Project Applicant: **Scaw South Africa (Pty) Ltd**

Project:

Electrical Co-generation Power Plant at Scaw Metals, Germiston

Report Name:

ENVIRONMENTAL IMPACT REPORT

Report Status:

(Final for Submission)

Revision No:	00
Report Date:	June 2014
Report Number:	S0445/EIR01
Prepared by:	Rudi de Jager
Reviewed by:	Matthew Hemming
For Submission to:	Department of Environmental Affairs (DEA): Integrated Permitting Systems, as part of the EIA process required in terms of in terms of the National Environmental Management Act, 1998 and the National Environmental Management: Waste Act, 2008
Reference No:	NEAS: DEA/EIA/0001129/2012. REF: 14/12/16/3/3/3/37

Johannesburg: Tel: +27 11 467 0945
Fax: +27 11 467 0978
PO Box 1596, Cramerview, 2060

Block 7, Fourways Manor Office Park
Cnr Roos & Macbeth Streets,Fourways

KwaZulu-Natal: Tel/Fax: +27 33 343 5826
2 Wattle Grove, Hilton, 3201

Working Together

Synergistics is a SLR Group company

PROJECT INFORMATION SHEET

PROJECT:

Development and Operation of Electrical Co-generation Power Plant at Scaw Metals

COMPETENT AUTHORITIES:

Environmental Authorisation:

Department of Environmental Affairs (DEA)

Directorate: Environmental Impact Evaluation, Integrated Permitting Systems

NEAS: DEA/EIA/0001129/2012 Ref: 14/12/16/3/3/3/37

Atmospheric Emissions Licence:

Ekurhuleni Metropolitan Municipality

Ref: to be confirmed once application is submitted

REPORT DETAILS:

Report Name:	**Environmental Impact Assessment Report**
Report Number:	S0445/EIR01
Report Status:	Final for Submission
Revision No:	01.1
Date:	June 2014

PROJECT APPLICANT:

Scaw South Africa (Pty) Ltd

Contact Person:	Mr Steve van Wyk
Designation:	Operations Manager
Tel:	011 842 9000
Fax:	011 842 9719
Email:	vanwyks@scaw.co.za
Postal Address:	PO. Box 61721, Marshalltown, 2107

INDEPENDENT ENVIRONMENTAL CONSULTANT:

Synergistics Environmental Services (Pty) Ltd *(Synergistics)*

Contact Person:	Matthew Hemming
Designation:	Environmental Assessment Practitioner (EAP)
Tel:	011 326 4158 / 082 940 8274
Fax:	011 326 4118
Email:	matthew@synergistics.co.za
Postal Address:	PO Box 68821, Bryanston, Johannesburg, 2021
EAP:	Matthew Hemming
EAP Expertise:	MSc (Conservation Biology), UCT, 2001. Member of Institute of Waste Management SA and IAIAsa. 8+ years' environmental management and assessment experience, specifically in the mining and waste management sectors.

REPORT DISTRIBUTION

	Name	Designation	Affiliation
Client Review			
1	Livhu Magdimisa	Project Manager	Scaw South Africa
2	Yaruschka Dell	Environmental Manager	Scaw Metals, Union Junction
3	Jurgen Theiss	Head of Safety Health and Environment	Scaw Metals
Draft for Public and Authority Review – April 2014			
4	All Registered IAPs		
5	Commenting Authorities		
6	Competent Authority		
Final for Approval – June 2014			
7	All Registered IAPs		
8	Commenting Authorities		
9	Competent Authority		

SO445/EIR01.1 **June 2014**

SCAW SOUTH AFRICA (PTY) LTD

Electrical Co-generation Power Plant at Scaw Metals, Germiston

Environmental Impact Report (Final)

EXECUTIVE SUMMARY

Introduction to the Project

Scaw South Africa (Pty) Ltd (Scaw Metals) has proposed the development of an Electrical Co-generation Power Plant at their Union Junction facility in Germiston.

Scaw Metals operates at Union Junction to produce a range of products from the recycling of scrap steel and iron ore. The facility has a number of plants, including the Directly Reduced Iron Plant (DRI) that produces up to 1050 tons of iron per day from three (3) kilns. Each kiln uses ore, dolomite and coal 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 'fluff' component. These resources, which contain energy, are currently reused, disposed to landfill or released to the atmosphere in terms of permits.

The current conceptual design of the Electrical Co-generation Power Plant consists of two interlinked components that could 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 up to 68 MW of electricity. The electricity will be utilised primarily by Scaw Metals, but may be available to the grid during low-load periods. 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 trigger a number of activities listed in terms of the National Environmental Management Act, 1998 (NEMA), the National Environmental Management: Waste Act, 2008 (NEMWA) and the National Environmental Management: Air Quality Act, 2004. Such listed activities cannot be undertaken without approval from the competent authorities. A scoping and environmental impact assessment (EIA) process, as stipulated in the EIA Regulations (GN R543, 18 June 2010) is required to support the applications for environmental authorisation, waste management licence (WML) and atmospheric emissions licence (AEL).

This report presents the results of the EIA undertaken for the proposed Electrical Co-generation Power Plant 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 applications for environmental authorisation, WML and AEL.

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:

Integrated Environmental Authorisation

As the Electrical Co-generation Power Plant requires approval under both the NEMA and NEMWA and the Department of Environmental Affairs is the competent authority under both Acts, an application has been made for an Integrated Environmental Authorisation.

Atmospheric Emissions Licence

Required for both components of the Electrical Co-generation Plant. The Ekurhuleni Metropolitan Municipality (EMM) will administrate the application for the AEL required in terms of the NEMAQA.

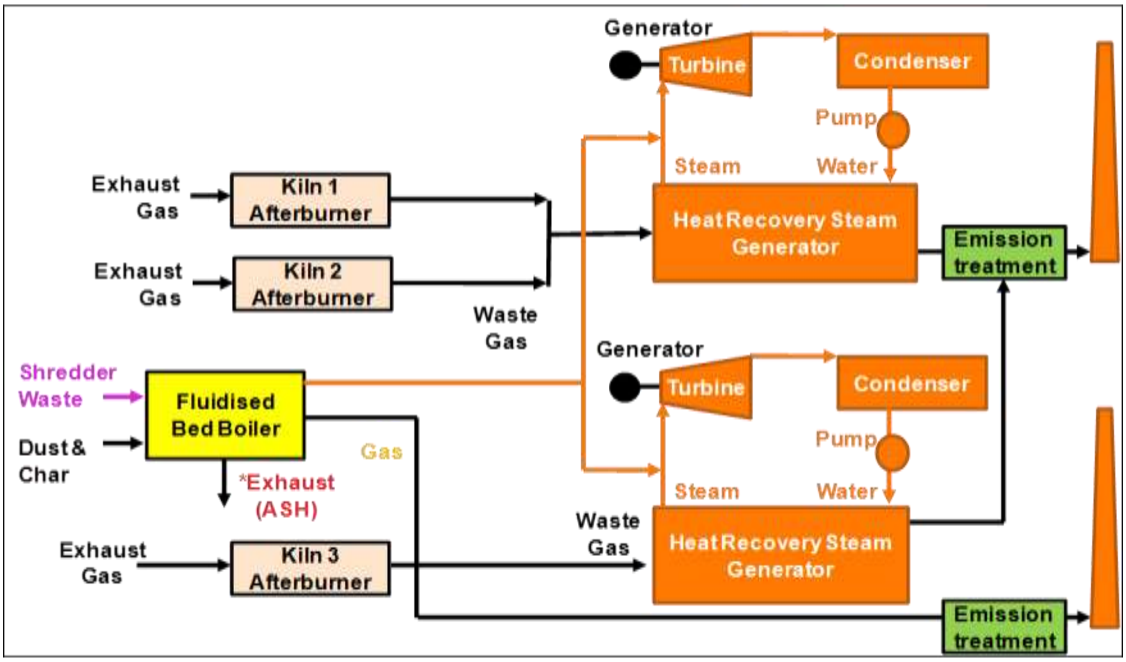
Project Description

The Electrical Co-generation Power Plant will utilise energy contained in the DRI output streams and the combustible component of the shredder waste to generate up to 68 MW of electricity that will be utilised at Scaw Metals. The project will improve the overall energy efficiency of the Scaw Metals Union Junction facility and reduce the emissions footprint for the site. The generation of electricity will improve security of supply, provide electrical capacity for expansion, reduce the amount of electricity required from Eskom and enable Eskom to supply other customers.

A number of alternative technologies and configurations were investigated for the Electrical Co-generation Plant. The preferred process design will produce up to 68 MW of electricity and can be executed through two interlinked components that can be executed jointly or independently and at various scales. The Electrical Co-generation Power Plant will be located on a site immediately north of the DRI plant and integrated with the DRI infrastructure.

Waste heat recovery component: High temperature exhaust gas from one, two or three of the DRI Kilns will be captured from the current process (post after-burners) and passed through Heat Recovery Steam Generators (HRSG). The Heat Recovery Steam Generators recover heat from the exhaust gas and generates steam. The steam generated in the process will be used to drive the turbine of a Generator which will generate electricity. An air-cooled condenser will cool the steam after use and enable its re-use. The exhaust gas will pass through a new bag-house before exiting through a new Stack. The HRSG will be designed to operate with varied availability of the DRI Kilns. If the HRSG or Generator is offline then the exhaust gas from the DRI kilns will revert to the existing DRI stack. Atmospheric emissions will be lower than the limits set in the NEMAQA for DRI kilns.

Combustion component: A Fluidised Bed Boiler (FBB) will be installed to combust dust and char from the DRI kilns as well as Shredder waste from the Scrap metal shredder plant (alternative fuels and raw materials) Natural gas and coal may also be considered as supplementary fuels for the FBB. The heated flue gas will be passed through a Heat Recovery Steam Generator to generate steam. The steam generated will be used to drive the turbine of a generator which will generate electricity. An air-cooled condenser cools the steam after use and enables its re-use. The exhaust gas will pass through a dedicated bag-house before exiting through a stack. Various operational and emissions control technologies will be employed to achieve emissions lower than the limits set in the NEMAQA for waste incineration.*



Proposed Process Flow for the Scaw Co-generation Facility

The electricity produced by the proposed Electrical Co-generation Power Plant will be consumed by operations at the Scaw Union Junction facility. At certain low-load periods excess electricity (if any) may be sold to the National grid.

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 is structured in accordance with GNR 543 and includes the consolidated results of the public participation and authority consultation processes conducted to date. Table 1-4 *(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 was updated and finalised. The final EIR has also been made available to the public and authorities for comment.

Specialist Studies

Airshed Planning Professionals were appointed to undertake an air quality impact assessment for the Electrical Co-generation Plant. The main focus of the air quality assessment was to determine the air pollutants resulting from the Electrical Co-generation Power Plant and the resultant impacts thereof on the surrounding environmental and human health. The scope of work included:

- *Baseline characterisation to define the emissions and impacts from the current operations at Scaw Metals;*
- *Compilation of an emissions inventory for the Electrical Co-generation Plant.*
- *Identify and distinguish all emissions sources (physical and chemical properties)*
- *Identify the change in emissions due to the project.*
- *Perform dispersion modelling for construction and operation of the Electrical Co-generation Plant.*
    - *A number of scenarios were assessed including waste heat recovery only, waste heat recovery and combustion and the combustion component with the combustion of shredder waste.*
- *Predict SO_2, NO_2, CO, dust fallout and fine particulate (PM10 and PM2.5) concentrations.*
- *Compare predicted emissions levels to relevant national ambient and specific process standards.*
- *Define dust nuisance (dust fallout) and potential health impact areas.*

- *Define air quality buffer and management zones around the sites (minimum distances to sensitive receptors).*
- *Propose emissions and dust control measures for construction and operation of the Electrical Co-generation Plant.*
- *Identification of any changes and or additions to the Air Quality Management Plan for Scaw Metals that may be required.*
- *Completion of the application forms for the Atmospheric Emissions Licensing.*

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. 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 Electrical Co-generation Power Plant at the Scaw Metals facility.

Issued Raised During Consultation with Interested and Affected Parties

Questions and issues raised by IAPs during the scoping phase are listed in Table 6-1 *in the main report.* The most prominent question related to the potential effects of the Electrical Co-generation Power Plant on air quality from emissions to atmosphere. Air quality (dust and emissions) is a concern to people living in the area. What emissions will the facility have and how will these be managed?

Environmental Impact Assessment

The environmental assessment for the development of the Electrical Co-generation Power Plant considered the potential incremental and cumulative impact from the Scaw Metals Facility. The assessment of the impact was based on monitoring data, modelling and predictions and specialist opinion. The combustion component of the Electrical Co-generation Power Plant will require the combustion of energy containing materials and waste in a Fluidised Bed Boiler (FBB), as well as the handling and transport of ash, char and shredder wastes. These actions potentially pose a risk to public health (carcinogenic and non-carcinogenic) from gaseous emissions as well as dust nuisance from fugitive dust emissions.

Test work carried out using a pilot-scale FBB indicate that should the FBB be operated at full capacity, numerous emission standards will be exceeded, including those for PM10, CO, NO_x*, CO,* NO_x*,* SO_2*, HCl, HF, and numerous metals. This could potentially have significant detrimental effects on the environment, human health and social welfare. In addition to emissions treatment technology that will be installed in the FBB, combustion rates and operation times will have to carefully controlled to restrict emissions to the permitted maximum emission rates i.e. minimum emission standards.*

Should the FBB be operated so as to restrict emissions to below the minimum emission standards, be it for waste incineration or the combustion of solid fuels, the commissioning and operation of the Electrical Co-generation Plant will have a negligible impact on air quality outside the boundaries of the Scaw Metals Union Junction Facility. In fact, a positive impact of low significance in terms of selected pollutants is expected, mainly due to significant reductions in emissions that will result from waste heat recovery of the Co-generation Plant. It is important that emissions monitoring is undertaken to ensure that emissions remain below the applicable minimum emissions standards.

The impact assessment of the Electrical Co-generation Plant concluded that there are a number of risks associated with the plant, but that with mitigation no negative impacts of significance beyond the boundaries of the Scaw Metals Union Junction Facility are predicted. Key to this is that emissions from combustion component of the Co-generation Plant be restricted to below the emissions standards presented.

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 environment. The Co-generation process will utilise waste heat from the existing DRI plant, as well as combustible wastes produced at Scaw Metals to generate approximately 68 MW of electricity. The project will therefore improve the overall energy efficiency of the Scaw Metals Union Junction facility and reduce the emissions footprint for the site. The generation of electricity will also improve security of supply, provide electrical capacity for expansion, reduce the amount of electricity required from Eskom and enable Eskom to supply other customers. In addition, by combusting waste to produce electricity, the co-generation plant will improve waste management practices at Scaw Metals and bring these in line with the National Waste Management Strategy (2010) adopted in South Africa, which espouses the recovery and treatment of waste over its disposal. Combusting waste will also extend the disposal life at Scaw Metals GLB+ Waste Disposal Site by reducing airspace consumption.

Not developing the Co-generation Plant will see the continuation of business as usual at the Scaw Union Junction Facility. Without the development of waste heat recovery of the Electrical Co-generation Plant, the DRI kilns at the Scaw Metals facility will continue to operate as is. Waste heat would therefore not be utilised to generate more power at the facility and would continue to be lost to the atmosphere. Waste heat recovery of the Electrical Co-generation Power Plant will also function as a 'cleaner technology' development and will improve the emissions control equipment on the DRI plant and ensure that emissions are reduced.

Without the development of the combustion component, wastes and by-products produced at the Scaw Metals facility would also not be utilised for power generation. This would likely have a number of negative outcomes, including:

- *No reduction in volume of waste for disposal*
- *The Scaw Metals facility remains dependant on Eskom*
- *The high risk of stoppages due to power outages continues*
- *Limited opportunity for expansion*
- *Substituted supply not available to other Eskom customers*

Conclusions and Key Findings

The Electrical Co-generation Power Plant will have benefits in generating significant amounts of electricity from a variety of energy containing materials and waste streams. Generating electricity from these resources will reduce electricity costs, improve the security of electrical supply, improve energy efficiency and reduce the carbon footprint per unit production at Scaw Metals.

The most significant risk of the Electrical Co-generation Power Plant is potential effects on air quality from emissions to atmosphere. Waste heat recovery of the project will function as a 'cleaner technology' project and will reduce atmospheric emissions over current levels. However, the combustion component requires combustion of energy containing materials and waste in a Fluidised Bed Boiler (FBB), resulting in emissions to atmosphere.

Should the FBB be operated at full capacity, numerous emission standards will be exceeded, including those for PM10, CO, NO_x, CO, NO_x, SO_2, HCl, HF, and numerous metals. This could potentially have significant detrimental effects on the environment, human health and social welfare. Combustion rates and operation times at the FBB will therefore have to carefully controlled to restrict emissions to below the permitted maximum emission rates i.e. minimum emission standards.

Should the FBB be operated so as to restrict emissions to below the applicable minimum emission standards, the commissioning and operation of the Electrical Co-generation Plant will have a negligible impact on air quality outside the boundaries of the Scaw Metals Union Junction Facility. It is important that emissions monitoring is undertaken to ensure that emissions remain below the applicable minimum emissions standards.

Synergistics Environmental Services (Pty) Ltd, as independent EAPs, conclude that there is no environmental reason why the development of the Electrical Co-generation Power Plant at Scaw Metals, Germiston, should not be authorised with an integrated environmental authorisation and AEL from the competent authorities.

SO445/EIR01.1 June 2014

SCAW SOUTH AFRICA (PTY) LTD

Electrical Co-generation Power Plant at Scaw Metals, Germiston

Environmental Impact Report (Final)

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF PLATES

LIST OF APPENDICES

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.
CDM	Clean Development Mechanism
CO_{2e}	Carbon dioxide equivalent
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, 1989 (Act No. 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 R	Government Notice Regulation
Hazardous waste	Waste, which even in low concentrations, can have significant adverse effects on public health and or the environment
HRSG	Heat recovery steam generator
IAP	Interested and Affected Parties
kl	Kilo-litres
km	Kilometre

m	Metre
m^3	cubic metre
mamsl	Metres above mean sea level
MW	Mega Watt
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
Nm^3	A normal cubic metre of a gas under a temperature of 273 Kelvin and pressure of 101.3 kPa
NWA	National Water Act, 1998 (Act No. 36 of 1998)
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
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

SO445/EIR01.1 **June 2014**

SCAW SOUTH AFRICA (PTY) LTD

Electrical Co-generation Power Plant at Scaw Metals, Germiston

Environmental Impact Report (Final)

1 Introduction

1.1 The Project

Scaw South Africa (Pty) Ltd (Scaw Metals) owns and operates a facility at Union Junction in Germiston. Scaw Metals produces a range of products from the recycling of scrap steel and iron ore. The Union Junction facility has a number of plants, including the Directly Reduced Iron Plant (DRI) that produces up to 1050 tons of iron per day from three (3) kilns. Each kilns uses iron ore, dolomite and coal as a feedstock. The outputs from the DRI process include coal dust and char (devolatilised coal) and exhaust gas. In addition, a portion of scrap material received at Scaw Metals is processed through a shredder plant to remove non-ferrous material which contains a metallic stream and a combustible component. These resources, which contain energy, are currently reused, disposed to the Scaw Metals GLB+ Waste Disposal Site (Ref 12/9/11/L471/3) or other landfill or released to the atmosphere in terms of a permit (Ref 53/29).

Scaw South Africa has proposed the development of an Electrical Co-generation Power Plant at Scaw Metals (see Figure 1). The Electrical Co-generation Power Plant will make use of the energy contained in the DRI output streams and the combustible component of the shredder waste to generate up to 68 MW of electricity. The electricity will be utilised primarily by Scaw Metals, but may be available to the grid during low-load periods. 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 current conceptual design of the Electrical Co-generation Power Plant consists of two interlinked components that can be executed independently of each other. The first, a waste heat recovery component, will utilise the waste heat in the DRI kiln exhaust gases to produce steam which will be converted to electricity (up to 40 MW). The second, a combustion component, will combust waste materials with a suitable calorific value to produce heated flue gas. This will be used to produce steam which will be converted to electricity (up to 28 MW). The maximum potential electrical output from the Electrical Co-generation Power Plant is 68 MW. However the actual output and the contribution from each component will depend on future operations at the DRI kilns. The scale of such operations (i.e. 1, 2 or 3 kilns operating) are influenced by the volume of scrap metal received at Scaw Metals. The Electrical Co-generation Power Plant could thus be constructed to a smaller scale in order to make use of reduced outputs from DRI kilns.

Development of the Electrical Co-generation Power Plant at Scaw Metals will trigger a number of activities listed in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA), the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) (NEMWA), and the National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) (NEMAQA). Such listed activities cannot be undertaken without approval from the respective competent authorities under each Act. 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 NEMA, is required to support the applications for environmental authorisation, a waste management licence (WML) and an atmospheric emissions licence (AEL).

This report presents the results of the EIA undertaken for the proposed Electrical Co-generation Power Plant 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 environmental impact report (EIR) in support of applications for environmental authorisation, a WML and an AEL.

1.2 Project Need and Desirability

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 waste gas and solid by-products/waste;
- Increased electrical supply at Scaw Union Junction and the Eskom grid;
- Improved security of electricity supply;
- Reduced load on the Eskom/National electricity supply grid;
- 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 policy and legislation.

The waste heat from the DRI plant at Scaw is currently cooled with air and water before it is released to atmosphere with no further benefit being derived. The solid wastes from the DRI and shredder are currently disposed to landfill with no further benefit being derived. The Electrical Co-generation Power Plant process will utilise the waste heat, as well as combustible solid wastes produced at Scaw Metals to generate up to 68 MW of electricity. The project will facilitate the recovery of energy from wastes and improve the overall energy efficiency of the Scaw Metals Union Junction facility. The waste heat recovery component of the Electrical Co-generation Power Plant will result in Scaw deriving more benefit from the same resources and will thus reduce the emissions footprint for the site.

The generation of electricity from waste will provide Scaw Metals with a significant, alternate source of electrical power. This generation will provide electrical capacity for future expansion at Scaw or reduce the amount of electricity required from Eskom and potentially enable Eskom to supply other customers. The on-site generation will also improve security of electrical supply for Scaw with reduced dependence on Eskom.

A further benefit of the Electrical Co-generation Power Plant is that electricity generated by waste heat recovery will result in significantly less CO_2e emissions per kWh than the Eskom supply does. Combustion is expected to produce electricity with CO_2e emissions similar to Eskom. The total electrical output will thus be produced with fewer CO_2e emissions per kW than the Eskom sourced electricity. The bulk of South African electricity is produced from the combustion of coal and is known to have high greenhouse gas emissions per kilowatt produced. Electricity production in South Africa currently contributes to ~ 39% of the country's GHG emissions (The Department: National Treasury, 2013). All consumers of electricity in South Africa thus contribute to the high GHG emissions through the indirect emissions from Eskom's coal fired power stations. Scaw will thus be able to reduce their CO_2e emissions relative to the use of Eskom supplied electricity.

Additionally, the implementation of the Electrical Co-generation Power Plant will result in the displacement of a small portion of the coal from the electricity consumed. This displacement will reduce the demand for coal and ultimately reduce the additional environmental impacts that occur at coal mines.

The combustion component of the Electrical Co-generation Power Plant will combust solid wastes produced at Scaw. The thermal treatment of solid waste can significantly reduce the volume of material requiring disposal. The reduction in waste requiring disposal after processing in the Electrical Co-generation Power Plant will reduce the amount of airspace required and extend the life of landfill sites at Scaw. Additionally the greatly reduced waste volumes are more cost effective to transport to disposal facilities.

In addition, by combusting waste to produce electricity, the Co-generation plant will improve waste management practices at Scaw Metals in line with the National Waste Management Strategy (2011) and supporting legislation. The waste hierarchy advocates the minimisation, recycling, recovery and treatment of waste prior to disposal. In terms of the hierarchy the recovery of waste should be undertaken prior to disposal. Energy generation from waste is a key form of recovery and thermal waste treatment is therefore preferred over waste disposal. The National Policy on Thermal Treatment of General and Hazardous Waste (2009) indicates National Government's position, whereby government intends to accept and advance the implementation of thermal waste treatment technologies as a key aspect of integrated waste management in South Africa. Thermal waste treatment for the recovery of energy, as proposed at the Electrical Co-generation Power Plant is thus a preferred technology supported by government policy. The recovery of energy from waste also prevents the total loss of the energy embodied in the waste.

The siting of the Electrical Co-generation Power Plant at Scaw Metals is required as the plant will be integrated with the existing DRI kilns. In order for the integration to be achieved effectively and efficiently the plants have to be physically close. Thus the proposed site is the only feasible location for the plant. 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. The Electrical Co-generation Power Plant will be an industrial facility that is considered to be appropriate for the proposed Union Junction locality.

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 1km from the proposed project locality. The locality is therefore appropriate for an industrial development such as the Electrical Co-generation Power Plant.

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

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 decisions on an integrated environmental authorisation and an AEL for the Electrical Co-generation Power Plant.

1.4 Environmental Assessment and Authorisation Process

The activities that will be undertaken at the proposed Electrical Co-generation Power Plant are regulated by various legislation and multiple authorisations/licences are required from the competent authorities prior to the commencement of the project.

The undertaking of a scoping and EIA process in support of applications for an integrated environmental authorisation and AEL for the Electrical Co-generation Power Plant at Scaw Metals commenced in March 2012. The application form for integrated environmental authorisation was submitted to the Department of Environmental Affairs (DEA) who acknowledged receipt and provided a reference number on 16 April 2012. The application for the AEL has yet to be submitted.

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 Electrical Co-generation Plant, was submitted to the DEA on 10 October 2012. The DEA reviewed the scoping report and accepted it on 3 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 EIA report and draft EMP have been compiled in accordance with the EIA Regulations (GNR 543) published in June 2010. The EIR report is submitted to the DEA for approval and granting of an integrated environmental authorisation in terms of the NEMA (including activities listed under the NEMA ad NEMWA. This report is also in support of an application for an AEL in terms of the NEMAQA.

Note that an application for a WML for disposal of ash from the Electrical Co-generation Power Plant in terms of the NEMWA is being undertaken simultaneously (REF: 12/9/11/L895/3).

