Working Together

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Project: **Waste Disposal Facility 5 at Scaw Metals, Germiston**

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PROJECT:

Development and Operation of Waste Disposal Facility 5 at Scaw Metals

COMPETENT AUTHORITIES:

Waste Management Licence:

Department of Environmental Affairs (DEA)

Directorate: Chemicals and Waste Management, Licensing

Ref: 12/9/11/L895/3

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6	Competent Authority		
Final for Approval – June 2014			
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8	Commenting Authorities		
9	Competent Authority		

SO445/EIR02 **June 2014**

SCAW SOUTH AFRICA (PTY) LTD

Waste Disposal Facility 5 at Scaw Metals, Germiston Environmental Impact Report (Final)

EXECUTIVE SUMMARY

Introduction to the Project

Scaw South Africa (Pty) Ltd owns and operates the Scaw Metals facility at Union Junction in Germiston. Scaw Metals produces a range of products from the recycling of scrap steel and iron ore. The Scaw Metals facility has a number of components, including the Directly Reduced Iron Plant (DRI) that produces up to 1050 tons of iron per day from three (3) kilns. Each of the DRI kilns uses ore, dolomite, coal and natural gas as a feedstock. The outputs from the DRI process include coal dust and char (devolatilised coal) and exhaust gas. A portion of scrap material received at Scaw Metals is processed through a shredder plant to remove non-ferrous material. The non-ferrous material includes a metallic stream and a combustible component. These resources, which contain energy, are currently reused, disposed to landfill or released to the atmosphere in terms of permits.

Scaw South Africa has proposed the development of an Electrical Co-generation Plant at Scaw Metals. The current conceptual design of the Plant consists of two interlinked phases that can be executed independently of each other. The Plant will make use of the energy contained in the DRI output streams and the combustible component of the shredder waste to generate approximately 68 MW of electricity. The project will improve the overall energy efficiency of Scaw, reduce the emissions footprint for the site, and improve the security of supply. The Electrical Co-generation Plant may qualify as a Clean Development Mechanism (CDM) project under the Kyoto Protocol.

Phase 2 of the Co-generation Power Plant will produce ash and bag house dust during the combustion process. The ash will require disposal at a licensed waste management facility. Scaw South Africa is proposing the development of a new Disposal Facility for the ash at their Union Junction property.

The disposal of waste to land is a listed activity in terms of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) (NEMWA) and may not be undertaken without approval from the competent authority. A scoping and Environmental Impact Assessment (EIA) process, as stipulated in the EIA Regulations (GN R543, 18 June 2010) is required to support the application for a waste management licence (WML).

This report presents the results of the EIA undertaken for the proposed Waste Disposal Facility (WDF) 5 at Scaw Metals. The draft environmental management programme (EMP) presents the management and mitigation measures that have been identified to address the potential environmental impacts. These documents will be submitted to the competent authority as the final environmental impact report (EIR) to support the application for a WML.

Environmental Legal Requirements and Responsible Authorities

Synergistics Environmental Services (Pty) Ltd was appointed by Scaw South Africa as independent environmental assessment practitioner (EAP) to undertake the necessary environmental work to meet the requirements of informing a WML. *The disposal of waste to land requires a WML in terms of the Schedule made in terms of the NEMWA. An application has been made for a WML for WDF 5. The DEA will administrate the application for a WML in terms of the NEMWA and EIA Regulations.*

The Department of Water Affairs (DWA) will provide input to the conditions of the WML as well as review and approval of the conceptual designs for the WDF.

Project Description

Phase 2 of the Electrical Co-generation Power Plant will combust various wastes, by-products and other energy containing resources. The combustion will generate ash which will require disposal. The current configuration of the plant is anticipated to produce ~ 300 t of ash per day. Because the carbon fraction has been burned out of the waste streams, the volume of ash generated will be 50% - 70% of the wastes that are currently disposed. The bag-houses on both Phase 1 and Phase 2 of the Electrical Co-generation Power Plant will produce fine dusts that require disposal.

Scaw South Africa proposes to develop an on-site facility to dispose of the ash and bag-house dust. The WDF 5 has been designed to cater for ash from the potential 25 year life of the electrical co-generation project. As the current on-site GLB+ WDF at Scaw Metals, namely Cell 4B, has a finite capacity, it is envisaged that the WDF 5 also be able to receive Scaw production wastes currently being disposed of at Cell 4B.

The WDF 5 will be designed to cater for the disposal of all ash from the proposed life of the Electrical Co-generation Power Plant and Scaw production wastes. Because of the hazard rating of some of the Scaw production wastes and possible waste interactions, the WDF 5 will be constructed to fulfil the requirements of a Class A hazardous landfill as per the Waste Classification and Management Regulations (GN R634, 2013). It is proposed to locate the WDF 5 to the north east of the DRI Plant and south of Dekema Road. The WDF 5 will cover a footprint of approximately 19 ha and be constructed to a final height of 25 m above natural ground level. The side walls will be benched and sloped to 1:3. The WDF 5 will provide for approximately 2.9 million m^3 of airspace.

Study Approach and Methodology

This EIR forms the final phase of the EIA process, it presents the results of the environmental assessment of the project and the environmental management measures. The EIR report is structured in accordance with GNR 543 and includes the consolidated results of the public participation and authority consultation processes conducted to date. Table 2 (see main report) provides a summary of the requirements of GNR 543, with cross references to the report sections where these requirements have been addressed.

Study Objectives

The specific objectives for the EIA are to:

- *Address issues and concerns raised by Interested and Affected Parties (IAPs) during the public participation process;*
- *Assess the key environmental impacts that were identified during the Scoping Phase;*
- *Identify mitigation measures to enhance positive impacts and reduce negative impacts identified during the EIA;*
- *Develop actions that can be implemented to address impacts for inclusion in the EMP;*
- *Provide feedback to stakeholders; IAPs as to how their concerns have been addressed; and*
- *Provide sufficient information to the environmental authorities in order that they can make an informed decision regarding the future of the project.*

Public Participation and Authority Consultation Process

The EIR provides details of the public participation process followed to date, which included:

- *Site notices;*
- *Press advertisements in the Beeld and the Germiston City News (25 May 2012));*
- *Notification of adjacent landowners;*
- *Notifications to relevant authorities;*
- *Email and postal distribution of a background information document to all persons on the HMC database;*
- *The hosting of information meetings;*
- *Maintenance of a register of IAPs;*
- *Receipt of comments from IAPs;*
- *Responses to IAP comments;*
- *Provision of draft and Final Scoping Report for public review;*
- *Feedback on EIA findings; and*
- *Provision of draft EIR for public review.*

Review of the EIR

The draft EIR was made available for public and authority review. Comments submitted by registered I&APs and commenting authorities on the draft EIR are included in the final EIR. Following the review period, the EIR were updated and finalised. The final EIR was also made available to the public and authorities for comment.

Specialist Studies

Specialist input and studies was conducted for the following environmental components:

- Geotechnical Assessment of the ash disposal site
- Geohydrological Impact Assessment

- Detailed Conceptual design of the WDF 5
- Air Quality Impact Assessment

The scope of work for these studies are outlined in the main report.

Assessment Methodology

The identification and assessment of environmental impacts is a multi-faceted process, which combines quantitative and qualitative descriptions and evaluations. For each environmental component (i.e. visual, air quality, ecology), impacts were identified and described in terms of the nature of the impact, compliance with legislation and accepted standards and the significance of the predicted environmental change. The significance of each impact was calculated as follows:

Impact significance = (extent + severity + duration + frequency) x probability

The impact assessment took into consideration the current status of the local environment. The direct impacts of the project as well as the cumulative impacts of the project were assessed. The assessment also considered the different phases of the project. Where possible, mitigation measures to reduce the significance of negative impacts and enhance positive impacts are recommended in the draft EMP. The EMP includes measures for the management of actions, the avoidance of impacts, monitoring of change and the rehabilitation of environmental degradation.

Description of the Affected Environment

Information on the baseline environment presented in the report represents the current environmental conditions of the project area. It is indicative of pollution and degradation due to industrial activities and waste disposal operations in the area and naturally occurring phenomena. Baseline information was sourced from desktop studies, site inspections and from on-going monitoring completed at the site. A large body of information exists at the Scaw Metals Union Junction site from the extensive specialist work that has been undertaken for previous projects. The baseline information serves as a reference point to scientifically measure or professionally judge future changes to the environment that may occur with the introduction of the WDF 5 at Scaw Metals, Union Junction.

Issued Raised During Consultation with Interested and Affected Parties

Questions and issues raised by IAPs during the scoping phase are listed in Table 10 in the main report. Comments by IAPs were mostly related to the need to adequately assess and address the potential quality impacts from the WDF 5.

Environmental Impact Assessment

The development of the proposed WDF 5 will facilitate the operation of the Electrical Co-generation Power Plant. The Electrical Co-generation Power Plant will have a number of desirable outcomes for Scaw Metals as well as the environment. The Co-generation Power Plant will improve the overall energy efficiency of the Scaw Metals Union Junction facility and reduce the emissions footprint for the site. The use of an in-house WDF will allow Scaw Metals to dispose of waste in a cost-effective manner and ensures that Scaw Metals retains responsibility for the waste throughout its life cycle. The Facility will also provide additional capacity for the disposal of other wastes produced at the Union Junction Facility.

Potential environmental impacts associated with the development of the proposed WDF 5 at Scaw Metals were assessed through the EIA process. The EAP concluded that the development of WDF 5 at its proposed location is not subject to any fatal flaws or significant impacts that cannot be mitigated to acceptable levels. The development of the proposed WDF 5 is also unlikely to introduce any new impacts to the greater Scaw Metals Union Junction Facility. Although the development of the WDF 5 will add to the cumulative impacts of the site, it will not alter the overall significance of the site's impacts. The assessment concluded that adjacent residential receptors are not currently, nor will they be exposed to any unacceptable environmental risk from the development and operation of the WDF 5 at Scaw Metals, Union Junction.

The main concerns prior to the EIA process were: the impact on the quality of groundwater and the Elsburg Spruit, the impact on air quality, mainly in terms of dust fall, as well as the stability of the underlying geology. Air Quality, Geohydrological and geotechnical studies were undertaken to investigate potential impacts from the proposed waste disposal operations.

The Air Quality Impact Assessment found that dust impacts from the waste disposal operations were localised and that health and nuisance risks to residential receptors were of very low significance. The Geohydrological Investigation found that the measured and simulated impacts on groundwater quality to be minimal. Contaminants from the waste disposal site may enter the ground water in the perched aquifer, but water quality in the Elsburg Spruit is not at risk from the waste disposal operations. The Geotechnical investigation found that the site is appropriate from a geotechnical perspective for the development of the WDF 5.

Failure to develop WDF 5 at the Scaw Metals Union Junction Facility may limit future impacts at the Scaw Metals Union Junction Facility, but will result in Scaw Metals having to identify an alternative for the disposal of the ash waste streams to be produced at the Electrical Co-generation Power Plant. Disposing of the waste at a commercial landfill will significantly reduce the viability of Scaw Metals as additional costs will be incurred not only for the disposal, but for the transport of the waste. Over and above the cost implications, there would also be increased risk with large volumes of hazardous waste being transported by heavy vehicles on public roads. As all wastes generated by the Co-generation plant will be disposed of on site, the WDF 5 will allow for the cradle to grave responsibility of the Co-generation plant.

The disposal facility will also provide additional capacity for the disposal of other wastes produced at the Union Junction Facility. As the current GLB+ waste disposal site at Scaw Metals Union Junction Facility, namely Cell 4B, has a limited amount of capacity left (approx. 5 years), this is considered of great benefit to Scaw Metals as their on-site waste disposal capacity would be extended by at least another 10 years.

The EAP can therefore conclude that:

- *it is best to dispose of the waste ash from the proposed Co-generation Plant locally;*

- *the proposed site is suitable for the development of the proposed WDF 5;*
- *the design of the waste cells and associated infrastructure are appropriate to ensure the management of environmental risk; and*
- *the proposed monitoring programmes are adequate to detect contamination.*

Conclusions and Key Findings

This report forms part of the EIA phase of the proposed WDF 5 at Scaw Metals environmental assessment. It outlines the results of the public participation and authority consultation process undertaken, explains the results of the specialist studies undertaken, assesses the environmental and socio-economic impacts and outlines mitigation measures.

The WDF 5 will allow waste ash to be generated at the proposed Electrical Co-generation Plant at Scaw Metals to be disposed of locally and avoid the need to transport and dispose of the waste ash off site. This will have a number of benefits, including the reduction of costs to Scaw Metals, the extension of waste disposal capacity at the Union Junction Facility, as well as allow for the cradle to grave responsibility of the Co-generation plant.

The most significant risks of the WDF 5 is the potential effects on ground and surface water quality due to the dissemination of contaminants from the site, as well as the emission of dust due to material handling and ash disposal. Specialist investigations showed however that these impacts will be minimal and well within acceptable limits, assuming that mitigation measures are implemented. The mitigation measures which are presented in the EMP (see Section 11) are considered to be sufficient to mitigate the impacts to environmentally acceptable levels. There are no impacts which have a high significance after mitigation. There have been no fatal flaws identified during the EIA phase.

The EAP considers that the environmental process followed meets the requirements of the legislation to ensure that the regulatory authorities receive sufficient information to enable them to make an informed decision.

Synergistics Environmental Services (Pty) Ltd, as independent EAPs, conclude that there is no environmental reason why the development of the WDF 5 at Scaw Metals, Germiston, should not be authorised with a WML from the competent authority.

SCAW SOUTH AFRICA (PTY) LTD

Waste Disposal Facility 5 at Scaw Metals, Germiston Environmental Impact Report (Final)

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TERMS AND ABBREVIATIONS

~	Approximately
AEL	Atmospheric Emissions Licence, in terms of NEM:AQA
AFR	Alternative Fuels and Resources
Airspace	Capacity of a landfill site in cubic metres.
DEA	Department of Environmental Affairs
DRI	Directly Reduced Iron
DWA	Department of Water Affairs (formerly Department of Water Affairs and Forestry)
EAL	Environment Assessment Level
EAP	Environmental Assessment Practitioner
ECA	Environment Conservation Act 73 of 1989
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EMM	Ekurhuleni Metropolitan Municipality
EMP	Environmental Management Programme
EPA	United States Environmental Protection Agency
FBB	Fluidised Bed Boiler
G	General Waste
GDARD	Gauteng Department of Agriculture and Rural Development
GN	Government Notice
H	Hazardous waste
hazardous waste	Waste, which even in low concentrations, can have significant adverse effects on public health and or the environment
HCBP	High Chrome Ball Plant
H:h	Rating of a disposal facility where waste of a moderate or low hazard rating may be disposed.
IAP	Interested and Affected Parties
kl	Kilo-litres
km	Kilometre
m	Metre
m^3	cubic metre
mamsl	Metres above mean sea level
NEMA	National Environment Management Act, 1998 (Act No. 107 of 1998)
NEM:AQA	National Environment Management: Air Quality Act, 2004 (Act No. 39 of 2004)

NEM:WA	National Environment Management: Waste Act, 2008 (Act No 59 of 2008)
NHRA	National Heritage Resources Act, 1999 (Act No. 25 of 1999)
NMOC	Non-methane organic compound
PM2.5	PM2.5 are inhalable particulates with an aerodynamic diameter < 2.5 µm
PM10	PM10 are inhalable particulates with an aerodynamic diameter < 10 µm
RfC	Reference Concentration
SAHRA	South African Heritage Resources Agency
Scaw	Scaw South Africa (Pty) Ltd and or Scaw Metals
SMGWDS	Scaw Metals GLB+ Waste Disposal Site
SMUJ	Scaw Metals Union Junction
SSGP	Sub-surface gas probe
tpa	Tons per annum
t/day	Tons per day
TSP	Total Suspended Particulates
UK EAL	UK-Environmental Assessment Levels
WDF	Waste Disposal Facility
WML	Waste Management Licence, in terms of NEM:WA
WUL	Water Use Licence, in terms of the NWA

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SCAW SOUTH AFRICA (PTY) LTD

Waste Disposal Facility 5 at Scaw Metals, Germiston
Environmental Impact Report
(Final)

1 Introduction

1.1 The Project

Scaw South Africa (Pty) Ltd owns and operates the Scaw Metals facility at Union Junction in Germiston. Scaw South Africa has proposed the development of an Electrical Co-generation Power Plant at Scaw Metals, Union Junction. The Electrical Co-generation Power Plant will make use of the energy contained in the Directly Reduced Iron Plant (DRI) output streams and the combustible component of waste from the shredder plant to generate approximately 68 MW of electricity. The project will improve the overall energy efficiency of Scaw, reduce the emissions footprint for the site, and improve the security of supply. The Electrical Co-generation Power Plant may qualify as a Clean Development Mechanism (CDM) project under the Kyoto Protocol.

The Electrical Co-generation Power Plant will produce a maximum of ~ 300 tons of ash per day during the combustion process. In addition, the bag-houses used for emissions control will produce dust as a waste. Scaw South Africa has proposed to develop an on-site facility to dispose of the ash and bag-house dust for the potential 25-year life of the Electrical Co-generation Power Plant. The Disposal Facility for the ash will comply with the current design standards for waste disposal facilities as endorsed by the Department of Environmental Affairs (DEA). It is estimated that the required Disposal Facility will cover a footprint of approximately 19 ha and be constructed to a final height of ~ 25 m above natural ground level.

As the current on-site waste disposal facility (WDF) at Scaw Metals, Union Junction, namely Cell 4B, will reach its capacity, it is envisaged that Disposal Facility planned for the ash disposal may in future also receive the Scaw Metals production wastes currently being disposed of at Cell 4B. The Disposal Facility was thus designed for the co-disposal of ash from the Electrical Co-generation Power Plant and all other Scaw Metals production wastes. The proposed facility will be known as WDF 5.

The disposal of hazardous waste to land is a waste management activity listed in the Schedule to the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) (NEMWA) and may not be undertaken without a waste management licence (WML) from the competent authority. Development and operation of WDF 5 requires a WML. A scoping and Environmental Impact Assessment (EIA) process, as stipulated in the EIA Regulations (GN R543, 18 June 2010) made under section 24(5) of the of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA), is required to support the application for a WML.

This report presents the results of the EIA undertaken for the proposed WDF 5 at the Scaw Metals, Union Junction. The draft environmental management programme (EMP) presents the management and mitigation measures that have been identified to address the potential environmental impacts. These documents will be submitted to the competent authority as the environmental impact report (EIR) in support of an application for a WML.

1.2 Project Need and Desirability

WDF 5 is necessary to dispose of waste ash and bag-house dust that will be generated by the proposed Electrical Co-generation Power Plant at Scaw Metals, Union Junction.

The development and operation of the Electrical Co-generation Power Plant will have a number of desirable outcomes for Scaw Metals as well as the local environment. The main benefits of the Electrical Co-generation Power Plant, which will meet the requirements of sustainable development are:

- The recovery of energy from solid waste and waste gas;
- Increased electrical supply at Scaw Union Junction and the Eskom grid;
- Improved security of electrical supply;
- Reduced carbon footprint in the production of electricity;
- A reduction in the volume of waste requiring disposal;
- Extension of life of waste disposal facilities; and
- Compliance with waste legislation.

Without WDF5 the feasibility of the Electrical Co-generation Power Plant is uncertain and the project would be unlikely to be developed. None of the potential benefits of the plant would be realised. (see the EIR for the Electrical Co-generation Power Plant for full details on the need and desirability of that project).

Apart from its desirability as supporting infrastructure for the Electrical Co-generation Power Plant, the WDF5 provides many benefits to Scaw Metals and the environment. As all wastes generated by the Co-generation plant will be disposed of on-site, the WDF5 will allow for the ‘cradle to grave’ responsibility of the Co-generation plant. Scaw Metals will be directly responsible for any environmental impacts arising from the WDF5. Scaw Metals have demonstrated skills and experience in managing the disposal of their production wastes and the monitoring of those facilities has not detected any significant impacts.

The locality of the WDF5 adjacent to the ash source will largely eliminate transport requirements. This has benefits in reducing the related negative impacts that would occur if transport was required to a more distant facility.

Although not its primary function, the WDF5 will also provide additional capacity for the disposal of other production wastes from Scaw Metals. These wastes are currently disposed to Cell 4b. This is of great benefit to Scaw Metals as their on-site waste disposal capacity would be extended by at least another 10 years.

The siting of the WDF5 at Scaw Metals, Union Junction is preferred as the facility is required by Electrical Co-generation Power Plant. In order for the most efficient and cost-effective operations the facilities, they are best located physically close to each other. The Union Junction area in Germiston, Gauteng comprises an extensive industrial area that has been in existence for many decades. Heavy industrial uses dominate the area and immediate surrounds. Scaw has disposed of production wastes to landfill sites at the property for many decades. These landfill bodies, with vegetated outer slopes, contribute to a softening of the industrial landscape and provide a certain degree of visual screening. The WDF5 is considered to be appropriate at the proposed locality at Union Junction.

Although there are residential areas adjacent to the Union Junction area (Dinwiddie to the north, Verwoerdpark to the north-west, Roodekop Extension 31 to the south-west), these are generally at least 1 km from the proposed project locality.

Figure 1: Locality of the Scaw Metals' Union Junction Facility

Figure 2: Proposed Location of Waste Disposal Facility 5 at Scaw Metals

1.3 Terms of Reference

Synergistics Environmental Services (Pty) Ltd was appointed by Scaw South Africa as independent environmental assessment practitioner (EAP) to undertake the necessary environmental work to meet the requirements of informing an application for a WML from the DEA for the development and operation of WDF 5 at Scaw Metals, Union Junction.

1.4 Environmental Assessment and Authorisation Process

The activities that will be undertaken at the proposed WDF 5 are regulated under the NEMWA and a WML is required from the competent authority prior to the commencement of the project.

The undertaking of a scoping and EIA process in support of the application for a WML for the WDF 5 at Scaw Metals commenced in March 2012. The application form was submitted to the DEA who acknowledged receipt and provided a reference number on 23 April 2012.

A scoping report, which forms the first phase of the EIA process and documents the initial identification of the environmental issues associated with the proposed development of the WDF 5, was submitted to the DEA on 10 October 2012. The DEA reviewed the scoping report and accepted it on 13 December 2012, indicating that the EIA process may proceed (Appendix A). Since then the EIA process has been underway with technology research, investigations and specialist studies being undertaken.

This EIR forms the final phase of the EIA process and documents the assessment of the environmental issues associated with the project and the management measures required to ensure an acceptable level of environmental risk. The EIR and draft EMP have been compiled in accordance with the EIA Regulations (GNR 543) published in June 2010. The EIR report is hereby submitted to the DEA for approval and granting of an environmental authorisation in terms of the NEMA and the NEMWA.

Note that an application for an integrated environmental authorisation for the Electrical Co-generation Power Plant at Scaw Metals, in terms of the NEMA and NEMWA is being undertaken simultaneously (NEAS: DEA/EIA/0001129/2012, Ref: 14/12/16/3/3/3/37).

1.5 Authorisation of Listed Activities

This section lists the specific activities for which approval/licences have been applied.

1.5.1 Environmental Authorisation ito NEMA

On the basis of current information, the disposal of ash from the Co-generation Power Plant or waste from Scaw Metal's production will not require environmental authorisation in terms of the 2010 EIA Regulations (GN R 544, 545 and 546 of June 2010).

1.5.2 Waste Management Licence ito NEMWA

Waste management activities applied for in terms of the Schedule (GN R 718, July 2009) published under the NEMWA, 2008 are set out in the Table below:

Note that GN R 718 was replaced with an updated Schedule of waste management activities in November 2013 (GN R 921). Transitional provisions in that Schedule indicate how applications pending at the date of replacement should be processed.

Table 1: Waste Management Activities Applicable to Waste Disposal Facility 5 (GNR 718)

Government Notice	Activity No	Applicability of the listed activity
GNR 718	A(2) The storage including the temporary storage of hazardous waste at a facility that has the capacity to store in excess of 35m3 of hazardous waste at any one time, excluding the storage of hazardous waste in lagoons.	Ash from the Co-generation Plant and Scaw production wastes may be stored prior to treatment and disposal
GNR 718	A(18) The construction of facilities for activities listed in Category A of this Schedule.	Infrastructure for waste storage may be constructed.
GNR 718	B(4) The biological, physical or physico-chemical treatment of hazardous waste at a facility that has the capacity to receive in excess of 500 kg of hazardous waste per day.	Ash from the Co-generation plant may require treatment to reduce the hazard rating prior to or during disposal at the WDF5. Certain of the Scaw production wastes require treatment prior to disposal.
GNR 718	B(5) The treatment of hazardous waste using any form of treatment regardless of the size or capacity of such a facility to treat waste.	
GNR 718	B(9) The disposal of any quantity of hazardous waste to land	The ash and some of Scaw's production wastes to be disposed of at the new Disposal Facility have been assessed as hazardous.
GNR 718	B(10) The disposal of general waste to land covering an area in excess of 200m^2.	Ash as well as general waste currently being disposed of at Cell 4B may be disposed of at the new WDF 5 once Cell 4B reaches its capacity.
GNR 718	B(11) The construction of facilities for activities listed in Category B of this Schedule.	Facilities for waste Disposal will be constructed at Scaw Metals.

1.6 Competent Authority

An application for waste a management licence for the development and operation of the proposed WDF 5 at Scaw Metals, Union Junction was submitted to the DEA: Chemicals and Waste Management: Licensing. The DEA issued a reference number **12/9/11/L895/3** for the project.

The assigned case officer at the DEA is:

Mr Shiba Sebone
Tel: 012 310 3445
Fax: 012 310 3753
Email: ssebone@environment.gov.za

1.7 Structure of the Environmental Impact Report

The EIR has been structured in accordance with GNR 543 and includes the consolidated results of the public participation and authority consultation processes conducted to date. Table 2 provides a summary of the requirements of GNR 543 for an EIR, with cross references to the report sections where these requirements have been addressed. Table 3 provides the same information for the draft EMP.

Table 2: Structure of the EIA in terms of GNR 543 Requirements

Legal and Regulatory Requirement	Cross Reference to Report Section
GNR 543 Section 31(1)	
If a competent authority accepts a scoping report and advises the EAP in terms of with regulation 30(1) to proceed with the tasks contemplated in the plan of study for EIA, the EAP must proceed with those tasks, including the public participation process for EIA referred to in Regulation 28(1)(g)(i)-(iv) and **prepare an EIR** in respect of the proposed activity.	This Report.
GNR 543 Section 31(2)	
An EIR must contain all information that is necessary for the competent authority to consider the application and to reach a decision contemplated in Regulation 35 and must include:	
a) Details of: (i) the **EAP** who prepared the report; and (ii) the **expertise** of the EAP to carry out an EIA;	See Project Information Sheet in front of the report.
b) A **detailed description of the proposed activity**;	See Section 4.
c) A **description of the property** on which the activity is to be undertaken and the location of the activity on the property, or if it is: (i) a linear activity, a **description of the route of the activity**; or (ii) an ocean-based activity, the coordinates where the activity is to be undertaken;	See Section 3.2 and 3.3.
d) A **description of the environment that may be affected** by the activity and the **manner in which activity may be affected** by the proposed activity;	See Section 5. (entire chapter)
e) Details of the **public participation process** conducted in terms of sub-regulation (1), including: (i) **steps undertaken in accordance with the plan of study**; (ii) A list of all persons or organisations that were **registered as Interested and Affected Parties (IAPs)**; (iii) A **summary of the comments from, and a summary of issues** raised by IAPs, the date of receipt of and **the response of the EAP to those issues**; and (iv) Copies of any representations and comments received from IAPs	See Section 3.5 (steps taken and process followed), Section 6.2 (summary of issues raised), as well as Appendix A (copies of all relevant documentation and correspondence).
f) A description of the **need and desirability** of the proposed activity;	See Section 1.2.
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;	See Sections 3.3, and 4.8
h) An indication of the **methodology** used in determining the significance of potential environmental impacts	See Section 3.8
i) A description and comparative assessment of all alternatives identified during the EIA process;	See Section 4.8
j) A summary of the findings and recommendations of any specialist report or report on a specialised process;	See text within Section 0
k) A description of all environmental issues that were identified during the EIA process, an assessment of the significance of which issue and indication of the extent to which the issue could be addressed by the adoption of mitigation measures.	See Section 0

Legal and Regulatory Requirement	Cross Reference to Report Section
l) An assessment of each identified potentially significant impact, including – (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; and (vii) the degree to which the impact can be mitigated;	See Section 0
m) A description of any assumptions, uncertainties and gaps in the knowledge	Section 3.8.5
n) A reasoned opinion as to whether the activity should or should not be authorised, and if the opinion is that the activity should be authorised, any conditions that should be made in respect of that authorisation	Section 8
o) An environmental impact statement which contains – (i) A summary of the findings of the EIA; and (ii) A comparative assessment of the positive and negative implications of the proposed activity and identified alternatives	Section 8
p) A draft EMP containing the aspects contemplated in regulation 33	See Section 11
q) Copies of any specialist reports and reports on specialised processes complying with regulation 32	See Appendices
r) Any specific information required by the competent authority; and	Within Sections 3 and 6 See Appendix A for copy of DEA's specific information requirements
s) Any other matters required in terms of sections 24(4)(a) and (b) of the Act.	None identified.
GNR 543 Section 32 (3):	
A specialist report or a report on a specialised process prepared in terms of these Regulations must contain-	
a) details of- i. the person who prepared the report; and ii. the expertise of that person to carry out the specialist study or specialised process;	See Specialist reports in Appendices
b) a declaration that the person is independent in a form as may be specified by the competent authority;	
c) an indication of the scope of, and the purpose for which, the report was prepared;	
d) a description of the methodology adopted in preparing the report or carrying out the specialised process;	
e) a description of any assumptions made and any uncertainties or gaps in knowledge;	
f) a description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives, on the environment;	
g) recommendations in respect of any mitigation measures that should be considered by the applicant and the competent authority;	

Legal and Regulatory Requirement	Cross Reference to Report Section
h) a description of any consultation process that was undertaken during the course of carrying out the study;	
i) a summary and copies of any comments that were received during any consultation process; and	
j) any other information requested by the competent authority.	See section 6.3

Table 3: Structure of the EMP in terms of GNR 543 Requirements

GNR 543 Section 33:	
A draft EMP must comply with section 24N of the Act and include	
a) Details of – i. The person who prepared the EMP; and ii. The expertise of that person to prepare and EMP.	See Project Information Sheet in front of the report.
b) Information on any proposed management or mitigation measures that will be taken to address the environmental impacts that have been identified in a report contemplated by these Regulations, including environmental impacts or objectives in respect of – i. Planning and design ii. Pre-construction and construction activities; iii. Operation or undertaking of the activity; iv. Rehabilitation of the environment; v. Closure; where relevant	See EMP Table
c) A detailed description of the aspects of the activity that are covered by the draft EMP.	See Section 4 of the EIA
d) An identification of the persons who will be responsible for the implementation of the measures contemplated in paragraph (b);	See EMP Table
e) proposed mechanisms for monitoring compliance with and performance assessment against the EMP and reporting thereon;	See EMP Table
f) as far as is reasonably practicable, measures to rehabilitate the environment affected by the undertaking of any listed activity or specified activity to its natural or predetermined state or to a land use which conforms to the generally accepted principle of sustainable development, including, where appropriate, concurrent or progressive rehabilitation measures;	See EMP Table
g) a description of the manner in which it intends to- (i) modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; (ii) remedy the cause of pollution or degradation and migration of pollutants; (iii) comply with any prescribed environmental management standards or practices; (iv) comply with any applicable provisions of the Act regarding closure, where applicable; (v) comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable;	See EMP Table
h) time periods within which the measures contemplated in the EMP must be implemented;	See EMP Table
i) the process for managing any environmental damage, pollution, pumping and treatment of extraneous water or ecological degradation as a result of undertaking a listed activity;	See EMP Table

j) an environmental awareness plan describing the manner in which- i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and (ii) risks must be dealt with in order to avoid pollution or the degradation of the environment;	See EMP Table
k) where appropriate, closure plans, including closure objectives	See Section 11.2.4

2 Environmental Legal Requirements

In accordance with EIA sub regulation 28(1f) of GN R 543, all legislation and guidelines that have been considered in the preparation of this report are documented. This section lists environmental legislation that has been identified as being pertinent to the construction and operation of WDF 5 at Scaw Metals.

2.1 National Environmental Management Act, 1998

The NEMA and EIA Regulations published there under, set out a schedule of listed activities that may not be undertaken without environmental authorisation from a competent authority. In terms of Section 24 (1) of NEMA the potential environmental impact associated with these controlled (or 'listed activities') must be considered, investigated, assessed and reported on to the competent authority for the granting of a relevant environmental authorisation.

2.1.1 2010 EIA Regulations

The EIA Regulations define the requirements for the submission, processing, consideration and decision of applications for environmental authorisation of listed activities. The EIA Regulations have been revised twice in the last 10 years and the current Regulations are of June 2010. Any activity that is captured in the lists requires environmental authorisation from the competent authority. Three lists were published (GN R 544 - 546) to define activities that require either a Basic Assessment or an EIA process in order to inform a decision from the competent authority.

All waste related activities are omitted from the Listing Notices published in the 2010 EIA Regulations as they were replaced by waste management activities listed under the NEM:WA (see Section 2.3). However, other non-waste related activities listed in terms of the EIA Regulations may still be triggered by the WDF 5. In this case environmental authorisation would then also be required in terms of NEMA.

No activities listed in the EIA Regulations will be triggered by the construction and operation of the WDF 5. Thus the construction and operation WDF 5 at the Scaw Metals Union Junction Facility does not require an environmental authorisation in terms of the NEMA and EIA Regulations.

The procedural requirements of the scoping and EIA process, as set out in the 2010 EIA Regulations, are also applicable to the assessment process required to support an application for a WML made under the NEMWA, 2008.

2.1.2 EIA Guidelines

The EIA Regulations provide clear instructions on the required content of EIA reports and this report has been prepared in accordance with these regulations. In addition, a number of draft guidelines to NEMA and the EIA Regulations have been published to assist in the scoping and EIA process. Guidelines that have been considered include:

- Integrated Environmental Management Guideline Series (5): Companion to the EIA Regulations, 2010 (DEA, 2012).

- Integrated Environmental Management Guideline Series (7): Public Participation 2010 (DEA, 2010).
- Integrated Environmental Management Guideline Series (9): Draft Guideline on Need and Desirability in terms of the EIA Regulations, 2010 (DEA, 2012).

2.2 National Environmental Management: Waste Act, 2008

The requirements of the NEMWA, 2008 came into effect on 1 July 2009. The Act makes provision for the identification of various waste management activities which may have a detrimental effect on the environment. A waste management activity identified in terms of the Act may not commence, be undertaken or conducted except in accordance with published standards or a WML.

On 3 July 2009 the list of waste management activities requiring a WML from a competent authority were published (GN R 718). The Schedule was replaced in November 2013 with GN R 921. Listed waste management activities are divided into Category A, Category B and Category C in the schedule. Activities identified in Category B require an EIA process, as stipulated in the EIA Regulations (GN R543) of the NEMA, in order to inform an application for a WML. Waste management activities that relate to the construction and operation of the proposed WDF 5 are presented in Section 1.5.2.

As required by the Schedule, the assessment and reporting process in support of the WML is being undertaken in accordance with the 2010 EIA Regulations (GN R543). These Regulations define the requirements for the submission, processing, consideration and decision of applications for environmental authorisation of listed activities.

2.2.1 Waste Classification

The Minister of Water and Environmental Affairs has published (August 2013) Regulations, Norms and Standards as provided for in terms of the NEMWA. These include:

- Waste Classification and Management Regulations (GN R 634, August 2013);
- National Norms and Standard for Assessment of Waste for Landfill Disposal (GN R 635, August 2013).
- National Norms and Standard for the Disposal of Waste to Landfill (GN R 636, August 2013);

These documents replaced the 'Minimum Requirements' guideline series (2nd edition, DWAF, 1998) in August 2013.

