



DMS Powders

Final Environmental Impact report for the
Atmospheric Emission License Application for the
R&D furnace at DMS Powders

Locality: Meyerton

Departmental Ref No: GAUT: 002/12-13/E0204

Date: October 2014

SHANGONI
Management Services (Pty) Ltd



FINAL ENVIRONMENTAL IMPACT ASSESSMENT REPORT

DMS Powders

**Final Environmental Impact report for the
Atmospheric Emission License Application for the
R&D furnace at DMS Powders**

Location: Meyerton

Departmental Ref No: GAUT: 002/12-13/E0204

DATE: 27 October 2014

Unit C8

Block @ Nature

472 Botterklapper Street

Pretoria

Office: + 27 (0)12 807 7036

Fax: +27 (0)12 807 1014

PROJECT DETAILS

Gauteng Department of Agriculture and Rural Development

Reference No.: GAUT: 002/12-13/E0204

Project Title: Atmospheric Emission License Application for DMS Powders, Meyerton.

Project Number: DMS-EIA-12-01-31

Compiled by: Ms Patricia van der Walt and Ms Lizette Crous

Date: 27 October 2014

Location: Meyerton

Technical Reviewer: Brian Hayes



RB Hayes (Pr.Eng.)

TABLE OF CONTENTS

LIST OF FIGURES	5
LIST OF TABLES.....	6
LIST OF APPENDICES	8
REFERENCES	9
DEFINITIONS	12
ABBREVIATIONS	17
EXECUTIVE SUMMARY	18
1. INTRODUCTION	21
1.1 Process followed	21
1.2 Details of the project applicant	24
1.3 Appointed Environmental Assessment Practitioner	24
1.4 Current situation.....	25
1.4.1 Licensing.....	25
1.4.2 Atomised FeSi Production Process	27
1.4.3 Milled FeSi Production Process	28
1.5 Proposed activity	29
2. NATURE AND EXTENT OF THE ENVIRONMENT AFFECTED BY ACTIVITY	37
2.1 Regional climate	37
2.1.1 Rainfall and Evaporation.....	37
2.1.2 Temperature.....	37
2.1.3 Wind.....	38
2.2 Biophysical aspects affected.....	41
2.2.1 Geology	41
2.2.2 Topography	42
2.2.3 Soils.....	42
2.2.4 Fauna and Flora.....	46
2.2.5 Surface water	47
2.2.6 Groundwater	48
2.2.7 Water authority	49
2.2.8 Air Quality	52
2.2.9 Aesthetics	56
2.2.10 Socio-economic aspects.....	57



3. APPLICABLE LEGISLATION AND GUIDELINES	61
4. PUBLIC PARTICIPATION PROCESS	64
4.1 Objectives of the Public Participation Process (PPP).....	64
4.2 Legislation and guidelines followed for the PPP.....	64
4.3 Public Participation Process followed	65
5. NEED AND DESIRABILITY FOR THE ACTIVITY	83
5.1 Developer/Applicant	83
5.2 Local community	83
6. CONSIDERATION OF ALTERNATIVES.....	83
6.1 No-Go option.....	83
6.2 Alternatives considered	85
7. ENVIRONMENTAL IMPACT ASSESSMENT.....	86
7.1 Aims of Environmental Impact Assessment.....	86
7.2 Environmental Impact Assessment Procedure	87
7.3 Description of Environmental Impacts.....	88
8. ENVIRONMENTAL IMPACT STATEMENT	99
8.1 Summary of key findings	99
8.2 Comparative assessment of positive and negative implications of the proposed activity and alternatives	99
9. CONCLUSION	100

LIST OF FIGURES

Figure 1: Atomised FeSi Production	28
Figure 2: Milled FeSi Production	29
Figure 3: Google earth image illustrating the location of the proposed R&D Furnace (1).	32
Figure 4: Google earth image illustrating the location of the proposed R&D (2).	33
Figure 5: Map depicting the proposed locality of the R&D Furnace in relation to adjacent land.	34
Figure 6: Site photograph 1.....	35
Figure 7: Site photograph 2.....	35
Figure 8: R&D Furnace Emission Control Technology	36

Figure 9: Wind rose for January.....	39
Figure 10: Wind rose for February	39
Figure 11: Wind rose for March	39
Figure 12: Wind rose for April	39
Figure 13: Wind rose for May.....	39
Figure 14: Wind rose for June.....	39
Figure 15: Wind rose for July	40
Figure 16: Wind rose for Augustus	40
Figure 17: Wind rose for September	40
Figure 18: Wind rose for October.....	40
Figure 19: Wind rose for November.....	40
Figure 20: Wind rose for December.....	40
Figure 21: 2528 Pretoria Geological Map 1:250 000	43
Figure 22: Topography Map of the area	44
Figure 23: Soil classes map of the area.....	45
Figure 24: Vegetation Map of the area	50
Figure 25: Onsite drainage catchments	51
Figure 26: "Hotspot" Zone Number 4.....	55
Figure 27: Main Economic activities in the Midvaal LM (Midvaal IDP 2012/2013)	58
Figure 28: Map of the Midvaal Local Municipality (IDP 2012-2016 for 2012-2013).....	59
Figure 29: Poverty rate for Sedibeng and its local Municipalities (Midvaal IDP 2012/2013).	60
Figure 30: HDI status of Sedibeng and its local municipalities (Midvaal IDP 2012/2013).	60
Figure 31: Percentage employment for the different working sectors within the Midvaal LM (Midvaal IDP 2012/2013).2.16.1 Demography.	61
Figure 32: Photograph of first notice board.....	66
Figure 33: Photograph of second notice board.....	67
Figure 34: Example of registered letters sent to I&APs and Organs of State (1)	68
Figure 35: Example of registered letters sent to I&APs and Organs of State (2)	69
Figure 36: Proof of registered letters sent to I&APs and Organs of State (1).....	70
Figure 37: Proof of registered letters sent to I&APs and Organs of State (2).....	71
Figure 38: Proof of registered letters sent to I&APs and Organs of State (3).....	72
Figure 39: Proof of registered letters sent to I&APs and Organs of State (4).....	73
Figure 40: Proof of newspaper advertisement placed in the Beeld	74
Figure 41: Proof of newspaper advertisement placed in the Vanderbijlpark Ster.....	75

LIST OF TABLES

Table 1: The EIR in terms of the EIA Regulations, 2010, under the NEMA, 1998	21
Table 2: Listed Activities in terms of Government Notice No. 893 of 22 November 2013.....	26
Table 3: Administrative and water management boundaries.....	31



Table 4: Direction & distance to the nearest town(s)	31
Table 5: Details of adjacent land owners to the site	32
Table 6: Average Monthly Rainfall (mm).....	37
Table 7: Mean monthly temperatures (°C).....	37
Table 8: Representative succession of the Karoo Supergroup south of BHP Metalloys in the Springfield mining area.	41
Table 9: Plant species of importance in the Soweto Highveld grassland.	46
Table 10: Modelled runoff volumes for the DMS Powders Site (Snyman, J., September 2012).....	47
Table 11: Groundwater Phase I investigation test results.	48
Table 12: Ambient Air Quality for common Pollutants as adopted to be the Air Quality Objection for Vaal Triangle Airshed Priority Area.	52
Table 13: Priority "Hotspot: zones indicating the sensitive receptors within the main contributing sources.....	52
Table 14: Source Contribution of inhalable Particulate Emissions.	53
Table 15: Applicable legislation, policies and/or guidelines	61
Table 16: List of adjacent landowners identified and notified	65
Table 17: Registered I&APs.....	76
Table 18: Comments received from the Gauteng Department of Agriculture and Rural Development	78
Table 19: Comments and responses	81
Table 20: Development vs. No-Go Option.	84
Table 21: Environmental impact assessment parameters	90
Table 22: Environmental Risk Matrix	91
Table 23: Environmental impact assessment: Atmosphere.....	92
Table 24: Environmental impact assessment: Atmosphere.....	93
Table 25: Environmental impact assessment: Atmosphere.....	94
Table 26: Environmental impact assessment: Soil, surface- and groundwater	96
Table 27: Cumulative impacts.....	98
Table 28: Comparison of the proposed preferred activities and the no-go option.....	100



LIST OF APPENDICES

APPENDIX A	- Site Plans
APPENDIX B	- Site Photographs
APPENDIX C	- Facility Illustrations
APPENDIX D	- Route Position
APPENDIX E	- Public Participation
APPENDIX E.1	- Proof of site notice
APPENDIX E.2	- Written notices
APPENDIX E.3	- Proof of Newspaper advertisements
APPENDIX E.4	- Communications to and from persons
APPENDIX E.5	- Minutes of any public and/or stakeholder meetings
APPENDIX E.6	- Comments and Response Report
APPENDIX E.7	- Comments from I&APs on the EIA Report
APPENDIX E.8	- Comments from I&APs on amendments to the EIA Report
APPENDIX E.9	- I&AP Register
APPENDIX E.10	- Comments from I&APs on the application
APPENDIX E.11	- Other
APPENDIX F	- Water use license(s) authorisation, SAHRA information, service letters from municipalities, water supply information
APPENDIX G	- Specialist Reports
APPENDIX H	- Environmental Management Programme
APPENDIX I	- Other Information



REFERENCES

A.J. Pelser, (August 2013). *Basic assessment report for an Atmospheric Emission Licence application, R&D furnace, DMS Powders, Meyerton Portion 4 of Kookfontein 545IQ, Gauteng*, A Pelser Archaeological Consulting, Lynnwood Ridge, Gauteng.

AGIS, (2007). Agricultural Geo-Referenced Information System, accessed from www.agis.agric.za on (20/06/2013).

Airshed Planning Professionals (Pty) Ltd, (November 2013). *Air Quality Impact Report for Dense Medium Separation Powders (Pty) Ltd in Meyerton*, Midrand, Gauteng.

Barnard, H.C., (2000). An explanation of the 1:500 000 General Hydrogeological Map. Johannesburg 2526.

Bergh, J.S. (red.), (1999). *Geskiedenisatlas van Suid-Afrika. Die viernoordelike provinsies Pretoria*, J.L. van Schaik.

Cilliè, J.F. and Savage, W.H.D., 1961. Die Steenkoolveld Vereeniging-Clydesdale. Mem. Geol. Surv. S. Afr. 50, 133 pp.

Draft Midvaal Local Municipality Integrated Development Plan, 2012-2016 for 2012-2013 (March 2013).

DMS Powders Environmental Management Plan, ref 7, 2011, HSECQ 001 MP.

Gauteng Province Air Quality Management Plan, GDARD, Aug 2009.

Huffman, T.N, (2007). Handbook to the Iron Age: *The Archaeology of Pre-Colonial Farming Societies in Southern Africa*, Scottsville, University of KwaZulu-Natal Press.

I-CAT, (December 2010). *Environmental Footprint Report for DMS Powders (Pty) Ltd*, Meyerton, International Consulting and Trading.

Lombard, M., L. Wadley, J. Deacon, S. Wurz, I. Parsons, M. Mohapi, J. Swart & P. Mitchell, (2012). *South African and Lesotho Stone Age Sequence Updated (I)*. *South African Archaeological Bulletin* 67 (195): 120–144, 2012.

Mucina, L., & Rutherford, M. C., (2006). *The vegetation of South Africa, Lesotho and Swaziland*. Pretoria: South African National Biodiversity Institute.



National Environmental Management Waste Act, 2008 (Act No. 59 of 2008).

National norms and standards for the assessment of waste for landfill disposal, General Notice No 635, Government Gazette No 36784 of 23 August 2013.

Proposed regulations to provide for the application for atmospheric emission license and matter pertaining to the implementation of the atmospheric emission licensing system, General Notice No 141, Government Gazette No 32962 of 17 February 2010.

Regulation for implementing and enforcing the Vaal triangle Air-shed Priority Area Air Quality Management Plan, Government Notice 614, Government Gazette No 32254 of 29 May 2009.

Shangoni AguiScience (Pty) Ltd., (September 2012). *Specialist Groundwater Investigation Phase I*, Pretoria, Gauteng.

Shangoni Management Services (Pty) Ltd., (September 2012). *DMS Powders - Storm Water Management Plan*, Pretoria, Gauteng.

Shangoni Management Services (Pty) Ltd, (February 2013). *Specialist Groundwater Investigation Phase III* Pretoria, Gauteng.

Sinclair, J.M., (2000). Collins English Dictionary: Harper Collins Publishers.

South African Air Quality Information System (NAQM), <http://www.saaqis.org.za>.

Inductotherm Corporation, (2006). *The induction heating and melting safety fundamentals guide that might save your life*.

Vaal Triangle Airshed Priority Area Air Quality Management Plan, Government Notice No 613, Government Gazette No 32263, (May 2009).

Vaal Triangle Air-shed Priority Area (VTAPA) Implementation Report one, DEAT, September 2011.

<http://www.environment.gov.za/enviro-info/enpat.htm> accessed on 22/05/2012.

http://www.windfinder.com/windstats/windstatistic_vereeniging.htm accessed on 03/06/2013.

<http://www.midvaal.gov.za> accessed on 21/05/2012.

<http://www.sedibeng.gov.za> accessed on 18/05/2012.



<http://encyclopedia.thefreedictionary.com> accessed on 1/06/2012.

Chief Surveyor General Database: www.csg.dla.gov.za.

DMS Powders: www.dmspowders.com.



DEFINITIONS

Air Pollution

According to NEM: AQA means any change in the composition of the air caused by smoke, soot, dust (including fly ash), including cinders, solid particles of any kind, gases, fumes, aerosols and odour substances. *[NEM: AQA, (Act 39 of 2004)]*

Air Quality Management Plan

Means a plan referred to in Section 15 of NEM: AQA *[NEM: AQA, (Act 39 of 2004)]*

Air Shed Priority Area

Means an area as set out in term of Section 18 of the National Environmental Management: Air Quality Act of 2004, Act No 36 of 2004. *[NEM: AQA, (Act 39 of 2004)]*

Ambient Air

Excludes air regulated by the Occupational Health and Safety Act, 1993 (Act No 85 of 1993). *[NEM: AQA, (Act 39 of 2004)]*

Atmospheric Emission

Means any emission or entertainment process emanating from a point, non-point or mobile source that results in air pollution. *[NEM: AQA, (Act 39 of 2004)]*

Atomise

To break into small fragments.

Building and demolition waste

Means waste, excluding hazardous waste, produced during the construction, alteration, repair or demolition of any structure, and includes rubble, earth, rock and wood displaced during that construction, alteration, repair or demolition *[NEM: WA, (Act No. 59, 2008)]*.

Demography

The scientific study of human population, especially, with reference to their size, structure and distribution.

Domestic waste

Means waste, excluding hazardous waste, that emanates from premises that are used wholly or mainly for residential, educational, health care, sport or recreation purposes [*NEM: WA, (Act No. 59, 2008)*].

Environment

The surroundings (biophysical, social and economic) 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 wellbeing.

Environmental Aspects

Elements of an organisation's activities, products or services that can interact with the environment.

Environmental Degradation

Refers to pollution, disturbance, resource depletion, loss of biodiversity, and other kinds of environmental damage; usually refers to damage occurring accidentally or intentionally as a result of human activities.

Environmental Impacts

Any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organisation's activities, products or services.

Environmental Impact Assessment

A study of the environmental consequences of a proposed course of action.

Environmental Impact Report

A report assessing the potential significant impacts as identified during the environmental impact assessment.

Environmental impact

An environmental change caused by some human act.



General waste

Means waste that does not pose immediate hazard or threat to health or to the environment, and includes-

- (a) domestic waste;
- (b) building and demolition waste;
- (c) business waste; and
- (d) inert waste [NEM: WA, (Act No. 59, 2008)].

Hazardous waste

Means any waste that contains organic or inorganic elements compounds that may, owing to the inherent physical, chemical or toxicological characteristics of that waste, have a detrimental impact on health and the environment [NEM: WA, (Act No. 59, 2008)].

Human Development Index

The Human Development Index (HDI) is a composite statistic used to rank countries by level of "human development" and separate developed (high development), developing (middle development), and underdeveloped (low development) countries. The statistic is composed from data on life expectancy, education and per-capita GNI (as an indicator of standard of living) collected at the national level using the formula given in the Methodology section below. There are also HDI for states, cities, villages, etc. by local organisations or companies.

(<http://encyclopedia.thefreedictionary.com>)

Land use

Land use is defined as the various ways in which land may be employed or occupied. Planners compile, classify, study and analyse land use data for many purposes, including the identification of trends, the forecasting of space and infrastructure requirements, the provision of adequate land area for necessary types of land use, and the development or revision of comprehensive plans and land use regulations.

Pollution

Pollution means any change in the environment caused by -

- (i) substances;
- (ii) radioactive or other waves; or
- (iii) noise, odours, dust or heat,

emitted from any activity, including the storage or treatment of waste or substances, construction and the provision of services, whether engaged in by any person or an organ of state, where that change has an adverse effect on human health or wellbeing or on the composition, resilience and productivity



of natural or managed ecosystems, or on materials useful to people, or will have such an effect in the future [NEM: WA, (Act No. 59, 2008)].

Pollution Prevention

Pollution prevention can be any activity that reduces or eliminates pollutants prior to recycling, treatment, control or disposal. [NEM: AQA, (Act 39 of 2004)]

Public Participation Process

A process of involving the public in order to identify needs, address concerns, in order to contribute to more informed decision making relating to a proposed project, programme or development.

Topography

Topography, a term in geography, refers to the "lay of the land" or the physio-geographic characteristics of land in terms of elevation, slope and orientation.

Vegetation

Vegetation is defined as all of the plants growing in and characterising a specific area or region; the combination of different plant communities found there.

Waste

Means any substance, whether or not that substance can be reduced, re-used, recycled and recovered-

- (a) that is surplus, wanted, rejected, discarded, abandoned or disposed of;
- (b) which the generator has no further use of for the purposes of production;
- (c) that must be treated or disposed of; or
- (d) that is identified as a waste by the Minister by notice in the *Gazette*, and includes waste generated by the mining, medical or other sector, but-
 - (i) a by-product is not considered waste; and
 - (ii) any portion of waste, once re-used, recycled and recovered, ceases to be waste [NEM: WA, (Act No. 59, 2008)].

Waste treatment facility

Means any site that is used to accumulate waste for the purpose of storage, recovery, treatment, reprocessing, recycling or sorting of that waste [NEM: WA, (Act No. 59, 2008)].

Land use

The various ways in which land may be employed or occupied. Planners compile, classify, study and analyse land use data for many purposes, including the identification of trends, the forecasting of



space and infrastructure requirements, the provision of adequate land area for necessary types of land use, and the development or revision of comprehensive plans and land use regulations.

Pollution Prevention

Any activity that reduces or eliminates pollutants prior to recycling, treatment, control or disposal.

Public Participation Process

A process of involving the public in order to identify needs, address concerns, in order to contribute to more informed decision making relating to a proposed project, programme or development.

Registered Interested and Affected Party

In relation to an application, means an interested and affected party whose name is recorded in the register opened for that application.

Topography

Topography, a term in geography, refers to the "lay of the land" or the physio-geographic characteristics of land in terms of elevation, slope and orientation.

Vegetation

All of the plants growing in and characterising a specific area or region; the combination of different plant communities found there.

Waste

As per the definition of the National Environmental Management Waste Act, Act 59 of 2008 - means any substance, whether or not that substance can be reduced, re-used, recycled and recovered— (a) that is surplus, unwanted, rejected, discarded, abandoned or disposed of; 3(b) which the generator has no further use of for the purposes of production; (c) that must be treated or disposed of; or (d) that is identified as a waste by the Minister by notice in the Gazette, and includes waste generated by the mining, medical or other sector, but— (i) a by-product is not considered waste; and 3(ii) any portion of waste, once re-used, recycled and recovered, ceases to be waste.



ABBREVIATIONS

AEL	-	Atmospheric Emission License
AIR	-	Atmospheric Impact Report
APPA	-	Atmospheric Pollution Prevention Act, 1965 (Act No.45 of 1965)
AQMP	-	Air Quality Management Plan
AQO	-	Air Quality Officer
BID	-	Background Information Document
CRR	-	Comments Response Report
DEA	-	Department of Environmental Affairs
DMS	-	Dense Medium Separation
EAP	-	Environmental Assessment Practitioner
ECA	-	Environmental Conservation Act, 1989 (Act No. 73 of 1989)
EIA	-	Environmental Impact Assessment
EIR	-	Environmental Impact Report
EMF	-	Environmental Management Framework
EMP	-	Environmental Management Programme
FeSi	-	Ferrosilicon
GDARD	-	Gauteng Department of Agriculture and Rural Development
GN	-	Government Notice
HDI	-	Human Development Index
I&AP	-	Interested and Affected Party
IDP	-	Integrated Development Plan
NAAQS	-	National Ambient Air Quality Standards
NFAQM	-	National Framework for Air Quality Management
NEMA	-	Environmental Management Act, 1998 (Act No. 107 of 1998) as amended
NEM:AQA	-	National Environmental Management: Air Quality Act, 2004 (Act No. 39, 2004)
R	-	Regulation
S&EIR	-	Scoping and Environmental Impact Reporting
SDM	-	Sedibeng District Municipality
SAHRA	-	South African Heritage Resources Agency
SWMP	-	Storm Water Management Plan
VTAPA	-	Vaal Triangle Air-shed Priority Area



EXECUTIVE SUMMARY

The Applicant

Dense Medium Separation Powders (Pty) Ltd is located within the boundaries of BHP Billiton (Metallurgy), on Portion 4 of the farm Kookfontein 545 IQ in Meyerton, which is approximately 8.7km's to the north of Vereeniging. Dense Medium Separation (DMS) Powders produces ferrosilicon (FeSi) powders for use in dense media separation technology. The company has a granulated ferrosilicon production capacity of 30 000 tons per annum, milled production capacity of 34 675 tons per annum and an atomised production capacity of 12 000 tons per annum.

Background description

DMS Powders intends to install a small scale Research and Development (R&D) furnace at their current facility to serve as a test furnace for future recipes.

Project description

The proposed R&D induction furnace will be used for product and process optimisation and to produce specialised products. The R&D test products will all be atomised products, like produced at the main plant, but scaled down.

Legal requirements and legislative process

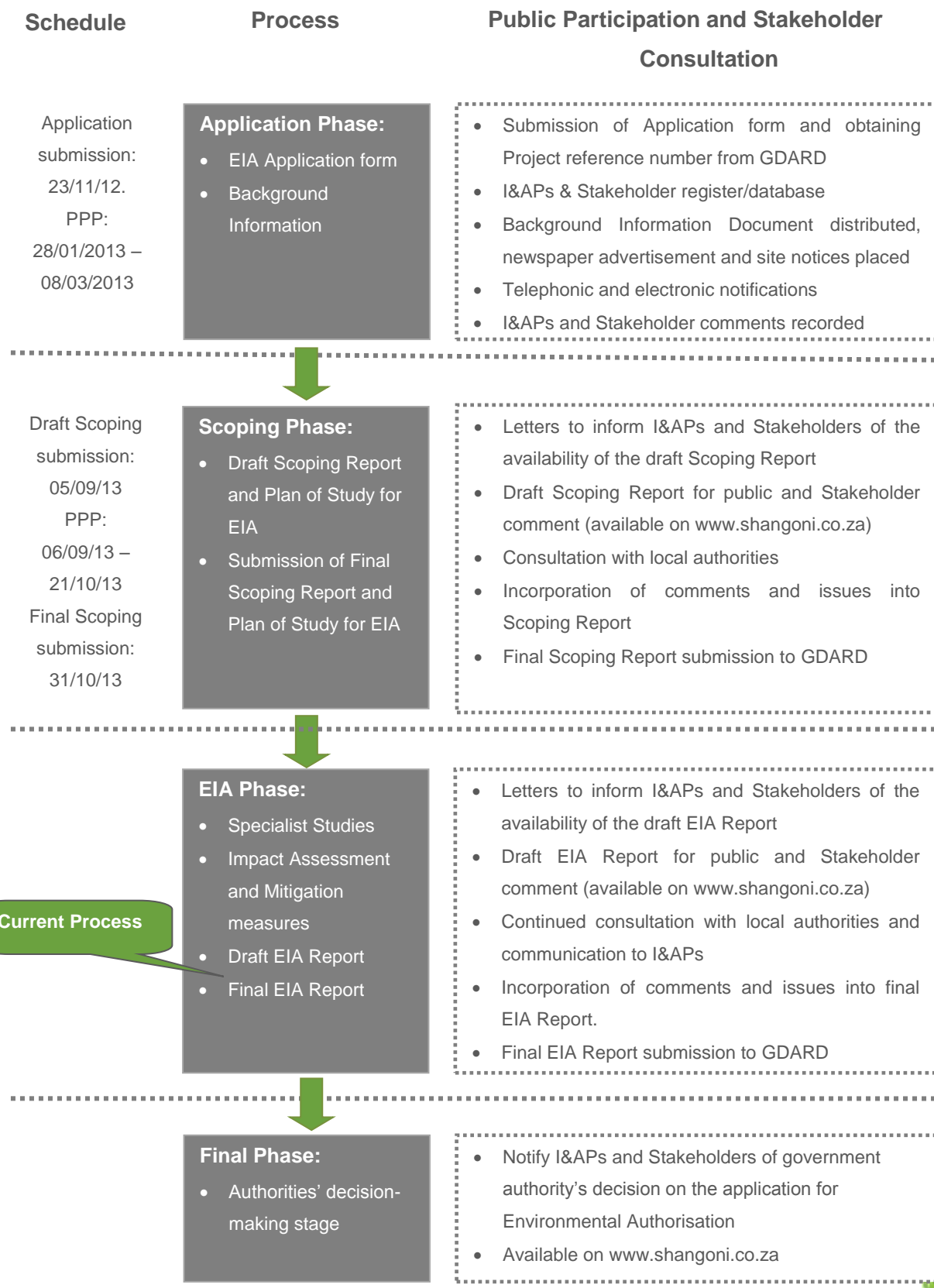
The installation of the proposed R&D Furnace triggers the activity listed in Category 4, Subcategory 4.1: Drying and Calcining and Category 4, Subcategory 4.9: Ferro-alloy production in terms of Government Notice No. 893 of 22 November 2013 as contemplated in Section 21(1)(b) of the National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) (NEM: AQA, 2004). In terms of Section 22 of NEM: AQA, 2004; no person may conduct a listed activity without a Provisional Atmospheric Emission License or an Atmospheric Emission License (AEL). A person must apply for an AEL with the licensing authority of the area in which the activity is to be carried out. In this case, this is the Sedibeng District Municipality.