1.5 Authorisation of Listed Activities

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

1.5.1 Environmental Authorisation under NEMA

Activities listed in terms of the 2010 EIA Regulations made under the NEMA are set out in the Table below:

Table 1-1: Listed Activities Applicable to the Co-generation Facility at Scaw Metals (GNR 544, 545, 546)

Government Notice	Activity No	Applicability of the listed activity
GNR 544	28) The expansion of existing facilities for any process or activity where such expansion will result in the need for a permit or license in terms of national or provincial legislation governing the release of emissions or pollution, excluding where the facility, process or activity is included in the list of waste management activities published in terms of section 19 of the NEMWA, 2008 in which case that Act will apply.	Scaw Metals were issued a Registration Certificate under the Atmospheric Pollution Prevention Act for all of the existing facilities and emissions sources at Union Junction (Ref 53/29). Waste heat recovery of the Electrical Co-generation Power Plant will use heat from the existing exhaust gas stream. The cooled exhaust gas will be directed through a new bag house and released through a new stack. This has been updated to an AEL in terms of the NEMAQA (April 2014).The new configuration will require an amendment to the existing AEL and is therefore captured under this activity.
GN R 545,	1) The construction of facilities or infrastructure for the generation of electricity where the electricity output is 20 megawatts or more.	The combined electrical output from both components of the Electrical Co-generation Power Plant will be more than 20 MW. The construction of the Electrical Co-generation Power Plant is therefore captured under this activity.
GNR 545	5) The construction of facilities or infrastructure for any process or activity which requires a permit or license in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent and which is not identified in Notice No. 544 of 2010 or included in the list of waste management activities published in terms of section 19 of the NEMWA, 2008 in which case that Act will apply.	Combustion component of the Electrical Co-generation Power Plant will combust materials of suitable calorific value to generate heated flue gas for the production of steam and then electricity. Materials combusted at the plant may include coal, natural gas and or AFRs from the Scaw Metals facility (char*, dust and shredder waste). a) Installations for the combustion of solid fuels (Subcategory 1.1) and gases (Subcategory 1.4) are listed in GN R 248 (March 2010) under the NEMAQA as activities which result in atmospheric emissions. As such an AEL will be required and this activity is triggered. The disposal of waste materials by incineration is also listed as an activity which results in atmospheric emissions (Category 8). As such an AEL will be required and this activity may be triggered.

1.5.2 Waste Management Licence under NEMWA

Waste management activities listed 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 1-2: Waste Management Activities Applicable to the Electrical Co-generation Power Plant at Scaw Metals (GN R 718*)

Government Notice	Activity No	Applicability of the listed activity
GNR 718	A(1) The storage including the temporary storage of general waste at a facility that has the capacity to store in excess of 100m^3 of general waste at any one time, excluding the storage of hazardous waste in lagoons.	Wastes from the Scaw Metals facility (char*, dust and shredder waste) will be stored in silos prior to being combusted in the Electrical Co-generation Plant. The combined storage capacity for these wastes may exceed 100 m^3.
GNR 71	A(2) The storage including the temporary storage of hazardous waste at a facility that has the capacity to store in excess of 35m^3 of hazardous waste at any one	Wastes from the Scaw Metals facility (char*, dust and shredder waste) will be stored in silos prior to being combusted in the Electrical Co-generation Plant. Some of these materials may

	time, excluding the storage of hazardous waste in lagoons.	be classified as hazardous wastes and the combined storage capacity for these wastes may exceed 35 m^3.
GNR 718	A(8) The recovery of waste including the refining, utilisation or co-processing of waste at a facility that has the capacity to process in excess of 3 tons of general waste or less than 500kg of hazardous waste per day, excluding recovery that takes place as an integral part of an internal manufacturing process within the same premises.	Combustion component of the Electrical Co-generation Power Plant will combust materials of suitable calorific value to generate heated flue gas for the production of steam and then electricity. Materials combusted at the plant may include AFR from the Scaw Metals facility (char*, dust and shredder waste).The Electrical Co-generation Power Plant will undertake the recovery of energy from wastes to produce electricity. The plant will combust in excess of 3 tons of general waste per day.
GNR 718	A(18) The construction of facilities for activities listed in Category A of this Schedule.	Facilities for the Electrical Co-generation Power Plant will be constructed at Scaw Metals for the storage and recovery of wastes.
GNR 718	B(3) The recovery of hazardous waste including the refining, utilisation or co-processing of waste at a facility with a capacity to process more than 500kg of hazardous waste per day excluding recovery that takes place as an integral part of an internal manufacturing process within the same premises or unless the Minister has approved re-use guidelines for the specific waste stream.	Combustion component of the Electrical Co-generation Power Plant will combust materials of suitable calorific value to generate heated flue gas for the production of steam and then electricity. Materials combusted at the plant may include AFR from the Scaw Metals facility (char*, dust and shredder waste).The Electrical Co-generation Power Plant will undertake the recovery of energy from wastes to produce electricity. Depending on classification of the particular waste streams used, the plant may trigger the activity for processing more than 500kg of hazardous waste per day.
GNR 718	B(8) The incineration of waste regardless of the capacity of such a facility.	Combustion component of the Electrical Co-generation Power Plant will combust AFR from the Scaw Metals facility (char*, dust and shredder waste) to generate heated flue gas for the production of steam and then electricity. Such combustion is considered as the incineration of waste.
GNR 718	B(11) The construction of facilities for activities listed in Category B of this Schedule.	Facilities for the Electrical Co-generation Power Plant will be constructed at Scaw Metals for the recovery of energy and the incineration of wastes.
*Please note that Scaw South Africa is of the opinion (and has sought legal advice) that the neither the coal dust nor the char generated at its operations fall within the definition of "waste" as contemplated in the NEMWA, 2008 (as amended). Both could however fall within the definition of a "by-product" for purposes of that Act. However, based on discussions with the competent authority and views expressed by that authority and in order to proceed with the project, Scaw is including the coal dust and char as wastes for purposes of the waste management application. The inclusion of coal dust and char in this application as a waste does not amount to an acknowledgement that the char is not a by-product and in this regard, such inclusion cannot be used against Scaw in any future regulatory matters.		

1.5.3 Atmospheric Emissions Licence under NEMAQA

Activities listed in terms of the NEMAQA, 2004 (GN R 248, March 2010) are set out in the Table below:

Note that GN R 248 was replaced with an updated Schedule of emissions activities in November 2013 (GN R 893).

Table 1-3: Atmospheric Emission Activities Applicable to the Electrical Co-generation Power Plant at Scaw Metals (GNR 718)

Government Notice	Category No	Applicability of the listed activity
GNR 248	Category 1; Subcategory 1.1: Solid fuel combustion installations. Solid fuels (excluding biomass) combustion installations used primarily for steam raising or electricity generation.	Combustion component of the Electrical Co-generation Power Plant will combust materials of suitable calorific value to generate heated flue gas for the production of steam and then electricity. Materials combusted at the plant may include chare and dust from the Scaw Metals facility. Char* and dust are equivalent to coking coal and the facility may be considered as a solid fuel combustion installation.
GNR 248	Category 8: Disposal of hazardous and general waste. Facilities where general and hazardous waste including	Combustion component of the Electrical Co-generation Power Plant will combust materials of suitable calorific value to

	health care waste, crematoria, veterinary waste, used oil or sludge from the treatment of used oil are incinerated.	generate heated flue gas for the production of steam and then electricity. Materials combusted at the plant may include AFR from the Scaw Metals facility (char*, dust and shredder waste). Depending on classification of the materials the facility may be considered to be incinerating wastes.
*Please note that Scaw is of the opinion (and has sought legal advice) that the neither the coal dust nor the char generated at its operations fall within the definition of "waste" as contemplated in the NEMWA, 2008. Both could however fall within the definition of a "by-product" for purposes of that Act. However, based on discussions with the competent authority and views expressed by that authority and in order to proceed with the project, Scaw is including the coal dust and char as wastes for purposes of the waste management application. The inclusion of coal dust and char in this application as a waste does not amount to an acknowledgement that the char is not a by-product and in this regard, such inclusion cannot be used against Scaw in any future regulatory matters.		

1.6 Competent Authorities

1.6.1 Integrated Environmental Authorisation

The National DEA is the competent authority for the application under the NEMA, 1998 (as the project involves electricity generation) and under the NEMWA, 2008 (as the project potentially involves hazardous wastes). As allowed for in Section 24(L) of the NEMA the applications may be combined into an integrated application.

The DEA has established an Integrated Permitting Systems department for handling applications for integrated authorisations. An application form for an integrated licence for the Co-generation facility was submitted to the DEA. The Department provided reference numbers for the project:

- NEAS Reference: DEA/EIA/0001129/2012
- Reference: 14/12/16/3/3/3/37

The assigned case officer at the DEA is:

Ms Nyiko Nkosi/ Ms Masina Litsoane
Tel: 012 395 1694/ 012 395 1778
Fax: 012 320 7539
Email: nnkosi@environment.gov.za / mlitsoane@environment.gov.za

1.6.2 Atmospheric Emissions Licence

The authority for the issuing of AELs in terms of the NEMAQA, 2004 has been delegated to the municipal level. At the Scaw Metals facility, the Ekurhuleni Metropolitan Municipality (EMM) is the competent authority.

The Air Quality Officer at the EMM has been informed of the project and an application for the AEL will be completed once the relevant project details have been finalised. The application will be structured as an amendment of the existing AEL issued to Scaw under the NEMAQA.

The relevant official from the EMM is:

Mr Edmund van Wyk
Assistant Chief: Air Quality & Noise Management
Tel: (011) 999 2470
Fax: 0866118357
Email: Edmund.vWyk@ekurhuleni.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 1-4 provides a summary of the requirements of GNR 543 for an EIA report, with cross references to the report sections where these requirements have been addressed. Table 1-5 provides the same information for the draft EMP.

Table 1-4: 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 EIA report** in respect of the proposed activity.	This Report.
GNR 543 Section 31(2)	
An EIA report 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 (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;	Within Sections 3.3, 4.4 and 4.8
h) An indication of the **methodology** used in determining the significance of potential environmental impacts	See Section 3
i) A description and comparative assessment of all alternatives identified during the EIA process;	For each technology, in Section 4

Legal and Regulatory Requirement	Cross Reference to Report Section
j) A summary of the findings and recommendations of any specialist report or report on a specialised process;	See text within Section 0 & 7.
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 & 7.
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 & 7.
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 12
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;	

Legal and Regulatory Requirement	Cross Reference to Report Section
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;	
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.	

Table 1-5: Structure of the EMP in terms of GNR 543 Requirements

Legal and Regulatory Requirement	Cross Reference to Report Section
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 3 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

Legal and Regulatory Requirement	Cross Reference to Report Section
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 12.2.4

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 the Electrical Co-generation Plant at Scaw Metals.

2.1 National Environmental Management Act, 1998

The NEMA, 1998 and EIA Regulations made 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.

Section 24(L) of the NEMA provides for the competent authorities under different environmental legislation to jointly exercise their respective power by issuing an Integrated Environmental Authorisation. The Electrical Co-generation Project requires both environmental authorisation and a WML from the National DEA. The DEA has established an Integrated Permitting Systems office to administer projects requiring an integrated environmental authorisation.

2.1.1 2010 EIA Regulations

The EIA Regulations (GNR 543, June 2010) 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 listing notices requires environmental authorisation from the competent authority. Three Listing Notices 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 2.2).

Activities in the Listing Notices that will be triggered by the construction and operation of the Electrical Co-generation Plant are discussed in Section 2.

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 WMLs 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 Electrical Co-generation Plant are presented in Section 1.5.2. ***Note that GN R 718 was replaced with an updated Schedule of waste management activities in November 2013 (GN R 921).***

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.

Section 45(3) of the NEMWA specifies a number of information requirements that must be met by persons who have applied for a WML for any activity that involves the treatment of waste by incineration. This includes:

- types of wastes that will be incinerated;
- existence of other incinerators in the area that are authorised to incinerate substantially similar wastes, and
- alternative, environmentally sound methods for treating the waste.

2.2.1 National Policy on Thermal Treatment of General and Hazardous Waste

The DEA published a National Policy on Thermal Treatment of General and Hazardous Waste (GN R 777, July 2009) to set out the Government's position on the thermal waste treatment as an acceptable waste treatment option and to provide the framework within which such waste treatment options should be implemented. The policy objectives clearly set out to accept and advance the implementation of waste incineration as means to recover energy from waste and integrate thermal waste treatment technologies as a key aspect of an integrated waste management system in South Africa.

Schedule 4 of the National Policy provides guidance on the conditions that should be applied as a minimum to the thermal waste treatment technologies.

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

2.3 National Environmental Management: Air Quality Act, 2004

The 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 AEL 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. The listed activities that will be triggered by the proposed Electrical Co-generation Plant are presented in Sections 1.5.3 & 2.

The Highveld Airshed was declared the second priority area by the Minister in November 2007, requiring that an Air Quality Management Plan be developed for the area. The plan will include the establishment of emissions reduction strategies and intervention programs based on the findings of a baseline characterisation of the area. The implication of this is that all contributing sources in the area will be assessed to determine the emission reduction targets to be achieved over the following few years.

Scaw Metals Union Junction Facility falls within the Highveld priority area. Emission reduction strategies will be included for all significant sources of pollution in the area with specific targets associated with it. In September 2011 the DEA published the management plan for the Highveld Priority Area. Included in this management plan are 7 goals, each of which has a further list of objectives that has to be met. Goal 2 of the plan applies directly to the Scaw facility.

- Goal 2: By 2020, industrial emissions are equitably reduced to achieve compliance with ambient air quality standards and dust fallout limit values

The objectives associated with this goal include:

- Emissions are quantified from all sources.
- Gaseous and particulate emissions are reduced.
- Fugitive emissions are minimised.
- Emissions from dust generating activities are reduced.
- Incidences of spontaneous combustion are reduced.
- Abatement technology is appropriate and operational.
- Industrial Air Quality Management (AQM) decision making is robust and well-informed, with necessary information available.
- Clean technologies and processes are implemented.
- Adequate resources are available for AQM in industry.
- Ambient air quality standard and dust fallout limit value exceedances as a result of industrial emissions are assessed.
- A line of communication exists between industry and communities.

Each of these objectives is further divided into activities, each of which has a timeframe, responsibility and indicator. Refer to the DEA (2011) Highveld Priority Management Plan for further details.

2.4 Applicable Air Quality Guidelines and Standards

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.

2.4.1 National Minimum Emission Standards

The Listed Activities and Minimum National Emission Standards, in accordance with the NEMAQA, were published on the 31st of March 2010 (Government Gazette No. 33064). Minimum National Emission Standards applicable to the Electrical Co-generation Power Plant include:

- **Waste heat recovery:** Heat recovery 1 is not carried out by means of a combustion process therefore; standards for pre-reduction and direct reduction (Subcategory 4.12) are applicable (Table 2-1).

Table 2-1: Minimum emission standards for pre-reduction and direct reduction

Subcategory 4.12: Pre-reduction and direct reduction			
Description	Production of pre-produced or metallised ore or pellets using gaseous or solids		
Application	All installations		
Substance or mixture of substances		**mg/Nm³ under normal conditions of 273 Kelvin and 101.3 kPa**	
Common Name	**Chemical Symbol**	**New plant***	**Existing plant**
Particulate matter (PM)	Not applicable	50	100
Sulphur dioxide	SO_2	500	1 700
Oxides of nitrogen	NO_x expressed as NO_2	1 000	2 000

* For DRI Plant and waste heat recovery, emissions for new plants should be noted since all existing plants need to comply with new plant emission standards by 2020.

- **Combustion:**
  - The classification of material to be incinerated in the FBB is subject to legal review[1], therefore the combustion component might be subject to:
    - Subcategory 1.1 Minimum Emission Standards for solid fuel combustion installations (Table 2-2); or
    - Category 8 Minimum Emission Standards for waste incineration (Table 2-3).

Table 2-2: Minimum emission standards for solid fuel combustion installations

Subcategory 1.1: Solid fuel combustion installations			
Description	Solid fuel (excluding biomass) combustion installations used primarily for steam raising or electricity generation.		
Application	All installations with design capacity equal to or greater than 50MW heat input per unit based on the lower calorific value of the fuel used.		
Substance or mixture of substances		**mg/Nm³ under normal conditions of 10% O_2, 273 Kelvin and 101.3 kPa**	
Common Name	**Chemical Symbol**	**New plant**	**Existing plant**
Particulate matter (PM)	Not applicable	50	100
Sulphur dioxide	SO_2	500	3 500
Oxides of nitrogen	NO_x expressed as NO_2	750	1 100

The following special arrangement shall apply:

i. Continuous monitoring of PM, SO_2 and NO_x is required

[1] *'Scaw is of the opinion (and has sought legal advice) that the neither the coal dust nor the char generated at its operations fall within the definition of "waste" as contemplated in the National Environmental Management: Waste Act, 2008. Both could however fall within the definition of a "by-product" for purposes of that Act. However, based on discussions with the competent authority and views expressed by that authority and in order to proceed with the project, Scaw is including the coal dust and char as wastes for purposes of the waste management application. The inclusion of coal dust and char in this application as a waste does not amount to an acknowledgement that the char is not a by-product and in this regard, such inclusion cannot be used against Scaw in any future regulatory matters'.*

Table 2-3: Minimum emission standards for hazardous and general waste disposal

Category 8: Disposal of hazardous and general waste			
Description	Facilities where general and hazardous waste including health care waste, crematoria, veterinary waste, used oil sludge from the treatment of used oil are incinerated.		
Application	Facilities with an incineration capacity of 10 kg per hour or more.		
Substance or mixture of substances		**mg/Nm³ under normal conditions of 10% O_2, 273 Kelvin and 101.3 kPa**	
Common Name	**Chemical Symbol**	**New plant**	**Existing plant**
Particulate matter (PM)	Not applicable	10	25
Carbon monoxide	CO	50	75
Sulphur dioxide	SO_2	50	50
Oxides of nitrogen	NO_x expressed as NO_2	200	200
Hydrogen chloride	HCl	10	10
Hydrogen fluoride	HF	1	1
Sum of lead, arsenic, antimony, chromium, cobalt, copper, manganese, nickel, vanadium	Σ(Pb, As, Sb, Cr, Co, Cu, Mn, Ni, V)	0.5	0.5
Mercury	Hg	0.05	0.05
Cadmium and thallium	Σ(Cd, Tl)	0.05	0.05
Total organic compounds	TOC	10	10
Ammonia	NH_3	10	10
Substance or mixture of substances		**Ng I-TEQ/Nm³ under normal conditions of 10% O_2, 273 Kelvin and 101.3 kPa**	
Dioxins and furans	PCDD/PCDF	0.1	0.1

The following special arrangement shall apply:

i. Compliance with the requirements specified under Schedule 4, Section 11.4 of the National Policy on Thermal Treatment of General and Hazardous Waste (GG No. 32439, Notice No. 777 of 24 July 2009).

2.4.2 National Policy on Thermal Treatment of General and Hazardous Waste

Prior to the formalisation of Minimum Emission Standards for waste incineration, air emission standards for waste incineration were regulated in the National Policy on Thermal Treatment of General and Hazardous Waste (GN R 777 of 24 July 2009). These standards have since been incorporated in the Section 21 Minimum Emission Standards for hazardous and general waste disposal (Category 8).

However the specific requirements for air quality management under Schedule 4, Section 11.4 of the National remain relevant and must be adhered to.

2.4.3 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)[2]. These standards were published for comment in the Government Gazette on 9 June 2007.

[2] *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.

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 2-4. 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 2-4: 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

2.4.4 Health Risk Criteria for Non-criteria Pollutants

The impact of other pollutants not considered criteria pollutants can be assessed according to guidelines published by the following institutions:

- WHO Guideline Values (GVs) for non-carcinogens and unit risk factors (URFs) for carcinogens;
- Inhalation reference concentrations (RfCs) and URFs published by the US EPA in its Integrated Risk Information System (IRIS);
- Reference exposure levels (RELs) and URFs published by the Californian Environmental Protection Agency (CALEPA); and
- Minimal risk levels (MRL) and URFs published by the Federal Agency for Toxic Substances and Disease Registry (ATSDR).

Chronic and acute inhalation criteria and URF's for pollutants included in the air quality study are summarised in Table 2-5.

Table 2-5: Chronic and acute inhalation screening criteria and unit risk factors

Pollutant	Chronic Screening Criteria (µg/m³)	Chronic Screening Criteria Reference	Acute Screening Criteria (µg/m³)	Acute Screening Criteria Reference	Inhalation URF (µg/m³)⁻¹	Inhalation URF Reference
Ammonia	0.1	IRIS	1.18	ATSDR	-	-
Arsenic	0.000015	CALEPA	0.0002	CALEPA	4.300E-03	IRIS
Cadmium	0.00001	ATSDR	0.00003	ATSDR	1.800E-03	IRIS
Cobalt	0.000006	ATSDR	-	-	9.000E-03	ATSDR
Copper	-	-	0.1	CALEPA	-	-
Hydrogen chloride	0.02	IRIS	2.1	CALEPA	-	-
Hydrogen fluoride	0.014	CALEPA	0.0164	ATSDR	-	-
Lead	0.5	NAAQS	-	-	1.200E-05	CALEPA
Manganese	0.00005	IRIS	-	-	-	-
Mercury	0.0003	IRIS	0.0006	CALEPA	-	-
Nickel	0.000014	CALEPA	0.0002	CALEPA	2.400E-04	IRIS
Benzene	0.03	IRIS	0.0288	ATSDR	7.80E-06	IRIS
PCDD, 2,3,7,8-	4.00E-08	WHO	-	-	3.80E+01	WHO

2.4.4.1 Non-carcinogenic Inhalation Health Risk Screening

Air quality impacts of non-carcinogenic, non-criteria (or trace) pollutants are screened against chronic and acute criteria listed in Table 2-5.

2.4.4.2 Increased Lifetime Cancer Risk Screening

Carcinogenic pollutants such as arsenic, cadmium, cobalt, lead, nickel, benzene and PCDD/PCDF may be emitted from the Electrical Co-generation Power Plant. Increased lifetime cancer risk can be calculated by applying the unit risk factors (summarised in Table 2-6) to predicted long term (annual average) pollutant concentrations.

The identification of an acceptable cancer risk level has been debated for many years and it possibly will still continue as societal norms and values change. Some people would easily accept higher risks than others, even if it were not within their own control; others prefer to take very low risks. An acceptable risk is a question of societal acceptance and will therefore vary from society to society. In spite of the difficulty to provide a definitive “acceptable risk level”, the estimation of a risk associated with an activity provides the means for a comparison of the activity to other everyday hazards, and therefore allowing risk-management policy decisions. Technical risk assessments seldom set the regulatory agenda because of the different ways in which the non-technical public perceives risks. Consequently, science does not directly provide an answer to the question.

Whilst not judging how much risk should be acceptable, the US EPA's application is considered the most suitable, i.e. *"If the risk to the maximally exposed individual (MEI) is no more than $1x10^{-6}$, then no further action is required. If not, the MEI risk must be reduced to no more than $1x10^{-4}$, regardless of feasibility and cost, while protecting as many individuals as possible in the general population against risks exceeding $1x10^{-6}$"*. Some authorities tend to avoid the specification of a single acceptable risk level. Instead a "risk-ranking system" is preferred. For example, the New York Department of Health produced a qualitative ranking of cancer risk estimates, from very low to very high (Table 2-6). Therefore if the qualitative descriptor was "low", then the excess lifetime cancer risk from that exposure is in the range of greater than one per million to less than one per ten thousand.

Table 2-6: Increased lifetime cancer risk (as applied by New York Department of Health)

Risk Ratio	Qualitative Descriptor
Equal to or less than one in a million	Very low
Greater than one in a million to less than one in ten thousand	Low
One in ten thousand to less than one in a thousand	Moderate
One in a thousand to less than one in ten	High
Equal to or greater than one in ten	Very high

2.4.5 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:
'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.

2.5 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.

2.6 National Heritage Resources Act, 1999

The National Heritage Resources Act, 1999 (Act No. 25 of 1999) provides for the management and conservation of heritage resources. Section 38 of the Act requires that any person proposing to undertake certain categories of development to notify the heritage resources authority of the proposed development. The authority may, if there is reason to believe that heritage resources will be affected by the development, require the developer to undertake a heritage impact assessment.

The footprint of the proposed Electrical Co-generation Plant is larger than the listed threshold.

2.7 National Water Act, 1998

Section 21 of the National Water Act, 1998 (Act No. 36 of 1998) (NWA) lists water uses for which a water use licence must be obtained. Currently there are no water uses in section 21 of the NWA which are applicable to the Electrical Co-generation Plant. If any such water uses will take place, then a Water Use Licence will be applied for from the DWA.

3 Study Approach and Methodology

The scoping phase of the assessment for the Electrical Co-generation Power Plant 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 Electrical Co-generation Power Plant 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 the Scaw Metals property at Union Junction and the area of land within 100 m of the site boundaries, as illustrated in Figure 1.

3.3 Consideration of Alternatives

3.3.1 Locality

Scaw Metals' facility at Union Junction is a large brownfields industrial complex with a wide range of emissions and current impacts. The Electrical Co-generation Power Plant has to be integrated with the existing DRI plant as it is dependent on the outputs of that plant. As such the locality for the Electrical Co-generation Power Plant is fixed. There are no reasonable or feasible alternatives that Scaw could consider to meet the purpose and requirements of generating electrical power from waste outputs of the DRI plant.

Thus no alternative locations were assessed in the EIA.

3.3.2 Technology

The purpose and requirements of this project are to generate electrical power from outputs of the DRI plant at Scaw Metals at an economically more attractive overall cost than current supply.

Scaw continues to assess other alternatives for the use of the outputs from the DRI and shredder plant. The combustion of char as an energy source for brick manufacturing is a consideration, but depends on 3rd party involvement. This option is dependent on securing a consistent off-take agreement with a 3rd party that has the required authorisations. While feasible, there is no energy return to the Scaw Metals facility. No alternatives have yet been identified for the dust from the DRI.

The pyrolysis of the shredder waste to produce oil and carbon black is also under consideration. The use of shredder waste as an energy source in the DRI kiln is also under consideration. Various research and development work is on-going and these alternatives may be investigated further. If feasible, Scaw will apply for the necessary environmental approvals. However, these alternatives would only ensure management of the shredder waste. Other measures are required for the waste heat and waste and resource streams

The pre-feasibility investigations have confirmed that electricity generation is the preferred means of energy recovery and is potentially a shared option for use of a number of the resource and waste streams. Electricity generation also benefits from economies of scale. This is particularly so because of the waste heat recovery part of the project where electricity generation is the only way to use the waste heat economically at Scaw.

As a result the dual approach (waste heat recovery and combustion) and technology proposed for the Electrical Co-generation Power Plant is presented as the only reasonable and feasible alternative to meet the purpose and requirements of the activity. The EIA did not assess the technology alternatives any further.