- Minimum Requirements for the Handling, Classification and Disposal of Hazardous Waste (2nd edition, DWAF, 1998);
- Minimum Requirements for Waste Disposal by Landfill.

Under the Waste Classification and Management Regulations all waste generators must ensure that all waste is classified within 180 days of generation. Waste that is to be disposed must be assessed in terms of the National Norms and Standard for the Disposal of Waste to Landfill.

Ash of a similar type that will be produced by the proposed Co-generation Power Plant and disposed of at the WDF 5 has been replicated and been subject to the classification and assessment processes (see Section 4.2.1)

2.3 Other Applicable Legislation

2.3.1 National Water Act, 1998

Section 21 of the National Water Act (No. 36 of 1998) (NWA) lists water uses for which a WUL (WUL) must be obtained. In terms of the NWA, section 21 g 'disposing of waste in a manner that may detrimentally impact on a water resource' is applicable to waste disposal facilities and the contaminated water storage facilities.

However, the NWA makes provision, in Section 22(3), for the DWA to dispense with a WUL if the purposes of the NWA will be met by an authorisation under another law. The preferred authorisation for waste disposal sites, as indicated in the licensing guideline of the Department of Water Affairs and Forestry (DWAF, 2000), is a permit or licence in terms of Section 20 of the ECA (now a WML in terms of the NEMWA).

The Department of Water Affairs (DWA) has been consulted during the WML application process. The Gauteng Region of the DWA indicated that a WUL was not required for Section 21(g) uses where the use is the 'disposal of solid waste to land'. Such a water use is regulated through the WML process and the Resource Protection and Waste Source Co-ordination office of the National DWA will provide comments and design approval.

The WDF5 design drawings will be submitted to the DWA: Engineering Services for approval. A record of decision from the DWA for the engineering design of the landfill barrier system will be required to inform the WML. In addition any comments from the DWA (Water Quality and Resource Protection and Waste Source Co-ordination sections) on the project will be provided to the DEA so that their requirements may be included in the conditions of the authorisation granted by the DEA. A letter indicating that the DWA have invoked section 22(3) of the NWA will be requested from the DWA.

2.3.2 National Environmental Management: Air Quality Act, 2004

The National Environmental Management: Air Quality Act, 2004 (Act No 39 of 2004) (NEMAQA) has been promulgated with the objective of reforming the law regulating air quality in order to protect the environment. It also aims to comply with general environmental policies and to bring legislation in line with local and international good air quality management practices. All outstanding sections of the Act came into effect on the 1st of April 2010 (Government Gazette, 26 March 2010). The Act has established a National Management Framework with standards for dust emissions. Current emissions standards for dust are considered in terms of SANS 1929.

An updated schedule of Listed Activities and Minimum National Emission Standards was published in November 2013 (GN R 893). Listed activities may only be undertaken after an Atmospheric Emissions Licence has been obtained. In terms of the Act the responsibility for the management of air quality has been delegated down to district and metropolitan municipality level with the Air Quality Officer responsible for issuing Atmospheric Emissions Licenses.

Waste disposal does not trigger any of the listed activities and an Atmospheric Emissions Licence is not required for the operation of the WDF 5.

2.3.2.1 National Ambient Air Quality Standards for Criteria Pollutants

Criteria pollutants are considered those pollutants most commonly found in the atmosphere, that have proven detrimental health effects when inhaled and are regulated by ambient air quality criteria.
The South African Bureau of Standards (SABS) was engaged to assist DEA in the facilitation of the development of ambient air quality standards. This included the establishment of a technical committee to oversee the development of standards. Standards were determined based on international best practice for PM_{10}, dustfall, SO_2, NO_2, O_3, CO, lead (Pb) and benzene (C_6H_6)[1]. These standards were published for comment in the Government Gazette on 9 June 2007. The proposed revised national ambient standards were published for comment in the Government Gazette on the 13th of March 2009. The final revised national ambient standards, as published in the Government Gazette on the 24th of December 2009, and applicable to the project, are listed in Table 4. In June 2012 the National Ambient Air Quality Standard (NAAQS) for $PM_{2.5}$ matter was approved and published in the Government Gazette No. 486.

Table 4: National Ambient Air Quality Standards

Pollutant	Averaging Period	Limit Value (µg/m³)	Limit Value (ppb)	Frequency of Exceedance	Compliance Date
C_6H_6	1 year	10	3.2	0	Immediate – 31 Dec 2014
	1 year	5	1.6	0	1 Jan 2015
CO	1 hour	30000	26000	88	Immediate
	8 hour(a)	10000	8700	11	Immediate
Pb	1 year	0.5	-	0	Immediate
NO_2	1 hour	200	106	88	Immediate
	1 year	40	21	0	Immediate
PM_{10}	24 hour	120	-	4	Immediate – 31 Dec 2014
	24 hour	75	-	4	1 Jan 2015
	1 year	50	-	0	Immediate – 31 Dec 2014
	1 year	40	-	0	1 Jan 2015
$PM_{2.5}$	24 hour	65		4	Immediate – 31 Dec 2015
	24 hour	40	-	4	1 Jan 2016 – 31 Dec 2029
	24 hour	25	-	4	1 Jan 2030
	1 year	25	-	0	Immediate – 31 Dec 2015
	1 year	20(a)	-	0	1 Jan 2016 – 31 Dec 2029
	1 year	15	-	0	1 Jan 2030
SO_2	10 minutes	500	191	526	Immediate
	1 hour	350	134	88	Immediate
	24 hour	125	48	4	Immediate
	1 year	50	19	0	Immediate

2.3.2.2 National Dust Control Regulations

Particulate matter is classified as a criteria pollutant, with ambient air quality guidelines and standards having been established to regulate ambient concentrations. National Dust Control Regulations were published in November 2013. The purpose of the regulations is to prescribe general measures for the control of dust in all areas including residential and light commercial areas.

The regulations state that:

[1] *SANS 69 - South African National Standard* - Framework for setting & implementing national ambient air quality standards and *SANS 1929 - South African National Standard* - Ambient Air Quality - Limits for common pollutants.

'No person may conduct any activity in such a way as to give rise to dust in such quantities and concentrations that -

1) The dust, or dustfall, has a detrimental effect on the environment, including health, social conditions, economic conditions, ecological conditions or cultural heritage, or has contributed to the degradation of ambient air quality beyond the premises where it originates; or
2) The dust remains visible in the ambient air beyond the premises where it originates; or
3) The dustfall at the boundary or beyond the boundary of the premises where it originates exceeds -
    a. **600 mg/m^2-day** averaged over 30 days in **residential and light commercial areas** measured using reference method ASTM 01739; or
    b. **1200 mg/m^2-day** averaged over 30 days in **areas other than residential and light commercial** areas measured using reference method ASTM 01739.'

Dustfall is assessed for nuisance impact and not inhalation health impact.

2.3.3 Conservation of Agricultural Resources, 1983

The Conservation of Agricultural Resources, 1983 (No 43 of 1983) defines a list of registered weeds and invader plants, categorises them into different classes and introduces restrictions where these plants may occur. The act prohibits the spread of weeds and requires that listed weeds be controlled.

An alien and invasive plant control programme in terms of the Act should be in place for all property owned by Scaw Metals.

2.3.4 National Heritage Resources Act (Act No. 25 of 1999)

The National Heritage Resources Act provides for the protection of all archaeological and paleontological sites and meteorites. Section 38 of the Act defines the categories of development for which the responsible heritage resources authority must be notified. Under Section 38 [(c) 'any development or other activity which will change the character of a site-'(i) exceeding 5000 m^2'] the responsible heritage authority must be informed of a development larger than 0.5 ha.

The footprint of proposed WDF 5 is larger than 0.5 ha and thus a heritage assessment may be required.

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

The Act provides for the Minister or MEC to list species and ecosystems which are threatened and in need of protection as well as to identify threatening processes within these ecosystems. No ecosystems or processes have as yet been listed. A list of threatened and protected species and regulations pertaining thereto has been published (GN R 150, 151 & 152, February 2007). The site has been previously disturbed by material borrowing and stockpiling activities and there is little to no chance of any sensitive species occurring, thus no mitigation or permits are required

2.3.6 Municipal By-laws

The Ekurhuleni Metropolitan Municipality has a number of by-laws. Key is the wastewater by-laws which state that “No person shall discharge or cause or permit to be discharged into any sewage disposal system any industrial effluent or other liquid or substance other than sewage without the written permission of the Council. Furthermore, the owner or occupier of any piece of land on which steam or any liquid, other than potable water, is stored, processed or generated shall provide all facilities necessary to prevent any discharge, leakage or escape of such liquid to any street, storm water drain or water course”.

The by-law requires that every person shall, before discharging any industrial effluent into a sewage disposal system, make an application, in writing, to the Council for permission to do so as set out in the relevant tariff determined by the Council and shall thereafter furnish such additional information and submit such samples as the Council may require.

Scaw Metals has a discharge permission from the Greater Germiston Council to discharge industrial effluent from the waste cells at Union Junction to the Council’s sewer system (Appendix J). Scaw Metals will most likely make an application for discharge permission for the leachate from the proposed WDF 5. Obtaining a discharge permission will be dependent on the leachate meeting the quality standards set by the Council.

3 Study Approach and Methodology

The scoping phase of the assessment for the WDF 5 at Scaw Metals was completed and described in the Scoping Report (Synergistics S0445/SR01, October 2011). The scoping report was submitted to and accepted by the DEA (See Section 1.4 and Appendix A).

This EIR presents the EIA and EMP for the development and operation of the WDF 5 at Scaw Metals, Union Junction.

3.1 Study Objectives

The specific objectives of the EIA process are to:

- Address issues and concerns raised by IAPs during the public participation process;
- Assess the key environmental impacts that were identified during the Scoping Phase;
- Identify mitigation measures to enhance positive impacts and reduce negative impacts identified during the EIA;
- Develop actions that can be implemented to address impacts for inclusion in the EMP;
- Provide feedback to stakeholders; IAPs as to how their concerns have been addressed; and
- Provide sufficient information to the environmental authorities in order that they can make an informed decision regarding the future of the project.

3.2 Study Area

The study area is defined as the Scaw Metals property at Union Junction and specifically the site proposed for the WDF5, as illustrated in Figure 1. The area of land within 100 m of the site boundaries of the property was considered for the assessment of certain alternatives.

3.3 Consideration of Alternatives

3.3.1 Locality

Scaw Metals, Union Junction is a brownfields industrial complex with various emissions and current impacts. The WDF 5 has to be in close proximity to the proposed Electrical Co-generation plant as it is required for the disposal of the outputs of that plant. Off-site waste disposal alternatives were not considered economically feasible due to the costs of acquiring land and the cost of transport. As such the locality for the WDF 5 is restricted to the Scaw Metals property at Union Junction.

The required footprint for the WDF5 limited the locality of the facility within the Scaw Meals property. The only available land at Scaw Metals, other than the selected site, was the property to the west of the N3 highway. This land has numerous residential areas located immediately adjacent to the boundaries. The site is also further from the Electrical Co-generation plant, increasing waste transport distances. As a result this site was not considered further. No alternative locations were assessed in the EIA.

3.3.2 No-go

The no-go alternative for the WDF 5 is considered and assessed in the EIA.

3.4 Information for describing the Environmental Baseline

The baseline environment represents the current prevailing environmental conditions at Scaw South Africa's Union Junction Facility, prior to the introduction of the WDF 5. It is indicative of the level of environmental degradation due to current Scaw Metals activities, human activities such as residential development, industry and infrastructure and naturally occurring phenomena.

Environmental baseline information used in this report was gathered through visual inspections of the project area and surroundings, desktop studies, review of existing reports and specialist reports prepared for this assessment.

3.4.1 Existing Reports and Monitoring Data

The Scaw Metals facility at Union Junction is a large industrial complex which was established prior to any formal requirements for the compilation of an environmental assessment or the implementation of environmental management. Some of the more recent additions at the Union Junction facility were developed after the undertaking of environmental studies and with management conditions. In addition, Scaw South Africa has implemented an environmental management system for the facility. The monitoring of various environmental parameters is undertaken. There is thus a large body of environmental data and information for the Union Junction site. Sources of relevant information are described below.

Monitoring undertaken at the Scaw Metals Facility includes:

- Surface water (Quarterly);
- Groundwater (Quarterly);
- Dust fallout (Monthly).

Recent environmental reporting includes:

- EIA for the Development of Cell 4b at Scaw Metals Waste Disposal Site (Synergistics, March 2011)
    - Geohydrological Impact Assessment (Jones & Wagener);
    - Dolomite stability report (Jones & Wagener);
- Noise Assessment Report: Scaw Metals (pro acoustic, March 2011)
- Air Quality Impact Assessment for the Scaw UJ Facility (Airshed, October 2011)
- Environmental Noise Impact Assessment (dBAcoustics, March 2012)
- Stack Emissions Measurement Surveys (Various consultants)
- Monthly Dust Deposition Monitoring Reports (SGS)
- Quarterly Groundwater Monitoring Reports (Various consultants)

3.4.2 Recent Reports

Jeffares and Green undertook baseline sampling for the geotechnical and geohydrological assessment of the site for the WDF5.

3.5 Public Participation Process

On-going participation of IAPs at Scaw Metals is facilitated through an Environmental Stakeholder Liaison, which is run by the Environmental Manager at Scaw. The public participation process for the WDF 5 was undertaken by Synergistics Environmental Services.

3.5.1 During Scoping

Public consultation undertaken during scoping was documented in the Scoping Report and included:

- Site notices;
- Press advertisements in the Beeld Sake 24 and the Germiston City News (25 May 2011);
- Notification of adjacent landowners and local authorities;
- Email and postal distribution of a background information document to all persons on the Scaw Metals database;
- The hosting of a public meeting (13 June 2012);
- Maintenance of a register of IAPs;
- Receipt of comments from IAPs;
- Responses to IAP comments; and
- Provision of draft and final Scoping Report for public review.

The issues raised by the public and authorities were mainly focused on the production of hazardous waste and the impact of its disposal on the environment.

3.5.2 During EIA

3.5.2.1 IAP Database

The register of IAPs for the project was maintained throughout the EIA and all stakeholder comments were recorded. The register was used to notify IAPs of project activities and opportunities for further involvement. The IAP database is included in Appendix B.

3.5.2.2 IAP Responses

A summary of the comments received from and the issues raised by IAPs is included in Section 6.2. Copies of the responses received from IAPs during the public participation process are provided in Appendix B.

3.5.2.3 Review of draft EIR

The draft EIR was made available for review to all IAPs at the Scaw Security office in Penny Road and at the Dinwiddie Library from 24 April 2014 for a period of 40 calendar days. The report was also published on the Synergistics website at www.synergistics.co.za from where it could be downloaded. All registered and affected parties were notified by fax, email or telephone of the report's availability.

Comments received from IAPs on the EIR were used to update the report and produce the Final EIR for submission to the DEA. The final EIR will also be published on the website and made available to IAPs whom request it.

3.5.2.4 Public Feedback Meeting

No public feedback meeting is proposed for the EIA due to the low numbers of registered IAPs. If there is significant interest or queries on the assessment from any specific party then consultation sessions will be arranged.

3.6 Authority Consultation

3.6.1 During Scoping

The following government departments were notified about the project and invited to a general information meeting:

- Ekurhuleni Metropolitan Municipality (Mayor and Councillor);
- Ekurhuleni Metropolitan Municipality (Environmental Department and Air Quality Officer);
- The Gauteng Department of Agriculture and Rural Development (GDARD); and
- The Department of Water Affairs (DWA).

The draft and final scoping reports were provided directly to the following Departments for comment (Appendix B). All responses received from these commenting authorities are included in the report.

Ekurhuleni Metropolitan Municipality	Mayor and Ward Councillor	Private Bag X1069, Germiston, 1401
	Environmental Department: Maphuti Moabelo	Maphuti.Moabelo@ekurhuleni.gov.za Cnr Van Riebeck Ave & Hendrik Potgieter Department of Environmental Resource Management P O Box 25 Edenvale 1610
	Air Quality Officer: Mr E van Wyk	Edmund.vWyk@ekurhuleni.gov.za Swartkoppies Municipal Complex Health Department Building Swartkoppies Road Alberton
Gauteng Department of Agriculture and Rural Development	Sustainable Use of the Environment: Ms M Rabambi	Mpho.rabambi@gauteng.gov.za 68 Eloff St., 8th floor Diamond Corner Building, JOHANNESBURG
	Waste Management: Zingisa Smale	Zingisa.Smale@gauteng.gov.za 68 Eloff St., 7th floor Diamond Corner Building, JOHANNESBURG
Department of Water Affairs	Resource Protection and Waste Source Co-ordination: Wilna Moolman	MoolmanW@dwa.gov.za Zwamadaka Building 110 157 Schoeman Street, Pretoria 0001

	Gauteng Region: Water Quality Section	Bothonga East Building 285 Schoeman Street Pretoria 0001
	Thya Pather	Thya@dwa.gov.za 15th Floor - Room 1545 Bothonga East Building 285 Schoeman Street Pretoria 0001

3.6.2 During EIA

The draft EIR was submitted directly to the same departments for a 40 calendar-day review period. The final EIR will also be provided to these Departments.

Discussions with DWA (Water Quality and Resource Protection) were aimed at obtaining comments and ensuring that the DWA comments are communicated to the DEA for inclusion in the WML so that the need for a WUL can be dispensed with in terms of Section 22(3) of the NWA.

The conceptual design drawings for the WDF 5 will be provided to the Integrated Environmental Engineering section at the DWA for a record of decision as is required. The DWA will have 60 days in which to comment and issue the record of decision in terms of Section 56(8) of the EIA regulations.

3.7 Specialist Studies

Significant information on the environmental conditions at the Scaw Metals site is available from the investigations that have been conducted for various projects at the site. In addition intensive monitoring of a number of different environmental aspects at the site has resulted in a detailed information database being available (see Section 3.4.1).

However the nature of the WDF 5 is such that additional specialist inputs are required in order to provide sufficient information to complete the EIA.

3.7.1 Geo-hydrological Impact Assessment

Jeffares & Green (Pty) Ltd completed a Geo-hydrological Investigation for the development of the proposed WDF 5 (Appendix C). The aim of the investigation was to ascertain and characterise the geohydrological setting and to determine the risk of impact on the groundwater environment from the proposed landfill development. The geohydrological investigation was carried out in accordance with DWA (formerly DWAF) guidelines using a phased approach.

An understanding of the geohydrology of the area was established from a desktop review, a site assessment, hydrocensus survey, geophysical surveys, borehole drilling and test pumping. This information was used to carry out a preliminary risk assessment of the aquifer beneath the proposed site.

3.7.1.1 Water Quality Status Quo Assessment

An assessment of the current ground- and surface water quality was carried out to determine if the current operations have had an impact on the groundwater and to assess whether an impact from the proposed WDF 5 could be expected based on the current water quality. Water quality data obtained from the current ground and surface water monitoring networks as well as from the six additional boreholes that were drilled upstream and downstream of the proposed WDF 5 were assessed against the SANS 241 (2011) drinking water standard screening guidelines.

3.7.1.2 Numerical Flow Model

A model consists of a set of assumptions that reduce the real problem and the real domain to simplified versions that are acceptable in view of the objectives of the modelling and of the associated management problem. A site-specific groundwater model was developed for the proposed ash waste facility site to determine the potential long-term impacts of waste operations.

The groundwater model was developed using the industry-standard and internationally accepted MODFLOW modelling code. MODFLOW is a modular three-dimensional finite difference groundwater flow model. Processing MODFLOW for Windows (PMWIN) software was utilised as a graphical user interface to develop, analyse and display model results.

Information from the site investigation phase was utilised for the groundwater model along with published information on geology, geohydrology, topography and precipitation. In addition, contaminants in the waste stream were reviewed so that the potential impact of waste operations could be modelled and used to inform decision-making processes. The model considered waste disposal with no liner, with a 300 mm compacted clay liner and with a 600 mm compacted clay liner. Liner designs specified by the Norms and Standards provide superior protection when compared to the modelled lining systems as they comprise additional elements to the compacted clay liner.

A two-layer steady-state base model was developed using PMWIN and calibrated against observed water levels. A 97% correlation was achieved between simulated and observed water levels, providing validation of the base model.

3.7.1.3 Contaminant Migration Simulation

The potential for groundwater contamination from certain sources highlights the need to understand the transport behaviour of contaminants. A groundwater contamination plume generally contains numerous contaminants each of which may migrate differently. In this study the potential migration of sulphates was simulated. Sulphate levels used in the models was determined from laboratory analysis of the waste stream (Golder report ref. 12613982-11736-1), which indicated sulphate presence in all six ash waste streams (char, char and dust, char and limestone, char and dust and limestone, char and shredder waste and limestone, char and shredder waste and limestone – bed).

The base model was utilised to investigate contaminant transport for a number of different scenarios using sulphate as the contaminant of concern.

The modelled scenarios included:

- No lining system with:

  - Sulphate present over a third of the site
  - Sulphate present over two-thirds of the site
  - Sulphate present over the entire site **(most conservative model)**
- 300mm clay lining system with:
  - Sulphate present over a third of the site
  - Sulphate present over two-thirds of the site
  - Sulphate present over the entire site
- 600mm clay lining system with:
  - Sulphate present over a third of the site **(least conservative model)**
  - Sulphate present over two-thirds of the site
  - Sulphate present over the entire site

3.7.1.4 Risk Assessment

A risk assessment was carried out to determine if the proposed ash waste facility would impact the aquifer beneath the site. The risk assessment reviewed the vulnerability and the strategic value of the aquifer in order to establish the level of risk of contamination from the proposed waste operations.

3.7.2 Geotechnical Investigation

Jeffares & Green (Pty) Ltd completed a Geotechnical Investigation for the development of the WDF 5 which considered the suitability, from a geotechnical perspective, of the site for the proposed WDF 5 (Appendix D). The study considered the potential for the spread of pollutants from the site as well as the potential for sinkhole development in light of the geological and geo-hydrological conditions at the site and the design of the facility. Subsurface conditions across the WDF 5 site gleaned from available geological information, as well as a field investigation, which entailed the following:

- The excavation of seventeen trial pits
- Foundation indicator, moisture density relationship (Proctor effort) and falling head permeability testing of disturbed soil samples.

The following laboratory tests were carried out on disturbed soil samples recovered during the investigation:

- Grading Analyses (Sieve analysis, including hydrometer) (x10)
- Atterberg Limit and Linear Shrinkage Determinations (x10)
- Moisture Density Relationship (Proctor effort) (x5)
- Falling Head Permeability Test (x5)

The testing was undertaken on various soil horizons to gain a detailed understanding of the nature of the soil materials observed on site.

3.7.3 Ash Classification

Scaw South Africa conducted various trials to generate ash of a similar type that will be produced by the proposed Co-generation Power Plant. The trial ash was generated by combusting samples of the various fuels in test facility operated by the CSIR. These samples were subjected to chemical analysis in order to undertake a waste classification. The study was undertaken by Golder Associates Africa (Appendix E).

Ash samples were subject to acid rain leach procedure extraction, deionised water extraction and aqua-regia digestion at an accredited laboratory. The waste classification was undertaken in terms of:

- Minimum Requirements for the Handling, Classification and Disposal of Hazardous Waste (Second Edition, 1998; DWAF) (MRs), and
- the (then draft) Norms and Standards for the Assessment of Waste for Landfill Disposal(GN R635 of August 2013).

In terms of the Minimum Requirements the ash was assigned to a Hazard Rating level based on the comparison of the analytical results to the Acceptable Risk Levels for specific Contaminants of Concern. The ash samples exceeded the ARL for Lithium (Li), Magnesium (Mg), Manganese (Mn) and Strontium (Sr). One of the ash samples was classified to hazard rating level 1 due to the elevated levels of Cr. In terms of the Minimum Requirements the trial Ash should thus be disposed on a H:H designed landfill, except when the monthly load is less than 2.8 tonnes when it can be disposed on a correctly engineered and authorised G:L:B+ landfill site with a leachate collection system.

Under the Norms and Standards the analyses were compared to thresholds for leachable and total concentrations of potential Contaminants of Concern (CoC), which in combination, determines the Risk Profile of the waste. Under the total concentrations Arsenic As, Berillium (B), Barium (Ba), Copper (Cu), Manganese (Mn), Lead (Pb) and Zink (Zn) exceeded the thresholds for the majority of samples tested. For the leachable concentrations B, Ba and Sulphate (SO4), Fluorine (F), As and Cadmium (Cd) exceeded the thresholds. Based on the total and leachable concentrations of CoCs in the Ash, according to the methodology detailed in the Norms and Standards, the ***trial Ash is a Type 3 waste*** and can be disposed on a landfill site with a Class C liner. This is the equivalent of a G:L:B+ landfill site.

3.7.4 Air Quality Impact Assessment

Airshed Planning Professionals was appointed to undertake an air quality impact assessment for the Electrical Co-generation Power Plant (including the Ash Disposal Facility). The main focus of the assessment was to estimate the atmospheric emissions arising from all operations associated with the project, consider the increase and significance of predicted impacts from operations on the surrounding environment and on human health. See Appendix F.

3.7.4.1 Scope of Work

The scope of work for the air quality impact assessment included the following:

- A review of proposed operations at Scaw Metals from an air quality perspective.
- A review of National and International guidelines and standards against which emissions, ambient air quality and inhalation health impacts are assessed and (or) screened.
- A description of the site from an air quality perspective including a discussion on terrain, land use and sensitive communities as well as a description of meteorological conditions governing site specific atmospheric dispersion potential.
- The estimation of atmospheric emissions arising from all operations associated with the project.
    - A number of scenarios were assessed and these are described in Section 3.7.4.3.1.1.

- Atmospheric dispersion model predictions to determine ambient air quality concentrations as a result of the project (SO_2, NO_2, CO, dust fallout, fine particulate (PM10 and PM2.5) concentrations, as well as trace compound concentrations, including HCl. HF, metals, NH_3 and PCDD/PCDF)
- a health risk assessment by comparing predicted emissions concentrations to relevant ambient air quality guidelines and specific process standards.
- The recommendation of suitable air quality mitigation and monitoring measures.

3.7.4.2 Methodology

Individual aspects of the air quality impact assessment methodology are described in more detail in the following sub-sections.

3.7.4.2.1 Review of Operations from an Air Quality Perspective

A review of all project aspects from an air quality perspective was conducted, reference was made to the following:

- Detailed project description provided by Synergistics (including maps, technical design, pilot plant test reports, sample analyses and process flow diagrams).
- The comprehensive baseline air quality impact assessment compiled by Airshed for SMUJ in 2011 as part of their Atmospheric Emission Licence (AEL) application.
- The Australian National Pollutant Inventory (NPI) Emission Estimation Technique Manuals (EETMs) and United Stated Environmental Protection Agency (US EPA) 'Compilation of Air Pollutant Emission Factors'.

3.7.4.2.2 Air Quality Impact Screening and Assessment Criteria

Air quality guidelines and standards are fundamental to effective air quality management, providing the link between the source of atmospheric emissions and the user of that air at the downstream receptor site. The ambient air quality standards and guideline values indicate safe daily exposure levels for the majority of the population, including the very young and the elderly, throughout an individual's lifetime. Air quality guidelines and standards are normally given for specific averaging or exposure periods.

Reference was made to National Ambient Air Quality Standards (NAAQS) and emission limits as set out in the NEMAQA for the evaluation of air emissions and ambient air quality impacts. Inhalation reference concentrations and cancer risk factors published by the World Health Organisation (WHO) and US EPA and other institutions were referred to.

The legislation pertaining to air quality for sources and pollutants relevant to the study is summarised in Section 2.3.2 of this document and Chapter 3 of Airshed's report.

3.7.4.3 Assessment of Wind Blown Dust Emissions

In order to provide a more detailed understanding of wind-blown dust emissions resulting from waste disposal at Scaw Metals, Airshed undertook an assessment of various operational scenarios. Airshed applied an in-house model, using hourly meteorological data, source specific particle size distribution (PSD), density and moisture (ADDAS) to estimate windblown dust emissions. The four scenarios considered included:

- Scenario (a) – Windblown dust from Cell4b.
- Scenario (b) – Windblown dust from Cell4b and the new WDF5, containing only ash and distributed over the entire footprint area.
- Scenario (c) – Windblown dust from the new WDF5, containing only ash and distributed over approximately one third of footprint area (Cell A of the WDF5).
- Scenario (d) – Windblown dust from the new WDF5, containing ash as well as other Scaw production wastes and distributed over the entire footprint area.

The model considered all emissions as unmitigated. Moisture contents were at 1%.

Estimated hourly emission rates were applied in the atmospheric dispersion model AERMOD, to determine ground level PM2.5 and PM10 concentrations and dustfall rates at the SMUJ boundary and nearby sensitive receptors.

3.7.4.3.1 Dispersion Modelling

Due to the integrated nature of the project with existing SMUJ operations the assessment is based on:

- Compliance with National emission limits;
- The expected incremental change in emissions and predicted ambient air concentrations as a result of the project from existing SMUJ operations; and
- Predicted cumulative ambient air concentrations and compliance with NAAQS.

The establishment of a comprehensive emission inventory formed the basis for the assessment of the air quality impacts from project's emissions on the receiving environment. Existing Scaw Metals operations result in fugitive particulate emissions, vehicle exhaust emissions as well as gaseous and particulate process emissions. The Co-generation project and associated waste disposal site will result in fugitive particulate emissions as well as gaseous and particulate process emissions. Fugitive emissions refer to emissions that are spatially distributed over a wide area and not confined to a specific discharge point as would be the case for process related emissions.

In the quantification of fugitive dust, vehicle exhaust and process emissions, use was made of emission factors which relate the quantity of a pollutant to the activity associated with the release of that pollutant, pilot plant emissions monitoring data, stack emissions monitoring data from existing sources and Minimum Emission Standards. Emissions of all pollutants likely to be emitted by project were included in the emissions inventory.

In the calculation of ambient air pollutant concentrations and dustfall rates use was made of the United States US EPA AERMOD atmospheric dispersion modelling suite. AERMOD is a Gaussian plume model best used for near-field applications where the steady-state meteorology assumption is most likely to apply. The dispersion of pollutants expected to arise from current operations was modelled for an area covering 10 km (east-west) by 10 km (north-south). The area was divided into a grid matrix with a resolution of 500 m^2, with the Scaw Metals Union Junction Facility located centrally. The nearest community areas were included as discrete receptors. AERMOD calculates ground-level (1.5 m above ground level) concentrations and dustfall rates at each grid and discrete receptor point.

Dispersion modelling was undertaken to determine highest hourly, highest daily and annual average ground level concentrations for each of the pollutants considered in the study. Averaging periods were selected to facilitate the comparison of predicted pollutant concentrations to relevant ambient air quality and inhalation health criteria.

3.7.4.3.1.1 Modelled Scenarios

Five distinct operational scenarios were identified and considered in the air quality impact assessment. These are:

- **Scenario 1:** representative of emissions from current SMUJ operations as quantified in 2011 (Krause & Kornelius, 2011) and updated to account for 2012 kiln stack emission measurements and waste disposal rates.
- **Scenario 2:** cumulative SMUJ operations with the commissioning of Phase 1 of the Co-Generation Project, whereby kiln exhaust gas is redirected to the waste heat recovery system and vented through a new dedicated bag-house.
- **Scenario 3:** cumulative SMUJ operations with the commissioning of Phase 1 and Phase 2 of the Co-Generation Project. For Scenario 3 it was assumed that only char, dust and limestone will be used in the FBB and that char and dust will be classified as a by-product thereby triggering Subcategory 1.1 Minimum Emission Standards. For this scenario it was also assumed that ash from the FBB and other SMUJ wastes would be disposed of at the new WDF 5.
- **Scenario 4:** similar to Scenario 3 in all respects except that that char and dust are classified as a waste. Scenario 4 therefore represents cumulative SMUJ operations with the commissioning of Phase 1 and Phase 2 of the Co-Generation Project. For Scenario 4 it was assumed that only char and dust with the addition of limestone will be used in the FBB and that char will be classified as a waste thereby triggering Category 8 Minimum Emission Standards. For this scenario was also assumed that ash from the FBB and other Scaw production wastes will be disposed of at the new WDF 5.
- **Scenario 5:** represents cumulative SMUJ operations with the commissioning of Phase 1 and Phase 2 of the Co-Generation Project. For Scenario 5 it was assumed that char, dust and shredder waste with the addition of limestone will be used in the FBB and that fuels will be classified as a waste thereby triggering Category 8 Minimum Emission Standards. For this scenario was also assumed that ash from the FBB and other Scaw production wastes will be disposed of at the new WDF 5.

Scenarios 3 and 4 for Phase 2 were considered as there is uncertainty over whether,

1) Shredder waste will be utilised as a fuel, and
2) the char and dust to be combusted in the FBB are classified as 'by-products' or 'wastes' under NEMWA.

3.7.4.4 Predicted Impacts and Compliance Assessment

The Air Quality Impact Assessment quantified cumulative annual emissions that are anticipated from the Electrical Co-Generation Power Plant (including the WDF5). These emissions were combined with meteorological data as input into the dispersion model (see Section 3.7.4.3.1 above). Ground level ambient pollutant concentrations as well as dustfall rates were determined and these are compared to ambient air quality criteria referenced in Section 3 of Airshed's report.

3.7.5 Heritage Assessment

The proposed WDF 5 and Electrical Co-Generation Power Plant projects were registered on the SAHRA website. SAHRA provided a response letter in June 2013 indicating that an accredited heritage specialist should be contracted to conduct a phase 1 heritage impact assessment or compile a motivation for exemption.

Given the sites long history of disturbances from industrial activities it was considered unlikely that any heritage resources existed. Professional Grave Solutions were appointed to assess the site and compile a motivation for exemption from a Heritage Impact Assessment. PGS submitted the motivation to SAHRA in July 2013. SAHRA provided a decision in August 2013 indicating that no further heritage assessment was required. See Appendix G.

3.8 Environmental Impact Assessment Methodology

The identification and assessment of environmental impacts is a multi-faceted process, using a combination of quantitative and qualitative descriptions and evaluations. It involves applying scientific measurements and professional judgement to determine the significance of environmental impacts associated with the proposed project. The process involves consideration of, *inter alia*: the purpose and need for the project; views and concerns of IAPs; social and political norms, and general public interest.

The methodology used for assessing impacts associated with the proposed project follows the philosophy of EIAs, as described in the booklet Impact Significance, Integrated Environmental Management Information Series 5 (DEAT, 2002b). The generic criteria and systematic approach that will be used to identify, describe and assess impacts are outlined below.

3.8.1 Identification and Description of Impacts

For each environmental component (i.e. visual, water quality, ecology), impacts will be identified and described in terms of the nature of the impact, compliance with legislation and accepted standards, receptor sensitivity and the significance of the predicted environmental change.

3.8.1.1 Current Impacts (Impacts of Existing Developments)

Existing infrastructure and activities at and around Scaw Metals have, in many cases, altered the baseline environment to a less than natural state. In order to explain the environmental context of the site a general assessment of the current impacts arising from the site will be provided. The EIA will consider the current levels of environmental degradation as at August 2012. Defining of the current level of degradation associated with existing developments is essential to understand and enable the assessment of cumulative impacts.

3.8.1.2 Incremental Impacts (Direct project impacts)

A detailed assessment of the impacts arising directly from the proposed introduction of the WDF 5 at Scaw Metals will be undertaken. The impacts directly attributable to the project are the incremental impacts and will either constitute a new impact at the site or may alter an existing impact.

3.8.1.3 Cumulative Impacts (Total Impacts)

For this project, cumulative impacts will be determined as:

Existing Impacts	**+**	***Incremental Impacts***	**=**	***Cumulative Impacts***
Existing impacts (current level of degradation) associated with existing developments and developments under construction		Impacts of the proposed WDF 5		Existing impacts (current level of degradation) associated with existing developments and developments under construction combined with the impacts of the proposed WDF 5

3.8.1.4 No-go Development Impacts

The no-go development is considered as an alternative in the EIA and impacts of not developing the proposed coal conveyor will be discussed in the EIR.