Section 24 of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA, 1998) applies to the AEL application for the proposed R&D Furnace. The installation of the proposed R&D Furnace therefore also requires environmental authorisation in terms of Activity 5 and 26 of Listing Notice 2 (Regulations R545: List of activities and competent authorities identified in terms of Section 24 (2) and 24D of the NEMA, 1998, dated June 2010) under the NEMA, 1998, as amended.

Relevant listed activities triggered by the proposed activities are described further in this Environmental Impact Assessment Report (EIR) (refer to Part 1.5). It is the intention of this EIR to provide the necessary information pertaining to the proposed activities associated with the project, as required in terms of the Environmental Impact Assessment Regulations (EIA Regulations R543: EIA



Regulations in terms of Chapter 5 of the NEMA, 1998, dated June 2010) under the NEMA, 1998. This EIR intends to highlight all information relevant to the proposed installation of the R&D furnace. The diagram below provides a visual representation of the Scoping- and EIA approach followed in terms of NEMA, 1998, and the Environmental Impact Assessment Regulations, dated 2010.



Potential impacts

The purpose of this document is to supply the Gauteng Department of Agriculture and Rural Development (GDARD) and the Sedibeng District Municipality with the requested information pertaining to the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA, 1998) as amended, and Regulation 28 of the Environmental Impact Assessment Regulations, dated 2010.

Contained in this document is a detailed investigation of the activities and site-specific potential impacts associated with the proposed R&D Furnace project.

The application for environmental authorisation of the above mentioned activities (Activity 5 and 26 of Listing Notice 2) entails conducting a Scoping and Environmental Impact Assessment Process. During the Environmental Scoping Report (ESR) phase, the baseline potential impacts related to the proposed activities were identified (See section 7.3).

Regulation 31 (of Regulation 543) of the EIA Regulations, 2010, under the NEMA, 1998, requires that an Environmental Impact Assessment Report (EIR) includes an assessment of the status, extent, duration, probability, reversibility, replaceability of resources and mitigatory potential of the major potential environmental impacts of the proposed project be undertaken. Refer to Part 7 for a detailed risk assessment.

Major potential impacts that have been identified during the scoping process are:

- Emissions generated by the proposed R&D furnace may contribute to the ambient ground level- and dust fall out concentrations in the Vaal Triangle Air-shed Priority Area;
- Soil contamination by incorrect handling, storage and disposal of slag generated by the proposed R&D furnace;
- Surface water contamination as a result of pollutant runoff from slag generated by the proposed R&D furnace as a result of incorrect handling, storage and disposal;
- Groundwater contamination as a result of pollutants leaching from slag generated by the proposed R&D furnace as a result of incorrect handling, storage and disposal; and
- Emergencies situations, such as explosions and fire, present a risk to human health and life, infrastructure damage and an increase in emissions to the atmosphere.

Appropriate mitigation measures will assist in minimising the potential impacts on the surrounding environment during the installation/construction and operational phases of the development. A draft Environmental Management Programme (EMP) has been compiled, with the aim of serving as a working document in order to manage and/or mitigate the identified potential impacts. Refer to Appendix H for a copy of the draft EMP.



1. INTRODUCTION

This EIR forms part of an application for environmental authorisation and atmospheric licensing of the proposed R&D Furnace project at DMS Powders. The application process is undertaken on behalf of the applicant, Dense Media Separation Powders (Pty) Ltd., by Shangoni Management Services (Pty) Ltd. Shangoni was appointed, as independent environmental practitioner, to assist the applicant in undertaking the process as prescribed in the mentioned environmental legislation.

An application to undertake an Environmental Impact Assessment (Scoping and Environmental Impact Reporting) process was submitted to the identified competent authority, the Gauteng Department of Agriculture and Rural Development (GDARD). The Department subsequently registered the project and the formal process was thereby initiated. A Scoping Report was submitted to the GDARD, and all the findings from the scoping- and EIA processes are included in this EIR report.

This EIR is divided into the following parts:

- Part 1: Introduction (including a description of the project).
- Part 2: Nature and extent of the environment affected by activity.
- Part 3: Applicable legislation and guidelines.
- Part 4: Public Participation Process.
- Part 5: Need and desirability for the activity
- Part 6: Consideration of Alternatives.
- Part 7: Environmental Impact Assessment
- Part 8: Environmental Impact Statement
- Part 9: Conclusion.

1.1 Process followed

1.1.3 The EIR in terms of the requirements of NEMA, 1998

Regulation 31(2) of the EIA Regulations, 2010 under the NEMA, 1998, lists aspects that must be included in EIA Reports (EIRs). Table 1 below indicates the parts where information has been provided as part of this EIR:

Table 1: The EIR in terms of the EIA Regulations, 2010, under the NEMA, 1998

Regulation No:		Description	EIR Part
R543 Regulation 31(2)(a)		Details of the Environmental Assessment Practitioner (EAP).	Part 1 & Appendix I
	(i)	Details of the EAP who prepared the report.	
	(ii)	Details of the expertise of the EAP to carry out the	



Regulation No:		Description	EIR Part
		environmental impact assessment.	
R543 Regulation 31(2)(b)		A description of the proposed activity.	Part 1
R543 Regulation 31(2)(c)		A description of the property on which the activity is to be undertaken and the location of the activity on the property.	Part 1
R543 Regulation 31(2)(d)		A description of the environment that may be affected by the activity and the manner in which the physical, biological, social, economic and cultural aspects of the environment may be affected by the proposed activity.	Part 2
R543 Regulation 31(2)(e)		Details of the public participation process conducted:	Part 4 & Appendix E
	(i)	Steps undertaken in accordance with the plan of study.	
	(ii)	List of persons, organisations and organs of state that were registered as interested and affected parties.	
	(iii)	A summary of comments received from, and a summary of issues raised by registered interested and affected parties, the date of receipt of these comments and the response of the EAP to those comments.	
	(iv)	Copies of any representations and comments received from registered interested and affected parties.	
R543 Regulation 31(2)(f)		A description of the need and desirability of the proposed activity.	Part 5
R543 Regulation 31(2)(g)		A description of identified potential alternatives to the proposed activity, including advantages and disadvantages that the proposed activity or alternatives may have on the environment and the community that may be affected by the activity.	Part 6, 7 & 8
R543 Regulation 31(2)(h)		An indication of the methodology used in determining the significance of potential environmental impacts.	Part 7
R543 Regulation 31(2)(i)		A description and comparative assessment of all alternatives identified during the environmental impact assessment process.	Part 6 & 8
R543 Regulation 31(2)(j)		A summary of the findings and recommendations of any specialist reports or report on a specialised process.	Part 2 & 7
R543 Regulation 31(2)(k)		A description of all environmental issues that were	Part 7



Regulation No:		Description	EIR Part
		identified during the environmental impact assessment process, an assessment of the significance of each issue and an indication of the extent to which the issue could be addressed by the adoption of mitigation measures.	
R543 Regulation 31(2)(l)		An assessment of each identified potentially significant impact, including:	Part 7
	(i)	Cumulative impacts.	
	(ii)	The nature of the impact.	
	(iii)	The extent and duration of the impact.	
	(iv)	The probability of the impact occurring.	
	(v)	The degree to which the impact can be reversed.	
	(vi)	The degree to which the impact may cause irreplaceable loss of resources.	
	(vii)	The degree to which the impact can be mitigated.	
R543 Regulation 31(2)(m)		A description of any assumptions, uncertainties and gaps in knowledge.	Part 9
R543 Regulation 31(2)(n)		A reasoned opinion as to whether the activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation.	Part 9
R543 Regulation 31(2)(o)		An environmental impact statement which contains:	Part 8
	(i)	A summary of the key findings of the environmental impact assessment.	
	(ii)	A comparative assessment of the positive and negative implications of the proposed activity and identified alternatives.	
R543 Regulation 31(2)(p)		A draft environmental management programme containing the aspects contemplated in Regulation 33 of the EIA Regulations, 2010.	Appendix H
R543 Regulation 31(2)(q)		Copies of any specialist reports.	Appendix G
R543 Regulation 31(2)(r)		Any specific information that may be required by the competent authority.	Part 4
R543 Regulation 31(2)(s)		Any other matters required in terms of sections 24(4)(a) and (b) of the Act.	Appendix I (if applicable)



1.2 Details of the project applicant

Name of Applicant	Dense Media Separation Powders (Pty) Ltd.
Postal Address	P.O. Box 945, Meyerton, 1960
Telephone No.	016 360 5200
Fax No.	016 360 5314
Farm name and portion on which the activities take place	Portion 4 of the farm Kookfontein 545 IQ
Title Deed Number and 21 Digit Code	T0IQ00000000054500004
Co-ordinates of operation	Latitude: -26.574657° Longitude: 27.987158°

1.3 Appointed Environmental Assessment Practitioner

Name of firm	Shangoni Management Services		
Postal address	P.O. Box 74726 Lynnwood Ridge Pretoria 0040		
Telephone No.	012 807 7036		
Fax	012 807 1014		
E-mail	lourens@shangoni.co.za		
Team of Environmental Assessment Practitioners on project			
Name	Qualifications & experience to conduct the EIA		Responsibility
Lourens De Villiers	<ul style="list-style-type: none">• MSc. Water Resource Management (UP)• BSc. (Hons) (PU for CHE)• More than 12 years' experience conducting Environmental Impact Assessments and Waste Management License Applications		Project Director
Lizette Crous	<ul style="list-style-type: none">• Post Graduate Certificate Environmental Management (University of London)• 3 years' experience conducting Environmental Impact Assessments and Waste Management License Applications		EAP
Patricia van der Walt	<ul style="list-style-type: none">• B.Sc. (Hons) (Applied Science in Environmental Technology)• 3 years' experience conducting Environmental Impact		EAP

	Assessments and Atmospheric Emission License Applications	
--	---	--

* Detailed CVs for the project team are attached (Appendix I).

Lourens de Villiers – Project Director

Lourens holds a M.Sc. Water Resource Management degree from the University of Pretoria and has ten years' experience in the environmental field. He specializes in compilation and management of Environmental Impact Assessments (EIA's) for commercial, industrial, agri-industrial, mining and residential developments. Lourens is also actively involved in third party ISO 14001 certification audits in the mining and industrial sectors.

Lizette Crous – Environmental Practitioner

Lizette obtained a B.Sc. degree specialising in Biodiversity and Ecology from the University of Stellenbosch. She is currently completing a M.Sc. in Environmental Management at the University of London and is responsible for Waste Management License Applications and Environmental Impact Assessments (EIA) at Shangoni.

Patricia van der Walt – Environmental Practitioner

Patricia obtained a B.Sc. degree in Microbiology and Life Sciences from the University of Limpopo, majoring in Biochemistry, Physiology and Biology. She went on to complete her B.Sc. Hons (Applied Science) degree in Environmental Engineering at the University of Pretoria, specializing in Environmental management, Air management, Water quality management and Waste management. She is responsible for Environmental Impact Assessments (EIA), Atmospheric Emission Licenses and Waste management Licenses at Shangoni.

1.4 Current situation

DMS Powders produces ferrosilicon (FeSi) powder for use in dense media separation technology. Two different processes are used at DMS Powders, namely Atomised FeSi production and Milled FeSi production.

Installations associated with the two different processes that contribute to atmospheric emissions include;

- Atomised Ferrosilicon: M8 Furnaces (A and B), M8 Baghouse and Kiln drier, M8 Atom Tank, M8 Vacuum Pump; and
- Milled Ferrosilicon: M9 Furnace, Ball Mills (MM4, MM5, MM6, MM7).

1.4.1 Licensing

The production of ferrosilicon (FeSi) powder at DMS Powders is listed in *Category 4, Subcategory 4.1: Drying and Calcining* and *4.9: Ferro-alloy production* in terms of Government Notice No. 893 as



contemplated in Section 21(1)(b) of the NEM: AQA, 2004. Refer to Table 2 for the description, application and minimum emission standards for these listed activities.

Table 2: Listed Activities in terms of Government Notice No. 893 of 22 November 2013

Category 4, Subcategory 4.1: Drying and Calcining			
Description	Drying and calcining of mineral solids including ore.		
Application	Facilities with capacity of more than 100 tons/month product.		
Substance or mixture of substances		Plant Status	mg/Nm³ under normal conditions of 273 Kelvin and 101.3 kPa
Common Name	Chemical Symbol		
Particulate Matter	N/A	New	50
		Existing	100
Sulphur Dioxide	SO₂	New	1000
		Existing	1000
Oxides of Nitrogen	NO _x expressed as NO₂	New	500
		Existing	1200
Category 4, Subcategory 4.9: Ferro-alloy production			
Description	Production of alloys of iron with chromium, manganese, silicon or vanadium, the separation of titanium, slag from iron-containing minerals using heat.		
Application	All installations.		
Substance or mixture of substances		Plant Status	mg/Nm³ under normal conditions of 273 Kelvin and 101.3 kPa
Common Name	Chemical Symbol		
Sulphur Dioxide	SO₂	New	500
		Existing	500
Oxides of Nitrogen	NO _x	New	400
		Existing	750
Particulate matter from primary fume capture system, open and semi-closed furnaces			
Particulate Matter	PM	New	30
		Existing	100
Particulate matter from primary fume capture system, closed furnaces			
Particular Matter	PM	New	50
		Existing	100
Particulate Matter from secondary fume capture system, all furnaces			
Particular Matter	PM	New	50
		Existing	100

DMS Powders holds a registration certificate for the production of ferrosilicon (FeSi) powder, which was a scheduled process (No. 63 Silicon processes) listed in the Second Schedule of the Atmospheric Pollution Prevention Act, 1965 (Act No. 45 of 1965) (APPA, 1965). The deadline for applications for renewal of the registration certificates, in terms of Section 61 of NEM: AQA, 2004 was on the 31st of March 2013. However, DMS Powders were given extension by the relevant licensing authority (Sedibeng District Municipality) to submit such a renewal application on or before the 11th of September 2013 (Refer to Appendix I for letter of extension and APPA, 1965 registration certificate).



Airshed Planning Professionals (Air Quality Specialists) compiled an Atmospheric Emission License (AEL) application form and supporting Atmospheric Impact Report for the conversion of DMS Powders' APPA, 1965 Registration Certificate. The APPA, 1965 registration certificate continued to be valid until the 11th of September 2014, as the conversion application was submitted on the 11th of September 2013. The acknowledgement letter received by the Sedibeng District Municipality validates the APPA, 1965 registration certificate until the AEL is issued (Refer to Appendix I). The Sedibeng District Municipality issued DMS Powders with an AEL for current operations on the 24th of April 2014 (also attached under Appendix I).

A provisional AEL is subject to such conditions and requirements as the licensing authority (Sedibeng District Municipality) may determine. The holder of a provisional AEL is entitled to an AEL when the commissioned facility has been in full compliance with the conditions and requirements of the provisional AEL for a period of at least six months. During this time, monitoring should take place to illustrate whether the existing plant complies with the prescribed minimum emission standards. Should the facilities not comply with the prescribed minimum emission standards an application can be made for the postponement of the compliance timeframes for the plant in terms of section 6 of NEM: AQA, 2004.

1.4.2 Atomised FeSi Production Process

Steel scrap and 75% ferrosilicon is melted in the M8 induction furnaces to produce molten ferrosilicon, with a silicon content of between 14 and 16%. The M8 induction furnaces use induction to heat metal to its melting point. The molten alloy is then atomised, dried and classified into various grades. The atomised process includes a vacuum filter, magnetic separator, cyclone and screening weighing as indicated on the flow diagram below. The process is summarised in Figure 1:



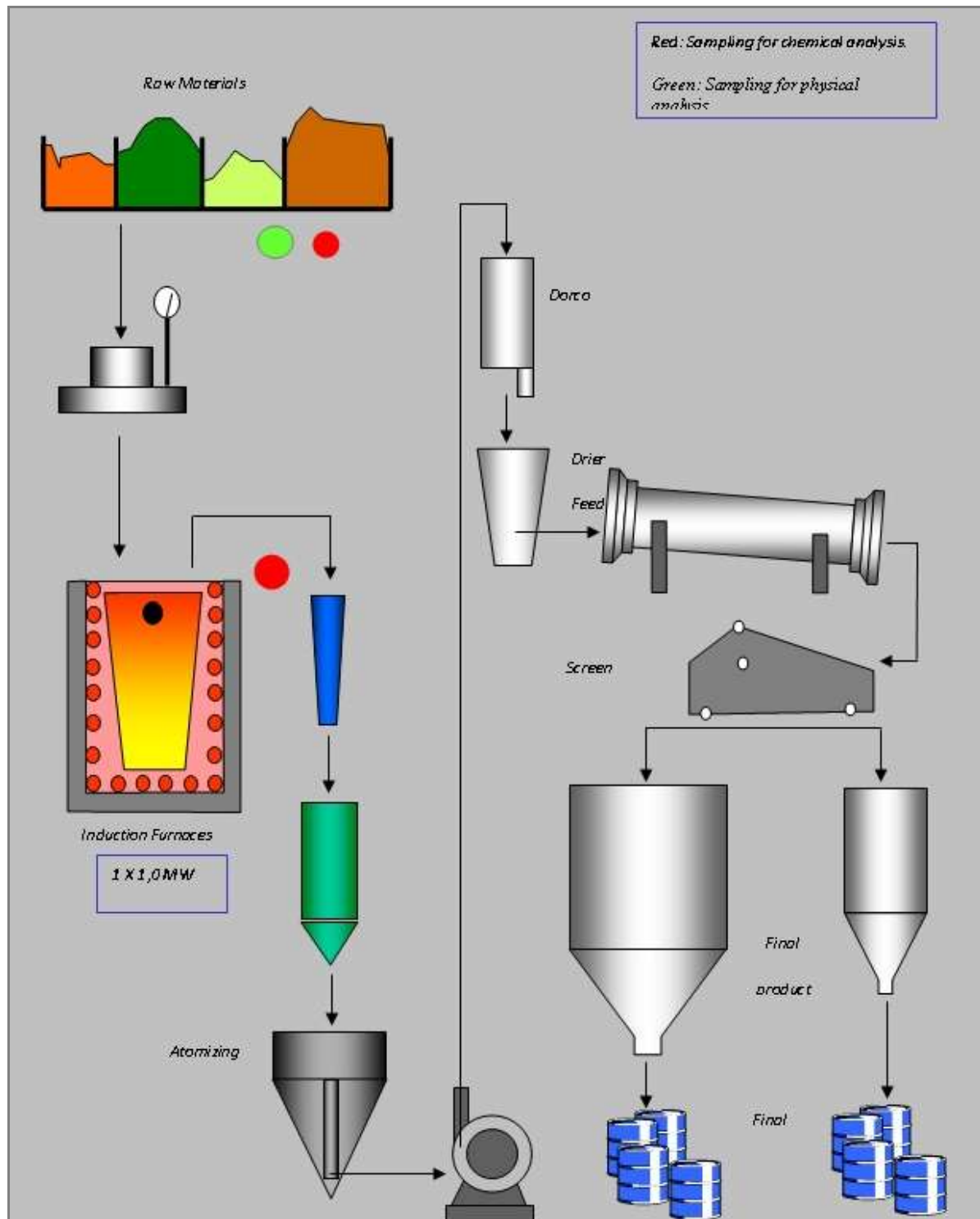
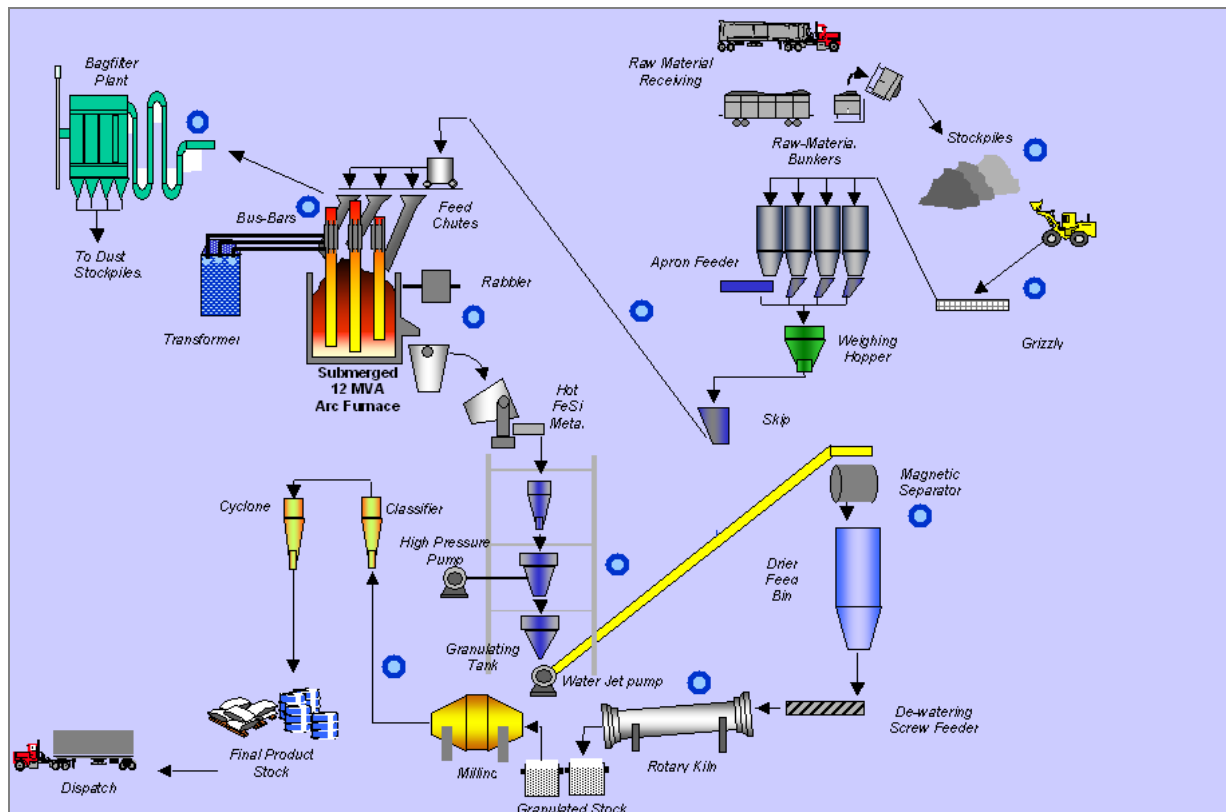


Figure 1: Atomised FeSi Production

1.4.3 Milled FeSi Production Process

Quartz, coal, coke and steel scrap are melted in the M9 submerged arc furnace to produce molten ferrosilicon with a silicon content of between 14 and 16%. The molten alloy is then water granulated, dried, milled and air classified into various grades. The milled process includes a bag house, granulation, trombone coolers, magnetic separator, and a drier. The process is summarised in the following diagram:



1.5 Proposed activity

DMS Powders intends to install a small scale Research and Development (R&D) induction furnace at their current facility to serve as a test furnace for future recipes for product and process optimisation and to produce specialised products. The furnace will have a capacity of approximately 300kg per load and will process approximately 5 tons of raw materials per day.

An induction furnace produces heat by alternating an electrical current from a power source through a copper coil. This creates an electromagnetic field that passes through the furnaces refractory material and induces an electrical current flow inside the metal charge (steel scrap), producing heat and rapidly causing the metal to reach a set point temperature.

The proposed operating procedure for the R&D furnace is as follows:

- Raw material (scrap steel) will be stored in 210 litre drums inside locked containers at the R&D facility. DMS proposes to use pre-pressed bales of tin-plated scrap steel as these corrode more slowly and will produce less fumes and slag in the R&D furnace;
- The furnace will have a swivel hood and suction fan connected to an electrostatic filter, able to filter out particles above 0.01 micron. Stack emission monitoring equipment will also be installed on the furnace (Refer to Figure 8);
- The raw materials will be loaded into the R&D furnace crucible with an overhead crawl and magnet or steel wire net, depending on which raw materials are loaded;



- Induction power will cause the raw materials in the crucible to melt. Additives will be added to make specific alloys, such as FeSi75 or FeSi15. Special additives will in particular be used for the testing of new alloys (research and development);
- Once the alloy has been brought to a specific tapping temperature (usually between 1 650 and 1 700°C), the hot alloy will be tapped into a water atomiser unit that will break up the hot metal into a fine powder using high pressure water and quenching;
- Once all the hot metal has been tapped out of the furnace, the hot slurry will be removed from the atomiser tank. This slurry will be fed into a double kiln, electrical hot air drier; and
- Once dried, the product will be screened, packed, weighed, sampled, wrapped and stored in containers ready for sale.

Process drawings are attached under Appendix C.

Stormwater Management

Process water from the atomiser unit will pass through a filter-lined skip, where large particles (10 microns and larger) will be filtered from the process water. From the skip, the water will enter into cooling/settling dams next to the R&D plant. From the cooling dams, the water will pass through a second filter system where solids larger than 2 micron will be removed. Thereafter, the water will pass through the ultraviolet treatment to control bacteria. The water will be re-used in the R&D process and the second phase filtration is required so that wear on the high pressure water pump in the atomiser unit is minimised. The filtered water will be pumped to a feed tank from where it can be used in the atomiser unit (atomisation pump). The process water from the cooling dams and feed tank will be analysed for pH, solids, heavy metals and bacteria in the proposed laboratory that will be built next to the R&D plant.

