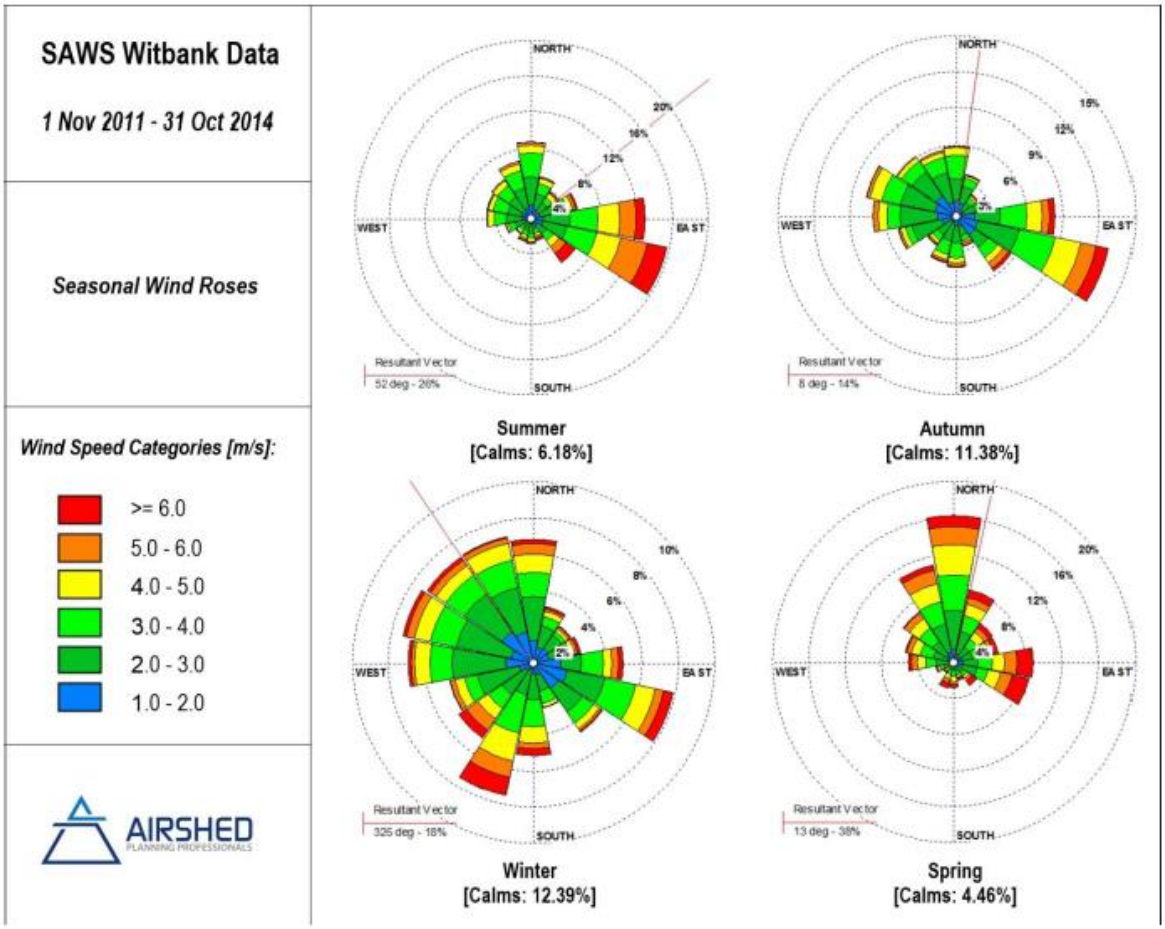


Figure 27: Seasonal wind roses (SAWS eMalahleni data, 2011 - 2014)

5.12.3 Ambient Air Quality within the region

5.12.3.1 Sources of Air Pollution within the Region

Mining and industrial activities, farming and residential land-uses occur in the vicinity of the Witbank Colliery. These land-use activities contribute to baseline pollutant concentrations via vehicle tailpipe emissions, household fuel combustion, biomass burning and various fugitive dust sources. Long-range transport of particulates, emitted from remote tall stacks and from large-scale biomass burning in countries to the north of South Africa, has been found to contribute significantly to background fine particulate concentrations within the South African boundary (Andreae, et al., 1996; Garstang, et al., 1996; Piketh, et al., 1996).

Sources of atmospheric emissions include:

- Gaseous and particulate emissions from mining operations;
- Gaseous and particulate emissions from industrial operations;
- Miscellaneous fugitive dust sources including vehicle entrainment on roads and windblown dust from open areas;
- Gaseous and particulate emissions from vehicles

- Gaseous and particulate emissions from household fuel burning; and
- Gaseous and particulate emissions from biomass burning (e.g. wild fires).

3.11.3.1.1 Mining and Ore Processing Operations

There are numerous existing and closed mines located in the vicinity of the Project. The closest mines located in the vicinity are: Transvaal, Delagoa, Schoongezicht, Naauwpoort, Waterpan, Witbank and Landau Collieries. Fugitive emissions sources from mining operations mainly comprise of land clearing operations (i.e. scraping, dozing and excavating), materials handling operations (i.e. tipping, off-loading and loading, conveyor transfer points), vehicle entrainment from haul roads, wind erosion from open areas and drilling and blasting. These activities mainly result in fugitive dust releases with small amounts of NOx, CO, SO_2, CH_4 and CO_2 being released during blasting operations. Ore processing may include crushing, screening, milling, grinding, drying etc.

3.11.3.1.2 Industrial Operations

Industrial sources within the Mpumalanga region include the following:

- Emissions from coal combustion by power generation, metallurgical and petrochemical industries represents the greatest contribution to total emissions from the industrial / institutional / commercial fuel use sector within the Mpumalanga region.
- The metallurgical group is estimated to be responsible for at least ~50% of the particulate emissions from this sector. This group includes iron and steel, ferro-chrome, ferro-alloy and stainless steel manufacturers (includes Highveld Steel & Vanadium, Ferrometals, Columbus Stainless, Transalloys, Middelburg Ferrochrome).
- Petrochemical and chemical industries are primarily situated in Secunda (viz. Sasol Chemical Industries). The use of coal for power generation and the coal gasification process represent significant sources of sulfur dioxide emissions. (Particulate emissions are controlled through the implementation of stack gas cleaning equipment.)
- Other industrial sources include: brick manufacturers which use coal (e.g. Witbank Brickworks, Quality Bricks, Corobrik, Hoëveld Stene, Middelwit Stene) and woodburning and wood drying by various sawmills (Bruply, Busby, M&N Sawmills) and other heavy industries (use coal and to a lesser extent heavy fuel oil for steam generation). The contribution of fuel combustion (primarily coal) by institutions such as schools and hospitals to total emissions is relatively due to the extent of emissions from other groups.

3.11.3.1.3 Fugitive Dust from Paved and Unpaved Roads

Emissions from unpaved roads constitute a major source of emissions to the atmosphere in the South African context. When a vehicle travels on an unpaved road the force of the wheels on the road surface causes pulverization of surface material. Particles are lifted and dropped from the rolling wheels, and the road surface is exposed to strong turbulent air shear with the surface. The turbulent wake behind the vehicle continues to act on the road surface after the vehicle has passed. Dust emissions from unpaved roads vary in relation to the vehicle traffic and the silt loading on the roads. Unpaved roads in the region are mainly haul roads.

Emission from paved roads are significantly less than those originating from unpaved roads, however they do contribute to the particulate load of the atmosphere. Particulate emissions occur whenever vehicles travel over a paved surface. The fugitive dust emissions are due to the re-suspension of loose material on the road surface. Paved roads in the region include the N4, R544, R555 and other municipal roads.

3.11.3.1.3 Vehicle Tailpipe Emissions

Air pollution from vehicle emissions may be grouped into primary and secondary pollutants. Primary pollutants are those emitted directly into the atmosphere, while secondary pollutants are formed in the atmosphere as a result of chemical reactions, such as hydrolysis, oxidation, or photochemical reactions. The significant primary pollutants emitted by vehicles include CO_2, CO, hydrocarbons (HCs), SO_2, NOx, DPM and Pb. Secondary pollutants include: NO_2, photochemical oxidants (e.g. ozone), HCs, sulphur acid, sulphates, nitric acid, nitric acid and nitrate aerosols. Hydrocarbons emitted include benzene, 1.2-butadiene, aldehydes and polycyclic aromatic hydrocarbons (PAH). Benzene represents an aromatic HC present in petrol, with 85% to 90% of benzene emissions emanating from the exhaust and the remainder from evaporative losses. Vehicle tailpipe emissions are localised sources and unlikely to impact far-field.

Transport in the vicinity of the Project is via trucks and private vehicles along the N4, R544, R555 and other municipal roads, which are the main sources of vehicle tailpipe emissions; as well as unpaved haul roads.

3.11.3.1.4 Household Fuel Burning

Energy use within the residential sector is given as falling within three main categories, viz.: (i) traditional - consisting of wood, dung and bagasse, (ii) transitional - consisting of coal, paraffin and liquefied petroleum gas (LPG), and (iii) modern - consisting of electricity (increasingly this includes the use of renewable energy). The typical universal trend is given as being from (i)

through (ii) to (iii). Pollutants include products of combustion (CO, NOx, SO_2 and VOC), unburned HC and particulate matter.

3.11.3.1.5 Biomass Burning

Biomass burning includes the burning of evergreen and deciduous forests, woodlands, grasslands, and agricultural lands. Within the Project vicinity wild fires may therefore represent a source of combustion-related emissions. Biomass burning is an incomplete combustion process, with CO, CH^4 and NO_2 gases emitted. Approximately 40% of the nitrogen in biomass is emitted as nitrogen (N_2), 10% is left is the ashes, and it may be assumed that 20% of the nitrogen is emitted as higher molecular weight nitrogen compounds. The visibility of the smoke plumes is attributed to the aerosol (particulate matter) content. In addition to the impact of biomass burning within the vicinity of the Project, long-range transported emissions from this source can further be expected to impact on the air quality. It is impossible to control this source of atmospheric pollution loading; however, it should be noted as part of the background or baseline condition before considering the impacts of other local sources.

5.12.4 Measured Ambient Air Quality

Ambient data from the Greendale High Air Quality monitoring station, eMalahleni, operated by the Mpumalanga Provincial Government, was obtained for the period January 2012 to January 2016. The monitoring station is located within 5 km of the Project site.

Monitored daily PM_{10} concentrations at the Witbank monitoring station show regular exceedances of the daily limit, between 2012 and 2015 (**Figure 25**). Similarly, daily $PM_{2.5}$ concentrations recorded at the Witbank monitoring station showed exceedances of the relevant standard in 2012, 2013 and 2015 (**Figure 26**). No exceedances were recorded in 2014, but the largest number of exceedances (in the 4 year period) was recorded in 2015.

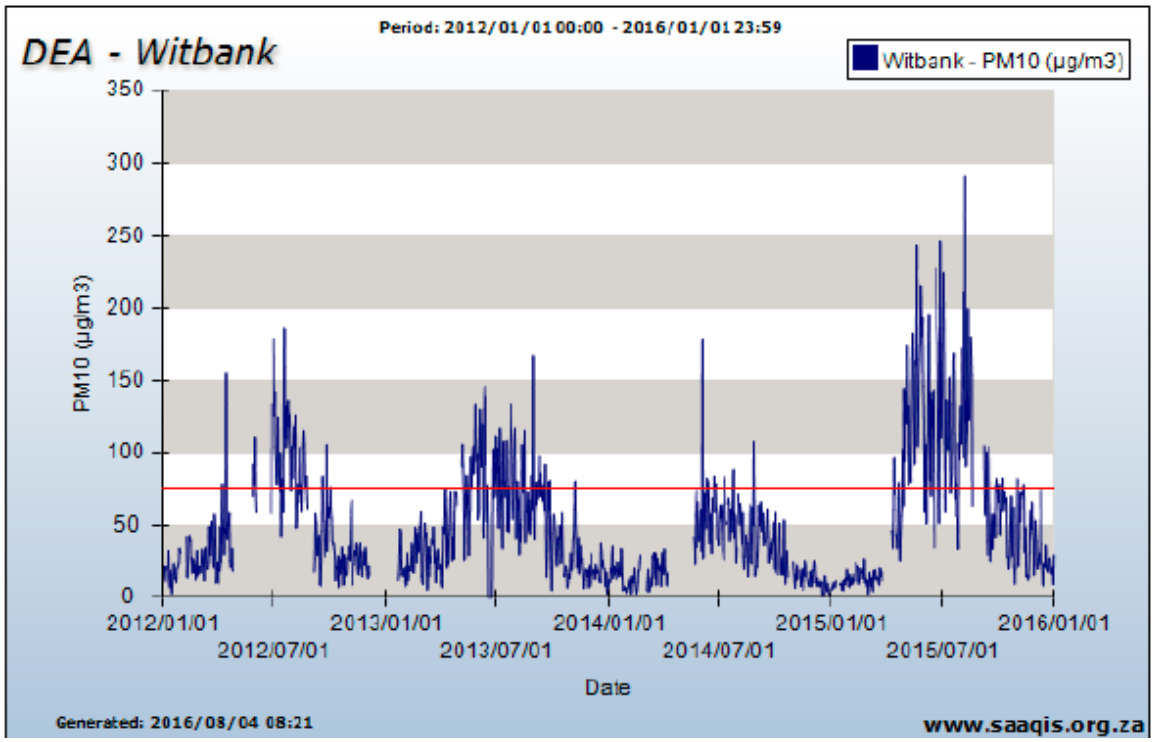


Figure 28: Daily PM10 concentrations monitored at the Witbank station between 2012 and 2016 (from www.saaqis.org.za). The horizontal red line indicates the daily limit concentration applicable from 2015 (75 µg.m-3)

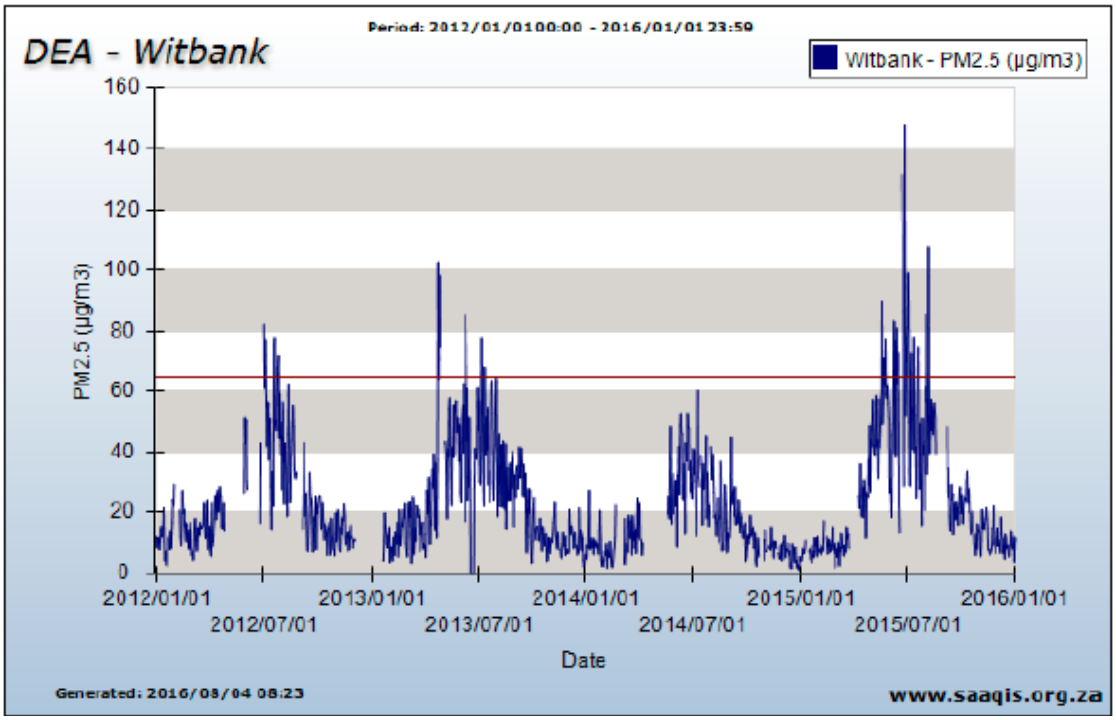


Figure 29: Daily PM2.5 concentrations monitored at the at the Witbank station between 2012 and 2016 (from www.saaqis.org.za). The horizontal red line indicates the daily limit concentration applicable during the period (65 µg.m-3)

5.12.5 Modelled Ambient Air Quality – Mpumalanga Highveld Priority Area

The Project is located in the Mpumalanga Highveld and is therefore situated within the boundaries of the Highveld Priority Area (HPA), which is an area that has been identified as characterized with poor air quality. As a result of the concerns over the poor ambient air quality over the Highveld area, the Minister of Environmental Affairs declared a portion of Mpumalanga and Gauteng provinces an air quality priority area in November 2007.