The technology presented for the Electrical Co-generation Power Plant has been selected through a pre-feasibility investigation conducted by Scaw South Africa and their advisory consultants. The studies considered a variety of technologies and configurations for the power plant. These alternatives were assessed on the basis of compatibility with the current DRI plant, the available energy resources, performance, capital costs and operational costs, etc. The alternatives that were investigated for each aspect/component of the plant have been discussed under each section.

3.3.3 No-go

The no-go alternative for the Electrical Co-generation Power Plant 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 Electrical Co-generation facility. 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 and review of existing reports.

3.4.1 Existing Reports

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. 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 Monitoring Data

Monitoring undertaken at Scaw's Union Junction Facility includes:

- Surface water (every second month or at overflow events);
- Groundwater (Quarterly);
- Dust fallout (Monthly);
- Stack emissions.

None of this monitoring is undertaken on the proposed site for the Co-gen plant but at the site boundary or specific facility.

3.5 Public Participation Process

On-going participation of IAPs at Scaw Metals is facilitated through an annual Environmental Stakeholder Liaison which is run by the Environmental Manager at Scaw. The public participation process for the Electrical Co-generation Facility 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 project's impact on air quality and its effect on the health of surrounding residence. Concerns were also raised regarding the production of hazardous waste and its disposal.

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 EIR

The draft EIR will be 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 40 calendar day review period. The report will also be published on the Synergistics website at www.synergistics.co.za from where it can be downloaded. All registered and affected parties were notified by fax, email or telephone of the report's availability. The review period will be 30 calendar days.

Comments received from IAPs on the EIA report will be 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 at the Scaw Security office and Dinwiddie Library.

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:

- EMM (Mayor and Ward councillor);

- EMM (Environmental Department and Air Quality Officer);
- Gauteng Department of Agriculture and Rural Development (GDARD); and
- 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 provided in Section 6.3.

EMM	Mayor	
	Councillor	
	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
GDARD	Ms M Rabambi	68 Eloff St., 8th floor Diamond Corner Building, JOHANNESBURG
DWA	Mr T Pather	Thya@dwa.gov.za 15th Floor Bothongo East, 285 Schoeman Street, Pretoria 0001

3.6.2 During EIA

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

Where required, focused consultation meetings will be held with the relevant DEA directorates and EMM Air Quality. The aim of the meetings will be to discuss the environmental assessment process, the project and alternatives and to define mitigation measures to be employed.

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 Electrical Co-generation Power Plant (especially combustion component) is such that an air quality impact assessment was required in order to provide sufficient information to complete the EIA. The scope of work of this study is summarised below.

3.7.1 Air Quality Impact Assessment

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

Note that this assessment also included consideration of the effects of the related Waste Disposal Facility (WDF) that will be developed for disposal of ash generated by the Electrical Co-generation Power Plant.

3.7.1.1 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 3.7.1.2.3.1.
- 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.

3.7.1.2 Methodology

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

3.7.1.2.1 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'.

3.7.1.2.2 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 2.4 of this document and Chapter 3 of Airshed's report.

3.7.1.2.3 Dispersion Modelling

Due to the integrated nature of the project with existing Scaw Metals 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.

3.7.1.2.3.1 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 waste heat recovery 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 waste heat recovery and Combustion component 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.
- **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 waste heat recovery and Combustion component 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 Metal Union Junction wastes will be disposed of at the new WDF.
- **Scenario 5:** represents cumulative SMUJ operations with the commissioning of waste heat recovery and Combustion component 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 Metal Union Junction wastes will be disposed of at the new WDF.

Scenarios 3 and 4 for combustion component 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.

3.7.1.3 Predicted Impacts and Compliance Assessment

The Air Quality Impact Assessment quantified cumulative annual emissions that are anticipated from the Electrical Co-Generation Power Plant. These emissions were combined with meteorological data as input into the dispersion model (see Section 3.7.1.2.3 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.

3.7.2 Heritage Assessment

The proposed Electrical Co-generation Power Plant and WDF projects were registered on the South African Heritage Resources Agency (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, air 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 present the current levels of environmental degradation as at June 2013. 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 Electrical Co-generation Power Plant at Scaw Metals is 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 Electrical Co-generation Plant		Existing impacts (current level of degradation) associated with existing developments and developments under construction combined with the impacts of the proposed Electrical Co-generation Plant

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 Electrical Co-generation Power Plant at Scaw Metals are 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 3-1: 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 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 3-2: 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 3-3: 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 plant 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 plant and its associated infrastructure.

The operational phase refers to the when construction is completed and the plant is fully operational. The design life of operations for the Electrical Co-generation Power Plant is 25 years. The impacts in the operational phase of the project have been further considered in terms of the two phases of the project. Waste heat recovery involves the use of waste heat from the DRI kilns, while the combustion component includes the combustion of wastes to augment the electricity production.

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

The post- closure phase refers to when the plant 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 Electrical Co-generation Power Plant 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 Electric Co-generation Plant 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 Electrical Co-generation Power Plant will be situated on Scaw Metal's Union Junction industrial complex, which is subject to conditions of existing environmental permits/licences/measures. The EMP presented here only provides the environmental management measures required for the Electrical Co-generation Power plant 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 Junction 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 Electrical Co-generation Power plant.

4 Project Description

4.1 Project Design Criteria

Scaw South Africa is investigating an electrical co-generation project at its Germiston operation (Scaw Metals Union Junction). Scaw Metal's primary objective for the project is to generate electricity at an economically more attractive overall cost than its current electricity costs. The table below summarizes the functional requirements as outlined in the Basis of Design document, 1197-PM-BOD-0001 RevC.

Table 4-1: Main Functional Requirements for Electrical Co-generation Power Plant

Description	Unit	Value
Design Life	Years	Target is >25
Electrical Demand (for SCAW Junction)	MW	SCAW consumption is - above 57 MW for 75% of the time. - above 95 MW for only 25% of the time
Availability and Maintainability	%	>85%
Operability	%	Load-following 25-75%

Due to the way the Directly Reduced Iron plant is operated the new power plant should be designed to:

- Operate at the minimum exhaust rates where 1 kiln is down for maintenance and 1 kiln is down during the daily 10 minute shut down. This implies the plant should be able to operate at 25% capacity under this scenario.
- The plant should still be able to produce electricity even if one source of energy is interrupted. If for instance the exhaust gases are interrupted the plant should still be able to produce electricity using the char and dust.
- The power plant should operate with at least 85% availability.

The project description provided in this document was sourced from the feasibility and engineering reports produced for Scaw Metals. The technical details are accurate at the time of compilation. However it must be stressed that details provided here have been produced at a conceptual design level and could be subject to refinement during the detailed design phase.

The current conceptual design of the Electrical Co-generation Power Plant presents the maximum potential electrical output from the Electrical Co-generation Power Plant as 68 MW. However the actual output and the contribution from each component will depend on future operations at the DRI kilns. The scale of such operations (i.e. 1, 2 or 3 kilns operating) are influenced by the volume of scrap metal received at Scaw Metals. The Electrical Co-generation Power Plant could thus be constructed to a smaller scale in order to make use of reduced outputs from DRI kilns.

4.2 Introduction

Scaw Metals produces a range of steel products from scrap steel at the Union Junction facility in Germiston. The Union Junction facility has a number of plants, including the Directly Reduced Iron (DRI) Plant that produces up to 1050 tons of product per day from 3 kilns. Each kiln uses ore, dolomite and coal as a feedstock. Operating patterns of the DRI kilns depends on market conditions that determine the availability of scrap steel and the demand for product. This can result in one, two or three of the kilns operating. The wastes from the DRI process include dust and exhaust gas. The DRI also produces char* (devolatilised coal) as a by-product.

Scaw Metals also operates a Shredder Plant at Union Junction. A portion of scrap material received at Scaw Metals is processed through the shredder plant to remove non-ferrous material which contains a metallic stream and a combustible component. These resources and wastes from the DRI and Shredder Plants, which contain energy, are currently reused, disposed to landfill (Ref 12/9/11/L471/3) or released to the atmosphere (Ref 53/29) in terms of licence/permits.

** please note that Scaw is of the opinion (and has sought legal advice) that the neither the coal dust nor the char generated at its operations fall within the definition of "waste" as contemplated in the National Environmental Management: Waste Act, 2008. Both could however fall within the definition of a "by-product" for purposes of that Act. However, based on discussions with the competent authority and views expressed by that authority and in order to proceed with the project, Scaw is including the coal dust and char as wastes for purposes of the waste management application. The inclusion of coal dust and char in this application as a waste does not amount to an acknowledgement that the char is not a by-product and in this regard, such inclusion cannot be used against Scaw in any future regulatory matters.*

Scaw South Africa has proposed the development of an Electrical Co-generation Power Plant at the Scaw Metals Union Junction facility. The Electrical Co-generation Power Plant will utilise energy contained in the DRI output streams (wastes and by-product*) and the combustible component of the shredder waste to produce electricity that will be utilised at Scaw Metals. The project will improve the overall energy efficiency of the Scaw Metals Union Junction facility and reduce the emissions footprint for the site. The generation of electricity will improve security of supply, provide electrical capacity for expansion, reduce the amount of electricity required from Eskom and enable Eskom to supply other customers.

The Electrical Co-generation Power Plant may qualify as a CDM project under the Kyoto Protocol.

A number of alternative technologies and configurations were investigated for meeting the purpose and requirements of the Electrical Co-generation Plant. The current conceptual design of the Electrical Co-generation Power Plant consists of two interlinked components that can be executed independently of each other. The first, a waste heat recovery component, can utilise the waste heat in the DRI kiln exhaust gases to produce steam which will be converted to electricity (up to 40MW). The second, a combustion component, can combust materials with a suitable calorific value to produce heated flue gas. This will be used to produce steam which will be converted to electricity (up to 28MW). Although the maximum potential electrical output from the Electrical Co-generation Power Plant is 68 MW, the actual output (and the contribution from each component) will depend on future operations at the DRI kilns. The Electrical Co-generation Power Plant could be constructed to a smaller scale in order to make use of reduced outputs from DRI kilns.

Waste Heat Recovery: High temperature exhaust gas from the three DRI Kilns will be captured from the current process (post after-burners) and passed through Heat Recovery Steam Generators (HRSG). The plant may be linked to one, two or three of the DRI kilns, depending on the likely future operations of the DRI kilns. The Heat Recovery Steam Generators recovers heat from the exhaust gas and generates steam. The steam generated in the process will be used to drive the turbine of a Generator which will generate electricity. An air-cooled Condenser will cool the steam after use and enable its re-use. The exhaust gas will pass through a new bag-house before exiting through a new Stack. The HRSG will be designed to operate with varied availability of the DRI Kilns. If the HRSG or Generator are offline then the exhaust gas from the DRI kilns will revert to the existing DRI stack.

Combustion: A Fluidised Bed Boiler (FBB) will be installed to combust DRI Dust and Shredder waste from the Scrap metal shredder plant (alternative fuels and raw materials) as well as DRI char*. Natural gas and coal may also be considered as supplementary fuels for the FBB. The heated flue gas will be passed through a Heat Recovery Steam Generator to generate steam. The steam generated will be used to drive the turbine of a Generator which will generate electricity. An air-cooled Condenser cools the steam after use and enable its re-use. The exhaust gas will pass through a dedicated bag-house before exiting through a stack.

See the Conceptual Process Flow diagram in Figure 2.

The FBB will generate waste ash that requires disposal to the existing Scaw Metals GLB+ Waste Disposal Site or to a dedicated WDF. Blow down water from the condensers and excess water from the process will be used to quench the ash or be disposed to the sewer in terms of a municipal discharge permit.

The electricity produced by the proposed Electrical Co-generation Power Plant will be consumed by operations at the Scaw Union Junction facility. At certain low-load periods excess electricity (if any) may be sold to the National grid.

Separate electronic file

Figure 2: Conceptual Process Flow for the Scaw Co-generation Facility

Separate electronic file.

Figure 3: Conceptual Layout of the Electrical Co-generation Power Plant at Scaw Metals

4.3 Plant Location

The proposed Electrical Co-generation Power Plant is to be situated in the Scaw Metals' Union Junction facility, which is located in the Alrode-Wadeville industrial area in Germiston, Gauteng Province. The Electrical Co-generation Power Plant will be integrated with the existing DRI plant at Scaw Metals and will be located on a site immediately to the north of the DRI plant, with its centre point at approximately 26˚17'01.77''S, 28˚09'37.89E. The plant will extend across Erf 632 and Erf 133 (Figure 3).

Plate 1: View of the site for the Electrical Co-generation Plant
(DRI plant to the left)

4.4 Waste Heat Recovery Component

The waste heat recovery component of the Electrical Co-generation Power Plant will utilise waste heat from one, two or three DRI kilns to produce up to 40 MW of electricity. This is considered relatively simple to engineer and integrate into the existing DRI infrastructure.

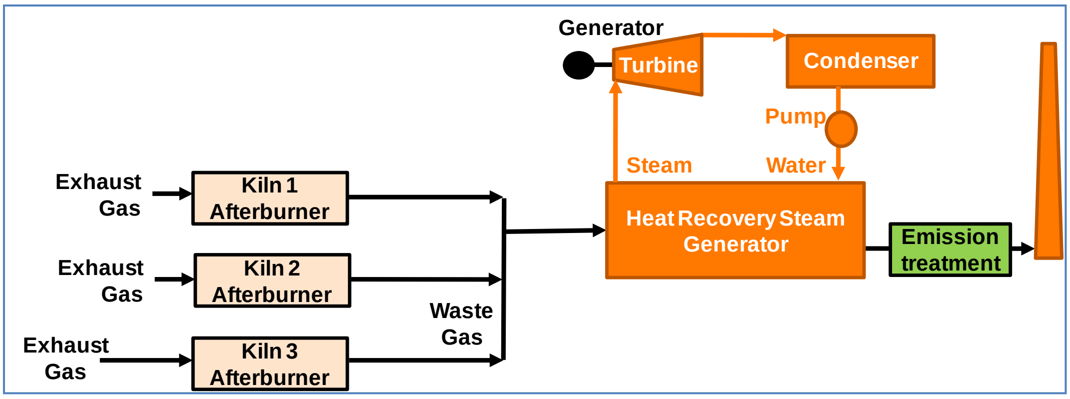


Figure 4: Proposed Process Flow for the Waste Heat Recovery Component of Electrical Co-generation Plant

Note that the Waste Heat Recovery component of the Electrical Co-generation Plant may operate from 1, 2 or 3 of the DRI kilns, depending on the likely future operations of the DRI kilns.

4.4.1 DRI Kiln (1 to 3) After-Burners

4.4.1.1 Introduction

The existing after-burners on the DRI kilns are large refractory lined vessels used to thermally oxidize the gas leaving the kilns. Because the kilns operate under reducing conditions, the gas exiting the kilns has high levels of carbon monoxide, volatile organic compounds and carbon rich dust. Fresh air is mixed with the kiln gas as it enters the after-burner. The mixture of air and gas is then maintained at high temperature for a period of time to burn out pollutants, forming carbon dioxide and water.

4.4.1.2 Technology

The after-burners are currently used only for the purpose of reducing emissions of carbon monoxide and VOCs. During the destruction of these compounds some is heat released. At present the heat in the gas is not utilized and there is no incentive for optimizing combustion in the after-burner. On implementation of this project the after-burner performance will become very important to the performance of the Electrical Co-generation Plant. The after-burners themselves will not be changed at all and will continue to function as they do presently. However, additional instrumentation and controls will be installed to improve their performance.

The new instrumentation will consist of flow measuring and gas analysis at the outlet of the after-burner. This will enable the performance of the after-burner to be continuously monitored and optimized. Additional controls, consisting of either variable frequency drive or automatic dampers, will be installed on the combustion air fans. The new instrumentation and controls will be connected to the new plant digital control system.

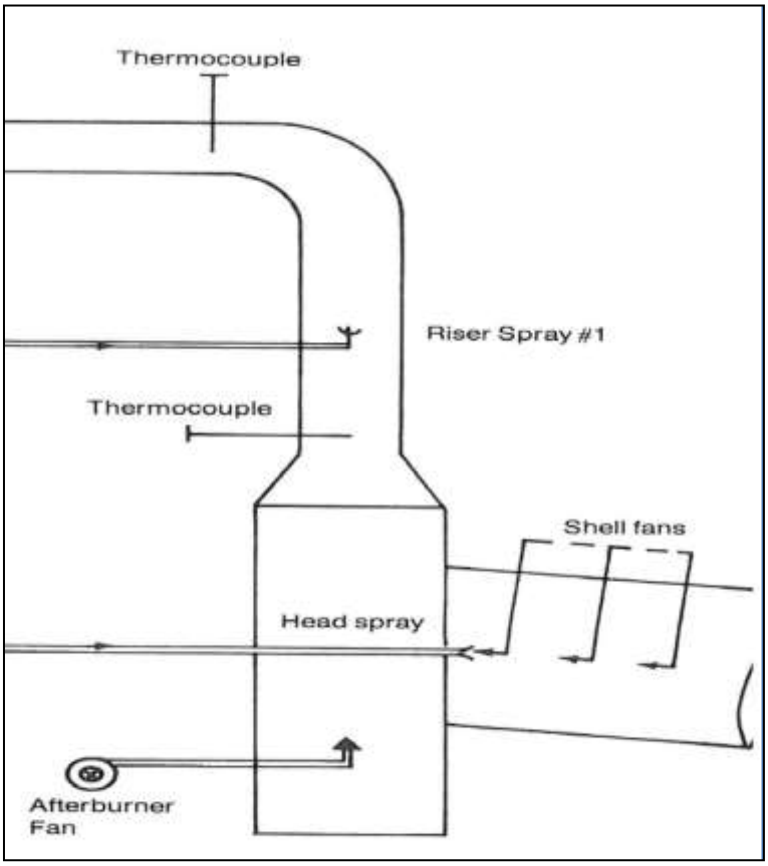


Figure 5: Schematic of the After-burners

4.4.1.3 Process Flow

Gas from the DRI kiln enters at the bottom of the after-burner where air is mixed in. The mixture then flows up through the refractory lined chamber. The refractory reduces heat loss from the gas mixture and also radiates heat back into the chamber to maintain a stable temperature. With the gas mixture maintained at a stable, high temperature, the combustible constituents react with the oxygen from the air that was added. As the gasses move upwards through the after-burner additional air is added burning out the combustible material. When the burned out gasses reach the top of the after-burner, it exits into a duct which carries it to the cooling system. For the Electrical Co-generation Plant, the outlet duct will be modified to carry the gasses to the waste heat boiler.

4.4.1.4 Alternatives

It would also be possible to remove the after-burners and burn out the combustibles in the gas when it reaches the waste heat boiler. Doing this would require the boiler to have a combustion chamber in which additional fuel is burned to initiate the combustion, or would require a large volume of catalyst. Since either of these alternatives would add to the cost of the boiler, and since the after-burners already exist, there is no good reason to consider these alternatives.

4.4.2 Fuel and other inputs

4.4.2.1 Waste Heat

The energy input comes from the waste heat in the DRI kiln off-gas. The gas exits the kilns at ~800-900°C and contains some combustible constituents. The combustible constituents are burned out in the afterburner so that the gas which will reach the HRSG will be ~ 1000°C and the energy will be entirely the sensible heat of the gas. The quantity of energy available in the gas is dependent on the production rate of DRI plant (i.e. how many kilns are operating). With all 3 DRI kiln operating the output is expected to be 580 GJ/Hr at full capacity.

4.4.2.2 Water

Water is used both for cycle make-up and for cooling. The cycle make-up requires a relatively small quantity of very high quality water to replace losses from the steam cycle (estimated to average ~1000 l per hour at full capacity). This water will be sourced from Rand Water in terms of the current allocation and processed through a demineralizing system.

Water for cooling is needed in larger quantities than for the cycle, but the quality requirements are much less. Cooling water will come from various sources at Scaw, in-plant recycling as well as from Rand Water. The anticipated volume is up to 2400 l per hour if the Electrical Co-generation Power Plant operates off all 3 DRI kilns.

4.4.3 Heat Recovery Steam Generators

4.4.3.1 Introduction

The heat recovery steam generators (HRSG) (also called waste heat boilers) capture the heat from the gas stream and produce steam. This is the source of the steam which drives the turbine. Their principle of operation is very simple, but because they must handle dust laden gas at high temperature they must be carefully designed and constructed. The HRSGs will be an industrial process type, which differs from the power generation type in being somewhat more robust and having special features for dust removal.

4.4.3.2 Technology

HRSG’s comprise a large casing which encloses multiple bundles of tubes. This is essentially a complex heat exchanger, configured with several different sections. The economizer section and the super heater section each consists of discrete tube bundles which are connected in series. Although the gas flow across each bundle is cross-flow, because there are multiple bundles in series the performance very nearly approximates a counter-flow heat exchanger. In the case of the generating section, all the bundles are connected in parallel and collected at the steam drum.

HRSG’s can be constructed either vertically or horizontally. A vertical flow HRSG has the gas flowing either up or down, with the tubes arranged perpendicular to the gas flow, in other words horizontally. The horizontal HRSG has vertical tubes and the gas flows horizontally through the HRSG. The selection of vertical or horizontal is made based on the site specific conditions and the application. At Scaw vertical HRSGs will be used as they are best suited for the process gas conditions and the limited space available at the site.

The HRSG can be equipped with catalysts to reduce emissions when required. Catalysts are not required for this application, but the engineers will provide space to add catalyst in the future if it becomes necessary.

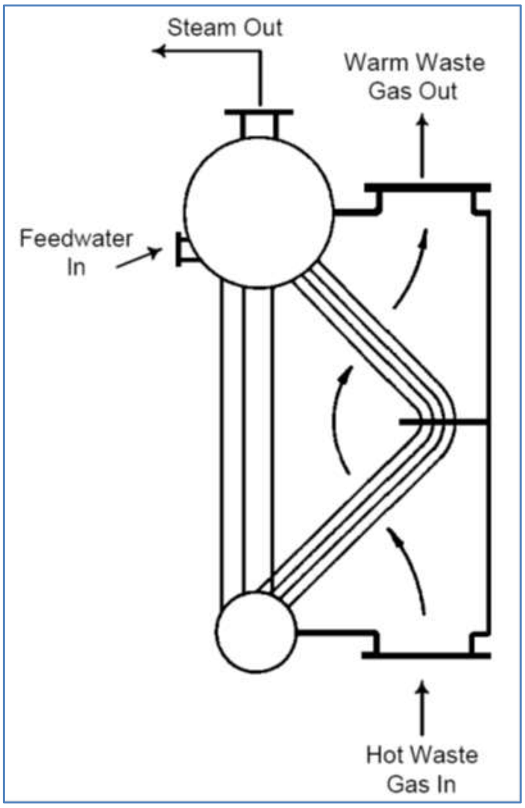


Figure 6: Schematic of the HRSG

4.4.3.3 Process Flow

The hot waste gas enters the HRSG and flows across the tubes which are filled with water and/or steam. Heat is transferred from the gas to the water and or steam. Dust that precipitates out is collected in hoppers at the bottom and removed. The cooled gas exits the HRSG and goes to the bag-house for further cleaning.

Preheated water from the de-aerator enters the HRSG and passes first through the economizer. The purpose of the economizer is to extract as much heat as possible from the gas by heating the water before it actually gets to the boiler section. The heated water then enters the steam drum. The steam drum separates the steam that is generated in the tubes from the water, so that the steam can flow to the super-heaters and the water can continue to circulate. Water from the steam drum flows through downcomers to the bottom headers and is distributed to the generating tubes. Water flowing through the generating tubes absorbs heat from the hot gas and some of the water is converted to steam. When the steam is separated from the water in the steam drum, it flows into the superheating section where it is raised to a higher temperature. Raising the steam to the highest practical temperature enables the maximum amount of power to be generated in the steam turbine.

4.4.3.4 Alternatives

The HRSG has been selected for this specific application, there generators will be specifically designed. There is no suitable alternative for this function.

4.4.4 Turbine Units

4.4.4.1 Introduction

The steam turbine generator is used to convert the energy transported by the steam into electricity, which in turn can be transported to the end users.

4.4.4.2 Technology

The steam turbine will be a well-proven industrial type, which have been used for decades in similar applications. This is a condensing and extraction type which is capable of supplying some process steam at various pressures and exhausting the remainder to the condenser. It drives a three-phase synchronous generator which will be connected through a transformer to the substation at Scaw.

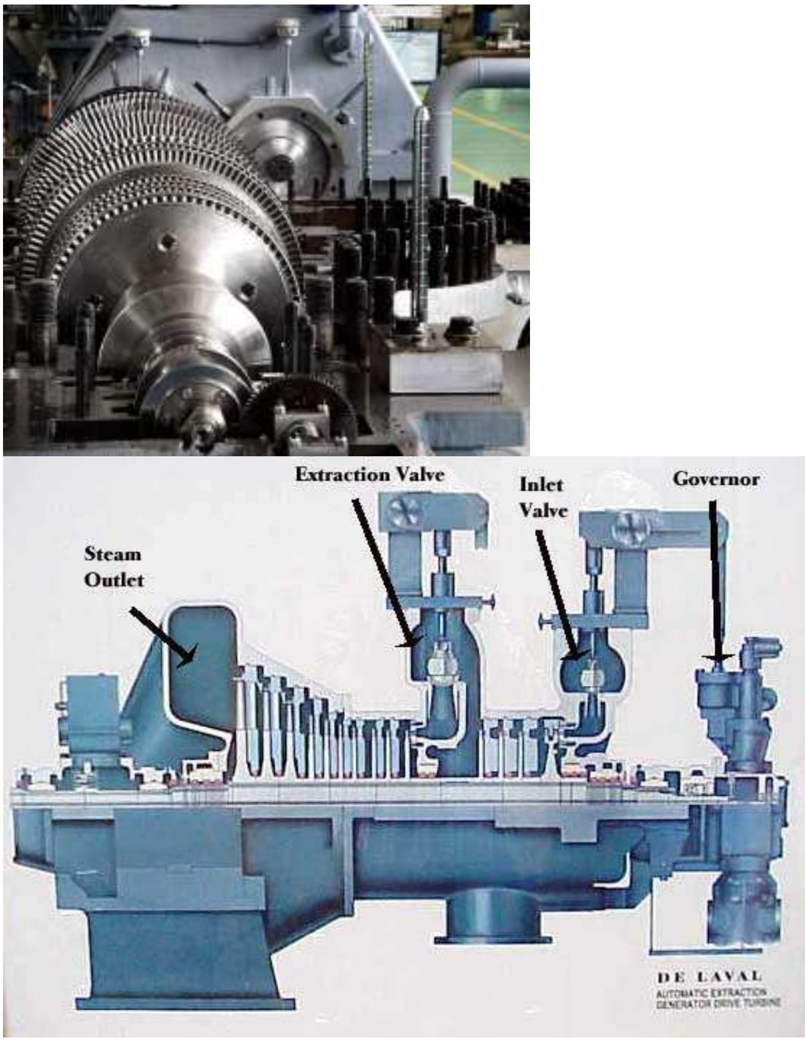


Figure 7: Photo and Schematic of the Turbine Unit

4.4.4.3 Process Flow

Steam enters the turbine through two valves, the first one of which is for safety and the second of which is for control. The first valve, named the Emergency Stop Valve (ESV) is a very fast closing, hydraulically opened and spring closed type. The second valve is the throttle valve which modulates the steam flow according to the demands of the system. After flowing through the valves, the steam enters the inlet nozzles which direct the steam at a specific speed and direction against the rotating blades. After each row of rotating blades is a row of stationary blades to redirect the steam into the next row of rotating blades. The steam moves through multiple stages of blades, continually decreasing in pressure and temperature, until it reaches the turbine exit. At the turbine exit, all possible energy has been extracted from the steam and it then flows to the condenser.