Settled fines and filtrates from the cooling/settling dams will be analysed to determine whether they can be returned to the R&D plant for further processing. If this is possible, the fines and filtrates will be added at the drying stage of the R&D process. Should this not be possible, the fines and filtrates will be briquetted and re-melted in DMS' M9 Furnace or at an off-site contractor. Slag build-up within the R&D Furnace will also be briquetted prior to melting in the M9 Furnace where the $\text{SiO}_2/\text{Fe}_2\text{O}_3/\text{FeO}$ within the slag will be recovered.

Designs for the Stormwater Management System at the R&D facility are attached under Appendix C. Mitigation Measures for the R&D furnace are discussed under Section 7.3.1. (Description of Environmental Impacts) as well as in the Environmental Management Programme attached under Appendix H.

Raw Materials Management

Raw materials will be stored in 220ℓ steel drums within two enclosed containers, one inside the R&D building (roofed area) and one outside the R&D building. The container inside the R&D building will



have 220ℓ steel drums containing approximately 1 ton of copper and 3 tons of tin. The container outside of the R&D building will have 220ℓ steel drums containing approximately 30 tons of tin plated scrap steel. Design drawings showing the storage of raw materials are attached under Appendix C.

Waste Management

During the construction phase of the proposed project, scrap steel waste, building rubble and domestic waste will be generated. The exact quantities of each type of waste is unknown at this stage. All the waste will feed into the existing waste management practices at DMS. For example, the scrap steel waste will be collected by a scrap metal recycler and the building rubble and domestic waste will be removed to a general landfill site.

During the operational phase of the proposed project, it is estimated that up to 5kg of high Silicon slag and up to 1.5kg of refractory waste (aluminium and silica, crucibles and nozzles) will be generated per day. The high Silicon slag will be crushed, briquetted and re-melted at an offsite recycling contractor. The refractory waste will be taken to an appropriate landfill site (general or hazardous depending on the classification of the waste).

1.5.1 Proposed locality

The proposed site for the installation/construction of the R&D furnace is located on Portion 4 of the farm Kookfontein 545 IQ in Meyerton, which is approximately 8.7km's to the north of Vereeniging. The proposed site is situated within the Midvaal Local Municipalities' jurisdiction. This local municipality forms part of the Sedibeng District Municipality, located within the Gauteng province.

Table 3: Administrative and water management boundaries

Province	Gauteng province
District Municipality	Sedibeng District Municipality
Local Municipality	Midvaal Local Municipality
Ward	3
Gauteng Department of Agriculture and Rural Developments Office	Diamond Corner Building, 68 Eloff and Market Street, Johannesburg, 2001
Sedibeng District Municipality	Corner of Beaconsfield & Leslie Streets, Vereeniging, 1930
Air-shed Priority Area	Vaal Triangle Air-shed Priority Area

Table 4: Direction & distance to the nearest town(s)

Direction	Distance from site	Closest town
North	8.7km	Vereeniging

The site locality map is given below as Figure 5 and is attached in Appendix A. Site photographs are also provided thereafter (refer to Figure 6 and Figure 7).



1.5.2 Land tenure and use of immediately adjacent land

The property on which the proposed project will take place belongs to BHP Billiton (Metalloys). DMS Powders have been leasing the property from Metalloys for the past 10 years.

BHP Billiton (Metalloys) specialises in the discovery, acquisition, development and marketing of natural resources, including but not limited to: Aluminium, Coal, Copper, Iron ore, Manganese, Nickel, Silver and Uranium.

Details of the adjacent land owner and their property are listed in the table below. Refer also to Section 4 for more detail regarding the Public Participation Process.

Table 5: Details of adjacent land owners to the site

Property owner	Address or property description
BHP Billiton Metalloys Samancor	Portion 4 and 63 of the farm Kookfontein 545 IQ



Figure 3: Google earth image illustrating the location of the proposed R&D Furnace (1).



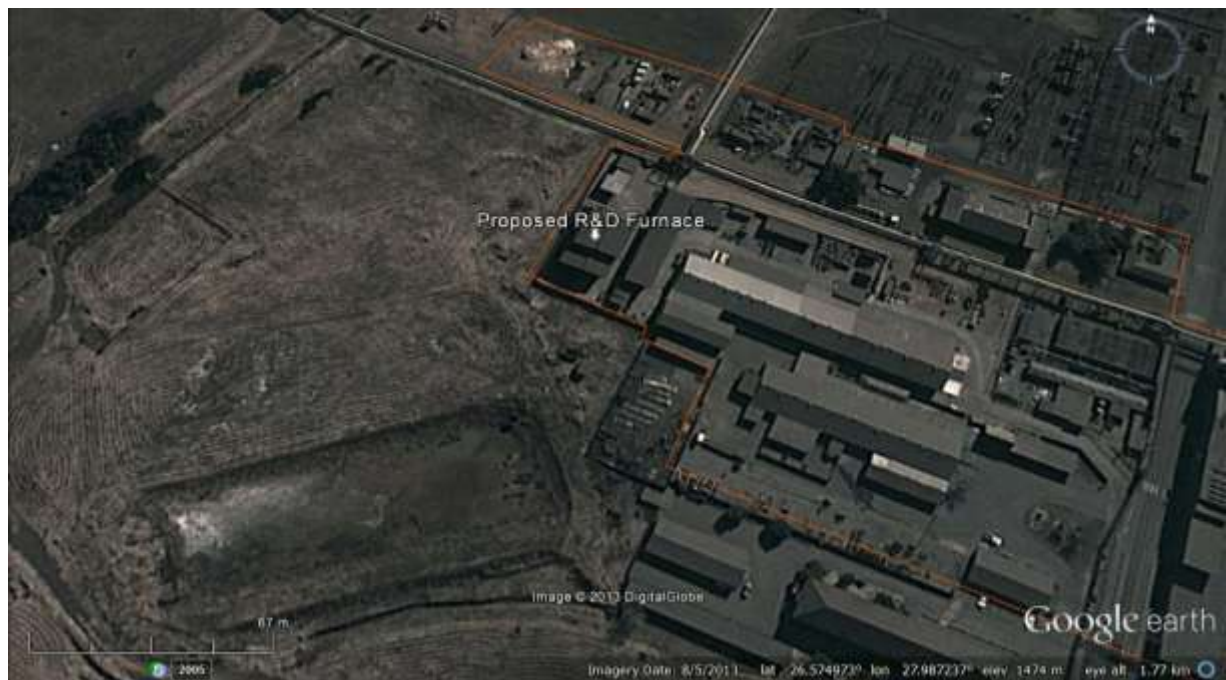


Figure 4: Google earth image illustrating the location of the proposed R&D (2).



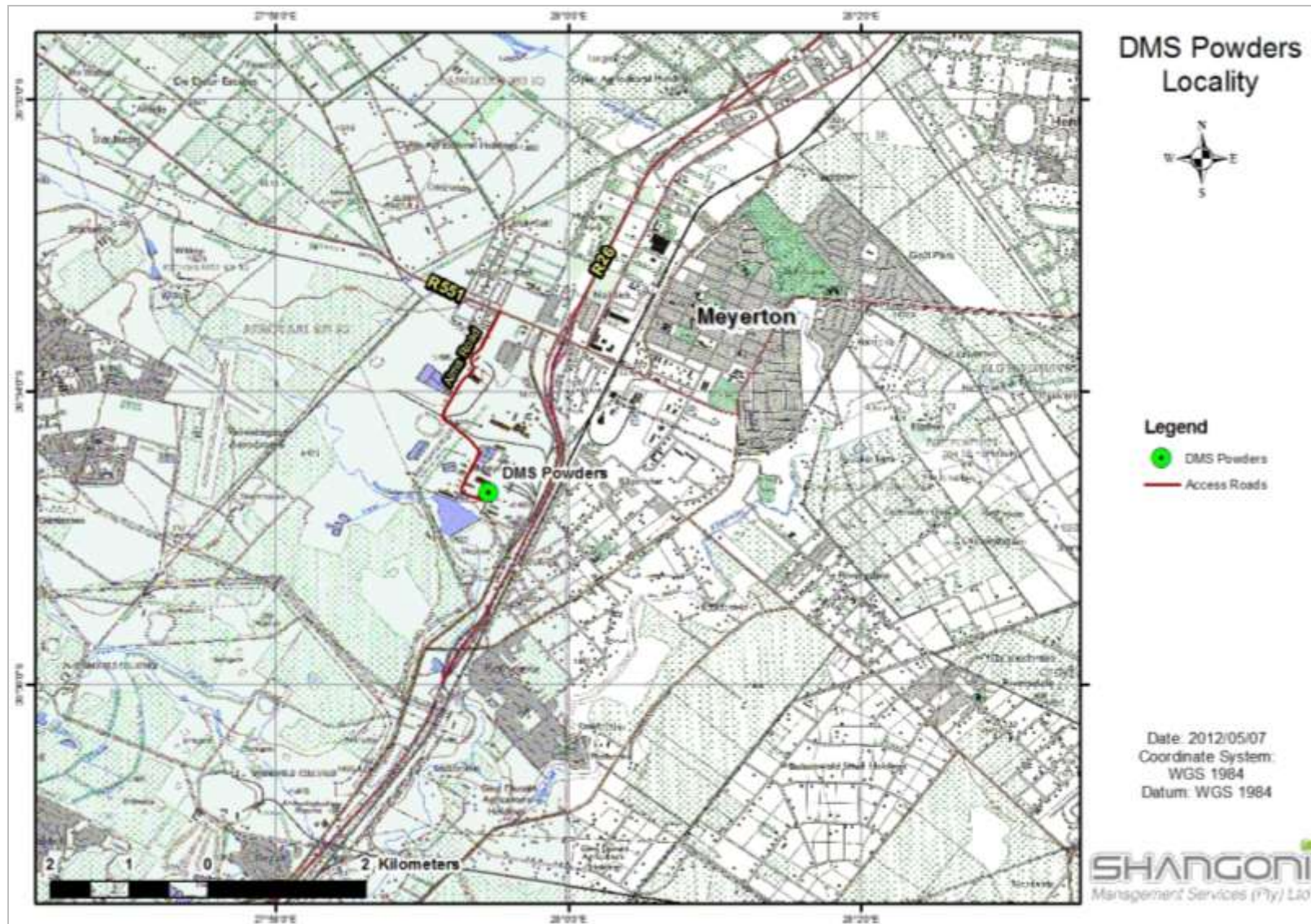


Figure 5: Map depicting the proposed locality of the R&D Furnace in relation to adjacent land.



Figure 6: Site photograph 1.



Figure 7: Site photograph 2.



1.5.3 Design

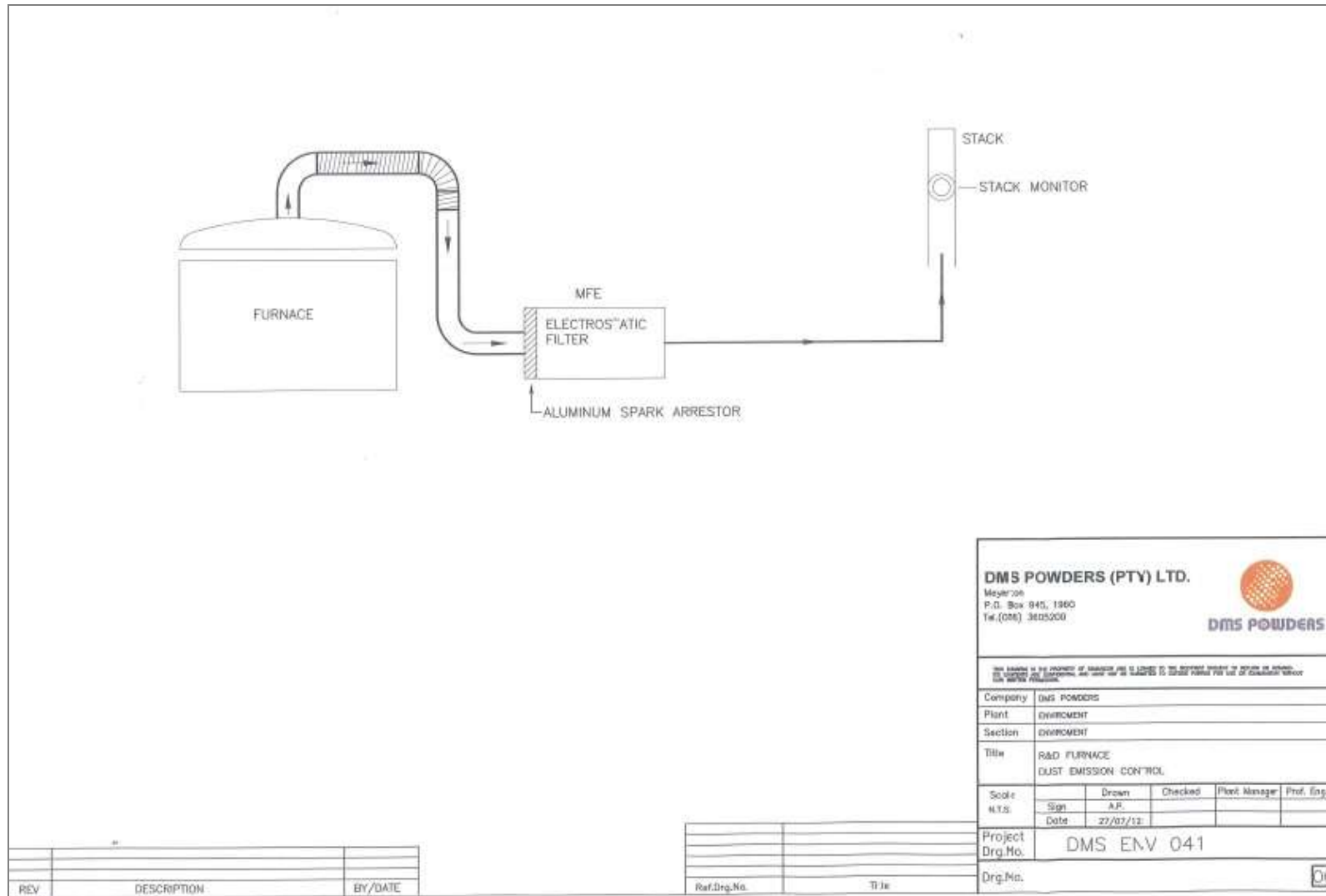


Figure 8: R&D Furnace Emission Control Technology

2. NATURE AND EXTENT OF THE ENVIRONMENT AFFECTED BY ACTIVITY

2.1 Regional climate

The regional climate of the area can be described as summer rainfall season with heavy thunderstorm in the late afternoons. The area has an average of 645.7mm of rain per year with the main prevailing wind direction being north-north west.

2.1.1 Rainfall and Evaporation

The area receives a mean annual rainfall of 645.7mm per year, of which most is received during typical late afternoon thunderstorms in the summer months. The gross annual evaporation is on average 2 001mm – 2 200mm.

Table 6: Average Monthly Rainfall (mm).

Date	Rainfall (mm)
January	118
February	88.1
March	86.8
April	30.5
May	12.4
June	7.9
July	2.6
August	6.5
September	25
October	69.3
November	93.3
December	105.3
Annual	645.7

2.1.2 Temperature

The mean annual maximum and minimum temperatures for the area is 24.0°C and 9.3°C and the mean annual temperature is calculated to be 16.7°C for the area. The mean monthly temperatures for the area are provided in Table 7 below.

Table 7: Mean monthly temperatures (°C).

Months	Max	Min	Mean
January	27.9	15.9	21.9
February	27.4	15.2	21.3

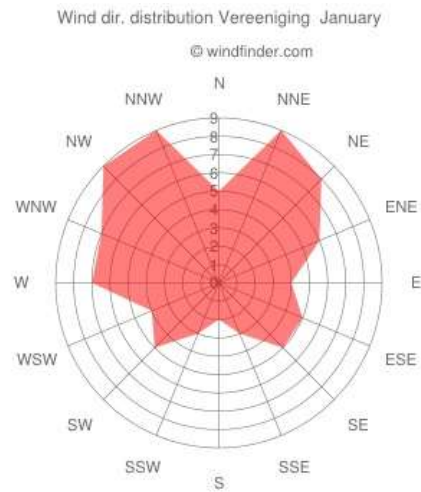
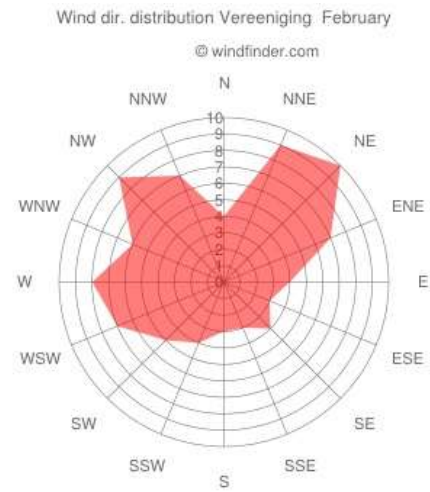
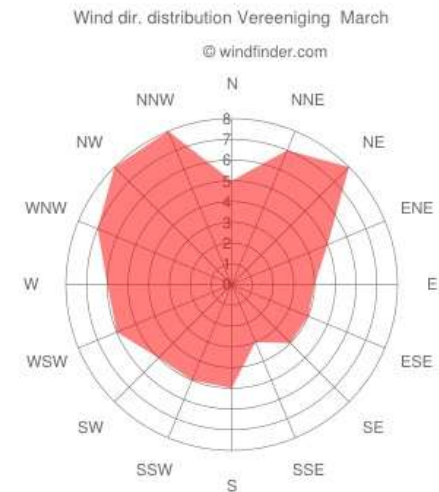
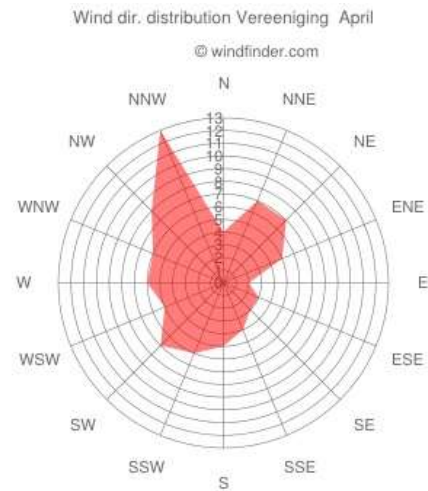
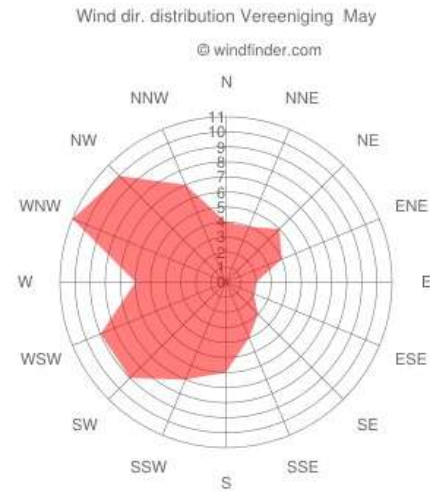
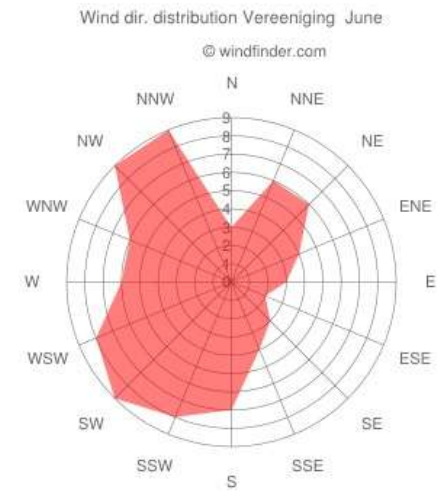


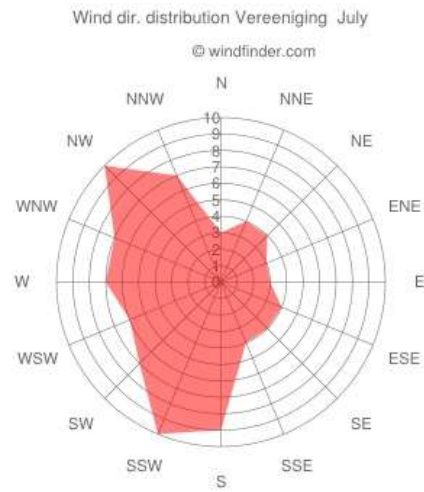
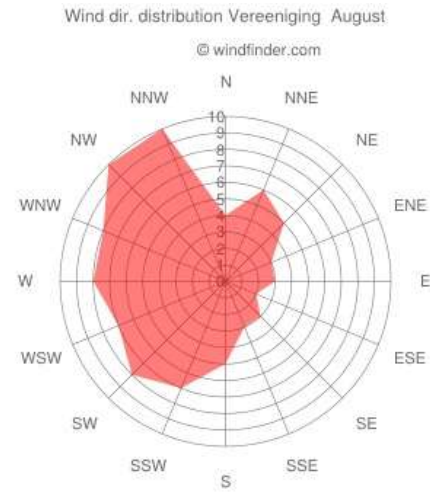
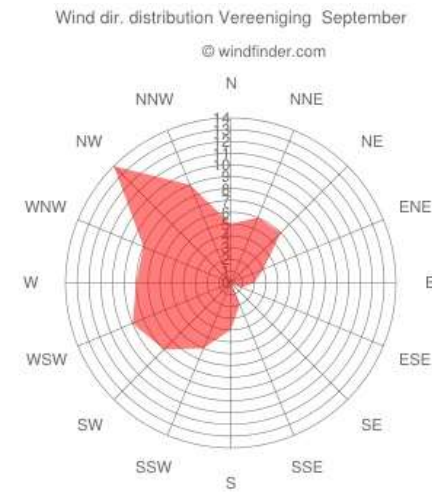
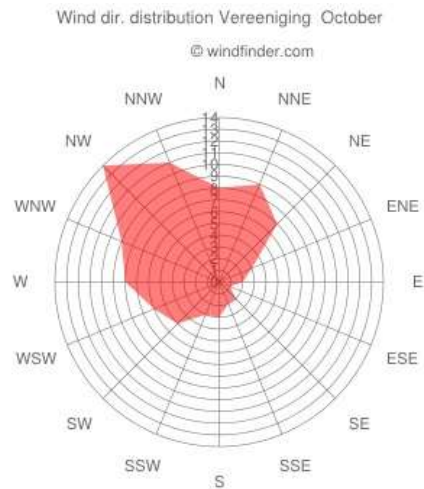
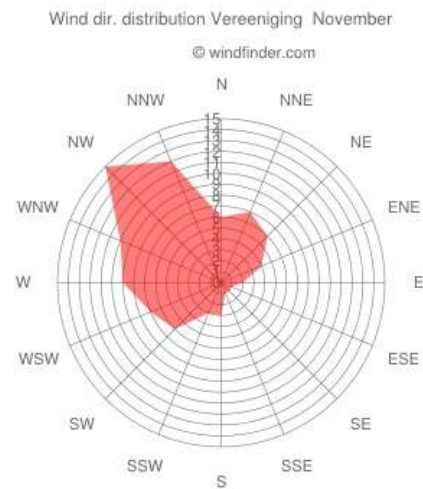
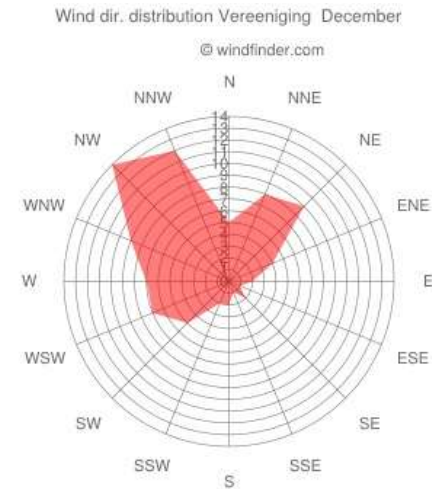
Months	Max	Min	Mean
March	26.3	13.6	19.9
April	23.2	9.6	16.4
May	20.7	4.4	12.6
June	17.7	0.4	9.1
July	18.5	0.2	9.3
August	21.4	3.4	12.4
September	24.9	8.6	16.7
October	26.0	11.8	18.9
November	26.6	13.8	20.2
December	27.7	15.0	21.3
Yearly	24.0	9.3	16.7

2.1.3 Wind

The dominant wind direction in Vereeniging is in a south easterly direction with an average wind speed of 6.5 knots. The following wind roses (Refer to Figure 9 to 20) were based on observations taken from February 2006 to April 2013 daily from 7am to 7pm (www.windfinder.com).



*Figure 9: Wind rose for January**Figure 10: Wind rose for February**Figure 11: Wind rose for March**Figure 12: Wind rose for April**Figure 13: Wind rose for May**Figure 14: Wind rose for June*

*Figure 15: Wind rose for July**Figure 16: Wind rose for August**Figure 17: Wind rose for September**Figure 18: Wind rose for October**Figure 19: Wind rose for November**Figure 20: Wind rose for December*

2.2 Biophysical aspects affected

2.2.1 Geology

The following geological information was abstracted from the Specialist Groundwater Phase I Investigation Report compiled by Shangoni Aquiscience, a division of Shangoni Management Services (Pty) Ltd. The geology and geohydrology of the catchment were characterised by a desktop study with information gathered from topographical, geological and hydrogeological maps including data sourced from the Groundwater Resource Directed Measures (GRDM).

The 2626 West Rand 1:250 000 geology map series indicates that DMS Powders is located on the contact of the Vryheid Formation belonging to the Eccca Group of the Karoo Supergroup and the Malmani subgroup belonging to the Chuiniespoort Group of the Transvaal Supergroup (Refer to Figure 21). A representative stratigraphic section of the Karoo Supergroup was obtained by Cilliè and Savage (1961) from a borehole drilled in the Springfield mining area to the south of BHP Billiton (Metalloys) (Table 8). The Vryheid Formation consists predominantly of arenaceous rocks with beds of shale and coal at depths of approximately 400m, 500m and 700m. The Dwyka Group consisting of shale, sandstone and conglomerate directly underlies the Eccca Group and is situated at approximately 850m. The Chuiniespoort dolomite is found below the Dwyka Group at approximately 890m. Major fault zones occur to the north and west of Meyerton (approximately 10km).