3.8.2 Mitigation Measures

The significance of environmental impacts are rated before and after the implementation of mitigation measures. The impact rating system considers the confidence level that can be placed on the successful implementation of the mitigation.

3.8.3 Rating the Significance of Environmental Impacts and Mitigation Measures

The system used for evaluating impact significance is explained below. The significance of an impact is calculated as follows:

Impact significance = consequence (intensity + frequency + extent + duration) x ***probability***

Although the criteria used for the assessment of impacts attempts to quantify the significance, it is important to note that the assessment is generally a qualitative process and therefore the application of these criteria is open to interpretation. The process adopted involves the application of scientific measurements and professional judgment to determine the significance of environmental impacts associated with the project. The assessment thus largely relies on experience of the EAP and the information provided by the specialists appointed to undertake studies for the EIA.

Where the consequence of an event is not known or cannot be determined, the "precautionary principle" is adhered to and the worst-case scenario assumed. Where possible, mitigation measures to reduce the significance of negative impacts and enhance positive impacts will be recommended. The detailed actions, which are required to ensure that mitigation is successful, will be given in the EMP.

Table 5: Criteria for assessing significance of impacts

EXTENT = SPATIAL SCOPE OF IMPACT	**RATING**
Site: limited to the impact site	1
Immediate area: affects the whole Scaw Metals UJ property	2
Local area: impact affects neighbouring properties with 1 km	3
Regional: impact extends beyond the neighbouring properties	4
Provincial: impact affects the Gauteng Province	5
INTENSITY = MAGNITUDE OF IMPACT	**RATING**
Insignificant: impact is of a very low magnitude.	1
Low: impact is of low magnitude	2
Medium: impact is of medium magnitude	3
High: impact is of high magnitude	4
Very high: impact is of highest order possible	5
DURATION = HOW LONG THE IMPACT LASTS	**RATING**
Very short-term: impact lasts for a very short time (days or less)	1
Short-term: impact lasts for a short time (weeks or months)	2
Medium-term: impact lasts for construction/ the first few years of operation	3
Long-term: impact occurs over the operational life of the plant	4
Residual: impact is permanent (remains after closure)	5
FREQUENCY = HOW OFTEN THE IMPACT CAUSE OCCURS	**RATING**
Seldom: impact cause occurs once or twice	1
Occasional: impact cause occurs every now and then	2
Regular: impact cause is intermittent but does not occur often	3
Often: impact cause is intermittent but occurs often	4
Continuous: the cause of the impact occurs all the time	5
PROBABILITY = LIKELIHOOD THAT THE IMPACT WILL OCCUR	**RATING**
Highly unlikely: the impact is highly unlikely to occur	1
Unlikely: the impact is unlikely to occur	2
Possible: the impact could possibly occur	3
Probable: the impact will probably occur	4

Definite: the impact will occur	5

Table 6: Significance rating matrix

	Consequence (intensity+ frequency + extent + duration)																			
Probability	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60
	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72	76	80
	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100

Table 7: Impact significance ratings

	Very high	81-100	impact is of the highest order possible /potential fatal flaw
	High	61-80	impact is substantial
	Medium	41-60	impact is real but not substantial in relation to other impacts
	Low	21-40	Impact is of a low order
	Very low	1-20	Impact is negligible

3.8.4 Project Phases

The environmental impacts for the project have been assessed over five phases of the project i.e. the planning and design, construction, operation, decommissioning and post-closure phase.

The planning and design phase refers to the stage when the pre-feasibility and feasibility studies are being undertaken, the project scope is being developed and the conceptual and final facility design is being prepared. During this phase the EIA is completed and environmental authorisations are applied for.

The construction phase will involve the physical construction of the facility and its associated infrastructure.

The operational phase refers to the when construction is completed and the facility is fully operational.

The decommissioning refers to the time in the life of the facility when operations are reduced in preparation for closure. This phase will occur once the end of the facility's life has been reached.

The closure phase refers to when the facility is shut down and no further activities are undertaken, this phase will occur after successful decommissioning has been achieved.

3.8.5 Assumptions and Limitations

The key assumptions and limitations of this EIR are detailed below.

- Details of the site operations and design information used to describe the project and identify impacts were provided by Scaw Metals and the design engineers.
- It is assumed that this information is accurate and that the WDF 5 will be implemented and operated as described.

- Monitoring data and the results of specialist studies formed the basis for the assessment of impact significance. The monitoring is conducted by independent specialists considered to be experts in their fields. It was assumed that the information from these sources is relevant and accurate.
- The identification of environmental impacts, the rating of impact significance and the recommendation of mitigation measures assumed that the design parameters and standard operating conditions at the WDF 5 are implemented with an acceptable level of management and maintenance efficiency. Occasional non-compliances or limited failures are an accepted part of operations and were thus included in the impact assessment.
- This study does not, and cannot assess the environmental risks associated with fires, accidents, very poor site management or maintenance and acts of nature. A full risk assessment would be required to deal with these issues.
- The assumptions and limitations of any specialist study or opinion are detailed in the individual reports.

3.9 Draft Environmental Management Programme

The draft EMP for the project was compiled to address:

- Management of activities undertaken during the various phases of the proposed project;
- Avoidance of environmental impacts;
- Monitoring to measure environmental change; and
- Rehabilitation of environmental degradation.

Note that the proposed WDF 5 will be situated on Scaw Metal's Union Junction property, which is subject to conditions of existing environmental permits/licences/measures. The EMP presented here only provides the environmental management measures required for the facility assessed in this EIA. This EMP does not replace any current EMPs or licences, nor does it provide for the management of matters that are adequately managed by existing measures. This EMP should thus be implemented in conjunction with any existing environmental management measures.

Scaw implements an Environmental Management System (EMS) for all operations across the entire Union Site. The EMS is accredited in terms of ISO 14001. The EMS will need to be updated in order to include the requirements of the WDF5.

4 Project Description

4.1 Project Design Criteria

The Electrical Co-generation Power Plant proposed by Scaw South Africa at its Germiston operation (Scaw Metals, Union Junction) may include a fluidised bed boiler which will produce ash as a waste. The bag-houses used for emissions control will also produce dust as a waste.

Scaw South Africa has proposed to make use of an internally owned and operated facility for the disposal of the waste generated at the Electrical Co-generation Power Plant. Waste Disposal Facility 5 (D5F) will be built and operated primarily for the disposal of waste ash from the Electrical Co-generation Power Plant. The WDF5 must have disposal capacity for the ash and bag-house dust for the potential 25-year life Electrical Co-generation Power Plant.

The basic design criteria for the WDF 5 were:

- use the available footprint effectively in order to maximise the airspace for ash disposal;
- completed height be similar to that of the existing waste disposal facilities (approximately 25m high);
- slopes, lifts and terraces to be similar to that of the existing waste disposal facilities;
- must comply with the current design standards for waste disposal facilities as endorsed by the DEA;
- primarily for the acceptance of ash from the Co-gen plant, but also capable of receiving wastes other than ash (i.e. those Scaw Metal production wastes that are currently disposed to Cell 4b)

4.2 Waste Generation

Phase 2 of the Electrical Co-generation Power Plant will combust various energy containing materials, alternative fuels, wastes and by-products. The combustion process will generate waste ash which will require disposal. At full operational capacity, the current configuration of the Co-generation Power Plant is anticipated to produce a maximum of ~ 300 t of ash per day. The bulk of the ash will be recovered directly from the fluidised bed boiler. Fine ash and dusts will arise from the bag houses on both Phase 1 and Phase 2 of the Electrical Co-generation Power Plant. All of this material will require disposal to the WDF5 for a period of 25 years.

In addition, the other production waste streams from Scaw Metals, which cannot be combusted in the Electrical Co-generation Power Plant (i.e. foundry sands, fumex dusts etc.)will continue to require disposal. These will be disposed to the existing Cell 4b site at Scaw Metals for as long as there is airspace capacity. Once this is exhausted the most likely possibility is these wastes will be disposed to the WDF5.
It is noteworthy that the total volume of Scaw production wastes will reduce over current volumes as these wastes are (will be):

- recycled or reused for other purposes;
- combusted in the Electrical Co-generation Power Plant (char, coal dust and shredder waste).

This will extend the disposal life of the Cell 4b site and any future waste disposal sites. Scaw will consider and assess the need for any additional waste disposal sites as part of future investigations. One alternative is to dispose of the other Scaw Metal production wastes (i.e. foundry sands, fumex dusts etc.) to the WDF5. The design engineers have therefore considered a co-disposal facility when designing the WDF5.

The exact volume of the production waste materials is not known as waste generation depends on the production profiles at Scaw Metals, while the volume of material requiring disposal depends on the re-use and recycling initiatives. Generation of these wastes is unlikely to exceed the volumes disposed to Cell 4b in 2013 (see Table 8). This assessment therefore also considers the disposal of the Scaw production waste streams to the WDF 5.

Table 8: Scaw Metal Production Waste Inventory for 2014

Waste Type	Source	Tons per annum (estimated)	Assessment in terms of Norms and Standards
Slag	High Chrome Ball Plant, Melt Shop	170 171	Type 2 and Type 3
Char & dust	DRI kilns	93 237	Not yet assessed, could be considered as a by-product.
Shredder waste	Shredder	26 688	Type 3
Sand	Chrome plant and Foundry	40 623	Type 3
Fumex dust	High Chrome Ball Plant, Melt shops	8 222	Not yet assessed, HR 1 under the Minimum Requirements.
Sludge	High Chrome Ball Plant	36	Not yet assessed
Mill scale	Ball Forge, Hille and Morgan mills, Melt Shop caster scale	7380	Not yet assessed

4.2.1 Waste Classification

Scaw South Africa conducted various trials to generate ash of a similar type that will be produced by the proposed Co-generation Power Plant. The trial ash has been generated by combusting samples of the various fuels in a test facility operated by the CSIR. Scaw appointed Golder Associates Africa (Pty) Ltd to assist with analyses and classification of the ash to be produced at the Co-generation Plant and disposed of at the proposed WDF 5.

Samples of the different ash waste streams that were subject to analyses and classification included the ash produced following combustion of the following:

- Char only;
- Char and Dust;
- Char and Limestone;
- Char, Dust and Limestone;
- Char, Shredder Waste and Limestone; and
- Char, Shredder Waste and Limestone – Bed.

These samples were submitted to Waterlab (a SANAS accredited laboratory) for acid rain leach procedure (ARLP) extraction, deionised water extraction and aqua regia digestion. Waste classification was based on both the Minimum Requirements for the Handling, Classification and Disposal of Hazardous Waste (Second Edition, 1998 DWAF) (MRs) and the (then draft) National Norms and Standards for the Assessment of Waste for Landfill Disposal (GN R. 635 of 2013).

4.2.1.1 Hazard Rating as per MRs

Per the MRs, the Hazard Rating is used to classify waste into any of the four Hazard Rating (HR) levels. These include the following:

- Hazard Rating 1 (Extreme Hazard): Contains significant concentrations of extremely toxic substances, including certain carcinogens, teratogens and infectious wastes;
- Hazard Rating 2 (High Hazard): Highly toxic characteristics which are not persistent, including certain carcinogens;
- Hazard Rating 3 (Moderate Hazard): Moderately toxic or containing substances that are potentially highly harmful to human health or to the environment, but are not persistent; and
- Hazard Rating 4 (Low Hazard): Contains potentially harmful substances in concentrations that in most instances would represent only a limited threat to human health or to the environment.

At a certain concentrations in the environment any compound (excluding certain carcinogens and teratogens) will be classified in any one of the above four Hazard Ratings. The waste streams tested were classified as follows:

- The Char, Char and Dust and Char and Limestone samples had elevated Lithium (Li), Magnesium (Mg) and Strontium (Sr) concentrations, exceeding the Acceptable Risk Levels (ARLs), resulting in a HR2 rating (due to elevated Li concentration);
- The Char, Dust and Limestone sample had elevated Li, Mg, Manganese (Mn) and Sr concentrations which exceeded the ARLs for these elements. Therefore the Char, Dust and Limestone has a HR2 rating due to the elevated Li and Mn concentrations;
- Due to elevated Chromium (Cr) concentration in the ARLP extract, the Char, Shredder Waste and Limestone sample has a HR1 rating. Other Contaminants of Concern (CoCs) exceeding the ARLs include Mg, antimony (Sb) and Sr; and
- The concentrations of all potential CoCs in the ARLP extract of the Char, Shredder Waste and Limestone – Bed sample were lower than the ARLs, except for Mg. Therefore this waste sample has a HR4 rating.

4.2.1.2 Hazard Rating as per Norms and Standards

In terms of Regulation 3(1) of the Norms and Standards, the potential level of risk associated with disposal of wastes must be determined by following the prescribed and appropriate leach test protocols as detailed in the Norms and Standards. The results must be assessed against the four levels of thresholds for leachable and total concentrations, which in combination, determines the Risk Profile of the waste. In order to determine this, the waste is analysed to determine total and leachable concentrations of potential CoCs. Figure 3 shows the flow diagram of the process followed to determine the waste type destined for disposal or downstream use. The results are then compared to the threshold values to determine the waste type (Type 0 – Type 4).

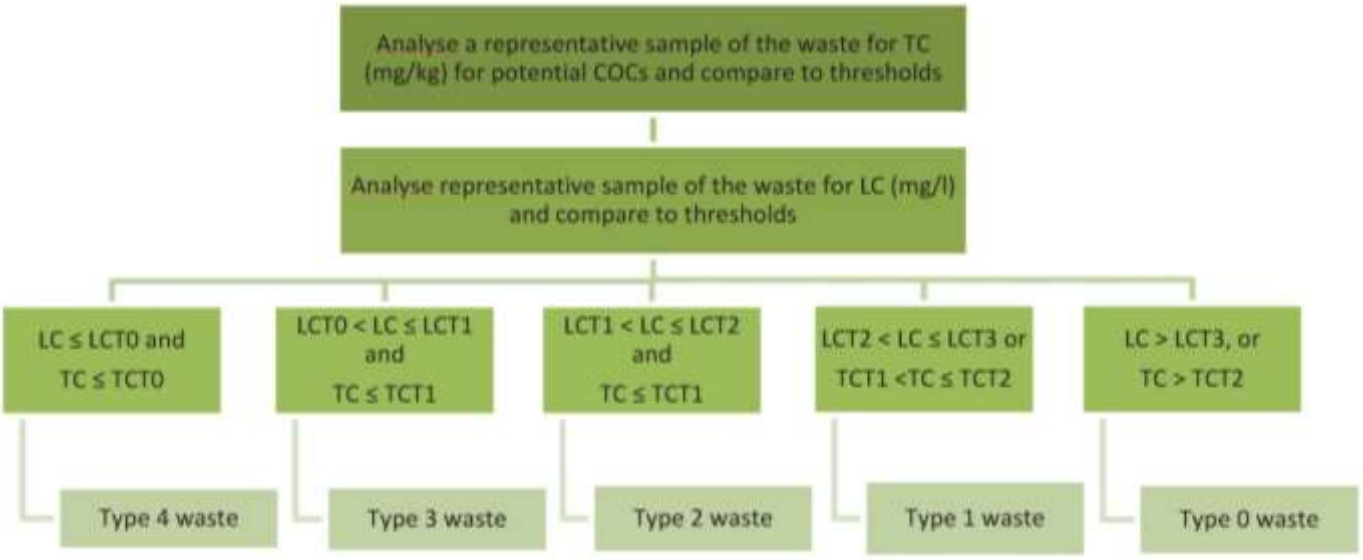


Figure 3: Flow diagram for determination of the waste type based on the WCMR

The applicable terminology as per Norms and Standards is as follows:

- LC = means the leachable concentration of a particular contaminant in a waste, expressed as mg/l;
- TC = means the total concentration of a particular contaminant in a waste, expressed as mg/kg;
- LCT = means the leachable concentration thresholds for particular contaminants in a waste (LCT0, LCT1, LCT2 and LCT3); and
- TCT = means the total concentration thresholds for particular contaminants in a waste (TCT0, TCT1, TCT2).

Laboratory results of the waste stream samples tested showed elevated total concentrations of Arsenic (As), Boron (B), Barium (Ba), Copper (Cu), Manganese (Mn), Lead (Pb) and Zink (Zn) in the majority of samples, exceeding the TCT0 threshold level. The Char, Shredder Waste & Limestone – Bed sample have elevated Ba and Mn concentrations only, while the total concentrations of all other CoCs were lower than the TCT0 threshold levels.

With respect to leachable concentrations, results indicated the following:

- Elevated leachable B and SO^4 in the Char and Char & Dust samples with slightly elevated F in the Char & Dust sample as well;
- The SO^4 concentration in the Char and Limestone sample exceeded the LCT0 threshold;
- The Char, Dust and Limestone sample have elevated leachable B, Cr, SO4 and F concentrations;
- The leachable As, Cd, Pb SO^4 and F concentrations in the Char, Shredder Waste and Limestone sample were elevated and exceeded the LCT0 threshold;
- The Char, Shredder Waste & Limestone – Bed sample has elevated SO4 concentration only;:

According to both total and leachable concentration tests, all the ash waste variants are classified as Type 3 waste, which can be disposed on a Class C (G:L:B+ equivalent) landfill site.

4.2.1.3 Other Scaw Metals' Production Wastes

Most of the other production wastes produced at Scaw Metals, Union Junction have been classified in terms of either the Minimum Requirements (DWAE, 1998) or the Norms and Standards (GN R 635, 2013). See Table 8.

4.3 Design Specifications for the Proposed Waste Disposal Facility 5

The conceptual design for the WDF 5 was prepared by design engineers at Jeffares & Green. The following is a summary drawn from the design report prepared by J&G, 2013 (See **Appendix H**).

4.3.1 Design Philosophy

The WDF 5 has been designed in accordance with Norms and Standards for Disposal of Waste to Landfill (GN R 636, August 2013) as endorsed by the DEA. Assessment of the trial ash in terms of the National Norms and Standards (GN R 635, August 2013) indicated that a Class C facility could be motivated.

The Scaw production wastes currently disposed of on site at Cell 4B may also require disposal at the proposed WDF 5 once Cell 4B reaches its capacity. These wastes consist largely of foundry sands, fumex dusts, slag, etc. Some are classified as general waste, but certain of the wastes are considered to be hazardous. The proposed WDF 5 would therefore serve as a co-disposal facility, meaning that it will receive an admixture of hazardous and general wastes with differing chemical properties. This may present additional risk due to the potential chemical reactions that may result from the mixing of wastes.

Scaw have therefore elected to take a conservative approach and design the WDF 5 in accordance with the requirements for a Class A landfill as detailed in the Norms and Standard for Disposal of Waste to Landfill (GNR 636 of 2013). As such, the WDF 5 will be suitable to accept all hazardous waste types (with a hazard rating of 1 through 4/Type 1 to 4).

4.3.2 General Layout and Dimensions

The WDF 5 will be located within the Scaw Metals, Union Junction facility, between the DRI plant and Dekema road. The facility will be located across three properties (Erf 632, Erf 133 and Erf 634) within the Scaw Metals property. The WDF5 is designed to provide for approximately 2.95 million m^3 of airspace, allowing for the disposal of ash for the full lifetime of the Co-generation Plant, a period of 25 years. The proposed facility will follow the shape of the site boundary with a 10 m servitude between the cell boundary and the site boundary. The purpose of the servitude is to allow for storm water diversion infrastructure and an access road around the site.

The WDF 5 will cover a footprint of approximately 19 ha and be constructed to a final height of 27 m above natural ground level. The general layout and location of the facility is presented in Figure 4.

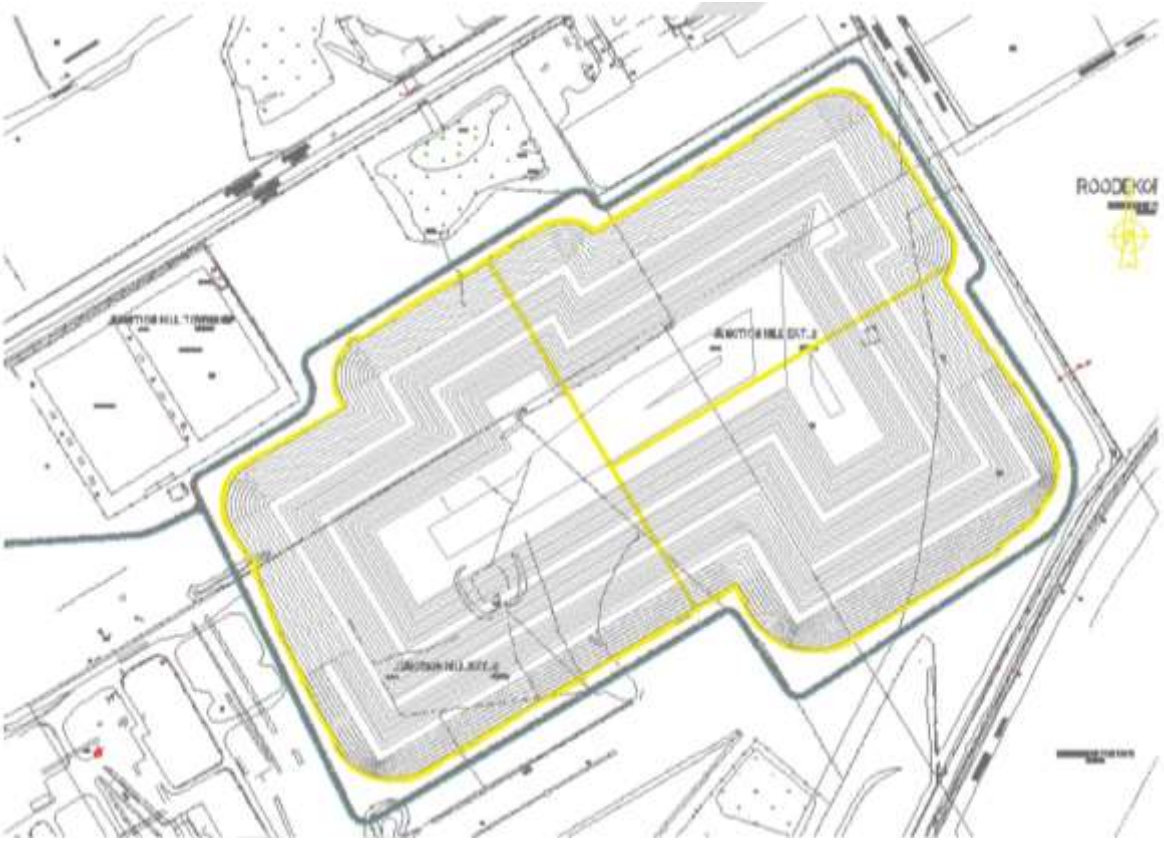


Figure 4: General layout of proposed Waste Disposal Facility 5

4.3.3 Cell Development

The development of the proposed 19 Ha WDF has been broken up into three distinct cells, to be known as Cell 5a, Cell 5b and Cell 5c. The proposed cell development sequence and layouts are given in **Error! eference source not found.**. The division of the proposed WDF5 into cells is done to reduce the area developed at any one time to a manageable size and to facilitate clean storm water diversion until the facility approaches design life capacity. Details of the development plan are shown in the design report and drawings (see Appendix H).

4.3.4 Side Slopes and Stability

Depending on the materials used and moisture content, the side walls will be benched and sloped to 1V:3.5H to 1V:4H for stability reasons. It is recommended that 5m wide terraces (with slight crossfall e.g. 1V:20H – Vertical height to equivalent horizontal distance ratio) be provided for every 8m of vertical height gained to improve slope stability and access. The final finished height of the landfill has been estimated at 27m above the highest NGL, based on 1V:3,5H slope. Conceptual profiles of the proposed WDF 5 are shown in the design report and drawings (see Appendix H).

An ash pile, assumed 25 metre high and at a final deposit-density of 950 kg/m3 would impose a load of 232 kPa or 0,23 MPa (assuming no differential settlement). The geotechnical report (Jeffares and Green, 2012) does not raise concerns with regards to in-situ soil bearing capacity.

A high level, preliminary slope stability check was undertaken based on the facility parameters. Various assumptions were made are based on a desktop literature review with regards to typical ash waste and in-situ soil characteristics. The lowest factor of safety calculated was 2.73 which is acceptable from a slope stability design point of view.

These assumptions should be confirmed / amended by testing representative samples of both the ash to be disposed and in-situ soil at the detailed design phase. A detailed slope stability analysis should be carried out after confirming the assumptions provided.

4.3.5 Basal Lining System

The basal lining has been designed to meet the requirements of a Class A System as prescribed in the National Norms and Standards (GN R 636, August 2013). As the presence of clay (suitable for the Compacted Clay Liner in the basal lining system) in the area immediately surrounding the proposed facility is known to be limited, the proposed basal liner system presented in the design substitutes the required CCL with a GCL of equivalent or better performance. See Figure 5.

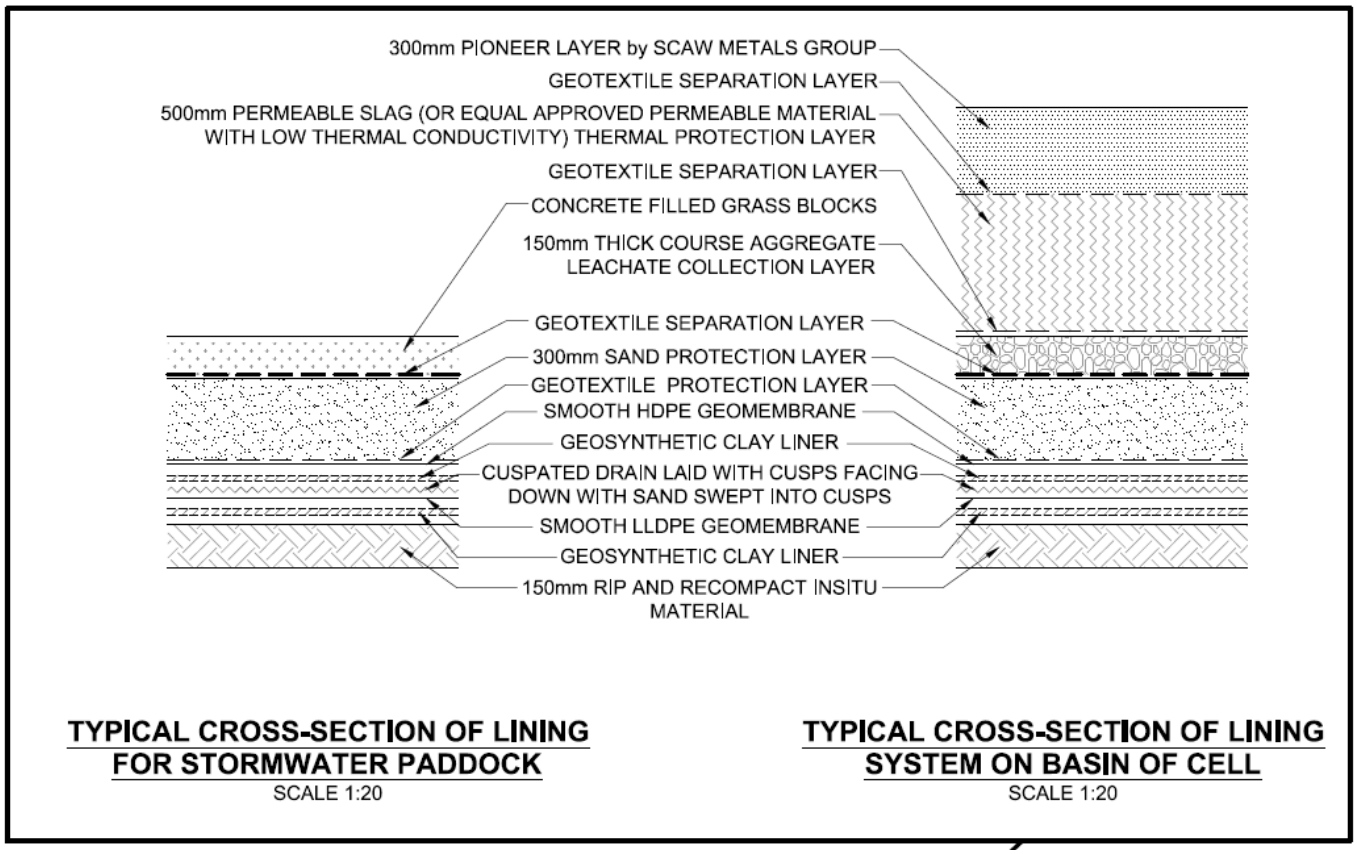


Figure 5: Class A Liner design for the WDF5

4.3.6 Leachate Systems

The leachate collection, treatment and disposal systems has been carefully considered as the waste material (dry ash) has a very fine particle size which may clog typical stone drainage layer (leachate collection layer) solidifying the drainage layer and preventing proper leachate collection and drainage.

The leachate collection system proposed consists of a 150mm thick stone aggregate layer (increasing to 300mm above the main collector drains) protected on both sides by a suitable geotextile and overlain by a 500mm thick permeable slag layer. A Herring-bone slotted pipe system will be installed within the stone aggregate layer to facilitate leachate collection. Leachate will drain to a sump for recovery and use or disposal to sewer.

The cell basin floor base preparation layer will be prepared to intrude as shallow as possible into the existing natural ground levels (to avoid the underlying ground water and / or hard excavatable material), using suitable natural fine-aggregate material excavated from the site, graded to a design low point at a fall of 1V:20H (5%); which will facilitate the drainage of leachate;

The landfill floor is proposed to be constructed in a series of troughs and berms (Refer to Figure 6) to ensure an adequate slope for drainage (5%). The longitudinal grade will approximate the existing natural site fall. The conceptual floor layout and proposed leachate collection system is shown in the design report and drawings (see Appendix H).

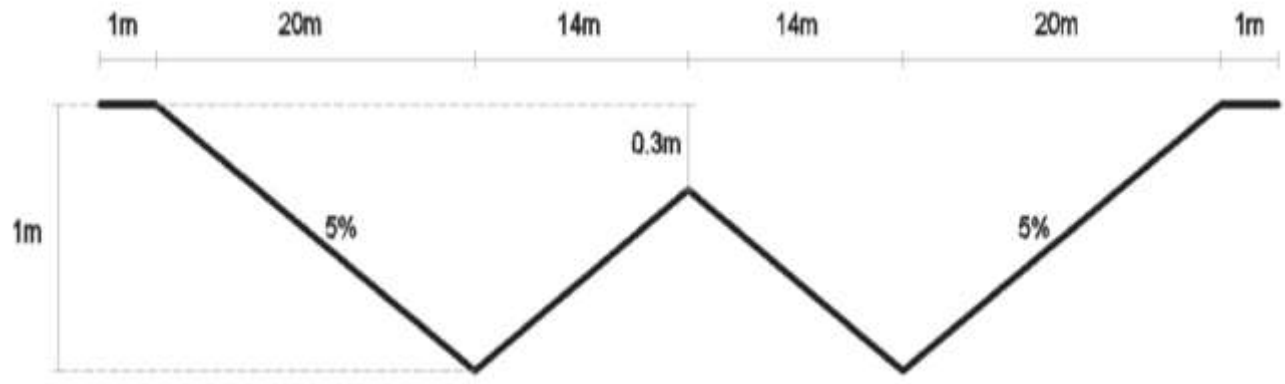


Figure 6: Cross Section through proposed Waste Disposal Facility 5 Floor

A possible alternative to a leachate collection pond is to incorporate the storage of leachate collected into a “toe paddock”/evaporation pond system alongside the proposed cells. This entails resizing the toe drain on the southern edge of the proposed WDF5 to provide adequate storage for leachate generated. The system has been designed to maximise evaporation and be designed such that routine maintenance could be carried out to clean the system of the waste material that settles out during evaporation and accumulates in the “toe paddock” system.

4.3.7 Storm water management systems

The design of the WDF 5 will incorporate clean storm water diversion and provision for the capture of contaminated storm water runoff. The design will incorporate lined storm water paddocks at the toe of the facility, as was used at Cell 4b. The function of the paddocks will be to intercept all storm water running off the sides of the WDF5. The outer side slopes will be progressively rehabilitated. The paddocks will be interlinked to allow full paddocks to spill into adjacent paddocks.

The system is designed to maximise evaporation and be such that routine maintenance could be carried out to clean the system of the waste material that settles out during evaporation and accumulates in the "toe paddock" system. The paddocks have been designed with a capacity to accommodate all dirty storm water runoff expected as a result of the estimated maximum 24 hr precipitation with a frequency of 1:50 years. The layout of the storm water management system is shown in the design report and drawings (see Appendix H).

4.3.8 Internal Temperature Control

The generation of heat within an ash landfill has been shown to reach temperatures in the order of 60 to 90 degrees Celsius, due to the hydration of pozzolans within the ash. Any significant increase in operating temperature poses a threat to the integrity of the lining system. The DWA expressed concern over the management of internal ambient temperature within the proposed WDF5.

A proposed solution is to make use of a material layer with a low thermal conductivity installed above the primary composite barrier (see the proposed design in **Figure 5**). This would improve thermal protection and reduce the ambient temperatures applied to subsequent elements of the barrier lining system. Slag typically has a lower thermal conductivity than conventional aggregates and has been favourably utilised as a thermal protection layer. Based on the findings presented by J&G, it is predicted that the thermal protection provided by a slag/foundry sand layer will be substantially improved compared with a conventional sand layer. An alternative thermal protection layer could be provided through the use of recycled vehicle tyres due to the low thermal conductivity of the recycled material.

A more high tech solution to thermal protection of basal linings are enhanced barrier system (EBS) which are installed below the primary composite liner and allow the passing of a medium (either air or water) through the lining system and then through a heat exchange system. Such a system is currently available on patent from Aquatan (Pty) Ltd for consideration by the design team

As an on-site waste material that is available for re-use, the sand or slag at Scaw Metals may be suited to the application. The specific thermal protection afforded by a combination of slag and foundry sand from the industrial processes at Scaw Metals Union Junction is to be investigated at the detailed engineering phase and the proposed design adjusted in accordance with the findings thereof.

4.3.9 Capping Details

Like the liner system, the capping or final cover system will require to be designed and constructed in accordance with the Norms and Standards. The capping system will be designed to maximise run-off of precipitation, while minimising infiltration and preventing ponding of water on the landfill. The proposed capping design, for both flat gradients and sloped embankments, comprises a series of elements as shown in Figure 7.