A comprehensive emissions inventory was completed for the region as part of the HPA baseline study. The results of the inventory were used to carry out a comprehensive dispersion modelling study over the area using the CALPUFF model (DEA, 2011b). Results of this dispersion study are illustrated in **Figure 27** for PM_{10}. The figure gives the areas in which ambient air quality standards are predicted to be exceeded for more than the allowed 1% of the time. The eMalahleni area is already elevated with respect to $PM1_0$ concentrations (**Figure 27**). Based on these dispersion modelling results, the Air Quality Management Plan (AQMP) identified Baseline Hotspots for PM_{10}. The project design should therefore also ensure minimal contribution to PM_{10} concentrations.

Power Generation activity in the HPA is the major source of SO_2 emissions (82%) and NOx emissions (73%) while it is only responsible for a relatively small contribution to the total PM_{10} load (12%) (DEA, 2011b). Predicted source contributions to PM_{10} are shown in **Figure 28**. The largest contributor to PM_{10} emissions is the industries, while the lowest contributors is the coal mines (DEA, 2011b).

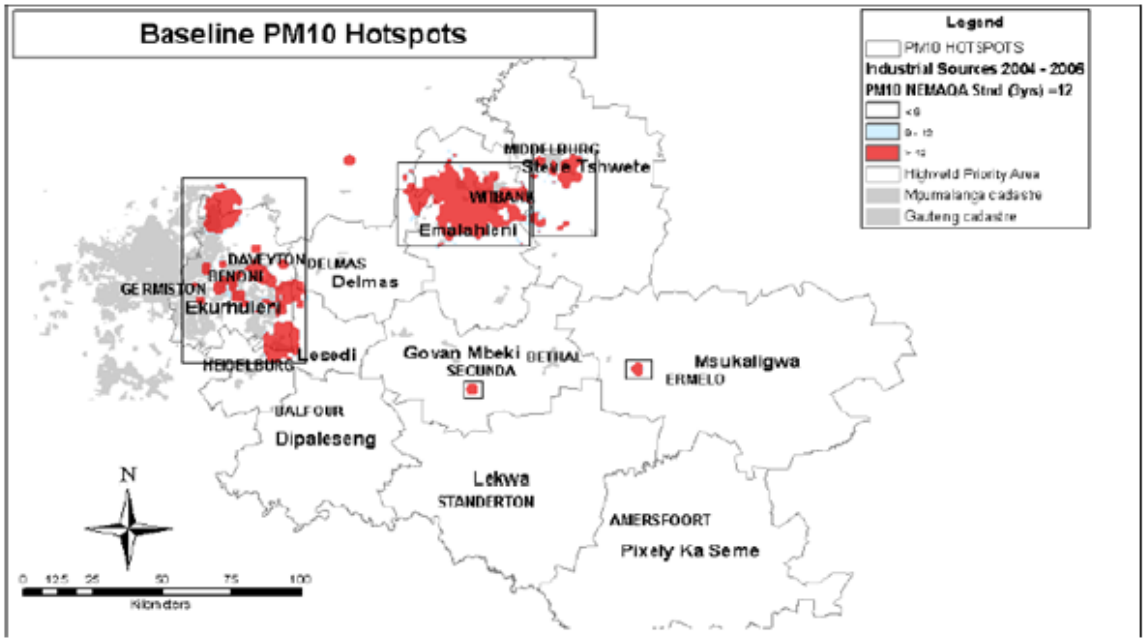


Figure 30: Simulated frequencies of exceedance of ambient PM_{10} NAAQS (DEA, 2010)

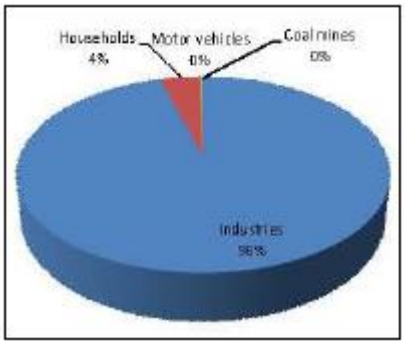


Figure 31: Contribution of different sources to ambient concentrations of PM10 in the Kriel Hot Spot (DEA, 2011b)

5.13 Socio-economic context

5.13.1 Economy of eMalahleni

About 190 662 people in the eMalahleni Local Municipality are economically active (employed or unemployed but looking for work), and of these 27.3% are unemployed. Of the 101 062 economically active youth (15 – 34 years) in the area, 36.0% are unemployed (Census 2011). The eMalahleni IDP indicates that, the Economy of the municipality is driven by the Mining sector which contributed more than 50% in 2009 followed by Electricity at 12.1% and Finance at 10.8%. Agriculture's contribution to the economy of Emalahleni is however relatively low compared to the other sectors of the economy. The other sectors with potential include Finance, Trade and the green economy (given the dominance of mining and electricity and their environmental degradation potential).

5.13.2 Population in ELM

According to Census 2011, Emalahleni Local Municipality had a total population of 395 466, of whom 81.3% are black African, 15.7% are white, with the other population groups making up the remaining 3.0%. The survey shows that in 2001 and 2011 there was slight decrease of Africans and a slight increase of Coloureds, with the white population group remaining the same.

The municipality has experienced an increase of males and decrease of females between 2001 and 2011 in the ELM. This is largely due to the nature of industries around the municipality area which tend to be more male oriented. The table also shows that there are more males than female, where the sex ratio is 111 males per 100 females in the municipality i.e. 52.8% males and 47.2% females. The number of females has gone down slightly which means the area attracts males compared to females.

5.13.3 Education in ELM

From a total population of 395 466 in 2011 within the Emalahleni Local Municipality, 4.0% of those aged 20 years and older have completed primary school, and 35.7% have some secondary education, 31.5% have completed matric, 14.0% have some form of higher education, while 5. 8% have no form of schooling.

The level of education is therefore generally low because only less than 9% of the population has a qualification more than matric. Basic education is a requirement for a healthy and developing country and it will be important to be given more attention (Source: Local Economic Development Strategy, 2011-2016).

5.13.4 Employment Levels in ELM

In ELM unemployment rate decreased since 2001. According to the IDP, unemployment rate for females and females was 37.1% and 20.8% respectively. Youth unemployment rate was at 36.0% in 2011 with highest unemployment in Ward 28 (43.3%) and lowest unemployment in Ward 24 (7.6%). In addition, employment increased by 61 879 between 2001 & 2011 according to the Census with formal employment 77.0% and informal employment 10.6%.

6 ALTERNATIVE ASSESSMENT

In terms of the EIA Regulations published in Government Notice (GN) R982 of 2014, feasible and reasonable alternatives must be identified and considered within the Environmental Scoping phase (section 28 (1)(c)) and further assessed in the EIA phase. GN R 982 of the EIA Regulations (2014) defines an alternatives as follows:

"**alternatives**" in relation to a proposed activity means different means of meeting the general purpose and requirements of the activity, which may include alternatives to –

(a) the property on which or location where it is proposed to undertake the activity;
(b) the type of activity to be undertaken;
(c) the design or layout of the activity;
(d) the technology to be used in the activity;
(e) the operational aspects of the activity; and
(f) the option of not implementing the activity.

In terms of NEMA, the proponent is required to demonstrate that alternatives have been described and investigated in sufficient detail during the EIA process. The feasible alternatives identified for the proposed Witbank ash dump were limited to various process alternatives.

The proposed Witbank ash reclamation project is required in order to support Clinker Supplies' operations and is dictated by the locality of the clinker dump. The reclamation process will require infrastructure (as described in section 1 above).The positioning of the access road is therefore dictated by the fact that the operation does not impact on the day to day lives of the close community by using the existing road since the operation will have trucks coming to site to collect material and/bricks once its start operating.

(a) Property and Location/Site Alternatives;

No alternatives in terms of project locality were considered as the proposed project entails the processing of an existing ash dump. The study site is dictated by the locality of the clinker reserve.

Only access road alternatives were considered. The proposed road is 1.06km (Pink route on locality map). A large section of the proposed access road route mostly cuts across agriculture field and is heavily disturbed area to the west of the Witbank ash dump site.

Alternative 1 (green route on locality map) traverses an approximate length of 0.9km. A large section of the alternative route 1 also cut across agriculture field and heavily disturbed area adjacent to the ash dump site. This alternative route runs through heavily disturbed landscape.

According to the ecological study conducted for the site, there is no major difference between the preferred access route in terms of layout alternatives and the alternative access route and therefore both are equally suited. The heritage study found that the two routes lie in a landscape that is heavily degraded from previous and current agricultural land use, mining and from infrastructure development. Given the situation, the chances of encountering significant in situ archaeological sites are limited. Alternative 1 is therefore preferred considering that it is shorter and will less cost implication during construction and its maintenance through the operation of the site.

(b) Activity Alternatives

No activity alternatives were considered as the project involves the processing of the clinker in order to rehabilitate the land.

(c) Technology Alternatives

No technology alternatives were considered. This ash reclamation process will follow a standard practice for aggregate processing operations. The applicant will:

- remove clinker layer by layer, from the top of the dump by excavator
- load and haul the reclaimed clinker from the dump to the processing plant.
- crush and screen the recovered material at the crusher plant in order to reduce it to various size aggregate
- stockpile the aggregate at a stockpile area, and
- sell the aggregate to clients, after its been weighed on the weigh bridge

(d) Design or Layout

The processing plant will be placed on the south western corner of the dump to reduce the visual/nuisance impact to the nearby residential community. The site already has existing building which the applicant will utilize as offices and workshops. A mobile processing plant will be used on during Phase 1 which will include the excavation of ash on the southwest corner of the dump. For Phase 2 a fixed primary and secondary crushing plant will be constructed on the area that had been cleared during Phase 1.

(e) Operational Alternatives

No operational alternatives were considered. The aggregate will be stockpiled until sold to clients.

(f) No-Go alternative

This option involves retaining status quo i.e. a situation where the ash dump remains as it is and the land remains un-rehabilitated. This could lead to major environmental liability, as Eskom must eventually take responsibility for adequate rehabilitation of the site in line with the legislative requirements. The status quo of the Witbank ash dump is currently presenting a potential pollution risk to the surrounding environment - proximal rivers and the Witbank Dam, which is the area's only major source of raw water, as well as numerous pans with emergent groundwater, cannot be excluded as potentially significant receptors of contamination. This will in turn affect the health of the human populations. It will also have a detrimental effect on the aquatic plant and animal life. It may even affect terrestrial animals should these animals be dependent upon aquatic plants and animals for food. Long term smouldering within the facility has resulted in the potential for emissions which may affect regional air quality for the nearby community and the general public.

It is imperative to note that the proposed ash reclamation presents only benefits in the sense that all of the clinker ash will be cleared with no residue remaining, and the property can then be re-zoned for commercial purposes.

Adopting the "No go alternative" is also against the EML's Waste Management By-Laws' objective to enhance sustainable development and to ensure that improved integrated waste management systems such as the legally permitted waste recovery facilities exist within the Municipality. The No-Go alternative is therefore not a feasible option in this case as it suggests that the ash dump should not be exploited.

7 PUBLIC PARTICPATI`ON PROCESS

The NEMA EIA Regulations, 2014 prescribes that the Environmental Impact Assessment process must undertake public participation in accordance with the Chapter 6 of the Regulations. Public participation is an integral part of the environmental assessment process, and affords potentially interested and affected parties (I&APs) an opportunity to participate in the EIA process, or to comment on any aspect of the development proposals. Involvement by I&APs is critical, as it contributes to a better understanding of the proposed project among I&APs, raises important issues that need to be assessed and provides local insight that will enhance the EIA process.

7.1 Public Participation during the scoping phase

For the purposes of the scoping phase, the PPP aims to ensure that the full range of stakeholders is informed about project scope. In order to achieve this, a number of key activities have taken place and will continue to take place. These included the following itemizes the steps:

7.1.1 Identification of Interested and Affected Parties

The interested and affected parties (I&APs) in and around the study area were identified and a dedicated stakeholder database for the project was developed. A list with complete details of the I&APs is kept by the EAP and will be updated as the project progresses. The I&APs register is included in **Appendix B5**.

The database includes stakeholder representatives of a broad range of sectors of society, i.e. National Government, Provincial Government, Local government (municipalities within in the study area) as well as stakeholders with a direct interest in the project.

Table 11: Key Departments identified to date

Type	Name	Organisation
National Government	Ms Adibawu Rambuda	Department of Water and Sanitation
Provincial Government	Selby Hlatshawayo	Mpumalanga Department of Economic Development, Environment &Tourism
	Robyn Luyt	Mpumalanga Department of Economic Development, Environment &Tourism
Local Government	The Municipal Manager Ms Margaret Skosana	Nkangala District Municipality
	Environmental Impact Management	Nkangala District Municipality

	Mr Vusi Mahlangu	
	The Municipal Manager Mr Theo Van Vuuren	eMalahleni Local Municipality
	Environmental Management and Compliance Mr Erald Nkambinde	eMalahleni Local Municipality
	Development Planning Ms Nomkita Fani	eMalahleni Local Municipality
Parastatal	Mr Kopano Matlala	Eskom – SHEQ Manager
	Ms Motlalapule Molaka	Eskom, Investment Recovery Department
Ward Councillor	Ext 8 Ward 33 Ms Naritha Naidu	eMalahleni Local Municipality

7.1.2 Announcement of the project and its EIA process

The proposed project and its EIA process were announced in the study area in the following ways:

7.1.3 Notification of I&APs

At the commencement of the project, written notices and Background Information Documents (BIDs), were sent to the landowners and / or the current occupants of the properties surrounding Witbank ash dump, as well as stakeholders and organs of state with a direct interest in the project. Since then, there has been ongoing distribution of these documents via email to I&APs that are identified as the project progresses. Copies of these letters, together with the details of the recipients are included in **Appendix B3**.

7.1.4 Media Announcement

Newspaper Advertisements (in English) informing stakeholders about the proposed project and inviting them to participate and register as interested and affected parties were compiled and placed in the Witbank News newspaper on 24th November 2016. Providing a brief description of the project, legislative requirements, and the process to be followed. The newspaper advert also informed any interested and affected party (I&APs) of the process to follow to register as an I&AP on the dedicated project database, and provided details of the EAP and contact details for more information on the project. See **Appendix B1.**

7.1.5 Site Notices

Six (6) environmental site notices (size A2) advertising the proposed development were fixed on 24 November 2016 on various conspicuous areas in proximity to the site including the project site; at Van Zyl Street; Van Cilliers Street, the Walter Sisulu Road and Langohaven. The site notice provided a brief description of the project, legislative requirements, and the process to be followed. The on-site notice also informed any interested and affected party (I&APs) of the process to follow to register as an I&AP on the dedicated project database, and provided details of the EAP and contact details for more information on the project. Proof of the placement of the site notices is included in **(Appendix B2).**

7.1.6 Background Information Document (BID)

Background Information Document (BID) (English) was prepared as a basis for discussion with stakeholders about the project **(Appendix B4)**. The BID introduced the project to the stakeholders, provided the rationale for the project, the EIA and public participation processes to be followed in the project, proposed project timeframes, etc. The BID included a registration/comment sheet which was available in English. The BID was distributed by hand and forwarded electronically to those stakeholders that have electronic. Some of the BIDs were left in public places frequently visited by local people, e.g. libraries and council offices, in the project area.

7.1.7 Distribution of Draft Scoping Report

The Draft Scoping Report was sent to state department and other I&APs who had requested the copy. A copy was also placed eMalahleni Main Library for the prescribed duration of 30 days from the 13 December 2016 to 02 February 2017. The placing of the Draft Scoping Report in the library was to allow for the public, especially the community within the proposed project, to be given adequate time to review the details of the project and provide, in writing, comments and concerns relating to the reclaiming of clinker at the Witbank ash dump. It must however be noted that no I&AP within the community, surrounding businesses within the project area has contacted the EAP requesting a copy of the report to enquire where they can get the report.

Electronic copies (CDs) were made available to any I&AP on request. Proof of delivery and document placement is attached to this report as **Appendix B7**. Additionally, the report was also made available to any I&AP upon request, as advised on the notice boards, notices and advertisements referred to in Section 5.2.1 and 5.2.2 above.

7.1.8 Public and Focus Group Meetings

A focus group meeting was held with the affected community of Extension 8 on the 08th May 2017. The meeting was unfortunately poorly attended. However, the contributions of those who attended were significant and useful. The following key aspects arose during the focus group meeting:

(a) Health and environmental concerns posed by the ash dump

(b) Source of water for the project

(c) Duration of the project operation

(d) Electricity supplies for the project

(e) Waste Management during operation

(f) Noise and dust management during operation

(g) Community sceptical about new projects in the area

The minutes of the meeting are attached as **Appendix B9**.