Table 8: Representative succession of the Karoo Supergroup south of BHP Metalloys in the Springfield mining area.

Group	Formation	Lithology	Thickness (m)	Depth (m)
Regolith		Sand, gravel		
ECCA	Vryheid	Sandstone, micaceous	128	226
		Shale, micaceous, black, sandy	174	399
		Coal, Top seam	6	405
		Shale and sandstone bedded	21	427
		Coal, Middle seam	104	531
		Sandstone, micaceous	18	549
		Shale, micaceous, sandy grey to black	119	668
		Coal, bottom seam	55	722
		Shale/ brown, bottom seam	12	735
		Coal, bottom seam	119	853
DWYKA	Mbizane	Shale, sandstone, conglomerate	9	863
	Elandsvlei	Diamictitie	21	884
Chuiniespoort		Dolomite	+ 0.6	890



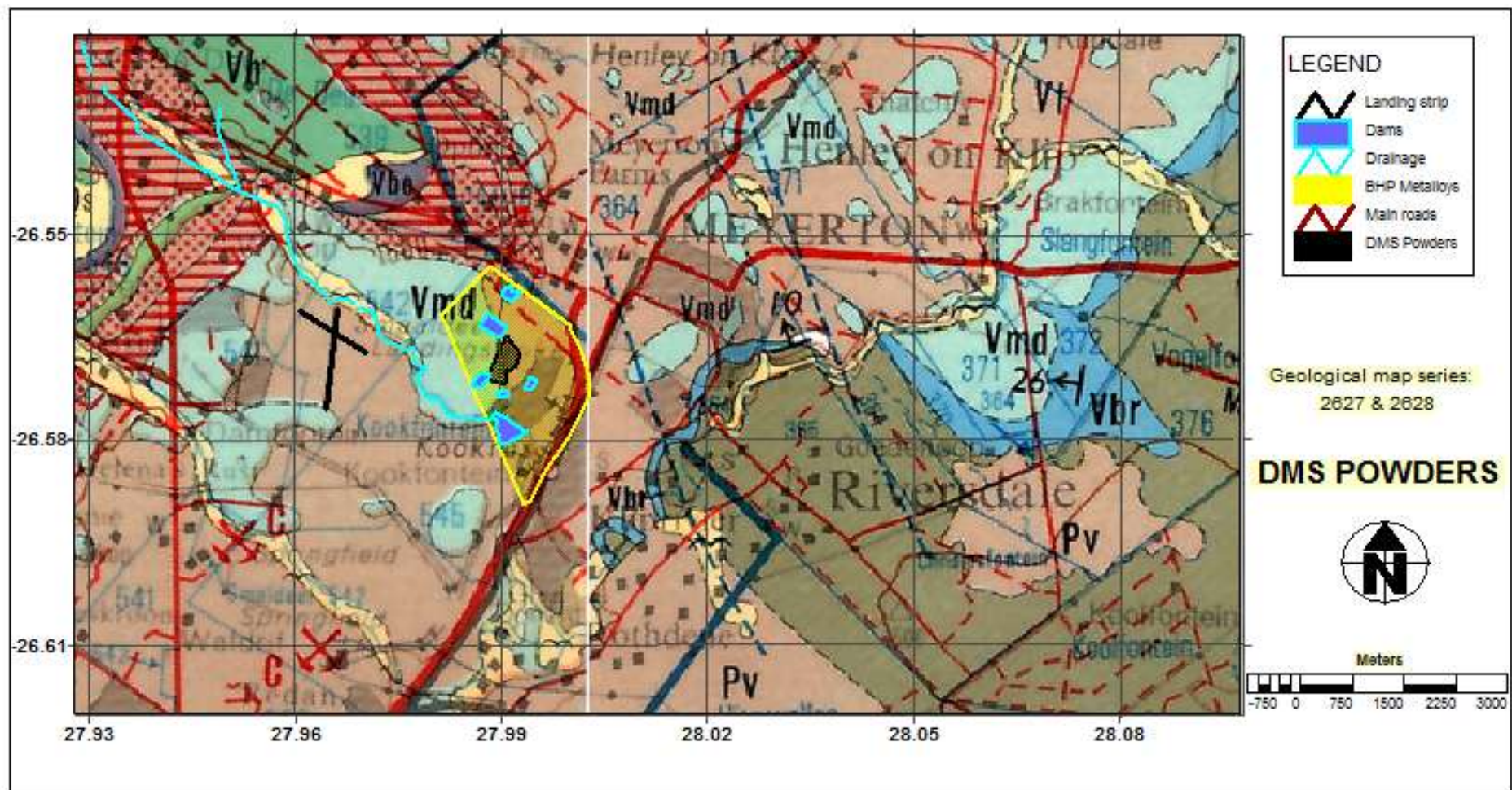
2.2.2 Topography

DMS Powders is situated at an elevation of 1474m (Refer to Figure 22). The surrounding environment gently slopes to the south. Most of the adjacent area is built up and surface water runoff is canalised. The general slope along the site is gentle at approximately 1:60. There is a depression on site between the plant and the raw material stockpile area where damming is confirmed to occur during the raining season (Shangoni Management Services (Pty) Ltd., 2012).

2.2.3 Soils

The soils in the area are classified as S2 (Refer to Figure 23) and described as Red, Yellow and greyish soils with a low to medium base status with a water holding capacity of 41-60mm (AGIS, 2007).





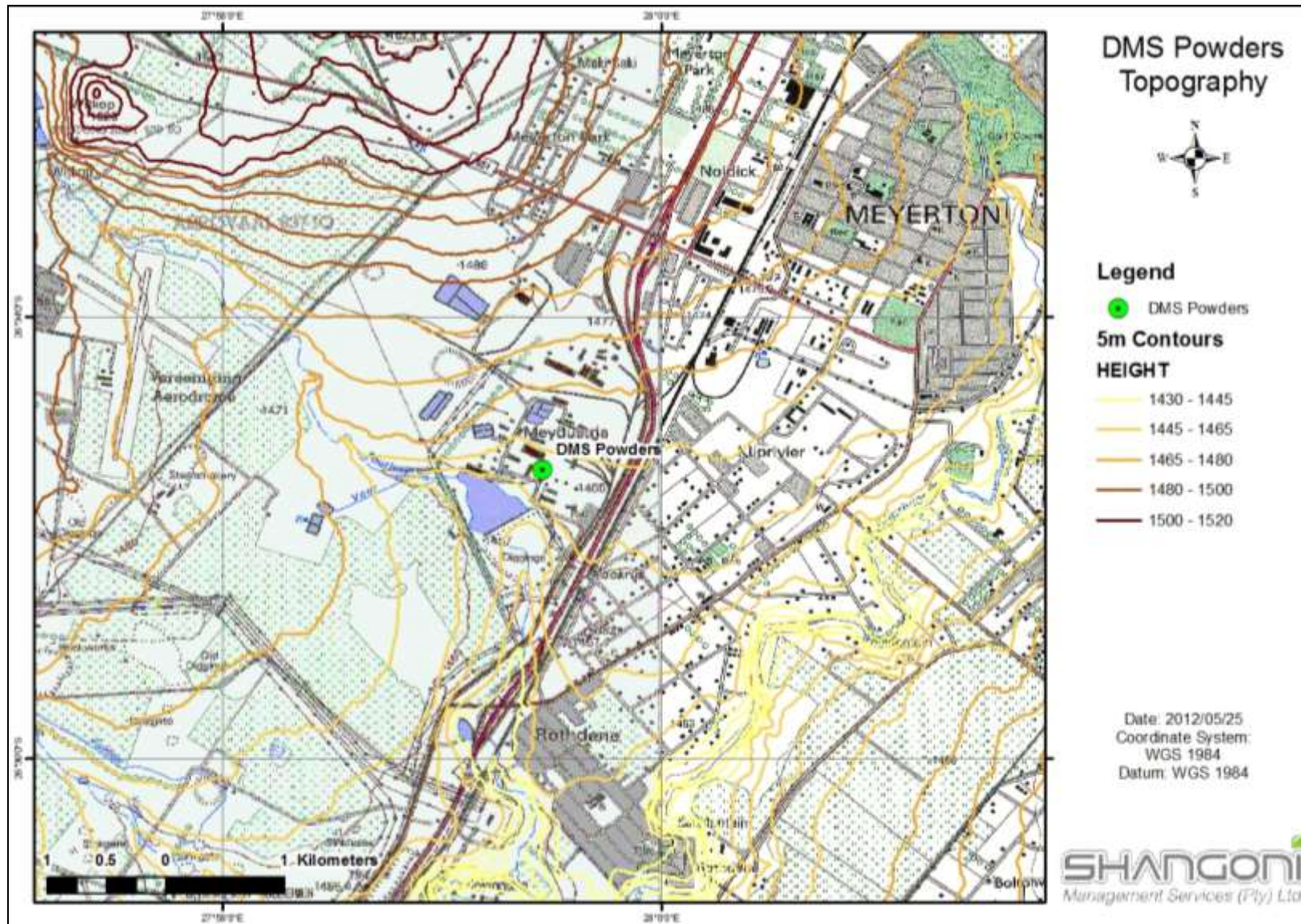


Figure 22: Topography Map of the area

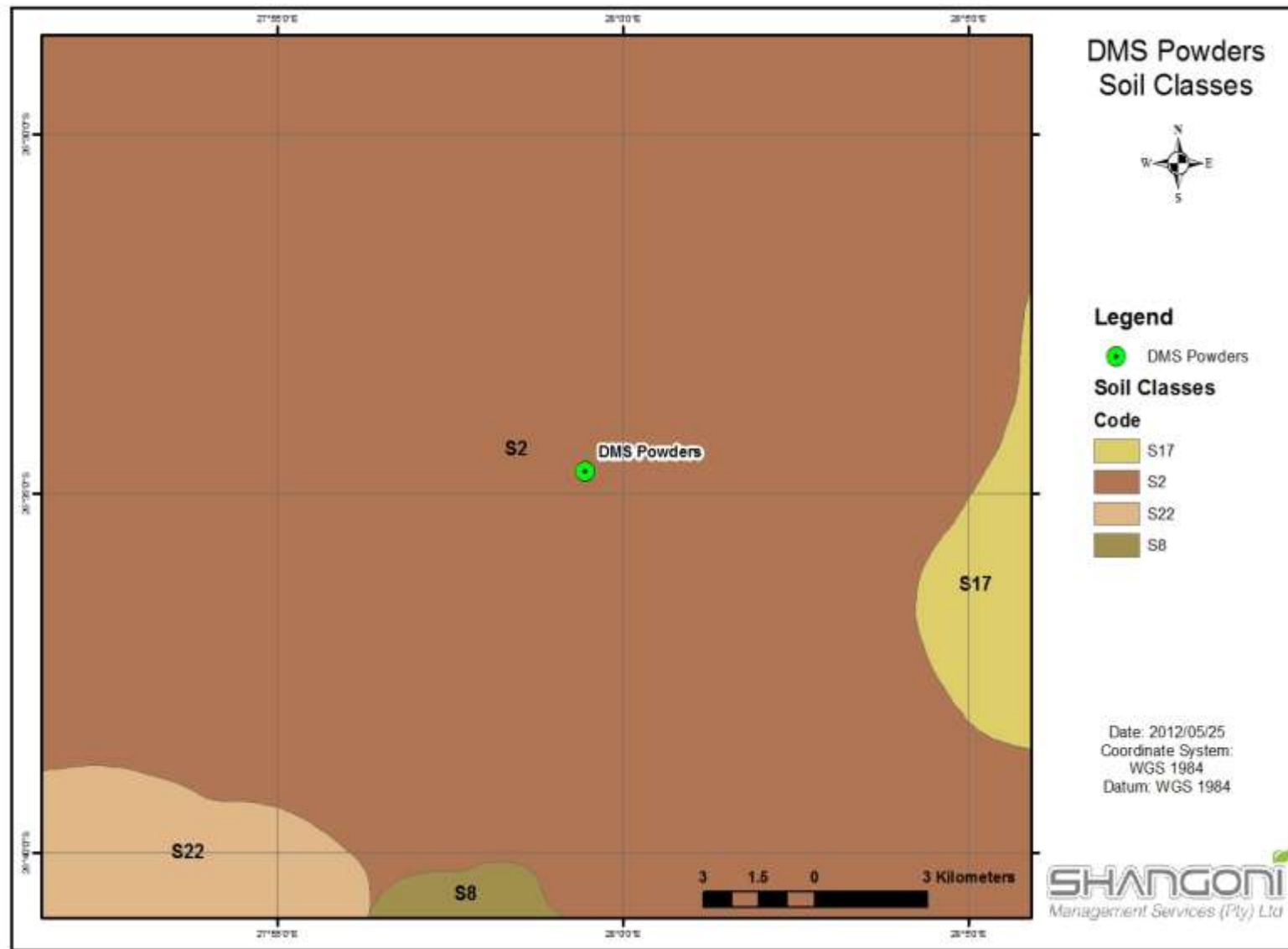


Figure 23: Soil classes map of the area.

2.2.4 Fauna and Flora

The site falls within the Soweto Highveld grassland (Figure 24) type and the vegetation type is generally described as a gently to moderately undulating landscape on the Highveld plateau supporting short to medium-high, dense, tufted grassland dominated almost entirely by *Themeda triandra* and accompanied by a variety of other grasses such as *Elionurus muticus*, *Eragrostis racemosa*, *Heteropogon contortus* and *Tristachya leucothrix*. In places not distributed, only scattered small wetlands, narrow stream alluvia, pans and occasional ridges or rocky outcrops interrupt the continuous grassland cover (Mucina, L., & Rutherford, M. C., 2006). Refer to Table 9 for plant species of importance in the Soweto Highveld grassland.

Table 9: Plant species of importance in the Soweto Highveld grassland.

Graminoid	
<i>Andropogon appendiculatus</i>	<i>Brachiaria serrata</i>
<i>Cymbopogon pospischilii</i>	<i>Cynodon dactylon</i>
<i>Elionurus muticus</i>	<i>Eragrostis capensis</i>
<i>Eragrostis chloromelas</i>	<i>Eragrostis curvula</i>
<i>Eragrostis plana</i>	<i>Eragrostis planiculmis</i>
<i>Eragrostis racemosa</i>	<i>Heteropogon contortus</i>
<i>Hyparrhenia hirta</i>	<i>Setaria nigrirostris</i>
<i>Setaria sphacelata</i>	<i>Themeda triandra</i>
<i>Tristachya leucothrix</i>	<i>Andropogon schirensis</i>
<i>Aristida adscensionis</i>	<i>Aristida bipartite</i>
<i>Aristida congesta</i>	<i>Aristida junciformis subsp. galpinii</i>
<i>Cymbopogon caesius</i>	<i>Digitaria diagonalis</i>
<i>Diheteropogon amplexans</i>	<i>Eragrostis micrantha</i>
<i>Eragrostis superba</i>	<i>Harpochloa falx</i>
<i>Microchloa caffra</i>	<i>Paspalum dilatatum</i>

Herbs	
<i>Hermannia depressa</i>	<i>Acalypha angustata</i>
<i>Berkheya setifera</i>	<i>Dicoma anomala</i>
<i>Euryops gilfillanii</i>	<i>Geigeria aspera var. aspera</i>
<i>Graderia subintegra</i>	<i>Haplocarpha scaposa</i>
<i>Helichrysum miconiifolium</i>	<i>Helichrysum. nudifolium var. nudifolium</i>
<i>Helichrysum rugulosum</i>	<i>Hibiscus pusillus</i>
<i>Justica anagalloides</i>	<i>Lippia scaberrima</i>
<i>Rhynchosia effuse</i>	<i>Schistostephium crataegifolium</i>
<i>Selago densiflora</i>	<i>Senecio coronatus</i>
<i>Vernonia oligocephala</i>	<i>Wahlenbergia undulate</i>



Geophytic Herbs	
<i>Haemanthus humilis subsp. hirsutus</i>	<i>Haemanthus montanus</i>
Herbaceous Climber	
<i>Rhynchosia totta</i>	
Low Shrubs	
<i>Anthospermum hispidulum</i>	<i>Anthospermum rigidum subsp. pumilum</i>
<i>Berkheya annectens</i>	<i>Felicia muricata</i>
<i>Ziziphus zeyheriana</i>	

2.2.5 Surface water

Surface water drainage from and in the vicinity of the DMS site will be predominantly from north to south, towards the Fouriespruit and Klip River. The Klip River is approximately 2.6km to the south east of DMS Powders and the Fouriespruit is approximately 550m to the south west of DMS Powders.

Quantity

The DMS Powders site is divided into three catchment areas: Northern stockpile area, Southern stockpile area, and Plant area. The storm water leaving the DMS Powders site is currently collected within an affected water dam (Samancor Storm Water Control Dam). Table 10 and Figure 25 illustrate the surface runoff at DMS Powders.

Table 10: Modelled runoff volumes for the DMS Powders Site (Snyman, J., September 2012).

Catchment areas	Runoff volumes (m3)			
	1:50 24hours	1:50 48hours	1:100 24hours	1:100 48hours
Northern Stockpile area	637	839	738	977
Southern Stockpile area	915	1205	1060	1404
Plant area	218	287	253	335

Quality

The following information was abstracted from the Specialist Groundwater Phase I Investigation Report compiled by Shangoni Aquiscience, a division of Shangoni Management Services (Pty) Ltd. Leachate tests and Acid Base Accounting (ABA) analyses were done on the iron shavings-, coal-, Si-carbide- and 'lumpy' stockpiles to determine their impact on the storm water quality emanating from the site. The following tests were done:

- Three TCLP leaching tests of iron shavings for organic and inorganic parameters;
- Three distilled water leaching tests of the coal stockpiles for inorganic parameters; and
- Three ABA analyses' on coal, Si-carbide and 'lumpy' stockpiles stored on site.



The water quality of the storm water; emanating from the raw material storage area, the M9 process water together with the storm water emanating upstream from but draining through DMS Powders, was analysed to identify contaminants that may originate from the site (Refer to Table 11).

Table 11: Groundwater Phase I investigation test results.

Area	Test/analysis	Results
Iron shavings stockpiles	TCLP leaching tests	<ul style="list-style-type: none"> Above detection limits of mostly petroleum hydrocarbons comprising volatile aromatic hydrocarbons (mostly phenols and cresols), including polycyclic aromatic hydrocarbons (PAH), Chlorophenol 4-chloro-3-methylphenol which was recorded in trace quantities.
Coal stockpiles	Distilled water leaching tests ⁴ ABA analyses	<ul style="list-style-type: none"> High total sulphur content of 0.52%, Potential to generate acid, Soluble and mobile major and trace metals. Metals recorded above detection limits which may pose a potential risk to the environment include F, Al, Fe, Mn, Mo, Sn and Zn.
"Si-Carbide and "Lumpy" stockpiles	ABA analyses	<ul style="list-style-type: none"> Lower total sulphur contents for the Si-Carbide (0.09%) and lumpy stockpiles (0.04%), Non-acid forming.
Raw material storage area	Storm water analysis	<ul style="list-style-type: none"> Contained constituents similar to the iron shavings leach tests but also recorded trace quantities of metals not found in the iron shavings or coal stockpiles, which included As, Cd, Hg, Pb and Cr, The organic parameters recorded included mostly petroleum hydrocarbons consisting of phenols, cresols and polycyclic aromatic hydrocarbons. Chlorophenol, 3-chloro-4-methylphenol was also recorded.
M9 process water	Storm water analysis	<ul style="list-style-type: none"> Some of the BTEX compounds were recorded for M9 process water but in relatively low concentrations.
Metalloids area	Storm water analysis	<ul style="list-style-type: none"> Trace quantities of a few polycyclic hydrocarbons were recorded.

2.2.6 Groundwater

The following information was abstracted from the Specialist Groundwater Investigation Report, phases I & III compiled by Shangoni Aquiscience, a division of Shangoni Management Services (Pty) Ltd.

Quantity

The groundwater occurrence in vicinity of the study area is associated with weathered and fractured sedimentary/sandstone/dolomite rocks not associated with dolerite intrusions but more related to compressional stresses and offloading. According to the hydrogeological map series 2526



Johannesburg (Barnard, 2000), the entire Meyerton region including BHP Billiton (Metalloys) and DMS Powders are situated in a C5 Karstic type aquifer ($>5\text{l/s}$) and not in the Vryheid sandstones of lesser quantities. The groundwater yield potential is classed as excellent on the basis that 50% of boreholes drilled into the Malmani dolomites produce more than 5l/s .

Quality

Reference boreholes relative to DMS Powders (BHP Billiton (Metalloys) owned) was sampled to assess the impact of DMS on the groundwater regime. The upgradient groundwater quality can be described as neutral, non-saline and soft with high to elevated levels of phosphate (PO_4) and ammonia (NH_4) and low to trace amounts of As, and petroleum products including toluene and styrene. The water is unfit for human consumption given the high ammonia concentration of 10.3mg N/l .

The groundwater quality down gradient from DMS can be described as neutral to slightly acidic, non saline with high levels of nitrate (NO_3) and trace quantities of toluene, styrene and halogenated hydrocarbons. Although the NO_3 concentration recorded in the downgradient borehole (11.2mg N/l) marginally exceeds the domestic limit for recommended use ($<11.0\text{mg N/l}$) it is not attributed to DMS since ammonia (NH_4) concentrations are already elevated at the upgradient borehole (nitrification process). However the presence of the halogenated hydrocarbons can most probably be related to DMS activities.

2.2.7 Water authority

The Gauteng Department of Water Affairs is the responsible water authority. DMS Powders is situated within the Upper Vaal water management area. The plant obtains its water directly from Rand Water.



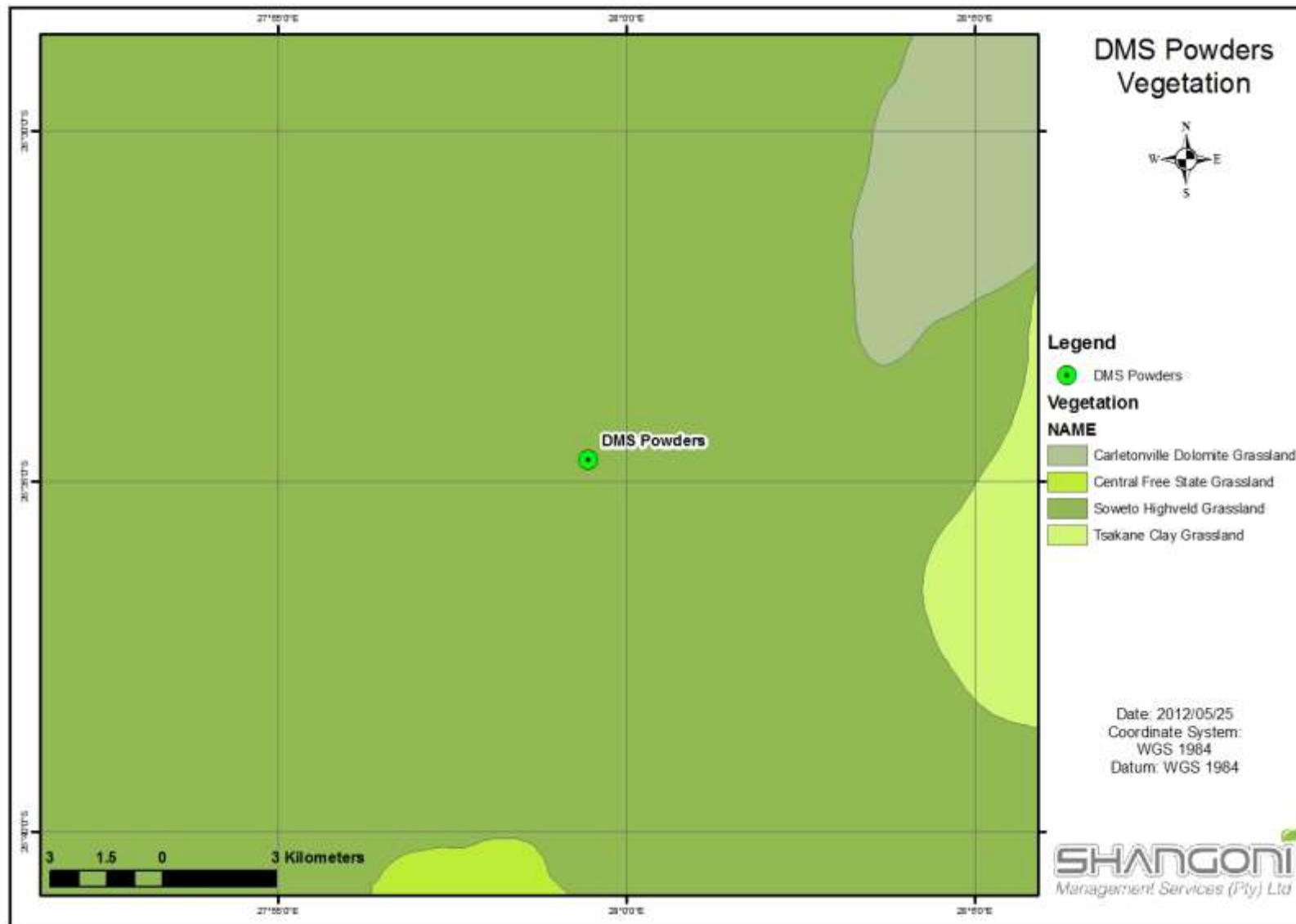


Figure 24: Vegetation Map of the area

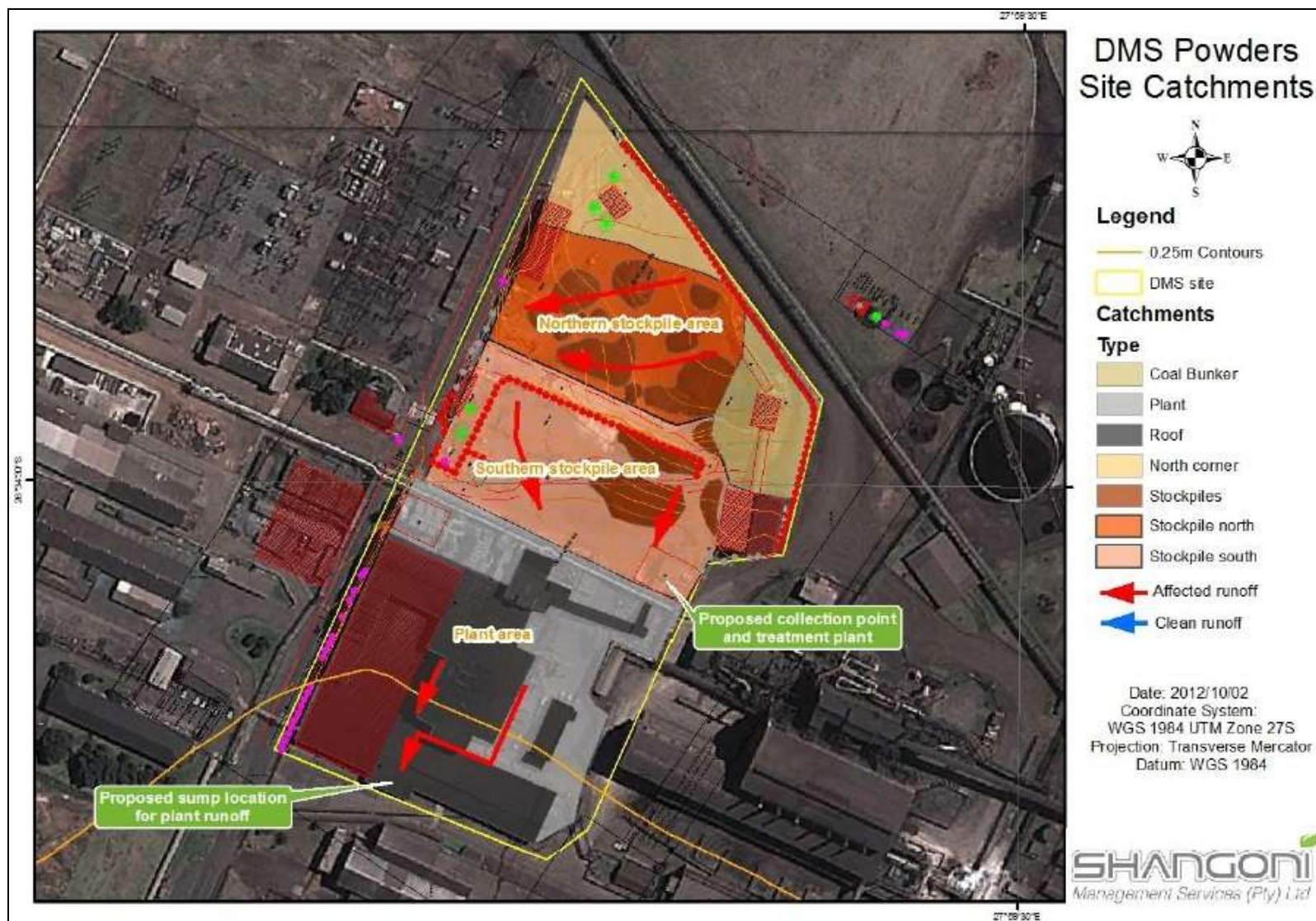


Figure 25: Onsite drainage catchments

2.2.8 Air Quality

Vaal Triangle Air-shed priority area

DMS Powders falls within the Vaal Triangle Air-shed Priority Area (VTAPA) as declared in Government Notice No 365 in Government Gazette No 28732 of 21 April of 2006. The VTAPA has 6 hotspots located all over the priority area. DMS Powders falls within the “Hotspot” Zone 4 (Refer to Figure 26). The pollutants of concern relating to “Hotspot” Zone number 4 are indicated in Table 12 and 13 below.