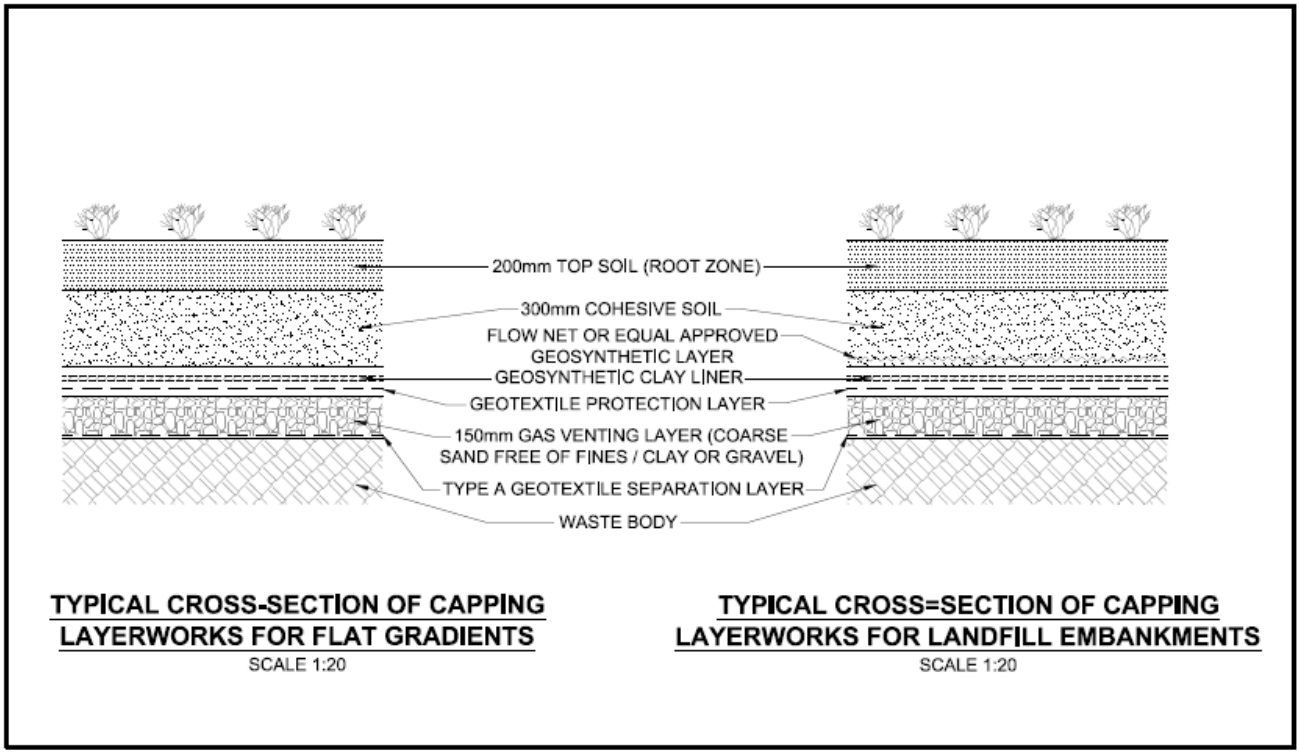


Figure 7: Preliminary Capping Layerworks for Class A Landfill

4.4 Operating Conditions

4.4.1 General

The proposed WDF5 will be operated and controlled by Scaw Metals (the waste manager). An Operational Control Plan is to be developed at the detailed design phase.

Access control, emergency control procedures and the provision of ablutions, personal protection equipment (PPE) and appropriate signage around the disposal cell and access road will form part of the Safety, Health and Environmental (SHE) requirements. A boundary fence around the proposed WDF5 is not a requirement since the proposed WDF5 site is situated on an access controlled site managed by the waste managers. No burning of waste will be allowed on site.

It is anticipated that haul trucks and similar plant/equipment as used on Cell 4b will be used to transport and dispose of the ash and other wastes. Landfilling operations are to be carried out in 0.5m lifts and are to be compacted to suitable density prior to placement of the next lift. If the ash material is too wet to meet the compaction requirement, the ash should be allowed to air dry.

Lifts are to be constructed such that any storm water runoff or water accumulating due to dust suppression is immediately diverted away from the landfill cells and directed to the toe drain/toe paddock system as required. Additional drainage between lifts is not envisaged provided that moisture content is monitored throughout the construction of the landfill and all surface water accumulating is diverted to the leachate collection infrastructure. The high rate of evaporation experienced at the proposed site will assist in maintaining optimum moisture content.

The fill methodology entails the consecutive filling of the three landfill cells (Refer to **Figure 4**). Cell 5A will be filled to a maximum slope of 1V:3,5H. Once this is achieved landfill operations will continue onto Cell 5B with the filling of waste material extending all the way until it is integrated into the finished slope of Cell 5A. The final finished height of the proposed facility has been estimated at 27 m above the highest natural ground level. Upon completion of Cell 5B, landfill operations on Cell 5C will commence with a similar construction methodology to be followed at the interface between all three cells. The final slope profile will be finished such that a 5 m wide terrace will be provided every 8 m of vertical height gained (Refer to **Figure 6**).

The requirements and methods for ash delivery to and disposal at the WDF5 are to be investigated at the detailed engineering phase (with inputs from the engineers of the Electrical Co-generation project) and the proposed design/operations adjusted in accordance with the findings thereof.

4.4.2 Dust Control

Dust suppression is a vital component of the operational controls that need to be established. Maintaining moisture content between 5 and 15% will be key to limiting dust as well as ensuring ash stability and reducing leachate generation. If the moisture content is managed correctly, it will assist with solidify the ash increasing density and stability of the ash pile. Dry ash density is approximately 814 kg/m^3 whilst the final deposited ash could be in the order of 950 kg/m^3. Dirty process water from the Electrical Co-generation plant may be used to quench ash before disposal. Additional water may be required to achieve the desired moisture content. Depending on the need and the qualities, storm water and leachate may be used to irrigate the waste pile for dust suppression, thus negating the need to use clean, potable water for dust suppression. Dust suppression methodologies during periods of rainfall and high wind conditions will form part of the operational controls of the site.

The requirements and methods for dust control are to be investigated at the detailed engineering phase and the proposed design/operations adjusted in accordance with the findings thereof.

4.4.3 Rising Green wall

Progressive capping/rehabilitation are to be carried out in order to protect the side slopes of the proposed WDF5. For each filling phase, a screening berm (‘rising green wall’) will be constructed behind which the waste disposal will take place. Such a berm will be constructed of dry waste material, most likely sand and slag. The outer slope of the berm will be covered with topsoil and grassed.

4.4.4 Leachate Management

The leachate collected in the collection layer of the basal lining system will be directed into the proposed leachate sump. The chemical composition of the leachate is to be analysed to determine its suitability for recirculation back onto the waste pile for dust suppression. Should the leachate be found to be unsuitable for recirculation, the leachate could be treated (on-site) to a suitable level for dust suppression irrigation or disposed to the sewer system, providing that system is capable of handling the chemical composition of the leachate generated.

A discharge permission would be required from the EMM for any disposal to sewer. Likely leachate composition is to be investigated at the detailed engineering phase and the proposed operations adjusted in accordance with the findings thereof.

4.4.5 Storm water Management

Storm water runoff generated upstream of the WDF5 site will be diverted away from the facility and returned to the environment.

Contaminated storm water arising on-site will be directed to the proposed storm water paddock system. If of suitable quality this water may be used for dust suppression on the ash pile. Managing the storm water accumulating in the storm water paddock will form part of the operational controls.

4.4.6 Treatment of hazardous waste

The waste classification conducted by Golder Associates (Pty) Ltd has determined that the majority of ash and dust waste streams have a HR2 or HR1 hazard rating and does not require any form of treatment during disposal.

Treatment of other Scaw production wastes will be dependent on the classification and assessment of those wastes.

4.4.7 Reduction, Re-use, Recovery and Recycling

Scaw Metals is placing a great deal of emphasis on the reduction of waste in order to prolong the life of waste disposal sites at the Scaw Metals facility. In an effort to maximise production and ensure minimum waste disposal Scaw Metals has, and intends to continue measures to reduce, re-use, recover and recycle wastes destined for disposal at the WDF5.

Wastes derived from the production at Scaw Metals may either contain products with economic value that are suitable for recovery, or the waste may be suitable for re-use in other manufacturing and construction processes. Appropriate approvals will be obtained for any re-use, recycling or recovery of wastes.

4.4.8 Buffer Zone

Historically, hazardous landfill sites have been operated with buffer and management zones to ensure a minimum distance between the source of potential contaminants and sensitive receptors such as residential, educational and social land uses. The extent of buffer zones for a landfill site are generally informed through a health risk assessment compiled as part of the air quality impact assessment. The physical separation is generally adequate to prevent a pathway between the source and receptor and thus limit exposure risks. Industrial uses are generally considered compatible and can be undertaken with the buffer zones around hazardous landfill sites.

For the WDF5 at Scaw Metal, Union Junction the only land use within a 1 km radius of the site are industrial. There is therefore little need for the implementation of a buffer zone. A management zone of 500m radius from the facility boundary should be implemented where dustfall monitoring be conducted to verify model results and ensure compliance.

4.4.9 Monitoring

Monitoring of operations and environmental parameters will be required to ensure that the WDF 5 is not having a detrimental effect on the environment or human health. The site falls within the existing monitoring networks at Scaw Metals, which includes groundwater, surface water and dust fallout (see Sections 5.1.4.4, 5.1.5.3 and 5.1.6.4 for a description of monitoring networks and schedules). These networks have been reviewed by responsible specialists and will be extended as required to accommodate the proposed WDF 5.

The ground water monitoring network at Scaw Metals was expanded with the addition of 6 boreholes during the specialist investigation. (Jeffares and Green, Geohydrological Report, 2012). These boreholes were intended to inform the specialist investigation and be available for long-term monitoring. An increase in the footprint of the WDF5 has resulted in these boreholes being within the footprint of the WDF5. It is thus required that paired monitoring boreholes be established at locations upstream and downstream of the WDF5. Each borehole pair should comprise a shallow and a deep borehole.

It is recommend that the dust fallout monitoring network be expanded to include an additional dust bucket to the east of the WDF5 site. If this monitoring records an increase in dustfall or an exceedance of dustfall levels then monitoring of PM10 should be initiated at the eastern site boundary for a period of at least 1 month.

A monitoring committee for the proposed WDF5 can be established by way of the existing public discussion forum hosted annually by Scaw Metals. A complaints register should be established.

4.5 Labour and Staff Requirements

The WDF 5 will be designed and constructed by various external contractors. The waste transport, disposal and management of the WDF 5 will be undertaken by a combination of Scaw employees and contractors.

4.6 Decommissioning and Closure

The WDF 5 will be operational for as long as the Electrical Co-generation Power Plant produces waste requiring disposal and the site has airspace available. The facility has been designed for a 25-year life of operation.

Final closure and end use plans will be prepared in terms of the standards endorsed by the DEA. A closure and rehabilitation plant will be developed as the WDF 5 nears the end-of-life. Information for this will be drawn from the monitoring data collected during cell operations and the rehabilitation of previous waste disposal cells. As a minimum the decommissioning and closure will include shaping of the surface, installation of a cap and final cover layers, provision for storm water flow and surface rehabilitation. In addition the management of leachate and storm water will occur for a number of years post-closure. Additional details will be provided in the EIA once the site design and assessment is complete.

It is envisaged that the final closed WDF will be a natural, open, green dome area. This will be confirmed in the closure application.

4.7 Development Alternatives

4.7.1 Alternatives

Off-site waste disposal alternatives were not considered economically feasible due to the costs of acquiring land close to the ash source, and the cost of transport to more distant facilities.

The disposal of the ash to land is being considered as a 'worst-case' scenario for the Electrical Co-generation Power Plant and is key to determining the overall economic feasibility of the project. Opportunities may exist to reuse or recycle portions of the waste, but these will only be investigated as value adding propositions later in the project cycle. The project must be feasible with all waste requiring disposal.

4.7.2 No-go Development Alternative

Failure to develop WDF 5 at the Scaw Metals Union Junction Facility will result in Scaw Metals having to identify an alternative for the disposal of their waste as there are currently no facilities on site that can accept the ash waste streams (having an HR1 and HR2 hazard rating) to be produced at the Electrical Co-generation Power Plant. Potential alternatives include the use of a commercial hazardous WDF or the development of a purpose built hazardous WDF at another location.

Disposing of the waste at a commercial landfill will significantly reduce the viability of Scaw Metals as additional costs will be incurred not only for the disposal, but for the transport of the waste. Similarly the development of a purpose built facility at an alternative locality would also result in significant disposal and transport cost increases. The increase in costs would result in a number of marginal production processes not being viable. Scaw Metals would need to cut base costs by measures such as retrenchment or close some or all of the production lines.

In terms of the current economic models and margins it is argued that the cost of using a WDF distant from the Scaw Metals Union Junction site would limit the financial viability of the production processes. Scaw Metals contend that such a change would require significant reductions in base costs, through retrenchments and other measures, or very likely the closure of the Scaw Metals facility.

Over and above the cost implications there would also be increased risk with large volumes of hazardous waste being transported by heavy vehicles on public roads. It is estimated that as many as 64 vehicle trips would be required per day to transport the Scaw waste to an alternative facility. The heavily laden vehicles will increase wear and tear on local roads, increase risk to road users and increase vehicle emissions. The disposal risks from the waste would be transferred to the commercial waste site, rather than being retained at Scaw Metals facility. All of these factors are less desirable than the current situation of waste disposal at the proposed WDF 5.

5 Description of the Affected Environment

The baseline environment described here represents the current environmental conditions of the Scaw Metals Union Junction area, and specifically the site of the proposed WDF 5. It is indicative of pollution and degradation due to Scaw Metals operations, human, agricultural and industrial activities in the area and naturally occurring phenomena. Baseline information was sourced from desktop studies, site inspections and from on-going monitoring completed at the site. The baseline information serves as a reference point to scientifically measure or professionally judge future changes to the environment that may occur with the development of the WDF 5 at Scaw Metals.

5.1 Physical Environment

5.1.1 Climate

The Scaw Metals site falls within the summer rainfall area of South Africa and is characterised by thunderstorms in summer, combined with winters that are typified by drought, severe night frost, and marked diurnal temperature variations. Climate conditions are typical of the Highveld region where rates of average annual evaporation exceed that of average annual precipitation.

Rainfall data were sourced from on-site measurements and the South African Weather Bureau Station, located at OR Tambo Airport, Johannesburg. The mean annual precipitation is in the region of 760 mm and the mean annual A-pan evaporation is approximately ~ 2200 mm. Rainfall occurs in high-intensity events that are largely confined to the summer months. Average monthly rainfall is less than 20mm between April and September.

Details of the local weather conditions, as relevant to the assessment of air quality impacts are described in the Air Quality Impact Assessment Report (Airshed, 2013).

The local wind field is characterised by dominant north westerly to north-north easterly winds. Moderate wind speeds prevail with 25% of hourly wind speeds between 3 and 4 m/s. Calm conditions occur 15% of the time. During the winter months there is an increase in the frequency of southerly winds. The period wind field and diurnal variability in the wind field are shown in Figure 8.

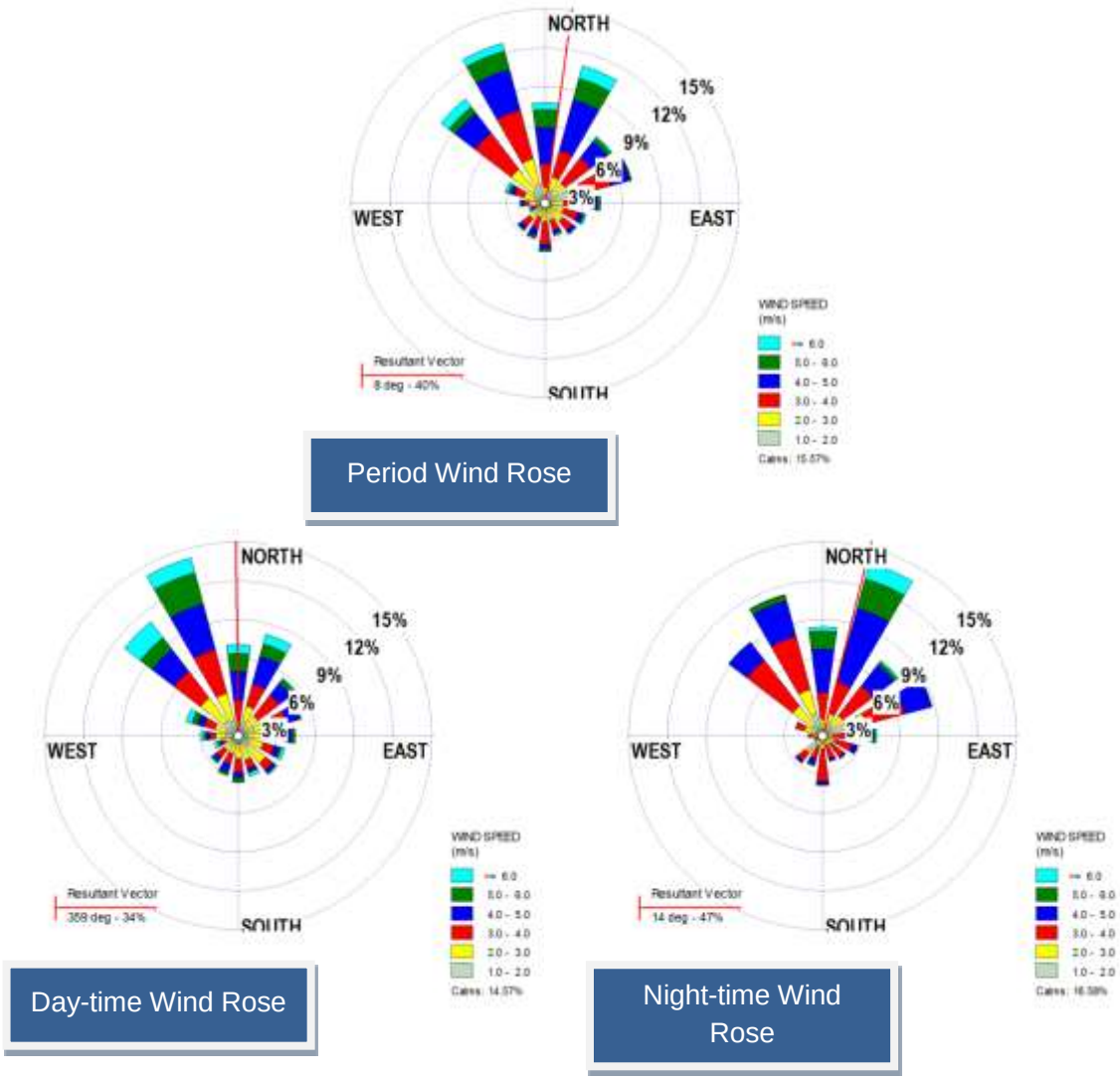


Figure 8: Average wind roses (MM5 data, 2008)

5.1.2 Topography

The region is typical of the Highveld and is characterised by a relatively flat, but undulating topography. The area is relatively low-lying and comprises low hills, natural pans and wetland areas. The site elevation is approximately 1620 mamsl and is generally flat, with a slight fall to the south and west. Drainage is toward the unnamed tributary of the Blesbokspruit River.

Topography on a portion of the site has been altered through the excavation of a borrow pit. A storm water channel exists the lowest point of the borrow pit and cuts across the WDF5 site in a more or less north-south orientation.

5.1.3 Geology and Soils

The following is taken from the site Geotechnical Report (Jeffares & Green, December 2012).

The regional geology in the vicinity of Scaw Metals comprises three geological units. The dominant geology underlying the proposed WDF 5 site is the Black Reef Formation of the Transvaal Supergroup, which consists of quartzite, chert, shale and lava rock. The overlying Malmani Subgroup of the Chuniespoort Group, is present to the south and is comprised of dolomite and chert. The dolomitic ground can pose a risk to surface infrastructure through sinkhole development. Extrusive rocks of the Klipriviersberg Group of Randian Age are present to the north and consist of basaltic lava, agglomerate and tuff. Intrusive rocks comprised of syenite veins are present and have been mapped within all rock units in the project area. Alluvium linked with the Elsburgspruit is present to the south east of the site. Drilling of 6 boreholes on the WDF5 site confirmed quartzite of the Black Reef Formation as the dominant geology underlying the WDF5 site. Clay, shale and chert were encountered in some of the boreholes (Jeffares & Green). There was no evidence of dolomites.

No regional mapped geological structures were noted immediately beneath or within the vicinity of the site. A geophysical survey of the WDF5 site noted slight variations and some anomalies were recorded at various locations. Boreholes were sited to investigate these.

The soil profiles observed in the trial pits excavated across the site indicate a typical soil profile consisting of a thin mantle of transported soils overlying pedogenic ferricrete and residual lava or weathered lava rock. The materials encountered on site were found to be of variable depth and consistency. The majority of the soils have moderate to high clay contents and were found to have low permeabilities (Jeffares & Green). The intact rock will be relatively impermeable and the joints observed in the trial pits were described as very narrow to closed.

With the exception of the transported gravel soils and the sandy colluvial soils, the majority of soils encountered would be suitable for use in the capping layer of a landfill. Materials suitable for use as layerworks for road construction were not encountered in sufficient quantities to be exploited as construction materials. Due to the shallow refusal depths encountered on-site, the quantity of in-situ material suitable for basal liner or capping is potentially limited.

5.1.4 Air Quality

5.1.4.1 Regional

Air quality in the Ekurhuleni region is known to be poor as the Ekurhuleni Metropolitan Municipal area is home to a large percentage of the industry in Gauteng. The Germiston area in particular has a high concentration of industries. The largest contributors to air quality pollution levels are industrial activities, household energy consumption, transportation systems and mining.

Problem pollutants include carbon monoxide (CO), nitrogen oxide (NO), nitrogen dioxide (NO_2) nitrogen oxides (NO_x), sulphur dioxide (SO_2) and benzene (C_6H_6), particulates (PM10) and the secondary pollutant, ozone (O_3). These criteria pollutants have the potential for human health and environmental effects, contribute to visibility degradation and can be associated with unpleasant odours. The Ekurhuleni Metropolitan Municipality (EMM) operates an ambient air quality station in Germiston, although data availability is low. This data indicates that PM10 concentrations in the area are elevated and exceed the National Ambient Air Quality Standards (NAAQS). Concentrations of NO_2 and SO_2 are well within the NAAQSs.

As a result of the concern over ambient air quality in the region the Highveld Priority Areas was declared in terms of Section 18(1) of the NEMAQA, in 2007. A draft Air Quality Management Plan (2011) has been developed for the Highveld which is aimed at co-ordinating air quality management in the area; addressing issues related to air quality in the area; and provides for the implementation of the plan by a committee representing relevant role-players. The EMM has also developed an Air Quality Management Plan for the Metropolitan area. The plan sets out an emissions reduction programme with short and medium-term measures to ensure the reduction of emissions of priority pollutants from certain sectors, including Industry, fuel burning appliances and electricity generation.

5.1.4.2 Sources at Scaw Metals

Scaw Metals undertakes a number of operations that result in gaseous and particulate emissions. Scaw South Africa currently holds a provisional Atmospheric Emissions Licence (14/1/1/1/7/4/04/SCAW/ALB) for listed activities at their Union Junction Facility in terms of the NEM:AQA. The ALE was issued on 26 March 2014 and is valid until 31 March 2016. The AEL replaced the previous Registration Certificate for scheduled processes in terms of the Atmospheric Pollution Prevention Act, 1965 (No 45 of 1965)

The DRI Main stack (Plant 1 and 2) and DRI stack (Plant 3) are registered as point sources in the AEL. DRI Plant 1 and 2 are equipped with Sonic Spray Towers and bag filters. DRI plant 3 has a bag filter. The AEL sets out permissible emissions rates for PM, SO_2 and NO_x from the two stacks. These are 100 mg/Nm^3 for PM, 1700 mg/Nm^3 for SO_2 and 2000 mg/Nm^3 for NO_x. The ALE requires annual sampling of emissions from the DRI Plant 1, 2 and 3.

5.1.4.3 Modelled Emissions

In 2011, Airshed Planning Professionals undertook an air quality impact assessment of the emissions and predicted air quality impacts associated with operations at Scaw Metals Union Junction. Predicted pollutant concentrations and dustfall rates were assessed in accordance with National Ambient Air Quality Standards (NAAQS) and dustfall limits. The main findings of the impact assessment were as follows:

- CO emissions from Scaw Metals operations result in ambient CO concentrations well below the NAAQS.
- NO_2 emissions from Scaw Metals operations result in ambient NO_2 concentrations below the hourly and annual NAAQS at the Scaw Metals Union Junction boundary as well as surrounding residential areas.
- PM10 emissions result in concentrations in exceedance with the NAAQS at the Scaw Union Junction boundary, Dinwiddie and Generaal Albertspark. Scaw Metals operations contribute 13% to the estimated cumulative annual average PM10 concentration and 34% to the estimated cumulative highest daily PM10 concentration at Dinwiddie.
- SO_2 emissions from Scaw Metals operations result in ambient concentrations below the long and short-term NAAQS.
- Predicted off-site dustfall rates as a result of particulate emissions from Scaw Metals are below the SANS residential dustfall limit.

5.1.4.4 Emissions and Air Quality Monitoring

Ambient air quality monitoring is not currently required or done at Scaw Metals Union Junction.

Scaw South Africa has commissioned various stack emissions monitoring surveys at the Scaw Metals facility. Levego has completed a series of surveys through 2012 and 2013. The stack emissions measurements were done on the plants operating at the time of each survey. For the DRI this has varied between Kiln 1, 2 and 3 although only Kiln 2 has been operating for most of 2013. Oxygen (O_2), carbon dioxide (CO_2), carbon monoxide (CO), oxide of nitrogen (NO_x) and SO_2 emissions were measured. The December 2013 survey measured average emissions for the DRI 2 stack; PM of 15.2 mg/Nm^3, SO_2 of 330.19 mg/Nm^3 and 69.33 mg/Nm^3 for NO_x. The DRI 2 stack was thus complying with the emissions limits. The previous survey in September 2013 recorded low PM concentrations, but SO_2 emissions were 900.96 mg/Nm^3. This was in excess of the 350 mg/Nm^3 limit in the previous registration certificate but is compliant with AEL. Prior surveys in early 2013 recorded PM of 76.26 mg/Nm^3 and SO_2 of 1145.23 mg/Nm^3. Measured levels for NO_x were below the detection limits. The operating parameters and conditions of the emissions control equipment has a significant influence on the emissions.

Dust fallout monitoring at Scaw Metals has been conducted on a monthly basis by external consultants since 1997. Single Dust Bucket Fallout Monitors are installed at a number of locations within Scaw and in the surrounding residential areas. Monitoring locations are indicated as either residential (R) or industrial (I) as per target levels set in terms of SANS 1929:2011 dustfall standards. At on-site industrial locations such as the DRI plant and Cast Grinding Media Plant dust fall out rates exceeding the residential threshold of 600 mg/m²/day are regularly measured. Dust fall levels at these sites have historically exceeded the industrial action threshold level of 1200 mg/m²/day in the drier and windier months. However, investigations into the Cast Grinding Media Plant dust fall out levels indicated that the bucket was incorrectly located. The bucket was subsequently moved. Monitoring results for 2013 has not recorded any exceedances of the industrial action threshold level. Measured dustfall at the Waste, DRI plant and Cast Grinding Media sites have generally recorded a reduction on dustfall levels over the monthly averages. The dust fall levels for 2013 at all of the other plant and residential sites monitored have been within the residential limits (Monthly Dust Deposition Monitoring Reports, SGS 2013). A register of dust complaints is also maintained.

5.1.5 Hydrology

5.1.5.1 Catchment

There are no watercourses or natural water resources on the project site. Scaw Metals is situated between the Elsburg Spruit and the Natal Spruit in the catchment of the Vaal River basin and lies within quaternary catchment C22B (Figure 9). The Elsburg Spruit flows south east to join the Natal Spruit which flows east and then southwards through an extensive wetland and reed bed. The river then flows into the Klipspruit which discharges into the Vaal River near Vereeniging.

5.1.5.2 Water Use and Management

Limited use of surface water takes place in the immediate surrounds of Scaw Metals. The main use is ecological in both the Elsburg Spruit and the Natal Spruit.

The majority of storm water across the Scaw Metals facility is directed into storm water channels. Scaw Metals has four storm water dams within the facility that are used to contain runoff from within the facility. Process water is sourced and recycled within these dams. The majority of inflows are into Dam 1 and Dam 2 and water is primarily drawn from these dams. The water flows sequentially through the dams and any overflow into the environment is from Dam 4. Dirty water from the DRI plant area flows to Dam 4.

Clean storm water from the non-production areas of the Scaw Metals facility is channelled and diverted from the property and returned to the environment. A storm water channels flows across a portion of the site proposed for the WDF5 and connects Dam 3 and Dam 4. There is a deep channel to the east of the WDF5 site that was excavated for security purposes, but also serves to drain clean storm water from the area.

The Scaw Metals General Waste Disposal Site has storm water management systems designed to keep clean and contaminated water separated by diverting clean water from the site and containing contaminated water. Dirty water captured on the active Waste Disposal cells is stored in toe paddocks. Clean runoff is released to the environment.

5.1.5.3 Monitoring and Surface Water Quality

Scaw Metals undertakes monitoring at the four storm water dams (designated Dam 1 to Dam 4). Monitoring is undertaken regularly and the samples analysed by Scaw or an external laboratory. Most recent analysis from December 2013 (Aquatico, 2013) indicate that most determinants are generally below the SANS 241:2011 standard guidelines and the DWA Domestic Use limits. The exceptions to this are Fluoride and faecal coliforms in all four dams. The municipal sewer pipe adjacent to the area is known to block and overflow on occasion and is the most likely source of the faecal coliforms.

Water quality in Dam 4, situated downstream of the other dams, fall within the General Limit Values as required by Permit 1415N and meet the resource water quality objectives for the Klip River. Toxicity testing of the water in Dam 4 indicated that the water quality is of limited to not acute toxicity and would have a limited impact on the aquatic ecosystem. Water quality in Dam 4 is thus generally of an acceptable quality for discharge to the Elsburg Spruit (Golder).

Surface water sampling is also undertaken at the pond downstream of the Scaw Disposal sites, most recently in December 2013. None of the measured variables exceeded the SANS 241:2011 standards (Aquatico, 2013).

5.1.6 Groundwater

5.1.6.1 Characterisation of the Aquifers

The proposed site is situated on mainly metamorphic and sedimentary rocks. Principle groundwater occurrence in these rocks is in secondary, fractured aquifers with median borehole yields in the range 0.1 to 0.5 litres per second (l/s) and generally less than 2.0 l/s. Groundwater quality of the Black Reef Formation, is generally moderate to good with Electrical Conductivity (EC) values averaging 34 mS/m to 63 mS/m. However, sulphate levels can be high in the Black Reef Formation.

The following aquifers underlie the area:

Shallow Aquifer: A shallow, perched aquifer of seasonal nature weathered aquifer. Likely to be related to the relatively impermeable sub-soils conditions and the gentle topography. The unsaturated zone is of variable thickness. Seepage was encountered in many test pits between 0.7 and 1.5 m below surface. Shallow groundwater was not encountered at all sites and therefore may be limited in extent across the WDF5.

Fractured Aquifer: A deeper, quartzite aquifer where fracture flows dominate. Groundwater piezometric levels are relatively shallow (generally <5 mbgl). However, the main aquifer is only encountered at depths of 25 mbgl or more across the site.

Dolomitic Karst Aquifer: The nearest known dolomites at Scaw were encountered in boreholes BH10-26S and BH10-26D, near the southern edge of Cell 4b at the Scaw Metals Waste Disposal Site. No cavities were intersected and only seepage water was encountered. The dolomite aquifer is therefore not expected to be well developed at the Scaw site. The dolomites occur to the south of the Scaw Metals property. The WDF5 site is not located over dolomites.

Test pumping of boreholes on the site indicates that a sustainable yield of between 0.06 and 0.20l/s can be achieved from the deeper groundwater system. Test pumping also indicated that a sustainable yield of 0.05l/s can be achieved from the shallow groundwater system (Jeffares & Green).

5.1.6.2 Groundwater Gradient and Levels

During the excavation of test pits groundwater seepage was observed in at depths between 0.7 and 1.5 m below surface. The groundwater level at the Scaw site generally mimics local topography and the flow is mainly towards the south–south east. Groundwater piezometric levels are relatively shallow (generally <5mbgl). However, the main aquifer is only encountered at depths of 25mbgl or more across the site.

The recharge rate is moderate, but variable depending on the presence or absence of subsoil material and their clay content.

5.1.6.3 Groundwater Use

Scaw Metals abstracts water from 3 boreholes on the property, located at the Meltshop 3, Hille Mill and Morgan Mill. There are no boreholes or use of groundwater at the DRI plant or site for the WDF5.

Reference has been made to the National Groundwater Archive (NGA) dataset of the DWA to confirm the existence of boreholes in the area (Jeffares & Green, 2012). All of the available borehole data was utilised to review the existing groundwater use in the project area.

A total of eleven (11) boreholes are known within 1.5 km of the project area. Scaw Metals reported a further 12 boreholes, not identified on the NGA dataset, associated with monitoring of the Scaw Metals General Waste Disposal Site. The locations of the boreholes as reported in the NGA and Scaw datasets are presented in Figure 10.

Figure 9: Catchments, Rivers and Wetlands at Scaw Metals
(Wetlands from NFEPA and SANBI)

5.1.6.4 Monitoring and Groundwater Quality

Two boreholes at Scaw Metals (Morgan Mill and Hille Mill) are upstream of the proposed WDF5 site, thus being representative of background groundwater quality. These boreholes are sampled every two months for alkalinity, ammonium, calcium, chloride, total chromium, chromium VI, electrical conductivity (EC), magnesium, pH, ortho-phosphate, potassium, sodium, sulphate and nitrate. Results of analysis between January and September 2012 were reviewed and show that all determinants are below SANS 241 (2011) standard guideline levels and indicate that the background groundwater quality in the area is very good.

Groundwater monitoring is also undertaken at 12 boreholes located at the waste disposal site (see Figure 10). These boreholes are sampled quarterly for a wide range of determinants including the major cations and anions, metals, pH, EC, total dissolved solids (TDS), alkalinity, chloride, sulphate, ammonium, ortho-phosphate, phenols, total organic carbon (TOC), dissolved organic carbon (DOC), chemical oxygen demand (COD), E. Coli and total coliforms. The most recent analyses have been taken and reported on by Aquatico Scientific (Pty) Ltd in December 2013. Results of analysis were reviewed and show that pH, chloride, Ammonium exceeded the Sans 241. In the October sampling these parameters as well as E. Coli, total coliforms, iron, manganese and phenols are above SANS 241 (2011) guideline levels at multiple boreholes through this period. In general most chemical indicator parameters measured are well within ideal and recommended SANS ranges. However, certain chemical indicator parameters such as chloride and ammonia in the shallow aquifer boreholes do indicate increasing concentration trends when considering monitoring data collected during the previous sampling runs (Aquatico October 2013).

Groundwater samples from newly drilled boreholes BH1S, BH2D and BH3 on the WDF 5 site (drilled between 31st October and 1st November 2012) were also tested to assess the water quality at the site with respect to water quality and any potential contamination. The samples from BH1S exceed the aesthetic limit for manganese. The groundwater samples were also tested for a suite of metals, phenols, TDS, ammonia and phosphate. Results of testing for these determinants indicate no exceedance of guideline values when compared to SANS 241 (2011) or the DWA Domestic Use limits. The results of analysis indicate that groundwater samples from all three boreholes exceeded the SANS 241 (2011) acute health limit for faecal coliforms. The municipal sewer pipe adjacent to the area is known to block and overflow on occasion and is the most likely source of the faecal coliforms.

5.1.6.5 Inferred Aquifer Characteristics and Resource Vulnerability

The general assessment of the water resources underlying the proposed WDF5 site by Jeffares & Green concluded that:

- Cover soils are variable and comprise clay, silt, sand and gravel although are predominantly silt and sand. This will provide good filtration and adsorption properties. Soils are of variable thickness, with between o and 1.35m ;
- Ferricrete was encountered in around half of the trial pits. Where present, this material will impede the vertical movement of surface waters and shallow groundwater.
- Groundwater piezometric levels are relatively shallow (generally <5mbgl). However, the main aquifer is only encountered at depths of 25mbgl or more across the site, and the permeability of the cover soils is low with good filtration and adsorption properties.
- The unsaturated zone is of variable thickness. The aquifer is therefore inferred to be at moderate risk overall.
- Recharge is moderate and will be variable over the site area and underlying aquifer dependent on the presence or absence of subsoil material and their clay content. Variations to the site geology may apply to neighbouring areas.