7.1.9 Comments and responses during scoping phase

Comments received were responded to as per the requirements of Regulation GN No. R.982. The comments and response report as well as all comments received have been attached to this report as **Appendix B8**. A record of all comments received, together with a note of the responses given, will maintained continuously.

7.1.10 Submission of the Final Scoping Report

The Final Scoping Report has been subjected to public participation for a period of 30 days has been submitted to DARDLEA on 10 March 2017. The Nkangala District has accepted the Final Scoping Report and granted the applicant to proceed with the EIA phase on 13 March 2017. One of the condition on the acceptance of the scoping report was to ensure a consultation meeting is held with community as it was still outstanding on the submission of the FSR.

7.2 Public Participation during the Impact Assessment Phase

Public Participation during the Impact Assessment Phase will revolve around a review of the findings of the EIA presented in the Draft Environmental Impact Assessment Report (DEIAR) (this report). This report will be made available for public review and comment for 30 days. I&APs were invited to a public meeting to discuss the content of the DEIAR and the findings of the specialist studies.

7.2.1 Media Announcement

Newspaper Advertisements (in English) informing stakeholders about the availability of the Draft EIAR will be compiled and placed in the Witbank News newspaper on June 2017. The newspaper advert will inform any interested and affected party (I&APs) the commenting period and provided details of the EAP and contact details for more information on the project.

7.2.2 Site Notifications

Afrimat will erect six (6) site notices at various noticeable locations around the perimeter of the site during the EIA phase.

7.2.3 Public and Focus Group Meetings

A focus group meeting with the affected community of Extension 8 will be arranged in due course of the review of this DEIAR.

8 IMPACT IDENTIFICATION AND ASSESSMENT

The impact of any activity on the receiving environment where the activity is to be established or is to take place is dependent on the nature of the activity, together with the nature of the receiving environment.

The process entails the reclaiming of clinker (old ash), crush and screen the recovered clinker in order to reduce it to various size fractions of -13mm and +13mm to -22mm to make aggregate that will be used by Concrete Product Manufacturers (CMPs), such as brick factories.

Potential issues requiring further investigation were identified during the Scoping Phase. A summary of the key issues and concerns that were addressed further in the Assessment Phase and documented in the Environmental Impact Assessment Report (EIAR) are provided in the subsections that follow. Specialists were appointed to assess these issues.

8.1.1 Impact Assessment

8.1.2 Approach

The impact assessment comprised of a number of specialist studies. The findings of the specialist studies were then integrated into this DEIAR and the impacts were assessed using the methodology as shown in Section 8.1.2 that compares the significance of each impact.

The following specialist studies were undertaken as part of this EIA process:

- Ecological Impact Assessment;
- Air Quality Impact Assessment;
- Traffic Impact Assessment;
- Noise Impact Assessment;
- Socio-Economic Impact Assessment;
- Heritage Impact Assessment; and
- Geotechnical Impact Assessment.

8.1.3 Impact Assessment Methodology

The methodology and approach followed during this EIA is described below. Each specialist undertook an impact assessment, and prepared an impact assessment report as supporting documentation to the EIA. The significance of the identified impacts was determined in terms of the following criteria:

- Cumulative impacts;
- Nature of the impact;
- Extent of the impact;

- Intensity of the impact;
- Duration of the impact;
- Probability of the impact occurring;
- Non-reversibility of Impacts;
- Impact on irreplaceable resources;
- Confidence level; and
- Description of mitigation measures

Activities within the framework of the proposed development and their respective construction and operational phases, give rise to certain impacts. For the purpose of assessing these impacts, the project has been divided into three phases from which impacting activities can be identified, namely:

Construction phase:
This phase refers to all the pre-construction and construction related activities on site, until the contractor leaves the site.

Operational phase:
This includes all post construction activities, including the operation and maintenance of the proposed development

Decommissioning Phase:
This includes all activities associated with the closure and decommissioning of the proposed development, including any removal of infrastructure and rehabilitation that may need to occur.

The assessment of the impacts will be conducted according to a synthesis of criteria required by the integrated environmental management procedure. The methodology that will be used comprises of the following four steps:

- Step 1: Identification of positive and negative impacts of the project;
- Step 2: Identification of the significance rating of the impact before mitigation;
- Step 3: Identification of the mitigation measure and the mitigation efficiency; and
- Step 4; Identification of the significance rating of the impact after mitigation;

Assessment Criteria

The assessment of the impacts has been conducted according to a synthesis of criteria required by the guideline documents to the EIA regulations (2006) and integrated

environmental management series published by the Department of Environmental Affairs and Tourism (DEAT) currently Department of Environmental Affairs (DEA). In addition to this, it is a requirement of the National Environmental Management Act (NEMA) 2014 Regulations, Appendices 1 and 2 that an Impact and Risk Assessment process be undertaken for Basic Assessments and Environmental Impact Reporting.

Below is the assessment methodology utilized in determining the significance of the construction, operational and decommission impacts of the proposed activities, and where applicable the possible alternatives, on the biophysical and socio-economic environment.

SIGNIFICANCE = CONSEQUENCE X PROBABILITY

WHERE Consequence = Extent + Intensity + Duration

The criteria used to determine impact consequence are presented on the tables below. Each rating has been allocated a score weighting

Table 12: Criteria used to determine the Consequence of the Impact

Rating	Definition of Rating	Score
A. Extent - the area over which the impact will be experienced		
Local	limited to the immediate area(s) around the project site -	1
Regional	extends over a larger area that would include a major portion of an area or province	2
National/International	nationally or beyond	3
B. Intensity - the magnitude of the impact in relation to the sensitivity of the receiving environment, taking into account the degree to which the impact may cause irreplaceable loss of resources		
Low	Site-specific and wider natural and/or social functions and processes are negligibly altered	1
Medium	Site-specific and wider natural and/or social functions and processes continue albeit in a modified way	2
High	Site-specific and wider natural and/or social functions or processes are severely altered	3
C. Duration– the lifetime of the impact, that is measured in relation to the lifetime of the proposed development and its reversibility		
Short-term	(0 to 3 years)	1
Medium-term	(3 to 10 years) confined to the construction period	2
Long-term	(more than 10 years)	3
Permanent	beyond the anticipated lifetime of the project	4

The combined score of these three criteria corresponds to a Consequence Rating, as follows:

Table 13: Method used to determine the Consequence Score

Combined Score (A+B+C)	3 – 4	5	6	7	8 - 9
Consequence Rating	Very low	Low	Medium	High	Very high

Once the consequence was derived, the probability of the impact occurring was considered, using the probability classifications presented in the table below.

Table 14: Probability Classification

Probability– the likelihood of the impact occurring	
Improbable	1
Possible	2
Probable	3
Definite	4

The overall significance of impacts was determined by considering consequence and probability using the rating system prescribed below

Table 15: Impact significance ratings

		Probability			
		Improbable	Possible	Probable	Definite
Consequence	Very Low	INSIGNIFICANT	INSIGNIFICANT	VERY LOW	VERY LOW
	Low	VERY LOW	VERY LOW	LOW	LOW
	Medium	LOW	LOW	MEDIUM	MEDIUM
	High	MEDIUM	MEDIUM	HIGH	HIGH
	Very High	HIGH	HIGH	VERY HIGH	VERY HIGH

Practicable mitigation and optimisation measures are recommended and impacts are rated in the prescribed way both without and with the assumed effective implementation of mitigation and optimisation measures.

The impact significance rating should be considered by authorities in their decision-making process based on the implications of ratings ascribed below:

- Insignificant: the potential impact is negligible and will not have an influence on the decision regarding the proposed activity/development.
- Very Low: the potential impact is very small and should not have any meaningful influence on the decision regarding the proposed activity/development.
- Low: the potential impact may not have any meaningful influence on the decision regarding the proposed activity/development.
- Medium: the potential impact should influence the decision regarding the proposed activity/development.
- High: the potential impact will affect the decision regarding the proposed activity/development.
- Very High: the proposed activity should only be approved under special circumstances.

Cumulative impact: Consideration must be given to the extent of any cumulative impact that may occur due to the proposed development. In relation to an activity, means the impact of an activity that in itself may not be significant but which may become significant when considered together with the potential impacts eventuating from similar or diverse activities or undertakings in the area. Such impacts will be either positive or negative, and will be graded as being of negligible, low, medium or high impact. Potential cumulative impacts identified for the proposed development include dust generation from crushing in the plant, materials handling, and vehicle travelling on unpaved roads; noise from the screening and crushing plant, vehicles collecting the material and the bricks.

Degree of confidence in predictions: The specialist should state what degree of confidence (low, medium or high) is there in the predictions based on the available information and level of knowledge and expertise.

Development of Mitigation Measures

A key aspect of the impact assessment process is the identification of mitigation measures which can and should be implemented in order to prevent or minimise any negative impacts associated with a proposed development/activity to ensure that any associated benefits are

maximised. To ensure successful implementation, mitigation measures should be unambiguous statements of actions and requirements that are practical to execute. The following summarize the different approaches that may be used in prescribing and designing mitigation measures:

- Avoidance: e.g. mitigation by not carrying out the proposed action on the specific site, but rather on a more suitable site;
- Minimization: mitigation by scaling down the magnitude of a development, reorienting the layout of the project or employing technology to limit the undesirable environmental impact;
- Rectification: mitigation through the restoration of environments affected by the action;
- Reduction: mitigation by taking maintenance steps during the course of the action; and
- Compensation: mitigation through the creation, enhancement or acquisition of similar environments to those affected by the action.

The mitigation measures associated with the impacts are detailed on the Environmental Management Programme (EMPr).

8.2 Assessment and Rating of Potential Impacts

8.2.1 Impact on Heritage Resources

Mbviseni Sustainable Environmental Management Initiative (MSEI) was appointed to conduct a Heritage Impact study to determine the impact for the proposed ash reclamation project. The terms of reference for the Heritage study were as follows:

- Describing the heritage baseline,
- Assess the impact of the proposed project on any identified heritage features/resources at the site and
- Make recommendations to avoid or minimise and/or mitigate identified impacts to heritage resources.

According to a heritage study conducted by Mbviseni Sustainable Environmental Management Initiative (MSEI), the ash dump site did not yield any verifiable archaeological sites or material. The affected landscape is heavily degraded from previous and current land use such as ash dumping, industrial infrastructure and from residential property developments. This limited the chances of encountering significant in situ archaeological sites to be preserved in situ. The proposed ash dump reclamation covers more than 5ha. The proposed development is located within a heavily disturbed landscape. The project area is characterised by residential, industrial infrastructures, commercial agricultural fields, grazing land; railway lines, bulk water pipelines, powerlines, roads and other associated infrastructures across the entire project area. As such

the proposed ash reclaiming and associated activities will be an additional development on the project area.

There are several buildings and structures older than 60 years, which are on record in the project area. The recorded historical buildings are still used by Eskom within the project area. The developer indicated that they intend to preserve the structures *in situ* and use them for their various functions. The recorded historical buildings are still used by Eskom within the project area. Clinker Supplies, the developer indicated that they intend to preserve the structures in situ and use them for their various functions.

Based on the field study results and field observations conducted by the heritage specialist, it can be concluded that the receiving environment for the proposed development is low to medium potential to yield previously unidentified archaeological sites during subsurface excavations and construction work associated with the proposed development. This observation is supported by the fact that no Iron Age sites are indicated in a historical atlas around the town of Witbank, which can be an indication of a lack of research.

Table 16: Significance of impacting on heritage resources

	Extent	Intensity	Duration	Consequence	Probability	Significance
Construction and Operational Phase						
Without mitigation	Local 1	Low 1	Short term 1	Very low 3	Possible 2	LOW
With mitigation	Local 1	Low 1	Short term 1	Very low 3	Possible 2	LOW

8.2.2 Ecological Impacts

An Ecological study to determine the impact of the surrounding ecological environment (flora, fauna and wetland) was undertaken by Dimela Eco Consulting. Dimela Eco Consulting further hired Classical Environmental Management Services (C.E.M.S) to conduct the faunal studies for the ash dump. The aim of the Ecological study is to characterise the baseline environmental condition and assess the direct and indirect impact of the proposed development on plant and animal life. The terms of reference for the Ecological opinion study are detailed below.

The terms of reference for the flora study were:

- Describe the baseline vegetation condition within the development footprint and immediate surrounds;

- Identify the locality of plants or plant communities that are of conservation concern (e.g. Red Data listed species) that were confirmed to occur or are likely to occur on the site or within its immediate surrounds;
- Assessment of the expected impacts that the proposed development could have on the vegetation observed, as well as cumulative impacts on nearby sensitive vegetation communities - if present; and
- Provide recommendations to mitigate impacts on vegetation including, to conserving threatened species or sensitive vegetation groupings if found to be present on the sites.

The terms of reference for the fauna study were as follows:

- Identification of the types of fauna habitat, especially ecologically sensitive areas, along the route and for 100m either side of the proposed road as well as within the greater study area with reference to mammals, avifauna and herpetofauna (reptiles and amphibians);
- Identification of the mammal, avifauna and herpetofauna species, with particular reference to endangered species, which could possibly occur on site;
- Identification of potential impacts of the proposed development on the fauna, if any;
- Provide mitigation measures of the proposed development on the fauna; and
- Provide a classification of each impact identified.

The site's ecological impacts are detailed below.

Faunal Disturbance / Persecution

Artificial lighting, noise and vibration associated with construction related activities will result in the redistribution of fauna assemblages or cause changes in fauna behaviour. These impacts may alter reproductive behaviours, cause disorientation, hamper communication, affect nesting choices, disrupt competitive hierarchies and either increase or reduce predation success rates of various species. (Francis et al. 2009). In addition, noise may negatively affect the foraging success of species such as bats that rely on acoustic cues when hunting (Schaub et al. 2008). Although the fauna assemblages on site are not of conservation concern they should be maintained to ensure species continuity of those that do utilise the area for distribution or foraging. Construction elements should be controlled to provide minimum disturbances to fauna assemblages.

Table 17: Significance of project on Fauna Disturbance/Persecution

	Extent	Intensity	Duration	Consequence	Probability	Significance
Construction and Operational Phase						
Without mitigation	Local 1	Medium 2	Medium term 2	Low 3	Possibly 2	VERY LOW
With mitigation	Local 1	Low 1	Short term 1	Very Low 3	Improbable	INSIGNIFICANT

Impacts on vegetation

Most of the study area is situated on secondary and transformed vegetation. The most significant impact is expected to occur during the construction phase. The greatest threat to the rehabilitation of the land disturbed by construction is the potential of invasive plant species to colonise the disturbed soil and spread into adjacent natural areas. If remedial measures and monitoring is properly employed, the vegetation that will be disturbed during construction could rehabilitate well over time, and long term impacts on vegetation and faunal habitats could thus be minimal. Furthermore, the presence of proximate access roads and dirt roads will greatly reduce the impacts if the existing roads and already disturbed areas are employed during construction.

Clearing and removal of vegetation

The construction of the access roads will inevitably require the removal vegetation for the purpose of building the new infrastructure and access routes. Removal of vegetation in proximity to the moist grassland, without proper rehabilitation or failure of rehabilitation. The vegetation within the study area is already secondary and therefore no natural vegetation clearing will occur, therefore a lower intensity was assigned to the impact.

Table 18: Significance of clearing and removal of vegetation

	Extent	Intensity	Duration	Consequence	Probability	Significance
Construction Phase						
Without mitigation	Local 1	Medium 2	Medium term 2	Medium 6	Probable 3	MEDIUM
With mitigation	Local 1	Low 1	Short term 2	Low 4	Probable 3	VERY LOW
Operation Phase						
Without mitigation	Local 1	Medium 2	Long term 3	Medium 6	Probable 3	MEDIUM

With mitigation	Local 1	Medium 2	Medium term 2	Low 5	Possible 2	VERY LOW

Exposure to erosion

The removal of surface vegetation, whether natural or disturbed, will expose the soils, which in rainy events would wash down into proximate moist grasslands/wetlands, causing sedimentation. In addition, indigenous vegetation communities are unlikely to colonise eroded soils successfully and seeds from proximate alien invasive plant species will spread easily into these eroded soils.

Table 19: Exposure to erosion significance rating

	Extent	Intensity	Duration	Consequence	Probability	Significance
Construction Phase						
Without mitigation	Local 1	Medium 2	Long –term 2	Medium 6	Probable 3	MEDIUM
With mitigation	Local 1	Medium 2	Medium term 2	Low 5	Possible 3	VERY LOW
Operational Phase						
Without mitigation	Local 1	Medium 2	Long term 3	Medium 6	Probable 3	MEDIUM
With mitigation	Local 1	Medium 2	Medium term 2	Low 5	Possible 2	VERY LOW

Potential increase in invasive vegetation

The proposed development area includes a large number of alien invasive plant species, of which nine (9) are classified as category 1 invaders by the NEMBA. The seed of alien invasive plant species that occur on and in the vicinity of the construction areas could spread into the disturbed areas. Also, the construction vehicles and equipment were likely used on various other sites and could introduce alien invasive plant seeds or indigenous plants not belonging to this vegetation unit to the construction site.