Table 12: Ambient Air Quality for common Pollutants as adopted to be the Air Quality Objection for Vaal Triangle Airshed Priority Area.

Substance	10 Minute Maximum (ug/m ³)	1 hour maximum (ug/m ³)	8 hour maximum (ug/m ³)	24 hour maximum (ug/m ³)	Annual average (ug/m ³)
Sulphur Dioxide (SO ₂)	500	350		125	50
Nitrogen dioxide (NO ₂)		200			40
Carbon Monoxide (CO)		30 000	10 000		
Particular Matter (PM ₁₀)				75	40
Ozone (O ₃)		200	120		
Lead (Pb)					0.5
Benzene					5

Table 13: Priority "Hotspot: zones indicating the sensitive receptors within the main contributing sources.

Hotspot Zone	Sensitive Receptors within the Zone	Emission Sources within the Zone	Additional Sources not quantified and included	Pollutants of concern
4	Residential developments of Vereeniging and Meyerton	Industrial activities (viz. ArcelorMittal, Vaal works, ArcelorMittal Klip Works Metalloys, Commercial boilers and other smack industrial activities) and domestic fuel burning	Agricultural Activities and large areas of biomass burning	PM ₁₀ , SO ₂ , NO ₂ , Ozone, VOC's

*** Table C from the Vaal Triangle Air-shed Priority Area, Air Quality Management Plan*

In Section 5 of the VTAPA Air Quality Management Plan (AQMP) BHP Billiton (Metalloys), was identified as one of the industries that have to reduce their emission to assist the air shed area to be able to reduce their emission within a certain time period. Refer to Table 14 for Ferroalloys contribution to inhalable particulate emissions.



DMS Powders operates on BHP Billiton (Metalloys) property and therefore shares the responsibility to reduce the emissions generated from that area to reach the targets as set out in the VTAPA AQMP.

Table 14: Source Contribution of inhalable Particulate Emissions.

Industry	Emission %
Iron & Steel Processes	30.70%
Petrochemical	10.01%
Ferroalloys	2.08%
Power generation	15.60%
Domestic Fuel Burning	5.14%
Vehicles	13.71%
Mines and Ash dumps	12.30%
Commercial	0.13%
Other Industries	10.33%

*** Vaal Triangle Air-shed Priority Area Air Quality Management Plan, May 2009*

Air Quality Impact Report, 2013

An air quality impact study conducted for DMS Powders by Airshed Planning Professionals (Pty) Ltd. and attached under Appendix G, identified the following processes as activities listed in terms of Government Notice No. 248 (now Government Notice No. 893) as contemplated in Section 21(1)(a) of the National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) (NEM: AQA, 2004):

- The production of Ferrosilicon (FeSi) in the M8 induction furnaces A and B;
- The drying of FeSi from M8;
- The production of FeSi in the M9 submerged arc furnace (SAF);
- The drying of FeSi from M9; and
- The proposed Research and Development (R&D) furnace.

Other unit processes that may result in emissions that are not considered listed activities include;

- Raw materials receipt, handling, preparation and storage;
- M8 FeSi atomizing;
- M9 FeSi granulation;
- Milling; and
- Product packaging and dispatch.

Emissions from these and other emission sources, such as fugitive dust and vehicle exhaust emission sources, were quantified to estimate annual emissions and indicated the following:

- Stack emissions contribute between 52% and 69% to estimated annual PM_{2.5}, PM₁₀ and PM emissions;



- Furnace building fugitive emissions account for between 30% and 36% of estimated PM_{2.5}, PM₁₀ and PM emissions;
- 78% of Carbon monoxide (CO) emissions occur as a result of vehicle exhaust;
- 79% to 100% of Oxides of Nitrogen (NO_x) and Sulphur dioxide (SO₂) emissions are emitted from stacks; and
- The R&D furnace is expected to increase emissions by less than 0.1%.

Predicted ground level pollutant concentrations, determined by atmospheric dispersion modelling, were screened against National Ambient Air Quality Standards (NAAQS) to assess the impact to human health and the following results were found:

- Exceedances of NAAQS for PM₁₀ are limited to the industrial area within which DMS Powders is located. Furnace building fugitives and stack emissions account for 69% and 21% of predicted PM₁₀ concentrations, respectively;
- Exceedance of the annual NAAQS for PM_{2.5} is limited to the industrial area within which DMS Powders is located. Exceedance of the 24-hour NAAQS for PM_{2.5} occurs at the R59 to the south-east of operations, but not at neighbouring communities. Furnace building fugitives and stack emissions account for 73% and 25% of predicted PM_{2.5} concentrations, respectively;
- Predicted CO, NO₂ and SO₂ concentrations do not exceed NAAQS off-site; and
- The R&D furnace's contribution to predicted ground level concentrations is considered immaterial.

Dust fall out rates at DMS Powders were compared to the Draft Dust Control Regulations for residential areas. It was found that dust fall out is localised and does not exceed the Draft Dust Control Regulation for residential areas off site. The proposed R&D Furnace's contribution to dust fall out was found to be immaterial.



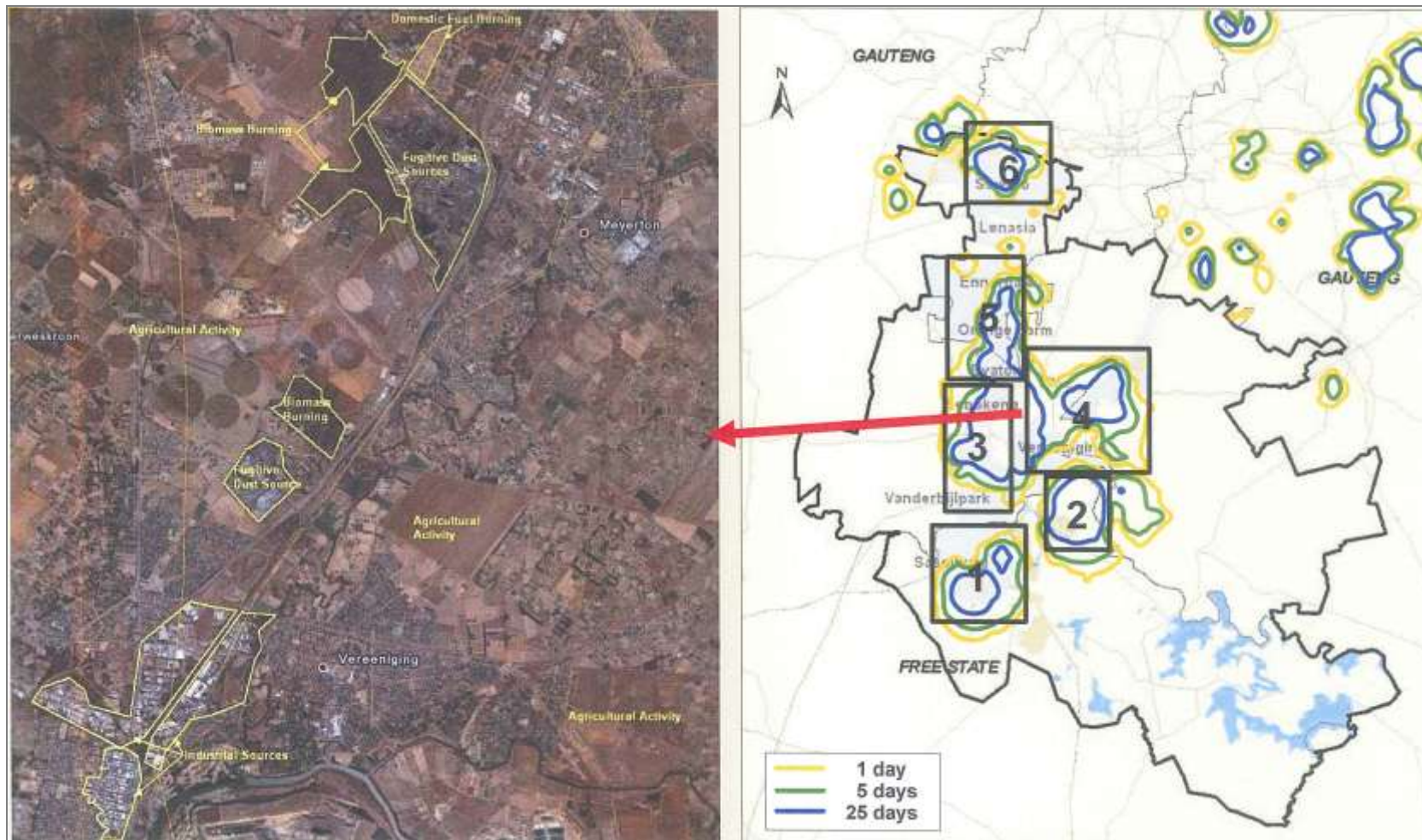


Figure 26: "Hotspot" Zone Number 4.

**Vaal Triangle Air-Shed Baseline Characterisation presentation 11 October 2007 – Airshed Planning Professional

2.2.9 Aesthetics

Land use

The land use and the land cover of the area have been identified as a built up area. The DMS Powders site is located within an existing industrial area on the M61 just west of the town of Meyerton.

Sites of Archaeological and cultural interest

The South African Heritage Resources Agency (SAHRA) requested a Phase 1 Heritage- and Archaeological Impact Assessment for the project. They also stipulated that should the property be very small or disturbed and there are no significant sites, the heritage specialist may choose to send a letter to the heritage authority to indicate that there is no necessity for any further assessment.

A site assessment as part of a Basic Heritage Impact Assessment for DMS Powders was done by A Pelser Archaeological Consulting (APAC) the 22nd of August 2013 and a representative of DMS Powders accompanied the Heritage Expert to the location of the furnace at the Plant. The following information was extracted from the Basic Heritage Impact Assessment.

The location is industrial in nature and as a result has been completely disturbed. If any archaeological or historical (cultural heritage) sites of significance did exist here in the past these would have been disturbed or destroyed to a large degree.

The Stone Age is the period in human history when lithic (stone) material was mainly used to produce tools. In South Africa the Stone Age can be divided in basically into three periods. It is however important to note that dates are relative and only provide a broad framework for interpretation. A basic sequence for the South African Stone Age (Lombard et.al 2012) is as follows: Earlier Stone Age (ESA) up to 2 million – more than 200 000 years ago Middle Stone Age (MSA) less than 300 000 – 20 000 years ago Later Stone Age (LSA) 40 000 years ago – 2000 years ago It should also be noted that these dates are not a neat fit because of variability and overlapping ages between sites (Lombard et.al 2012: 125). No Stone Age sites or occurrences (Stone Age artefacts) were identified during the survey. ESA and LSA sites, including rock art (engravings) are known from the larger geographical area near Vereeniging, Vanderbijlpark, Heidelberg and the Suikersbosrand Nature Reserve (Berg 1999: 4-5). The Iron Age is the name given to the period of human history when metal was mainly used to produce artefacts. In South Africa it can be divided in two separate phases in Berg 1999: 96-98), namely: Early Iron Age (EIA) 200 – 1000 A.D. Late Iron Age (LIA) 1000 – 1850 A.D. Huffman (2007: xiii) however indicates that a Middle Iron Age should be included. His dates, which now seem to be widely accepted in archaeological circles, are: Early Iron Age (EIA) 250 – 900 A.D. Middle Iron Age (MIA) 900 – 1300 A.D. Late Iron Age (LIA) 1300 – 1840 A.D. Once again no Iron Age sites were identified, and if they were present in the past they would have been completely destroyed by development and agricultural activities during the recent past. Late Iron Age settlements are known to



occur near Vereeniging and Heidelberg (Berg 1999: 7). The historical age started with the first recorded oral histories in the area. It includes the moving into the area of people that were able to read and write. The first Europeans to move through or close to the area were the group of hunter and traveller Cornwallis Harris during 1836 (Berg 1999: 13). Meyerton was proclaimed a town in August 1892 (Berg 1999: 21; 147). During the Anglo-Boer War (1899-1902) there were two concentration camps situated near Meyerton – one for Whites and one for Blacks (Berg 1999: 54).

DMS Powders is the world's leading supplier of ferrosilicon. The production of Milled Ferrosilicon (FeSi) in South Africa dates back to 1949 for use in the Dense Medium Separation of diamonds. This was also the early beginning of DMS Powders, trading as Amcor at the time. The production facility relocated to Meyerton in the 1950's with the Atomized Ferrosilicon production facility being commissioned in 1967. In 1975, Amcor merged with SA Manganese and started trading as Samancor. A stand-alone business entity for Ferrosilicon was created in 2000 with the formation of DMS Powders, a division of Samancor. In April 2006, an independent company Dense Media Separation Powders (Pty) Ltd was established under new ownership as a fully Black Economic Empowered company as defined by the South African Black Economic Empowerment Act of 2004 (www.dmspowders.com).

The oldest map that could be obtained from the Chief Surveyor General's database (www.csg.dla.gov.za) dates to January 1938 (CSG Document 10JIF201) and pertains to Portion 74 of the farm. At the time the farm was numbered 57 and was located in the district of Vereeniging. It also indicates that the whole farm was originally granted to an unmentioned individual on 30/10/63 – probably in 1863. No historical features are indicated on this map. The site where the new furnace will be developed, and for which the application is required, is in current use, and a new furnace will be developed here. The site and the buildings here are not older than 60 years of age and of no heritage significance. The buildings will not be demolished. The development from this perspective can therefore continue.

The site for the new development is located in an Industrial area that has been extensively developed and disturbed in the past and as a result no sites, features or material of an archaeological or historical (cultural heritage) nature exists here anymore. The area is currently being used as a furnace area, and a new, larger furnace will be developed here. The building where the furnace is located will not be demolished and is also not older than 60 years of age (A.J. Pelser, August 2013).

2.2.10 Socio-economic aspects

DMS Powders are located within ward 3 of the Midvaal Local Municipality (LM) within the jurisdiction of the Sedibeng District Municipality.



Demography

The Demography of the Midvaal Local Municipality, especially relating to the labour force in relation to the district municipality and the other local municipalities in the Sedibeng district, is described in the sections below.

Major economic activities

The major economic activities within the Midvaal local municipality can be divided into three sectors namely primary, secondary and tertiary sectors. The main activities in the different sectors have been set out in Figure 27.

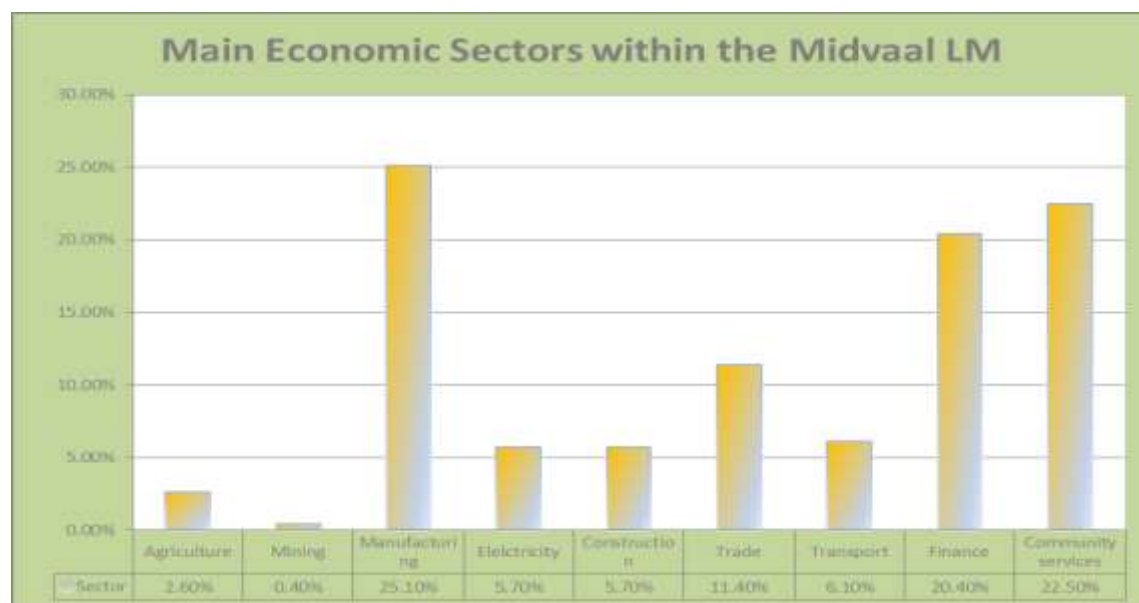


Figure 27: Main Economic activities in the Midvaal LM (Midvaal IDP 2012/2013)

Unemployment and employment

According to statistics shown in the Midvaal Integrated Development Plan (IDP) of 2012/13, the Midvaal Municipality has the lowest poverty rate of approximately 17.2% in relation to the 41% of Emfuleni LM and the 37% of Lesedi LM (Refer to Figure 28).

Human Development Index

The Human development index for the Midvaal Local Municipality is the highest of all the local municipalities in the Sedibeng District Municipality (Refer to Figure 29).

Employment per Economic Sectors

The three main employment opportunities are within the trade, manufacturing and the community services sector within the Midvaal Local Municipality. The agricultural sector only employs approximately 2% and the transport sector only 6% of the economically active population (Refer to Figure 30 below).



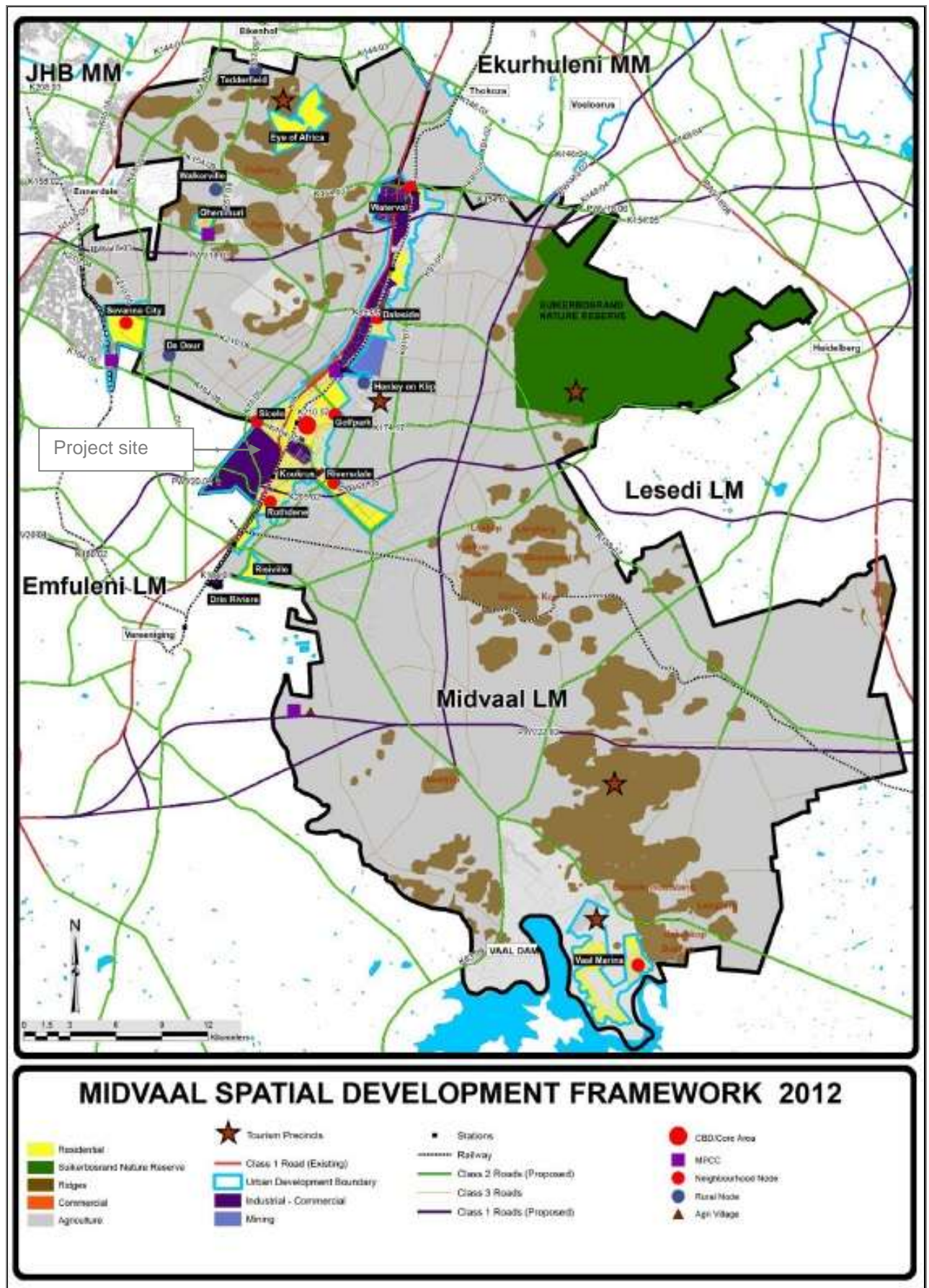


Figure 28: Map of the Midvaal Local Municipality (IDP 2012-2016 for 2012-2013).

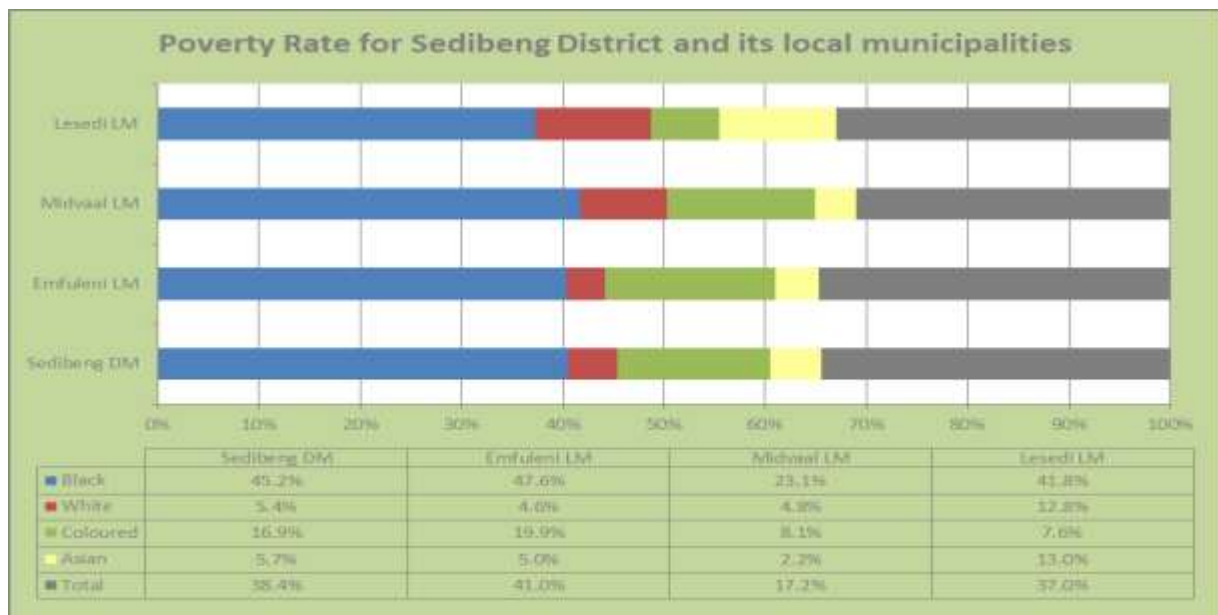


Figure 29: Poverty rate for Sedibeng and its local Municipalities (Midvaal IDP 2012/2013).