Some steam is extracted from the turbine at intermediate stages, before it has reached the exit. The extraction points are selected according to the desired pressure of steam. Some steam is extracted at about 4 BarA to be used in the de-aerator and other auxiliary systems. Additional steam is extracted at about 0.3 BarA to be used in the first feed water heater.

4.4.4.4 Output

Maximum output from the waste heat recovery component is anticipated to be 252 859 MWh per year with a related output of 247 801 tons CO_2 per year. This would reduce if the plant only operated on waste heat from 1 or 2 of the DRI kilns.

4.4.4.5 Alternatives

For generating power from steam there is no practical alternative to a steam turbine. In some situations steam is required for process uses and a steam turbine would not be used. However, at Scaw there is no need for process steam so all the steam generated in the HRSG will be used in the turbine.

4.4.5 Condensers

4.4.5.1 Introduction

The purpose of the condenser is to recover the high purity water that is used as the working fluid in the cycle. The condenser accepts all the steam from the turbine and other users, and condenses it to water by removing the heat of vaporization. The liquid water is then available to be used in the boiler to generate more steam.

4.4.5.2 Technology

The condenser will be an air cooled type. Diminishing water resources and increased water pollution concerns have led to the explosive growth of dry cooling worldwide. The most popular style of air cooled condenser is the modularized A-Frame design, used on power plants of all sizes as shown in the figure below.

Dry cooling utilizes an air cooled condenser to cool the exhaust steam using a large array of fans that force air over finned tube heat exchangers. The heat is rejected directly to the atmosphere, and no external water supply is needed.

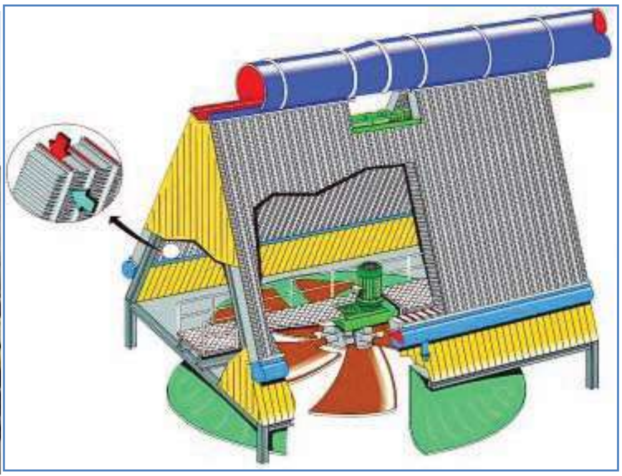


Figure 8: Example of a Condenser Plant

4.4.5.3 Process Flow

Steam from the turbine exhaust is carried through to steam duct to the air cooled condenser. The steam duct runs at the top of the A frame and smaller tubes are connected to a header at the bottom. Air is drawn over the tubes by various fans. The steam that condenses in the tubes flows to the condensate header at the other end. All the condensate is collected from the headers and drained to the condensate tank. The air removal system draws any non-condensable gasses from the condensate tank to maintain the lowest possible operating pressure. Water from the basin is continuously circulated and sprayed over the outside of the tubes. Some fraction of the circulating water is blown down to maintain the correct water chemistry. The water that evaporates is replaced with make-up from the service water system and other available sources.

4.4.5.4 Alternatives

Alternatives for this application are wet cooling (utilising natural draught or forced draught air flow) or hybrid systems that use water, but less than conventional cooling towers.

The water cooled condenser and cooling tower combination is the most typical configuration for a power plant. However, this arrangement requires much greater volumes of water than dry-cooling and is very sensitive to water quality. Water scarcity is a significant concern in South Africa. The technology is also susceptible to plugging tubes when there is a high solids loading in the water. Because of the industrial environment, the circulating water could be heavily loaded with dirt from the air. This would lead to many operational problems and reduced reliability for the system.

The air cooled condenser is therefore proposed as the preferred alternative and will result in significantly lower water demand for the facility.

4.4.6 Emissions Control

4.4.6.1 Introduction

Emissions from the DRI kiln are currently regulated in terms of the AEL held by Scaw Metals. These are set at Particulate Matter of 100 mg/Nm^3, Sulphur Dioxide of 170 mg/Nm^3 and Oxides of nitrogen of 2000 mg/Nm^3. Monitoring of emissions during 2012 and 2013 (Levego) showed that the DRI Plant is almost always compliant with the $S0_2$ emissions limits. PM levels have been problematic at various times but are currently compliant. The emissions levels vary between the different kilns and are also dependent on the operational controls and functionality of the baghouse.

The waste heat recovery component of the Electrical Co-generation Power Plant will not add or remove any physical material to the exhaust gas, but will remove heat. In terms of NEMAQA Emissions Limits the DRI plant must comply with the new emissions limits for the Metallurgical Industry, specifically subcategory 4.12 for direct reduction processes (GN R248, 2010), as shown in Table 2-1.

The waste heat recovery component of the Electrical Co-generation Power Plant will function as ‘cleaner technology’ development and will be required to improve the emissions control equipment on the DRI plant to ensure that the current emissions limits are achieved. It is proposed to make use of new bag houses to achieve the desired emissions control. Test work and the air quality impact assessment will be used to determine if any additional emissions treatment is required to achieve the emissions limits set in the AEL.

4.4.6.2 Technology

The exhaust gas from the Electrical Co-generation Power Plant will be passed through a new bag house before being discharged to the atmosphere through a new stack. The purpose of the bag house is to remove particulates from the gas prior to its release to atmosphere.

Fabric filters, commonly termed “bag filters” or “baghouses,” are collectors in which dust is removed from the gas stream by passing the dust-laden gas through a fabric of some type (e.g., woven cloth, felt, or porous membrane). These devices are “surface” filters in that dust collects in a layer on the surface of the filter medium, and the dust layer itself becomes the effective filter medium.

Although the design details of the DRI plant indicate that the plant should operate at SO_2 output levels below the 350 mg/Nm^3, emissions do sometimes exceed this limit. This depends on which kiln(s) is operating, the kiln conditions and the functionality of the emissions control equipment. The DRI technical team is investigating improvements in the operational controls and additional emissions technology to ensure that the DRI plant consistently meets the allowable SO_2 emissions levels.

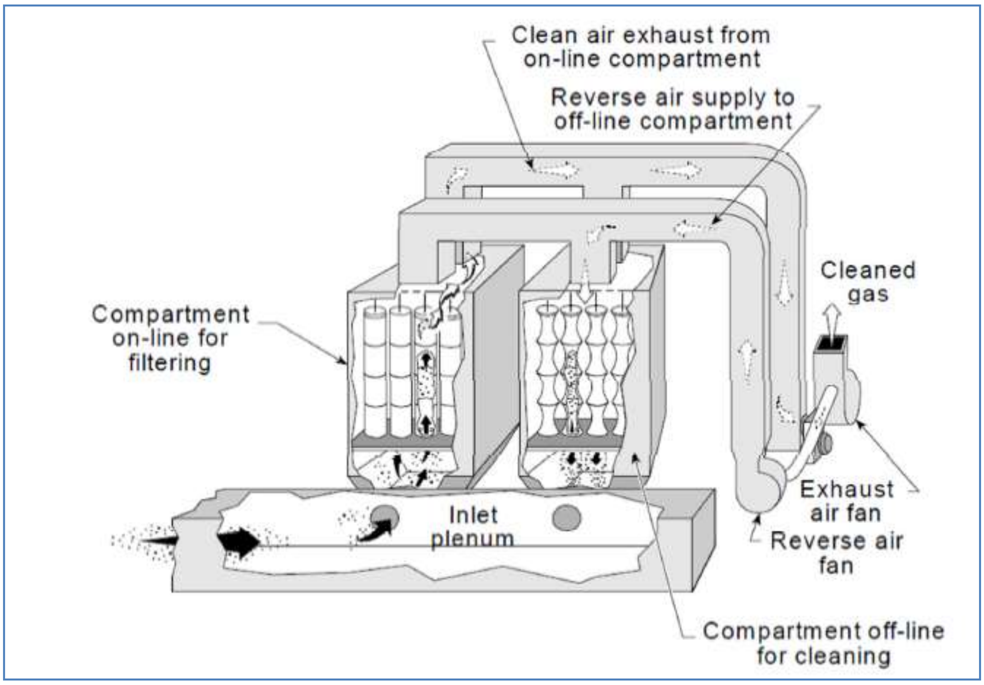


Figure 9: Schematic of a Bag-house

The stack for the waste heat recovery component will have the following operating parameters which have been determined to ensure adequate dispersion of the emissions

Stack Height	60 m
Gas Temperature	90 °C
Stack Diameter	3.4 m
Gas Exit Velocity	16.1 m/s
Gas Volumetric Flow Rate	92.5 Nm3/s (a)

Plate 2: Example of a Stack

4.4.6.3 Process Flow

After the flue gas leaves the HRSG it will be at a temperature of about 200 degrees Celsius. The gas enters the baghouse and passes through the filter bags. As the dust laden gas passes through the filter bags, the dust particles are collected on the outside surfaces of the numerous filter bags. The dust will build up around the bags and is removed by periodic activation of pulsed air. The air causes the bags to shake and expand. This causes the dust layer to fall down into a hopper from where it is removed to the waste disposal site.

The cleaned gas continues up the stack and exits into the atmosphere.

4.4.6.4 Alternatives

Various technologies exist for the cleaning and treatment of effluent gas streams before release into the atmosphere. Alternative technologies are electrostatic precipitators, gravity settling chambers, mechanical collection (Cyclone) and particulate wet scrubbers.

Fabric filter bags will be used, since they are most reliable technology for cleaning gas streams, providing very high cleanliness levels with only very small particles remaining.

4.5 Combustion Component

The other component of the Electrical Co-generation Power Plant will combust dust, char and shredder waste to produce up to 28 MW of electricity. This will require the development of new infrastructure and its design is influenced by the type and availability of the fuel stock. A fluidised bed boiler has been selected for the combustion of the materials. The size of the installed FBB will depend on the volume of materials (char and dusts) likely to be produced from the DRI kilns. This is dependent on how many of the DRI kilns are operating.

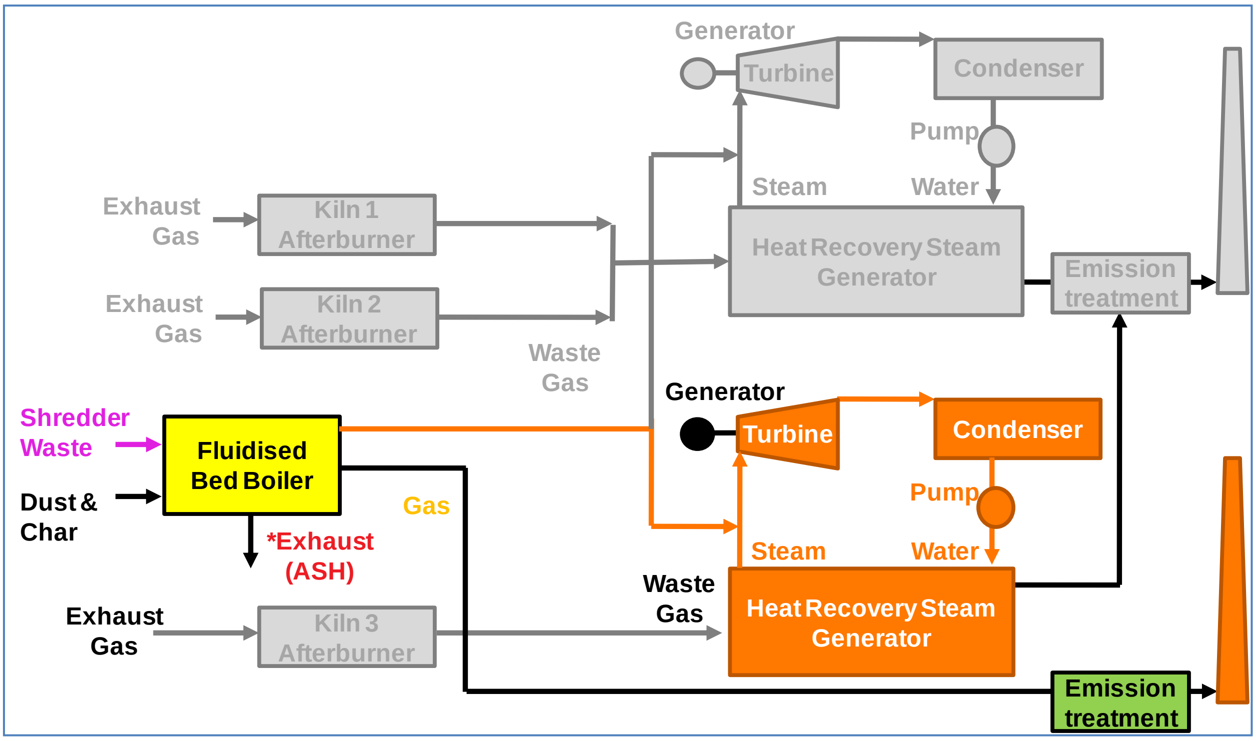


Figure 10: Proposed Process Flow for the Combustion component of Electrical Co-generation Plant

CO_{2e} emissions for the electrical generation from combustion will be higher than waste heat recovery as the FBB will combust carbonaceous materials. The bulk of the fuel will comprise char and coal dust and thus the CO_{2e} emissions are expected to be equivalent to those at Eskom's coal fired power stations.

4.5.1 Fluidised Bed Boiler

4.5.1.1 Introduction

A fluidised bed boiler (FBB) will be included to burn the dust and char by-products and shredder waste in order to generate electrical power. Having an independently controlled supply of energy to the waste heat boilers also allows them to be operated more evenly and to keep the steam turbine above its minimum allowable load point. Burning the wastes and by-products enables power to be produced from a material that would otherwise be disposed of.

4.5.1.2 Technology

A fluid bed is a type of furnace design where fuel is combusted in a bed of material containing, generally, sand, ash, fuel, and lime. Enough air is introduced under the grate to lift the material and force vigorous mixing of the material in the bed. There are various fluidized bed designs ranging from the "moving bed" to "bubbling bed" and "circulating bed" (see figure below). The difference is in the amount of fluidization that occurs, and the fuel particle sizing required.

The temperature is stabilized by the bed of a large amount of inert material which is fluidized and thoroughly mixed by the flow of air through the bed. The thermal inertia of the bed material facilitates the even and reliable combustion of materials which are difficult to burn in a conventional manner. The stable combustion conditions promote the complete oxidation of the fuel so that low levels of CO are achieved. In addition, because lower peak combustion temperatures are reached, it reduces the formation of thermal NOx. Additionally, limestone can be added into the bed which will absorb sulfur and reduce the emissions of SOx.

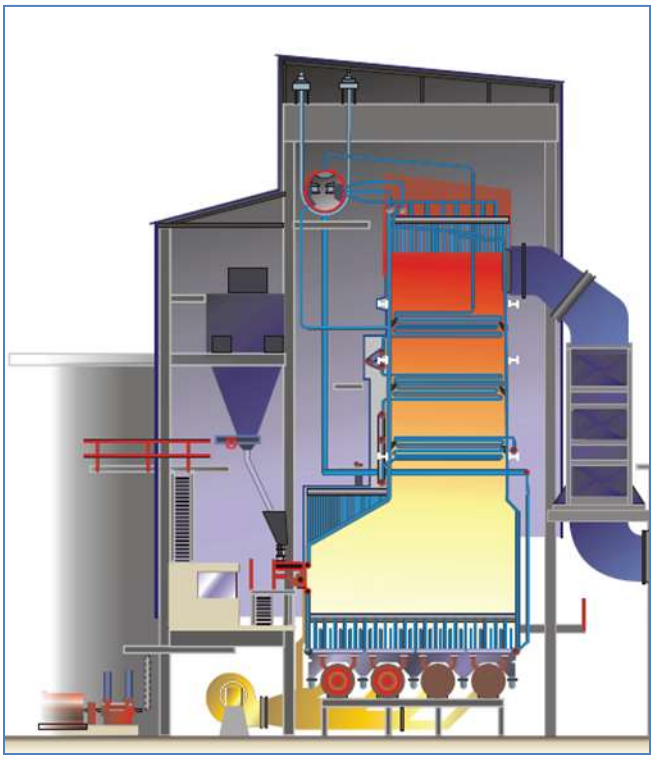


Figure 11: Schematic of the FBB

4.5.1.3 Process Flow

The fuel is added to the FBB near the top of the bed, or sometimes above the bed, and air is added under the bed. The bed is supported by a perforated grate which prevents the bed material from falling down into the air chamber. Air flows up through the grate and into the bed. Depending on the amount of air added under the grate, the bed will either be partially fluidized as air bubbles rise through it, or fully fluidized and the smaller particles carried out of the furnace. The bubbling bed FBB intended for this project is of the first type. In the second type it is necessary to recapture the bed material with a cyclone and return it back to the bed.

As the air flows up through the bed it burns with the fuel which tends to raise the bed temperature. The bed temperature must be maintained at a level below the ash fusion temperature of the fuel in order to prevent the melted ash from adhering to everything. The bed temperature can be maintained by bed coolers through which steam flows and removes heat from the bed material. For this project, the bed temperature will be controlled by adding some recycle gas to the FBB. The relatively cool recycle gas will remove heat and then flow with the combustion products to the WHB where that heat will be converted to steam.

4.5.1.4 Alternatives

An alternative to the fluidised bed boiler is a fluidised bed combustor. The only difference is that it does not have steam generating equipment included and can therefore provide a cheaper solution. However, a secondary boiler will be required to generate the required steam. The combustion process will be exactly the same in both technologies, so there is no difference with the operation or the achievable emissions levels.

4.5.2 Fuel and other inputs to FBB

4.5.2.1 Coal Dust and Char

The DRI kilns generate coal dust and char that have historically been disposed to the waste disposal sites at Scaw Metals. Due to their carbonaceous content and calorific value, these materials have been identified as suitable fuels for the FBB. The coal dust and char will comprise the normal fuel for the FBB. The quantity of char and coal dust is dependent on the production rate of DRI and is expected to be 287 GJ/Hr at full capacity. If the future operation of the DRI kilns are restricted then this output will be less.

A portion of the coal which is used for reducing the iron in the DRI process is not completely consumed in the kilns. This is collected as dust in the DRI baghouse and also separated from the iron slag as char on exiting the DRI cooler. The char and coal dust are equivalent to coke, as it is almost entirely carbon with some ash.

4.5.2.2 Shredder Waste

The shredder at Scaw Metals generates waste that has historically been disposed to landfill. This waste was classified in terms of the Minimum Requirements as a Hazard Rating 2 waste due to the elevated Mn, Zn and Pb concentrations and should be disposed to a hazardous landfill. The waste could delist for disposal to a GLB+ landfill site where a maximum load of 7.7 t/ha/month can be achieved. Under the National Norms and Standards for the Assessment of Waste for Landfill Disposal the Shredder waste has a Type 3 (Low Risk) profile and can be disposed on a Class C/ G:L:B+ landfill (Golder, 2012).

A study conducted by Scaw in 2010 identified that on average about 1250 tonnes/month of combustible material could be recovered from the shredder waste. The quantity of shredder waste is dependent on the quantity and source of scrap being shredded. The shredder waste is considered to be an opportunity fuel and not a normal fuel for the FBB. It will be used if it is available and if its properties meet the specifications for the FBB. It is anticipated that the shredder waste would not be fed on a continuous basis, but used intermittently when it is available and needed to maintain the required steam turbine output.

4.5.2.3 Other wastes

No other commercial wastes will be incinerated in the FBB.

4.5.2.4 Water

Water is used both for cycle make-up and for cooling. The cycle make-up requires a small quantity of very high quality water to replace losses from the steam cycle. This water will be supplied from Rand Water and processed through a demineralizing system.

Water for cooling is needed in much larger quantities than for cycle, but the quality requirements are much less. Cooling water will come from storm water drains within the plant and waste water to the extent possible. Any additional water that is needed will be supplied from the Rand water authority.

Separate electronic file.

Figure 12: Conceptual Water Cycle of the Electrical Co-generation Power Plant

4.5.3 HRSG, Turbine and Condenser

The combustion component will make use of similar technology for the HRSG, Turbine and Condenser as described for waste heat recovery. A second, dedicated line of equipment would be added for this component.

4.5.3.1 Output

The combustion component is anticipated to produce 177 001 MWh per year with a related output of 173 461 tons CO_2 per year (estimated based on the current Eskom Grid factor (0.98) as the production is based largely on the combustion of coal containing materials).

4.5.4 Emissions Control

4.5.4.1 Introduction

As the combustion component includes the combustion of materials, emissions control will be required to ensure that emissions to atmosphere meet the emissions limits for combustion activities. As discussed in Section 2.4.1, 1.6.2 the relevant air emissions activity depends on whether the FBB is combusting waste or not.

If the fuels for the FBB are not waste, but solid fuel then Category 1.1 of the NEMAQA listed activities (the combustion of solid fuel) is applicable. The emissions control equipment will be required to meet the emissions limits, as shown in Table 2-2.

If the fuels for the FBB are defined as waste Category 8 (GN R248, 2010) of the NEMAQA listed activities (the disposal of hazardous and general waste) is applicable for the combustion of wastes and alternative fuels in the FBB. The emissions control equipment will be required to meet the emissions limits for the disposal of hazardous and general waste by incineration, as shown in Table 2-3.

The design engineers have opted for the conservative approach and emissions control equipment required to meet the Category 8 emissions limit has been specified. The emissions limits will be met through accurate control of the combustion conditions, the addition of various additives to capture target compounds and emissions treatment technology. It is proposed to make use of bag house to achieve the desired PM emissions control.

Gas will be discharged to the atmosphere through a new stack with the following parameters:

Stack Height	60 m
Gas Temperature	150 °C
Stack Diameter	2.2 m
Gas Exit Velocity	10.1 m/s
Gas Volumetric Flow Rate	20.8 Nm^3/s

4.5.4.2 Technology

NOx formation in the FBB will be controlled by limiting the bed temperature to <900°C and by maintaining very low levels of excess air. The bed temperature will be controlled by recirculation of gas from the ID fan outlet. The oxides of nitrogen will be controlled post-combustion with ammonia or urea by selective non-catalytic reduction, also called thermal deNOx. The System will be designed to limit NOx emissions to 200 mg/Nm^3 @10% O_2. Thermal deNOx is most effective in the temperature range of about 900°C to 1000°C and can achieve about 40% - 70% reduction of NOx. The reagent will be injected at the outlet of the FBB, before the afterburner, via an injection grid. If necessary a static mixer will be installed to ensure adequate dispersion of the reagent in the gas stream prior to the afterburner. As the gas passes through the afterburner the nitrogen oxides will be reduced to nitrogen and water vapour.

The sulphur oxides will be removed from the gas streams by duct injection of alkali (LSD technology). It is expected that finely ground dolomite will be effective at the conditions which exist in the afterburner. The ground dolomite will be injected pneumatically at the entrance to the afterburner. To ensure complete calcination of the dolomite and optimal reaction with SO_2 the afterburner must be maintained between 800°C and 900°C. Sulphur emissions from the plant will be reduced to achieve 50mg/Nm^3 at 10% O_2.

The FBB outlet gas will also have high levels of carbon monoxide and duct burners running on natural gas can be used to convert the CO to CO_2 and to destroy the VOCs. The gas must however then be cooled before it reaches the baghouse. Another option is an oxidation catalyst before or after the baghouse but then the gas must be heated to ensure sufficient oxidation.

A dedicated bag-house gas will be provided for gas from the FBB. As the dust laden gas passes through the filter bags, the dust particles are collected on the outside surfaces of the numerous filter bags. The dust will build up around the bags and is removed by periodic activation of pulsed air. The air causes the bags to shake and expand. This causes the dust layer to fall down into a hopper from where it is removed to the waste disposal site. Dusts from the bag-house filters will be disposed as wastes.

The gas discharged to the atmosphere will have the approximate properties shown below.

Temperature °C	Volume Flow AM^3/Hr	%CO_2	%H_2O	% O_2	%N_2 + Ar
90	527635	14.6%	6.6%	4.7%	74.0%

4.5.4.3 Process Flow

Gas exiting the FBB will be treated via an injection grid and then an afterburner. The gas will then be cooled before entering the baghouse and passing through the filter bags. The cleaned gas continues up the stack and exits into the atmosphere.

4.5.4.4 Alternatives

Various technologies exist for the cleaning and treatment of effluent gas streams before release into the atmosphere. Alternative technologies are electrostatic precipitators, gravity settling chambers, mechanical collection (Cyclone) and particulate wet scrubbers.

Fabric filter bags will be used, since they are most reliable technology for cleaning gas streams, providing very high cleanliness levels with only very small particles remaining.

As for waste heat recovery. The inclusion of an alkaline scrubber (for SO_2, NO_x, HCl and HF control has been considered as part of the design.

4.6 Management of Waste

4.6.1 Exhaust Gas

As described for each component, exhaust gases will be passed through bag-houses and other control mechanisms to achieve the necessary emissions control and then released to atmosphere via a stack. All emissions will comply with the NEMAQA emissions limits.

4.6.2 Blow Down Water

All water discharged from the plant will be in a single stream, disposed either with the ash or to the municipal sewer. The bulk of the blow down water will likely be used to quench the ash prior to its disposal. If discharged to sewer the water composition and properties will meet the discharge standards defined by the municipality. The maximum volume flow is expected to be about 284 l per hour.