- Based on the industrial nature of the site and the presence of pollution sources in the area, it is anticipated that the groundwater in the project area is likely to have been subject to polluting activities. The laboratory test results indicate that the groundwater is generally of good quality in terms of drinking water limits with the exception of total and faecal coliforms.
- The storm water dams and the drainage channel in the central part of the site are of limited importance as a resource given their use. However, good engineering practice will be required to manage surface water flows and prevent the downstream resource becoming contaminated during waste operations. In addition, diversion of storm water originating upslope, around the site will be required.
- The Elsburg Spruit is an important resource although it is unlikely that it will be affected by waste operations given the proposed engineering and the distance between the site and this resource.

A risk assessment considered the aquifer vulnerability and the strategic value. The results are depicted below.

Risk Assessment Summary	
Aquifer Vulnerability	LOW to MED
Aquifer Strategic Value	MED to HIGH

Figure 10: Groundwater Monitoring Points at Scaw Metals Union Junction Facility

5.1.7 Noise

The Scaw Metals site is located in an industrial district. The SANS 10103 criteria for outdoor noise ratings are applicable.

Table 9: Equivalent Continuous Rating Levels for Outdoor Noise (SANS 10103)

Type of District	SANS 10103 Table 2: Equivalent Continuous Rating Levels for Outdoor Noise (dBA)		
	Day/Night	Day	Night
Rural districts	45	45	35
Suburban districts with little road traffic	50	50	40
Urban districts	55	55	45
Urban districts with one or more of the following: workshops, business premises and main roads.	60	60	50
Central business districts	65	65	55
Industrial districts	70	70	60

Noise here is typical of a large industrial facility. The main contributors to current ambient noise levels in the area include:

- Heavy vehicles delivering materials to Scaw Metals,
- Machinery and equipment handling scrap metal;
- Production activities at the various Scaw Metals facilities;
- Waste disposal operations including:
  - Refuse trucks approaching and leaving site,
  - Refuse trucks dumping their contents,
  - Operation of site equipment (i.e. bulldozer and water truck),
- Traffic on the N3 highway, and
- Trains.

The various residential suburbs in the area (see Section 5.4.2) represent noise sensitive receptors. The noise sensitive receptors are generally located at least 0.5 km from the Union Junction boundary. Noise impacts are generally correlated with distance and line of sight.

In 2011 a noise complaint was received from a residence in Albermarle suburb, situated 1.4 km to the northwest of Scaw Metals. Pro Acoustic was appointed to undertake a noise assessment to assess the issue. 24 hr noise level measurements were taken concurrently at the Scaw Metals boundary and at the residence in Albermarle. The recorded noise peaks at the Scaw boundary were largely associated with passing trains and trucks, not related to Scaw operations. The study concluded that the neither the disturbing noises nor the noise nuisance at the residence were emanating from Scaw Metals.

A further noise survey was conducted by dBAcoustics in March 2012 as part of compliance with the Meltshop 3 authorisation. The noise survey aimed to investigate if noise from normal operations at Workshop 3 (Arc Furnace activities) resulted in noise levels that exceed the ambient guidelines at the Scaw Metals property boundary or at the residential boundary. The study concludes that noise levels generated were at, or close to, the allowable limits. Weather conditions will play an important role in determining whether the noise was propagated or attenuated.

5.2 Biological Environment

5.2.1 Vegetation and Habitat Status

Vegetation across almost the entire footprint of the Scaw Metals property (east of the N3 Highway) has been transformed as part of operations. Given the relatively high frequency of disturbance the majority of the areas are vegetated by pioneer species. Weeds and alien and invasive species are present on the site. Scaw Metals has initiated an on-going alien plant clearance programme across the Union Junction site. All areas are of little ecological significance.

The footprint of the site for the WDF5 is largely disturbed and unvegetated (see Plate 1). Where vegetation does occur this comprises pioneer species with a high percentage of alien and invasive plants. The likelihood of encountering any species of conservation importance on the site itself is regarded as very low.

Plate 1: View toward the NW portion of the Waste Disposal Facility 5

Plate 2: View of the NE portion of WDF5 footprint.

Plate 3: View of SE portion the WDF5 Footprint

Plate 4: View of SW portion of the WDF5 Footprint

The adjacent grassland vegetation (mostly west of the N3 highway) is mapped as Carltonville Dolomite Grassland (Mucina and Rutherford, 2006). All of these natural areas provide potential habitat and refuge for a variety of species, although they have experienced significant disturbances from either physical transformation or pollutants. Low average species diversity and a large number of non-indigenous species are anticipated. There are various other important, irreplaceable and protected sites in the Germiston area (GDARD Conservation Plan, Version 3), the Scaw Metals site falls outside of these areas (Figure 11).

5.2.1.1 Aquatic Habitats

No natural aquatic habitats were observed on the site of the WDF5. Some of the deposited material and excavations across the site provide limited aquatic habitat. These areas are largely vegetated with Phragmites Reeds, typical of wet areas in the region (see Plate 5). The recently moved storm water channel remains largely unvegetated.

Plate 5: Wet areas across the WDF5 Site

Natural aquatic habitats nearest the site are the Elsburg Spruit and Natal Spruit and their associated wetlands, located to the south (~450 m) and west (~ 1.7km) of Scaw. These comprise large extents of Eastern Temperate Freshwater Wetlands (Mucina and Rutherford, 2006). The wetlands have been identified as an irreplaceable sites by GDARD (GDARD Conservation Plan, Version 3) and are mapped in the NFEPA. Water quality in these rivers shows slightly elevated electrical conductivity, sulphate and magnesium levels (DWA). Such contamination is most likely arising in storm water run-off from surrounding industries, unlawful discharges and sewage pipe leaks. The extensive reed beds in these systems are likely to be making a significant contribution in the moderation of water quality. As water quality in these resources remains reasonably good it is likely that the aquatic biodiversity of the system is reasonably healthy.

5.2.2 Fauna

The Scaw Metals facility is highly industrialised and provides little natural habitat for fauna. The few avifauna species observed around the Scaw Metals facility were those species that are highly tolerant of disturbed and urbanised areas. As a result of the disturbed, fragmented and secondary nature of habitats at and surrounding the Scaw Metals site the potential of the site to harbour red data species is regarded as zero.

The footprint of the site for the WDF5 is largely unvegetated or vegetated with pioneer and invasive plant species and provides little habitat for any fauna (see plates). During visits to the site no fauna of any type was observed. The site footprint is not host to any significant populations of avifauna and had no habitat suitable for foraging, roosting or nesting of significant numbers of any bird species. The site is similarly unsuited to the presence of bat populations with no suitable area for roosting. Foraging of insects may occur.

The grassland to the west (> 800m) and wetlands to the south (> 450 m) are likely to host a range of species, largely those tolerant of partially transformed habitats and moderate levels of disturbance.

Figure 11: Regional Vegetation and Ecological Sensitivity at Scaw Metals
(Mucina & Rutherford, GDARD CPlan V3.3)

5.3 Land Ownership and Zoning

The entire Union Junction site is zoned as industrial. The properties within the Scaw Metals facility are owned by Scaw South Africa (Pty) Ltd. The proposed site for the WDF 5 is surrounded on most sides by properties owned and utilised by Scaw Metals. Some of the industrial sites to the east of the WDF5 are owned or leased by private companies.

Beyond the Scaw Metals site the adjacent properties to the north, west and south are privately owned (Figure 1). The areas adjacent to the Union Junction industrial site are zoned as residential suburbs.

5.4 Land Use

5.4.1 Scaw Metals Facility

The large majority of land within the Scaw Metals property at Union Junction is utilised for industrial purposes relating to the recycling of scrap metal and the production of steel. The Scaw Metals property is zoned as industrial 2. Some of the land in between the various plants is only partly or temporarily utilised. The main area of unused land within the Scaw property is to the west of the N3 highway.

The Scaw Metals Waste Disposal Site now comprises 4 waste cells that have been used for waste disposal by Scaw Metals. Waste cells 1 and 3 have been closed, capped and vegetated. It is expected that the site, with the addition of Cell 4b, will be operational until at least ~ 2018. Scaw Metals has approval for the reworking of materials from these waste disposal sites. The end use of the site (future land use after closure) has not yet been defined.

5.4.2 Surrounding Land Use

The area surrounding the Scaw Metals property is characterised by industrial use, vacant land and residential suburbs (Figure 12). There are industrial areas to the south east, west and south west of the Scaw property. In relation to existing residential areas, the WDF5 site at Scaw Metals is:

- ~ 1 km south of Dinwiddie;
- ~ 1.2 km south east of Verwoerdpark; and
- ~ 1.2 km north east of Roodekop Extension 31.

The industrial sites to the east of the WDF5 are owned or leased by private companies such as Afrox and Extrupet.

5.4.3 Regional and Local Land Use Policies and Plans

5.4.3.1 Ekurhuleni Integrated Development Plan and Spatial Development Framework

Ekurhuleni has developed and updated their Integrated Development Plan (IDP) as a guide to all planning, budgeting, resource allocation and decision-making within its area of jurisdiction. The IDP 2013/14 does not specify or outline any planning objectives for the area in which Union Junction is located.

The Spatial Development Framework (SDF) is an operational strategy for the development and planning department of Ekurhuleni. The framework manages the use of the land, highlights priority investment and development areas, provides guidelines for development and serves as a guide for decision-makers or investors. Ekurhuleni is subdivided into three (3) management regions with Regional Spatial Development Frameworks compiled for each region (EMM, 2011). Union Junction is located in the Southern Service Delivery Region. The regional framework (EMM, 2011) demarcates the Wadeville Alrode Corridor in which Union Junction is located as an industrial area, and forms one of municipalities Blue IQ projects.

5.5 Land Use Potential

The Scaw Metals facility is located in the Alrode-Wadeville industrial area and within an existing industrial site. Land use is thus seen as industrial with limited land capability for purposes other than industry. The agricultural potential of the area is very low (GDACE Conservation Plan, Version 3.3).

5.6 Cultural and Heritage Resources

The great majority of the footprint of the proposed project site has been subject to years of industrial activity and related disturbance. Any archaeological artefacts or aspects of cultural or historical significance, which may have been on each of the sites, would have been destroyed. It is considered highly unlikely that there are any archaeological artefacts or aspects of cultural or historical significance.

Professional Grave Solutions, an accredited heritage specialist, assessed the site and concluded that “Based on the information from the desktop research and the results of the site visit, no heritage resources are present within the two study areas proposed for development of the proposed electrical co-generation plant and WDF 5 on the Scaw Metals property”. Indications are that the receiving environment is not a sensitive archaeological or historical landscape, and is in fact a severely degraded industrial landscape.
Therefore, no negative impacts on heritage resources are foreseen and no mitigation is required.

5.7 Traffic

Heavy trucks frequent the Scaw Metals facility for the delivery of scrap metals and the transport of products. The majority of heavy motor vehicles make use of Dekema Road to access Scaw Metals and the other industries.

Internally the bulk of the traffic is for the delivery of waste to the waste disposal site. On average, ~60 trucks deliver waste loads on a daily basis. These trucks use transport routes internal to the Scaw Metals property and do not impact on traffic on public roads.

Figure 12: Land Use at Scaw Metals
(Aerial Photo, October 2011)

5.8 Visual

The visual environment and aesthetic character of the Union Junction area is highly transformed and industrial in nature. The large industrial buildings, chimney stacks and waste disposal sites at the Scaw Metals facility dominate the viewshed and define the character of the site. The facilities are visible from the N3 highway, although the vegetated slopes of the waste disposal sites at Scaw Metals provide effective screening. There are some view points to the south and west, but less so from the north and east due to trees and other buildings. The areas character is long established with the industrial area having been present for some decades now.

5.9 Socio-Economics

The Scaw Metals facility at Union Junction is located within Germiston, Gauteng and falls within the boundaries of the Ekurhuleni Metropolitan Municipality (EMM). Ekurhuleni has a total surface area of ~ 2000 km^2 and accommodates ~2.7 million people. This constitutes ~ 5.6 % of the national population and 28 % of Gauteng's population. EMM is one of the most densely populated areas in South Africa, with ~ 1400 people per km^2. Ekurhuleni has a large and diverse economy, with manufacturing and industry being the primary economic sector, accounting for almost 20 % of the Gauteng Gross Domestic Product (GDP). It has the largest concentration of industry in the whole of South Africa, often being referred to as 'Africa's Workshop'. Scaw Metals is situated in the Alrode-Wadeville Industrial corridor. The Union Junction area is mostly occupied by the Scaw Metals facility, but there are a number of other industrial sites located along Dekema Road.

Scaw Metals is situated within ward 39 of EMM with a population of ~ 22 000 residents (Census 2001). The residential areas of Dinwiddie and Verwoerd Park are located north and north-west of the Union Junction site, while the greater Wadeville industrial area lies to the north-east. The majority of the residents (55%) are Afrikaans, followed by 35% English and 3% Zulu speaking. The ratio of males to females is fairly even, with males comprising just over 50% of the residents. The relatively new, low-income, suburb of Roodekop lies to south west.

Employment figures, obtained from the Demarcation Board, indicate that the majority of the population are employed (67%), 7% are unemployed and the remaining 26% are not economically active. Education levels within the ward are fairly high, with 45% having completed matric or higher and only 1.5% having had no formal education. Scaw Metals employs approximately 3300 people at the Union Junction Facility.

Communities living near to industrial sites and waste disposal facilities could experience nuisance as well as other more serious problems such as visual eyesores, dust, pests (e.g. flies), odours, and health problems due to the emissions. Complaints from local communities to Scaw Metals have generally related to dust generation. There has however been a significant decline in complaints over the last few years as the waste disposal cells have moved further from Dinwiddie. Improved management and operations practices at the waste disposal site have also reduced dust generation. In the past 2 years Scaw Metals has also received complaints regarding noise disturbances.

5.9.1 Occupational Health

Occupational Health and Safety is not considered in detail in the EIA as this is regulated by Occupational and Safety Act and not environmental legislation.

Scaw Metals has a Safety, Health and Environmental policy which has been translated into a Safety, Health and Environmental management system that is *OHSAS* 18001 certified. Scaw operates an occupational health clinic at Union Junction and also have a paramedic response team on call 24-hours-a-day.

5.9.2 Public Health

Public health risks may arise from operations at Scaw Metals. One of the main risks is from air quality. Air emissions that exceeded the National Ambient Air Quality Standards (NAAQS) at the property boundary could constitute a public health risk. The 2011 dispersion model by Airshed determined dustfall rates and the highest hourly, highest daily and annual average ground level concentrations for each of the pollutants considered in the study. The potential for exceedances of the NAAQS levels of each pollutant was assessed at the property boundary.

Predicted incremental CO concentrations, incremental SO_2 concentrations and incremental highest daily dustfall rates were low and did not present health risks beyond the property boundary. Hourly NO_2 concentrations exceed the NAAQS limit value of 200 µg/m³ more than the permissible 88 hours per year at the boundary but not at any of the residential areas. Incrementally, emissions from Scaw Metals result in PM10 concentrations in exceedance of the annual NAAQS of 40 µg/m³ at the boundary but not at any of the residential areas. Daily PM10 concentrations exceed the NAAQS limit value of 75 µg/m³ more than the permissible 4 days per year at the boundary as well as at Dinwiddie and Generaal Albertspark. Scaw Metals operations contribute 13% to the estimated cumulative annual average PM10 concentration and 34% to the estimated cumulative highest daily PM10 concentration at Dinwiddie. Airshed indicated that the PM10 impacts are the most significant and Scaw Metals should implement feasible air quality management measures for PM10 emissions.

6 Results of Public Consultation

6.1 Collation of Issues and Concerns

Issues and concerns relating to the introduction of the WDF 5 at Scaw Metals have been captured by means of:

- Minutes from the public meeting held at the Scaw Club;
- Written, email and telephonic responses received following public notification of the project ; and
- Written and email responses received following a review of the scoping report.

6.2 Summary of Issues raised by Interested and Affected Parties

Table 10 and Table 13 provide a summary of issues and concerns raised by IAPs for the project and the project response to the comments. It must be noted that the public meeting and scoping report was combined for two projects at Scaw: (1) the proposed, development of an Ash Disposal Facility at Scaw Metals as well as a related but separate project - (2) the proposed development of an Electrical Co-generation Power Plant. Thus, not all of the questions asked and concerns raised were relevant to the WDF project.

Table 10 below provides issues raised by IAPs at the public meeting held in July 2012. Table 11 provides details on correspondence relating to the submission of the draft scoping report to IAPs. The minutes of the public meetings and attendance registers are attached in Appendix B.

Table 10: IAP Issues and Concerns Raised at the Public Meeting on 13 July 2012.

No	Issues	Response to IAP Issues, as amended to take into account the findings of the EIA	Reference to Report Section where IAP Issues are Addressed
1.	Rupert Retief: stated that the project is in an unfortunate location surrounded by residential areas. He asked what would be done for emissions control, as well as what was to be controlled?	The Scaw Metals facility is operated in terms of an AEL under the NEMAQA which sets permissible emissions limits. This replaced the previous Registration Certificate. The Electrical Co-generation Power Plant has been designed to achieve the minimum emission standards set by NEMAQA for the particular activities. These standards are conservative and aim to minimise nuisance and health risks to the public. The WDF5 will be managed such that particulate levels at the property boundaries are at or below the required limits. The Air Quality Impact Assessment that was undertaken has indicated that particulate matter levels at most boundaries will not exceed standards. However, in the unmitigated scenario, particulate levels at the eastern boundary are likely to exceed standards. Management of the WDF5 is required to limit dust generation.	This applies largely to a separate project - the development of the Co-Generation Plant at Scaw Metals. However, potential impacts of the WDF5 on air quality was also assessed. See discussion on air quality impacts, Section 7.4.1
2.	Rupert Retief asked if anything would be discharged?	There will be emissions to the atmosphere, as explained above. Leachate produced from the WDF5 may be used for dust suppression or disposed to the municipal sewer	See Project Description (Section 4).
3.	Rupert Retief asked what types of hazardous waste are anticipated?	Some parts of the fuel used in phase 2 will remain as waste ash. The emissions control equipment will also generate dust and other wastes that could be hazardous. All wastes will be classified in terms of the currently accepted methods. The WDF5 has been designed to accept hazardous wastes.	Wastes were classified as HR 2 and HR1 hazardous waste, thus requiring an H:H landfill. See Sections 4.2.1
4.	Michael Kriek asked if there will be follow-up presentations?	Matthew Hemming replied yes. The final documents with the results of the specialist studies will be made available to IAPs. A presentation of the EIA findings could be held if deemed necessary	See Section 3.5 for details on further public participation.
5.	Michael Kriek stated that the project needs to be made more visible to people, such as by placing billboards at shops.	Mr Hemming indicated that the public notification process to date had been done in terms of the legislated requirements. Further notification will continue as the project proceeds.	See Section 3.5 for details of the public participation completed to date.

The draft and final scoping reports were made available for public review. Comments received from IAPs on the draft scoping report are summarised in Table 11 below.

Table 11: Comments Received from IAPs on the Draft Scoping Report

No	Issues	Response to IAP Issues, as amended to take into account the findings of the EIA	Reference to Report Section where IAP Issues are Addressed
	Mr Hanré Crous of EScience Associates (Pty) Ltd raised the following questions		
1.	Firstly, most of the comments below relate to air quality and the proposed new disposal site, which could be a significant source of dust deposition in the area. However, the draft Scoping Report makes no mention of possible alternatives to the disposal of ash. Worldwide, and in South Africa, ash re-use and recycling activities and technologies are continuously growing and becoming more acceptable. I believe that the EIR should consider the feasibility of alternative options to landfill.	Scaw is very aware of and is constantly considering and implementing alternatives for the re-use and recycling of their waste streams. The potential for the re-use and recycling of the ash from the Electrical Co-generation Power Plant will also be investigated in due course. However, for the purpose of assessing the feasibility of the Electrical Co-generation Power Plant (economic and environmental) the decision was taken to only consider the 'worst case scenario' where all the ash required disposal. i.e. what will the environmental impacts be if there are no alternatives to disposal?	See Section 7 and in particular Section 7.4.1. Also see specialist air quality impact assessment (Appendix F)
2.	Although the draft SR refers mostly to 'ash' from the co-generation plant, it is clear that the site would also be used for disposal of bag filter dust. Physically and chemically, there could be a notable difference between these two streams, and the EIR should be clear in distinguishing between the physical (e.g. course vs fine) and chemical characteristics (e.g. metals content) of the two waste streams, volumes to be disposed of together, possible interactions between the streams (also see next comment) etc.	The air quality impact assessment considered the bottom and fly ash component of the ash stream from the Electrical Co-generation Power Plant. Although these streams will be different in physical composition there is not anticipated to be a significant difference in the chemistry. The impact of the disposal of these streams is discussed in this EIA report.	See waste classification Section 4.2.1 and impact discussion Section 7.4.1.
3.	Incidentally, due to this reference to other waste streams (i.e. not from the proposed co-generation plant) and references to limited capacity at the current Cell 4b, it seems that Scaw may in any event be required to expand their disposal capacity. One should be careful not to motivate a new disposal site based on the benefits of co-generation, where this site may then not be linked with the co-generation process at all (e.g. if Phase 2 does not go ahead), instead just fulfilling a near feature need for disposal of current/existing waste streams at Scaw.	The WDF under consideration is being proposed as a direct requirement of the Electrical Co-generation Power Plant. It is likely that the ash from the Electrical Co-generation Power Plant will be hazardous waste and can therefore not be disposed to current general waste disposal sites at Scaw. The feasibility of the Electrical Co-generation Power Plant can only be determined with the inclusion of an ash disposal site with disposal capacity for the life of operation. The need for the WDF is thus entirely motivated by ash from the Electrical Co-generation Plant. Combustion of wastes from Scaw Metals at the Electrical Co-generation Power Plant will reduce the volume of material disposed and extend the life of the current waste disposal facilities at Scaw. Nevertheless these facilities have a finite capacity and at some point in the future Scaw will require another disposal site for the production wastes. The WDF will have the added benefit to Scaw of providing a disposal solution for other production wastes generated by Scaw. It has therefore been assessed as such. The liner design of the facility is conservative and the facility will be able to accept all of the production wastes from Scaw operations.	See project desirability Section 1.2 and discussion on alternatives Section 4.7

4.	I did not notice any reference to consideration of PM2.5 emissions or ambient concentration in the report. Note that the DEA recently (29 June 2012) promulgated a national ambient air quality standard for particulate matter of aerodynamic diameter less than 2.5 micron. The air quality impact assessment should consider this standard, particularly due to the nature of emissions expected and the material to be disposed.	Compliance with the PM2.5 standard has been assessed in the air quality impact assessment. Operational measures or dust suppression required to manage potential dust emissions are reflected in the EMP for the WDF	See Section 7.4.1 and the specialist air quality impact assessment (Appendix F).
5.	The EIR, and EMP specifically, would have to detail measures to suppress and manage all forms of dust, particularly the handling and disposal of ash and bag filter dust. This should include some form of continuous dust suppression at the dump, and/or consideration of pre-treatment options.	The air quality impact assessment assessed potential dust emissions from the Electrical co-generation power plant, the handling of materials and the handling and disposal of all wastes. The study considered the need for and methods of dust suppression. Operational measures or dust suppression required to manage potential dust emissions are reflected in the EMP for the Waste Disposal Facility.	See Section 7.4.1.
6.	Lastly, note that the EIR should also address more than the establishment of the disposal site, and include operational aspects (e.g. phased development, phased rehabilitation) and ultimate closure/rehabilitation of the site.	The EIR has considered the various phases of the Waste Disposal Facility. The management requirements of each of these phases are presented in the EMP.	See methodology Section 3.8.4, impact assessment Section 7 and the EMPR Section 11.

Table 12: Comments from Registered IAPs on the DEIR

No	Authority Issues	Reference to Report Section where Issues are Addressed
1.	EScience Associates, on behalf of Extrupet, did not have any additional comments, but maintained their concern regarding particulates and dust from the Co-gen plant and waste disposal site. EMM- Environmental Resources Management	The EIR report

6.3 Authority Issues and Concerns

A summary of issues and concerns raised by authorities following the submission of the application is provided in Table 13. This includes a list of requirements from the DEA following the regarding what must be addressed in the assessment process. In the acceptance of the final scoping report, the DEA further requested that a number of amendments and additional information be included in the EIR. These are provided Table 14. Comments provided by other authorities are given in Table 14.

Table 13: Authority Issues and Concerns raised following the Submission of the Application

No	Authority Issues	Reference to Report Section where Issues are Addressed
1.	All applicable Departmental Guidelines must be considered throughout the application process. These include, but are not limited to, the following topics: Scoping, Environmental Impact Reporting, Stakeholder engagement, Specialist Studies, Impact Significance, Cumulative Effects Assessments, Alternatives in EIA and EMPs.	See Section 3 for a full description of the study approach and methodology used in this EIA process.

No	Authority Issues	Reference to Report Section where Issues are Addressed
2.	Please be advised that in terms of the EIA Regulations and NEMA, the investigation of alternatives must be identified and investigated to determine if they are feasible and reasonable. It is also mandatory to investigate and assess the option of not proceeding with the proposed activity (the "no-go" option).	Alternative technologies are assessed throughout Section 4. See Section 7.4.13.
3.	Should water, solid waste removal, effluent discharge, storm water management and electricity services be provided by the municipality, you are requested to provide this office with written proof that the municipality has sufficient capacity to provide the necessary services to the proposed development. Confirmation of the availability of services from the service providers must be provided together with the reports to be submitted.	Where possible, these approvals are in place or in progress. Certain of the needs and requirements can only be determined once detailed design is underway. Any services/approvals resulting from this work can only be applied for at that point. (i.e. municipal effluent discharge permit)
4.	In the reports to be submitted, it must clearly be demonstrated in which way the proposed development will meet the requirements of sustainable development. You must also consider energy efficient technologies and water saving devices and technologies for the proposed development. This could include measures such as the recycling of waste, the use of low voltage or compact fluorescent lights instead of incandescent globes, maximising the use of solar heating, etc.	See Section 4.
5.	A detailed and complete EMP must be submitted with the EIR. This EMP must not provide recommendations but must indicate actual remediation activities which will be binding on the applicant. Without this EMP the documents will be regarded as not meeting the requirements and will be returned to the applicant for correction.	See Section 11.
6.	The applicant/EAP is required to inform this Department in writing upon submission of any draft report, of the contact details of the relevant State Departments to whom copies of the draft report were submitted for comment.	See Section 3.6.1.
7.	Should it be necessary to apply for a permit in terms of the National Heritage Resources Act, 1999 (Act 25 of 1999), please submit the necessary application to SAHRA or the relevant provincial heritage agency and submit proof thereof with the EIR. The relevant heritage agency should also be involved during the public participation process and have the opportunity to comment on all the reports to be submitted to this Department.	SAHRA has been notified of the project and an assessment was undertaken of the site. SAHRA confirmed that no further heritage studies are required.
8.	Other Authorities including the DWA and DEA: Waste indicated that they would provide comments on receipt of the Scoping Report.	See Table 14 below
9.	Should a positive environmental authorization be obtained the best available technology with reference to abatement measures must be put in place to prevent the escape of excessive gaseous emissions into the atmosphere. Maintenance schedules on all wearing parts and equipment should be documented for easy access by environmental agencies.	Noted Documentation of maintenance schedules on all wearing parts has been included as a management measure in the EMPR. See EMPR Table Section 11.

Table 14: Requests from the DEA following a review of the Final Scoping Report

No	Authority Issues	Reference to Report Section where Issues are Addressed
1.	Details of the future plans for the site and infrastructure after decommissioning in 20-30 years and the possibility of upgrading the proposed infrastructure to more advanced technologies.	It is envisaged that the final closed WDF will be a natural, open, green dome area. This will be confirmed in the closure application. See Section 4.6.
2.	The total footprint of the proposed development should be indicated. Exact locations of the co-generation Power Plant, and associated infrastructure should be mapped at an appropriate scale.	See Section 4.

3.	Should a WUL be required, proof of application for a licence needs to be submitted.	The DWA have been asked to comment and make recommendations such that their requirements can be included in the WML. Should the purpose of the NWA be met through the WML then the DWA can dispense with the comments requirement for a WUL.
4.	The impacts of the proposed facility on avifauna and bats must be assessed in the EIA phase.	See Sections 5.2.2
5.	Possible impacts and effects of the development on the surrounding industrial area.	See Sections 5.4.2, 7.3.1, and 7.4.12.2
6.	The EIR should include information on the following: • Environmental costs vs. benefits of the co-generation Power Plant activity; and • Economic viability of the facility to the surrounding area and how the local community will benefit.	See Section 7.
7.	Information on services required on the site, e.g. sewage, refuse removal, water and electricity. Who will supply these services and has an agreement and confirmation of capacity been obtained?	Additional water, if required for dust suppression, will be obtained from the local municipality. Effluent discharge (if any) such as leachate will be to the existing sewer. The current permit will be updated. No significant change in waste removal is expected. An existing agreement to obtain services from the local municipality is in place.
8.	A construction and operational phase EMP to include mitigation and monitoring measures.	See Section 11
9.	Should blasting be required, appropriate mitigation measures should be provided.	No blasting will be required – see Section 4.

Table 15: Comment from Authorities on the Draft EIR

No	Authority Issues	Reference to Report Section where Issues are Addressed
1.	A meeting was held with the Gauteng Region of the DWA to discuss the draft EIR and the need for a WUL for the WDF 5. (15 May 2014 with Barbara Kalembo and Phyllis Maphakela) The Gauteng Region of the DWA indicated that a WUL was not required for Section 21(g) uses where the use is the 'disposal of solid waste to land'. Such a water use is regulated through the WML process and the Resource Protection and Waste Source Co-ordination office of the National DWA will provide comments and design approval.	

7 Environmental Impact Assessment

Potential environmental (biophysical and socio-economic) impacts associated with the development of the WDF 5 are evaluated in the following sections. Impacts are assessed in the planning, construction, operation and decommissioning phases. A summary of the methodology used to assess the significance of environmental impacts is provided below. The methodology is fully described in Section 2.8.

The impacts on each environmental aspect are described and discussed first. The impact rating table follows at the end of the section.

7.1 Summary of Impact assessment Criteria

The significance of each impact was calculated as follows:

Impact significance = (extent + severity + duration + frequency) x probability

Although the criteria used for the assessment of impacts attempts to quantify the significance, it is important to note that the assessment is generally a qualitative process and therefore the application of these criteria is open to interpretation. The assessment process involved the application of scientific measurements and professional judgment to determine the significance of environmental impacts associated with the project. The assessment thus largely relied on experience of the EAP and the information provided by the specialists who undertook studies for the EIA.

For each impact, the current situation is considered, then the impact is assessed with the addition of the WDF 5 and finally the total cumulative impacts assessed.

7.2 Planning Phase

Good planning and the adequate consideration of key aspects of a project can ensure that many potential environmental impacts of a development are prevented or reduced in significance. Planning for the Waste Disposal Facility 5 has been undertaken through the design documents prepared for Scaw Metals by Jeffares & Green Engineering and Environmental Consulting.

The main purpose of the planning was to develop a technically feasible facility, which can provide for the environmentally responsible disposal of ash produced by the Electrical Co-generation Power Plant. Consideration was also given to ensure that the project would be legally compliant and could be operated in a sustainable manner.

7.2.1 Enviro-legal Compliance

One of the key aspects of the investigations was to ensure that the project, if implemented, would comply with all relevant legislation. The feasibility study was required to investigate all legislation with relevance to and jurisdiction over the Waste Disposal Facility 5.

The study aimed to identify all of the permitting and authorisation requirements so that these could be applied and allow the project to be lawfully developed. Failure to obtain any authorisation required in terms of legislation could result in delays to the project implementation.

The study also aimed to identify the legislation, standards and guidelines that could influence the operational parameters of the project. Failure to do so could result in a facility that does not meet the compliance standards and is not able to operate lawfully.

Key legislation influencing the WDF5 are the NEMWA, 2008; the NWA, 1998 and the NEMAQA, 2004.

7.2.2 Groundwater Quality

As a project for the disposal of large quantities of potentially hazardous wastes it is essential that due consideration be given to the groundwater resource during planning. Uncontained waste or leakages of leachate from the WDF5 are the main concern with respect to groundwater contamination. Laboratory testing indicates that the ash may contain high levels of metals and sulphate along with an elevated pH. Although soil permeabilities are low, the unsaturated zone is variable and a near surface aquifer on the site is relatively vulnerable to contamination. There is the potential for migration within the shallow subsoil sediments, to depth in the fractured aquifer and with groundwater flow paths to other areas. The risk is significant. It is therefore necessary to implement measures to separate the waste from the groundwater. Measures to prevent leachate emissions and prevent a contaminant pathway between source and receptor are vital.

The containment of waste is achieved through an appropriate basal lining system. A composite basal and sidewall lining system are key to prevent leakage and minimise the risk to the groundwater system. Given the types of waste proposed to be disposed to the WDF5 (including some Type 1 wastes), and the possible mixing or chemical interactions between the different waste types, there is a likelihood of leachate being generated that contains contaminants of concern. Such leachate would pose a significant risk to groundwater resources. It is therefore necessary to ensure that landfill design, and specifically the basal liner system, is adequate to contain the waste and any resultant leachate. Jeffares & Green therefore proposed and designed a basal lining system which meets the requirements of a “Class A” system as specified in the WCMR. Due to the limited presence of clay in the area, the required CCL in the design was substituted with a GCL of equivalent or better performance. Such a composite liner should include leak detection and sub-soil seepage layers. Leachate collection and abstraction should also be incorporated into the design.

Due to the shallow aquifer and the variable thickness of the unsaturated zone across the site, construction of the base of the waste cell at depths of more than 2 to 5 m below natural ground surface is likely to place the base of the waste material in direct contact with groundwater (seasonal or permanent). While the waste will be contained by a competent basal liner, direct contact between this liner and groundwater will significantly increase the risk of leachate entering the groundwater. Such impacts may not occur initially, but the risk will increase over time as the length of exposure increases and could continue to increase long after closure.

Given the limited soils and shallow depth to groundwater it is advocated that the design should make allowance for no or very limited excavations. Best practice is to ensure that the base of the basal liner is at least 1 m above the bottom of the unsaturated zone across the site. Thus the basal liner should be constructed on or very close to the natural ground level. This will ensure a reasonable degree of separation between ground water and the base of the waste body. The basal liner should also incorporate sub-soil seepage layers to remove groundwater that comes into contact with the basal liner.

Measures to limit exposure of the waste to the elements can also play a role in reducing the risks of

groundwater contamination. It is therefore advocated that the WDF5 be subdivided into smaller cells, and that these cells be developed consecutively. Waste should only be disposed to the operational cell. The outer walls of the cell will be covered and vegetated to reduce exposure and limit infiltration. The following cell is only developed as the current cell nears the maximum fill capacity. This has the added benefit of reduce upfront capital costs.

The generation of heat within an ash pile due to the hydration of pozzolans within the ash is a concern. The exothermic reaction can raise the temperature within the ash pile to temperatures in the order of 60 to 90 degrees Celsius. Such increases in operating temperature pose a threat to the integrity of the lining system and have been shown to result in the significant degeneration of various components of the liner system, well within the design life of these components. The failure of the basal liner system would significantly increase the risk of leachate entering the groundwater. The conceptual design proposed by Jeffares & Green includes measures to address this risk and ensure the longevity of the composite barrier. The possible solution proposed is the use of a material layer with a low thermal conductivity installed above the primary composite barrier. This would improve thermal protection and reduce the ambient temperatures applied to subsequent elements of the barrier lining system. The preferred method would be to use a 0.5 m thick layer of slag and foundry sand from the industrial processes at Scaw Metals. The specific thermal protection afforded by such slag and foundry sand is to be investigated at the detailed engineering phase and the proposed design adjusted in accordance with the findings thereof.

The planning for an appropriate basal lining system with provision for leachate containment and collection will enable the WDF5 to be developed and operated with relatively low risks to groundwater. Additional consideration to install the basal liner system above the unsaturated zone provides further separation of waste from the groundwater. Mitigation of potential increased heat on the liner will ensure that the liner functions to specifications for at least its design life. With these measures in place it is considered likely that the WDF5 at Scaw Metals can be implemented, operated and closed with relatively low risk to groundwater quality.