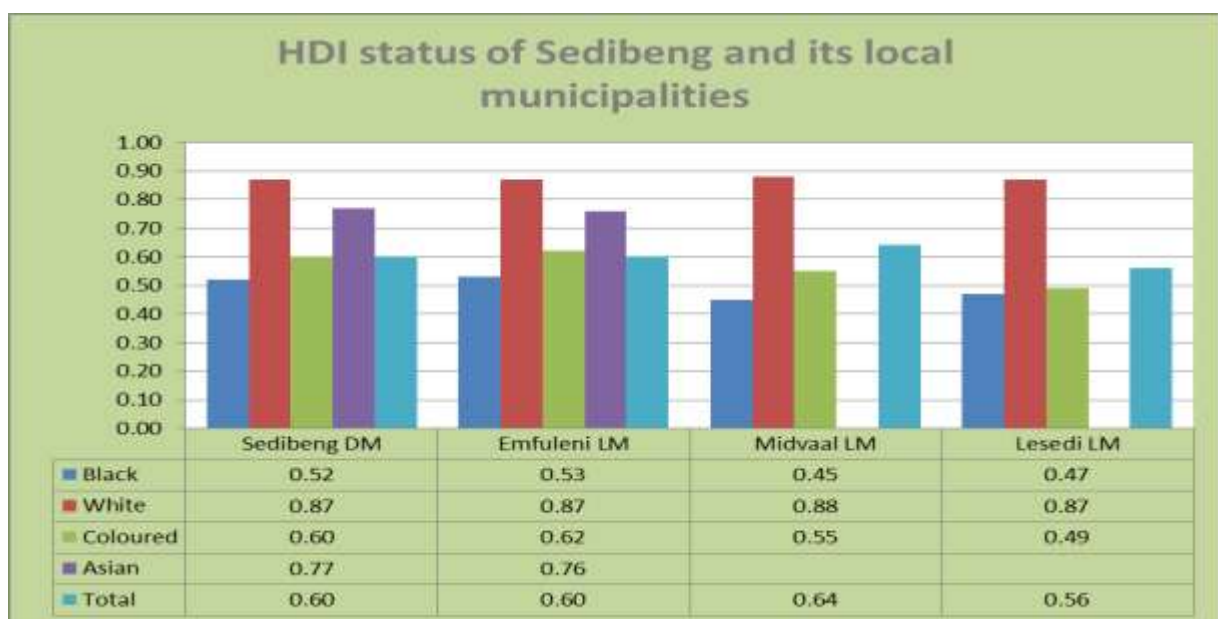


Figure 30: HDI status of Sedibeng and its local municipalities (Midvaal IDP 2012/2013).



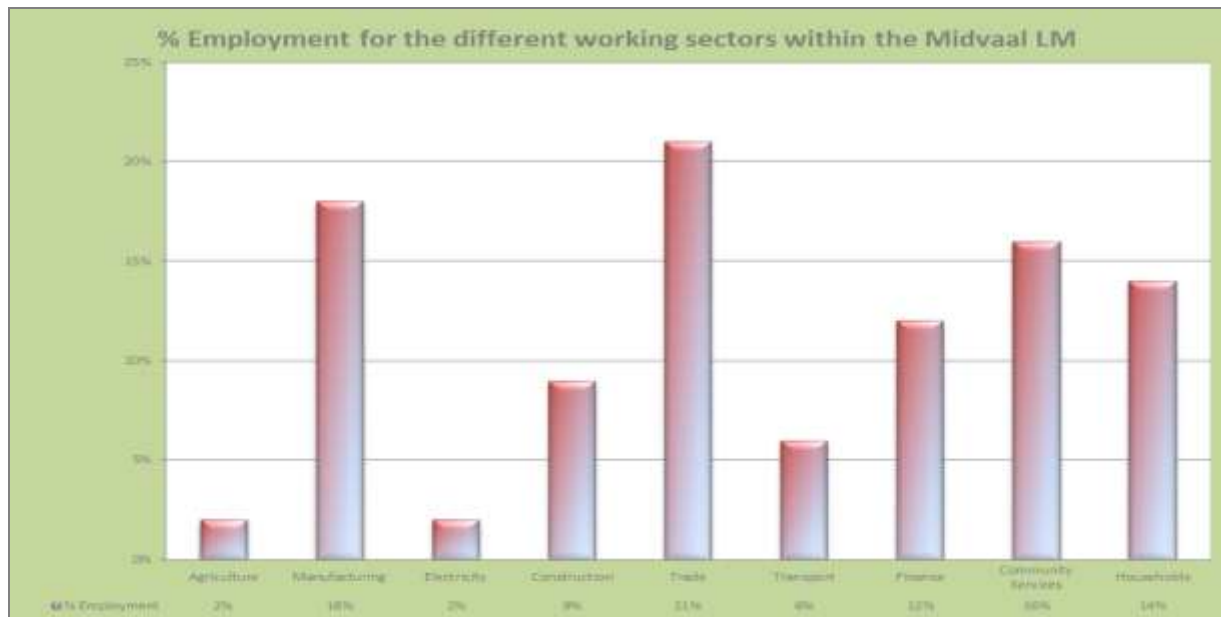


Figure 31: Percentage employment for the different working sectors within the Midvaal LM (Midvaal IDP 2012/2013).2.16.1 Demography.

3. APPLICABLE LEGISLATION AND GUIDELINES

Table 15 below provides an indication of the main legislation, policies and/or guidelines applicable to the proposed R&D Furnace project.

Table 15: Applicable legislation, policies and/or guidelines

Title of legislation, policy or guideline	Administering authority	Aim of legislation, policy or guideline
Laws of General Application		
The Constitution of the Republic of South Africa, 1996 (Act 108 of 1996)	-	To establish a Constitution with a Bill of Rights for the RSA.
Environment Conservation Act, 1989 (Act 73 of 1989 as amended)	Gauteng Department of Agriculture and Rural Development	To control environmental conservation.
National Environmental Management Act, 1998 (Act 107 of 1998)	Gauteng Department of Agriculture and Rural Development	To provide for the integrated management of the environment, and to regulate the 'Duty of Care' Principle.
Promotion of Access to Information Act, 2000 (Act 2 of 2000 as amended)	-	To give effect to the constitutional right of access to any information held by the State and any information that is held by another person and that is required for the exercise or protection of any

Title of legislation, policy or guideline	Administering authority	Aim of legislation, policy or guideline
		rights.
Air Quality and Noise		
National Environmental Management: Air Quality Act (Act No 39 of 2004) (NEM:AQA)	Sedibeng District Municipality and the Gauteng Department of Agriculture and Rural Development	To reform the law regulating air quality to protect the environment by providing reasonable measures for the prevention of pollution. To provide for national norms and standards regulating air quality monitoring, management and control.
Government Notice No. 248 (now Government Notice No. 893) as contemplated in Section 21(1)(a) of the NEM:AQA (Category 4, Subcategory 4.1: Drying and Calcining and Category 4, Subcategory 4.9: Ferro-alloy production)	Sedibeng District Municipality	Licensing of activities which result in atmospheric emissions which have or may have a significant detrimental effect on the environment, including health, social conditions, economic conditions, ecological conditions or cultural heritage
The Vaal Triangle Airshed Priority Area (VTAPA) and the National Framework for Air Quality Management	Department of Environmental Affairs	Tool for Achieving continuous improvement in the Air Quality over time.
Water Management		
National Water Act (NWA), 1998 (Act No 36 of 1998)	Department of Water Affairs	To provide for fundamental reform of the law relating to water resources.
Waste Management		
National Environmental Management: Waste Act (Act No. 59 of 2008)	National Department of Environmental Affairs	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.
Biodiversity		
National Environmental Management Biodiversity Act, 2004 (Act No 10 of 2004)	Gauteng Department of Agriculture and Rural Development	To provide for the management and conservation of South Africa's biodiversity within the framework of the National Environmental Management Act, 1998.
Conservation of Agricultural Resources Act, 1983 (Act No 43 of 1983)	Gauteng Department of Agriculture and Rural Development	To provide for control over the utilisation of the natural agricultural resources of South Africa in order to promote the conservation of the soil, the water sources and the vegetation and the combating of weeds and



Title of legislation, policy or guideline	Administering authority	Aim of legislation, policy or guideline
		invader plants.
National Veld and Forest Fire Act, 1998 (Act No 101 of 1998)	Gauteng Department of Agriculture and Rural Development	To reform the law on veldt and forest fires.
Agricultural Pest Act, 1983 (Act No 36 of 1983 as amended) – GN R276 of 5 March 2004	Gauteng Department of Agriculture and Rural Development	To regulate plants, plant products and other regulated articles when imported into South Africa.
Soil and Land Management		
National Environmental Management Act, 1998 (Act 107 of 1998).	Gauteng Department of Agriculture and Rural Development	To provide for the integrated management of the environment and to regulate the 'Duty of Care' Principle.
National Environmental Management Amendment Act, 2008 (Act 62 of 2008).		
Environment Conservation Act, 1989 (Act 73 of 1989 as amended)	Gauteng Department of Agriculture and Rural Development	To control environmental conservation.
Heritage and Archaeological Resources		
National Heritage Resources Act No 25 of 1999 (Act No 25 of 1999 as amended)	South African Heritage Resources Agency	To introduce an integrated and interactive system for the management of the national heritage resources; to promote good government at all levels, and empower civil society to nurture and conserve their heritage resources so that they may be bequeathed to future generations
Protected Areas		
National Environmental Management: Protected Areas Act, 2003 (Act No 57 of 2003 as amended)	Gauteng Department of Agriculture and Rural Development	To provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes.
Planning of New Activities		
National Environmental Management Act, 1998 (Act 107 of 1998)	Gauteng Department of Agriculture and Rural Development	To provide for the integrated management of the environment and to regulate the 'Duty of Care' Principle.
EIA Regulations R 543, R 544, R 545 and R 546, dated June 2010) under the NEMA, 1998	Gauteng Department of Agriculture and Rural Development	To regulate and control the authorisation of certain listed activities.



4. PUBLIC PARTICIPATION PROCESS

4.1 Objectives of the Public Participation Process (PPP)

Section 24 of the Constitution of the Republic of South Africa of 1996 guarantees everyone the right to an environment that is not harmful to their health and well-being and to have the environment protected for the benefit of present and future generations. In order to give effect to this right, the National Environmental Management Amendment Act (NEMA), 2008, came into effect.

In terms of Section 24 (4) of the NEMA, 2008, procedures for the investigation, assessment and communication of the potential consequences or impacts of activities on the environment must, *inter alia*, ensure, with respect to every application:

- Coordination and cooperation between organs of state in the consideration of assessments where an activity falls under the jurisdiction of more than one organ of state.
- That the findings and recommendations flowing from an investigation, the general objective of integrated management laid down in NEMA, 2008 and the principles of environmental management set out in Section 2 of NEMA, 2008 are taken into account in any decision made by the organ state in relation to any proposed policy, programme, process, plan or projects, consequences or impacts.
- Public information and participation procedures which provide all integrated and affected parties, including all organs of state in all spheres of government that may have jurisdiction over any aspect of the activity, with a reasonable opportunity to participate in those information and participation procedures.

One of the general objectives of integrated environmental management laid down in Section 23(2) (d) of NEMA, 2008 is to: “ensure adequate and appropriate opportunity for public participation in decisions that may affect the environment.”

The National Environmental Management Principles as stipulated in NEMA, 2008 say;

- “Environmental management must place people and their needs at the forefront of its concern, and serve their physical, psychological, developmental, cultural and social interests equitably.
- The participation of all interested and affected parties in environmental governance must be promoted, and all people must have an opportunity to develop the understanding, skills and capacity necessary to achieve equitable and effective participation, and participation by vulnerable and disadvantage persons must be ensured”.

4.2 Legislation and guidelines followed for the PPP

The public participation process for this project was conducted by Shangoni Management Services in terms of:

- The procedures and provisions in terms of the NEMA (as amended), 2008;



- Chapter 6 of the EIA Regulations of 2010;
- GN 807; Public Participation Guideline in the Environmental Impact Assessment Process, dated October 2012; and
- Other relevant legislation such as the Promotion of Access to Information Act (PAIA), 2000.

4.3 Public Participation Process followed

4.3.1 Identification and registration of I&APs and key stakeholders

Table 16 below lists the landowners and adjacent landowners identified and notified (by means of e-mail, telephone, fax and/or post) of the proposed project. Copies of the notifications to the I&APs have been included in Appendix E.

Table 16: List of adjacent landowners identified and notified

Property owner	Address or property description
BHP Billiton (Metalloys) Samancor	Portion 4 and 63 of the farm Kookfontein 545 IQ

All organs of state that may have jurisdiction in respect of the proposed project are considered to be registered I&APs.

The following organs of state were notified of the proposed project:

- Midvaal Local Municipality;
- Sedibeng District Municipality;
- Gauteng Department of Agriculture and Rural Development;
- Department of Water Affairs;
- South African Heritage Resources Agency (SAHRA);
- Department of Community Safety;
- Department of Economic Development;
- Department of Finance;
- Department of Health;
- Department of Infrastructure Development;
- Department of Local Government and Housing; and
- Department of Roads and Transport.

Copies of the notifications to the organs of state and adjacent land owners have been included in Appendix E, and examples are included in the figures below.



4.3.2 Methods of notification

4.3.2.1 Advertisement(s)

The proposed project was advertised in two local newspapers, the Vaal Ster and the Beeld, on the 29th of January 2013. These newspapers were found to be the most appropriate newspapers in terms of their accessibility to I&APs. A copy of the advertisements and proof of the placement thereof is attached in Appendix E. Refer also to the figures below.

4.3.2.2 Placement of site- and public notices

Notice was also given to Interested and Affected Parties (I&APs) via the placement of notice boards. Notice boards were placed at two different, noticeable and conspicuous places, at the entrance to the site (off the M61 onto Crop Street) and on BHP Billiton's bulletin board. A copy of the site notice and photographs of the site notices are attached in Appendix E. Refer also to the figures below.

4.3.2.3 Background Information Document

The Background Information Document (BID) provides background information pertaining to the proposed project and is intended to inform I&APs of the project. The BID also includes a registration form that I&APs, stakeholders and organs of state are encouraged to complete in order to register as I&APs for the proposed project.

The BID was sent to adjacent land owners, organs of state and stakeholders together with the notification letters mentioned previously. This correspondence was sent via registered mail and hand delivery where required.

Copies of the BID and proof of distribution of the BID to the adjacent landowners and organs of state has been attached as Appendix E.



Figure 32: Photograph of first notice board.



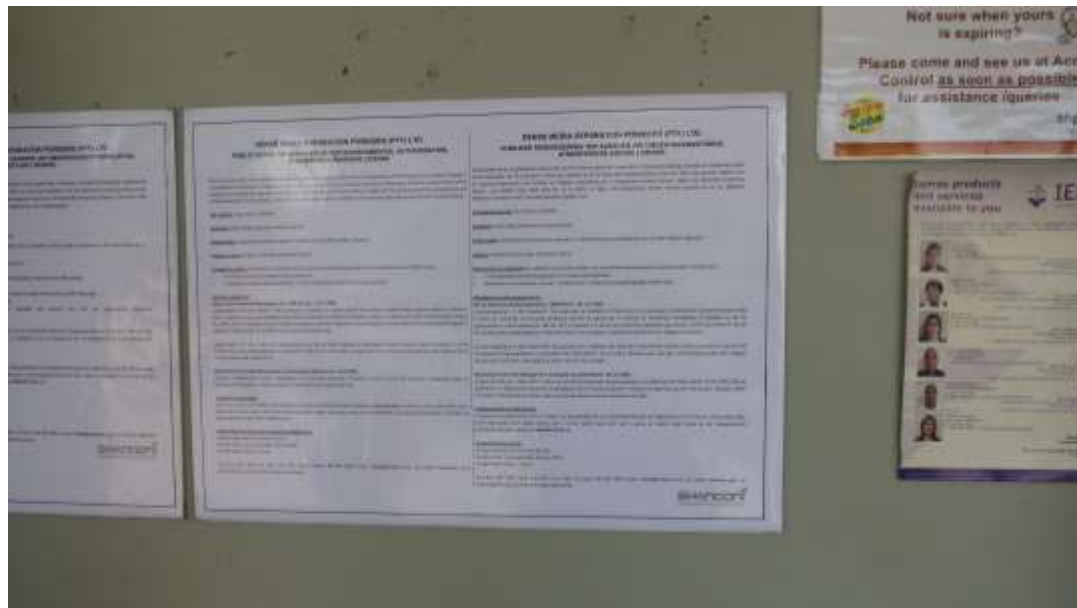


Figure 33: Photograph of second notice board.





Figure 34: Example of registered letters sent to I&APs and Organs of State (1)

you wish to not be part of this EIA process, it will be appreciated if we could receive a written confirmation thereof to enable us to continue with the application.

Please do not hesitate to contact the undersigned should you require any additional information.

Contact Details: Shangoni Management Services

Miss Lizette Orous

E-mail: lizette@shangoni.co.za

Fax 2 E-mail: 088 643 5360

Fax: 012 807 1014

Online Participation: Go to www.shangoni.co.za and click on Public Documents.

Regards,



Lizette Orous
Environmental Assessment Practitioner

Figure 35: Example of registered letters sent to I&APs and Organs of State (2)




List of REGISTERED LETTERS

Lys van GEREGETREERDE BRIEWE

(with an insurance option/met 'n versekeringsopsie)

Full tracking and tracing/Volledige volg en spoor



Post Office

Name and address of sender:
 Naam en adres van afsender: Shangoni Management Services
P.O. Box 14716, Lynnwood Ridge, Pretoria, 0040
Lizette Crous

Enquiries/Nayrae
 Toll-free number
 Tolvry nommer
0800 111 502

No	Name and address of addressee Naam en adres van geadresseerde	Insured amount Versekerde bedrag	Insurance fee Versekeringsgeld	Postage Posgeld	Service fee Diensgeld	Affix Track and Trace customer copy Plak Volg-en-Spoor-klantafskrif
1	Gauteng Department of Community Safety - Adv. M.Tshangeni/ Ms N. Mazibuke - P.O. Box 62440, Marshalltown, 2107					REGISTERED LETTER (with a domestic insurance option) Streekl 0800 111 502 www.saps.co.za RD 630 032 198 ZA CUSTOMER COPY 301028R
2	Gauteng Dep. of Economic Development - Mr. Khulu Radebe P/Bag X 91, Marshalltown, 2107					REGISTERED LETTER (with a domestic insurance option) Streekl 0800 111 502 www.saps.co.za RD 630 032 184 ZA CUSTOMER COPY 301028R
3	Gauteng Dep. of Finance, Mr. M. Nkomo/mr. S. Lumka P/Bag X 112, Marshalltown, 2107					REGISTERED LETTER (with a domestic insurance option) Streekl 0800 111 502 www.saps.co.za RD 630 032 215 ZA CUSTOMER COPY 301028R
4	Gauteng Dep. of Health - Dr. N. Xundu P/Bag X 085, Marshalltown, 2107					REGISTERED LETTER (with a domestic insurance option) Streekl 0800 111 502 www.saps.co.za RD 630 032 207 ZA CUSTOMER COPY 301028R
5	Gauteng Dep. of Infrastructure Development - Mrs. M. Modipa/ Mr. S. Lumka - P/Bag X 83, Marshalltown, 2107					REGISTERED LETTER (with a domestic insurance option) Streekl 0800 111 502 www.saps.co.za RD 630 032 238 ZA CUSTOMER COPY 301028R
6	Gauteng Dep. of Local Government & Housing - Mr. M. Mayani P/Bag X 77, Marshalltown, 2107					REGISTERED LETTER (with a domestic insurance option) Streekl 0800 111 502 www.saps.co.za RD 630 032 224 ZA CUSTOMER COPY 301028R
7	Gauteng Dep. of Roads & Transport - Mrs. M. Diedricks P/Bag X 88, Marshalltown, 2107					REGISTERED LETTER (with a domestic insurance option) Streekl 0800 111 502 www.saps.co.za RD 630 032 255 ZA CUSTOMER COPY 301028R
8	Department of Water Affairs, Mrs. F. Manabalo P/Bag X 313, Pretoria, 0001					REGISTERED LETTER (with a domestic insurance option) Streekl 0800 111 502 www.saps.co.za RD 630 032 241 ZA CUSTOMER COPY 301028R
9	SAHRA - Mr. A. Solomon P.O. Box 4637, Cape Town, 8000					REGISTERED LETTER (with a domestic insurance option) Streekl 0800 111 502 www.saps.co.za RD 630 032 272 ZA CUSTOMER COPY 301028R
10	Midrand Local Municipality - Mr. H. Human P.O. Box 7, Meyerton, 1960					REGISTERED LETTER (with a domestic insurance option) Streekl 0800 111 502 www.saps.co.za RD 630 032 269 ZA CUSTOMER COPY 301028R
Number of letters posted Getal briewe gepos		10				
Signature of client Handtekening van klient						
Signature of accepting officer Handtekening van aanneembeamp						


The value of the contents of these letters is as indicated and compensation is not payable for a letter received unconditionally. Compensation is limited to R100,00. No compensation is payable without documentary proof. Optional insurance of up to R200,00 is available and applies to domestic registered letters only.

Die waarde van die inhoud van hierdie briewe is soos aangedui en vergoeding sal nie betaal word vir 'n brief wat sonder voorbehoud ontvang word nie. Vergoeding is beperk tot R100,00. Geen vergoeding is sonder dokumentêre bewys betaalbaar nie. Opsionele versekering van tot R2 000,00 is beskikbaar en is slegs op binnelandse geregistreerde briewe van toepassing.

MASIGHARE PRINTERS

781248

Date stamp




Datumstempel

Figure 36: Proof of registered letters sent to I&APs and Organs of State (1)

List of REGISTERED LETTERS Lys van GEREGETREERDE BRIEWE

(with an insurance option/met 'n versekeringsopsie)

Full tracking and tracing/Volledige volg en spoor



Post Office

Name and address of sender:
 Naam en adres van afsender: Shangoni Management Services
PO Box 74726, Lynnwood Ridge, Pretoria, 0042
Lizette Craus

Enquiries/Navrae
 Toll-free number
 Tolvry nommer
0800 111 502

No	Name and address of addressee Naam en adres van geadresseerde	Insured amount Versekerde bedrag	Insurance fee Versekeringsgeld	Postage Posgeld	Service fee Diensgeld	Affix Track and Trace customer copy Plak Volg-en-Spoor-kliëntafskrif
1	<u>Sediberg District Municipality - Mr. Z. van Zyl</u> <u>PO Box 471, Vereeniging, 1930</u>					REGISTERED LETTER <small>(with a domestic insurance option)</small> RD 630 032 290 ZA CUSTOMER COPY 30102R
2	<u>Samuel Mangenese - Hussein Kaka</u> <u>PO Box 66, Meyerton, 1960</u>					REGISTERED LETTER <small>(with a domestic insurance option)</small> RD 630 032 286 ZA CUSTOMER COPY 30102RR
3						
4						
5						
6						
7						
8						
9						
10						
Total Totaal		R	R	R	R	


Number of letters posted
 Getal briewe gepos 2

Signature of client
 Handtekening van klient Craus

Signature of accepting officer
 Handtekening van aanneembeampte _____

The value of the contents of these letters is as indicated and compensation is not payable for a letter received unconditionally. Compensation is limited to R100,00. No compensation is payable without documentary proof. Optional insurance of up to R200,00 is available and applies to domestic registered letters only.

Die waarde van die inhoud van hierdie briewe is soos aangedui en vergoeding sal nie betaal word vir 'n brief wat sonder voorbehoud ontvang word nie. Vergoeding is beperk tot R100,00. Geen vergoeding is sonder dokumentêre bewys betaalbaar nie. Opsionele versekering van tot R2 000,00 is beskikbaar en is slegs op binnelandse geregistreerde briewe van toepassing.