4.6.3 Ash

The ash from the FBB consists of oxides of silica, alumina, iron, potassium, sodium, calcium, and other metals. It is essentially the same material as is currently disposed to the Scaw disposal site, with the carbon fraction removed. Because the carbon fraction has been burned out, the volume will be about 50% - 70% of what is currently disposed. The FBB will produce two ash streams known as bottom ash and fly ash. At maximum availability the FBB is expected to produce 300 tons of ash per day. This is based on the plant receiving the full output of dust and char from the 3 DRI kilns. If the DRI operates with fewer kilns then the inputs to the FBB will reduce with a related reduction in ash.

Various alternatives may prove viable for the re-use, sale or recycling of the ash. As a worst case scenario the waste ash will be disposed to a purpose-built WDF.

Design and licensing of the related WDF is currently the subject of separate authorisation process that is being run in parallel to this process (WML 12/9/11/L895/3). The EIA for the WDF is also being prepared by Synergistics. For the purposes of that assessment the ash was subject to a waste classification process (Golder 2012). Samples of the trial ash generated at the CSIR were subject to waste classification in terms of the Minimum Requirements (DWAF, 1998) and the National Norms and Standards for the Assessment of Waste for Landfill Disposal.

Under the Norms and Standards the ash waste streams classified as Type 3 (low risk) wastes suitable for disposal to a Class C landfill (equivalent to a GLB+). The addition of shredder waste to the input fuel increased concentrations of certain elements in the analysis, but made no significant difference to the assessment of the ash. All the ash collected will be disposed of on the proposed new waste disposal site proposed at Scaw Metals (Ref 12/9/11/L471/3).

4.6.4 Fly ash

Fly ash will be collected through a cyclone and at the baghouse. All the ash collected will be disposed of on the proposed new waste disposal site proposed at Scaw Metals (Ref 12/9/11/L471/3).

4.7 Operations and Safety of Personnel

Operation of the co-generation facility will be based on three 8-hour shifts per day. The following personnel will be required to operate the plant:

POSITION	No.
Plant manager	1
Plant operators	4
Operator's Assistants	4
Technicians	4
Technical Apprentice	2
Fitting (crew rate)	2
Cleaners/ Laborers	10
Security	6
Drivers	8
TOTAL	41

Safety is addressed in all aspects of design, engineering, fabrication, construction, commissioning and operations. The design of the cogeneration plant specifically addresses protection of the environment, the public, and operations staff by means of engineered safety systems, environmental monitoring systems, and safety assessment of the design and proposed operations.

4.8 Development Alternatives

4.8.1 Alternatives

The location of the proposed plant is constrained by the requirement that it integrate with the existing DRI plant. As such the location is fixed and no alternatives were considered. The selected site is considered to be both suitable and appropriate as it is a disturbed site located within an industrial area.

Scaw's investigations have concluded that the only economically feasible means to utilise the waste heat from the DRI kilns is to generate electricity. This is achieved through waste heat recovery component of the proposed project.

Electrical generation from the various resources and wastes from the DRI and Shredder plants was identified as the most feasible solution, common to most of the available materials. This is achieved through the combustion component of the project, whose feasibility benefits from the economies of scale when combined with the waste heat recovery component.

See Section 3.3 for a discussion of alternatives that have been assessed by Scaw or which are subject to on-going investigation in order to make use of the waste outputs of the DRI and or Shredder plant.

4.8.2 No-go Development Alternative

The no-go alternative will see the Electrical Co-generation Facility not being developed. The status quo at Scaw Metals will therefore continue, subject to any other developments or changes. The no-go can be considered for each phase of the project independently, or collectively as a whole:

Potential consequences of the no-go for the waste heat recovery component include:

- No on-site electrical generation;
  - Scaw remains fully dependant on Eskom;
  - High risk of stoppages due to power outages;
  - Limited opportunity for expansion due to electrical supply constraints;
  - Substituted supply not available to other Eskom customers;
- Continued emission and loss of produced heat to atmosphere;
- No reduction in carbon emissions of consumed electricity

No significant benefits to the no-go option for waste heat recovery component were identified.

The potential consequences of the no-go for combustion component include:

- As for waste heat recovery component, with the following additional losses;
  - Continued disposal of wastes with embodied energy.
  - No reduction in volume of waste for disposal
  - No extension of life of Scaw Metals GLB+ Disposal Facility.

The main benefit of the combustion component no-go option is the elimination of the point source emissions that will arise from the combustion of the input wastes and resources.

4.9 Project Implementation Schedule

Construction is anticipated to take 24 months and may commence in 2014. The design life of the Electrical Co-generation Facility at Scaw Metals is 25 years. The precise schedule of development will only be determined during final feasibility.

4.10 Monitoring

As the development of Electrical Co-generation Power Plant will take place at the Scaw Metals General Waste Disposal Site, the development will largely fall within the existing monitoring networks. The monitoring networks include:

- Surface water;
- Groundwater; and
- Dust fallout.

Monitoring of ambient air quality and stack emissions will be done in line with the requirements of the AEL.

4.11 Decommissioning and Closure

The Electrical Co-generation Power Plant has been designed for a 25 year life of operation. The need and possibility of decommissioning the facility will be dependent on the operation of the DRI kilns and the condition of the equipment.

Decommissioning of the facility will require the dismantling of the equipment, the sale and final disposal of all components, the decontamination of any contaminated areas and the rehabilitation of the site to condition suitable for an end land use.

5 Description of the Affected Environment

The baseline environment described here represents the current environmental conditions of the Scaw Metals, Union Junction area. 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 Electrical Co-generation Power Plant at Scaw Metals.

Where the specifics of one of the proposed sites is different from the general overview provided of the environmental aspects, then such additional information is detailed as a sub-section.

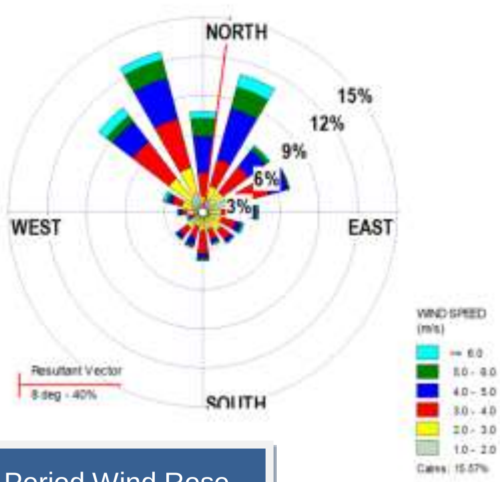
5.1 Physical Environment

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.

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 13.



Period Wind Rose

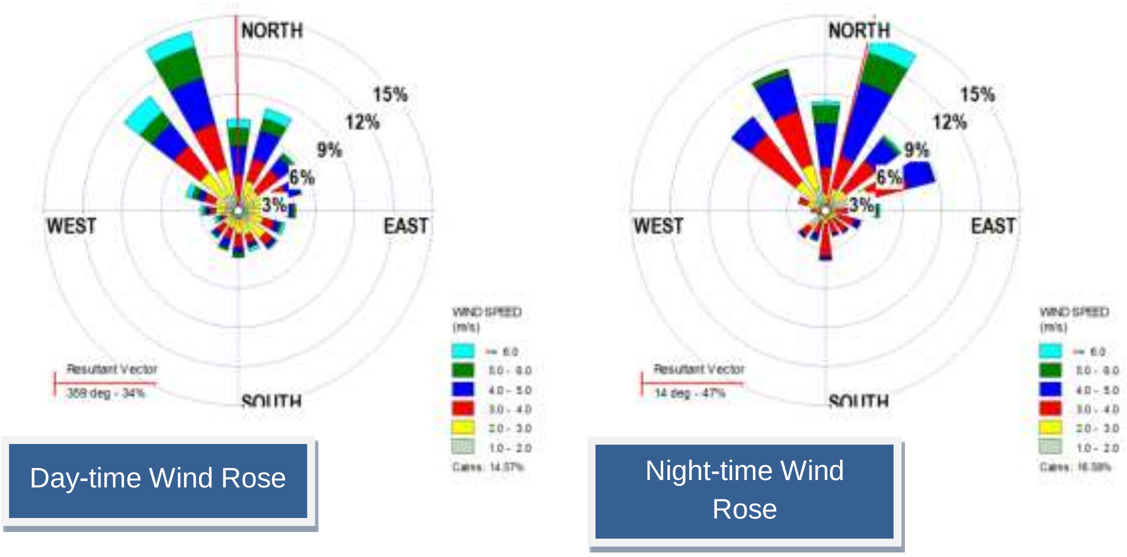


Figure 13: Average wind roses (MM5 data, 2008)

5.1.2 Topography

The site is flat without any topographical features. Elevation is approximately 1620 mamsl, Drainage is south and west toward the unnamed tributary of the Elsburg Spruit.

5.1.3 Soils

Surface soils across the Scaw Metals area consist of clayey colluvial sands of mixed origin. Soil profiles recorded in test pits for the disposal site indicates two basic soil profiles. These include a shallow hardpan ferricrete which is overlain by ferruginised hillwash sands and a deeper profile comprising hillwash and ferruginised hillwash soil profile over a well cemented and ferruginised transition. Underlying the ferricrete horizon are weathered sedimentary rocks.

Topsoils across the site have been historically disturbed and removed to varying degrees across the site with the addition and removal of stockpiled materials.

5.1.4 Geology

The regional geology in the vicinity of Scaw Metals comprises three geological units. The site appears to be mainly underlain by the Black Reef Formation of the Transvaal Supergroup of Vaalian Age, which consists of quartzite, conglomerate and shale. The overlying Malmani Subgroup of the Chuniespoort Group, also of Vaalian Age, 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.

5.1.5 Air Quality

5.1.5.1 Regional

Air quality in the Ekurhuleni region is known to be poor as the EMM 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 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.

5.1.5.2 Sources at Scaw Metals

Scaw Metals undertakes a number of operations that result in gaseous and particulate emissions to the atmosphere. Scaw South Africa currently holds a provisional AEL in terms of the NEMAQA for activities at their Union Junction Facility. The AEL (14/1/1/1/7/4/04/SCAW/ALB) was issued in 2014 and remains valid until end March 2016. The AEL has replaced the Registration Certificate (53/29).

The DRI Main stack (Plant 1 and 2) and DRI stack (Plant 3) are registered as point sources in the certificate. 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 AEL requires annual sampling of emissions from the DRI Plant 1, 2 and 3.

5.1.5.3 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.

5.1.5.4 Air Quality Monitoring and Management

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

Scaw South Africa has commissioned various stack emissions monitoring surveys at the Scaw Metals facility. In early 2012 Levego completed a series of surveys (February, April, May/June 2012 and September). The February survey measured emissions from the DRI 3 stack. The average emissions for the DRI 3 stack were PM of 74.3 mg/Nm^3, SO_2 of 694.12 mg/Nm^3 and 13.5 mg/Nm^3 for NO_x. The DRI 3 stack was thus not complying with the emissions limits set for particulate matter or sulphur dioxide in the Registration Certificate. These emissions would be in compliance with the current AEL.

The DRI 3 kiln was stopped because of damage to the refractory lining. The bags were replaced pending a restart. DRI Kiln 1 and 2 were then brought into operation. The rest of the 2012 surveys assessed emissions from the stack for these kilns. During 2012 the average emissions for the DRI kin 1 were in exceedance of the SO_2 limits but compliant for PM and NO_x. The average emissions for DRI Kiln 2 were in exceedance of the SO_2 limits but compliant for PM and NO_x. These exceedances were in terms of the Registration Certificate but these emissions would be in compliance with the current AEL.

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.

5.1.6 Hydrology

5.1.6.1 Catchment

There are no watercourses or 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 14). 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.

5.1.6.2 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. 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. One of these storm water channels flows across a portion of the site proposed for the Electrical Co-generation Plant.

Scaw Metals has four storm water dams within the facility that are used to contain runoff from within the facility. Process water is also sourced and recycled within these dams(Dam 1, 2, 3, 4). The majority of inflows are into Dam 1 and Dam 3 and water is primarily drawn from these dams. The water flows from dam to dam and any overflow into the environment is from Dam 4. Dirty water from the DRI plant area flows to Dam 4.

5.1.6.3 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).

5.1.7 Groundwater

5.1.7.1 Characterisation of the Aquifers

The proposed site is situated on mainly metamorphic and sedimentary Vaalian rocks and extrusive Randian rocks not known to contain economic aquifers. However, groundwater contributes to stream flow and in some instances high yielding boreholes have been recorded. Test pumping in boreholes around Union Junction has revealed that a sustainable yield of between 0.06 and 0.2 l/s can be achieved. The following aquifers underlie the area:

Weathered Aquifer: A shallow, weathered aquifer in the weathered lava and quartzite. The most consistent water strike is located at the fresh bedrock / weathering interface. Groundwater elevations vary between 1.74m and 3.52m below surface.

Fractured Aquifer: A deeper, fresh lava / quartzite aquifer where fracture flows dominate. Groundwater migration within the upper portion of this aquifer appears to be governed by jointing while major faults and intrusions form the significant conduits at depth. The depth to groundwater in this aquifer ranges from artesian to 3.67m below surface. This is indicative of confined conditions.

At the southern edge of Union Junction, groundwater occurs in the Black Reef quartzite and Malmani dolomite. In this area the following aquifer may be present:

Dolomitic Karst Aquifer: Carbonate rocks are practically impermeable and therefore devoid of any effective primary porosity. During its geological history, however, the dolomite is subjected to karstification and erosion. During this dissolution processes, the carbonate is removed from the dolomite and residual products such as silica, iron and manganese oxides and hydroxides (wad) are left behind. The residual mass is spongy, compressible, of low density and has a high void volume. Fissures and caves also develop. Fault zones are preferential zones of weathering and are transformed into groundwater conduits. The potential for large-scale groundwater exploitation depends solely on the extent to which the dolomite has been leached by percolating rainfall and groundwater drainage, as well as the degree to which it has been transformed into aquifers capable of yielding significant quantities of water and sustaining high abstraction capacities.

The only boreholes at Union Junction to be drilled into dolomite were those to the south of Cell 4b at the 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.

5.1.7.2 Groundwater Gradient and Levels

The groundwater level at the Scaw site generally mimics local topography and the flow is mainly towards the south. Average groundwater depth varies from 10 – 20 m below ground level with a moderate recharge rate.The groundwater levels in the area shows seasonal variations.

5.1.7.3 Groundwater Use and Management

Groundwater use in the area is limited. 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.

Figure 14: Catchments, Rivers and Wetlands at Scaw Metals
(Wetlands from NFEPA and SANBI)

5.1.7.4 Monitoring and Groundwater Quality

Two boreholes at Scaw Metals (Morgan Mill and Hille Mill) are upstream of the 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. 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, 2013).

Note that no borehole water is used for human consumption.

5.1.8 Noise

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

Table 5-1: 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. Unused areas at Union Junction are either managed as parkland or are unmanaged. 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. In 2012 Scaw undertook a vegetation survey and cleared most alien and invasive species. Scaw Metals has 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 Electrical Co-generation Power Plant 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 3: Storm water channel on the Electrical Co-generation Power Plant 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 15).

5.2.1.1 Aquatic Habitats

No natural aquatic habitats were observed on the site of the Electrical Co-generation Power Plant. An excavated storm water drainage channel that runs across the site provides limited aquatic habitat. The channel is partially vegetated with Phragmites Reeds, typical of wet areas in the region (see Plate 3). These habitats are temporal as the channels are cleaned regularly. During heavy rainfall, low-lying portions of the site are prone to temporary inundation due to an under capacitated culvert in the channel. In the SANBI 2010 database this site is identified as a wetland (see Figure 14), but the validity of this categorisation is questioned as it is an excavated storm water drain. The process water dams at Scaw Metals are also indicated as wetlands.

Natural aquatic habitats nearest the site are the Elsburg Spruit and Natal Spruit and their associated wetlands, located to the south (~800 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 streams 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 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 Electrical Co-generation Power Plant is largely unvegetated and provides little habitat for any fauna. 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.

The grassland to the west (~700 m) and wetlands to the south (> 450 m) of the Union Junction area are likely to host a range of species, largely those tolerant of partially transformed habitats and moderate levels of disturbance.

Figure 15: Regional Vegetation and Ecological Sensitivity at Scaw Metals
(Mucina & Rutherford, GDARD CPlan)

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. The DRI and the proposed site for the Electrical Co-generation Power Plant is surrounded on all sides by properties owned and utilised by Scaw Metals.

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 General 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. 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 16). There are industrial areas to the south east, west and south west of the Scaw property. In relation to existing residential areas, the DRI plant at Scaw Metals is:

- ~ 1 km south of Dinwiddie;
- ~ 1.1 km south east of Verwoerdpark; and
- ~ 1 km north east of Roodekop Extension 31;

Figure 16: Land Use at Scaw Metals
(Aerial Photo, October 2011)

5.4.3 Regional and Local Land Use Policies and Plans

5.4.3.1 Ekurhuleni Integrated Development Plan and Spatial Development Framework

The EMM 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 the EMM. 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. The EMM 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 2).

5.6 Other Incinerators

According to the register held by EMM, other licensed incinerators in the municipal area (with AELs) include:

- Abrasive grit Metal recovery in Jet park
- Bayer - Hazardous waste
- AVBOB
- Athermal - Hazardous waste
- Aid safe - Hazardous waste

None of these facilities combust waste that is substantially similar to the proposed facility at Scaw Metals.

5.7 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 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.

5.8 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.

5.9 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 waste disposal sites 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.

5.10 Socio-Economics

The Scaw Metals facility at Union Junction is located within Germiston, Gauteng and falls within the boundaries of the EMM. The EMM 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. The EMM 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.

5.10.1 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.

5.10.2 Public Health

Public health risks may arise from operations at Scaw Metals. One of the main risks is to 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 Electrical Co-generation Power Plant 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 6-1 and Table 6-2 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 was combined for two projects at Scaw: (1) the proposed development of an Electrical Co-generation Power Plant, as well as a separate but related project - (2) the proposed development of a WDF at Scaw Metals. Thus, not all of the questions asked in the meetings were relevant to the Electrical Co-generation Power Plant project.

Table 6-1 below provides issues raised by IAPs at the public meeting held in July 2012. Table 6-2 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 6-1: 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 in terms of NEMAQA which sets permissible emissions limits. This replaced the APPA Registration Certificate. The Electrical Co-generation Power Plant has been designed to achieve the minimum emission standards set by NEMAQA for the particular activities. It is necessary to regulate Particulate matter (PM), Carbon monoxide, Sulphur dioxide, Oxides of nitrogen, Hydrogen chloride, Hydrogen fluoride, heavy metals, Mercury, Cadmium and thallium, Ammonia and TOC. These standards are conservative and aim to minimise nuisance and health risks to the public. The project includes various emission control technologies such as bag-houses, after burners and a scrubber. The Air Quality Impact Assessment that was undertaken has demonstrated that the plant can achieve the minimum emission standards provided that it is equipped with emission control technologies and is operated to the design parameters.	See Project Description (Section 4), specifically sections on Emissions Control, as well as the description of the Air Quality Impact Assessment (Appendix D).
2.	Rupert Retief asked if anything would be discharged?	There will be emissions to the atmosphere, as explained above. The Co-gen plant will generate blown down water from the cooling cycle. This would be used to quell the ash or disposed to the municipal sewer. The combustion component of the Co-gen will generate ash and dusts that will be disposed to a disposal facility. See the separate EIA report for the Ash Disposal Facility.	See Project Description (Section 4).
3.	Rupert Retief asked what types of hazardous waste are anticipated?	Some parts of the fuel combusted in the combustion component will remain as waste ash. Trial samples of the ash were subject to waste classification and are considered hazardous. Bag-house dusts are likely to have a similar composition and be hazardous. The design of the WDF is being influenced by the waste classification and a conservative liner design has been proposed. Any other wastes that may result from the plant will be classified once they are generated and disposed appropriately.	See Section 4.6.
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 6-2 below.

Table 6-2: 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, on behalf of Extrupet, 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 4.6.3.
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 the EIA for the WDF.	See Sections 4.6.3**Error! eference source not found.**.

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 the combustion component 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 waste disposal site with disposal capacity for the life of operation. The need for the WDF is thus entirely motivated by 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 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 wastes from Scaw operations.	This concern applies largely to the project for the development of the WDF at Scaw Metals.
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 D)**Error! Reference source ot found.** This concern applies largely to the project for the development of the WDF at Scaw Metals.
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 WDF.	See Section 7.4.1. This concern applies largely to the project for the development of the WDF at Scaw Metals.
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 components of the Electrical Co-generation Power Plant. The management requirements of each of these components are presented in the EMP.	This concern applies largely to the project for the development of the WDF at Scaw Metals.

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 6-3. This includes a list of requirements from the DEA 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 in Table 6-4.

The EMM provided comments on the DEIR and these are included in

Table 6-5.

Table 6-3: 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 Environmental Management Plans.	See Section 3 for a full description of the study approach and methodology used in this EIA process.
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 7.6.
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.	Scaw currently hold a permit for leachate disposal to sewer. This will be amended if there is a need to dispose process water to sewer.
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 1.2 and specific sections of the project description in 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 12.
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.

No	Authority Issues	Reference to Report Section where Issues are Addressed
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 EIA Report. 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. A Heritage specialist assessed the site and produced a motivation for exemption from a heritage impact assessment.
13.	Other Authorities including the DWA and DEA: Waste indicated that they would provide comments on receipt of the Scoping Report.	See Table 6-4 below

Table 6-4: 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.	Waste heat recovery component of the Co-gen will involve the upgrading of the current stack to a new stack with improved emissions control technology. Future use will be industrial, as part of the Scaw Metals complex.
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 Figure 3
3.	Should a Water Use Licence be required, proof of application for a licence needs to be submitted.	A Water Use Licence is not required for the Electrical Co-generation Power Plant .
4.	The impacts of the proposed facility on avifauna and bats must be assessed in the EIA phase.	The proposed Co-generation Plant will be developed in an industrial area where very little natural habitat remains. The proposed plant will also cover a relatively small area. As such, no significant impact on avifauna and bats is predicted. See Sections 5.2.2 and 7.4.2
5.	Possible impacts and effects of the development on the surrounding industrial area.	See Sections 5.4.2, 7.3.1,
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?	Water will be obtained from the local municipality. Effluent discharge (if any) will be to an existing sewer. No significant change in waste removal is expected. An existing agreement for services from the local municipality is in place.
8.	A construction and operational phase EMP to include mitigation and monitoring measures.	See Section 12

9.	Should blasting be required, appropriate mitigation measures should be provided.	No blasting will be required.

Table 6-5: Comments on the Draft EIR

No	Authority Issues	Reference to Report Section where Issues are Addressed
1.	EMM- Environmental Resources Management Department: Air Quality Section. The EMM has accepted the proposed development. The following listed activities in terms of the NEMAQA, 2004 must be taken into consideration: Sub-category 4.12 Pre-reduced and direct reduction Sub-category 1.1 Solid fuel combustion installations Sub-category 8.1 Thermal treatment of hazardous and general waste. The EMM recommends a noise baseline survey and to ensure that construction noise levels are in compliance with the Gauteng Noise Control Regulations, Notice 5479 of August 1999.	The EIR report
2.	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.	

7 Environmental Impact Assessment

Potential environmental (biophysical and socio-economic) impacts associated with the development of the Electrical Co-generation Power Plant are evaluated in the following sections. A summary of the methodology used to assess the significance of environmental impacts is provided below. The methodology is fully described in Section 3.

The impacts on each environmental aspect are described and discussed first. The impact rating table follows at the end of the section (see Table 7-5).

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 Electrical Co-generation Power Plant 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 Electrical Co-generation Power Plant has been undertaken through the feasibility assessment conducted for Scaw Metals by various technical consultants. The main purpose of the planning was to develop a technically feasible and economically viable project that can produce electrical power from existing resources and wastes at Scaw Metals. Consideration was also given to ensure that the project would be sustainable and could be operated with the least practicable environmental impact.

7.2.1 Enviro-legal Compliance

One of the key aspects of the feasibility study 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 Electrical Co-generation Power Plant.

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.

One of the key pieces of legislation influencing this combustion facility is the NEMAQA, 2004. The impacts of the NEMAQA on the facility are discussed in the following section.

7.2.2 Emissions and Air Quality

As a project that is predicated on combustion processes to produce steam and electrical energy, it is essential that due consideration be given to atmospheric emissions during planning. The feasibility study was required to ensure that each aspect of the project and the overall facility was able to operate within the minimum emissions standards made in terms of the NEMAQA. Minimum emissions standards are set for key pollutant for different emitters. The National Ambient Air Quality Standard sets ambient limits for criteria pollutants. Failure to do so could result in a facility that was not in compliance with legislation and which caused environmental and health impacts.

The technology, the operational parameters and emissions control technology were selected in order to ensure that the Electrical Co-generation Power Plant operates in terms of the Minimum Emissions standards made under the NEMAQA as a minimum. As materials considered to be wastes will be combusted, the facility has been engineered to comply with the minimum emissions standards set for waste incineration. The achievement of these minimum emissions standards will ensure legal compliance and minimise the risk for nuisance and health impacts.

7.2.3 Water Use and Efficiency

South Africa is a water scarce country where the allocation of water resources is constrained. The generation of electricity in South Africa by current methods consumes significant volumes of water and the facilities are relatively inefficient in their water consumption. More of the same level of water use efficiency for electricity generation is unlikely to be acceptable. Scaw Metals is largely dependent on municipal water supply. Such supply is subject to certain allocation restrictions and has cost implications.

The Electrical Co-generation Power Plant will require water to operate. The use of significant volumes of water would have potentially significant environmental impacts and could affect the economic feasibility of the project. In light of the above limitations the feasibility study investigated various technologies to reduce water use and improve the efficiency of use.

The main intervention was the selection of an air cooled condenser over a more typical wet cooling (utilising natural draught or forced draught air flow) system. Wet cooling systems lose about 85% of the water supplied through evaporation. An air cooled condenser requires relatively little external water supply as it does not require the evaporation of large quantities of water to achieve the required cooling effect. By way of example the, water consumption at Medupi Power Station is expected to be ~ 0.1 litres per kWh of electrical output versus the average of about ~1.5 litres per kWh from wet-cooled power stations. Water consumption at dry-cooled power stations is approximately 15 times lower than a conventional wet-cooled power station.

The dry cooling system was selected despite the fact that dry-cooled power stations comparatively are less efficient than wet-cooled stations and there is higher capital and operating costs associated with the technology.

7.2.4 Sustainable Development

While the primary objective of the Electrical Co-generation Power Plant is typical of an industrial project (generate electricity at an economically more attractive overall cost than current electricity costs), the method of achieving the outcome is closely aligned with the goal of sustainable development. One of the core principles of sustainability is resource use efficiency.