7.2.3 Air Quality

As a project that requires the handling and disposal of ash comprised of fine particulate matter, it is essential that due consideration be given to potential particulate emissions during planning. Particulate emissions are likely to include both fine health-risk particulates (PM10 and PM2.5) and coarser nuisance dustfall. Particulate emissions are likely to be generated as a result of vehicle travel, material handling and wind erosion across unconsolidated areas. High levels of particulate emissions from the WDF5 would contribute to already elevated dustfall and PM10 levels in the Scaw area. The dispersion of emissions could create nuisance and health concerns at adjacent residential and possibly even dust sensitive industrial receptors. The risk is significant. It is therefore necessary to implement measures to limit the generation of particulate emissions.

Operational planning must include measures to limit particulate sources and ensure minimal particulate emission related risks. The key element to reducing particulate emissions from the ash are to ensure a moisture content of between 5 and 10%. Modelling has shown that the risk of particulate emissions will increase exponentially if ash moisture content drops below 5%. It is therefore vital that operational planning incorporates measures to ensure that the ash is sufficiently wetted. The wetting of ash should take place as early as possible in the handling chain to limit opportunities for dusty conditions. Further wetting of the ash pile may be necessary at points where the ash is exposed and or agitated.

Vehicles must travel the shortest reasonable distance and avoid travel across unconsolidated areas of fine particulate matter. The size of areas vulnerable to wind erosion must be limited by disposing to the smallest area possible, stabilising or covering areas where disposal has been completed and by limiting or disrupting wind speeds and flow paths. It is advocated that the WDF5 be subdivided into smaller cells, and that these cells be developed consecutively. Waste should only be disposed to the operational cell. The outer walls of the cell will be covered and vegetated to reduce exposure.

The achievement of the NAAQS and dust control standards for at least the industrial band at the site boundary will ensure legal compliance and minimise the risk for nuisance and health impacts.

7.2.4 Sustainable Development

Landfill sites are generally considered unsustainable as they involve the consumptive use of land for a finite period with relatively little opportunity for productive future use. The main benefit of the WDF5 will be that Scaw Metals retains and remains responsible for the waste generated from their production processes. This 'Cradle to Grave' to grave responsibility is advocated, particularly for hazardous wastes.

The disposal of ash to the WDF5 has been proposed as a 'worst-case' scenario, necessary to determine the economic and environmental feasibility of the Electrical Co-generation Power Plant. It is likely that large portions of the ash will be disposed. However Scaw Metals must continue to investigate and pursue alternative uses for the ash. Any future re-use, recycling or recovery of the ash, or other Scaw production wastes, will improve the overall sustainability of the project.

The design and layout of the WDF5 and the measures proposed to close and rehabilitate the site must give due consideration to the future use of the site. It is likely that any future use will be industrial in nature and measures to facilitate this must be considered in the design. The overall landscape functionality of the site must be considered.

7.3 Construction Phase Impacts

7.3.1 Land Ownership, Zoning and Use

The use of vacant and underutilised, industrial land within the Scaw Metals property is preferable to the conversion of land zoned for other purposes. Development of the WDF5 within the Scaw Metals facility is compatible with this zoning. Use of the proposed site for this industrial development is appropriate and compatible with surrounding uses. There will be no direct impact on land ownership or zoning and no change to the cumulative impact.

The land use potential of the site will be altered permanently. While the proposed use is productive for the operational life, future use may be restricted due to the final topography and stability as well as the potentially hazardous nature of the underlying materials. The current direct impact is of low significance. The long-term cumulative impact may be of more significance, although this is dependent on how the site is closed and what the future use pressures are in the area.

7.3.2 Visual

Construction of the WDF5 will alter the site footprint, but such alterations will be largely at ground level and will not be visible from beyond the site. The site is located within a highly developed industrial area with a complex visual environment. The construction is not anticipated to increase the visual complexity over current conditions.

Initial construction of the WDF5 will have a very limited impact on the visual environment. No detectable change to the cumulative impact on the visual environment is predicted. The visual impact is not assessed to be of significance.

7.3.3 Geology and Soils

The development of the WDF 5 will not alter the geology of the site and there are no known mineral resources at the site. The site lies near to the edge of a dolomitic area. Given the underlying soils, as well as geological and groundwater conditions, the risk of sink-hole development is considered very low (see Geotechnical Report, Jeffares & Green, 2012).

Development of the WDF5 and associated infrastructure over an area of 19 ha would cover all of the soils in the area with waste, resulting in their complete loss. The site has limited topsoil due to historical disturbances and relatively little of the area has clean and undisturbed topsoil. However, topsoil is a limited resource, which is essential for plant growth. Any loss of topsoil would be an impact of high significance.

Conservation of soils requires salvaging prior to development, correct stockpiling and handling during construction and operation and utilization for a suitable purpose. All topsoil should be stripped from the development site. Where possible the clean soils and the contaminated soil should be handled separately. Soils should be stored in defined stockpiles, located away from water flow paths and protected from erosion by wind and water. The height and slope of the stockpiles should be limited to ensure a stable pile. The soil should be protected from pollution resulting from the spillage of hydrocarbons and chemical. The storage and handling of the soils should be managed to ensure minimum contamination of soils with construction materials. The salvaged topsoil should only be used for appropriate uses. Such mitigation measures will keep the impacts at a very low significance.

7.3.4 Ecology and Biodiversity

7.3.4.1 Terrestrial Flora and Fauna

No natural, undisturbed habitat remains on the site of the WDF5. Disturbances from construction of the proposed WDF5 will only affect a previously disturbed area of very low ecological significance. The impact during the construction of the proposed WDF5 on terrestrial flora and fauna is therefore expected to be very limited.

7.3.4.2 Alien and Invasive Species

The disturbance and revegetation of areas provides an opportunity for alien and invasive plant species to establish and proliferate. Disturbed areas at the WDF5 site will be vulnerable to such establishment. Many such species have been declared illegal and action must be taken by the landowner. All areas disturbed during construction must be actively rehabilitated with the use of appropriate indigenous species, or non-invasive exotic species. Scaw Metals runs an alien plant control programme across the Union Junction site and this will include the WDF 5. Accordingly there will be no significant impact from alien and invasive plants species.

7.3.4.3 Aquatic biodiversity

No natural aquatic habitats are found on the WDF5 site. The bulk of the site is greater than 500 m from wetland areas (along the Elsburg Spruit and Natal Spruit), with the southern-most point approximately 450 m from these wetlands. Thus no direct physical disturbance of aquatic biodiversity will occur.

An excavated storm water drainage channel, which forms part of Scaw's storm water management system, runs across the WDF5 site. This channel and various excavations and impoundments resulting from surface disturbances provide limited aquatic habitat on the site. These are largely vegetated with Phragmites Reeds, typical of wet areas in the region (see Plate 5). These areas will be eliminated during construction of the proposed WDF5, which represents a minor direct impact on aquatic biodiversity within the proposed footprint of the WDF5.

The dispersion of sediments and contaminants from the WDF site during construction would impact on downstream water quality, alter the aquatic habitat and thus affect aquatic biodiversity. If large volumes of sediment or hazardous pollutants were dispersed a significant impact could result. During construction all clean run-off water must be diverted from the site while run off from areas with potential contaminants should be contained within the existing systems at Scaw. Construction materials and soil stockpiles should be located away from water flow paths and protected from erosion by water. All chemicals and hydrocarbons must be stored in lined and bunded areas located at least 100 m away from watercourses. Any spillages must be contained and cleaned up as part of an emergency response.

Assuming that waste management and storm water management measures are in place during construction the development of the proposed WDF5 is expected to have no significant impact on downstream aquatic habitats.

7.3.5 Surface and Groundwater

Due to the flat gradient of the proposed site, there are no exposed steep slopes which may present problems with regard to erosion.

There are no natural surface water features on the site proposed for the WDF5. The storm water channel(s) that flows through the area will have to be relocated to ensure that the storm water system function is not compromised. The storm water channel must not be blocked and the diversion must be suitably sized to handle the expected peak storm water flows. The manager of the Union Junction Site must be fully informed of, and approve all storm water designs and construction plans as well as work procedures and schedules with respect to the relocation of the canal. Such storm water facilities should be designed to at least handle the maximum precipitation event from a 1:50 year rainfall event of 24 hr duration.

Another concern is the risk of storm water run-off from construction areas becoming contaminated and this water being allowed to enter the clean water system and the natural environment. Likely contaminants on the proposed WDF5 site during construction would include leaked fuels and oils from vehicles operating on site, stockpiled building materials (e.g. sand and concrete), soils as well as litter and waste. Pollution control measures to manage potential contaminants during the construction periods of the project are thus essential. During construction all clean run-off water must be diverted from the site while run off from areas with potential contaminants should be contained within the existing systems at Scaw. Construction materials and soil stockpiles should be located away from water flow paths and protected from erosion by water. All chemicals and hydrocarbons must be stored and handled in lined and bunded areas located at least 100m away from watercourses. Any spillages must be contained and cleaned up as part of an emergency response.

Although generally deeper, shallow groundwater may be encountered at depths of around 1 m below surface. Thus reasonably shallow excavations may expose groundwater which could be contaminated by pollutants introduced during construction. Pollution control measures to manage potential contaminants during the construction periods of the project are thus essential. The main excavations required for the construction should be undertaken in the late winter months when the seasonal, shallow aquifer is least likely to be present.

Assuming that waste management and storm water management measures are in place during construction the development of the proposed WDF5 is expected to have no significant impact on surface or groundwater quality or downstream surface water resources.

7.3.6 Air Quality

Particulate matter and dustfall levels at certain areas within the Scaw property are elevated close to or above industrial band limits. Measured dust fall out at the property boundary is generally below the residential band limits. Construction operations such as site clearance and excavation, the movement of heavy vehicles, handling of soils and the creation of material stockpiles will increase the potential for dust generation from the WDF5 site. Dust from this construction could increase the dustfall levels. The entrainment of particulate matter, in combination with wind, may result in dust fall out beyond the boundaries of the Scaw Metals site.

The WDF5 site is located close to the eastern boundary of the Scaw property. There are no residential sites here, but there are other industries which may be sensitive to dustfall. The dust fall could impact on industrial processes and equipment that require clean air. Such impacts, if any, are likely to be of short-duration.

Simple dust control measures with high efficiency should be implemented during construction. These should include the wetting of construction roads to limit dust entrainment by vehicles, the wetting or covering of exposed areas where the surface is unconsolidated and the suspension of dust generating activities during periods of high wind.

Assuming that reasonable dust management measures are in place during construction, the development of the proposed WDF5 is not expected to have a significant impact on fall out dust beyond the site boundaries. The monitoring of dustfall at the eastern site boundary should commence prior to the commencement of construction.

7.3.7 Noise

The construction of the proposed WDF5 Plant will require earthworks and civil operations. Heavy machinery will be involved. Certain of these operations will generate significant noise for short periods. An increase in traffic noise is also expected due to the delivery and removal of materials and wastes during the construction.

There are existing facilities that generate noise of varying levels all around the site. The additional noise from construction activities is highly unlikely to increase ambient noise levels by more than 7dB.

The various residential suburbs in the area, which represent noise sensitive receptors, are generally located at least 0.95 km away from the proposed WDF5. As such, noises to these receptors are not anticipated to alter from the current situation in any significant manner during the construction of the plant. Thus, noise impact from the proposed construction is not expected of be of any significance.

7.3.8 Traffic

During construction, building materials would need to be transported via truck to the proposed construction site. Dekema Road is heavily used by heavy motor vehicles arriving to Scaw and other sites and the addition of construction vehicles could result in significant congestion. However, this will be temporary and limited to period when regular traffic is heavy and a large number of construction deliveries were occurring. The scheduling of construction deliveries for periods of low traffic flow would effectively manage this impact.

7.3.9 Heritage Resources

The great majority of the footprint of the proposed project site has been subject to years of industrial activity and related disturbance. Any archaeological artefacts or aspects of cultural or historical significance, which may have been on the site, would have been destroyed. The brief heritage inspection by Professional Grave Solutions did not record any heritage resources. The SAHRA concluded that there is no need for a heritage impact assessment for the WDF5.

It is considered highly unlikely that there are any archaeological artefacts or aspects of cultural or historical significance. As such, no impact is anticipated. Should any heritage resources be discovered during construction, the operations should be stopped and the finding reported to the local heritage authority for assessment.

7.3.10 Occupational Health and Safety

Health and Safety impacts are not considered in detail in the EIA as this is regulated by Occupational Health and Safety Act and not environmental legislation.

Construction operations must be undertaken within the requirements of the Occupational Health and Safety Act, 1993 and the Scaw Metals' Health and Safety policies. All contractors and personnel must be aware of the risks and ensure that safe practices are implemented. Risk assessments should be undertaken and

documented for all operations. The site must be access controlled and only suitably trained and experienced persons, who have received a health and safety induction, should be granted access. Personal protective equipment must be specified for all construction areas and operations.

7.3.11 Socio-Economics

Construction of the WDF5 will create employment opportunities for personnel and contractors appointed to construct the facility. Where possible the labour required must be sourced from local persons and local contractors. The employment opportunities must include training and skills transfer for employees. Contracts with foreign consultants and experts required to install imported equipment must include provision for training of local persons.

Construction of the WDF5 will require the supply of significant volumes of material as well as specific components and materials. Although certain of the equipment is likely to be imported, opportunities will be available for local and South African suppliers. Where possible the procurement for the development must favour local persons and local suppliers. The requirements of the Scaw BBBEE procurement policies must be adhered to.

7.4 Operational Impacts

7.4.1 Climate

Waste disposal sites that dispose of organic waste generate landfill gas (which includes greenhouse gases) and contribute to global warming. As the WDF 5 will only be used for dry, largely inert materials, there will be almost no landfill gas emissions and thus no impact on the climate.

The waste is transported to the disposal site by vehicles, which produce green-house gas emissions. However, the use of WDF 5 requires significantly less transport than any alternative site and results in the least production of greenhouse gas emissions. The impact is of very low significance.

7.4.2 Topography

Development of the WDF 5 will completely alter the local topography from flat/moderately undulating site to a 25 m high, terraced table-top. This change will be permanent in nature but will be limited to the site. The direct impact will be of moderate significance as it is limited to the site footprint only.

Operation of the site to ensure stable side slopes that are accessible and can be maintained and rehabilitated is important.

7.4.3 Visual and Landscape Character

The landscape character of the Union Junction area is one of a developed and industrialised site. In general the WDF 5 will be comparable with adjacent waste disposal sites and will not significantly change the character of the site. On-going disposal to the WDF5 will increase its height and its visual prominence. If the facility is dark in colour and generates dust clouds the impact could be of moderate significance.

The facility shape is simple in nature and will simplify, not increase the complexity of the visual environment of this highly developed industrial area. The WDF5 may even screen the industrial area from some residential areas and certain view points and should improve the overall landscape character marginally. Overall the development fits with the context of the industrial character of the area.

Development of WDF 5, with the ‘rising green wall’ method, will limit the severity of the impact. Control of windblown dust will further restrict impacts to a low significance.

7.4.4 Air Quality

The operation of the proposed Electrical Co-generation Power Plant and WDF 5 will result in the emissions of various gasses and particulate matter that could impact on air quality. An air quality impact assessment was undertaken by Airshed Planning Professionals to establish the project’s impacts on air quality (see Appendix F). The assessment considered various scenarios for the project.

The Co-generation Power Plant is likely to be responsible for most of the gaseous emissions (see the EIA for that plant) while the WDF5 could potentially result in emissions of particulate matter, including dust fall, PM10 and PM2.5. Such emissions will result from material handling, entrainment from vehicles travelling on haul roads, dust from vehicles on public roads and wind erosion from the WDF5 areas.

7.4.4.1 Analysis of Dust Emissions

Airshed noted the following with regards the estimated windblown emissions:

- Since windblown dust emissions were found to occur only between 3% and 10% of the hours in a year, annual average PM10 and PM2.5 concentrations associated with the waste disposal sites are very low and well within NAAQS.
- Exceedance of short term (24-hour) NAAQS are only predicted at the SMUJ boundary.
- Predicted dustfall at the boundary and all sensitive receptors are low and well below the draft dust control regulation of 600 mg/m^2-day for residential areas for all scenarios.
- The highest boundary impacts are associated with Scenario (b), the disposal of mixed waste (excluding char, dust and some shredder waste) at Cell 4b and ash over the entire footprint of the proposed new WDF5. This is considered a theoretical worst-case scenario since the WDF5 will be developed in three cells. It is unlikely that the entire footprint of the WDF5 will be exposed at any given time.
- Scenario (c) is considered the most likely future scenario since it only considers only a 3rd of the WDF5 footprint as erodible (ie the active portion).

Table 16: Predicted maximum PM concentrations and dustfall rates at the SMUJ boundary as a result of windblown dust (Airshed, 2013)

Pollutant	**$PM_{2.5}$**		**PM_{10}**		**Dustfall**
Averaging Period	**Annual Average Conc. (µg/m3)**	**Frequency of Exceedance of the 2030 24-hour NAAQS (days per year)**	**Annual Average Conc. (µg/m3)**	**Frequency of Exceedance of the 24-hour NAAQS (days per year)**	**Daily Dustfall Rate (mg/m2-day)**
NAAQS/ Dustfall Regulation	*15 µg/m3*	*4 days*	*40 µg/m3*	*4 days*	*600 mg/m2-day*
Scenario (a)	0.90	4	2.5	3	58
Scenario (b)	2.8	10	6.22	8	390
Scenario (c)	**0.37**	**1**	**1.8**	**3**	**160**
Scenario (d)	1.28	6	3.5	5	190

In impact assessment Scenario 3, 4 and 5, (representative of cumulative SMUJ operations with the commissioning of Phase 1 and Phase 2 of the Co-Generation Project and all waste disposals at the new WDF5) reference is made to Scenario (c) for dust emissions.

7.4.4.2 Estimated Total Annual Emissions

A summary of estimated cumulative annual emissions from all operations at Scaw Metals is provided in Table 17. With respect to the WDF5, the following can be concluded:

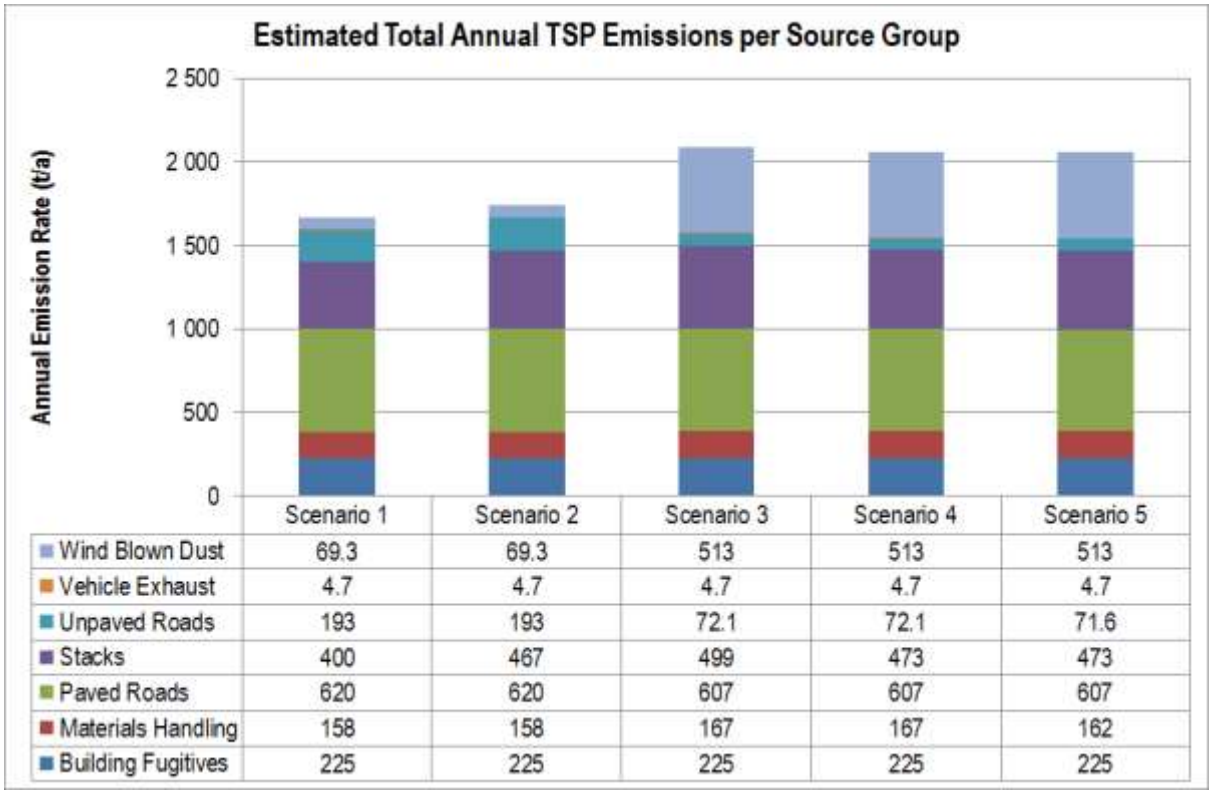
- Estimated TSP, PM_{10} and $PM_{2.5}$ emissions increase by between 23% and 64% as a result of the Co-Generation Plant and WDF 5. The increase in particulate emissions occurs largely as a result of windblown dust from the new ash disposal facility[2].

[2] Refer to Appendix A for detailed windblown dust emission estimation and impact assessment methodology.

Table 17: Summary of total emissions and % change from the baseline (Airshed, 2013).

Pollutant		Scenario 1	Scenario 3	Scenario 4	Scenario 5
TSP	Total emission rate (t/a)	1669	2087	2061	2055
	Incremental change from Scenario 1		25%	23%	23%
PM_{10}	Total emission rate (t/a)	789	1108	1082	1080
	Incremental change from Scenario 1		41%	37%	37%
$PM_{2.5}$	Total emission rate (t/a)	561	918	892	891
	Incremental change from Scenario 1		64%	59%	59%
CO	Total emission rate (t/a)	584	584	617	617
	Incremental change from Scenario 1		0%	6%	6%
NO_x	Total emission rate (t/a)	699	1190	830	830
	Incremental change from Scenario 1		70%	19%	19%
SO_2	Total emission rate (t/a)	908	1235	940	940
	Incremental change from Scenario 1		36%	4%	4%

As can be seen in Figure 13, the additional particulate matter emitted by the project is largely as result of windblown dust from the WDF5. PM10 and PM2.5 follow a similar pattern with the increase in emissions also being largely as a result of activities the WDF5.



	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Wind Blown Dust	69.3	69.3	513	513	513
Vehicle Exhaust	4.7	4.7	4.7	4.7	4.7
Unpaved Roads	193	193	72.1	72.1	71.6
Stacks	400	467	499	473	473
Paved Roads	620	620	607	607	607
Materials Handling	158	158	167	167	162
Building Fugitives	225	225	225	225	225

Figure 13: Estimated total Annual TSP emissions per group.

7.4.4.3 Atmospheric Dispersion Modelling and Compliance Assessment

Dispersion modelling was undertaken with AERMOD to determine highest hourly, highest daily and annual average ground level concentrations for each of the pollutants considered in the study. The modelled output provides the spatial and temporal patterns in the ground level concentrations arising from the emissions sources. Averaging periods were selected to facilitate the comparison of predicted pollutant concentrations to relevant ambient air quality and inhalation health criteria. The results are presented as discrete values

predicted at the property boundary or at specific receptors. Where exceedances are predicted, the extent is presented in ground level concentration isopleth plots.

7.4.4.3.1 Predicted Dustfall Rates

Baseline dustfall monitoring at Scaw indicates fairly regular exceedances of the industrial band limits at locations within the property. However, dustfall at the site boundaries and residential locations is generally below the residential bands of the dustfall regulations.

Predicted annual dust emissions will increase as a result of the Co-gen plant and WDF5. The greatest increase will occur as a result of windblown emissions from the WDF5. However, most of the dust fall will be restricted to within the Scaw property. The off-site dustfall rates predicted with the project are well below the draft dustfall regulation limit values for residential areas for all Scenarios considered in the assessment. The commissioning of the new WDF5 (and the closure of Cell 4b) will result in an increase in dustfall rates at the SMUJ boundary to the east and south-east but a reduction in dustfall levels at the sensitive receptors downwind (south and south-west) of the SMUJ site. The predicted reduction is a function of the WDF5's location in relation to sensitive receptor locations.

Dustfall at current sensitive residential receptors to the west is thus predicted to decrease, even with the operation of the WDF5. Dustfall rates are however predicted to increase at the Scaw Metals property boundary to the south-east and at the industrial area adjacent to the eastern boundary. The dust fall rates at these sites are not predicted to exceed the industrial bands.

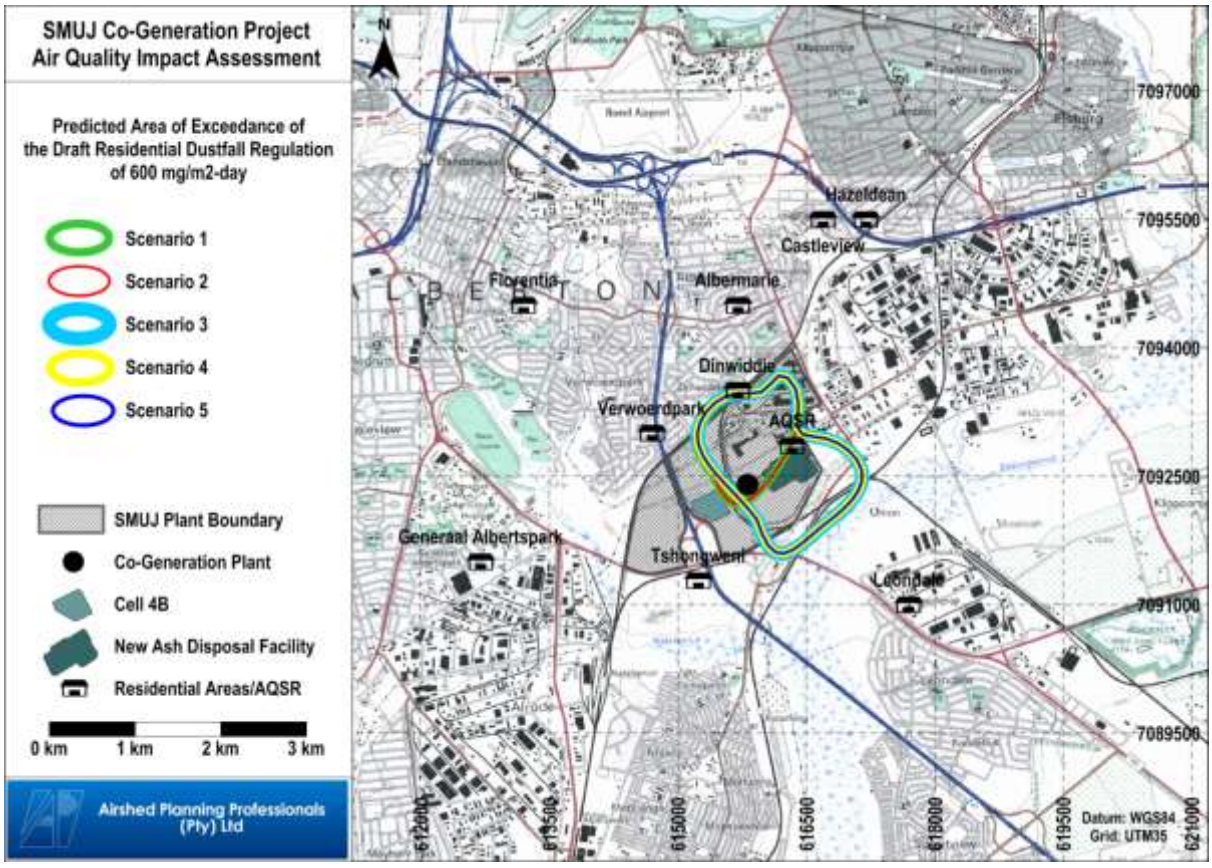


Figure 14: Predicted area of exceedance of the Residential Dust Fall Regulations

Development and operation of the WDF5 could be expected to have a direct negative effect on dustfall rates at industrial sites to the east. The predicted dust fall is not likely to exceed limits of the industrial bands, but

could affect dust-sensitive processes at these locations. This direct impact of the WDF5 on dust fall will be of low to moderate significance.

However, the predicted dustfall rates shown in the model are based on the unmitigated scenario and are considered highly conservative. The model assumed 1% moisture content in the ash and considered the entire surface area of the operational cell of the WDF5 as an emission source, with no mitigation. The operational plan for the WDF5 will require that the ash has a moisture content of between 5 and 10%. This will improve the ease of handling the ash, increase its compactability and reduce dust emissions. Over wetting of the ash must also be avoided as this will increase leachate A sensitivity analysis of the dust emissions model indicated a decrease in total windblown dust emissions by two orders of magnitude if the moisture content is increased from 1% to 5%. In addition only one cell (ie one third of the area) will be used for active disposal at any one time. The covering and vegetation of the outer slopes will also decrease the erodible area and reduce dust sources. It is thus predicted that in the mitigated scenario the direct impact of ash disposal to the WDF5 will be of low significance in terms of dust fall to receptors to the east.

Maintenance of the moisture content of the ash above 5% and the greening of the outer slopes during development will be important to ensuring that the WDF5 does not result in significant dust fall. Monitoring will be required to assess the effectiveness of the management measures.

There may be a period when both Cell 4b and the WDF5 are operated simultaneously. This situation is likely to result in the highest dust fall rates, over the widest extent. However, the dispersion modelling of dust fall shows that emissions from these two sources tend to be dispersed to different areas. The effect of simultaneous operation would be that the extent of the dust fall would increase, but that dust fall rates would probably not increase substantially. Any such simultaneous operations will be for a relatively short duration (a few years) as Cell 4b has a limited lifespan. It is thus predicted that in the mitigated scenario the direct impact of dust fall from simultaneous disposal to Cell 4b and the WDF5 will be of low to moderate significance to receptors to the east and south west.

7.4.4.3.2 PM10 Concentrations

As discussed in Section 5.1.4, current (baseline) annual average PM10 concentrations exceed the National Ambient Air Quality Standards (NAAQS) at the Scaw Metals boundary, while 24-hour average PM10 concentrations are exceeded at Dinwiddie, Generaal Albertspark and Tshongweni.

Predicted annual PM10 emissions will increase over current levels as a result of the Co-gen plant and WDF5. As with dust fall the greatest increase will result from windblown emissions off the WDF5.

The extent of the exceedances of the annual average and 24 hr average PM10 concentrations do not change significantly between all scenarios. With the commissioning of the WDF5 and the closure of Cell 4b, predicted PM10 concentrations at off-site residential receptors actually decrease, despite an increase in windblown dust emissions from the WDF5. The decrease at the residential areas can be explained by the location of the new WDF5 in relation to sensitive receptors, the wind field and the nature of windblown dust emissions. However, PM10 concentrations are predicted to increase at the industrial area adjacent to the eastern boundary. The days of exceedance of the annual average NAAQS limit at the eastern boundary are predicted to increase from 113 to 133 per annum.

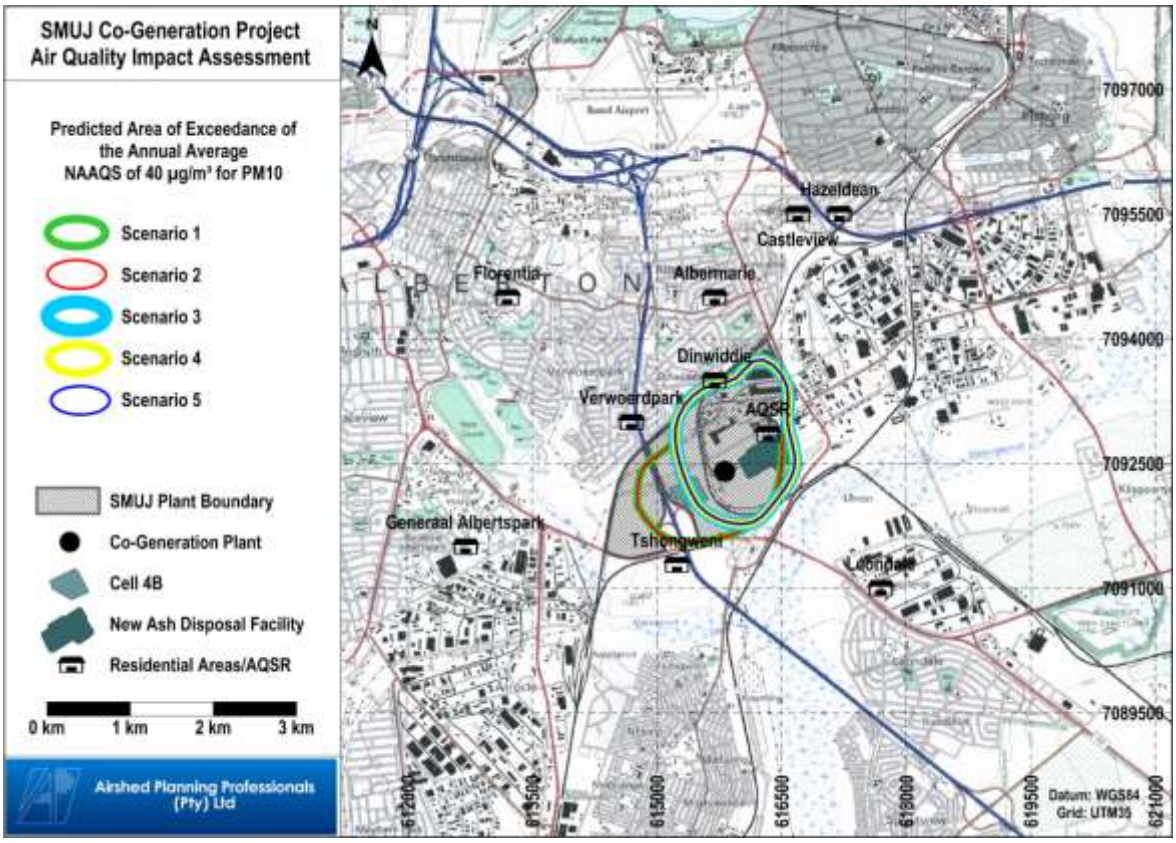


Figure 15: Predicted area of exceedance of the annual average NAAQS for PM10

Development and operation of the WDF5 could be expected to have a direct negative effect on PM10 concentrations at industrial sites to the east. Thus direct impact of the WDF5 on PM10 concentrations will be of low to moderate significance. Dust sensitive processes and personnel employed at these locations could be affected. However, the modelled PM10 concentrations are based on the unmitigated scenario and are considered highly conservative. The model assumed 1% moisture content in the ash and considered the entire surface area of the operational cell of the WDF5 as an emission source. The operational plan for the WDF5 will require that the ash have a moisture content of between 5 and 10%. This will improve the ease of handling the ash, increase its compact ability and reduce PM10 concentrations. A sensitivity analysis of the dust emissions model indicated a decrease in total windblown dust emissions by two orders of magnitude if the moisture content is increased from 1% to 5%. The covering and vegetation of the outer slopes will also decrease the erodible area and reduce dust sources. It is thus predicted that in the mitigated scenario the direct impact of ash disposal to the WDF5 will be of low significance in terms of PM10 concentrations to the east.

Maintenance of the moisture content of the ash above 5% and the greening of the outer slopes during development will be important to ensuring that the WDF5 does not result in significant dust fall.

7.4.4.3.3 Predicted PM2.5 Concentrations

As with PM10 concentrations the current (baseline) PM2.5 concentrations are expected to exceed the National Ambient Air Quality Standards (NAAQS) at the Scaw Metals boundary, as well as at Dinwiddie, Generaal Albertspark and Verwoerdpark.