Date stamp

 Datumstempel

MASQNAME PRINTERS
701248

Figure 37: Proof of registered letters sent to I&APs and Organs of State (2)

List of REGISTERED LETTERS Lys van GEREGISTREERDE BRIEWE (with an insurance option/met 'n versekeringsopsie) Full tracking and tracing/Volledige volg en spoor

Name and address of sender:
Naam en adres van afsender: Shangoni Management Services (Pty) Ltd
PO Box 74726 Lynnwood Ridge 0040


Post Office


Enquiries/Navrae
Toll-free number
Tolvry nommer
0800 111 502

No	Name and address of addressee Naam en adres van geadresseerde	Insured amount Versekerde bedrag	Insurance fee Versekeringsgeld	Postage Posgeld	Service fee Diensgeld	Affix Track and Trace customer copy Plak Volg-en-Spoor-klantafskrif	
1	GAUTENG DEPARTMENT OF COMMUNITY SAFETY PO BOX 52440 MARSHALTON 2107 ADVOCATE MONKIEZI TSHOMANEI LMS NONHLENIHLELA FAITH MZIZIBUKO					REGISTERED LETTER (with a domestic insurance option) ShareCall 0800 111 502 www.saps.co.za RD 856 133 415 ZA CUSTOMER COPY 301028R	
	GAUTENG DEPARTMENT OF ECONOMIC DEVELOPMENT PRIVATE BAG 1001 MARSHALTON 2107 MR. KHULU RABEAB					REGISTERED LETTER (with a domestic insurance option) ShareCall 0800 111 502 www.saps.co.za RD 856 133 486 ZA CUSTOMER COPY 301028R	
3	GAUTENG DEPARTMENT OF HEALTH PRIVATE BAG 1055 MARSHALTON 2107 DR. NENONOSE XUNDO					REGISTERED LETTER (with a domestic insurance option) ShareCall 0800 111 502 www.saps.co.za RD 856 133 512 ZA CUSTOMER COPY 301028R	
4	GAUTENG DEPARTMENT OF FINANCE PRIVATE BAG 1112 MARSHALTON 2107 MR. MUNDLA NEMBE LUY STANFORD LUNGA					REGISTERED LETTER (with a domestic insurance option) ShareCall 0800 111 502 www.saps.co.za RD 856 133 526 ZA CUSTOMER COPY 301028R	
5	GAUTENG DEPT OF LOCAL GOV AND HOUSING PRIVATE BAG 1719 MARSHALTON 2107 HOD: MR. MONDZEN MNYANI					REGISTERED LETTER (with a domestic insurance option) ShareCall 0800 111 502 www.saps.co.za RD 856 133 472 ZA CUSTOMER COPY 301028R	
6	GAUTENG DEPT OF INFRASTRUCTURE DEVELOPMENT PRIVATE BAG 153 MARSHALTON 2107 HOD: MS. MAGE MEBIPA / MR. STANFORD LUNGA					REGISTERED LETTER (with a domestic insurance option) ShareCall 0800 111 502 www.saps.co.za RD 856 133 509 ZA CUSTOMER COPY 301028R	
7	GAUTENG DEPT OF ROADS AND TRANSPORT PRIVATE BAG 188 MARSHALTON 2107 HOD: MR. MABARET-ANN NEDERICES					REGISTERED LETTER (with a domestic insurance option) ShareCall 0800 111 502 www.saps.co.za RD 856 133 424 ZA CUSTOMER COPY 301028R	
8	MAGWAL Local Municipality PO Box 9 Meyerton 1960 Mr. Henry Human					REGISTERED LETTER (with a domestic insurance option) ShareCall 0800 111 502 www.saps.co.za RD 856 133 438 ZA CUSTOMER COPY 301028R	
9	SANTAMORE MANGANESE (PTY) LTD PO Box 86 Meyerton 1960 Huisan Kaica					REGISTERED LETTER (with a domestic insurance option) ShareCall 0800 111 502 www.saps.co.za RD 856 133 398 ZA CUSTOMER COPY 301028R	
10	GAUTENG DEPT OF LOCAL GOV AND HOUSING PO Box 102350 MBELENI Plaza 0167 MR. KILLIAN MURINGA					REGISTERED LETTER (with a domestic insurance option) ShareCall 0800 111 502 www.saps.co.za RD 856 133 490 ZA CUSTOMER COPY 301028R	
Number of letters posted Getal briewe gepos		10	Total Totaal	R	R	R	R

Signature of client
Handtekening van klient *Reduall*

Signature of accepting officer
Handtekening van aanneembeampte *[Signature]*

Date stamp



Datumstempel

The value of the contents of these letters is as indicated and compensation is not payable for a letter received unconditionally. Compensation is limited to R100,00. No compensation is payable without documentary proof. Optional insurance of up to R200,00 is available and applies to domestic registered letters only.

Die waarde van die inhoud van hierdie briewe is soos aangedui en vergoeding sal nie betaal word vir 'n brief wat sonder voorbehoud ontvang word nie. Vergoeding is beperk tot R100,00. Geen vergoeding is sonder dokumentêre bewys betaalbaar nie. Opsionele versekering van tot R2 000,00 is beskikbaar en is slegs op binnelandse geregistreerde briewe van toepassing.

MASIQHAME PRINTERS
701248


Figure 38: Proof of registered letters sent to I&APs and Organs of State (3)

List of REGISTERED LETTERS

Lys van GEREGISTREERDE BRIEWE

(with an insurance option/met 'n versekeringsopsie)

Full tracking and tracing/Volledige volg en spoor



Post Office

Name and address of sender:
 Naam en adres van afsender: Shangoni Management Services (Pty) Ltd
PO Box 74726 Lynwood Ridge 0040

Enquiries/Navrae
 Toll-free number
 Tolvry nommer
0800 111 502

No	Name and address of addressee Naam en adres van geadresseerde	Insured amount Versekerde bedrag	Insurance fee Versekeringsgeld	Postage Posgeld	Service fee Diensgeld	Affix Track and Trace customer copy Plak Volg-en-Spoor-klöntafskrif
1	S.A. Heritage Resources Agency PO Box 4637 Cape Town 800 Mr. Andrew Salomon					REGISTERED LETTER <small>(with a domestic insurance option)</small> <small>SkemaCall 0800 111 502 www.sapo.co.za</small> RD 856 133 407 ZA CUSTOMER COPY 30102BR
2	Teresa Pius Environmental PO Box 41409 Craighall 2024 Ms. Paula Toksberg					REGISTERED LETTER <small>(with a domestic insurance option)</small> <small>SkemaCall 0800 111 502 www.sapo.co.za</small> RD 856 133 384 ZA CUSTOMER COPY 30102BR
3	PO Box 264196 Three Rivers 1935 Mr. ANTHONY M. HEARD					REGISTERED LETTER <small>(with a domestic insurance option)</small> <small>SkemaCall 0800 111 502 www.sapo.co.za</small> RD 856 133 469 ZA CUSTOMER COPY 30102BR
4	SEDIBENG DISTRICT MUNICIPALITY PO BOX VEREENIGING 1930 Mr. ZIEZ van Zyl					REGISTERED LETTER <small>(with a domestic insurance option)</small> <small>SkemaCall 0800 111 502 www.sapo.co.za</small> RD 856 133 455 ZA CUSTOMER COPY 30102BR
5						
6						
7						
8						
9						
10						
Number of letters posted Getal briewe gepos: <u>4</u>		Total Totaal: R		R	R	R


Signature of client
 Handtekening van kliënt: Rodwalk

Signature of accepting officer
 Handtekening van aanneembeampte: [Signature]

The value of the contents of these letters is as indicated and compensation is not payable for a letter received unconditionally. Compensation is limited to R100,00. No compensation is payable without documentary proof. Optional insurance of up to R200,00 is available and applies to domestic registered letters only.

Die waarde van die inhoud van hierdie briewe is soos aangedui en vergoeding sal nie betaal word vir 'n brief wat sonder voorbehoud ontvang word nie. Vergoeding is beperk tot R100,00. Geen vergoeding is sonder dokumentêre bewys betaalbaar nie. Opsionele versekering van tot R2 000,00 is beskikbaar en is slegs op binnelandse geregistreerde briewe van toepassing.

Date stamp



Date stamp

MASIQHAME PRINTERS
701248

Figure 39: Proof of registered letters sent to I&APs and Organs of State (4)



Figure 40: Proof of newspaper advertisement placed in the Beeld

Figure 41: Proof of newspaper advertisement placed in the Vanderbijlpark Ster

4.3.3 I&AP register

Once all landowners, adjacent landowners, organs of state and the public were notified of the proposed project, an I&AP register (as provided in Appendix E) was compiled. Table 17 below provides an extract of the I&AP Register indicating the organs of state and other I&APs that have been registered.

Table 17: Registered I&APs

No.	Name	Department
Organs of State		
1	Mr Andrew Salomon	South African Heritage Resources Agency
2	Mr Killian Mwiinga	Gauteng Department of Local Government and Housing
3	Mr Musa Mahlatji	Sedibeng District Municipality
4	Mr Zies van Zyl	Sedibeng District Municipality
5	Mr Henry Human	Midvaal Local Municipality
6	Advocate Mongezi Tshongweni / Ms Nonhlanhla Faith Mazibuko	Gauteng Department of Community Safety
7	Mr Khulu Radebe	Gauteng Department of Economic Development
8	Mr. Mandla Nkomfe / Mr Stewart Lumka	Gauteng Department of Finance
9	Dr Nomonde Xundu	Gauteng Department of Health
10	Ms Maggie Modipa / Mr Stewart Lumka (Acting)	Gauteng Department of Infrastructure Development
11	Ms Margaret-Ann Diedricks	Gauteng Department of Roads and Transport
12	Martha Manaka	Department of Water Affairs
No.	Name	Interest
Registered I&APs		
1	Husain Kaka	Samancor Manganese (Pty) Ltd.
2	Ms Paula Tolkdorff	Terra Pacis Environmental
3	Anthony M. Hearn	Vaal Triangle resident
4	Ms Y. Malaza and Ms T. Lengolo	Gauteng Department of Human Settlements

Refer also to Appendix E for a detailed I&AP Register including contact information for all registered organs of state and I&APs.

4.3.4 Public meeting(s)

Thus far, no public meetings have been required for this project and none are anticipated at this stage.



4.3.5 Access and opportunity to comment on written submissions

4.3.5.1 Scoping Report

The draft Scoping Report was made available to the public for review for a period of forty (40) days, from the 4th of September to the 21st of October 2013. Electronic copies of the draft Scoping Report were sent via registered mail to all I&APs and an electronic copy of the draft Scoping Report was also posted on the Shangoni Management Services' website (www.shangoni.co.za).

The draft Scoping Report was submitted to the Department on the 4th of September 2013 and the Department acknowledged having received the draft Scoping Report on the 17th of September 2013. Hereafter the Scoping Report was finalised and submitted on the 30th of October 2013. The Department formally acknowledged receipt of the final Scoping report on the 12th of November 2013. The Department issued a formal letter of acceptance of the final Scoping Report on the 13th of February 2014.

4.3.5.2 Environmental Impact Assessment Report

Similar to the Scoping Report, the draft Environmental Impact Assessment Report and draft Environmental Management Programme was made available to the public for review for a period of forty days, from the 12th of August 2014 to the 29th of September 2014. Electronic copies of the draft Environmental Impact Assessment Report were sent via registered mail or courier to all I&APs and an electronic copy of the draft Environmental Impact Assessment Report was also posted on the Shangoni Management Services' website (www.shangoni.co.za).

The draft Environmental Impact Assessment Report was submitted to the Department on the 22nd of September 2014 and the Department acknowledged having received the draft Environmental Impact Assessment Report on the 29th of September 2014.

Comments received on the draft Environmental Impact Assessment Report have been added to the Comments and Responses table (Table 19) below.

4.3.6 Consultation with the relevant Authorities

4.3.6.1 Application form in terms of the NEMA, 1998

The Environmental Authorisation application form under NEMA, 1998, was submitted to the Gauteng Department of Agriculture and Rural Development on the 23rd of November 2012 date. A reference number (GAUT: 002/12-13/E0204) was issued by the 30th of November 2012. The letter of acknowledgement indicating the above mentioned reference number is included in Appendix E.

4.3.6.2 Authorities meeting(s)

No meetings with the Gauteng Department of Agriculture and Rural Development have been required thus far.



4.3.7 Further consultation with relevant Authorities

No meetings or consultation with the Gauteng Department of Agriculture and Rural Development is presently foreseen. The following comments were received from the Gauteng Department of Agriculture and Rural Development in their Acceptance letter for the final Scoping Report for this project. Shangoni's responses to the comments and requirements are also given in the table below.

Table 18: Comments received from the Gauteng Department of Agriculture and Rural Development

Comments received from GDARD	Response from Shangoni
<p>APPLICATION FOR ENVIRONMENTAL AUTHORISATION FOR THE PROPOSED SMALL RESEARCH AND DEVELOPMENT (R&D) INDUCTION FURNACE AT DMS POWDERS, MEYERTON.</p> <p>The scoping report and a plan of study for environmental impact assessment which were submitted by you in respect of the abovementioned application and received by the Department on 30 October 2013 have been accepted by the Department. You may accordingly proceed with undertaking the environmental Impact assessment in accordance with the tasks that are outlined in the plan of study for Environmental Impact Assessment.</p> <p>Please note that in addition to providing the information as required by the Regulations, the following site specific information must also form part of the Environmental Impact Assessment Report (EIAR):</p> <ol style="list-style-type: none"> A detailed discussion regarding the operation of the proposed R&D induction furnace including all potential environmental impacts and mitigation measures thereof; Air quality impact assessment study and emission reduction strategies for the 	<ol style="list-style-type: none"> The operation of the R&D Furnace has been discussed under Section 1.5. All potential environmental impacts and mitigation measures for the operation of the R&D Furnace are given in Section 7.3.1. of this report (Description of Environmental Impacts) as well as in the Environmental Management Programme attached Under Appendix H. An Air Quality Impact Assessment has been compiled for the operation of the R&D furnace and this report is attached under Appendix G. The study includes emission reduction strategies. The emission reduction strategies are also included in the mitigation measures proposed as part of this report and in the Environmental Management Programme attached Under Appendix H. <ol style="list-style-type: none"> Confirmation that the Occupational Exposure Limits will not be exceeded in any of the phases of this project is given under Appendix I (Other Information). Confirmation that all effluents will meet the relevant local authority and DWA requirements before discharge into a municipal sewer or system for disposal is given under Appendix I (Other Information). Confirmation that Shangoni has consulted with the Sedibeng District Municipality regarding the Atmospheric Emission License that is required for the R&D furnace is given under Appendix I (Other Information). The Sedibeng District Municipality and the

Comments received from GDARD	Response from Shangoni
<p>operation of the proposed project;</p> <p>c. The following must be confirmed:</p> <p>i. Occupational Exposure Limits for each of the substances resulting from all phases of the proposed activity will not be exceeded; and</p> <p>ii. All effluents will meet the relevant local authority and DWA requirements before discharge into a municipal sewer for disposal.</p> <p>d. Confirmation that Sedibeng District Municipality was consulted regarding an Atmospheric Emission License (AEL) under the National Environmental Management; Air Quality Act, 2004 (Act No.39 of 2004) as the licensing authority;</p> <p>e. Comments from the Sedibeng District Municipality, DWA and any other relevant stakeholders regarding the proposed activity;</p> <p>f. A detailed discussion regarding the storage of all raw materials, including the design of the storage facilities, stormwater management system and mitigation measures;</p> <p>g. An emergency/fire plan must be included. This plan must be approved by an approved risk consultant and /or local authority.</p> <p>h. Type and quantities of waste to be produced and managed thereof. A waste management plan (for both hazardous and general waste) must be compiled and include the EIAR based on various stages of the process; and</p>	<p>Department of Water Affairs are both registered Interested and Affected Parties and are informed of all public participation opportunities. The municipality and DWA have been given an opportunity to comment on the draft Scoping Report and draft Environmental Impact Assessment Report, but no comments have been received from either of the authorities to date. Should comments be received in future, they will be forwarded to the GDARD. To date, only the South African Heritage Resources Agency and the Gauteng Department of Human Settlements have commented on this project.</p> <p>f. The storage of raw materials is discussed under Section 1.5 of this report. Designs for the raw material storage area are given under Appendix C. The design for the stormwater management at the R&D facility, is attached under Appendix C. The Stormwater Management Plan for the entire DMS site is attached under Appendix G. Mitigation measures are given in Section 7.3.1. of this report (Description of Environmental Impacts) as well as in the Environmental Management Programme attached Under Appendix H.</p> <p>g. The emergency/fire plan is attached under Appendix I (Other Information).</p> <p>h. The type and expected quantities of wastes that will be produced at the R&D Furnace are given under Section 1.5 of this report. The Waste Management Plan (part of DMS' Environmental Management Plan) is included under Appendix I.</p> <p>i. The Environmental Management Programme is attached under Appendix H.</p>

Comments received from GDARD	Response from Shangoni
<p>i. A comprehensive Environmental Management Program (EMPr) for various phases of the proposed activity (construction, operational and decommissioning phases). The EMPr must include a discussion on mitigation measures for all potential impacts as well as the persons responsible for implementing such measures.</p> <p>Please note that the EIA report must reflect all the requirements as stated in section 31 (2) of Government Notice R543 of Environmental Impact Assessment Regulations of 2010 promulgated in terms of section 24 (5), 24M AND 44 of the NEMA act, 1998 (as amended).</p>	

4.3.8 Comments and responses

All issues, comments and questions received from I&APs thus far have been summarised in the table below. Copies of the comments received have also been included in Appendix E.

4.3.9 Conclusions of the PPP

In conclusion, the Public Participation exercise has provided adequate information to enable an understanding of what the proposed R&D Furnace activities would entail and to address the concerns and comments received during the scoping- and EIA processes.



Table 19: Comments and responses

Contact Person	Organisation/Department	Date	Method of comment	Issue raised	Response
Mr Andrew Salomon	South African Heritage Resources Agency	15 February 2013	Formal letter	<p>APPLICATION FOR ENVIRONMENTAL AUTHORISATION: ATMOSPHERIC EMISSION LICENSE FOR A R&D FURNACE AT DMS POWDERS, MEYERTON ATMOSPHERIC EMISSION LICENSE APPLICATION FOR A R&D FURNACE AT DMS POWDERS, MEYERTON (EIA Ref: Gaut: 002/12-13/E0204; SMS Ref: DMS-EIA-31-01-12)</p> <p>Thank you for your Background Information Document regarding this development.</p> <p>In terms of the National Heritage Resources Act, no 25 of 1999, heritage resources, including archaeological or palaeontological sites over 100 years old, graves older than 60 years, structures older than 60 years are protected. They may not be disturbed without a permit from the relevant heritage resources authority. This means that before such sites are disturbed by development it is incumbent on the developer to ensure that a Heritage Impact Assessment is done. This must include the archaeological component (Phase 1) and any other applicable heritage components. Appropriate (Phase 2) mitigation, which involves recording, sampling and dating sites that are to be destroyed, must be done as required.</p> <p>The quickest process to follow for the archaeological component is to contract an accredited specialist (see the web site of the Association of Southern African Professional Archaeologists www.asapa.org.za) to provide a Phase 1 Archaeological Impact Assessment Report. This must be done before any large development takes place.</p> <p>The Phase 1 Impact Assessment Report will identify the archaeological sites and assess their significance. It should also make recommendations (as indicated in section 38) about the process to be followed. For example, there may need to be a mitigation phase (Phase 2) where the specialist will collect or excavate material and date the site. At the end of the process the heritage authority may give permission for destruction of the sites.</p> <p>Where bedrock is to be affected, or where there are coastal sediments, or marine or river terraces and in potentially fossiliferous superficial deposits, a Palaeontological Desk Top study must be undertaken to assess whether or not the development will impact upon palaeontological resources - or at least a letter of exemption from a Palaeontologist is needed to indicate that this is unnecessary. If the area is deemed sensitive, a full Phase 1 Palaeontological Impact Assessment will be required and if necessary a Phase 2 rescue operation might be necessary.</p> <p>If the property is very small or disturbed and there is no significant site the heritage specialist may choose to send a letter to the heritage authority to indicate that there is no necessity for any further assessment. Any other heritage resources that may be impacted such as built structures over 60 years old, sites of cultural significance associated with oral histories, burial grounds and graves, graves of victims of conflict, and cultural landscapes or viewsapes must also be assessed.</p> <p>Should you have any further queries, please contact the designated official using the case number quoted above in the case header.</p>	<p>Good day Mr Salomon</p> <p>I hereby acknowledge receipt of SAHRA's comments on the application for environmental authorisation of the following project: Atmospheric Emission License for a R&D Furnace at DMS Powders, Meyerton (EIA Ref Nr: Gaut: 002/12-13/E0204).</p> <p>Thank you for your inputs.</p> <p>A Phase 1 Heritage Impact Assessment has been conducted by A Pelser Archaeological Consulting and has been submitted to SAHRA on the SAHRIS website for consideration.</p>
Ms Y.	Gauteng Department of	28 August	Email	RE: DRAFT EIA REPORT FOR REVIEW ATMOSPHERIC EMSSION LICENSE FOR A R&D FURNANCE AT	Good morning Thato



Contact Person	Organisation/Department	Date	Method of comment	Issue raised	Response
Malaza Ms Thato Lengolo	Human Settlements	2014		DMS POWDERS MEYERTON We acknowledge with thanks receipt of your communiqué dated 27 August, content thereof is noted. Also be advised that the matter has been brought to the attention of our Sedibeng regional head (Lesibe Sekela-082 603 6563) to facilitate response. Hope you will find the above in order.	I hereby acknowledge receipt of the Department of Human Settlements' letter dated 28 August 2014 as well as the contents thereof.



5. NEED AND DESIRABILITY FOR THE ACTIVITY

A need and desirability for this project is evident from the following perspectives:

5.1 Developer/Applicant

Using the M8 Furnaces and M9 Furnace for research and development results in a decrease in productivity. The proposed R&D Furnace will thus not only result in product optimisation but process optimisation as well. The proposed R&D Furnace will produce specialised products that cannot be manufactured in the main plant. This will increase the number of products that can be produced, increasing the market that DMS can cater for.

5.2 Local community

Through job creation community pride is ensured, with previously disadvantaged individuals acquiring skills and the ability to support themselves and their families.

6. CONSIDERATION OF ALTERNATIVES

The following definition of “alternatives” is given in the EIA Regulations of 18 June 2010: “alternatives”, in relation to the 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”.*

Typically, alternative assessments are conducted to assist in comparing various projects or attributes of projects that will occur. The most critical comparison is evaluating any proposed project against the No-Go option (Section 6.1). The alternatives assessment then considers alternatives to project site selection for the proposed development; alternatives to layout of the development; and alternatives to construction methodologies and/or materials used for the development (Section 6.2).

6.1 No-Go option

This alternatives assessment was conducted using a simple cost-benefit analysis, through assessing various environmental attributes. These attributes can include physical (geology and soils, surface water quality and quantity, groundwater quality and quantity); biophysical (flora and fauna, sensitive



environments); and social attributes (site of archaeological or cultural importance, land use issues, social health and welfare).

The impact of the each alternative was then evaluated in terms of whether it has a positive, negative, or no impact. In this instance, the impact is not evaluated in terms of significance but rather whether or not it will arise. Positive impacts are assigned a value of 1; no impact a value of 0; and a negative impact a value of -1.

By adding all of the attribute scores for each alternative, a suitability score is derived that indicates the preferred alternative. A total positive score indicates the project benefits outweigh the potential negative impacts, while a total negative score indicates the project environmental costs outweigh the potential benefits. Essentially, the highest scoring alternative is then carried forward for full impact evaluation.

The potential impact of the preferred project option on environmental and socio-economic attributes identified during the assessment phase is evaluated against the potential impact of the no-go option (the option wherein the proposed R&D Furnace is not installed) on the same attributes. The summary of this assessment is provided in Table 20 below.

Table 20: Development vs. No-Go Option.

Attribute	Development Option	No-go Option 2
Natural environment		
Air Pollution	-1	0
Noise Pollution	0	0
Water Quality	0	0
Water Quantity	0	0
Visual Aesthetics	0	0
Fauna and Flora	0	0
Sensitive Environments	0	0
Economic environment		
Process efficiency	1	0
Development of new technology	1	0
National and or regional economy	1	0
Social environment		
Employment opportunities	1	0
Skills development	1	0
Traffic	0	0
Impact on property values	0	0
Safety and security	0	0



Attribute	Development Option	No-go Option 2
Infrastructure development	0	0
Total	4	0

Note: Positive Impact = 1, No Impact = 0 and Negative Impact = -1

The negative environmental impacts expected by the proposed development can be mitigated to acceptable limits. The positive environmental and social impacts outweigh the negative impacts and the consideration of the “no-go” option can be justifiably dismissed as a sustainable alternative.

6.2 Alternatives considered

The following alternatives were compared using a qualitative assessment.

6.2.1 Activity alternatives

The activity of producing Ferroalloys from silicon and iron-containing minerals by the application of heat will remain the same, as it is DMS Powders' trade to produce ferrosilicon (FeSi) powders for use in dense media separation technology.

6.2.2 Location alternatives

The property on which the proposed project will take place belongs to BHP Billiton (Metalloys) Samancor; DMS Powders have been leasing the property from BHP Billiton (Metalloys) for the past 10 years. A move is not foreseen in the near future thus no site alternatives could be considered.

6.2.3 Design and Technology Alternatives

The proposed R&D Furnace will serve as a test furnace for future recipes. As the activity of producing Ferroalloys from silicon and iron-containing minerals by the application of heat will remain the same, no design and technology alternatives were identified.

An electrostatic filter uses induced electrostatic charge to easily remove particles from the gas emitted without impeding the flow of the gas, also making it very energy efficient. This technology was compared to alternatives (mechanical filter and wet scrubber) and chosen as the preferred emission control technology for the following reasons:

- Mechanical filters load with particles over time and must be regularly replaced to ensure they don't inhibit gas flow; and
- Wet scrubbers have the ability to handle high temperatures and moisture and they can remove both gasses and particulate matter. Wet scrubbers also apply energy directly to the flowing gas and they require entrainment separation or mist removal to obtain high efficiencies and treatment or re-use of spent liquid.



6.2.4 Input and Process Alternative

As the proposed R&D Furnace is a test furnace, the inputs and process may vary depending on the recipe trial.

6.2.5 Scheduling Alternative

It is recommended that installation take place during the drier months to avoid any complications in wet weather. No detailed information regarding the proposed time frame for the project is available yet, however it is anticipated that construction/installation will start as soon as possible after all the necessary approvals have been obtained.

7. ENVIRONMENTAL IMPACT ASSESSMENT

7.1 Aims of Environmental Impact Assessment

The Environmental Impact Assessment (EIA) phase aims to adequately investigate and address all potentially significant environmental issues in order to provide the Gauteng Department of Agriculture and Rural Development (GDARD) with sufficient information to make an informed decision regarding the proposed project.

Basic potential environmental impacts (biophysical) associated with the proposed R&D Furnace were identified during the Scoping phase of the Environmental Impact Assessment (EIA).