The project will generate electricity while using less natural resources than electricity derived from current commercial sources. The overall CO_{2e} output per kW derived from the Electrical Co-generation Power Plant will be less than the electricity available from Eskom.

While the electricity from the project will ultimately be generated from non-renewable sources, the waste heat recovery aspect generates electricity from the waste heat of an existing process. This heat is currently lost to atmosphere and the Electrical Co-generation Power Plant thus creates a useable energy source where there is currently not one. The combustion component will generate electricity by combusting carbonaceous materials. However these materials are wastes from an existing process that are currently disposed of. The Electrical Co-generation Power Plant thus recovers energy that is embodied in an existing waste stream.

7.3 Construction Phase Impacts

7.3.1 Land Ownership, Zoning and Use

The proposed Electrical Co-generation Power Plant will be constructed and operated within the boundary of the Scaw Metals industrial facility. There will be no change to the external footprint of the site. The use of vacant and underutilised land within the Scaw Metals property is preferable to the conversion of land zoned for other purposes. The Union Junction area is zoned for industrial use. Development of the Electrical Co-generation Power Plant 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, zoning or land use and no change to the cumulative impact.

7.3.2 Topography and Soils

The construction of the Co-generation Plant will require minor earthworks and levelling of small platforms for the building foundations. The direct impacts to topography will be of very low significance.

The clearance of soils is required for the development of the Electrical Co-generation Power Plant infrastructure. Uncontaminated soils are regarded as a valuable resource as they are essential for rehabilitation. However, given the sites historical use as a rail siding and stockpile area the soils are not pristine. Site development may result in the loss of soils under the development or through poor handling and inappropriate use. The impact on soils is considered to be low as any impacts that occur will be limited to the plant site.

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.

7.3.3 Ecology and Biodiversity

7.3.3.1 Terrestrial Flora and Fauna

No natural habitat remains on the site of the Co-generation Plant. Disturbances associated with the proposed plant will only affect a previously disturbed area of very low ecological significance. The impact during the construction and operation of the proposed Electrical Co-generation Power Plant on terrestrial flora and fauna is therefore expected to be very limited. No direct impact on terrestrial biodiversity associated with adjacent grasslands (mostly west of the N3 highway) is expected.

7.3.3.2 Aquatic biodiversity

An excavated storm water drainage channel, which forms part of Scaw's storm water management system, runs across the Electrical Co-generation Power Plant site and provides limited aquatic habitat. The channel is largely vegetated with Phragmites Reeds, typical of wet areas in the region (see Plate 3). This channel will have to be relocated prior to the construction of the proposed plant, which represents a minor direct impact on aquatic biodiversity within the proposed footprint of the plant.

The dispersion of sediments and contaminants from the site during construction would impact on downstream water quality, alter the aquatic habitat and thus affect aquatic biodiversity. The site is approximately 800 m from sensitive wetlands (along the Elsburg Spruit and Natal Spruit). 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 100m away from watercourses. Assuming that waste management and storm water management measures are in place during construction the development of the proposed Electricity Co-generation Power Plant is expected to have no significant impact on downstream aquatic habitats.

7.3.3.3 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 Co-generation Plant 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. Accordingly there will be no significant impact from alien and invasive plants species.

7.3.4 Surface and Groundwater

There are no natural surface water features in the site proposed for the Electrical Co-generation Plant The clean storm water channel that flows across a portion of the plant 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.

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 Co-generation Plant 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.

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

Assuming that waste management and storm water management measures are in place during construction the development of the proposed Electricity Co-generation Power Plant is expected to have no significant impact on surface water quality or downstream surface water resources.

7.3.5 Air Quality

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 site. Particulate matter and dustfall levels within the Scaw property are generally elevated close to or above industrial band limits. Dust from this construction could increase these levels. The dust fall could impact on industrial processes and equipment that require clean air.

The entrainment of particulate matter and dust generated during these operations, in combination with wind, may result in dust fall out beyond the boundaries of the Scaw Metals site. Measured dust fall out at the boundary is generally below the residential band limits and is not a concern. The project site is fairly centrally located within the Union Junction property and is not close to any of the property boundaries. Thus the construction site is not anticipated to contribute significantly to dust fall beyond the site boundary.

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 Electricity Co-generation Power Plant is not expected to have a significant impact on fall out dust beyond the site boundaries.

7.3.6 Noise

The construction of the proposed Electrical Co-generation Power Plant will require earthworks. Erection of the plant may include operations such as piling, welding, grinding, cutting and drilling. 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 wastes and materials during the construction.

The site is located centrally within the Scaw Metals property which is an industrial area. There are existing facilities that generate noise of varying levels all around the site. The additional noise 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 plant. 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.

7.3.7 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. Construction vehicles must not block access or cause congestion on public roads when off-loading materials.

7.3.8 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 SHARA concluded that there is no need for a heritage impact assessment for the Electrical Co-generation Plant

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.

7.3.9 Visual

Construction of the Electrical Co-generation Power Plant will change the site and increase the visual complexity over current conditions. Certain of the infrastructure that will be added will include multi-storey buildings. The plant will also include 2 chimney stacks that will be ~ 60 m tall, one of which is a replacement of an existing stack. The site is located within a highly developed industrial area and the plant will be closely integrated with the existing DRI Plant infrastructure. The plants' profile and character is compatible with the current visual environment within the Scaw Metals facility.

The site is generally not visible from points external to the Scaw Metals property with significant screening provided by the existing infrastructure and the waste disposal sites at Scaw. As such the development will not alter the character of the current visual environment. Development of the Electrical Co-generation Power Plant 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.

7.3.10 Current Operations

Construction activities for the Co-generation Plant could interfere with and disrupt current operations within the DRI Plant. The waste heat recovery in particular is located amongst and integrated with the DRI plant. Such interference could result in poor operational control and subsequent secondary impacts on the environment.

Construction activities must not be allowed to disrupt operations without prior notice and must never be allowed to compromise the quality of the DRI operation. The Manager of the DRI Plant must be fully informed of, and approve all designs and construction plans as well as work procedures and schedules. Operators of the HHWDS must be fully aware of the construction plans, requirements and work in progress. Construction personnel and equipment may only access and utilise those areas of the DRI plant, which have been approved for their use by the DRI Plant manager.

7.3.11 Occupational Health and Safety

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

Occupational risks during construction will be increased by the fact that the site is located within an operating industrial site and aspects of the facility must be integrated. Significant care must be taken to manage the integration process and excellent communication between construction managers and managers of the DRI Plant will be required. All contractors and personnel must be aware of the existing operations and make allowances to manage these risks. In addition it is essential that personnel and contractors at the existing operations are made aware of the construction and the changing environment this presents. Personnel at existing operations must make allowances to manage these risks.

7.3.12 Socio-Economics

Construction of the Co-generation Plant will create employment opportunities for personnel and contractors appointed to construct the facility. Where possible the labour and skills 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 Co-generation Plant will require the supply of significant volumes of material as well as components and equipment. 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 Phase Impacts

7.4.1 Air Quality

As described in Section 4, the Electrical Co-generation Power Plant will comprise two linked but independent components. The air quality impacts from the two components are discussed separately below. This information is drawn from the air quality impact assessment (AQIA) undertaken by Airshed.

7.4.1.1 Waste Heat Recovery Emissions

Waste heat recovery will involve the capture of high temperature exhaust gas from the existing DRI Kilns which will be passed through Heat Recovery Steam Generators (HRSG) to generate electricity. The exhaust gas will be cleaned in a dedicated bag-house and vented to atmosphere through a new dedicated stack. This component will therefore not involve combustion or the production or release of any additional atmospheric pollutants as only existing exhaust gasses will be utilised. It is subject to the Minimum Emission Standards for new plant in Sub-category 4.12.

The AQIA (scenario 2) found that:

- Current emissions for the total DRI kilns comply with emission standards for existing plant but exceed PM and SO_2 emission standards for new plant.
- Stack emissions from Waste heat recovery will be in compliance with existing and new plant emission standards due to an increased volumetric flow rate.

Table 7-1 shows the stack parameters and emissions from the new stack in comparison with Minimum Emissions Standards and existing kiln emissions (Airshed, 2013).

Note that for Waste heat recovery, emissions from the two existing DRI kiln stacks will probably be combined in a single bag-house and enter the atmosphere via a single stack with a volumetric flow rate roughly similar to the existing kiln stacks combined. The table shows that PM concentrations will be reduced from an existing 50 mg/Nm^3 in stacks 1 & 2 and 73.8 mg/Nm^3 in stack 3, to a total of 50 mg/Nm^3 in the new stack. An even greater reduction in the concentration of SO_2 emissions is expected, from an existing 1060 mg/Nm^3 in stacks 1 & 2 and 189 mg/Nm^3 in stack 3 to 311 mg/Nm^3 in the new stack. Reductions in total NOx and CO concentrations are also expected (see Table 7-1 below).

Table 7-1: Waste heat recovery stack parameters and emissions in comparison with Minimum Emission Standards and existing kiln emissions (Airshed, 2013).

Parameter	Minimum Emission Standards		Existing DRI Kiln 1&2 Stack[b]	Existing DRI Kiln 3 Stack[b]	Phase 1 Stack (waste heat recovery)
	New Plants	Existing Plants			
Stack Parameters					
Stack Height			42.7 m	59.6 m	60 m
Gas Temperature			193 °C	167 °C	90 °C
Stack Diameter			2.1 m	2.3 m	3.4 m
Gas Exit Velocity			15.9 m/s	21.0 m/s	16.1 m/s
Gas Volumetric Flow Rate			20.1 Nm^3/s [a]	39.3 Nm^3/s [a]	92.5 Nm^3/s [a]
Emission Concentrations (mg/Nm^3)[a]					
PM	50	100	50	37.3	50.0 [d]
SO_2	500	1700	**1 060** [c]	189	311

Parameter	Minimum Emission Standards		Existing DRI Kiln 1&2 Stack(b)	Existing DRI Kiln 3 Stack(b)	Phase 1 Stack (waste heat recovery)
	New Plants	Existing Plants			
NO_x as NO_2	1000	2000	25.8	8.63	9.27
CO	n/a	n/a	568	0.04	123

Notes:

a) Normal conditions at 10% O_2, 0 °C and 101.3 kPa

b) Extracted from 2012 and 2013 (Kiln 3) stack monitoring reports

c) Exceeded existing plant SO_2 minimum emission standard in the previous Registration Certificate

d) New plant MES

As seen in the Table below there is no change in emissions from waste heat recovery over the current for CO, NOx or SO2. Total TSP and PM emissions are modelled to increase marginally. This increase is as a result of the increase in operational times of the DRI kilns (the air quality study assessed the potential maximum operation of the Co-gen Plant, which would only be achieved if the 3 DRI kilns operated at higher availability than they have over the previously monitored periods)

Table 7-2: Summary of total and change in emissions from the Scenario 1, the 'baseline'

Pollutant		Scenario 1 (current)	Scenario 2 (Phase 1)
TSP	Total emission rate (t/a)	1669	1736
	Incremental change from Scenario 1		4%
PM_{10}	Total emission rate (t/a)	789	856
	Incremental change from Scenario 1		8%
$PM_{2.5}$	Total emission rate (t/a)	561	628
	Incremental change from Scenario 1		12%
CO	Total emission rate (t/a)	584	584
	Incremental change from Scenario 1		0%
NO_x	Total emission rate (t/a)	699	699
	Incremental change from Scenario 1		0%
SO_2	Total emission rate (t/a)	908	908
	Incremental change from Scenario 1		0%

The new bag-house that will be installed for Waste heat recovery is also expected to operate to a higher level of availability than the current bag-house, reducing outages. Waste heat recovery will thus have no direct negative impacts on air quality and could result in slight improvements to emissions from the DRI kilns.

7.4.1.2 Combustion Component Emissions

The combustion component of the Co-Generation Project will involve the combustion of dust, char and possibly shredder waste in a Fluidised Bed Boiler (FBB). The resulting heated flue gas will be passed through a Heat Recovery Steam Generator to generate electricity. The exhaust gas will pass through a dedicated bag-house, an afterburner and an alkali scrubber before exiting through a stack. The combustion component will also involve the handling and transport of ash, char and shredder wastes, which will result in fugitive dust emissions from materials handling, the movement of vehicles, as well as windblown dust from stockpiling areas.

Since a new WDF is required for ash and dusts from the FBB, fugitive dust emissions from the operation of the new waste disposal site were also incorporated in the assessment. The impacts of the WDF are not explicitly considered in this document as they are assessed in the EIA for that facility.

7.4.1.2.1 Stack Emissions

To inform the determination of stack emissions from the combustion of solid waste streams in the combustion component, test work using a pilot-scale FBB at the CSIR was undertaken. Emission measurements were carried out by C&M Consulting Engineers (Engelbrecht & North, 2012). Assuming that the pilot-scale emissions would be representative of full scale FBB operations, the following can be concluded:

- There is little difference between measured air pollutant concentrations with the addition of shredder waste to the other waste streams in the FBB;
- PM emissions exceed emission standards for combustion installations as well as for waste incineration;
- Metal emissions (all except Hg) exceed emission standards for waste incineration;
- CO, NO_x, SO_2, HCl, HF emissions exceed emission standards for waste incineration; and
- NH_3 and PCDD/PCDF emissions were not measured.

This data established that FBB for the combustion component could not be operated without emissions control equipment. As a result the balance of the dispersion modelling for the combustion component makes reference to the permitted minimum emission standards.

7.4.1.2.2 Estimated Total Annual Emissions

A summary of estimated cumulative annual emissions from all operations at Scaw Metals is provided in Table 7-3. Taking into consideration that minimum emission standards were used to estimate PM in waste heat recovery, and all combustion component emissions, 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. The increase in particulate emissions occurs largely as a result of windblown dust from the new WDF[3].
- Estimated CO emissions change only slightly (~5%) as a result of the Co-Generation Plant.
- Noticeable changes in emissions are associated with NO_x and SO_2 emitted during the combustion component of the project. The highest increase is seen to be as a result of Scenario 3 which is explained by emission standards for combustion processes being more lenient than for waste incineration.

Table 7-3: 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%

3 Refer to Appendix A for detailed windblown dust emission estimation and impact assessment methodology.

$PM_{2.5}$	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 17, the additional particulate matter emitted by the project is largely as result of windblown dust from the new WDF. Direct particulate emissions from material handling for the combustion component and the FBB stack are limited. PM10 and PM2.5 follow a similar pattern with the increase in emissions being largely from the new WDF

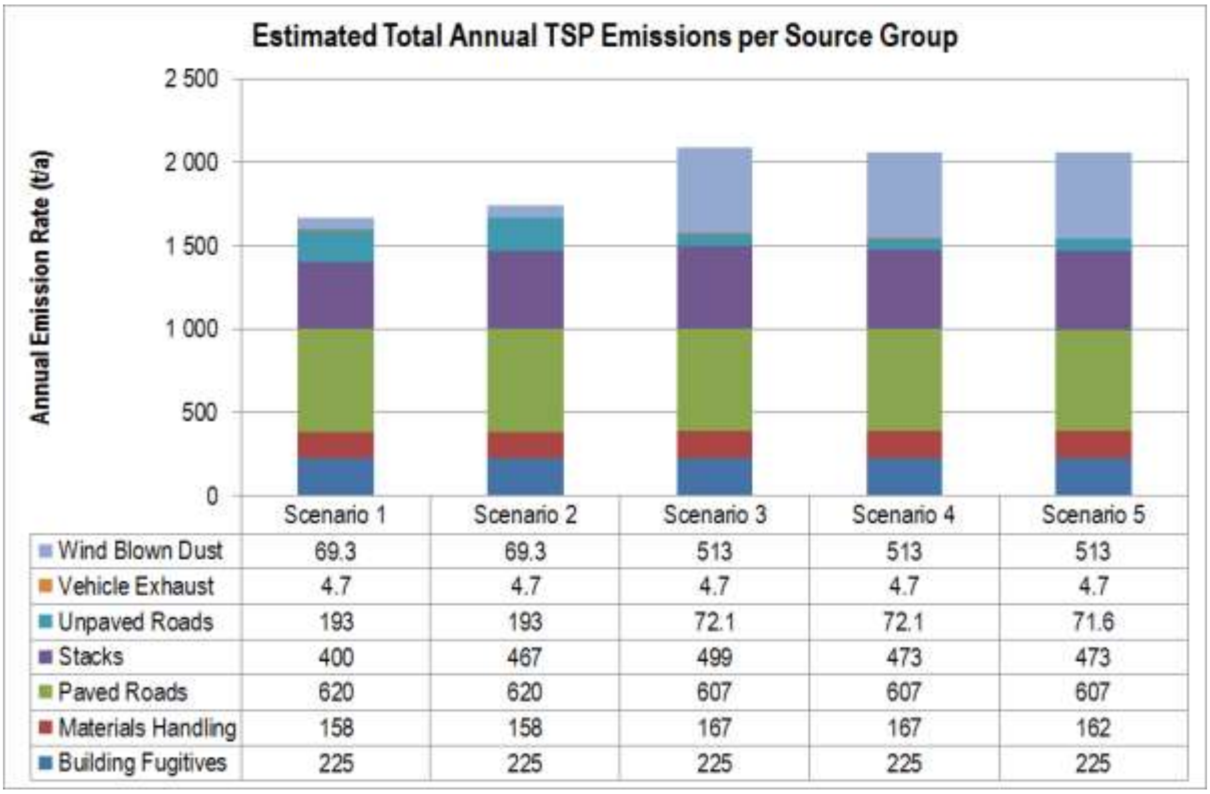


Figure 17: Estimated total Annual TSP emissions per group.

7.4.1.3 Atmospheric Dispersion Modelling and Compliance Assessment

Dispersion models compute ambient concentrations of pollutants based on source configurations, emission strengths and meteorological characteristics. Modelled output is a useful tool to ascertain the spatial and temporal patterns in the ground level concentrations arising from the emissions sources.

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. 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.

7.4.1.3.1 Predicted Dustfall Rates

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

Dustfall rates are predicted to increase at the Scaw Metals boundary and the industrial area adjacent to the eastern boundary. The increased dustfall is not as a result of the Electrical Co-generation Power Plant, but can be explained by the location of the new WDF.

Development and operation of the Electrical Co-generation Power Plant is not expected to have a direct negative effect on dustfall rates at sensitive receptors. The plant will cause an indirect change in dustfall as a result of the WDF. Issues relating to the WDF are discussed in the EIA for that facility.

7.4.1.3.2 PM10 Concentrations

As discussed in section 5.1.5, current (baseline) PM10 concentrations exceed the National Ambient Air Quality Standards (NAAQS) at the Scaw Metals boundary, as well as at Dinwiddie and Generaal Albertspark.

With the commissioning of the Electrical Co-generation Power Plant (maximum of both components) predicted PM10 concentrations at the Scaw Metals boundary and at off-site receptors decrease. The project will result in less dust emissions at the current SMGWDS as fewer wastes will be disposed there, but a new emissions source will be created at the WDF. The decrease at the residential areas is in spite of an increase in total windblown dust emissions and can be explained by the location of the new WDF 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 PM10 issues relating to the WDF are discussed in the EIA for that facility.

Development and operation of the Electrical Co-generation Power Plant is not expected to have a direct negative effect on PM10 concentrations at sensitive receptors. The plant will cause an indirect change in PM10 concentrations as a result of the WDF. Issues relating to the WDF are discussed in the EIA for that facility.

7.4.1.3.3 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.

With the commissioning of the Electrical Co-generation Power Plant (maximum of both components) predicted PM2.5 concentrations at locations downwind of Scaw Metals will decrease. However, PM2.5 concentrations are predicted to increase at the industrial area adjacent to the eastern boundary. This can be explained by the location of the new WDF. The PM2.5 issues relating to the WDF are discussed in the EIA for that facility.

Development and operation of the Electrical Co-generation Power Plant is not expected to have a direct negative effect on PM2.5 concentrations at sensitive receptors. The plant will cause an indirect change in PM2.5 concentrations as a result of the WDF. Issues relating to the WDF are discussed in the EIA for that facility.

7.4.1.3.4 Predicted CO Concentrations

The maximum 1-hour CO ground level concentration predicted at the SMUJ boundary is less than 1% of the NAAQS limit value of 30 000 µg/m^3 for all scenarios considered in the study. Operation of the Electrical Co-generation Power Plant is predicted to change CO emissions by less than 0.1%

Impacts due to the emissions of CO from the Electrical Co-generation Power Plant are therefore expected to be negligible.

7.4.1.3.5 Predicted NO_2 Concentrations

A slight decrease (<2%) in off-site annual average ground level NO_2 concentrations is predicted for waste heat recovery which may be as a result of the increased stack height.

Although an increase of between 1% and 11% in annual average ground level NO_2 concentrations is predicted at certain downwind receptors with the commissioning of combustion components (Scenario 4 and 5), neither the annual nor the 1-hour NAAQS for NO_2 is exceeded off-site as a result of any of the Scenarios included in the assessment.

As such, the impacts due to NO_2 emissions from the proposed Electrical Co-generation Power Plant are considered negligible.

7.4.1.3.6 Predicted SO_2 Concentrations

A substantial reduction (5% to 56%) in off-site SO_2 concentrations is predicted with the commissioning of the Electrical Co-generation Power Plant. SO_2 emissions from current DRI kiln operations contribute significantly to ambient SO_2 concentrations. The predicted reduction in off-site SO_2 concentrations is as a result of increased buoyancy (increased volumetric flow rate) of kiln off-gas as it passes through the proposed waste heat recovery system, dedicated new bag-house and higher stack (Airshed, 2013).

The combustion component of the plant is predicted to contribute to a slight increase in off-site SO_2 concentrations over the waste heat recovery operations (which will be reduced from current levels). Even with the increase due to combustion component the predicted off-site SO_2 concentrations will be reduced when compared to the current levels. Predicted annual average, 24-hour and 1-hour SO_2 concentrations are well below the NAAQS for all the scenarios included in the assessment.

The commissioning of the proposed Co-generation plant will therefore have a significant positive impact on air quality with regard to SO_2 concentrations at and around the Scaw Metals facility.

7.4.1.3.7 Predicted Trace Compound Concentrations

The single maximum ground level annual average concentration and maximum 1-hour average concentration HCl, HF, metals, NH_3 and PCDD/PCDF concentrations over the entire study area as a result of the combustion component operations were estimated as part of the air quality impact assessment. The predicted concentrations were compared to screening criteria and unit risk factors discussed in Section 2.4.4.

Neither the chronic nor acute health risk screening criteria for HCl, HF, NH_3, PCDD/PCDF or metals are exceeded on or off-site as a result of the combustion component emissions. Calculated increased lifetime cancer risk is very low (less than one in a million) to low (between one in one million and one in ten thousand).

The commissioning of the proposed Electrical Co-generation Power Plant is predicted to result in very slight increases in emissions of trace compounds when compared to the current levels. These emissions will cause a very slight increase in chronic or acute health risk around the Scaw Metals facility. However, no significant health risk is expected.

7.4.1.4 Recommendations for Management of Air Quality

7.4.1.4.1 Waste heat recovery Emissions control

An effective baghouse with a high availability is required for waste heat recovery of the Electrical Co-generation Power Plant.

7.4.1.4.2 Combustion component FBB Emission Control

An effective baghouse with a high availability is essential for the combustion component of the Electrical Co-generation Power Plant. While PM and non-volatile metals from the combustion component will be controlled by the dedicated bag-house, additional controls will be required for the reduction of CO, SO_2, NOx, HCl, HF emissions. An after-burner (for CO) and alkaline scrubber (for SO_2, NO_x, HCl and HF) are required to ensure emissions below set emission standards.

7.4.1.4.3 Source Monitoring

The NEMAQA requires:

- continuous stack monitoring for Subcategory 1.1 processes (i.e. solid fuel combustion installations);
- Annual stack emission sampling for all listed activities (ie such as Subcategory 4.12 direct reduction).

The **National Policy on Thermal Treatment of General and Hazardous Waste** requires *continuous*, *on-line* measurements of Category 8 Listed Activities. The monitoring must include all pollutants listed.

Stack monitoring results can be used to populate/update the emissions inventory and track the efficiency of control equipment.

7.4.1.4.4 Air Quality Monitoring

Ambient air quality monitoring is not considered a requirement for the project.

Monitoring of PM10 and dustfall are not required for the Electrical Co-generation Power Plant. The requirements for such monitoring will be discussed in the EIA for the WDF.

7.4.2 Ecology and Biodiversity

7.4.2.1 Terrestrial Flora and Fauna

Operation of the Electrical Co-generation Power Plant will have no direct impact on terrestrial biodiversity.

7.4.2.2 Aquatic biodiversity

The materials and wastes that will be received and stored at the proposed Electrical Co-generation Power Plant can be 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. In the worst case the potential impacts could be considered significant.

The Electrical Co-generation Power Plant will be located within the dirty water management system at Scaw Metals. Where required the dirty water management systems will be extended to incorporate the plant. Storage and handling areas for hazardous materials and wastes will be lined and bunded, or placed under roof, to limit contamination risks.

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 proposed Electricity Co-generation is expected to have no significant impact on downstream aquatic habitats.

7.4.2.3 Alien and Invasive Species

Disturbed and rehabilitated areas around the site 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.

7.4.3 Surface Water

Operations at the Co-generation Plant will include handling of fuels and lubricants, certain chemicals and some hazardous materials. For the combustion component various combustible wastes will be brought to site and stored. Waste ash will also be generated and stored prior to disposal. Surface water coming into contact with these materials could become contaminated and would cause pollution if dispersed to the environment.

Pollution control measures to manage potential contaminants during operations are thus essential. Storage and handling areas for hazardous materials and wastes will be lined and bunded, or placed under roof, to limit contamination risks. In addition, storm water from active plant areas at the Co-generation plant must be contained within a dirty water management system. Contaminated storm water collected in the plant must be directed to a dirty storm water dam. Any release from these dams to the environment must meet the water quality objectives for the resource.

It is therefore expected that, if waste management and storm water management measures are implemented at the proposed Electrical Co-generation Plant, there are unlikely to be any negative impacts on downstream surface water resources.

7.4.4 Groundwater

7.4.4.1 Change in Groundwater Levels

The Electrical Co-generation Power Plant will not be abstracting any local groundwater. The plant will also not cause any groundwater recharge (increase in groundwater level). Thus, water on the site is unlikely to reach the water table. The use of water for the project is likely to have little effect on the groundwater levels in the nearby vicinity.