Table 20: Potential increase in invasive vegetation significance rating

	Extent	Intensity	Duration	Consequence	Probability	Significance
Construction Phase						
Without mitigation	Local 1	High 3	Long term 3	Very High 8	Probable 3	VERY HIGH
With mitigation	Local 1	Medium 2	Medium term 2	Medium 6	Possible 2	LOW
Operational Phase						
Without mitigation	Regional 2	High 3	Long term 3	Very High 8	Probable 3	VERY HIGH
With mitigation	Local 1	Medium 2	Medium term 2	Low 5	Possible 2	VERY LOW

Soil compaction

The movement of heavy machinery over vegetated areas will result in soil compaction that will modify habitats, destroy vegetation and inhibit re-vegetation. Soil compaction as a result of vehicles and traffic, could lead to a decrease of water infiltration and an increase of water runoff. Such areas are more likely to be colonised by pioneer, alien invasive plant species, than indigenous species. This will further transformed the vegetation of the area.

Table 21: Significance of soil compaction significance rating

	Extent	Intensity	Duration	Consequence	Probability	Significance
Construction Phase						
Without mitigation	Local 1	Medium 2	Long –term 3	Medium 6	Probable 3	MEDIUM
With mitigation	Local 1	Low 1	Medium – term 2	Very low 4	Possible 2	INSIGNIFICANT

Disturbance / impacts to moist grassland, loss of stabilising vegetation

Destruction of the vegetation within and in proximity to the moist grasslands could impact on its hydrological function. Polluted water or sediment reaching moist grasslands will have detrimental effects on the vegetation and hydrology. Soil erosion could lead to increased sedimentation and turbidity, which could then reduce water storage capacity, smother vegetation, and decrease oxygen concentration. In addition, the lack of natural vegetation

could drastically reduce water holding capacity and the subsequent loss of the ecological function of the moist grassland vegetation. This could have a cumulative impact on plants within these areas, as well as other hydrologically connected areas.

Table 22: Disturbance / impacts to moist grassland, loss of stabilising vegetation significance rating

	Extent	Intensity	Duration	Consequence	Probability	Significance
Construction Phase						
Without mitigation	Regional 2	Medium 2	Long –term 2	Medium 6	Probable 3	MEDIUM
With mitigation	Local 1	Low 1	Medium – term 2	Low 4	Possible 2	VERY LOW

8.2.3 Impact on ambient noise

The proposed activities will contribute to noise in the receiving environment and will therefore be assessed in the impact ratings in the EIA phase. For this task, Eco Elementum (Pty) Ltd specialist were utilised. The terms for reference for the environmental noise study were:

- Identify key noise sources associated with the proposed project,
- Identify sensitive receivers with in the surrounding environment,
- Undertaken field measurement to determine the baseline noise condition at the site and at identified sensitive receiver sites,
- Modelled and predicted the change in noise levels associated with operation of the proposed project,
- Proposed mitigation for identified noise impacts and state the effectiveness of the proposed mitigation in addressing the identified change in noise at point of receiver.

According to the site assessment conducted by the specialist, almost all of the noise measurements sampling points was above the allowable limit as per SANS 10103:2008, although it only transgressed slightly. Impact s are anticipated to occur during the construction and the operational phase

The following activities during the construction phase are identified as possible noise sources;

- Offloading of construction materials;
- Excavations and backfilling where required;
- Concrete mixing and batching;

- Use and maintenance of roads;
- Machinery noise from construction related activities.

The construction machinery will be a source of continuous noise throughout the construction phase. Offloading of construction materials and clearing the bins of the loader trucks contribute to increased ambient noise. Excavation machinery and backfilling where required of excavations also result in noise pollution. Concrete mixing and batching especially when coarse stone material is being mixed result in increased noise levels. Vehicle use and maintenance of roads would result in engine noise as well as wheel noise on the hardened surfaces. Construction of the associated infrastructure in support of the proposed operations all require various forms of construction equipment to be used which could potentially result in higher than usual ambient noise levels to be experienced during this phase.

Table 23: Significance of noise impact during the construction phase

	Extent	Intensity	Duration	Consequence	Probability	Significance
Construction Phase						
Without mitigation	Local 1	Medium 2	Short term 1	Very Low 4	Definite 4	LOW
With mitigation	Local 1	Low 1	Short term 1	Very Low 3	Probable 3	VERY LOW

The following activities during the operational phase are identified as possible noise sources:

- Use and maintenance of haul roads (incl. transportation of material to plant and offsite),
- Removal of clinker bearing material (mining process) and stockpiling,
- Machinery and excavation noise,
- Use and maintenance of conveyors,
- Crushing and screening,
- Trucks clearing their load bins before loading,
- Vehicle travelling to and from site on a daily basis.

The operational machinery will be a source of continuous noise throughout the operational phase. The crushing and screening activities during operational phase are identified as the highest noise producing source. Dump mining fleet vehicles working on loading and transporting of clinker-bearing material also result in increased noise. Clearing of bins when trucks enter the loading facility also result in ambient noise increasing. Various vehicles travelling on the access road leading to the offices and main operational complex will also

contribute to ambient noise levels increasing. Conveyors also contribute to noise, although there's minimal noise sensitive receptors in the vicinity of this infrastructure.

Table 24: Significance of noise impact during operational phase

	Extent	Intensity	Duration	Consequence	Probability	Significance
Operational Phase						
Without mitigation	Local 1	Medium 2	Short term 1	Very Low 4	Definite 4	LOW
With mitigation	Local 1	Low 1	Short term 1	Very Low 3	Probable 3	VERY LOW

8.2.4 Socio-economic impacts

New projects are known to bring changes to their surrounding human populations. It is therefore important that such changes be studied in detail to determine the impact the project will bring. Mawenje Consulting Africa was appointed to conduct the Social Impact Assessment (SIA) to understand the social change that will be brought by the proposed project. Social impact assessment (SIA) is a tool used to review the social effects of infrastructure projects and other development interventions Social impact assessment includes the processes of analysing, monitoring and managing the intended and unintended social consequences, both positive and negative, of planned interventions (policies, programs, plans, projects) and any social change processes invoked by those interventions. Its primary purpose is to bring about a more sustainable and equitable biophysical and human environment. The terms of reference for the SIA were:

- Description of the baseline social environment;
- Description of the proposed project elements which could bring about change to the social and economic environment;
- A description and assessment of the potential social and economic impacts associated with the proposed activities; and
- Proposed measures to enhance potential positive social benefit and mitigate negative social/economic.

The key social issues identified during the SIA can be divided into:

- The policy and planning related issues; and
- Local, site-specific issues.

The local site-specific issues can in turn be divided into construction and operational related issues. These issues are discussed and assessed below. The potential impacts associated with the associated off-site transportation and management are also assessed.

8.2.4.1 Policy and Planning Issues

Legislative and policy context plays an important role in identifying and assessing the potential social impacts associated with a proposed development. In this regard, a key component of the SIA process is to assess the proposed development in terms of its fit with key planning and policy documents. The review of the relevant planning and policy documents was undertaken as a part of the SIA.

It has been determined that the proposed ash reclamation project will be re-establishing the compliance practice to the relevant legal and other requirements by rectifying the damage already induced while at the same time implementing some of the municipal's policy objectives. This development will therefore be supporting some of the key objectives outlines in the Municipal's IDP such as:

- To create an attractive and conducive environment for sustainable economic growth and empowerment for the business and broader communities within ELM; and
- To contribute to the health and safety of communities in Emalahleni through the pro-active identification, mitigation and management of health including environmental health, fire and disaster risks.

The findings of the review of the relevant policies and documents pertaining to this ash dump reclamation project indicate that such development is supported at a national, provincial, and local level. It is therefore, the opinion of the authors that the proposed ash dump reclamation is supported by national, provincial and local policies and planning guidelines.

Table 25: Significance of creation of employment and income

	Extent	Intensity	Duration	Consequence	Probability	Significance
Operational Phase						
Without mitigation	Local 1	Medium 2	Medium term 1	Low 5	Probable 3	MEDIUM (Positive)
With mitigation	Local 1	Low 1	Medium term 1	Low 5	Definite 4	HIGH (Positive)

Table 26: Brick production for housing development

	Extent	Intensity	Duration	Consequence	Probability	Significance
Operational Phase						
Without mitigation	Local 1	Medium 2	Medium term 1	Low 5	Probable 3	HIGH (Positive)
With mitigation	-	-	-	-	-	There are no mitigation measures as this is a positive impact

8.4.2.2 Local and site specific impacts

A survey was conducted to during a public meeting undertaken on 06 May 2017with the community members of the Emalahleni Extension 8 area. The survey comprised questions such as the period that the locals had been residing in the area for, the opinion (negative and positive) of the locals regarding the project and the effects that the residents think the ash dump has or may have had on the area and its residents.

The key concerns and views expressed by the residents of Emalahleni Extension 8 in the questionnaires during the public meeting (06 May 2017) are as follows:

- The project would induce a lot of air pollution in the form of dust;
- The project would cause a lot of traffic congestion due to the presence of trucks;
- The quality of roads will decrease even further and the number of potholes will increase;
- There would be a lot of noise pollution should the proposed project commence; and
- Locals would be exposed to hazardous chemical substances from the clinker during the operational phase.

Table 27: Health impacts associated with the operations

	Extent	Intensity	Duration	Consequence	Probability	Significance
Operational Phase						
Without mitigation	Local 1	High 3	Medium term 2	Medium 6	Probable 3	MEDIUM
With mitigation	Local 1	Low 1	Medium term 1	Low 5	Definite 4	LOW

The nuisance is expected to last a short while in which the ash dump will be completely removed at the end of operation and therefore restore the sense of place and aesthetic value.

Table 28: Visual impact associated with the proposed operations

	Extent	Intensity	Duration	Consequence	Probability	Significance
Operational Phase						
Without mitigation	Local 1	High 3	Medium term 2	Medium 6	Definite 3	MEDIUM
With mitigation	Local 1	High 1	Permanent 4	Very high 9	Probable 3	VERY HIGH (Positive)

Table 29: Potential safety impacts associated with crush machinery and movement of vehicles

	Extent	Intensity	Duration	Consequence	Probability	Significance
Operational Phase						
Without mitigation	Local 1	High 3	Medium term 2	Medium 6	Probable 3	MEDIUM
With mitigation	Local 1	Medium 1	Medium term 3	Low 5	Probable 3	LOW

Socio-economic Cumulative impacts

Positive Cumulative Impacts

- Creation of permanent employment and skills and development opportunities for members from the local community and creation of additional business and economic opportunities in the area.
- Promotion of social and economic development and improvement in the overall well-being of the community
- At the completion of the project, the aesthetic value of the site will be restored as the site will not be having at ash dump any more.

Negative Cumulative Impacts

- Long term exposure of the workers to the ash dump could give rise to potential illness in a long run.

- The display of heavy machinery and dust during the operational phase of the project may not be aesthetically appealing to the residents that are near the ash dump

8.2.5 Air Quality Impacts

Airshed Planning Professionals (Pty) Ltd (Airshed) was appointed to undertake an air quality impact assessment for the Project. The terms of reference for the air quality study were:

- Study of the receiving environment in the vicinity of the project including air quality sensitive receptors (AQSRs);
- Description of the sources of emission and associated pollutants by reviewing the proposed project activities;
- Study of regulatory requirements and inhalation thresholds for identified key pollutants against which compliance need to be assessed and health risks screened;
- The compilation of an emissions inventory;
- Modelled the atmospheric dispersion to simulate ambient air pollutant concentrations and dustfall rates as a result of the Project; and
- Screen assessment to determine compliance of simulated pollutant concentrations and rates with ambient air quality standards and guidelines.

8.2.5.1 Atmospheric Emissions

(a) Construction phase impacts

It is anticipated that construction phase activities for this Project will be limited and mainly focused on road construction. Although construction operations are potentially significant sources of dust emissions, the impact on local air quality will be temporary. No information was made available as to the road construction period, and therefore the construction phase emissions were not quantified.

(b) Operational Phase Impacts

During the operation the ash reclamation process will comprise two phases. Phase 1 will include the excavation of ash on the southwest corner of the dump. Ash will be cooled down and kept moist by pumping 1000 m^3 water per day to the active area of the dump, from where it will be hauled via haul trucks to a mobile screening plant where the ash will be screened and thereafter stockpiled before being sold as aggregate to concrete product manufacturers, such as brick factories.

For Phase 2 a fixed primary and secondary crushing plant will be constructed on the area that had been cleared during Phase 1, with conveyors used to feed the crusher with excavated ash from the top of the dump. The crushed product will be stockpiled using closed conveyors and then loaded to trucks for transport off-site (also using conveyors). The haul road on top of the ash dump will be longer for Phase 2 than for Phase 1, where hauling activities were limited to the southwest corner of the dump.

As part of the project an access road will be constructed. Two possibilities were investigated in the study, viz. an unpaved versus a paved access road.

The sources of emission and associated pollutants considered in the emissions inventory for the operational phase include:

- Materials handling – $PM_{2.5}$, PM10, TSP
- Entrained dust from unpaved roads - $PM_{2.5}$, PM_{10}, and TSP
- Entrained dust from the access road - $PM_{2.5}$, PM_{10}, and TSP
- Crushing and screening – $PM_{2.5}$, PM_{10}, TSP

The following may be inferred from the emissions inventory:

Phase 1

- Vehicle entrained dust from roads contribute most notably to estimated PM emissions.
    - Unpaved case scenario (Figure 30): About 39% to 82% of emissions are expected to be due to road dust when design mitigation is applied. Screening is the second highest source of PM emissions, with percentage contributions ranging from 17% to 60%. The lowest emission source is materials handling, with percentage contributions ranging from 0.6 to 0.9%.
    - Paved case scenario (Figure 31): About 33% to 73% of emissions are expected to be due to road dust when design mitigation is applied. Screening is the second highest source of PM emissions, with percentage contributions ranging from 26% to 66%. The lowest emission source is materials handling, with percentage contributions ranging from 0.8 to 1.5%.

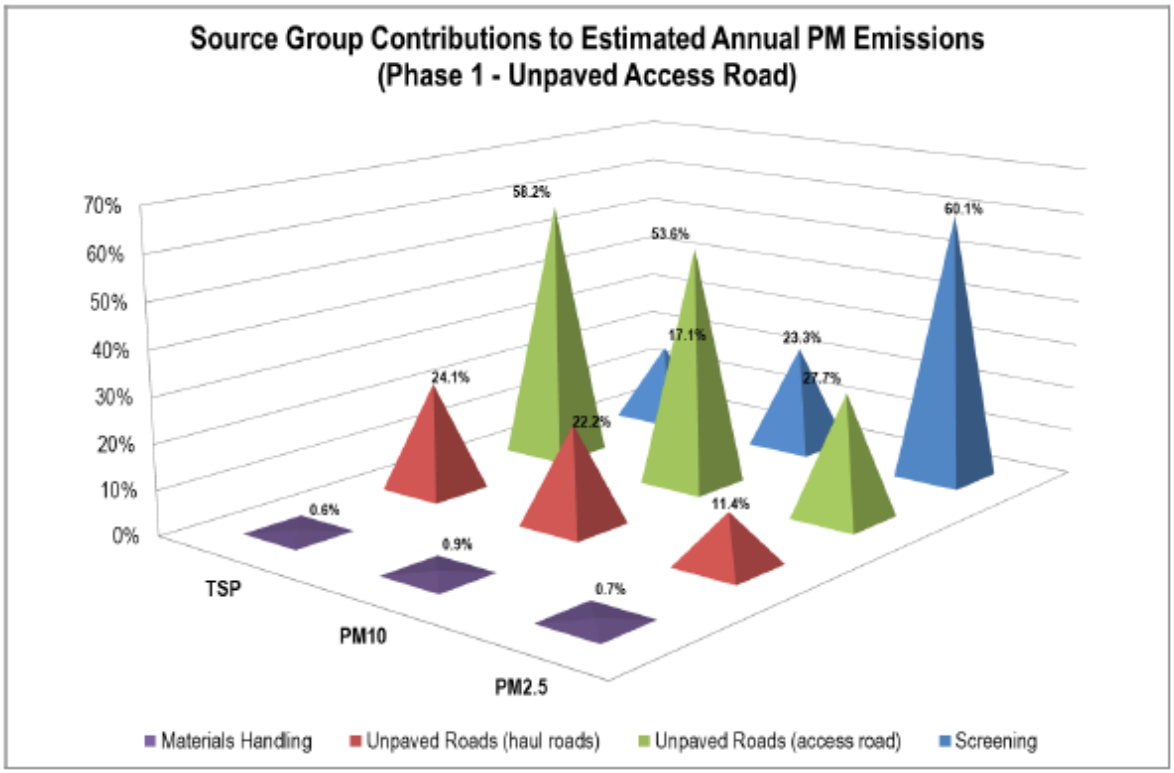


Figure 32: Source group contributions to estimated annual PM emissions (Phase 1 – unpaved access road)