This part of the document focuses on the identification of the major potential impacts that the activities, processes and actions may have on the surrounding environment. It indicates the major impacts that these activities may have on the environmental components associated with the site, as required in terms of R.543 of the EIA Regulations, 2010.

The EIA aims to achieve the following:

- To provide a detailed assessment of the biophysical environments affected by the proposed project;
- To assess impacts on the study area in terms of environmental criteria; and
- To identify and recommend appropriate mitigation measures for potentially significant environmental impacts.

This EIR addresses the following:

- A detailed description of the proposed project;
- Detailed assessment of the impacts identified which are determined to be potentially significant;
- Recommendations regarding the mitigation of significant impacts; and
- To meet the requirements and to comply with the necessary legislation and Acts.



Any specialist studies are combined into this consolidated report to allow for easy assessment of the potential aspects with associated impacts.

7.2 Environmental Impact Assessment Procedure

The environmental risk of any aspect is determined by a combination of parameters associated with the impact. Each parameter connects the physical characteristics of an impact to a quantifiable value to rate the environmental risk.

Impact assessments should be conducted based on a methodology that includes the following:

- Clear processes for impact identification, predication and evaluation;
- Specification of the impact identification techniques;
- Criteria to evaluate the significance of impacts;
- Design of mitigation measures to lessen impacts;
- Definition of the different types of impacts (indirect, direct or cumulative); and
- Specification of uncertainties.

The construction and operational phases of the project were considered whilst identifying impacts. A detailed understanding of the proposed activity was obtained to ensure that all the potential impacts could be identified. The following process was followed to identify and assess the impacts of the proposed activity:

- The current environmental conditions were determined in detail. This acted as a baseline against which impacts could be identified and measured;
- The changes that will occur in future, should the proposed activity not occur, were identified;
- A detailed understanding of the R&D Furnace was obtained in order to fully understand its consequences; and
- The significant impacts that will occur as a result of the proposed R&D Furnace were identified.

In broad terms, the impact assessment for this project included the following:

- All major impacts of the proposed activity were identified and assessed;
- The nature, extent, magnitude and duration of all potentially significant impacts were predicted;
- A range of mitigation measures that could diminish the impacts were identified; and
- The significant of residual impacts that remain, after the proposed mitigation measures are implemented, were evaluated.

After all impacts were identified, the nature of each impact could be predicted. The impact prediction took into account physical, biological, socio-economic and cultural information and the likely parameters and characteristics of the impacts were then estimated. The aim of the impact prediction was to provide a basis from which the significance of each impact could be determined and



appropriate mitigation measures could be developed. The impact prediction took into account the following parameters (summarised in the table below):

- The extent of the impact. This refers to the physical or geographical size that is affected by the impact and is divided into the following categories:
 - Onsite: Within the specific site boundary;
 - Local: Within the municipal boundary; and
 - Regional: Outside of the municipal boundary.
- The duration of the impact. This refers to the time span associated with the impact and is divided into the following categories:
 - Short term: An impact lasting for one year or less;
 - Medium term: An impact lasting for one to five years; and
 - Long term: An impact lasting for more than five years.
- The intensity and reversibility of the impact. This refers to the severity of the impact on the receiving environment and is divided into the following categories:
 - Low: Natural and/or cultural processes continue in a modified way and the impact is reversible;
 - Medium: Natural and/or cultural processes stop and the impact is partially reversible; and
 - High: Natural and/or cultural processes are disturbed to an irreversible state.

A weighting value is assigned to each parameter category, with the value increasing as the impact becomes higher. For example, an impact that is of short duration will have a lower weighting value than one that is of longer duration.

To determine the significance of an impact, the weighting values for its extent, duration and intensity are added together (Extent + Duration + Intensity = High / Medium / Low Impact). Multiplication of the significance of the impact by the probability of the impact occurring produces a final conclusion of the overall risk that an impact poses to the surrounding environment (the “environmental risk”). To determine the probability or likelihood of an impact occurring, the following categories are used:

- Unlikely: There is a 0% - 45% chance of the potential impact occurring;
- Possible: There is a 46% - 75% chance of the potential impact occurring; and
- Likely: There is a greater than 75% chance of the potential impact occurring.

7.3 Description of Environmental Impacts

The aim of this section of this EIA report is to provide information regarding the potentially major environmental impacts associated with the proposed R&D Furnace. In order to provide background information and a framework for the environmental risk assessment, a description of the different environmental impacts (biophysical) associated with the proposed R&D Furnace identified during the Scoping phase are described below:



Planning and Design

- Failing to identify suitable alternatives may lead to selecting poor facility location, technology and/or equipment failure (Refer to section 6.2 for Alternatives considered);
- Poor development of maintenance, monitoring and management plans, may lead to equipment failure and environmental pollution (Refer to Appendix H for the Environmental Management Programme);
- A poor monitoring plan can result in the inability to identify and rectify environmental aspects and potential impacts (Refer to Appendix H for the Environmental Management Programme); and
- Failing to identify and initiate relevant specialist studies may result in false representation of cumulative impacts (Refer to Appendix G for the Air Quality Impact Study and the Heritage Impact Assessment).

Construction/Installation

- Incorrect installation of the proposed R&D Furnace and its emission abatement technology may lead to equipment failure. Equipment failure may result in air pollution because of poor induction and/or ineffective emission reduction by abatement technology;
- Installation of the proposed R&D Furnace can contribute to ambient noise pollution;
- Incorrect segregation and disposal of any infrastructure and/or building rubble may lead to unnecessary use of landfill airspace; and
- Incorrect disposal of any waste, infrastructure and/or building rubble outside the site boundaries may result in an impact on the surrounding land, water, micro-organisms, plant and animal life and the interrelationships among and between them and their physical, chemical, aesthetic and cultural properties and conditions that influence human health and well-being.

Operation

- Inadequate maintenance, and management of the proposed R&D Furnace and its emission abatement technology may lead to equipment failure, Equipment failure may result in air pollution because of poor induction and/or ineffective emission reduction by abatement technology;.
- Inconsistent emission monitoring may result in a false representation of the R&D furnace's impact on the ambient air quality and delay problem identification and corrective action implementation;
- Incorrect water quality- and sludge disposal monitoring may result in a false representation of the R&D furnace's impact on the surrounding environment and delay problem identification and corrective action implementation;
- Surface- and groundwater contamination as a result of ineffective treatment and discharge of contaminated water from the R&D Furnace; and
- Surface- and groundwater contamination as a result of incorrect disposal of sludge from the R&D Furnace.



Closure

It is unlikely that DMS Powders will be decommissioned and closed in the foreseeable future. However, if closure is considered, an extensive closure and rehabilitation plan will be drafted and sent to the Department prior to the event.

Due to the following reasons, the below listed activities are considered to present a **low impact** and have not been included in the risk assessment: DMS Powders has existing Environmental Management Plans, such as their Waste Management Plan, that covers all waste streams (including building rubble, scrap steel and domestic waste); the R&D Furnace will be installed on an existing concrete foundation inside an existing building; and the raw materials will be stored in small quantities (210ℓ drums) within enclosed containers.

- Installation of the proposed R&D Furnace;
- Concurrent rehabilitation during installation of the proposed R&D Furnace;
- The storage of raw materials; and
- General housekeeping and waste management.

Refer to the tables below for the impacts associated with the proposed R&D Furnace project.

The environmental risk of an impact is plotted in a matrix, shown in Table 22. Assigning a colour to the environmental risk provides a clear and immediate visual representation of the magnitude of the risk of an impact on the environment.

Table 21: Environmental impact assessment parameters

Parameters	Description
Extent	Refers to the physical or geographical size that is affected by the impact. It can be categorised into the following ranges: <ul style="list-style-type: none"> • Onsite – Within specific site boundary (weight value – 1) • Local – Within municipal boundary (weight value – 2) • Regional – Outside municipal boundary (weight value – 3)
Duration	Time span associated with impact: <ul style="list-style-type: none"> • Short term – 1 Year or less (weight value – 1) • Medium term – 1-5 Years (weight value –2) • Long term – Longer than 5 Years (weight value – 3)
Intensity and reversibility	The severity of an impact on the receiving environment: <ul style="list-style-type: none"> • Low – Natural and/or cultural processes continue in a modified way and is reversible (weight value – 1) • Medium – Natural and/or cultural processes stop and is partially reversible (weight value – 2) • High – Natural and/or cultural processes disturbed to an irreversible state (weight value – 3)
Significance of Impact/Consequence	Adding the extent, duration and intensity together provides the significance of the impact (High, Medium or Low).

	Extent + Duration + Intensity = High/Medium/Low Impact
Probability	<p>The likelihood of an impact occurring:</p> <ul style="list-style-type: none"> Unlikely – 0% - 45% chance of the potential impact occurring (weight value – 1) Possible – 46% - 75% chance of the potential impact occurring (weight value – 2) Likely - >75% chance of the potential impact occurring (weight value – 3)
Environmental Risk - Refer to Table 17 below	<p>Multiplication of the significance of the impact by the probability of the impact occurring produces a final conclusion of the overall risk that an impact poses to the surrounding environment.</p> <p>High/Medium/Low Impact X Probability = High/Medium/Low Environmental Risk</p>

Table 22: Environmental Risk Matrix

Significance of Impact				
		Low Impact (3 → 5)	Medium Impact (6 → 8)	High Impact (9)
Probability	Definite / Very Likely 3	9 - 15 L - M	18 - 24 M - H	27 H
	Possible 2	6 - 10 L - M	12 - 16 M	18 M - H
	Unlikely 1	3 - 5 L	6 - 8 L	9 L
ENVIRONMENTAL RISK		Guidelines for Control Strategies		
(H) - High		Proactively reduce risk level, short term response.		
(M- H) Medium to High		Proactively reduce risk level, short term response.		
(M) – Medium		Management strategies to reduce risk level, short to medium term response.		
(L – M) Low to Medium		Management strategies to reduce risk level, short to medium term response, operational control and housekeeping.		
(L) - Low		Operational control and housekeeping.		



7.3.1 Impacts associated with the proposed R&D Furnace (Activity 5 and 26 of Listing Notice 2, Regulation R545)

Table 23: Environmental impact assessment: Atmosphere

Activity: Operation of the proposed R&D Furnace											
Aspect: Stack emissions of Particulate matter, Carbon monoxide, Sulphur dioxide and Nitrogen dioxide and fugitive emissions from the furnace building.											
Applicable Alternatives: Preferred alternative											
Nature and significance of environmental impact											
Impact Description	Risk rating (before mitigation)			Environmental Objective	Management / Mitigation / Monitoring Measures	Timeframe	Responsibility	Risk rating (after mitigation)			Applicable legislation / other documents
	Probability	Significance	Environmental Risk					Probability	Significance	Environmental Risk	
Installation/Construction Phase											
The operation of the proposed R&D Furnace will not occur during the Installation/Construction Phase.	Not applicable										
Operational Phase											
In an Air Quality Impact Study done for DMS Powders by Airshed Planning Professionals (Pty) Ltd., emissions were quantified for the different point sources, fugitive dust sources and vehicle exhaust emissions and a source contribution analysis was done. It was then found that the proposed R&D furnace is expected to increase emissions from DMS Powders by less than 0.1% and its contribution to the predicted ground level concentrations and dust fall out concentrations were considered immaterial.	3	5	L-M	To ensure compliance with the minimum emission standards for a new plant and the National Ambient Air Quality Standards	<ul style="list-style-type: none">Installation of emission control technology -Electrostatic filter (See section 1.5.3); andImplementation of the Operational Maintenance and Monitoring Plan, part of the Environmental Management Programme (Refer to Appendix H).	Upon installation of the R&D Furnace	Facility Manager	3	1	L	<ul style="list-style-type: none">NEM: AQA, 2004;GN. 248 dated 31 March 2010; andGN. 827 dated 1 November 2013.
Decommissioning Phase											
The decommissioning of the R&D furnace, while improbable in the foreseeable future, is a possibility. Should the R&D Furnace be decommissioned/closed, the operation of the R&D Furnace will be ceased. Such decommissioning would then entail the dismantling and removal of the furnace from the R&D building (currently an existing structure). During the decommissioning, no alterations will be made to the existing building and associated structures, such as floors, and it is highly likely that the building would be	Not Applicable										



used for alternative industrial purposes, either by DMS Powders or a different company. The R&D building and its associated infrastructures will therefore not be decommissioned.

Table 24: Environmental impact assessment: Atmosphere

Activity: Operation of the proposed R&D Furnace

Aspect: Equipment failure

Applicable Alternatives: Preferred alternative

Nature and significance of environmental impact											
Impact Description	Risk rating (before mitigation)			Environmental Objective	Management / Mitigation / Monitoring Measures	Timeframe	Responsibility	Risk rating (after mitigation)			Applicable legislation / other documents
	Probability	Significance	Environmental Risk					Probability	Significance	Environmental Risk	
Installation/Construction Phase											
The operation of the proposed R&D Furnace will not occur during the Installation/Construction Phase.	Not applicable										
Operational Phase											
<p>Molten metal is inherently dangerous. When molten metal comes into contact with water or any liquid bearing material it instantaneously turns water into steam, expanding 1600 times its original volume producing explosion that endanger workers, the surrounding infrastructure and environment.</p> <p>The furnace coil requires continual cooling to increase electrical efficiency and to prevent it from melting. If an electrical or mechanical failure damages the cooling system a dangerous build-up of heat and resulting explosion.</p>	2	8	M	To prevent emergencies such as equipment and control technology failure, and ensure the optimum operation of the R&D Furnace.	<ul style="list-style-type: none">Train employees on the environmental risk presented by the R&D Furnace and the manner in which their tasks must be performed;A sufficient number of employees must receive training to cover for leave periods, absences due to illness and public holidays;The facility manager is to maintain accurate records of any training undertaken;Installation of a backup cooling system;Installation of a dry spill pit in front of the induction furnace to contain any molten metal spills;Installation of a ground leak detection system to provide protection against electrical shock and warning of metal to	Upon installation of the R&D Furnace	Facility Manager	1	5	L	<ul style="list-style-type: none">NEM: AQA, 2004;GN. 248 dated 31 March 2010; andGN. 827 dated 1 November 2013.



				coil penetration; and <ul style="list-style-type: none">Implementation of the Operational Maintenance and Monitoring Plan, part of the Environmental Management Programme (Refer to Appendix H).						
Decommissioning Phase										
The decommissioning of the R&D furnace, while improbable in the foreseeable future, is a possibility. Should the R&D Furnace be decommissioned/closed, the operation of the R&D Furnace will be ceased. Such decommissioning would then entail the dismantling and removal of the furnace from the R&D building (currently an existing structure). During the decommissioning, no alterations will be made to the existing building and associated structures, such as floors, and it is highly likely that the building would be used for alternative industrial purposes, either by DMS Powders or a different company. The R&D building and its associated infrastructures will therefore not be decommissioned.	Not applicable									

Table 25: Environmental impact assessment: Atmosphere

Activity: Operation of the proposed R&D Furnace											
Aspect: Emissions into an Airshed priority area											
Applicable Alternatives: Preferred alternative											
Nature and significance of environmental impact											
Impact Description	Risk rating (before mitigation)			Environmental Objective	Management / Mitigation / Monitoring Measures	Timeframe	Responsibility	Risk rating (after mitigation)			Applicable legislation / other documents
	Probability	Significance	Environmental Risk					Probability	Significance	Environmental Risk	
Installation/Construction Phase											
The operation of the proposed R&D Furnace will not occur during the Installation/Construction Phase.	Not applicable										
Operational Phase											



<p>DMS Powders falls within the Vaal Triangle Airshed Priority Area (VTAPA). Sources of atmospheric emission which contribute to air pollutant concentrations within the Area include industrial emissions from ferromanganese and ferrosilicon production, vehicle tailpipe releases, household fuel burning and fugitive dust sources. In addition to which pollution emitted outside of the area is dispersed into the area from distant natural and anthropogenic sources.</p> <p>The R&D Furnace and other emission sources of DMS Powders therefore contribute to the cumulative air quality impact.</p>	3	8	M-H	<p>To reduce the cumulative contribution of the R&D Furnace and all other emission sources at DMS Powders.</p>	<ul style="list-style-type: none"> • Installation of R&D Furnace emission control technology -Electrostatic filter (See section 1.5.3); • Implementation of the Operational Maintenance and Monitoring Plan, part of the Environmental Management Programme (Refer to Appendix H); • It is recommended that primary fume extraction be considered at the M8 induction furnaces and that extracted fumes be controlled through the use of a suitable air pollution control device such as a bag filter or electrostatic precipitator; • Secondary fume extraction and air pollution control should also be considered for the M9 Submerged arc furnace tapping area and to capture fumes escaping the primary extraction system; • Reduce fugitive dust emissions from the raw materials area; • Watering of the unpaved raw material area will reduce dust entrained by vehicles travelling within the raw materials area; • Store fine raw materials prone to dust emissions in bunkers or, if practical, use water suppression to keep material damp; • Dust emissions from coal/coke crushing can be reduced by 83% with the installation of an enclosure and dust extraction with a bughouse; and • Reduce raw material handling steps as far as is practicable. 	Upon installation of the R&D Furnace	Facility Manager	1	5	L	<ul style="list-style-type: none"> • NEM: AQU; • GN. 248 dated 31 March 2010; • GN. 827 dated 1 November 2013; • VTAPA; and • NFAQM
Decommissioning Phase											
<p>The decommissioning of the R&D furnace, while improbable in the foreseeable future, is a possibility. Should the R&D Furnace be decommissioned/closed, the operation of the R&D Furnace will be ceased. Such decommissioning would then entail the dismantling and removal of the furnace from the R&D building (currently an existing structure). During the decommissioning, no alterations will be made to the existing building and associated structures, such as floors, and it is highly likely that the building would be used for alternative industrial purposes, either by DMS Powders or a</p>	Not applicable										

different company. The R&D building and its associated infrastructures will therefore not be decommissioned.

Table 26: Environmental impact assessment: Soil, surface- and groundwater

Activity: Slag generation											
Aspect: Incorrect disposal of slag											
Applicable Alternatives: Preferred alternative											
Nature and significance of environmental impact											
Impact Description	Risk rating (before mitigation)			Environmental Objective	Management / Mitigation / Monitoring Measures	Timeframe	Responsibility	Risk rating (after mitigation)			Applicable legislation / other documents
	Probability	Significance	Environmental Risk					Probability	Significance	Environmental Risk	
Installation/Construction Phase											
The operation (i.e. disposal of slag) of the proposed R&D Furnace will not occur during the Installation/Construction Phase.	Not applicable										
Operational Phase											
Slag is a by-product of the metal smelting. Slag forms when rust, dirt and sand from the charge and refractory material erode and rise to the top of the bath. It is usually a mixture of metal oxides and silicon dioxide, and may contain metal sulphides and metal in elemental form. During tapping slag is skimmed from the surface of the molten metal and depending on its characteristics disposed of in landfills, sold as road ballast's, or used as a raw material in a furnace to produce a chemically related ferroalloy product.	2	6	M	To ensure correct disposal of slag to prevent soil, surface- and groundwater contamination.	<ul style="list-style-type: none">Slag from the proposed R&D Furnace is to be weighed and crushed and briquetted for recycling; andA sample of slag from current processes has been sent for analysis and will be screened in terms of the National norms and standards for the assessment of waste for landfill disposal.	Upon installation of the R&D Furnace	Facility Manager	1	5	L	<ul style="list-style-type: none">GN No 635, GG No 36784 of 23 August 2013.Inductotherm Corporation, 2006
Decommissioning Phase											
The decommissioning of the R&D furnace, while improbable in the foreseeable future, is a possibility. Should the R&D Furnace be decommissioned/closed, the operation of the R&D Furnace will be ceased. Such decommissioning would then entail the	Not applicable										



dismantling and removal of the furnace from the R&D building (currently an existing structure). During the decommissioning, no alterations will be made to the existing building and associated structures, such as floors, and it is highly likely that the building would be used for alternative industrial purposes, either by DMS Powders or a different company. The R&D building and its associated infrastructures will therefore not be decommissioned.



Refer to Part 8 below for a summary on the key findings related to the proposed R&D Furnace and associated infrastructure.

7.3.3 Cumulative impacts

Cumulative impacts refer to the situation where an activity may in itself not have a significant impact, but may become significant when added to the existing and potential impacts from similar or different activities in the area.

The following potential cumulative impacts have been identified:

Table 27: Cumulative impacts

Activity	Aspect	Cumulative Aspect
Operation of the R&D Furnace	Emissions of Particulate matter, Carbon monoxide, Sulphur dioxide and Nitrogen dioxide and fugitive emissions from the furnace building.	<p>DMS Powders falls within the Vaal Triangle Airshed Priority Area (VTAPA). Sources of atmospheric emission which contribute to air pollutant concentrations within the Area include industrial emissions from ferromanganese and ferrosilicon production, vehicle tailpipe releases, household fuel burning and fugitive dust sources. In addition to which pollution emitted outside of the area is dispersed into the area from distant natural and anthropogenic sources.</p> <p>Available monitoring data indicate elevated PM₁₀ concentrations in exceedance of the NAAQS in the Meyerton area.</p> <p>The R&D Furnace and other emission sources of DMS Powders therefore contribute to the cumulative air quality impact.</p>



8. ENVIRONMENTAL IMPACT STATEMENT

8.1 Summary of key findings

DMS Powders found that using their M8 Furnaces and M9 Furnaces for research and development resulted in a decrease in productivity. They wish to install a small scale Research and Development (R&D) Furnace at their current facility to serve as a test furnace for future recipes for product and process optimisation and to produce specialised products. This will increase the number of different products that can be produced, increasing the market that DMS can cater for.

An alternative assessment was conducted to assist in comparing various other activities, designs, technologies and inputs. The potential impact of the preferred project option on environmental and socio-economic attributes identified during the assessment phase was evaluated against the potential impact of the no-go option (the option wherein the proposed R&D Furnace is not installed) on the same attributes.

The negative environmental impacts expected from the proposed development can be mitigated to acceptable limits. The positive environmental and social impacts outweigh the negative impacts and the consideration of the “no-go” option can be justifiably dismissed as a sustainable alternative.

The main significant impacts were found to be:

- Emissions generated by the proposed R&D furnace may contribute to the ambient ground level- and dust fall out concentrations in the Vaal Triangle Air-shed Priority Area;
- Soil contamination from incorrect handling, storage and disposal of slag generated by the proposed R&D furnace;
- Surface water contamination as a result of pollutant runoff from slag generated by the proposed R&D furnace as a result of incorrect handling, storage and disposal;
- Groundwater contamination as a result of pollutant leaching from slag generated by the proposed R&D furnace as a result of incorrect handling, storage and disposal; and
- Emergencies situations, such as explosions and fire, present a risk to human health and life, infrastructure damage and an increase in emissions to the atmosphere.

8.2 Comparative assessment of positive and negative implications of the proposed activity and alternatives

Part 6 of this EIR contains a detailed investigation and assessment of the alternative options for the proposed R&D Furnace. The positive and negative implications of each alternative are also described in Table 28 below. A comparison is done below to assess the positive and negative implications of the proposed activities compared with the no-go alternative. This should provide a fundamental consideration of the feasibility of the project.



Table 28: Comparison of the proposed preferred activities and the no-go option

	Preferred alternative	No-go option
Positive impacts	<ul style="list-style-type: none"> • Develop recipes for product and process optimisation that may lead to increased process efficiency and new technology development; • Stimulation of national and regional economy; • Employment opportunities; and • Skills development. 	No positive impacts will result from the No-go option.
Negative impacts	<ul style="list-style-type: none"> • Increase in emissions from DMS Powders by less than 0.1%. 	No negative impacts will result from the No-go option.

9. CONCLUSION

Information has been provided to the Gauteng Department of Agriculture and Rural Development (GDARD) and Interested and Affected Parties during the Scoping- and EIA Phases. Comments and concerns were received and integrated into this Environmental Impact Assessment Report. The draft report was circulated to the registered I&APs and state departments for review and commenting. Comments received on this report within the notice period provided were included and addressed in this final report. This report will be submitted to the competent authority, GDARD in this case, for final perusal. This EIA process has been carried out in accordance with the NEMA, 1998, and the Regulations there under.

DMS Powders' trade to produce ferrosilicon (FeSi) powders for use in dense media separation technology. The property on which the proposed project will take place belongs to BHP Billiton (Metalloys) Samancor. DMS Powders have been leasing the property from BHP Billiton (Metalloys) for the past 10 years. The proposed R&D Furnace will produce specialised products that will increase the number of different products that can be produced by DMS, increasing the market that DMS Powders can cater for. The implementation will also contribute to job creation and skills development. During the assessment of the no-go alternative, the implementation of the proposed R&D Furnace was found to be the preferred option.

The site for the proposed R&D Furnace is located in an industrial area that has been extensively developed. A Basic Heritage Impact Assessment done by A Pelsers Archaeological Consulting (APAC) at the location of the proposed R&D Furnace found no sites, features or material of an archaeological or historical (cultural heritage) nature. The proposed R&D Furnace will be installed within an existing building. The building where the furnace will be installed will not be demolished and is also not older than 60 years of age.



An Air Quality Impact study done by Airshed Planning Professionals (Pty) Ltd., found the proposed R&D furnace's contribution to predicted ground level concentrations and dust fall out rates in residential areas immaterial.

The project can therefore be expected to have low negative impacts on the various environmental attributes if existing environmental management plans are followed and if the mitigation measures in the Environmental Management Programme (EMP) attached hereto are followed and the proposed emission control technology is implemented.

The following recommendations are therefore made:

- 1. The project should be approved and allowed to proceed;**
- 2. The mitigation measures proposed above, that have been incorporated into the Environmental Management Programme in more detail, must be implemented;**
- 3. Strict monitoring and enforcement of the requirements of the Environmental Management Programme must be undertaken to ensure that employees adhere to these requirements;**
- 4. An independent Environmental Control Officer must be appointed to ensure implementation of the Environmental Authorisation, existing Environmental Management Plans and the Environmental Management Programme attached hereto for the construction and operational phases; and**
- 5. A communications pathway must be established that would allow the Management and during construction, the designated ECO, to accept and deal with stakeholder complaints.**