7.4.4.2 Change in Groundwater Quality

All materials and wastes with the potential to contaminate groundwater will be stored and handled in lined and bunded areas, or placed under roof. As a result there is very limited risk to groundwater.

Waste ash from the combustion component of the Electrical Co-generation Plant, which could potentially impact groundwater quality if not properly managed, will be disposed to a purpose-built WDF. Potential impacts of that facility are considered in the EIA completed for that facility. Blow down water from the condensers and excess water from the process will be co-disposed with the ash or disposed to the sewer in terms of a municipal discharge permit.

If the storm water systems, storage areas for materials and wastes and waste management measures are implemented, then there is likely to be little effect on groundwater quality.

Scaw Metals has a network of boreholes in the Union Junction area that are used to monitor groundwater. Regular monitoring should continue to ensure that the systems are functioning correctly and that pollutants cannot reach the groundwater. If groundwater pollution is detected, then the source must be investigated and remedial or corrective measures implemented.

7.4.5 Noise

Noise levels at Scaw Metals are typical of a large industrial facility. Adjacent residential suburbs in the area (see Section 5.4.2) represent noise sensitive receptors and are located along the northern, western and south-western boundary of the property boundary. Noise monitoring at Scaw has indicated that noise levels at the Scaw Metals property boundary are at, or close to, the allowable limits. However, certain of this noise arises from road and train traffic not related to Scaw Metals. Weather conditions are likely to play an important role in determining whether the noise is propagated or attenuated.

Operation of the Electrical Co-generation Power Plant will generate noise. Aspects such as the condenser fans and the steam turbine generator will result in the generation of noise. During certain operational periods steam blow down will occur also resulting in noise. An increase in traffic noise is also expected due to the handling and disposal of feedstock and wastes during operational phase. These noise sources are expected to generate noise that is typical of heavy industrial activities.

Noise impacts to sensitive receptors are unlikely as the Electrical Co-generation Power Plant is not less than 500 m from the Scaw Metals property boundary and in most cases is as much as 1 km from the nearest sensitive receptors. The noise that will be generated at the proposed plant is not expected to have an appreciable impact on noise levels at this distance. Thus, noise impact from the proposed plant is not expected to be of significance.

However, it is advised that a noise survey be done prior to establishment of the Electrical Co-generation Power Plant and subsequently once each component of the Electrical Co-generation Power Plant are commissioned. If noise is detected that alters the current ambient levels by more than 5dB or results in the ambient levels exceeding 70dB at the Scaw Metals property boundary, then the source must be investigated and remedial or corrective measures implemented.

7.4.6 Traffic

During waste heat recovery operations there will not be any additional traffic other than employees attending work. During the combustion component operations, the bulk of traffic would be associated with the daily transport of wastes and materials to and from the proposed plant by heavy motor vehicle. 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.

7.4.7 Health Risks

7.4.7.1 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.

7.4.7.2 Public Health

The potential public health risks of the Electrical Co-generation Power Plant are mostly related to air emissions from the plant. As discussed, waste heat recovery of the Co-generation Project will not result in any additional emissions to atmosphere. The improved management of the DRI kilns necessitated by the Co-generation Power Plant, and the new bag-house is anticipated to reduce emissions of fine particulate matter and thus reduce the potential for public health risks from the DRI kilns. This is assessed as a positive impact of low significance.

The combustion component will involve the combustion of various materials and will result in air emissions. These emissions will include trace amounts of pollutants such as HCl, HF, metals etc., that may cause chronic or acute health issues, including cancer. A summary of estimated annual trace compound emissions for the combustion component is provided in Table 7-4 below (Note that emission rates have been calculated assuming compliance with Minimum Emission Standards for general and hazardous waste incineration).

Table 7-4: Summary of trace compound emissions

Trace Compound	Estimated Annual Emission Rate (t/a) from the FBB Baghouse Stack
HCl	6.6
HF	0.66
Σ(Pb, As, Sb, Cr, Co, Cu, Mn, Ni, V)	0.33
Hg	0.033
Σ(Cd, Tl)	0.033
TOC	6.6
NH3	6.6
PCDD/ PCDF	0.000066

At these emission rates, neither the chronic nor acute health risk screening criteria for HCl, HF, NH_3, PCDD/PCDF or 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 operation of the combustion component of the Electrical Co-generation Plant are predicted to be negligible.

This finding assumes that emissions from the combustion component of the Electrical Co-generation Plant comply with the Minimum Emission Standards for general and hazardous waste incineration. As such it is vital that emissions of the criteria pollutants from the FBB stack are monitored. If exceedance of any of the criteria pollutants is detected, then the source must be investigated and remedial or corrective measures implemented.

7.4.8 Socio-Economics

7.4.8.1 Employment

Operation of the Electrical Co-generation Power Plant will result in direct employment opportunities. These persons will all receive training and acquire the skills to operate the Plant. 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. The design, fabrication and supply of the plant will also result in short-term job opportunities in consulting and manufacturing companies. The plant components will probably be imported, but the sourcing of infrastructure will be done locally. This is a positive impact of moderate significance.

7.4.8.2 Sustainable Development

The development and operation of the Electrical Co-generation Power Plant will have a number of desirable outcomes in terms of sustainable development. The Co-generation process will utilise waste heat from the existing DRI plant, as well as combustible wastes produced at Scaw Metals to generate approximately 68 MW of electricity. The project will therefore improve the overall energy efficiency of the Scaw Metals Union Junction facility and reduce the emissions footprint for the site.

The electricity generated will:

- improve security of supply at Scaw enabling operations to continue with reduced interruptions;
- provide electrical supply capacity for expansion that may enable Scaw to create additional jobs;
- reduce the amount of electricity required from Eskom and enable Eskom to supply other customers.

The project will also improve the overall efficiency of Scaw Metals and reduce the emissions footprint for the site. This will improve the environmental sustainability of operations at Scaw Metals and contribute to a cleaner and greener economy that will benefit all South African citizens.

In addition, by combusting waste to produce electricity, the co-generation plant will improve waste management practices at Scaw Metals in line with the National Waste Management Strategy (2010) adopted in South Africa, which espouses the recovery and treatment of waste over its disposal. Combusting waste will also extend the disposal life at Scaw waste sites by reducing airspace consumption.

These actions will improve the sustainability of operations at Scaw Metals and the DRI plant in particular. The Electrical Co-generation Power Plant will therefore contribute to the principles of sustainable development.

7.5 Closure and Decommissioning

Scaw Metals intends to operate the Electrical Co-generation Power Plant for at least 25 years and possibly for the foreseeable future. Decommissioning of the facility will require the dismantling of the equipment, the sale or final disposal of all components, the decontamination of any contaminated areas and the rehabilitation of the site to condition suitable for an end land use. As the facility is located within a large and established industrial area any future use is likely to be for industrial purposes also. Thus any planned objectives of rehabilitation would likely be to make the site suitable from further industrial use rather than to create a natural

At the time when the plant 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. However, the basic impacts of decommissioning and closure are anticipated as follows:

Health and Safety risks from:

- Dangerous equipment or facilities on site;
- Derelict plant or facilities on site
- Hazardous materials and wastes on site; and
- Contaminated equipment or facilities on site.

These risks could be significant and any contractor or personnel must be made aware of them and be suitably prepared and equipped. Compliance with requirement of the OSH Act should be a minimum requirement.

Environmental degradation risks from:

- Hazardous waste materials on site;
- Contamination of soil at the site;
- Waste residues on surfaces, drains and equipment.
- Dispersion of contaminants in surface water run-off; and
- Dispersion of dusts and health risk substances in air emissions.

Such risks could also be significant if not adequately assessed and managed. Any contractor doing work must be made aware of the environmental risks and be suitably prepared and equipped to limit such impacts.

As a facility licensed in terms of the NEMA and NEMWA it is likely that the decommissioning of the Electrical Co-generation Power Plant will trigger listed activities. It will therefore be necessary to subject the decommissioning to an environmental assessment which will assess the environmental impacts and identify management and mitigation measures.

7.6 No-go Alternative

Without the development of waste heat recovery of the Electrical Co-generation Plant, the DRI kilns at the Scaw Metals facility will continue to operate as is. Waste heat would therefore not be utilised to generate electrical power at the facility and this energy would continue to be lost to the atmosphere. The overall energy efficiency of the Scaw Metals facility would not be improved. In addition, the current emissions control equipment would remain and emissions would not be improved as is likely with the addition of the waste heat recovery of the Electrical Co-generation Power Plant. The Co-gen plant will also function as a ‘cleaner technology’ development and will be required to improve the emissions control equipment on the DRI plant and ensure that emissions are reduced.

Without the development of the combustion component, wastes and by-products produced at the Scaw Metals facility would also not be utilised for power generation. These materials would continue to be handled in the current manner, which mostly involves disposal. The wastes will remain of the same volume and continue to utilise limited airspace in the waste disposal cells at Scaw Metals. As such the energy embodied in these wastes will continue to be lost to landfill. The continued disposal to landfill will also see Scaw Metals continuing to manage waste in the manner least favoured in terms of the waste management hierarchy.

Not developing the Electrical Co-generation Power Plant will have a number of other negative outcomes for Scaw Metals, including:

- No electricity generation so the Scaw Metals facility remains dependant on Eskom;

- The high risk of stoppages due to power outages continues;
- Limited opportunity for expansion of production at Scaw Metals; and
- Substituted electrical supply will not become available to other Eskom' customers.

However, without the development of the Electrical Co-generation Plant, none of the negative impacts as described in the preceding sections would take place.

Table 7-5: Assessment of environmental impacts for the development and operation of the Electrical Co-generation Power Plant at Scaw Metals

Mitigation measures for all of the impacts identified are included in the draft EMP (see Section 12).

Environmental Impact Assessment			Without Mitigation							With Mitigation					
Impact	Project Phase / Timing	Impact Status	Extent	Severity	Duration	Probability	Impact Sig	Impact Significance	Design and Operations Measures for Impact Control	Extent	Severity	Duration	Probability	Impact Sig	Impact Significance
CONSTRUCTION PHASE IMPACTS															
Land ownership, Zoning and Use															
Development of an industrial facility on a site within the Scaw Metals property	Construction	Negative	1	1	3	2.5	-21	Neg Low	Restrict all construction to within the Union Junction property	1	1	3	1	-19	Neg Low
Topography and soils															
Cut and fill earthworks for site levelling	Construction	Negative	1	1	3	2.5	-21	Neg Low	none possible	1	1	3	2.5	-21	Neg Low
Construction of built infrastructure over soils	Construction	Negative	1	2	3	2.5	-27	Neg Low	salvaging of topsoils from construction footprint Stockpiling of topsoils Protection from contamination and erosion Appropriate use of topsoils	1	1	3	2.5	-21	Neg Low
Ecology and biodiversity															
Terrestrial biodiversity: clearance of habitat for construction of built infrastructure	Construction	Negative	1	0	3	2.5	-15	Neg Low	Only clear vegetation form the footprint required for construction	1	0	3	2.5	-15	Neg Low
Aquatic biodiversity: loss during relocation of storm water drain from site	Construction	Negative	1	2	1	2	-24	Neg Low	Ensure functional replacement of storm water drain.	1	1	1	2	-18	Neg Low
Aquatic biodiversity: dispersion of sediments and contaminants in run-off	Construction	Negative	2	2	2	2	-34	Neg Moderate	Keep material stockpiles and chemicals away from storm water flow paths. Protect disturbed areas from erosion	2	1	2	2	-28	Neg Low
Establishment and proliferation of alien and invasive plant species on disturbed ground	Construction	Negative	1	2	3	3	-27	Neg Low	Rehabilitate disturbed areas with appropriate, locally adapted vegetation. Remove alien and invasive vegetation	1	2	2	3	-26	Neg Low

Environmental Impact Assessment			Without Mitigation							With Mitigation					
Impact	Project Phase / Timing	Impact Status	Extent	Severity	Duration	Probability	Impact Sig	Impact Significance	Design and Operations Measures for Impact Control	Extent	Severity	Duration	Probability	Impact Sig	Impact Significance
Surface and Groundwater															
Functionality of stormwater management system	Construction	Negative	1	3	3	2	-32	Neg Moderate	Ensure functional replacement of storm water drain. Undertake replacement during drier periods of the year.	1	1	3	1	-19	Neg Low
Decline in surface water quality from dispersion of contaminated surface water runoff	Construction	Negative	2	3	2	2.5	-41	Neg Moderate	Keep material stockpiles, wastes and chemicals away from storm water flow paths.Protect disturbed areas from erosion.Contain dirty storm water	1	2	2	2	-25	Neg Low
Contamination of groundwater from pollutants on site	Construction	Negative	1	2	2	1.5	-25	Neg Low	Store all fuels and chemicals in lined and bunded areas. Implement clean up response in event of a spillage	1	1	2	1	-18	Neg Low
Eroison of construction areas due to concentrated water flows	Construction	Negative	1	2	2	2.5	-26	Neg Low	Manage storm water flows to limit erosion risk. Stabilise storm water flow paths.	1	1	2	2.5	-20	Neg Low
Air Quality															
Increase in dustfall levels at site boundary from construction activities.	Construction	Negative	2	2	2	2.5	-35	Neg Moderate	Limit vehicle speeds on site to 30 km/h. Apply dust suppression or sweep roads.	1	2	2	2	-25	Neg Low
Increase in dustfall levels at site boundary from wind blown dust from exposed surfaces	Construction	Negative	2	3	2	3	-41	Neg Moderate	Restrict the clearance of vegetation to those areas immediately required. Suspend earth moving activities on windy days. Cover or vegetate exposed material stockpiles.	1	2	2	2	-25	Neg Low
Noise															

Environmental Impact Assessment			Without Mitigation							With Mitigation					
Impact	Project Phase / Timing	Impact Status	Extent	Severity	Duration	Probability	Impact Sig	Impact Significance	Design and Operations Measures for Impact Control	Extent	Severity	Duration	Probability	Impact Sig	Impact Significance
Change to ambient noise levels at site boundary	Construction	Negative	2	1	2	2.5	-29	Neg Low	Limit construction activities to regular working hours.	1	1	2	2	-19	Neg Low
Traffic															
Change to traffic on Dekema Road	Construction	Negative	2	1	2	2	-28	Neg Low	Limit construction deliveries to off peak hours. Vehicles not allowed to obstruct traffic flow while delivering/off-loading materials	1	1	2	2	-19	Neg Low
Heritage Resources															
Disturbance of heritage resources during construction earthworks	Construction	Negative	1	3	3	1	-31	Neg Low	Suspend work at the location if a heritage resource is uncovered.Call local heritage authority to assess.	1	1	2	2	-19	Neg Low
Visual															
Increase in visual complexity and/or change to site character	Construction	Negative	2	1	3	2	-29	Neg Low	Keep the site neat and tidy	1	1	2	2	-19	Neg Low
Current Operations															
Interference with or disruption of systems or operational controls at the DRI plant resulting in environmental impacts	Construction	Negative	1	2	1	2.5	-25	Neg Low	Inform manager of the DRI Plant of, all designs and construction plans as well as work procedures and schedules. Construction personnel and equipment may only access approved areas of the DRI plant.	1	1	2	2	-19	Neg Low
Health and Safety															
Occupational health and safety risks to personnel and contractors	Construction	Negative	1	3	2	2.5	-32	Neg Moderate	Compliance with Occupational Health and Safety Act, 1993 and the Scaw Metals' Health and Safety policies	1	1	2	2	-19	Neg Low
Socio economics															

Environmental Impact Assessment			Without Mitigation							With Mitigation					
Impact	Project Phase / Timing	Impact Status	Extent	Severity	Duration	Probability	Impact Sig	Impact Significance	Design and Operations Measures for Impact Control	Extent	Severity	Duration	Probability	Impact Sig	Impact Significance
Employent opportunities during construction	Construction	Positive	2	1	2	2.5	28.5	Pos Low	Labour and skills to be sourced from local persons and local contractors. Include training and skills transfer for employees	2	1	2	2.5	28.5	Pos Low
Procurement opportunities for supply of materials and equipment	Construction	Positive	2	2	2	2.5	34.5	Pos Moderate	Procurement for the development must favour local persons and local suppliers	2	2	2	2.5	34.5	Pos Moderate
OPERATIONAL PHASE IMPACTS															
Air Quality - Waste Heat recovery															
Emission of criteria pollutants above legal limits	Operational	Negative	1	0	1	1	-11	Neg Low	DRI plant manager to ensure that kilns are operated properly and that emissions control technology is available and functional.	1	0	1	1	-11	Neg Low
Reduction in ambient air quality	Operational	Negative	1	0	1	1	-11	Neg Low	All emissions to be discharged through stack	1	0	1	1	-11	Neg Low
Air Quality - Combustion															
Emission of criteria pollutants above legal limits, reducing ambient air quality (CO, NO2, SO2, Trace compounds)	Operational	Negative	3	2	3	3	-45	Neg Moderate	Implement operational and emissions control on combustion component to ensure that minimum emission standards are achieved.	2	1	3	1.5	-29	Neg Low
Reduction in ambient air quality from particulates (TSP, PM10, PM2.5)	Operational	Negative	2	2	3	3	-36	Neg Moderate	Implement operational and emissions control on combustion component to ensure that minimum emission standards are achieved.	1	2	3	1.5	-26	Neg Low
Ecology and Biodiversity															
Aquatic biodiversity: dispersion of contaminants used at the facility in surface water run-off	Operational	Negative	2	3	3	2.5	-42	Neg Moderate	Contain dirty storm water	1	1	3	1	-19	Neg Low
Surface water															

Environmental Impact Assessment			Without Mitigation							With Mitigation					
Impact	Project Phase / Timing	Impact Status	Extent	Severity	Duration	Probability	Impact Sig	Impact Significance	Design and Operations Measures for Impact Control	Extent	Severity	Duration	Probability	Impact Sig	Impact Significance
Decline in surface water quality as a result of contaminants in surface water run-off	Operational	Negative	2	2	3	2.5	-36	Neg Moderate	Keep material stockpiles, wastes and chemicals away from storm water flow paths. Separate clean and dirty storm water areas.	1	1	3	1	-19	Neg Low
Groundwater															
Change to groundwater levels	Operational	Negative	1	0	3	1	-13	Neg Low	No abstraction of groundwater	1	0	3	1	-13	Neg Low
Decline in groundwater quality as a result of contaminants from on-site materials	Operational	Negative	1	2	3	2	-26	Neg Low	Store all fuels and chemicals in lined and bunded areas.	1	1	3	1	-19	Neg Low
Noise															
Change to ambient noise levels from traffic	Operational	Negative	2	2	3	2.5	-36	Neg Moderate	Maintain all vehicles. Limit vehicle speeds	1	1	2	2	-19	Neg Low
Change to ambinet noise levels from plant operations	Operational	Negative	2	3	3	3.5	-43	Neg Moderate	Undertake ambient noise surveys during tpical operations.Investigate noise sources where ambient limits are change are exceeded.Implement corrective measures	1	2	3	2.5	-27	Neg Low
Traffic															
Change to traffic patterns or voulumes on local roads	Construction	Negative	1	1	3	2.5	-21	Neg Low	Restrict vehicles transporting fuels and waste to internal Scaw roads	1	1	3	0.5	-19	Neg Low
Health Risks															
Occupational health risks to personnel.	Operational	Negative	1	3	2	2.5	-32	Neg Moderate	Compliance with Occupational Health and Safety Act, 1993 and the Scaw Metals' Health and Safety policies	1	2	3	2	-26	Neg Low

Environmental Impact Assessment			Without Mitigation							With Mitigation					
Impact	**Project Phase / Timing**	**Impact Status**	Extent	Severity	Duration	Probability	Impact Sig	**Impact Significance**	**Design and Operations Measures for Impact Control**	Extent	Severity	Duration	Probability	Impact Sig	**Impact Significance**
Public health risk (PM10 , non-carcinogenic, carcinogenic) from site and plant emissions. (will initially increase and then decrease)	Operational	Negative	3	3	3	3	-51	Neg High	Implement operational and emissions control on combustion component to ensure that minimum emission standards are achieved. Ensure availability and functionality of emissions control equipment. Monitoring of stack emissions.	1	2	3	1.5	-26	Neg Low
Social and Economic															
Economic benefits through employment	Operational	Positive	3	2	3	3.5	45.5	Pos High	Labour and skills to be sourced from local persons and local contractors.	1	2	3	3.5	27.5	Pos Low
Contribution to sustainable development	Operational	Positive	2	1	3	2	29	Pos Low	Maximise generation of electricity from waste heat and other waste materials. Displace electricity generated from new coal	1	3	3	3	33	Pos Moderate
No-go Alternative															
No negative impacts as described above	Operational	Positive	2	2	4	3.5	37.5	Pos Moderate							
Continued loss of existing waste heat to atmosphere	Operational	Negative	2	2	4	3.5	-38	Neg Moderate							
Missed opportunity to improve emissions control equipment at DRI kilns	Operational	Negative	1	3	3	1	-31	Neg Low							
Continued disposal of dusts, char and shredder to waste to landfill, with on-going loss of embodied energy to landfill.	Operational	Negative	1	2	3	2	-26	Neg Low							
Maintain current level of dependance on electricty generated from new coal.	Operational	Negative	1	2	3	3.5	-28	Neg Low							
No additional electricty available to Scaw and other users	Operational	Negative	2	3	3	3.5	-43	Neg Moderate							

7.7 Discussion of Cumulative Impacts

This section provides a discussion of the potential cumulative impacts of the Electrical Co-generation Power Plant in combination with the existing operations at Scaw Metals Union Junction and the related WDF. The potential impacts to air quality are considered as the main cumulative impact of significance.

7.7.1 Air Quality

Waste heat recovery is expected to have a slightly positive impact on atmospheric emissions from the DRI plant and on overall air quality at Scaw Metals. This improvement will result from the greater availability of the new bag-house and the greater atmospheric dispersion achieved as a result of the higher volumetric flow in the single stack. The overall cumulative impact of waste heat recovery on air quality is neutral to very slightly positive.

The combustion component requires the additional handling of materials as feedstock, introduces a combustion process and new stack and requires the handling and disposal of the resultant ash to a new WDF. Current volumes of waste disposed to the SMGWDS will reduce significantly. As shown in Table 7-3 the estimated total annual particulate matter emissions at the Scaw Metals facility will increase.

- Estimated TSP, PM_{10} and $PM_{2.5}$ emissions increase by between 23% and 64%;

As can be seen in Figure 17, the additional particulate matter emitted by the project is largely as result of windblown dust from the new WDF. PM10 and PM2.5 follow a similar pattern with the increase in emissions being largely from the new WDF. While the total particulate matter levels increase the ground level PM10 concentrations at off-site sensitive receptors decrease. However an increase is predicted in ground level PM10 concentrations at the eastern boundary and the Industrial receptor located adjacent to the new WDF (see Figure 18). The overall increase in particulate emissions is a concern and could result in significant impacts if it influences sensitive receptors.

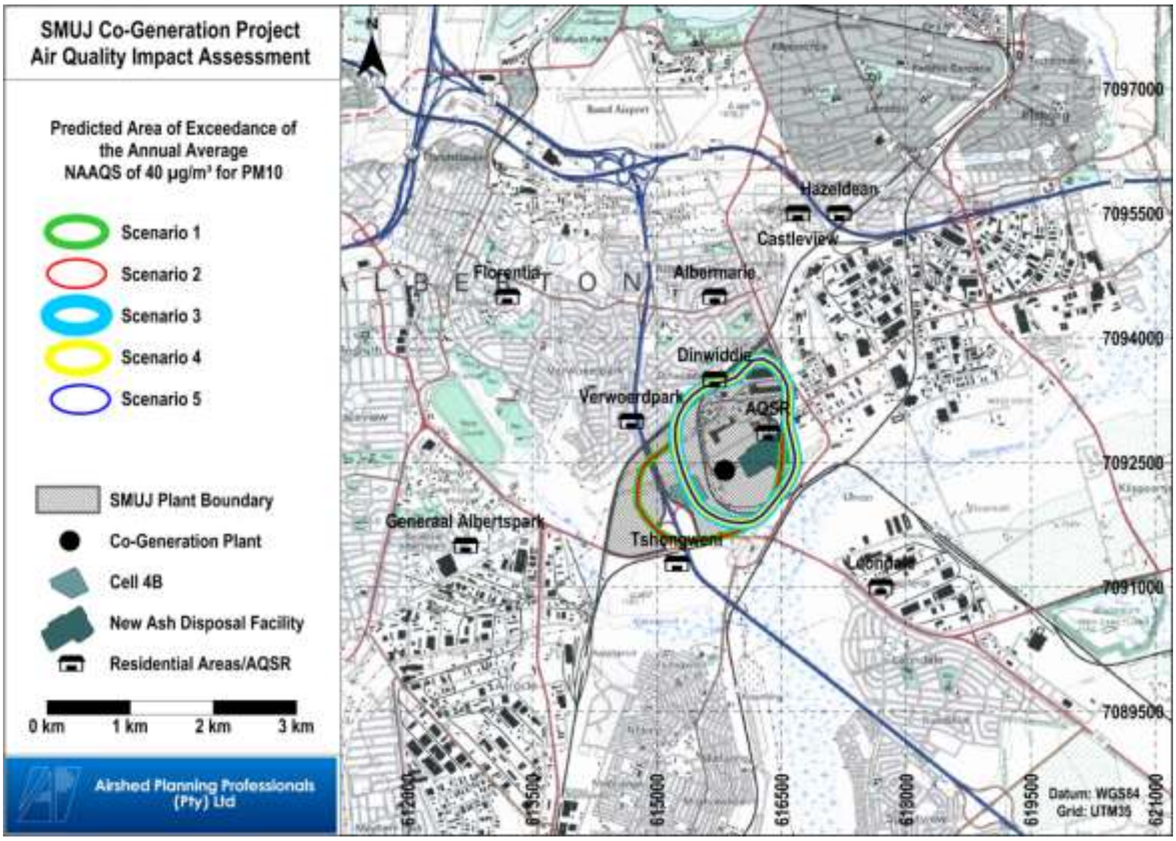


Figure 18: Predicted area of exceedance of the annual average NAAQS for PM10

Of relevance is that the emissions model:

- Considered the unmitigated scenario;
- Assumed that the entire surface of the WDF would be a source of windblown dust
- Assumed a moisture content of 1% in the ash.

These parameters make the emissions model very conservative and likely to represent a worst case scenario. The WDF is likely to be developed in 3 cells with only 1 cell active at a time. Stabilised and rehabilitated sections of the WDF will not be sources for windblown dust. Thus the source area at the WDF for windblown dust will be only one third or less than used in the model. The emissions model is also very sensitive to moisture content of the ash. If moisture content is increased to 5% the model predicts a decrease in total windblown blown ash emissions of two orders of magnitude.