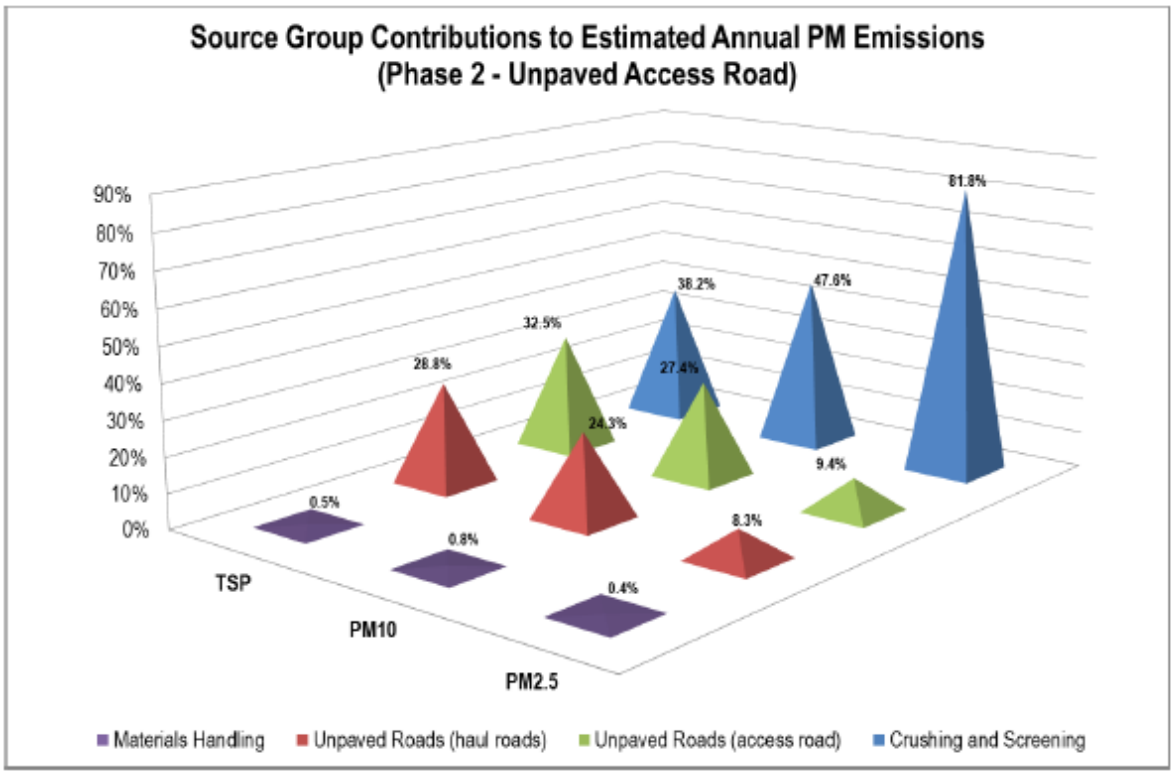


Figure 33: Source group contributions to estimated annual PM emissions (Phase 2 – unpaved access road)

Phase 2

- Vehicle entrained dust from roads contribute most notably to estimated TSP and PM10 emissions, but crushing and screening contribute most to estimated $PM_{2.5}$ emissions.
  - Unpaved case scenario (Figure 32): About 18% to 61% of emissions are expected to be due to road dust when design mitigation is applied. The percentage contributions due to crushing and screening range from 38% to 82%. The lowest emission source is materials handling, with percentage contributions ranging from 0.4 to 0.8%.
  - Paved case scenario (Figure 33): About 15% to 52% of emissions are expected to be due to road dust when design mitigation is applied. The percentage contributions due to crushing and screening range from 47% to 84%. The lowest emission source is materials handling, with percentage contributions ranging from 0.4 to 1.0%.

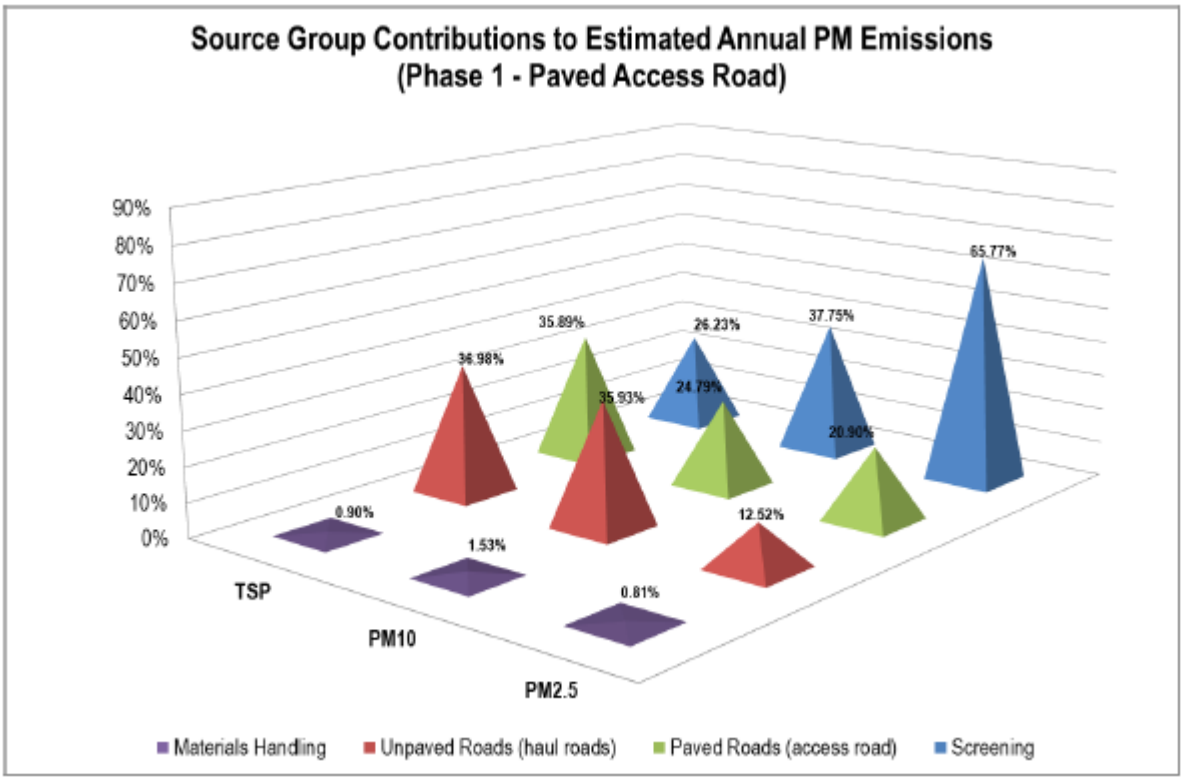


Figure 34: Source group contributions to estimated annual PM emissions (Phase 1 – paved access road)

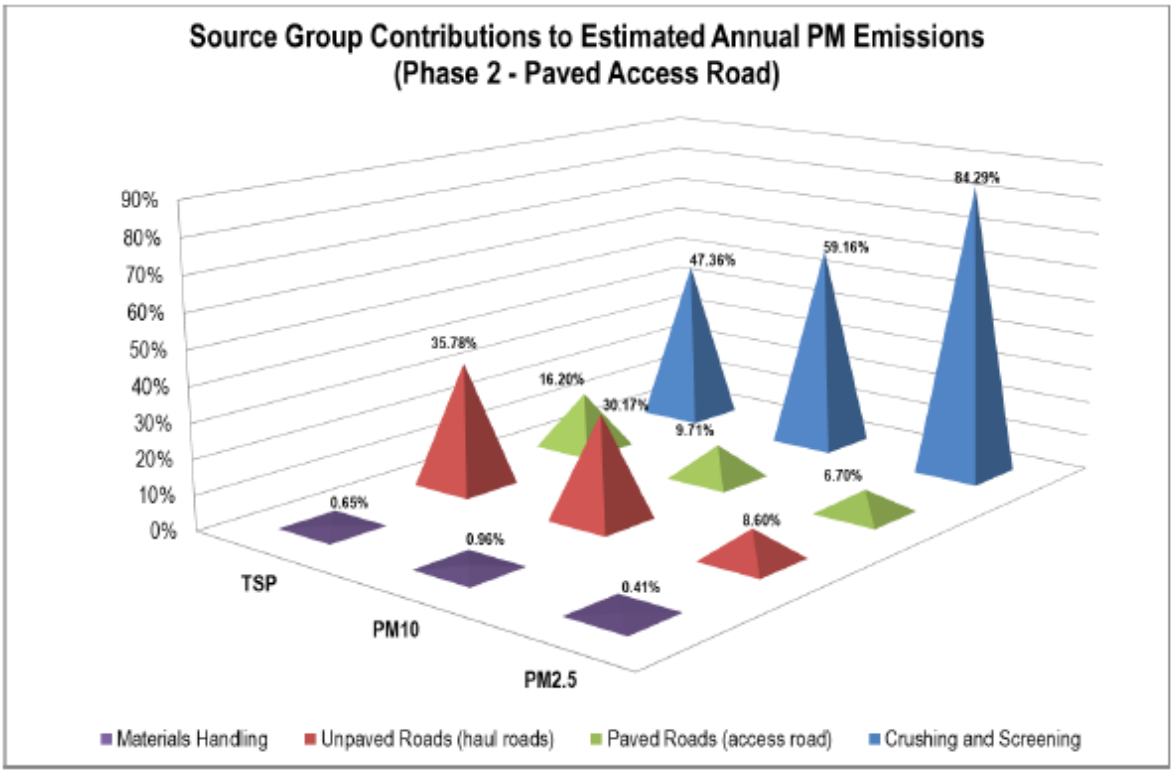


Figure 35: Source group contributions to estimated annual PM emissions (Phase 2 – paved access road)

(c) Closure Phase

All operational phase activities will have ceased by the closure phase of the Project. The potential for impacts during the closure phase will depend on the extent of rehabilitation efforts undertaken at the plants, temporary roads and stockpiles areas. Activities associated with the closure phase of the Project include the demolition and stripping away of buildings and facilities as well as wind-blown dust from exposed areas. According to Clinker Supplies, at the closure phase, all of the ash will have been cleared with no residue remaining, and the property will be re-zoned for commercial purposes. Hence, emissions during the closure and post closure phases are expected to be insignificant.

8.2.5.1 Dispersion Simulation Results, Health Risk and Nuisance Screening (Operational Phase)

Pollutants with the potential to result in human health impacts and assessed in this study include $PM_{2.5}$ and PM_{10}. Dustfall is assessed for its nuisance effects.

$PM_{2.5}$ Impact

The areas of non-compliance with highest daily $PM_{2.5}$ NAAQS for Phase 1 are shown in Figure 34 (for a case scenario with an unpaved access road) and Figure 35 (in the case of a paved access road) respectively. The figures show that exceedances of the highest daily $PM_{2.5}$ NAAQS

are limited to the site only (for both case scenarios). The impact footprint for the case scenario "unpaved access road" is slightly larger than the corresponding footprint for the scenario "paved access road". No exceedances of the annual average $PM_{2.5}$ NAAQS were predicted (for both case scenarios).

The areas of non-compliance with highest daily $PM_{2.5}$ NAAQS for Phase 2 are shown in Figure 36 (for a case scenario with an unpaved access road) and Figure 37 (in the case of a paved access road) respectively. The figures show that simulated exceedances of the highest daily $PM_{2.5}$ NAAQS extend slightly (~40 m) over the western and southern Project boundaries (for both scenarios). Exceedances of the highest daily $PM_{2.5}$ NAAQ limit were predicted at the nearest 2 sensitive receptors (Evkompark and Highveld Single Quarters) and at 6 boundary receptors, but that the number of days exceeded were not more than 4 in one year and thus within the highest daily $PM_{2.5}$ NAAQS. No exceedances of the annual average $PM_{2.5}$ NAAQS were predicted (for both case scenarios). The significance rating is shown on Table 26 below.

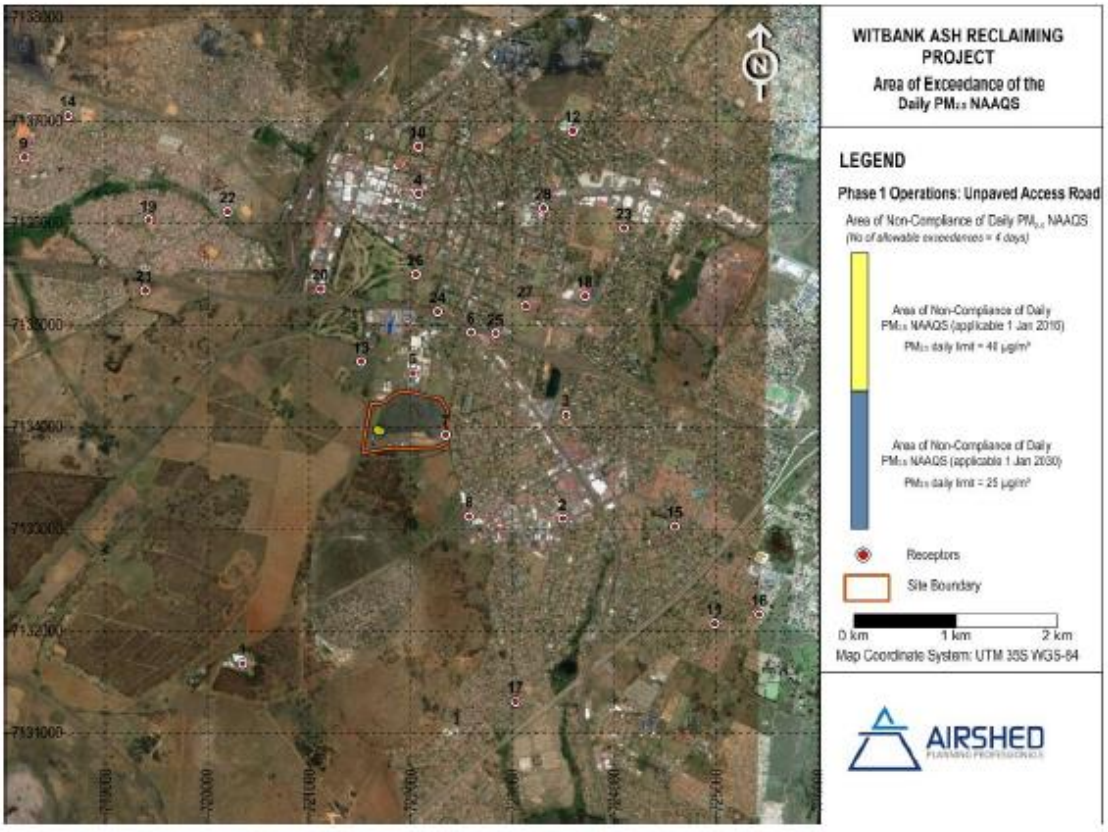


Figure 36: Area of exceedance of the 24-Hour SA NAAQS for PM2.5 (Phase 1 operations – unpaved access road)