Predicted total annual PM2.5 emissions will increase over current levels as a result of the Co-gen plant and WDF5. As with dust fall and PM10 the greatest increase will result from windblown emissions off the WDF5.

The extent of the exceedances of the annual average and 24 hr average PM2.5 concentrations do not change significantly between all scenarios. With the commissioning of the WDF5 and the closure of Cell 4b, predicted PM2.5 concentrations at off-site residential receptors actually decrease, despite an increase in windblown dust emissions from the WDF5. The decrease at the residential areas can be explained by the location of the new WDF5 in relation to sensitive receptors, the wind field and the nature of windblown dust emissions. However, PM2.5 concentrations are predicted to increase at the industrial area adjacent to the eastern boundary and at Leondale. The days of exceedance of the annual average NAAQS limit at the eastern boundary are predicted to increase from 110 to 114 per annum.

Management measures as discussed for PM10 will ensure that the direct mitigated impact of ash disposal to the WDF5 will be of low significance in terms of PM2.5 concentrations to the east

7.4.4.4 Recommendations for Management of Air Quality

It is recommended that existing fugitive dust management measures employed at Scaw Metals be extended to include dust sources at the Co-Generation Project and associated WDF5. This includes sweeping of paved road, watering of unpaved roads and water sprays on stockpiles and disposal sites of unconsolidated materials. Stockpiles of fine and unconsolidated material that is erodible by wind must be limited in extent and protected from exposure to wind.

The WDF5 must be developed in three (3) or more cells, in a phased approach such that the total area of unconsolidated and uncovered waste material is limited. The working face of the disposal area must be maintained to the smallest possible extent. Completed areas or areas where disposal will not be immediately-on-going should be covered with coarser materials. The outer slopes or berms around the WDF5 must be progressively covered with coarser materials, topsoil and vegetated.

During disposal the key to limiting particulate emissions will be the maintenance of the moisture content of the ash is kept between 5% and 10%. The moisture content of ash on the surface of the disposed area must be maintained above 5%. Where vehicles traverse areas of disposed ash a running coarse of coarser material must be placed on the ash. Where ash deposition is completed the area must be covered and vegetated. Controls of other fine wastes will also be required and these should generally be covered with coarser materials during disposal.

Airshed proposed a management zone of approximately 500 m from the WDF5 be established, based on predicted cumulative dustfall rates. Dust fall must be monitored into se zone of influence and management of the disposal operation adapted if dust fall increases above standards. No buffer zone was proposed.

7.4.4.4.1 Source Monitoring

The disposed waste is unlikely to generate landfill gas as no organic matter is present. There is thus little value in sub-surface gas probes around the facility. No source monitoring is required.

7.4.4.4.2 Air Quality Monitoring

It is recommended that, for dust management purposes an additional dustfall sampling location be added to the existing network, at the eastern boundary near the WDF5. It is also recommended that periodical PM10 sampling be conducted at any location where the dust fall exceeds the actions limits set in Sans 1929 (2011) for two consecutive periods. Ambient air quality monitoring is not considered a requirement for the project.

7.4.5 Ecology and Biodiversity

7.4.5.1 Terrestrial Flora and Fauna

Operation of the WDF5 will have no direct impact on terrestrial biodiversity.

7.4.5.2 Alien and Invasive Species

The outer slope of the WDF5 should be vegetated with a self-sustaining sward of locally adapted grasses. Indigenous species should be used in preference to exotic species. Invasive plant species may not be used for rehabilitation.
Disturbed and rehabilitated areas on and around the WDF5 must be inspected on an annual basis for alien and invasive plants and action taken to control their establishment. Accordingly there will be no significant impact from alien and invasive plants species.

7.4.5.3 Aquatic biodiversity

Certain of the wastes that will be received on and disposed WDF5 are considered as hazardous. These could pose environmental risks at elevated concentrations if the contaminants were dispersed into the environment in surface water runoff. Contaminated runoff could impact on downstream aquatic habitats, including the Elsburg Spruit and its associated, sensitive wetlands. Additionally, groundwater flow originating from site may discharge as base flow to the Elsburg Spruit and affect the aquatic environment. The unmitigated impacts of surface water pollution on aquatic biodiversity are likely to be of medium significance.

The WDF5 will include facilities for the capture of contaminated water run-off from the waste body. The WDF5 will also be located within the dirty water management system at Scaw Metals. Runoff from contaminated areas is contained in existing storm water dams within the Scaw Metals facility. Water quality in the last dam in the system is generally of an acceptable quality for discharge to the Elsburg Spruit and has very little to no impact on the aquatic ecosystem.

With respect to contaminated groundwater flow from the waste site affecting the Elsburg Spruit, the liners in the design of the waste cell will prevent the ingress of water through the waste body into the underlying geology. In addition, the underlying soils have a very low permeability, which acts as an additional buffer for the ingress of water into the underlying geology. Groundwater flow to the Elsburg Spruit is thus likely to take a considerable amount of time, as long as 30 years according to modelling results, sufficient for illness causing organisms to die off (Jeffares & Green, 2012). More persistent contaminants associated with proposed ash waste operations (e.g. metals, sulphate) would need to be monitored in the long term (Jeffares & Green, 2012).

Assuming that waste management and storm water management measures are in place and used according to their design specifications, the operation of the of the WDF5 is expected to have no significant impact on downstream aquatic habitats.

7.4.6 Surface Water

7.4.6.1 Change in Surface Water Quality

Wastes that will be received and disposed at the WDF pose environmental risks due to their chemistry. Storm water that comes into contact with ash has the potential to become polluted and transport contaminants to local water resources. No natural water features occur on site, however a number of artificial drainage features in the form of ditches and channels are present and could transport pollutants from the site.

Pollution can reduce the quality of the water. The unmitigated impacts of surface water pollution are likely to be of medium to high significance.

In order to minimize contaminated run-off, it is recommended that site drainage measures are implemented to prevent surface and groundwater from entering the facility. The following drainage measures should be incorporated into the landfill design:

- Runoff from the existing storm water dam to the north of the site must be diverted around the site.
- Surface and subsoil drainage must be provided along the up-slope site boundaries.

These measures will prevent upstream surface water run-off from coming into contact with the waste and will reduce the pollution risk.

Runoff from the active surface of the WDF5 would be contaminated and must not be allowed to re-enter the water resource. The WDF5 must include facilities for the capture of contaminated water run-off from the waste body. At the SMGWDS, paddocks at the toe of the cells have been shown to be effective in containing dirty water on site. Similar toe paddocks are proposed for the WDF5. All leachate generated from the disposal operations must be captured and contained. These facilities must be designed to accommodate the runoff from the maximum precipitation likely to be received during a 1:50 year rainfall event of 24 hr duration. Storage facilities should allow for a 0.5 m freeboard. With the implementation of dirty water controls it is anticipated that the potential impact to surface water quality will be of low significance.

The WDF5 will also be located within the dirty water management system at Scaw Metals. Runoff from these areas is contained in existing storm water dams within the Scaw Metals facility. Water quality in the last dam in the system (Dam 4) must be of an acceptable quality for discharge to the Elsburg Spruit in order to ensure no impact on the aquatic ecosystem.

The operation of the proposed WDF 5 will also involve the collection and transportation of waste ash produced at the proposed Electrical Co-generation Plant, as well handling of waste ash at waste handling areas. Spillages of waste ash during collection, transport and handling could result in the spread of contaminants which may affect local surface water quality. There is also a risk that storm water flows that come into contact with waste ash stored in handling areas become polluted and transport contaminants to local water resources. However, this storm water flow from the materials area is collected and contained within the larger Union Junction site. Waste handling areas will also be covered with a hardstand. Clean run off water will be diverted away whilst dirty water will be directed to an existing dirty water dam within the Union Junction site. These measures will prevent contaminants from dispersing through the larger Union Junction site. Once storm water flows are controlled the impact on surface water quality is anticipated to be of very low significance.

Assuming that waste management and storm water management measures are in place and operated according to their design specifications, the operation of the of the WDF5 is expected to have no significant impact on surface water quality.

Monitoring of surface water qualities across the Union Junction site must be continued to monitor the effectiveness of the system.

7.4.6.2 Change in Surface Water Quantity

Operation of the WDF 5 will require the capture of surface water across the operational areas to prevent pollution. This run-off will be lost from the local catchment. However, less than 1 % of the quaternary catchment surface area will be lost. There is thus a small loss of runoff from the catchment. The impact will be reversed once the WDF 5 is capped and returned to the clean water system.

7.4.7 Groundwater

Wastes that will be disposed at the WDF 5 pose environmental risks due to their composition. Certain of the ash and other Scaw Metals production wastes have elevated concentrations of Arsenic (As), Boron (B), Barium (Ba), Copper (Cu), Manganese (Mn), Lead (Pb) and Zinc (Zn). Moisture in the ash pile and rainfall on the site could result in the generation of leachate which may contain elevated concentrations of a number of contaminants (including metals and sulphates). If this leachate were to come into contact with groundwater then the local groundwater would become polluted. Contaminants would travel vertically to the water table and then follow groundwater flow paths towards the south east and disperse through the aquifer in the direction of Elsburg Spruit There are no known groundwater users to the south east of the WDF5 site, but the presence of the Elsburg Spruit is noted. The unmitigated impacts of groundwater pollution are likely to be of medium to high significance.

The permeability of sub-soils is low (average of ~1.90X10^{-4} cm/s) and the risk of groundwater quality being adversely affected is low to moderate. The groundwater model for the WDF5 (Jeffares & Green) considered the movement of a contaminant plume from the WDF5 toward the Elsburg Spruit. Sulphate was used as a representative contaminant as it is present in most of the waste streams. With no lining system and waste across the entire area of the WDF5 it was estimated that the first arrival of a contaminant plume at the Elsburg Spruit would take 35 years. With a liner system of a permeability of 1x10-8 m/s and waste on a third of the WDF5 area the first arrival of a contaminant plume at the Elsburg Spruit would take at least 60 years. The geosynthetic clay liner (GCL) proposed by the design engineers has a material permeability of an order or two magnitude less than that used in the model.

The basal and sidewall lining system is of primary importance in preventing leakage of leachate into the groundwater system. The composite lining system proposed for the WDF5 includes a basal liner, leak detection layer, GCL and HDPE layers and a seepage layer. This type of lining system provides significant protection against leakages and minimises the risk to the groundwater system. The leachate collection and abstraction system is also essential to allow for the removal of leachate from the waste body. Preventing the build-up of a hydraulic head on the basal liner will significantly reduce the risk of leakages. The surface drainage on site must divert all surface runoff away from the WDF5. With these measures in place the risks to groundwater are very low.

The success of preventing groundwater contamination from the WDF5 will also rely on good practice in terms of operation and maintenance. The basal liner must be correctly installed and operated to avoid damages to the integrity of the liner. It is advisable to minimise areas of active waste operations and progressively construct engineered caps on areas where waste disposal operations have been completed, thus reducing leachate generation.

Assuming that presented management measures are in place and operated according to their design specifications, the operation of the WDF5 is expected to have no significant impact on groundwater quality.

7.4.7.1 Recommendations for Management of Groundwater Quality

The integrity of the basal liner is vital to the effective protection of groundwater. The installation of the liner must be subject to on-going quality control, particularly at joints (Construction Quality Assurance). The GCL must be protected by a running coarse to prevent injury by heavy machinery. The temperature of the liner must be monitored with probes and regulated to within the design parameters.

The possibility of leachate generation must be minimised by regulating moisture in the waste material in the desired range. The target is between 5 and 10%, to reduce dust, but not cause significant leachate generation. This also includes limiting the active disposal area by disposing to a dedicated 'active' area within cell and minimising the area of exposed ash after disposal through covering. The WDF5 must be developed in three (3) or more cells, in a phased approach such that the area of active disposal is limited. The outer slopes or berms around the WDF5 must be covered with coarser materials and topsoil and vegetated.

Clean storm water must be diverted away from WDF5. All areas of the ash pile must be kept free draining and storm water falling on the WDF5 must captured and handled as leachate. Leachate within the waste body must be removed from the cell though a collection and containment system.

Groundwater below the liner must be removed in a seepage collection layer so as to maintain an unsaturated layer below the basal liner.

7.4.7.1.1 Groundwater Quality Monitoring

Monitoring of groundwater will be required to ensure that the resource is not being adversely affected by disposal operations. Monitoring must be done for the presence of leachate on the primary liner, leakage below the primary liner and seepage below the basal liner. The quality of liquids encountered in these layers must be analysed. Upstream and downstream monitoring boreholes are required in the deep and shallow aquifers. Water quality analysis must be done on groundwater monitoring boreholes on a quarterly basis.

7.4.8 Traffic

During operations, ash wastes will be transported from the Co-gen plant to the WDF5 via heavy motor vehicle. Once disposal to Cell 4b ceases the other Scaw Metals production wastes will also be transported to the WDF5. These trucks would use internal transport routes within the Scaw Metals property and would not impact on traffic on public roads. Traffic impact as a result of the proposed development is therefore expected to be negligible.

7.4.9 Health Risks

7.4.9.1 Occupational Health

Occupational Health and Safety is not considered in detail in the EIA as this is regulated by Occupational Health and Safety Act and not environmental legislation.

Operations must be undertaken within the requirements of the Occupational Health and Safety Act, 1993 and the Scaw Metals' Health and Safety policies. Risk assessments should be undertaken and documented for all operations. The site must be access controlled and only suitably trained and experienced persons, who have received a health and safety induction, should be granted access. Personal protective equipment must be specified for all areas and operations.

7.4.9.2 Public Health

The air quality impact assessment found that the proposed WDF 5 will not add significantly to existing pollution levels in the area.The potential public health risks of the WDF5 are mostly related to particulate emissions from the site. The fine particulates (PM10 and PM2.5) can pose health risks, as can the heavy metals contained in these emissions. At the emission rates predicted for the project, neither the chronic nor acute health risk screening criteria for metals will be exceeded on or off-site, and the calculated increased lifetime cancer risk is very low to low, that is, between one in one million and one in ten thousand. As such, the risks posed to human health due to the WDF5 are predicted to be negligible.

Elevated background PM10 and PM2.5 concentrations are predicted in the study area with cumulative concentrations in exceedance of the NAAQS over a wide area. The exceedance of the NAAQS PM10 and PM2.5 limits are almost exclusively due to existing impacts, as discussed in Section 5.1.4. The WDF5 is not predicted to result in an increase in either PM10 or PM2.5 concentrations at residential receptors and thus no additional health risk is anticipated. PM10 monitoring should be initiated if disposal operations result in an increase in dustfall above the action level for the monitoring site.

There are generally very few sensitive receptors within close proximity of the site. Based on this scientific evidence the public health risks associated with the proposed WDF 5 are considered very low to minimal. Airshed proposed that a management zone of approximately 500 m from the WDF5 be established in which dustfall be monitored. Disposal operations will need to be managed to ensure that dust fall does not increase in the management zone. No buffer zone was proposed.

7.4.10 Noise

The operation of the WDF 5 will require on-going transport with heavy motor vehicle and earthworks with heavy machinery. None of these sources are likely to generate significant noise levels although their operation will contribute to ambient noise. Noise levels are not anticipated to alter from the current situation in any significant manner.

Noise impacts are likely to be minor as the WDF 5 is located within an industrial area with a variety of noise sources similar to those that will emanate from the proposed plant. Adjacent areas comprise vacant land or further industrial users. The nearest residential suburbs in the area, which represent noise sensitive receptors, are generally located at least 0.9 km away from the WDF5. Thus, noise impact from the WDF5 is not expected of be of any significance.

7.4.11 Traffic

During construction, building materials would need to be transported via truck to the proposed construction site. However, this will be temporary and would not constitute large traffic volumes. During operation, the bulk of traffic would be associated with the daily transport of wastes and materials to and from the proposed plant. These trucks would use transport routes internal to the Scaw Metals property and would not impact on traffic on public roads. Traffic impact as a result of the proposed development is therefore expected to be low and of a temporary nature, i.e. a minor increase in traffic volume during the construction phase of the project.

7.4.12 Socio-Economics

7.4.12.1 Employment

Operation of the WDF5 will result in direct employment opportunities. Some may be new opportunities although many personnel will move from current operations at Cell 4b. These persons will all receive training and acquire the skills to undertake operations at the WDF5. These individuals, and their dependants, will benefit economically from the employment. The bulk of the persons employed will be from local communities and spend their income in these communities. This is a positive impact of moderate significance.

7.4.12.2 Nuisance conditions

Dust emissions and dustfall has the potential to cause significant nuisance to surrounding residents and businesses. Predicted off-site dustfall rates are however well below the dustfall regulation limit values for residential areas. The closure of Cell4b and commissioning of the new ash disposal cell will result in an increase in dustfall rates at the Scaw Metals Union Junction boundary but noticeable reduction in dustfall levels (2% to 20%) at the surrounding sensitive receptors. Operation of the WDF5 will therefore not result in any significant increase in nuisance conditions in residential areas surrounding the Scaw Union Junction Facility.

Certain industrial sites to the east of Scaw Metals may experience an increase in dust fall as a result of the WDF5. Even in the unmitigated scenario such dust fall is predicted to be below the industrial band limits. With mitigation the dust fall is not anticipated to result in nuisance conditions beyond the boundary of Scaw Metals.

7.4.13 No-go Alternative

Failure to develop WDF 5 at the Scaw Metals Union Junction Facility will result in Scaw Metals having to identify an alternative for the disposal of their waste as there are currently no facilities on site that can accept the ash waste streams to be produced by Phase 2 of the Electrical Co-generation Power Plant. Potential alternatives include the use of a commercial hazardous WDF or the development of a purpose built hazardous WDF at another location.

Disposing of the waste at a commercial landfill will significantly reduce the viability of the Electrical Co-generation Power Plant as additional costs will be incurred not only for the disposal, but for the transport of the waste. Similarly the development of a purpose built facility at an alternative locality would also result in significant transport cost increases.

Over and above the cost implications there would also be increased risk with large volumes of hazardous waste being transported by heavy vehicles on public roads. It is estimated that as many as 64 vehicle trips would be required per day to transport the Scaw waste to an alternative facility. The heavily laden vehicles will increase wear and tear on local roads, increase risk to road users and increase vehicle emissions.

Furthermore the disposal risks from the waste would be transferred to the commercial waste site, rather than being retained at Scaw Metals facility. All of these factors are less desirable than the preferred situation of waste disposal at the proposed WDF 5.

Not developing the WDF5 at the proposed site would result in the site remaining as is, or being developed for alternate uses. The impacts of alternate uses are not assessed here as the nature of the alternate uses, if any, are not known.

Finally, not developing the WDF5 would prevent all of the impacts identified and described in the preceding sections from taking place. However, given the proposed mitigation there are no negative impacts of significance predicted and the no-go would not have major benefits. The negatives of the no-go, (i.e. not developing phase 2 of the Electrical Co-generation Power Plant) are considered significant.

Table 18: Assessment of environmental impacts for the development and operation of the Waste Disposal Facility 5 at Scaw Metals

Environmental Impact Assessment		Waste Disposal Facility (Direct with mitigation)							Scaw Metals Union Junction Facility (Cumulative)						
Impact	**Design and Operations Measures for Impact Control**	Extent	Severity	Duration	Frequency	Probability	Impact Sig	**Impact Significance**	Extent	Severity	Duration	Frequency	Probability	Impact Sig	**Impact Significance**
Land Ownership and Zoning															
Conflict with ownership or zoning	Only develop on land owned by Scaw. Develop and operate site to contain effects to within Scaw boundary. Consult with owners of private land and servitudes before accessing.	1	0	0	0	1	-9.5	Neg Low	1	0	0	0	1	-9.5	Neg Low
Land Use and Potential															
Change in the land use of site	Only develop the approved footprint area. All development in terms of licence conditions.	1	1	3	4	4	-22	Neg Low	1	1	3	4	4	-22	Neg Low
Change of land use and potential of surrounding land	Develop and operate site to contain effects to within Scaw boundary.	2	0	0	4	1	-21	Neg Low	2	0	0	4	1	-21	Neg Low
Topography															
Change in the natural topography of site.	Limit height of WDF 5 to 25 m above natural ground level.	1	3	4	4	4	-35	Neg Moderate	1	3	4	4	4	-35	Neg Moderate
Landscape Character															
Change in the local aesthetics due to site operations.	Limit height of WDF 5 to match other cells. Operate WDF 5 with a rising green wall.	2	2	3	4	3	-37	Neg Moderate	2	2	3	4	3	-37	Neg Moderate

Environmental Impact Assessment		Waste Disposal Facility (Direct with mitigation)							Scaw Metals Union Junction Facility (Cumulative)						
Impact	**Design and Operations Measures for Impact Control**	Extent	Severity	Duration	Frequency	Probability	Impact Sig	**Impact Significance**	Extent	Severity	Duration	Frequency	Probability	Impact Sig	**Impact Significance**
Climate															
Emissions of GHG from transport	Use fuel efficient vehicles and machines. Use quality fuels. Optimise loads and travel distances.	1	1	3	3	4	-22	Neg Low	1	1	3	3	4	-22	Neg Low
Geology and Soils															
Loss of topsoil resource	Strip and stockpile all useable topsoil from the site. Use topsoil in rehabilitation.	1	1	2	1	4	-20	Neg Low	1	1	2	1	4	-20	Neg Low
Risk of sinkhole formation	Cell liners and drains to limit ingress of water into underlying geology	1	3	1	1	1	-29	Neg Low	1	3	1	1	1	-29	Neg Low
Hydrology															
Contamination of local surface water from waste site	Contain runoff water from all dirty areas on-site. Containment to have capacity for 1:50 year, 24 hr storm event. All waste handling operations to be within dirty water areas. Store and dispense all chemicals and fuels within bunded areas. Manage vehicles and machinery to prevent spillages. Ensure that spill kits are available on site and that spillages are contained and cleaned up. Monitoring of clean and dirty water quality.	2	1	3	1	3	-29	Neg Low	2	1	3	1	3	-29	Neg Low

Environmental Impact Assessment		Waste Disposal Facility (Direct with mitigation)							Scaw Metals Union Junction Facility (Cumulative)						
Impact	**Design and Operations Measures for Impact Control**	Extent	Severity	Duration	Frequency	Probability	Impact Sig	**Impact Significance**	Extent	Severity	Duration	Frequency	Probability	Impact Sig	**Impact Significance**
Contamination of local surface water from material re-use/ handling area .	Hardstand the materials handling area. Establish dedicated storm water management system for material handling area. Containment to have capacity for 1:50 year, 24 hr storm event. All waste handling operations to be within dirty water areas. Monitoring of dirty water quality.	1	2	3	2	3	-27	Neg Low	1	1	3	1	3	-20	Neg Low
Loss of runoff to the catchment	Divert all clean water away from waste disposal areas. Rehabilitate closed cells and release runoff to the environment if quality permits.	2	1	3	3	4	-31	Neg Low	2	1	3	3	4	-31	Neg Low
Geohydrology															
Impact on other groundwater users	Install sub-surface drain to intercept rising groundwater. Construct cell, liners and drains to a high level of integrity.	2	1	3	1	2	-29	Neg Low	2	1	3	1	2	-29	Neg Low
Contamination of groundwater	Construct cell, liners and drains to a high level of integrity. Ensure correct disposal, treatment and capping of cell. Implement dirty water controls. Monitoring of ground water quality.	2	1	3	4	3	-31	Neg Low	2	1	3	4	3	-31	Neg Low

Environmental Impact Assessment		Waste Disposal Facility (Direct with mitigation)							Scaw Metals Union Junction Facility (Cumulative)						
Impact	**Design and Operations Measures for Impact Control**	Extent	Severity	Duration	Frequency	Probability	Impact Sig	**Impact Significance**	Extent	Severity	Duration	Frequency	Probability	Impact Sig	**Impact Significance**
Ecology and Biodiversity															
Loss of habitat on site	Limit disturbance to footprint of infrastructure. Revegetate capped cells with indigenous vegetation.	1	0	3	1	4	-15	Neg Low	1	2	3	1	4	-27	Neg Low
Loss of biodiversity from site	Limit disturbance to footprint of waste cell. Revegetate capped cells with indigenous vegetation.	1	0	3	1	4	-15	Neg Low	1	2	3	1	4	-27	Neg Low
Impact on sensitive sites (habitat and ecosystem function beyond site)	Limit direct disturbance to footprint of waste cells. Prevent the dispersion of pollutants from the waste cells.	2	1	3	1	2	-29	Neg Low	2	1	3	1	2	-29	Neg Low
Impact on red data species	Limit direct disturbance to footprint of infrastructure. Prevent the dispersion of pollutants from the waste cells.	2	1	3	1	2	-29	Neg Low	2	1	3	1	2	-29	Neg Low
Introduction of alien invasive species	Re-vegetate closed cells with indigenous species. Implement alien plant control programme.	1	1	3	2	3	-21	Neg Low	1	1	3	2	3	-21	Neg Low
Heritage															
Destruction of heritage resources	Report possible artefacts and heritage discoveries to local museum.	1	0	1	1	1	-11	Neg Low	1	0	1	1	1	-11	Neg Low

Environmental Impact Assessment		Waste Disposal Facility (Direct with mitigation)							Scaw Metals Union Junction Facility (Cumulative)						
Impact	**Design and Operations Measures for Impact Control**	Extent	Severity	Duration	Frequency	Probability	Impact Sig	**Impact Significance**	Extent	Severity	Duration	Frequency	Probability	Impact Sig	**Impact Significance**
Traffic															
Heavy vehicle traffic on access roads	Waste delivery vehicles to remain within Scaw property. Schedule deliveries for off-peak hours. Optimise loads and travel distances.	1	0	3	3	3	-15	Neg Low	1	0	3	3	3	-15	Neg Low
Noise															
Elevated noise levels	Maintain machinery to limit noise generation	2	1	3	3	2	-30	Neg Low	2	1	3	3	2	-30	Neg Low
Air Quality															
Nuisance from dustfall	Maintain fallout levels below SANS targets at all sites by: Limit vehicle speeds to 30km/h. Wet suppression to roads and exposed surfaces to manage dust. Sweep paved roads if required Vegetate outer walls of waste cell. Suspend non-essential operations in conditions of extreme wind. Continue monitoring using dust fall out network.	2	1	3	2	2	-29	Neg Low	2	1	3	2	2	-29	Neg Low
Cancer health risk from PM10 dispersion		1	0	3	1	1	-13	Neg Low	1	0	3	1	1	-13	Neg Low
Non-carcinogenic health risk from PM10 dispersion		1	0	3	1	1	-13	Neg Low	1	0	3	1	1	-13	Neg Low
Health-risk from release of gasses	Install gas monitoring boreholes and monitor gas emissions.	1	0	3	1	1	-13	Neg Low	1	0	3	1	1	-13	Neg Low

Environmental Impact Assessment		Waste Disposal Facility (Direct with mitigation)							Scaw Metals Union Junction Facility (Cumulative)						
Impact	**Design and Operations Measures for Impact Control**	Extent	Severity	Duration	Frequency	Probability	Impact Sig	**Impact Significance**	Extent	Severity	Duration	Frequency	Probability	Impact Sig	**Impact Significance**
Social and Economic															
Occupational health risk from exposures	Implement Scaw health and safety programme. Risk assessments. Induction of personnel on risks. Use of PPE. Medical Surveillance. Exposure monitoring. Emergency procedures in place.	1	2	3	3	2	-27	Neg Low	1	2	3	3	2	-27	Neg Low
Economic benefits through employment	Preference to local persons and suppliers.	2	1	3	4	3	30.5	Pos Low	2	1	3	4	3	30.5	Pos Low
Continued legal and managed disposal of waste from Scaw Metals.	Operate the WDF 5 in terms of permit / WML conditions and Minimum Requirements. Competent person to manage site. Annual external audit of site performance and compliance.	2	3	3	1	4	41.5	Pos Moderate	2	3	3	1	4	41.5	Pos Moderate
No-go Alternative															
Reduction in local dustfall and air-borne pollutant concentrations	Close, cap and vegetate cells	2	1	4	2	2	30	Pos Low	2	1	4	2	2	30	Pos Low
Reduction in groundwater pollution	Close, cap and vegetate cells. Maintenance of cells and infrastructure. On-going monitoring of water quality	2	1	3	4	2	30	Pos Low	2	1	3	4	2	30	Pos Low
Closure of marginal businesses/ Scaw Metals facility.	Reduce base costs Retrenchment of personnel. Decommission and close all facilities	2	2	2	1	2	-34	Neg Moderate	2	3	2	1	2	-40	Neg Moderate

Environmental Impact Assessment		Waste Disposal Facility (Direct with mitigation)							Scaw Metals Union Junction Facility (Cumulative)						
Impact	**Design and Operations Measures for Impact Control**	Extent	Severity	Duration	Frequency	Probability	Impact Sig	**Impact Significance**	Extent	Severity	Duration	Frequency	Probability	Impact Sig	**Impact Significance**
Loss of employment	Redeploy personnel to other functions if possible	2	1	3	4	3	-31	Neg Low	2	1	3	4	3	-31	Neg Low
Increased heavy vehicle traffic on public roads	All vehicles to be road worthy and operators trained. Minimise loads and use shortest appropriate route. Schedule trips for off-peak hours.	3	2	3	2	3	-45	Neg Moderate	3	2	3	2	3	-45	Neg Moderate
Consumption of airspace in other landfill sites	Minimise waste disposal by implementing process efficiency and waste recovery.	1	2	3	3	4	-28	Neg Low	1	2	3	3	4	-28	Neg Low
Displacement of risk of waste disposal to other hazardous waste disposal sites	Ensure disposal to licensed and managed site. Full disclosure of waste contents to site operator.	1	2	3	4	4	-28	Neg Low	1	2	3	4	4	-28	Neg Low

Mitigation measures for all of the impacts identified are included in the draft EMP.

8 Environmental Impact Statement

The development of the proposed WDF 5 will facilitate the operation of phase 2 of the Electrical Co-generation Power Plant. The Electrical Co-generation Power Plant will have a number of desirable outcomes for Scaw Metals as well as the environment. The Co-generation Power Plant will improve the overall energy efficiency of the Scaw Metals Union Junction facility and reduce the emissions footprint for the site. The use of an in-house WDF will allow Scaw Metals to dispose of waste in a cost-effective manner and ensures that Scaw Metals retains responsibility for the waste throughout its life cycle. The WDF5 will also provide additional capacity for the disposal of other wastes produced at the Union Junction Facility. As the current GLB+ waste disposal site at Scaw Metals Union Junction Facility, namely Cell 4B, has a limited amount of capacity left (approx. 5 years), this is considered of great benefit to Scaw Metals as their on-site waste disposal capacity would be extended by at least another 10 years.

Potential environmental impacts associated with the development of the proposed WDF 5 at Scaw Metals were assessed through the EIA process. The EAP concluded that the development of WDF 5 at its proposed location is not subject to any fatal flaws or significant impacts that cannot be mitigated. The development of the proposed WDF 5 is also unlikely to introduce any new impacts to the greater Scaw Metals Union Junction Facility. Although the development of the WDF 5 will add to the cumulative impacts of the site, it will not alter the overall significance of the site's impacts. The assessment concluded that adjacent residential receptors are not currently, nor will they be exposed to any unacceptable environmental risk from the development and operation of the WDF 5 at Scaw Metals.

The main concerns prior to the EIA process were: the impact of waste disposal on local groundwater quality and potentially on the Elsburg Spruit, the impact on air quality, including nuisance and public health, from particulate emissions arising from disposal to the WDF5. Air Quality, Geohydrological and geotechnical studies were undertaken to investigate potential impacts of the proposed waste disposal operations.

The Air Quality Impact Assessment utilised an emissions inventory and dispersion model to consider current and predict future impacts. The assessment found that dust impacts from the unmitigated waste disposal operations were likely to be localised. Predicted annual dust emissions will increase as a result of windblown emissions from the WDF5. However, most of the dust fall will be restricted to within the Scaw property. The off-site dustfall rates predicted were well below the draft dustfall regulation limit values for residential areas for all scenarios. The commissioning of the new WDF5 (and the closure of Cell4b) will result in an increase in dustfall rates at the SMUJ boundary to the east and south-east but a reduction in dustfall levels at the sensitive receptors downwind (south and south-west) of the Scaw Metals property. Health and nuisance risks to residential receptors were of very low significance. With appropriate mitigation the concentration and extent of particulate emissions could be maintained below the standards. The study recommended that the existing dust fall monitoring be continued with the addition of a further dust bucket to the east of the WDF5.

The Geotechnical investigation found that the site is appropriate for the development of the WDF 5. No significant geological structures or anomalies were encountered. Soil are relatively impermeable although portions of the site did have seepage at shallow depths below surface. The Geohydrological Investigation constructed a groundwater flow and mass transport model to consider current and future impacts on groundwater quality. The assessment considered the soil permeability, depth to groundwater, possible flow paths and the use of a proposed basal liner system. The assessment found that simulated impacts on groundwater quality to be minimal. In the most conservative simulation, contaminants from the ash disposal would take 35 years to arrive at the Elsburg Spruit. Overall the groundwater resources is not at risk from the waste disposal operations. The study recommended that the existing monitoring network be expanded with the addition of upstream and downstream boreholes.

Failure to develop WDF 5 at the Scaw Metals Union Junction Facility may prevent the predicted impacts at the site, but will require Scaw Metals to identify an alternative for the disposal of the ash waste streams to be produced at the Electrical Co-generation Power Plant. Or alternatively not to develop phase 2 of the Electrical Co-generation Power Plant. Disposing of the waste at a commercial landfill will significantly reduce the viability of the Electrical Co-generation Power Plant as additional costs will be incurred not only for the disposal, but for the transport of the waste. Over and above the cost implications, there would also be increased risk with large volumes of hazardous waste being transported by heavy vehicles on public roads. As all wastes generated by the Co-generation plant will be disposed of on-site, the WDF 5 will allow for the cradle to grave responsibility of the Co-generation plant.

The WDF5 will also provide additional capacity for the disposal of other wastes produced at the Union Junction Facility. As the current GLB+ waste disposal site at Scaw Metals Union Junction Facility, namely Cell 4B, has a limited amount of capacity left (approx. 5 years), this is considered of great benefit to Scaw Metals as their on-site waste disposal capacity would be extended by at least another 10 years.

The EAP can therefore conclude that:

- it is best to dispose of the waste ash from the proposed Co-generation Plant locally;
- the proposed site is suitable for the development of the WDF 5;
- the design of the waste cells and associated infrastructure are appropriate to ensure the management of environmental risk; and
- the proposed monitoring programmes are adequate to detect contamination.

9 Conclusions and Key Findings

This report forms part of the EIA phase of the proposed WDF 5 at Scaw Metals. It outlines the results of the public participation and authority consultation process undertaken, explains the results of the specialist studies undertaken, assesses the environmental and socio-economic impacts and outlines mitigation and environmental management measures.

The WDF 5 will allow waste ash, generated at the proposed Electrical Co-generation Plant at Scaw Metals to be disposed of locally and avoid the need to transport and dispose of the waste ash off site. This will have a number of benefits including allowing for the ‘cradle to grave’ responsibility by Scaw Metals for wastes from their production processes; the reduction of disposal costs for ash from the Co-generation plant; as well as the extension of waste disposal capacity at the Union Junction facility.

The most significant risks of the WDF 5 are the potential effects on groundwater quality due to the leakage of leachate from the site and a reduction in air quality (nuisance and health risk) from particulate emissions of material handling and ash disposal. Specialist investigations showed however that these impacts will be of relatively low risk. With the proposed mitigation the overall significance of these impacts are anticipated to be well within acceptable limits. The required mitigation measures, which are presented in the EMP (see Section 11), are considered to be sufficient to mitigate the impacts to environmentally acceptable levels. There are no impacts which have a high significance after mitigation. There have been no fatal flaws identified during the EIA phase.

The EAP considers that the environmental process followed meets the requirements of the legislation to

ensure that the regulatory authorities receive sufficient information to enable them to make an informed decision.