It is thus concluded that particulate matter emissions from Scaw Metals are a concern. While residential areas are predicted to be exposed to reduced particulate matter concentrations the industrial sites to the east could be exposed to higher particulate matter concentrations. Pro-active measures are required through the design and operation of the Electrical Co-generation Power Plant, and the WDF in particular.

The estimated total annual emissions of criteria pollutants at the Scaw Metals are not expected to change significantly. Even where slight increases are recorded the ground level concentrations predicted at the Scaw Metals boundary will remain well below the NAAQS limit values for CO, NO_x and SO_2. Similarly, neither the chronic nor acute health risk screening criteria for HCl, HF, NH_3, PCDD/PCDF or metals are exceeded on or off-site as a result of the combustion component emissions. Calculated increased lifetime cancer risk is very low (less than one in a million) to low (between one in one million and one in ten thousand).

The commissioning of the Electrical Co-generation Power Plant is not predicted to result in significant changes in emissions of criteria pollutants or trace compounds when compared to the current levels. It is therefore concluded that the Electrical Co-generation Power Plant in combination with existing operations at Scaw Metals facility should not have significant health risks beyond the site boundary.

8 Environmental Impact Statement

Waste heat recovery of the Electrical Co-generation Power Plant will convert heat in exhaust gases of the DRI Plant into energy and will not increase emissions to atmosphere. This component is not expected to have any negative impacts and may improve local air quality slightly through better atmospheric dispersion of emissions from the DRI kilns.

The combustion component of the Electrical Co-generation Power Plant will require the combustion of energy containing materials and waste in a Fluidised Bed Boiler (FBB), as well as the handling and transport of dust, char and shredder wastes. The facility may pose a risk to public health (carcinogenic and non-carcinogenic) from gaseous and particulate matter emissions as well as dust nuisance.

Test work carried out using a pilot-scale FBB indicated that should the FBB be operated without emissions control technology, atmospheric emission standards including those for PM10, CO, NO_x, CO, NO_x, SO_2, HCl, HF, and numerous metals would be exceeded. These emissions could potentially have significant detrimental effects on air quality and human health. However, the air quality impact assessment concluded that, should the FBB be operated in compliance with the minimum emission standards, the Electrical Co-generation Power Plant would have a negligible impact on air quality beyond the boundaries of the Scaw Metals Union Junction property. The dispersion model predicted that the ground level concentrations at the Scaw Metals boundary will remain well below the NAAQS limit values for criteria pollutants. Additionally neither the chronic nor acute health risk screening criteria for HCl, HF, NH_3, PCDD/PCDF or metals are exceeded on or off-site as a result of the combustion component emissions. The health risk assessment concluded that calculated increased lifetime cancer risk is very low (less than one in a million) to low (between one in one million and one in ten thousand).

Cumulative emissions of particulate matter from the Scaw Metals property are likely to decrease at most residential sites, but may increase at the property boundaries and industrial sites to the east. Disposal of ash to the WDF will be the main source for the windblown emissions and pose a significant nuisance risk. Mitigation can be implemented to significantly reduce the emission levels.

The impact assessment of the Electrical Co-generation Plant concluded that there are a number of risks associated with the plant, but that with mitigation no negative impacts of high significance are predicted beyond the boundaries of the Scaw Metals Union Junction property. Key to this is that emissions from the combustion component of the Co-generation Plant be restricted to below the minimum emissions standards. Mitigation measures at the WDF will also be essential to limit excessive particulate matter emissions to industrial areas east of the site. It is important that emissions monitoring is undertaken to inform the effectiveness of emissions control.

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 environment. The Co-generation process will utilise waste heat from the existing DRI plant, as well as combustible wastes produced at Scaw Metals to generate approximately 68 MW of electricity. The project will therefore improve the overall energy efficiency of the Scaw Metals Union Junction facility and reduce the emissions footprint for the site. The generation of electricity will also improve security of supply, provide electrical capacity for expansion, reduce the amount of electricity required from Eskom and enable Eskom to supply other customers. In addition, by combusting waste to produce electricity, the co-generation plant will improve waste management practices at Scaw Metals in line with the National Waste Management Strategy (2010) adopted in South Africa, which espouses the recovery and treatment of waste over its disposal. Combusting waste will also extend the disposal life at Scaw waste sites by reducing airspace consumption.

Not developing the Co-generation Plant will see the continuation of business as usual at the Scaw Union Junction Facility. Without the development of Phase 1 of the Electrical Co-generation Plant, the DRI kilns at the Scaw Metals facility will continue to operate as is. Waste heat would therefore not be utilised to generate more power at the facility and would continue to be lost to the atmosphere. Waste heat recovery at the Electrical Co-generation Power Plant will also function as a ‘cleaner technology’ development and will be required to improve the emissions control equipment on the DRI plant and ensure that emissions are reduced.

Without the development of the combustion component, wastes and by-products produced at the Scaw Metals facility would also not be utilised for power generation. This would likely have a number of negative outcomes, including:

- No reduction in volume of waste for disposal
- The Scaw Metals facility remains dependant on Eskom
- The high risk of stoppages due to power outages continues
- Limited opportunity for expansion
- Substituted supply not available to other Eskom customers

9 Conclusions and Key Findings

This report forms part of the EIA phase of the Electrical Co-generation Power Plant 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 measures.

The Electrical Co-generation Power Plant will have benefits in generating significant amounts of electricity from a variety of energy containing materials and waste streams. These materials and waste streams are currently lost to the atmosphere, are unutilised or are disposed. Generating electricity from these resources will reduce electricity costs, improve the security of electrical supply, improve energy efficiency and reduce the carbon footprint per unit production at Scaw Metals. In terms of the waste management hierarchy, the recovery of energy from wastes is preferable to disposal.

Waste heat recovery by the project will recover energy from a resource that is currently lost to atmosphere while having almost no negative impacts. This component will function as a ‘cleaner technology’ and may improve local air quality slightly over current levels through better atmospheric dispersion of emissions from the DRI kilns.

The most significant risk of the Electrical Co-generation Power Plant is potential effects on air quality from emissions to atmosphere of the combustion component. The combustion of materials and waste in a Fluidised Bed Boiler (FBB), during the combustion component will result in additional emissions to atmosphere. The Air Quality Impact Assessment concluded that, should the FBB be operated so as to restrict emissions to below the applicable minimum emission standards, the emissions from the combustion component will have a negligible impact on air quality outside the boundaries of the Scaw Metals Union Junction Facility. Neither the chronic nor acute health risk screening criteria for HCl, HF, NH3, PCDD/PCDF or metals are exceeded on or off-site as a result of the combustion component emissions.

Emissions of particulate matter and the dispersion thereof are an aspect of concern. Disposal of ash to the WDF will be the main source for the windblown emissions and pose a significant nuisance risk. With management of that facility, including limiting the ‘working face’ and maintain the moisture content of the ash between 5 and 10%, it should be possible to limit particulate matter emissions such that nuisance conditions do not result.

There are no impacts which have a high significance after mitigation. There have been no fatal flaws identified during the EIA phase. The mitigation measures which are presented in the EMP (see Section 12) are considered to be sufficient to mitigate the impacts to environmentally acceptable levels. It will be vital that emissions monitoring is undertaken to ensure that emissions are kept below the applicable minimum emissions standards.

Synergistics Environmental Services (Pty) Ltd, as independent EAPs, conclude that there is no environmental reason why the development of the Electrical Co-generation Power Plant at Scaw Metals, Germiston, should not be authorised with an integrated environmental authorisation and an AEL 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 environmental assessment 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 EIA report represents an objective and complete assessment of the environmental issues associated with the proposed introduction of the Electrical Co-generation Power Plant at Scaw Metals, Germiston.

COMPILED BY:

Matthew Hemming
Environmental Scientist

For Synergistics Environmental Services (Pty) Ltd
PO Box 1822
Rivonia
2128

11 References

Antrobus, B and Glendinning J, 2010 Dolomite Risk Assessment for Landfill Site 4, Cell 4b. Jones & Wagener

Aquatico Scientific (Pty) Ltd, Quarterly Monitoring report for Scaw Metals Waste Disposal Facility, December 2013.

Department of Water Affairs and Forestry, Second Edition, 1998. Minimum Requirements for Waste Disposal by Landfill. Waste Management Series 2. Department of Water Affairs and Forestry.

Engelbrecht, A. D., & North, B. C. (2012). Scaw Fluidised Ben Combustion Tests on Char, Dust and Shredder Waste with Limestone Addition. Pretoria: CSIR.

Glendinning J. March 2012. Quarterly Water Quality Monitoring Report for Waste Disposal Sites at Scaw Metals.

Hanna, S. R., Egan, B. A., Purdum, J., & Wagler, J. (1999). Evaluation of ISC3, AERMOD, and ADMS Dispersion Models with Observations from Five Field Sites.

IFC. (2007). General Environmental, Health and Safety Guidelines. World Bank Group.

Knopperson, O, Davidson R and Knopperson J, March 2011.Noise Assessment Report: Scaw Metals. Pro Acoustic Consortium.

Krause N & Kornelius G, 2011. Air Quality Impact Assessment for the Scaw Metals Group Union Junction Operations in Germiston. Airshed Planning Professionals, 09SMG01 Rev 1.2.

Levego (Woollatt, GB). Stack Emissions Measurement Survey for Scaw Metals, Germiston. Various months in 2012 and 2013.

Mpina, Z (various dates) Monthly Dust Deposition Monitoring Progress Report for Scaw Metals. SGS Environmental Services.

The University of Tennessee. (2009). Chemical Toxicity Values. Retrieved October 11, 2012, from The Risk Assessment Information System: http://rais.ornl.gov

Tiwary, A., & Colls, J. (2010). Air pollution: measurement, monitoring and mitigation (3rd Edition ed.). Oxon: Routledge.

US EPA. (2011, December 28). US EPA: Emissions Factors & AP 42, Compilation of Air Pollutant Emission Factors. Retrieved April 18, 2013, from US EPA Web site: http://www.epa.gov/ttnchie1/ap42/

Van der Merwe, B, March 2012. Environmental Noise Impact Assessment, Scaw Metals, Dekema Road, Wadeville. dBAcoustic, 023/2012.

Von Reiche, V & Krause N, 2010. Air Quality Impact Assessment for the proposed Development of Cell 4b at the Scaw Metals General Waste Disposal Site in Germiston. Airshed Planning Professionals, 10SYN13 Rev 0.

Von Reiche, V., Liebenberg-Enslin, H., Kornelius, G., 2012. Air Quality Impact Assessment for the proposed Co-Generation Plant and Waste Disposal Facility at the Scaw Metals Group Union Junction Operations in Germiston. Airshed Planning Professionals, 10SYN13 Rev 0.

WHO. (2005). WHO Air Quality Guidelines, Global Update. World Health Organisation.

12 Draft Environmental Management Programme

12.1 Introduction

This draft EMP, for the Electrical Co-generation Power Plant at Scaw Metals, 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, approved EMPs and an EMS. 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 Electrical Co-generation Power Plant 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.

Environmental management of the WDF that will be required for ash generated in the combustion component will be dealt with in a separate EMP that is presented in the EIA for that facility.

12.1.1 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.

12.1.2 Project Activity

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

12.1.3 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 Electrical Co-generation Power Plant 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 Electrical Co-generation Power Plant.

Operations Manager:	Engineer appointed to manage and oversee all the Co-generation Plant operations.
Supervisor:	Persons responsible for work teams.
Environmental Manager:	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 Manager.

12.2 Management and Mitigation Measures

12.2.1 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 plant is being designed. Local knowledge, site specific information and lessons learnt from pilot work should be implemented in the planning and design of the plant layout. Designs and operating procedures must be developed to ensure compliance with relevant environmental legislation, emissions standards and health risk guidelines.

12.2.2 Construction Phase

This phase will involve the physical construction of the Electrical Co-generation Power Plant and its associated infrastructure. The construction and installation of the Electrical Co-generation Power Plant must be done in terms of the specifications, methods or procedures as set out by the respective suppliers. The installation of the various plant 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 12-2.

12.2.3 Operational Phase

This phase refers to the period when the Electrical Co-generation Power Plant will be operational and will involve all the activities associated with its operation as detailed in Section 4. The expected operational lifetime of the plant is 25 years. Requirements to avoid, reduce and mitigate environmental impacts identified in the EIA are detailed in

Table 12-3.

12.2.4 Decommissioning and Closure

Scaw Metals intends to operate the Electrical Co-generation Power Plant for the foreseeable future. The decommissioning of the plant will occur when the facilities reaches the end of its design life, i.e. 25 years, or is replaced by improved technology. At the time when the plant 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. However, the basic impacts of decommissioning and closure of the plant is anticipated as follows:

- Health and Safety risks from:
    - Dangerous/ contaminated equipment or facilities on site;
    - Hazardous waste materials on site;

- Environmental degradation from:
    - Contamination of soil at the site;
    - Hazardous waste materials on site;
    - Waste residues on surfaces, drains and equipment.

A specific closure plan has not yet been developed for the Electrical Co-generation Power Plant 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 relevant legislation. The basic environmental management that will be applied during closure of the Electrical Co-generation Power Plant is set out in Table 12-4.

Table 12-1: Planning and Design EMP for the Electrical Co-generation Plant

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 EMP rests with Scaw Metals. The project manager is responsible for ensuring compliance with environmental legislation.	Scaw Metals Project Manager	During planning
Sustainability and Efficiency			
Ensure a project that contributes toward sustainable development and which is efficient in the use of resources.	Decisions affecting the Design and Scope of the project must give cognisance to: - principles of sustainable development; - environmental legislation and related standards; - resource use and energy efficiency; - public health and safety; and - environmental risks.	Project Manager	During planning
Environmental Awareness and Training			
Ensure that all persons working at the design are aware of the requirements of environmental legislation and best practice	All persons with influence on the Design and Scope of the project, including consultants, must be made aware of the environmental legislation applicable to the project and any related goals, targets and restrictions.	Project Manager	During planning
Environmental Legal Compliance			
Ensure the project is environmentally and legally complaint through all phases	Decisions affecting the Design and Scope for the project are to be made with cognisance of the enviro-legal compliance requirements for all phases of the project	Project Manager	During planning

Table 12-2: Construction EMP for the Electrical Co-generation Power Plant

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 plant 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 authorisation, 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 authorisation, 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 Plant 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 Electrical Co-generation Power Plant (to be incorporated into normal induction training) including permanent workers, contractors and consultants. As part of the induction all workers on site must be made aware of the conditions of the EMP.	Construction Manager	Prior to site establishment. For all new personnel.
Occupational Health and Safety			
Ensure the safety of workers at the Electrical Co-generation Plant.	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.	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	Materials for the construction of the facility and any rubble stored in a manner that does not pose risk to the 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 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.	Construction Manager	During construction

Objectives and Goals	Management and Monitoring Actions	Implementation Programme	
		Responsibility	**Implementation & Frequency**
	All equipment that leaks fluid must be repaired immediately or removed from site when necessary.		
	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
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 Co-generation plant site to: - Divert clean water away from the site; - Contain dirty storm water within the Scaw Metals systems.	Construction Manager	During construction
	The storm water water channel on site may not be blocked or filled until an alternative has been implemented. Any new storm water system must have sufficient capacity to handle run-off anticipated during a rainfall event of 1:50 year intensity and 24 hr duration. The main flow path of the system must have erosion protection and the outlet must have	Construction Manager	During construction

Objectives and Goals	Management and Monitoring Actions	Implementation Programme	
		Responsibility	Implementation & Frequency
	strucutres to dissipate energy and reduce flow velocities.		
	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 remains that may be excavated during the construction phase	If any archaeological remains or artefacts are exposed during the construction phase, the construction must be suspended immediately and the SAHRA and DEA must be informed.	Environmental Manager/ Contractor	If graves or artefacts are 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

Objectives and Goals	Management and Monitoring Actions	Implementation Programme	
		Responsibility	Implementation & Frequency
	Chemical and hydrocarbon spills are to be regarded as an environmental non-conformances 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 and managed as hazardous waste.	Construction Manager	At a spill
	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 and 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

Objectives and Goals	Management and Monitoring Actions	Implementation Programme	
		Responsibility	Implementation & Frequency
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.
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 Co-gen Plant 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 construciton 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
EMP Compliance			
Implementation of the required management measures and compliance with the EMP	A copy of the EMP and all environmental authorisations 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.	Contractor	Throughout the duration of the contract.

Objectives and Goals	Management and Monitoring Actions	Implementation Programme	
		Responsibility	Implementation & Frequency
	Contractors must not deviate from the EMP or written instructions without approval from Scaw Metals.		
	The ECO will monitor and audit the construction activities to ensure compliance with this EMP and the Environmental Authorisation.	Environmental Compliance Officer	Weekly during 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 Record of Decision 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 should it be requested.	Environmental Manager	During construction phase
Public Relations			
To ensure that public complaints are recorded and addressed.	Maintain a complaints register at the site entrance. 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 proovided 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 12-3: Operations EMP for the Electrical Co-generation Plant

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 Plant Manger to be responsible for overseeing operations in compliance with the EMP. The Plant Manager is responsible for implementation, monitoring and auditing of compliance with the EMP Records are to be kept.	Scaw Metals Plant 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 Electrical Co-generation Power Plant (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.	Plant Manager	Prior to site establishment. 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 plant
	Environmental emergency procedures should be addressed as part of environmental training.	Environmental Manager	Throughout life of plant.
	A copy of the EMP and all environmental authorisations must be kept at the main office.	Environmental Manager	Throughout life of plant.
	Environmental emergency procedures should be addressed as part of environmental induction training.	Environmental Manager	Throughout life of plant.
Occupational Health and Safety			
Ensure the safety of workers at the Electrical Co-generation Plant.	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.	Plant Manager	Throughout life of plant

Objectives and Goals	Management and Monitoring Actions	Implementation Programme	
		Responsibility	Implementation & Frequency
Waste Heat Recovery operations			
To minimise impacts on air quality	Maximise the recovery of electricity from heat from the DRI waste gas. Operational parameters of the plant must comply with conditions of the AEL.	Plant Manager	Throughout life of plant
	Emissions from the Phase I stack must not exceed limits set in the AEL.	Plant Manager	Throughout life of plant
	The efficiency of control equipment must be maintained. The bag house must be must be operated and maintained to ensure that particulate matter emissions limits are achieved.	Plant Manager	Throughout life of plant
Combustion operations			
To minimise impact on storm water runoff quality	All feedstock materials of a hazardous nature must be stored and handled in lined and bunded areas. Such areas must have systems to contain spillages as well as contaminated storm water.	Plant Manager	Throughout life of plant
	Dirty water run-off must be contained and not allowed to enter into the surrounding environment.	Plant Manager	Throughout life of plant
To minimise impacts on air quality	Operational parameters of the plant must comply with conditions set in the AEL.	Plant Manager	Throughout life of plant
	Emissions from the combustion component stack must not exceed limits set in the AEL.	Plant Manager	Throughout life of plant
	The efficiency of control equipment must be maintained. The bag house must be must be operated and maintained to ensure that particulate matter emissions limits are achieved.	Plant Manager	Throughout life of plant

Objectives and Goals	Management and Monitoring Actions	Implementation Programme	
		Responsibility	Implementation & Frequency
	Operational activities must be managed such that ground level concentrations of criteria pollutants at the site boundary are in compliance with relevant standards	Plant Manager	Throughout life of plant
Minimise noise disturbance to surrounding communities	Operational activities must be managed such that noise levels at the site boundary are in compliance with relevant standards.	Plant Manager	Throughout life of plant
Management of hydrocarbons and chemicals			
Minimise contamination risk to water resources	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.	Plant Manager	Throughout life of plant
	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.	Plant Manager	Throughout life of plant
	Chemicals (including 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.	Plant Manager	Throughout life of plant
	All chemicals and hydrocarbons to be stored in lined and bunded areas and handled to prevent dispersion to the environment.	Plant Manager	Throughout life of plant
	Fuel and other petrochemicals must be stored in receptacles that comply with SANS100-1:2003 (SABS089-1:2003).	Plant Manager	Throughout life of plant
	Personnel dealing with hazardous substances must be appropriately trained.	Plant Manager	Throughout life of plant
	Regular inspection to be carried out on areas where hazardous substances are stored or handled.	Plant Manager	Throughout life of plant
	Chemical and hydrocarbon spills are to be regarded as an environmental non-conformances and reported through the incident reporting system.	Plant 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.	Plant Manager	At a spill

Objectives and Goals	Management and Monitoring Actions	Implementation Programme	
		Responsibility	Implementation & Frequency
	All soils that have become contaminated with oils, fuels and lubricants must be removed and managed as hazardous waste.	Plant Manager	At a spill
	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.	Plant Manager	Throughout life of plant
Waste Management			
To ensure effective management of wastes generated at the Plant	Waste generated during operations must be: - separated by type (general and hazardous); - stored so as to prevent environmental pollution; - re-used or recycled where possible.	Plant Manager	Throughout life of plant
	All wastes generated must be classified and assessed for disposal in terms of the requirements of the Waste Classification and Management Regulations (August 2013)	Plant Manager	As required
	Provide designated waste collection points and storage areas. Ensure that these have adequate capacity and are frequently cleaned.	Plant Manager	Throughout life of plant
	Separate waste receptacles must be provided for general and hazardous wastes. All hazardous waste must be handled and stored in containers or on areas with impervious surfaces and bunds. Containers for hazardous waste must be labelled "hazardous waste".	Plant Manager	Throughout life of plant
	Waste must be removed from site on a regular basis and disposed of at a licensed landfill site. Records of disposal must be kept.	Plant Manager	Throughout life of plant
Environmental Monitoring			
To recognise impacts on air, ground and surface water resources in the area.	All sampling is to be conducted by suitably qualified and competent persons using appropriate sampling techniques. All samples to be analysed at an accredited, independent laboratory. Records of monitoring must be kept for the site.	Environmental Manager	Throughout life of plant
	Source emissions from the stacks must be monitored in accordance with the AEL.	Environmental Manager	As per AEL requirements
	Stack emissions monitoring must be in accordance with the AEL requirements	Environmental	

Objectives and Goals	Management and Monitoring Actions	Implementation Programme	
		Responsibility	Implementation & Frequency
		Manager	
	Monitoring of fall-out dust is to be continued at the existing dust monitoring network. An additional fall-out dust station is to be added at the eastern boundary.		
	Results from air qulaity monitoring to be assessed in terms of NAAQS/SANS standards to determine impacts. Management action to be initiated if impacts are detected.	Environmental Manager	Bi-annually If required
	Monitoring of surface water is to be continued at the existing monitoring network.	Environmental Manager	Quarterly
	All monitoring results must be made available to the Plant Manager on a quarterly basis Potential negative impacts should be identified and addressed as soon as possible. Management action to be initiated if impacts are detected.	Environmental Manager	Quarterly
	Occupational health and medical surveillance monitoring must be conducted as per the Scaw Metals SHEQ protocol.	Environmental Manager	Annually
EMP Compliance			
Implementation of the required management measures and compliance with the EMP	A copy of the EMP and all environmental authorisations must be kept at the main plant office.	Plant Manager	Throughout life of plant
	Operations must not deviate from the authorisation or EMP without approval from the competent authority	Plant Manager	Throughout life of plant
	A register of all environmental incidents is to be maintained. The Environmental Manager is to be notified of all environmental incidents.	Plant Manager	Throughout life of plant
	Records relating to the compliance and non-compliance with the conditions of the EMP and environmental authorisation 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 should they be requested.	Plant Manager	Throughout life of plant
Environmental Risks and Emergencies			
Minimise the risk for environmental emergencies occurring and implement controls to deal with	Risk assessments to be undertaken for all plant facilities and activities. Environmental 'Emergency Response Plans' is to be developed for potential high risks.	Plant Manager	Throughout life of plant

Objectives and Goals	Management and Monitoring Actions	Implementation Programme	
		Responsibility	Implementation & Frequency
situations, should they occur.	Scaw Metals to ensure that the projects' Emergency Response Plan is compliant with the plan for the SMUJ		
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.

Table 12-4: Closure EMP for the Electrical Co-generation Plant

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 plant 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	Review closure and rehabilitation objectives. Give consideration for the preferred end-use of the site when defining the closure objectives.	Closure Manager	At the start of the decommissioning.
	Develop a preliminary rehabilitation plan, outlining the way forward for rehabilitation and closure planning.	Closure Manager	At the start of the decommissioning
	Determine costs for implementation of rehabilitation and closure objectives.	Closure 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	Closure 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.	Closure Manager	During decommissioning
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.	Closure Manager	During decommissioning

Objectives and Goals	Implementation Programme		
	Management and Monitoring Actions	Scheduling	
		Responsibility	Implementation & Frequency
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.	Closure Manager	During decommissioning
Soils			
Minimise the impacts on soils after site closure and facilitate successful rehabilitation	All soils that have become contaminated with oils, fuels and lubricants must be removed and managed as hazardous waste. Bioremediation of contaminated soils shall take place should such a facility be available on site.	Closure Manager	During decommissioning
	Spill prevention measures to be implemented as described in construction and operational phase.	Closure Manager	During decommissioning
Land Capability			
Improve the capability of the rehabilitated land	All disturbed areas must be topsoiled, sloped and re-vegetated as soon as possible using suitable grass species. This re-vegetation will assist in reducing the potential for soil erosion.	Closure Manager	During decommissioning
	Appropriate soil conservation measures will be provided in order to prevent soil erosion and loss of topsoil.	Closure Manager	During decommissioning

12.3 Environmental Awareness Plan

Scaw Metals must present an annual induction or training, which includes an environmental awareness aspect, to all site personnel. 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 Co-generation Power Plant 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 Co-generation Power Plant 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.

12.4 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 Co-generation Power Plant must be added as an item on the internal and external audits conducted at the Scaw Metals UJ property. The audits must report on compliance of the Co-generation Power Plant with the EMP and conditions of the licence(s).

COMPILED BY:

____

Matthew Hemming
MSc. Conservation Biology
Environmental Assessment Practitioner
Synergistics Environmental Services (Pty) Ltd

ACCEPTED BY:

____

Steve van Wyk
Operations Manager
Scaw Metals

List of Appendices

Appendix A: Integrated Environmental Authorisation Documentation

DEA Accept Application
DEA Accept Final Scoping Report

Appendix B: Public Consultation Documentation

B1: Database of Registered Interested and Affected Parties
B2: Responses from Interested and Affected Parties
B3: Correspondence to Interested and Affected Parties
B4: Comments on Reports

Appendix C: Air Quality Impact Assessment

Appendix D: Heritage Assessment