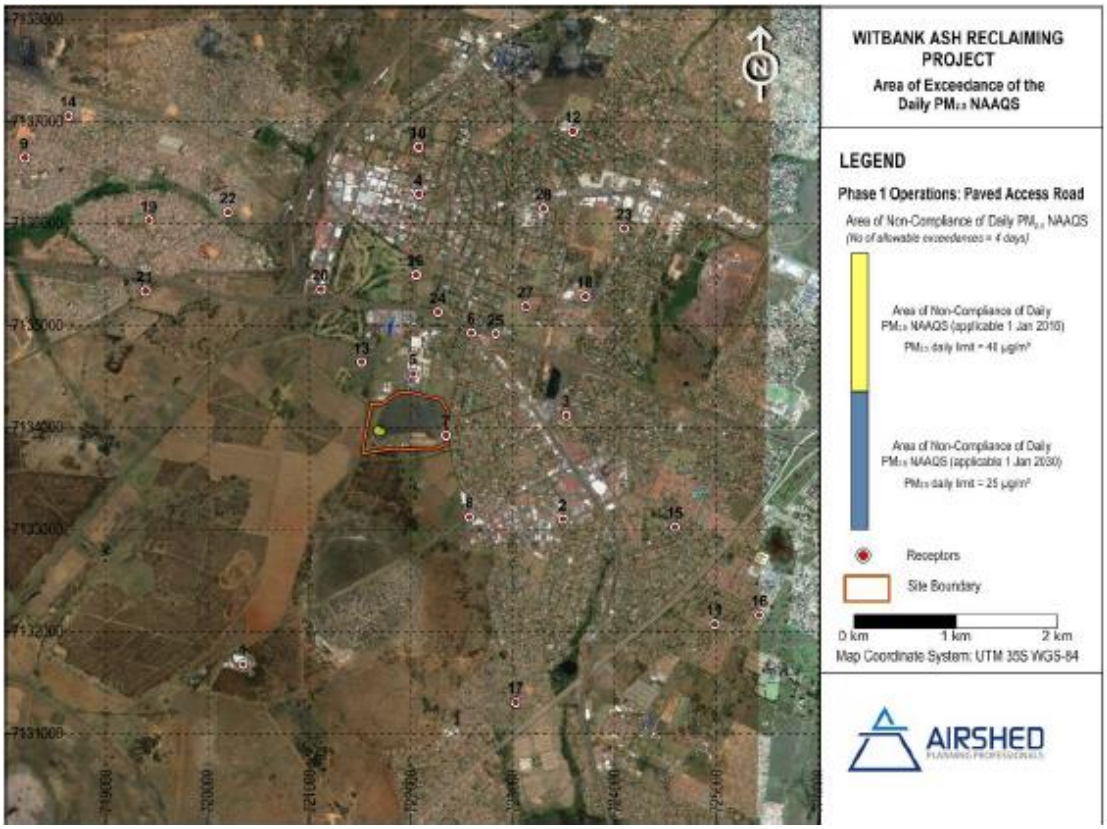


Figure 37: Area of exceedance of the 24-Hour SA NAAQS for PM2.5 (Phase 1 operations – paved access road)

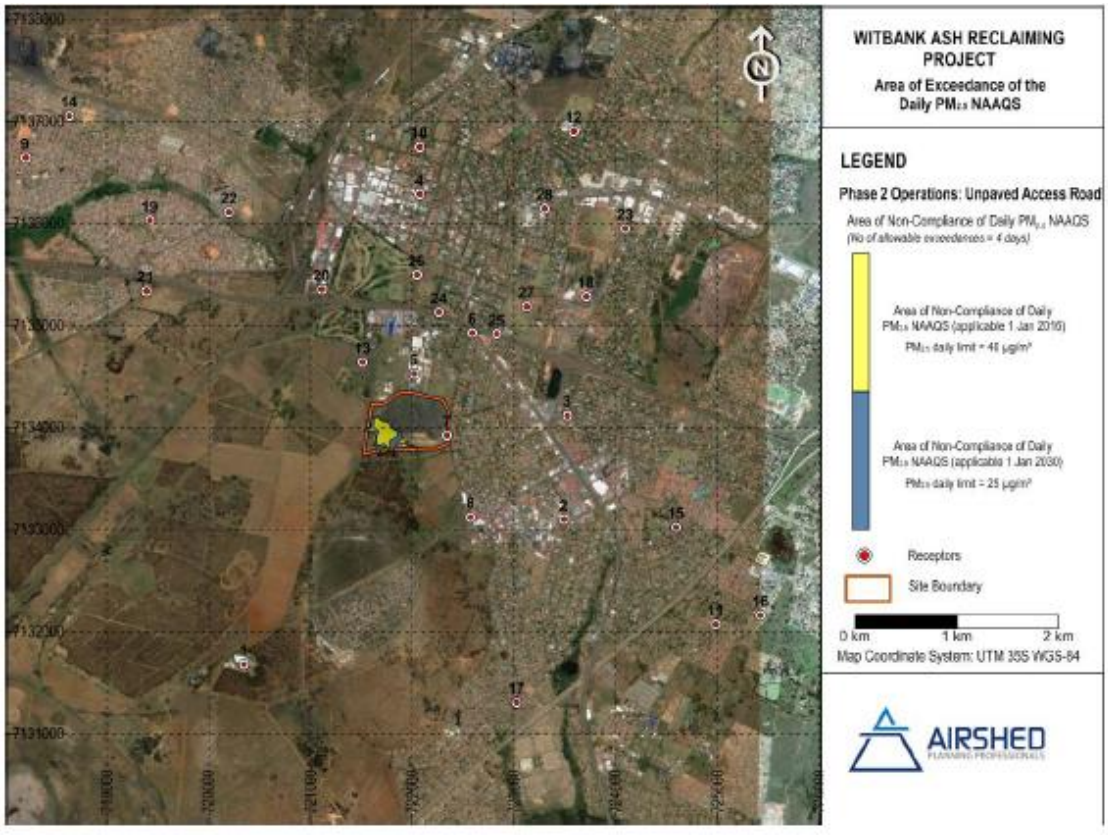


Figure 38: Area of exceedance of the 24-Hour SA NAAQS for PM2.5 (Phase 2 operations – unpaved access road)

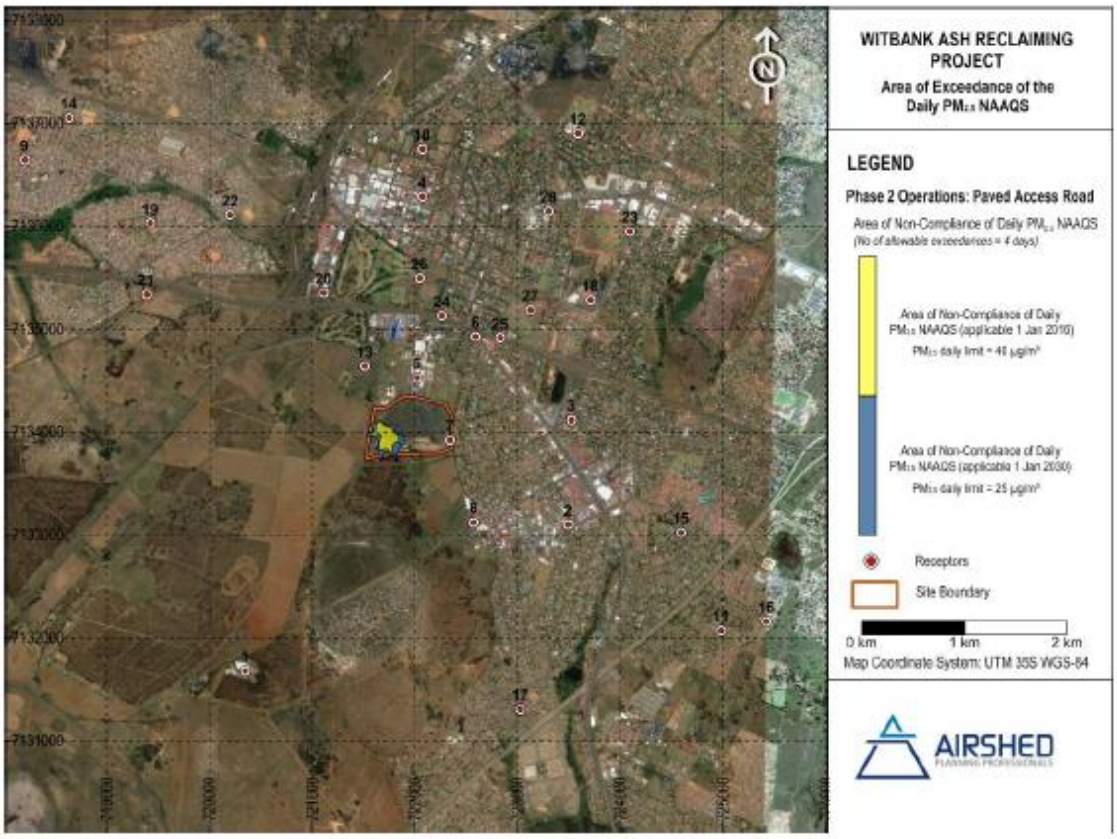


Figure 39: Area of exceedance of the 24-Hour SA NAAQS for PM2.5 (Phase 2 operations – paved access road)

Table 30: PM2.5 Impact significance rating

	Extent	Intensity	Duration	Consequence	Probability	Significance
Construction Phase						
Without or without mitigation	Local 1	Low 1	Short term 1	Very Low 3	Probable 3	Very Low
Operational Phase						
With mitigation	Local 1	Medium 2	Long term 1	Medium 6	Definite 4	Medium
Closure and Post Closure phase						
Without or without mitigation	Local 1	Medium 2	Short term 1	Very Low 4	Definite 4	Very Low

PM_{10} Impact

The areas of non-compliance with highest daily PM_{10} NAAQS for **Phase 1** are shown in Figure 38 (for a case scenario with an unpaved access road) and Figure 39 (in the case of a paved access road) respectively. The figures show that exceedances of the highest daily PM_{10} NAAQS are limited to the site

only (for both case scenarios). The impact footprint for the case scenario "unpaved access road" is slightly larger than the corresponding footprint for the scenario "paved access road". No exceedances of the annual average PM_{10} NAAQS were predicted (for both case scenarios).

The areas of non-compliance with highest daily PM_{10} NAAQS for **Phase 2** are shown in Figure 40 (unpaved access road) and Figure 41 (paved access road) respectively. Similar to the isopleths for $PM_{2.5}$, the figures show that simulated exceedances of the highest daily PM_{10} NAAQS extend slightly (~40 m) over the western and southern Project boundaries (for the unpaved access road scenario) and over the western Project boundary only (for the paved access road scenario). Exceedances at sensitive receptors and boundary receptors for Phase 2 operations (case scenario unpaved access road, i.e. worst case scenario) shows the highest daily PM_{10} NAAQ limit were predicted at 5 boundary receptors, but that the number of days exceeded were not more than 4 in one year and thus within the highest daily PM_{10} NAAQS. No exceedances of the annual average PM_{10} NAAQS were predicted (for both case scenarios).

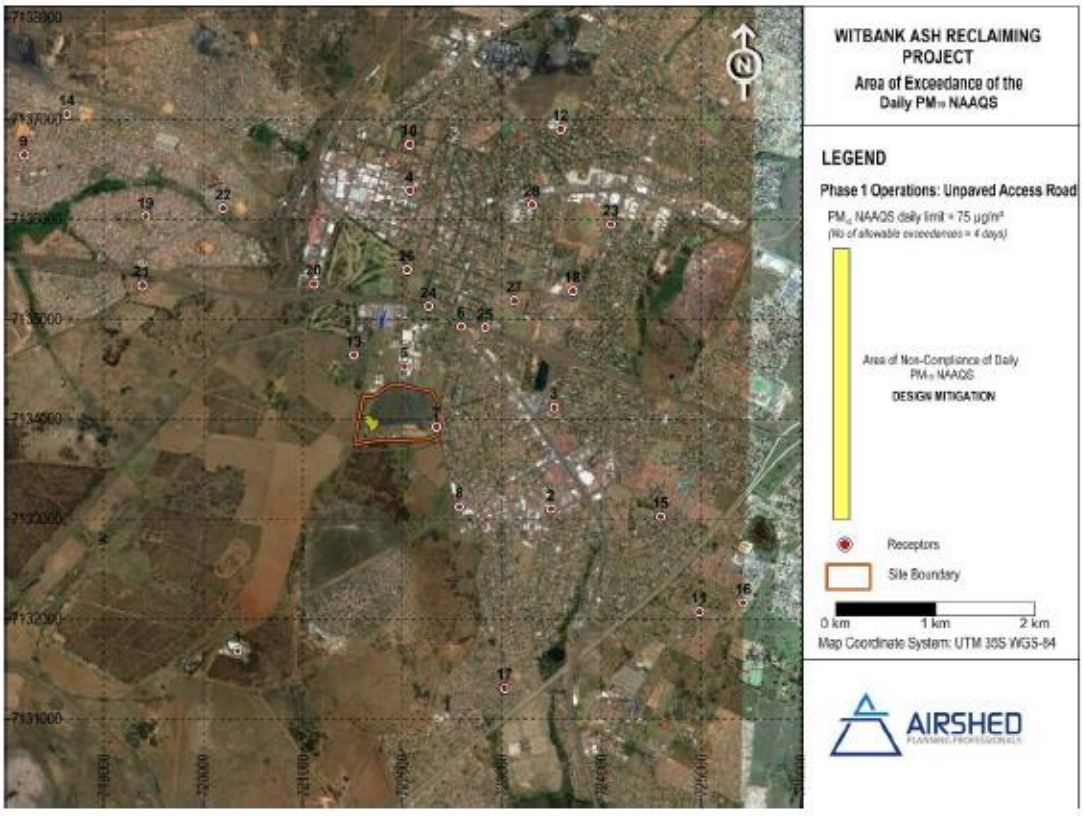


Figure 40: Areas of exceedance of the 24-Hour SA NAAQS for PM_{10} (Phase 1 operations – unpaved access road)

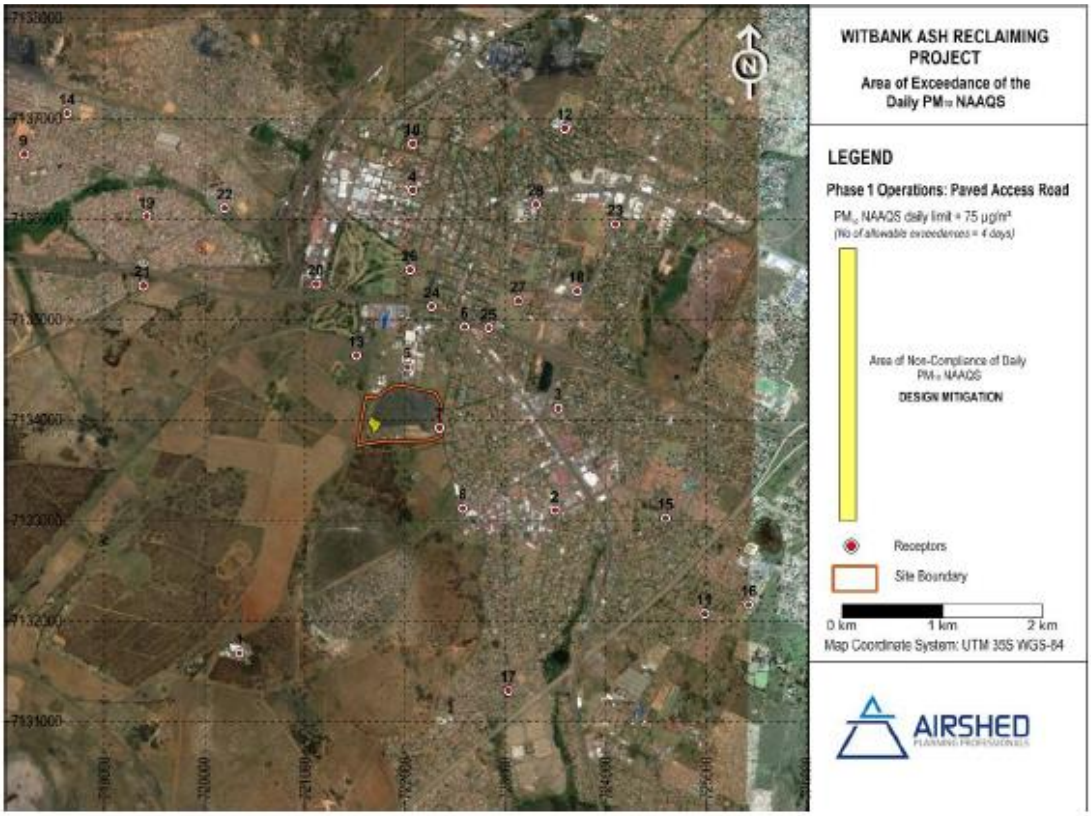


Figure 41: Areas of exceedance of the 24-Hour SA NAAQS for PM_{10} (Phase 1 operations – paved access road)