Synergistics Environmental Services (Pty) Ltd, as independent EAPs, conclude that there is no environmental reason why the development of the WDF 5 at Scaw Metals, Germiston, should not be authorised with a WML from the competent authorities.

10 Consultant Declaration

Synergistics Environmental Services is an independent environmental consultancy that was established in South Africa in 2004. Synergistics Environmental Services acted as independent consultants to Scaw Metals and has no financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the EIA Regulations, 2010. Matthew Hemming, the practitioner responsible for the reporting on this project, is an EAP with over 8years of experience in the field of environmental consulting, particularly in the mining and waste management sectors.

Synergistics has made every effort to disclose, to the competent authority and IAPs, all relevant facts and material information that has the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the EIA Regulations, 2010. It is deemed that the EIA process followed meets the requirements of the legislation to ensure that the regulatory authorities receive sufficient information to enable an informed decision.

I, the undersigned herewith declare that this EIR represents an objective and complete assessment of the environmental issues associated with the proposed introduction of the WDF 5 at Scaw Metals, Germiston.

COMPILED BY:

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11 Draft Environmental Management Programme

11.1 Introduction

This draft EMP, for the WDF 5 at Scaw Metals, Union Junction has been prepared as per the requirements of the EIA Regulations (Regulation 33 of GNR 543, 2010). The EMP, once approved by the competent authority, is a legal document and Scaw Metals is overall accountable and responsible for the implementation thereof.

It must be noted that site management and waste disposal at the Scaw Metals facility is undertaken in terms of current site permits, licences and EMPs. These documents specify numerous management and monitoring measures to effect environmental management at the Scaw Metals facility. This EMP does not repeat the commitments contained in these documents and has only set out the management and monitoring measures specific to the WDF 5 assessed in this EIA. This EMP does not replace current licences, permits or EMPs and should be implemented in conjunction with any existing environmental management measures.

11.1.1 EMP Structure

The EMP details the actions/mitigation measures to be put in place to ensure the protection of the environment and lessen the environmental impacts associated with the project across its life cycle. The EMP is structured to include:

- The project activity/aspect requiring management;
- The management objective arising from these activities/aspects;
- The management and monitoring actions to be implemented, and
- The timeframes associated with the required management or monitoring action.

11.1.2 Project Activity

The aspects covered by the EMP include those described in Section 4 of the EIR.

11.1.3 Responsible Persons

It is the responsibility of Scaw Metals to implement the EMP and to make sure that all the actions are carried out. The successful implementation of the EMP is however dependent on clearly defined roles and responsibilities for each of the management actions given. Roles have been ascribed to the following parties:

Project Manager	The person, from Scaw Metals, overall responsible for the WDF 5, including its feasibility, design, construction, operational, decommissioning and post closure phases. Takes overall responsibility for implementation of the EMP.
Construction Manager	Person appointed to manage the construction of the WDF 5.
WDF5 Manager	The person, from Scaw Metals, responsible for the overall management of the proposed WDF 5 including its construction, operational, decommissioning and post closure phases. Takes overall responsibility for implementation of the EMP.
Environmental Practitioner:	Environmental personnel at Scaw UJ responsible for: • Overseeing environmental compliance of all operations with respect to legislation, EMS ,EMPs procedures etc. the EMP by the contractor's staff and sub-contractors and their staff;

	• Issuing instructions to remediate non-compliance; • Conducting regular inspection meeting with the Project Manager; • Report non-compliance to the Scaw Metals Plant Manager.
Environmental Compliance Officer (ECO):	Responsible for monitoring all environmental aspects relating to the construction phase and auditing construction activities to ensure compliance with this EMP, the Environmental Authorisation and other environmental licences. Report non-compliance to the Environmental Practitioner.

11.2 Management and Mitigation Measures

11.2.1 Planning and design

The planning and design phase refers to the stage when the feasibility studies are being undertaken, the project description is being developed, responsible persons are being appointed, and the facility and supporting infrastructure is being designed. Designs and operating procedures must be developed to ensure compliance with relevant environmental legislation, emissions standards and health risk guidelines.

Local knowledge, site specific information and lessons learnt from previous cells should be implemented in the planning and design of the facility. The key measure to isolate the waste cell from the environment is to ensure that the base of the cells is above the groundwater table.

The WDF 5 must be designed to meet or improve on the criteria for a Class A disposal site as specified in the National Norms and Standards for Disposal of Waste to Landfill (GN 636, August 2013). The facility is to be designed by professional engineers in terms of NEMWA and best practice. Approval of the basal liner system designs is to be obtained from the competent authority prior to construction.

Activities during planning and design for the development of WDF 5 will take place within the Scaw Metals property. The site at Union Junction is disturbed as a result of past activities at the facility. Planning and design are not anticipated to result in impacts of significance.

All personnel and contractors must be made aware of the Scaw Metals safety system. The necessary inductions, risk assessments and PPE must be enforced.

11.2.2 Construction Phase

This phase will involve the physical construction of the WDF 5 and its associated infrastructure. The construction and installation of the WDF 5 must be done in terms of the specifications, methods or procedures as set out by the approved designs and respective suppliers. The installation of the various components will be undertaken by contractors. All contractors must be informed of the requirements to comply with the conditions of the EMP. Requirements to avoid, reduce and mitigate environmental impacts identified in the EIA are detailed in Table 19.

11.2.3 Operational Phase

This phase refers to the period when the WDF 5 will be operational and will involve all the activities associated with its operation as detailed in Section 4. The expected operational lifetime of the facility is 25 years. Requirements to avoid, reduce and mitigate environmental impacts identified in the EIA are detailed in Table 20.

11.2.4 Decommissioning and Closure

Scaw Metals intends to operate the WDF 5 for the foreseeable future. The decommissioning of the facility will occur when the facilities reaches the end of its design life, i.e. all airspace has been consumed. This is likely to be in 25 years or longer if waste re-use and recycling opportunities are identified. At the time when the facility is closed the local environment may have changed significantly from the current state. It is therefore not feasible to undertake a comprehensive assessment of the closure related impacts.

A specific closure plan has not yet been developed for the WDF 5 as the site is many years from closure. Scaw Metals will embark on the development of a plan for closure at least two years prior to the planned closure of the facility. Closure planning will be undertaken in terms of the waste disposal guidelines endorsed by the DEA and other relevant legislation. The basic environmental management that will be applied during closure of the WDF 5 is set out in Table 21.

Table 19: Construction EMP for the Waste Disposal Facility 5

Objectives and Goals	Management and Monitoring Actions	Implementation Programme	
		Responsibility	Implementation & Frequency
Roles and Responsibilities			
To define roles and responsibilities for the implementation of the EMP.	Ultimate responsibility for the implementation of and compliance with the construction EMP rests with Scaw Metals. Scaw Metals is to nominate a Construction Manger to be responsible for overseeing construction of the WDF5 in compliance with the EMP. The Construction Manager is responsible for implementation, monitoring and auditing of compliance with the EMP. Construction Manager is to ensure regular compliance checks during any construction period. Records are to be kept.	Scaw Metals Construction Manager	On approval of EMP, continuous Weekly.
	Scaw Metals is to ensure that all contractors and sub-contractors are aware of and familiar with site operations, the key environmental issues and consequences of non-compliance to the EMP. Adherence to the licence, the EMP and Scaw EMS must be included as a contractual requirement. All contractors must be provided with a copy of the EMP and all Environmental Emergency Response Plans.	Scaw Metals Construction Manager	Throughout the duration of the contract.
	Each contractor is to provide Scaw Metals with a signed letter indicating their acknowledgement of the conditions of the licence, the EMP and Scaw EMS. Contractors are responsible for compliance with the EMP for all aspects of their work package. Any incident or non-compliance is to be immediately reported to Scaw Metals.	Contractors	Throughout the duration of the contract.
	Scaw Metals must appoint or nominate, in writing, a capable and suitably qualified environmental compliance officer (ECO) to monitor all environmental aspects and EMP compliance during construciton.	Construction Manager	Throughout the duration of the contract.

Objectives and Goals	Management and Monitoring Actions	Implementation Programme	
		Responsibility	Implementation & Frequency
Environmental Awareness and Training			
Ensure that all persons working at the WDF5 site are aware of the objectives of the EMP as well as the consequences of their individual actions	Environmental induction training must be provided to all persons undertaking work at the WDF5 (to be incorporated into normal induction training) including permanent workers, contractors and consultants.		Ensure that all persons working at the Plant are aware of the objectives of the EMP as well as the consequences of their individual actions
Occupational Health and Safety			
Ensure the safety of workers at the WDF5	All operations to be managed in compliance with the requirements of the Occupational Health and Safety Act, 1993 (Act 85 of 1993) and Scaw Metal policies.	Construction Manager	During construction
Construction activities			
Maximise the recovery of topsoil during construction.	All clean topsoil should be salvaged from infrastructure footprints for appropriate later use. Topsoil should be stockpiled and protected from erosion by wind and water. Topsoil may not be utilised as fill material or disposed of. Contaminated topsoil must be handled seperately from clean topsoil.	Construction Manager	During construction
Prevent contamination of surface and groundwater resources	Appropriate soil conservation measures must be provided in order to prevent soil erosion and sedimentaiton of surface water.	Construction Manager	During construction
	Materials for the construction of the facility and any rubble must be stored in a manner that does not pose risks to the contamination/ quality of storm water runoff.	Construction Manager	During construction
	Chemical toilets must be provided for construction personnel if the sewage system is found to be insufficient for the number of people on site during construction. These toilets must be located further than 100m from a water resource and must be regularly serviced. Sewage may only be disposed to a recognised sewage treatment facilty and records of safe disposal must be kept.	Construction Manager	During construction
Manage hydrocarbons.	On site fuelling and servicing of construction equipment and vehicles must only occur in a	Construction	During construction

Objectives and Goals	Management and Monitoring Actions	Implementation Programme	
		Responsibility	Implementation & Frequency
	designated area with adequate measures to prevent the spillage of hydrocarbons. All equipment and vehicles must be checked for leaks before commencing work on site. Drip trays must be placed beneath equipment and parked vehicles which drip oil. All equipment that leaks fluid must be repaired immediately or removed from site when necessary.	Manager	
	Source populations of alien plants, if present, must be removed during construction phase. The alien plants should then be disposed of in a manner which will not result in proliferation of the plants.	Construction Manager	During construction
Minimise dust generation	Limit vehicle speeds on unpaved areas to 30 km/h. Undertake regular and effective wetting or chemical dust suppression of gravel access roads and working areas. Paved roads and loading areas must be regularly cleared of silt with the use of vacuum and/or broom sweepers. Cover or wet material stockpiles that generate dust.Intensify dust suppression or suspend dust generating activities during windy conditions.	Construction Manager	During construction
Keep noise to acceptable limits	Where possible, construction working hours are to be limited to day time. All machinery to be used during the construction phase should be properly muffled and maintained so as to reduce noise generation to a minimum. Construction activities must be managed such that noise levels at the site boundary are in compliance with relevant standards.	Construction Manager	During construction
To ensure rehab of disturbed areas	Once the construction activity has been completed, the remaining disturbed area which will not be used must be sloped, topsoiled and re-vegetated as soon as possible using suitable grass species. This re-vegetation will assist in reducing the potential for soil erosion.	Construction Manager	On completion of construction
Basal liner			
To ensure that the basal liner installed meets the design and quality specifications	The basal liner of waste disposal cells to be designed by professional engineers in terms of requirements for a Class A landfll.	Project Manager	During construction

Objectives and Goals	Management and Monitoring Actions	Implementation Programme	
		Responsibility	Implementation & Frequency
	Approval by the DWA of all designs must be obtained prior to construction.		
	Basal liner components must be procured from suppliers who can guarantee quality and performance.	Construction Manager	During construction
	Excavations and cut to fill operations for the basal liner system must remain at least 1m above the base of the unsaturated zone.	Construction Manager	During construction
	Quality Control Assurance programme during liner installtion to ensure functionality and integrity of liner	Construction Manager	During construction
	Waste disposal or placement may not commence in the WDF5 until the the liners, drains and suitable barriers are in place to prevent dispersion of contaminants.		
Storm water management			
To ensure the control of storm water and the protection of downstream water resources	Storm water run-off controls must be implemented for the WDF5 site to: - Divert clean water away from the site; - Contain dirty storm water within the Scaw Metals systems.	Construction Manager	During construction
	All dirty storm water drains and canals must have sufficient capacity to handle run-off anticipated during a rainfall event of 1:50 year intensity and 24 hr duration.	Scaw Metals	Continuous.
	Dirty water dams, paddocks and other containment structures must be designed not to spill more than once every 50 years (ie. the risk of spillage must be less than 2% in any one year). All containment structures should have a design free-board of 0.5 m.	Scaw Metals	Continuous.
	The storm water water channel on site may not be blocked or filled until an alternative has been implemented. The main flow path of the system must have erosion protection and the outlet must have structures to dissipate energy and reduce flow velocities.	Construction Manager	During construction
	Discharge of any contaminants such as fuels, oils, detergents, cement and organic materials into any watercourse or storm water drain is prohibited.	Construction Manager	During construction
Heritage Resources			
Prevent any impact on archaeological	If any archaeological remains or artefacts are exposed during the construction phase, the	Environmental Manager/ Contractor	If graves or artefacts are

Objectives and Goals	Management and Monitoring Actions	Implementation Programme	
		Responsibility	Implementation & Frequency
remains that may be excavated during the construction phase	construction must be suspended immediately and the South African Heritage Resources Agency (SAHRA) and DEA must be informed.		uncovered at any time.
	The grave or artefact uncovered must not be moved until clearance is given by the heritage specialist / archaeologist. Measures must be taken to prevent damage to the grave / artefact.	Environmental Manager/ Contractor	If graves or artefacts are uncovered at any time.
Spill Prevention and Management			
Minimise environmental impact from spills	All chemicals and hydrocarbons to be stored in lined and bunded areas and handled to prevent dispersion to the environment. Appropriate containers must be used for storage and transport of hazardous substances.	Construction Manager	During construction
	Ensure adequate signage at chemical and hydrocarbon storage areas. Material Safety Data (MSD) sheets for all chemicals and hydrocarbons must be displayed in close proximity to the area of storage.	Construction Manager	During construction
	Chemicals (indcluding those used for cleaning) and hydrocarbon must not be released into the environment or sewage treatment system. These materials must be contained and disposed of as hazardous waste.	Construction Manager	During construction
	Fuel and other petrochemicals must be stored in receptacles that comply with SANS100-1:2003 (SABS089-1:2003).	Construction Manager	During construction
	Personnel dealing with hazardous substances must be appropriately trained.	Construction Manager	During construction
	Regular inspection to be carried out on areas where hazardous substances are stored or handled.	Construction Manager	During construction
	Chemical and hydrocarbon spills are to be regarded as an environmental incident and reported through the incident reporting system.	Construction Manager	At a spill
	All spills of chemicals or hydrocarbons (oil, grease, diesel, petrol, etc.) will be cleaned with the use of suitable absorbent materials such as Drizit or Oclansorb.	Construction Manager	At a spill
	All soils that have become contaminated with oils, fuels and lubricants must be removed	Construction	At a spill

Objectives and Goals	Management and Monitoring Actions	Implementation Programme	
		Responsibility	Implementation & Frequency
	and managed as hazardous waste.	Manager	
	Ensure appropriate inspections are conducted to ensure early detection of spills. The integrity of containers and bunds are to be monitored regularly to ensure that no seepage escapes.	Construction Manager	During construction
Waste Management			
To ensure effective management of wastes generated during construction	Waste generated during construction must be: - separated by type (general or hazardous); - stored so as to prevent environmental pollution; - re-used or recycled where possible. No illegal dumping or disposal may take place.	Construction Manager	During construction
	Provide designated waste collection and storage points. Ensure that these have adequate capacity and are frequently cleaned.	Construction Manager	During construction
	Separate waste receptacles must be provided for general and hazardous wastes. All hazardous waste must be handled and stored in containers or on impervious surfaces. Containers for hazardous waste must be labeled "hazardous waste".	Construction Manager	During construction
	Waste must be removed from site on a regular basis and disposed of at a licensed landfill site. Records of disposal must be kept.	Construction Manager	During construction
	Control litter on an on-going basis.	Construction Manager	During construction
Environmental Risks and Emergencies			
Minimise the risk for environmental emergencies occurring and implement controls to deal with situations, should they occur.	Risk assessments to be undertaken for all construction facilities and activities. Environmental 'Emergency Response Plans' is to be developed for potential high risks. Scaw Metals to ensure that the projects' Emergency Response Plan is compliant with the plan for the SMUJ. Scaw Metals to provide contractors with a copy of Emergency Response Plan.	Environmental Manager	Prior to site establishment. For any new activty or facility.

Objectives and Goals	Management and Monitoring Actions	Implementation Programme	
		Responsibility	Implementation & Frequency
Ensure appropriate response to an emergency and prevent the recurrence of repeat incidents	In the case of an emergency the appropriate response in terms of the Emergency Response Plan should be initiated. Such Emergency Response and reporting must be in terms of Section 30 of the NEMA	Scaw Metals	During construction, at an incident.
Environmental Monitoring			
To recognise impacts on air, ground and surface water resources in the area.	Monitoring in terms of the existing Scaw Metals networks shall continue. Persons involved in sampling and interpretation shall be made aware of the WDF5 construction. Any results of concern should be reported to the Construction Manager.	Environmental Manager	Continuous
	The Construction Manager must consider and investigate construction operations as a possible source of the concern. Should construction activities be or possibly be, the source then measures to correct the incident and/or prevent the recurrence of such an incident must be implemented	Construction Manager	Continuous
	All sampling is to be conducted by suitably qualified and competent persons using appropriate sampling techniques. All samples will be analysed at an accredited, independent laboratory. Records of monitoring must be kept for the site.	Environmental Manager	Continuous
EMP Compliance			
Implementation of the required management measures and compliance with the EMP	A copy of the EMP and all WMLs must be kept at the main site office.	Construction Manager	During Construction phase
	Each contractor must keep a copy of the EMP at their site office and this copy must be available to their staff.	Contractor	Throughout the duration of the contract.
	Contractors must implement any procedures and written instructions in terms of the EMP issued to them by Scaw Metals. Contractors must not deviate from the EMP or written instructions without approval from Scaw Metals.	Contractor	Throughout the duration of the contract.
	The ECO will monitor and audit the construction activities to ensure compliance with this	Environmental	Weekly during

Objectives and Goals	Management and Monitoring Actions	Implementation Programme	
		Responsibility	Implementation & Frequency
	EMP and the WML.	Compliance Officer	construction
	A register of all environmental incidents is to be maintained. The Environmental Manager is to be notified of all environmental incidents.	Environmental Manager	During construction phase
	Records relating to the compliance and non-compliance with the conditions of the EMP and WML will be kept in good order. Such records will be available for inspection at the site office and must be made available to the DEA within seven (7) working days of the date of the written request by the Department for such records.	Environmental Manager	During construction phase
Public Relations			
To ensure that public complaints are recorded and addressed.	Maintain a complaints register according to the EMS system.. The complaints register will record the following: Date when complaint/concern was received; Name of person to whom the complaint/concern was reported; Nature of the complaint/concern reported; The way in which the complaint/concern was addressed (date to be included).	Environmental Manager	During construction
	Any complaints regarding the said development will be brought to the attention of the Environmental Manager within 24 hours after receiving the complaint.	Environmental Manager	During construction
	Scaw Metals must assess the merits of every complaint and initiate an investigation when required.	Environmental Manager	As required, within 48 hrs
	The complaints must be investigated and remedied where possible. A response should be provided to the complainant.	Environmental Manager	During construction within 72 hours
	The complaints register will be kept up to date for inspection by members of the DEA.	Environmental Manager	During construction

Table 20: Operations EMP for the Waste Disposal Facility 5

Objectives and Goals	Management and Monitoring Actions	Implementation Programme	
		Responsibility	Implementation & Frequency
Roles and Responsibilities			
To define roles and responsibilities for the implementation of the EMP.	Ultimate responsibility for the implementation of and compliance with the operational EMP rests with Scaw Metals. Scaw Metals is to nominate a Manager to be responsible for overseeing operations in compliance with the EMP. The WDF5 Manager is responsible for implementation, monitoring and auditing of compliance with the EMP Records are to be kept.	Scaw Metals WDF5 Manager	On approval of EMP, continuous
Environmental Awareness and Training			
Ensure that all persons working at the Plant are aware of the objectives of the EMP as well as the consequences of their individual actions	Environmental training and awareness must be provided to all persons employed at the WDF5 (to be incorporated into normal SHEQ training) including permanent workers, contractors and consultants. As part of the training all workers on site must be made aware of the conditions of the EMP.	WDF5 Manager	Annually and for all new personnel.
	An environmental awareness programme to be implemented for plant work force addressing pertinent topics as required.	Environmental Manager	Throughout life of site
	Environmental emergency procedures should be addressed as part of environmental training.	Environmental Manager	Throughout life of site
	A copy of the EMP and all environmental authorisations must be kept at the main office.	Environmental Manager	Throughout life of site
	Environmental emergency procedures should be addressed as part of environmental induction training.	Environmental Manager	Throughout life of site
Occupational Health and Safety			
Ensure the safety of workers at the WDF5.	All operations to be managed in compliance with the requirements of the Occupational Health and Safety Act, 1993 (Act 85 of 1993) and Scaw Metal policies.	WDF5 Manager	Throughout life of site

Objectives and Goals	Management and Monitoring Actions	Implementation Programme	
		Responsibility	Implementation & Frequency
Waste Disposal to WDF5			
To ensure appropriate development and operation of the WDF5	The WDF5 must be developed in terms of the approved designs and within the specified design parameters.	WDF5 Manager	Throughout life of site
	The WDF5 must be operated and managed in terms of the Operations Manual, the WML and all relevant Norms and Standards.	WDF5 Manager	Throughout life of site
To ensure the appropriate handling and disposal of waste.	Waste may only be deposited, stored, stockpiled, treated, disposed or otherwise handled within the footprint of the waste cell.	WDF5 Manager	Throughout life of site
	Moisture content of the ash must be maintained between 5 and 10%	WDF5 Manager	Throughout life of site
	The cells of the WDF5 must be developed consecutively, using the rising green wall method of development.	WDF5 Manager	Throughout life of site
To ensure the appropriate knowledge of wastes for disposal to the WDF5	Prior to disposal at the WDF5, all wastes must have been assessed in terms of the Norms and Standards for Assessment of Waste for Disposal to Landfill. Only suitable wastes may be disposed to the WDF5	WDF5 Manager	Throughout life of site
To ensure the appropriate treatment of waste.	Treatment must be applied to waste destined for disposal to the WDF5, as determined by the waste classification.	WDF5 Manager	Throughout life of site
To maximise the life of the WDF5	Minimise waste disposal by implementing process efficiencies and investigating the re-use, recycling and recovery of materials from the waste stream. Such operations should only be undertaken if they: - uses less natural resources than the disposal of the waste; - are less harmful to the environment than the disposal of the waste	WDF5 Manager	Throughout life of site
Storm water Management			
To ensure the control of storm water and the protection of the water resource	All clean storm water must be diverted away from the WDF5 and returned to the environment. All contaminated storm water arising from the WDF5 must be contained within the WDF5 storm water facilities.	WDF5 Manager	Throughout life of site
	Storm water controls for the WDF5 to - divert clean water away from the site;	WDF5 Manager	Throughout life of site

Objectives and Goals	Management and Monitoring Actions	Implementation Programme	
		Responsibility	Implementation & Frequency
	- contain dirty storm water within the site; must be inspected and maintained to their design function.		
	All storm water containment structures must be managed to maintain a freeboard of 0.5m and prevent overflows.	WDF5 Manager	Throughout life of site
	All chemicals and hydrocarbons to be stored in bunded areas and handled to prevent dispersion to the environment.	WDF5 Manager	Throughout life of site
Leachate Management			
To regulate the management of leachate/seepage	Leachate and subsoil seepage from the WDF5 must be captured and contained: All Leachate arising from the WDF5 must be contained within the WDF5 leachate facilities. Where such leachate cannot be used for dust suppression on the site it must be treated or disposed to sewer (only in terms of a municipal permit).	WDF5 Manager	Throughout life of site
	All leachate containment structures must be managed to maintain a freeboard of 0.5m and prevent overflows.	WDF5 Manager	Throughout life of site
	The leachate collection system must be inspected and maintained to its design function.	WDF5 Manager	Throughout life of site
Dust Management			
To limit the generation of particulate matter emissions form the WDF5.	Vehicle speeds on site must be limited to 30km/h.	WDF5 Manager	Throughout life of site
	Roads should be swept to remove loose particles or wetted to dampen dust.	WDF5 Manager	Throughout life of site
	Vehicle pathways across the ash pile must be covered with a running course of coaser material such as slag.	WDF5 Manager	Throughout life of site
	The outer berms/walls of the waste cell must be covered in soil and vegetated.	WDF5 Manager	Throughout life of site
	The working face/disposal area in the active waste cell must be limited to the smallest area possible. The moisture content of the surafce ash at the working face/disposal area must be maintained above 5%.	WDF5 Manager	Throughout life of site
	Areas where ash disposal has been completed (ie maximum lift achieved) must be covered with soil or slag.	WDF5 Manager	Throughout life of site

Objectives and Goals	Management and Monitoring Actions	Implementation Programme	
		Responsibility	Implementation & Frequency
	For dust suppression: Contaminated storm water may only be used within the lined areas of the waste disposal cells. Clean water must be used where dust supression is required outside of the lined waste disposal cells.	WDF5 Manager	Throughout life of site
Environmental Risks and Emergencies			
Minimise the risk for environmental emergencies occurring and implement controls to deal with situations, should they occur.	Risk assessments to be undertaken for all operational facilities and activities. Environmental 'Emergency Response Plans' is to be developed for potential high risks. Scaw Metals to ensure that the projects' Emergency Response Plan is compliant with the plan for the SMUJ. Scaw Metals to provide operators with a copy of Emergency Response Plan.	WDF5 Manager	Throughout life of site
Ensure appropriate response to an emergency and prevent the recurrence of repeat incidents.	In the case of an emergency the appropriate response in terms of the Emergency Response Plan should be initiated. Such Emergency Response and reporting must be in terms of Section 30 of the NEMA	WDF5 Manager	During operations, at an incident.
Environmental Monitoring			
To recognise impacts on air, ground and surface water resources in the area.	Monitoring in terms of the existing Scaw Metals networks shall continue. Persons involved in sampling and interpretation shall be made aware of the WDF5. Any results of concern should be reported to the WDF5 Manager.	Environmental Manager	Throughout life of site
	All sampling is to be conducted by suitably qualified and competent persons using appropriate sampling techniques. All samples will be analysed at an accredited, independent laboratory. Records of monitoring must be kept for the site.	Environmental Manager	Throughout life of site
	Monitoring results must be made available to the WDF 5 Manager.	Environmental Manager	Quarterly, Throughout life of site
	The WDF5 Manager must consider and investigate operations as a possible source of the concern.	WDF5 Manager	As required

Objectives and Goals	Management and Monitoring Actions	Implementation Programme	
		Responsibility	Implementation & Frequency
	Should WDF5 activities be or possibly be, the source then measures to correct the incident and/or prevent the recurrence of such an incident must be implemented		
	Monitoring is to be undertaken as set out in Section 11.3 of the EMP. A Water Monitoring Protocol is to be developed for the WDF 5 which sets out the locations, frequency and variables for monitoring of surface water, groundwater, leachate, sub-soil seepage and leak detection.	Environmental Manager	Throughout life of site
EMP Compliance			
Implementation of the required management measures and compliance with the EMP	A copy of the EMP and all WMLs must be kept at the main site office.	WDF5 Manager	Throughout life of site
	Any contractor must keep a copy of the EMP at their site office and this copy must be available to their staff.	Contractor	Throughout the duration of the contract.
	Operations personnel must implement any procedures and written instructions in terms of the EMP issued to them by Scaw Metals. Operations must not deviate from the EMP or written instructions without approval from Scaw Metals.	WDF5 Manager	Throughout life of site
	The ECO will monitor and audit the operations to ensure compliance with this EMP and the WML.	Environmental Compliance Officer	Monthly during operations
	A register of all environmental incidents is to be maintained. The Environmental Manager is to be notified of all environmental incidents.	Environmental Manager	Throughout life of site
	Records relating to the compliance and non-compliance with the conditions of the EMP and WML will be kept in good order. Such records will be available for inspection at the site office and must be made available to the DEA within seven (7) working days of the date of the written request by the Department for such records.	Environmental Manager	Throughout life of site
Public Relations			
To ensure that public complaints are recorded and addressed.	Scaw Metals to maintain a public complaints register according to the EMS system.. The complaints register will record the following: Date when complaint/concern was	Environmental Manager	During construction

Objectives and Goals	Management and Monitoring Actions	Implementation Programme	
		Responsibility	Implementation & Frequency
	received; Name of person to whom the complaint/concern was reported; Nature of the complaint/concern reported; The way in which the complaint/concern was addressed (date to be included).		
	Any complaints regarding the WDF5 must be brought to the attention of the WDF5 Manager within 24 hours after receiving the complaint.	Environmental Manager	Throughout life of site
	Scaw Metals must assess the merits of every complaint and initiate an investigation when required.	Environmental Manager	As required, within 48 hrs
	The complaints must be investigated and remedied where possible. A response should be proovided to the complainant.	Environmental Manager	As required within 72 hours
	The complaints register will be kept up to date for inspection by members of the DEA.	Environmental Manager	Throughout life of site

11.3 Monitoring

The WDF 5 is located within the Scaw Metals, Union Junction property. Environmental parameters are monitored through various networks including:

- Surface water is monitored at Scaw Metals on a quarterly basis. The monitoring network is to be expanded to include:
    - Contaminated storm water at WDF5 paddocks;
    - WDF5 leachate sump;
    - In clean storm water diversion, down-stream of the WDF5;

  Standard water quality parameters must be included in the analyses as well as any constituents that are known to be typical of the wastes disposed to the WDF5. The monitoring is to be undertaken in terms of a Monitoring Protocol.

- Groundwater is monitored at boreholes at Scaw Metals on a quarterly basis. The monitoring network is to be expanded to include the additional boreholes specific to the WDF5. This should include:
    - 1 borehole pair upstream of the site for background monitoring;
    - 2 borehole pairs downstream of the site.

  The new borehole pairs must be established to specifically monitor the shallow and deeper aquifers.
- The boreholes added during the specialist Geohydrological investigation should be monitored for as long as possible until their closure is required by development of the WDF5.
  These are located at:
    - BH24S -26.280500° S 28.165056° E
    - BH24D -26.280528° S 28.165083° E
    - BH25S -26.282611° S 28.167389° E
    - BH25D -26.282583° S 28.167361° E
    - BH26 -26.284250°S 28.163306° E
    - BH27 -26.281417° S 28.163083° E

  Standard water quality parameters must be included in the analyses as well as any constituents that are known to be typical of the wastes disposed to the WDF5. The monitoring is to be undertaken in terms of a Monitoring Protocol.

- Waste body monitoring must include monthly monitoring of volume and quality of:
    - Sub soil seepage;
    - Liquids in leak detection layer;
    - Leachate;

- Dust fallout is monitored around the Scaw Metals property and surrounds on a monthly basis. An additional dust bucket must be added to the network adjacent to the WDF5 at the eastern edge of the Scaw Metals property.
  If dust fallout is elevated at a sampling site for 2 consecutive months then PM10 sampling should be conducted at that location for at least 1 month.

  Sub-surface gas monitoring boreholes are not considered necessary.

11.4 Environmental Awareness Plan

Scaw Metals must present an annual induction or training, which includes an environmental awareness aspect, to all site personnel at the WDF5. The information required includes a description of the local environment, the sensitive aspects of this environment, the risks associated with the operations and disposal of waste at the WDF5 and the obligations of personnel towards environmental controls and methodologies. All on-site activities should be approached in a risk-averse manner and the precautionary principle should always be applied. All contractors involved in work on the WDF5 must also be presented with the induction prior to commencing work.

If necessary, “refresher” meetings/ talks should be held at a frequency determined by Scaw Metals/ contractor (as applicable) based on the level of risk to the environment.

11.5 Records, Reporting and Performance Assessment

All records related to the implementation of this EMP (e.g. WML, operating procedures, site instruction book, register of incidents and emergencies etc) must be kept together in an office where it is safe and can be retrieved easily. These records should be kept for submission to the relevant authorities if so requested. It is recommended that photographs are taken of the site prior to, during and immediately after construction as a visual reference. These photographs should be filed with other records related to this EMP.

The WDF5 must be subject to internal and external audits as per the requirements of the WML. The audits must report on compliance of the WDF5 with the EMP and conditions of the WML.

Table 21: Closure EMP for the Waste Disposal Facility 5

Objectives and Goals	Implementation Programme		
	Management and Monitoring Actions	Scheduling	
		Responsibility	Implementation & Frequency
Roles and Responsibilities			
To define roles and responsibilities for the implementation of the EMP.	Ultimate responsibility for the implementation of and compliance with the Closure EMP rests with Scaw Metals.	Scaw Metals	At the start of the decommissioning.
	Scaw Metals must appoint an individual to be responsible for implementation of and compliance with the Closure EMP during closure.	Scaw Metals	At the start of the decommissioning
Rehabilitation and Closure Planning			
Minimise residual impacts on site and ensure the closure objectives are achieved	Define closure and rehabilitation objectives, giving consideration for the preferred end-use of the site when defining the closure objectives.	WDF5 Manager	At the start of the decommissioning
	Undertake closure planning and obtain the necessary licences from the competent authority in terms of current legislation.	WDF5 Manager	At the start of the decommissioning
	Develop a preliminary rehabilitation plan, outlining the way forward for rehabilitation and closure planning.	WDF5 Manager	At the start of the decommissioning
	Determine costs for implementation of rehabilitation and closure objectives.	WDF5 Manager	During decommissioning
Landfill Capping			
Ensure the covering of the waste body in a manner to limit infiltration and exposure.	Design of the capping layers for the WDF5 must comply with the system endorsed by the competent authority for landfill sites of this type.	WDF5 Manager	During decommissioning
Noise			
Minimise the production of noise during the decommissioning phase	Activities must be managed such that noise levels at the site boundary are in compliance with relevant standards	WDF5 Manager	During decommissioning
Air Quality			
Minimise the generation of dust during decommissioning	Dust mitigation measures to be implemented such that dust at site boundaries does not exceed acceptable limits.	WDF5 Manager / Environmental Manager	During decommissioning
Surface water			
Manage operations to limit impacts on surface water quality.	Manage decommissioning operations and implement mitigation to ensure that storm water leaving the site does not exceed acceptable quality limits.	WDF5 Manager / Environmental	During decommissioning

Objectives and Goals	Implementation Programme		
	Management and Monitoring Actions	Scheduling	
		Responsibility	Implementation & Frequency
		Manager	
Waste Management			
To ensure effective management of wastes generated at the Plant	Waste generated during closure must be: - separated by type; - stored so as to prevent environmental pollution; - re-used or recycled where possible. No illegal dumping or disposal may take place.	WDF5 Manager	During decommissioning
Public Relations			
To keep affected parties aware of the project status.	Notify IAPs of the intended closure. Present results of any reports, studies or analyses done for the closure.	Scaw Metals	As required
Health and Safety			
To ensure health and safety of employees.	All closure activities to be managed in compliance with the requirements of the Occupational Health and Safety Act, 1993 (Act 85 of 1993) and Scaw Metal policies.	Scaw Metals	During decommissioning

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List of Appendices

Appendix A: Waste Management Licence Documentation

DEA Accept WML Application
DEA Accept Scoping report

Appendix B: Public Consultation Documentation

B1: Interested and Affected Parties Database
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Appendix C: Geohydrological Impact Assessment

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Exemption Letter
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Appendix H: WDF5 Design Report and Drawings

Appendix I: Procedures and Operations Manuals

Conceptual Operations manual