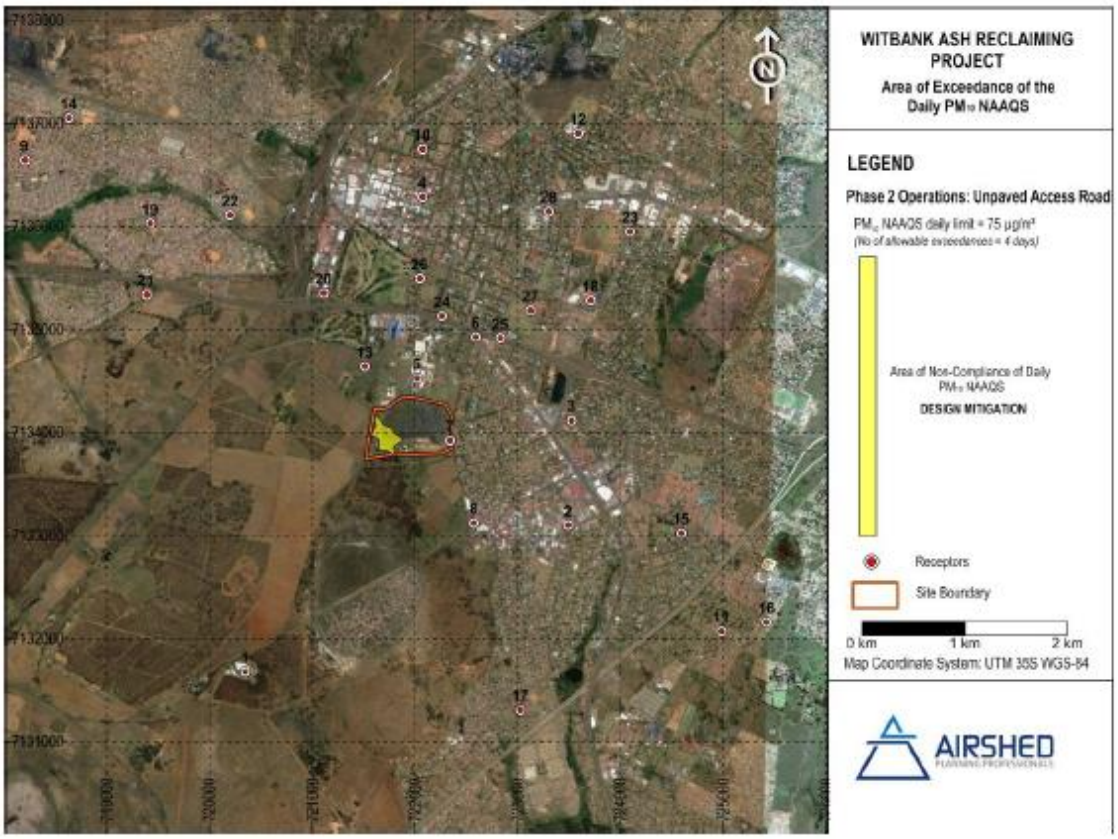


Figure 42: Areas of exceedance of the 24-Hour SA NAAQS for PM_{10} (Phase 2 operations – unpaved access road)

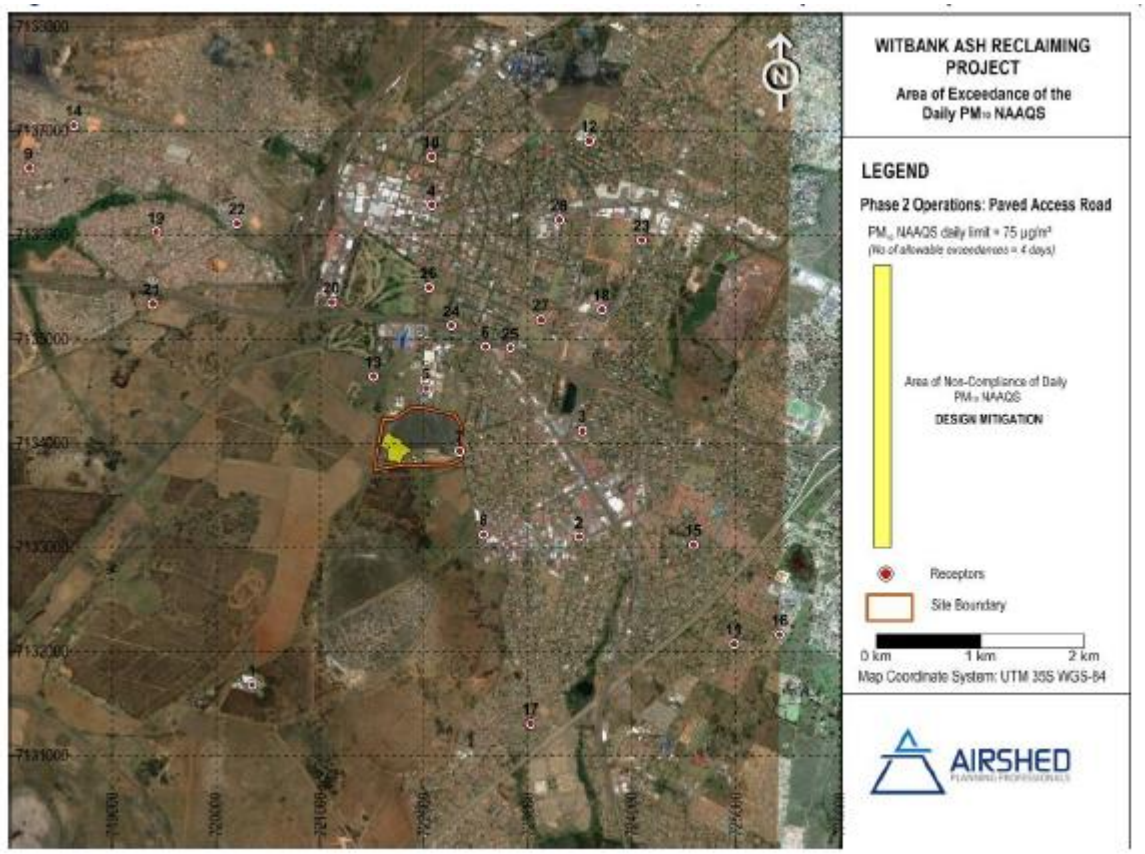


Figure 43: Areas of exceedance of the 24-Hour SA NAAQS for PM10 (Phase 2 operations – paved access road)

The PM_{10} significance rating is described on the Table 27 below.

Table 31: PM_{10} Impact significance rating

	Extent	Intensity	Duration	Consequence	Probability	Significance
Construction Phase						
Without or without mitigation	Local 1	Low 1	Short term 1	Very Low 3	Probable 3	Very Low
Operational Phase						
With mitigation	Local 1	Medium 2	Long term 1	Medium 6	Definite 4	Medium
Closure and Post Closure phase						
Without or without mitigation	Local 1	Medium 2	Short term 1	Very Low 4	Definite 4	Very Low

Dustfall Impact

The simulated highest monthly average dustfall levels (in mg/m²/day) due to proposed operations were assessed for compliance with NDCR.

The areas of non-compliance for **Phase 1** are shown in Figure 42 (case scenario unpaved access road) and Figure 43 (case scenario paved access road) respectively. The figures show that off-site exceedances of NDCR are predicted only for the unpaved access road scenario. No exceedances were predicted at the AQSR's.

The areas of non-compliance for **Phase 2** are shown in Figure 44 (case scenario unpaved access road) and Figure 43 (case scenario paved access road) respectively. The figures are similar to those of Phase 1 except for additional impacts due to the longer haul road on top of the dump. The figures again show that off-site exceedances of NDCR are predicted only for the unpaved access road scenario. No exceedances were predicted at the AQSR's.

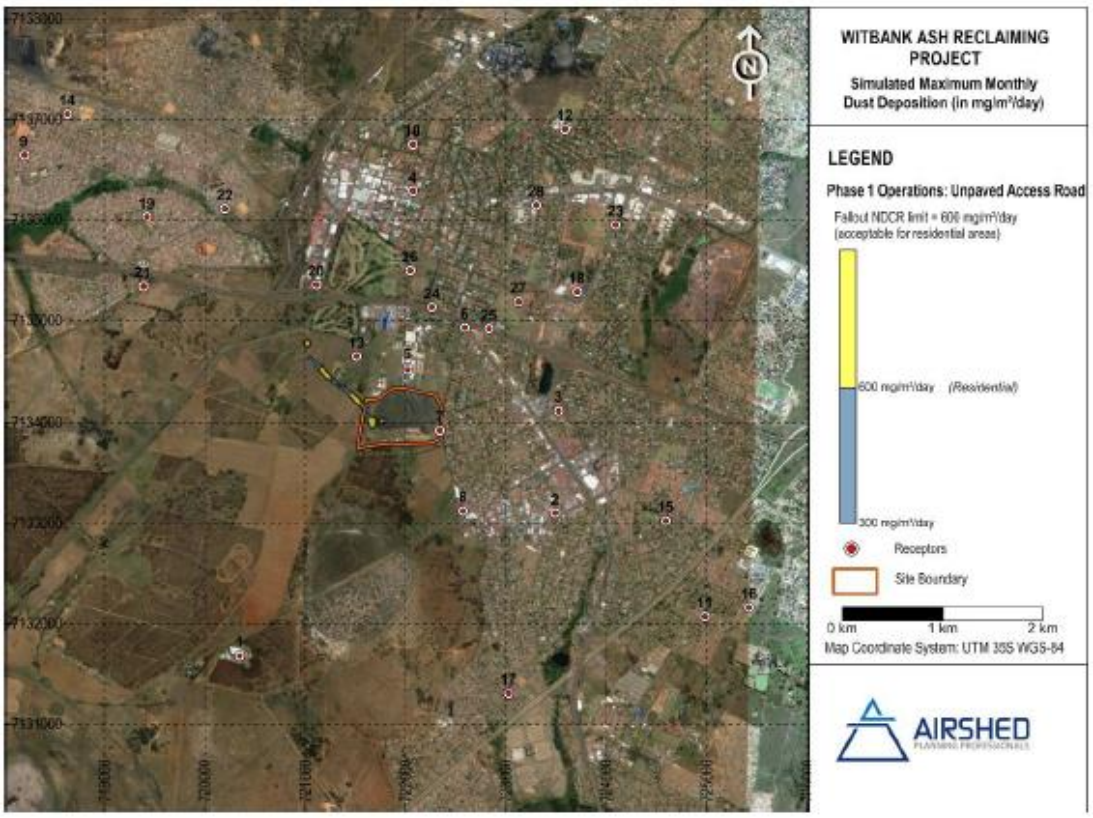


Figure 44: Area of exceedance of the dustfall limit for residential areas (Phase 1 – unpaved access road)

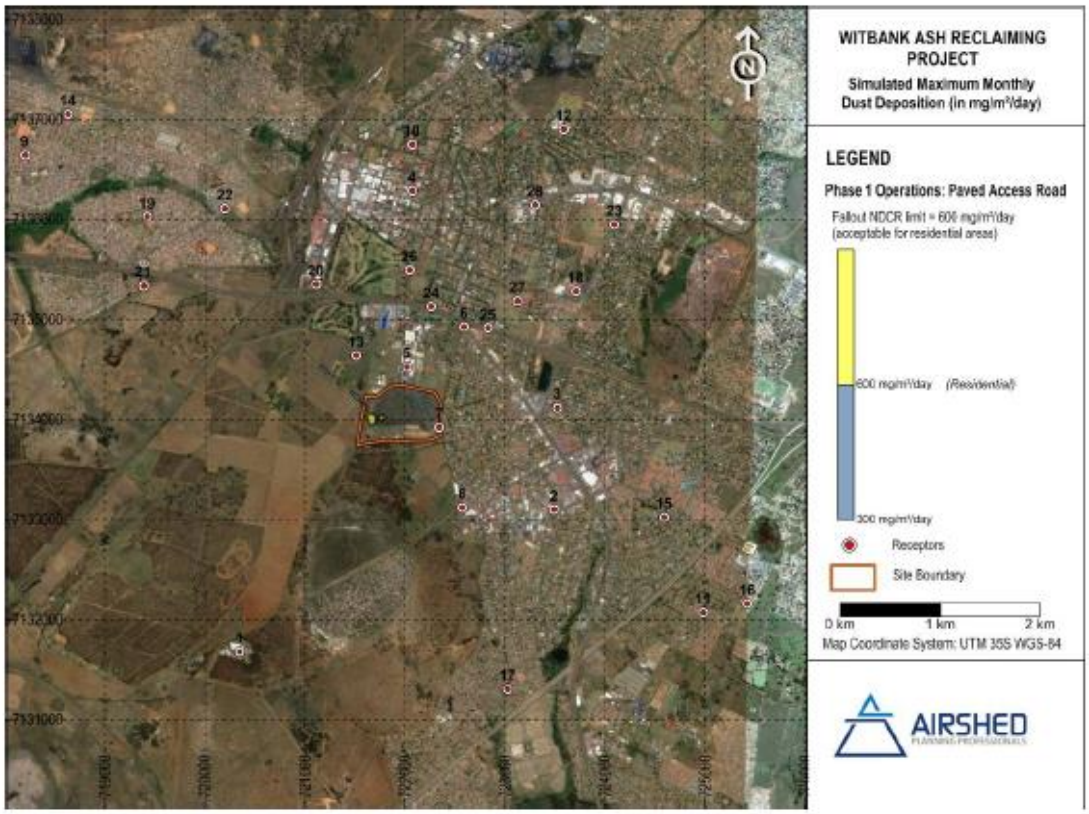


Figure 45: Area of exceedance of the dustfall limit for residential areas (Phase 1 – paved access road)

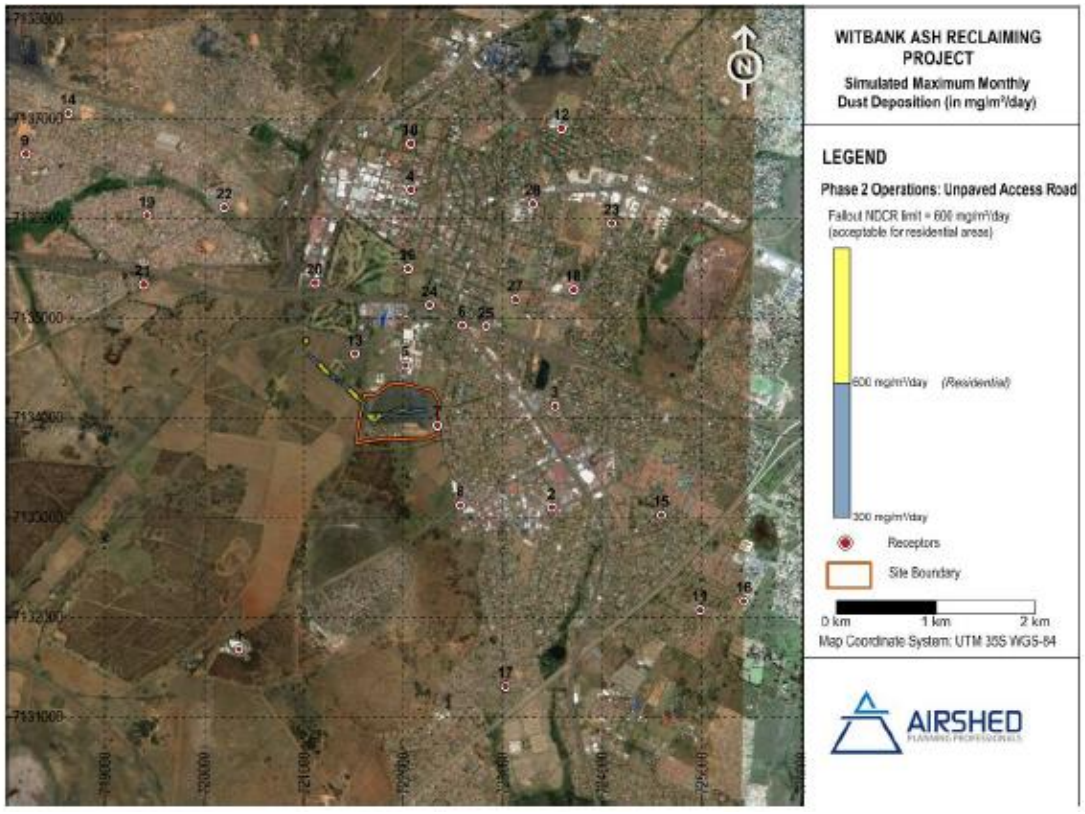


Figure 46: Area of exceedance of the dustfall limit for residential areas (Phase 2 – unpaved access road)

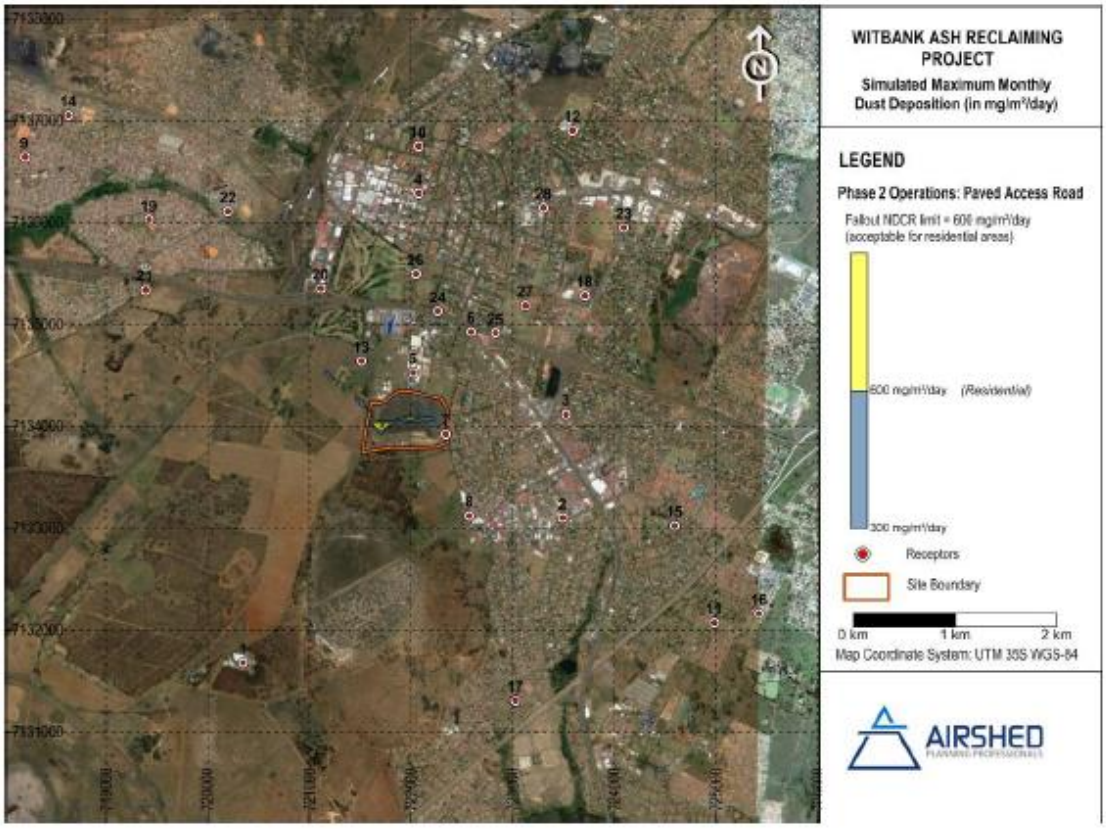


Figure 47: Area of exceedance of the dustfall limit for residential areas (Phase 2 – paved access road)

Table 32: Dustfall Impact significance rating

	Extent	Intensity	Duration	Consequence	Probability	Significance
Construction Phase						
Without or without mitigation	Local 1	Low 1	Short term 1	Very Low 3	Probable 3	Very Low
Operational Phase						
With mitigation	Local 1	Medium 2	Long term 1	Medium 6	Definite 4	Medium
Closure and Post Closure phase						
Without or without mitigation	Local 1	Medium 2	Short term 1	Very Low 4	Definite 4	Very Low

8.2.6 Traffic Impacts

Malani Padayachee & Associates (MPA) Consulting Engineers (Pty) Ltd were appointed by Clinker Supplies (Pty) Ltd to compile a Traffic Impact Assessment for the Ash Dump Reclamation Site. The proposed project will also include a construction of a new access road to

site both by workers and clients. The transport of the clinker and bricks from the site is the predominant traffic in this assessment. The terms of reference for the TIA were:

- Describe the baseline traffic conditions;
- Assesse the traffic volumes that will be generated by the proposed development and analysed the impact it may have on the surrounding road network;
- Determine the potential environmental and social (including health and safety) indirect, direct and cumulative risks / impacts to receptors from a traffic and transportation perspective for this project;
- Propose mitigation measures for identified significant risks / impacts and enhance positive risks / impacts of the project; and
- Identification of monitoring and capacity requirements, and costs for implementing the suggested mitigation measures.

8.2.6.1 Access options analysis

Two possible access route to the ash reclamation site are proposed. These are shown in the following image. It is possible for both accesses to be used. Option 1 is shown in red. The existing road is upgraded to accommodate trucks and this road is used to connect to the N4. Option 2 is shown in green and involves constructing a new road as shown in the Figure 5. The land required for this option has been discussed with relevant land owners. Option 2 is entirely feasible since the land owner (a mining Company)

Figure 48: Proposed access options to the ash dump

Table 33: Pros and cons for each option of the two access road

Option 1 (Red Line)	Option 2 (Green Line)
Longer Route (3.25km)	Shorter Route(1.18km)
Noise problem near residential suburb	No noise problem near residential suburb
Lower initial investment	Higher initial investment
Greater disruption to existing traffic	Less disruption to existing traffic
Higher traffic near a residential area	Lower traffic near a residential area
High additional volumes through intersections C4 and C5.	Low additional volumes through intersections C4 and C5

From the table it is clear that Option 2 is preferable and should be implemented. The intersection between the proposed road and Price Street should be 200m away from the Price Street/ Walter Sisulu Drive intersection which means it is still more than 100m from the bend in Price Street to the east of the intersection.

The proposed road will carry all of the future truck traffic and 70% of the future employee vehicle traffic.

8.2.6.2 Traffic Analysis of the intersections

The ADT for the N4 in 2013 was 41 395vpd with an ADTT of 2594vpd while in 2012 the ADT was 39 839vpd while the ADTT was 2499vpd. This suggests a 4% growth in traffic and truck traffic. This is predominantly on the N4 through route and the traffic using the interchange itself is expected to be lower.

The road network is already operating at high capacity and therefore it is assumed that the future growth rate will be about 2% for the next 15 years. The traffic analysis of 2012 and 2030 were conducted. The total traffic for 2021 includes the existing traffic counts grown at 2% for 5 years as well as the development trips. The total traffic for 2031 includes the existing traffic counts grown at 2% for 15 years as well as the development trips. These volumes were imposed on the existing intersection layouts.

These intersections were analysed:

- C1: Walter Sisulu Dr-Price St.
- C2A: Walter Sisulu Dr-N4
- C2B: Walter Sisulu Dr-N4

- C3: Walter Sisulu Dr-Colliery St.
- C4: Jellico St.-Van der Byl St.
- C5: Langenhoven St.-Watermeyer St.
- C6: Langenhoven St.-Visagie St.
- C7: Langenhoven St.-Sherly St.
- C8: Langenhoven St.-Longfellow St.

2021 Total Traffic (2021 Background Traffic + Development Traffic)

In order for this intersection to meet the capacity requirements of the total traffic in 2016, it should be signalised and a short right turn should be added to the east approach. This layout is shown in the following figure and will allow the intersection to operate acceptably even with the 2021 Total traffic. These upgrades are also required and acceptable for the 2031 background traffic; however, further upgrades are required for the 2031 Total traffic.

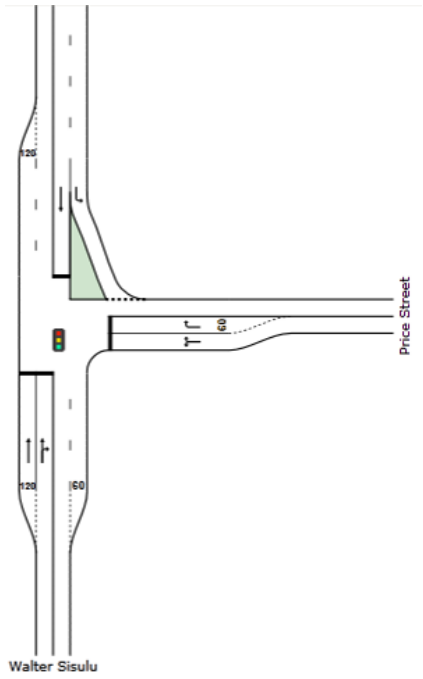


Figure 49: Required Upgrades to C1 for 2021 Total traffic

No further upgrades are required for C2b in the future; however, further C2a upgrades are required. In order for the 2021 Background traffic to be accommodated, yet another short additional through lane is required for the northbound traffic. No further upgrades are then required to accommodate the 2021 Total traffic.

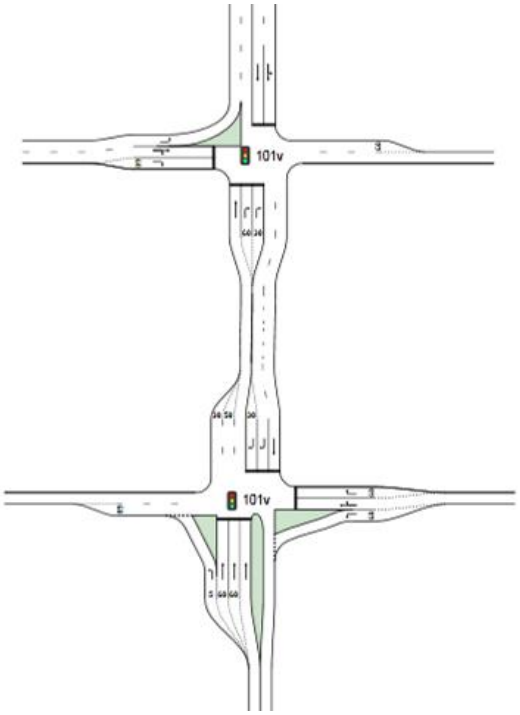


Figure 50: Required upgrades for 2021 Traffic

The C6 intersection needs to be changes to a two-way stop with Langenhoven as the major road. This needs to be done immediately and remains acceptable even in 2021.

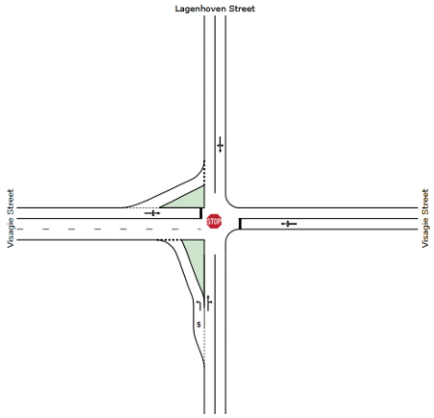


Figure 51: Required Layout of C6

2031 Total Traffic (2031 Background Traffic + Development Traffic)

For the 2031 scenario, a free-flow interchange should be considered- particularly on the southern side of the highway. This will need to be considered whether or not the development takes place and the development only makes up a small portion of the trips at these intersections. The percentage of development trips out of the total 2031 AM trips is 7,5% at intersection 2a and 2,5% at intersection 2b. By the time these upgrades are completed, the Ash

dump will be closed and will need to be rezoned. It is therefore not necessary for any further upgrades to be completed before the Ash dump recycling development is implemented.

From a preliminary observation, a partial par-clo interchange will be required with the design shown in Figure 51. Further conceptual design is outside the scope of this TIA.

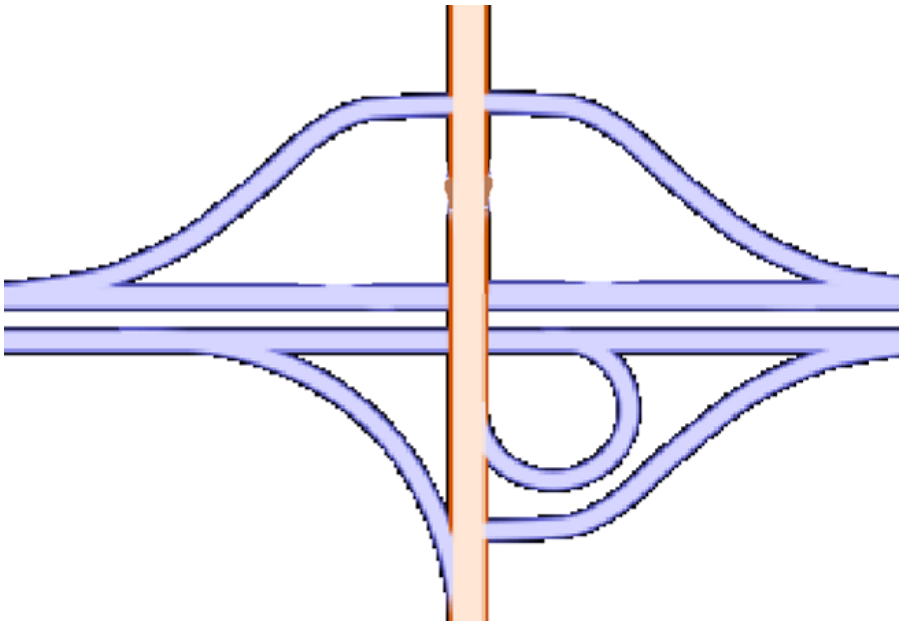


Figure 52: Partial Par-Clo Interchange

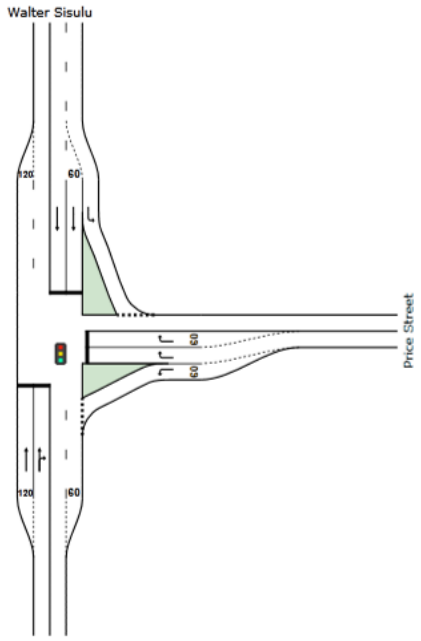


Figure 53: All upgrades required for C1 for 2031

The 2021 upgrades are critical to promote the necessary safety at the intersection and these should be completed before the Ash Dump becomes operational. The 2031 upgrades are more long term and should be the responsibility of other developers of the area if required.

9 CONCLUSION

Potential environmental impacts (biophysical and social) associated with the proposed Witbank ash reclamation project, have been identified herein. This EIA assessed and addressed all potentially significant environmental issues in order to provide the Mpumalanga Department of Agriculture, Rural Development, Land and Environmental Affairs (DARDLEA) with sufficient information to make an informed decision regarding the proposed project.

The proposed ash reclamation project is expected to improve the current site condition which has created a visual and other environmental nuisances over the years. The reclamation of the clinker ash will further prevent the potential pollution risk to the surrounding environment - proximal rivers and the Witbank Dam, which is the area's only major source of raw water, as well as numerous pans with emergent groundwater, which may affect aquatic life. The proposed ash reclamation will ensure that the dump is rehabilitated as all of the clinker ash will be cleared with no residue remaining, and the property can then be re-zoned for commercial purposes.

9.1 Uncertainties, Assumptions and Gaps in Knowledge

The EIA followed the legislated process required and as governed and specified by the EIA Regulations of 2014. Inevitably, when undertaking scientific studies, challenges and limitations are encountered. For this specific EIA, the following challenges were encountered:

(i) Many stakeholders declined to partake in the public participation process when invited.
(ii) There was a very poor turn-up of the community on the community consultation meeting in the scoping phase.
(iii) The timeframes of the project were exceeded due to the slow pace at which information was exchanged.

The following uncertainties, assumptions and gaps in knowledge pertain to this impact assessment:

- It has been assumed that specialist findings are accurate and impartial that information on the recycling processes and the site history provided by the land owner, is accurate.
- The specific human health impacts of inappropriate exposure to the dust and products stored and handled at the facility are varied. Due to this uncertainty, the assessment of this impact has used a duration varying from Short-term to Permanent; and an intensity varying from Low to High.
- Besides the above, there are no assumptions, uncertainties or gaps in knowledge which are material to this application.

9.2 Opinion of the Environmental Assessment Practitioner

The EIA for the Witbank Ash Reclamation project has holistically assessed the perceived and envisaged impacts associated with the proposed development. Impacts were identified through the commissioning and conducting of key specialist studies which were identified through the following processes:

(i) Development of the proposal to undertake the EIA to the applicant;
(ii) Scoping of the study and development of the Plan of Study by the EAP;
(iii) Engaging with key I&APs and stakeholders who recommended required studies or highlighted key issues;
(iv) Developing an in-depth understanding of the project scope and the receiving environment.

These processes have enabled a holistic scientific assessment of the impacts which will affect the environment should the ash reclamation project be authorised and undertaken. The results indicate that there no fatal flaws were found preventing the project from continuing, there is overall negligible impact associated with the project, provided that the mitigation measures for the impacts identified are sufficiently implemented and appropriate monitoring takes place. No impacts will remain high after mitigation measures are implemented. Furthermore, the negative impacts identified are to a significant extent negated by the benefits the project will bring

The Environmental Practitioner (EAP) recommends that the proposed project be considered for approval subject to the following conditions:

- EMPr for this application be made a binding document for the contractors and managers on site.
- Continued consultation and engagement with all relevant stakeholders – especially property owners, neighbouring local community, and respective municipalities during labour recruitment and procurement for services and supplies during construction phase;
- Appointment of an independent ECO to monitor compliance to the EMPr during construction and operational phase of the project. Considering the nature of the project, the ECO can visit the site bi-weekly
- The Emalahleni Municipality should assist on the following:
    - Upgrades to 2021 Requirements for Intersection of Walter Sisulu Drive and Price Street;
    - The terminals of the N4 Walter Sisulu Drive should be upgraded based on discussions with the relevant road authority. As a minimum, the terminals should be signalised; and

- All NMT and Public Transport Upgrades.

- A wetland specialist should confirm whether the moist grassland is a wetland/ water course
- The Applicant must take full responsibility for the execution of the project in a manner which does not negatively impact on the environment by ensuring that responsible decisions are made.

10 REFERENCES

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