



**ENVIRONMENTAL IMPACT ASSESSMENT
WASTE MANAGEMENT LICENCE APPLICATION
WATER USE LICENCE APPLICATION
AT SILICON SMELTERS (PTY) LTD - RAND CARBIDE,
EMALAHLENI, MPUMALANGA PROVINCE OF SOUTH
AFRICA**

BACKGROUND INFORMATION DOCUMENT

Prepared for

Silicon Smelters (Pty) Ltd

Prepared by

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LIST OF DEFINITIONS, ABBREVIATIONS AND ACRONYMS

| | |
|---------------------|--|
| Al | Aluminium |
| BID | Background Information Document |
| Ca | Calcium |
| CBD | Central Business District |
| DEA | Department of Environmental Affairs |
| DWA | Department of Water Affairs |
| E.C.A | Electrically Calcined Anthracite |
| EAP | Environmental Assessment Practitioner |
| EIA | Environmental Impact Assessment |
| EIR | Environmental Impact Report |
| EMPr | Environmental Management Programme report |
| Fe-Si | Ferrosilicon |
| I&AP | Interested and Affected Party |
| IWUL | Integrated Water Use Licence |
| IWWMP | Integrated Water and Waste Management Plan |
| NEM:WA | National Environmental Management: Waste Act, 2008 (Act 59 of 2008) |
| NEMA | National Environmental Management Act, 1998 (Act 107 of 1998) as amended |
| NWA | National Water Act, 1998 (Act 36 of 1998) |
| PPP | Public Participation Process |
| Rand Carbide | Silicon Smelters (Pty) Ltd – Rand Carbide |
| WMA | Water Management Area |
| WML | Waste Management Licence |

1 INTRODUCTION

HydroScience cc, an independent Environmental Assessment Practitioner (EAP), has been appointed by Silicon Smelters (Pty) Ltd - Rand Carbide, hereafter referred to as Rand Carbide, to undertake an Environmental Impact Assessment (EIA) process and submit a Scoping Report, Environmental Impact Report (EIR), Environmental Management Programme report (EMPr) and Integrated Water and Waste Management Plan (IWWMP) in support of the applications for environmental authorisation, a waste management licence (WML) and an integrated water use licence (IWUL).

As part of the EIA process (Figure 1), an application form, in terms of the listed activities under Government Notice Regulation 718 (3 July 2009) in accordance with Section 20(b) of the National Environmental Management: Waste Act (NEM:WA), 2008 (Act 59 of 2008) and the EIA regulations made under Section 24(5) of the National Environmental Management Act (NEMA), 1998 (Act 107 of 1998) as amended, and in accordance with Government Notice Regulation 543 (18 June 2010), will be submitted to the Directorate: Authorisation and Waste Disposal Management of the National Department of Environmental Affairs (DEA) in Pretoria.

As part of the water use licence application in terms of Section 21 of the National Water Act (NWA), 1998 (Act 36 of 1998), an IWWMP as well as all the applicable water use registration/licencing forms will be submitted to Department of Water Affairs (DWA).

2 PURPOSE OF THIS DOCUMENT

The purpose of this document (Background Information Document or BID) is to provide background information (in addition to the published notices) in terms of Regulation 56 of the NEMA, 1998, as amended and the NWA, 1998, to all Interested and Affected Parties (I&APs) regarding the applications for environmental authorisation, a WML and IWUL by Rand Carbide for their on-site activities in eMalahleni, Mpumalanga Province.

In addition, this document will provide a platform from which to obtain comments and contributions from stakeholders with regard to the potential environmental impacts of the project as part of the Public Participation Process (PPP). The aim of the PPP is not only to adhere to the legislative requirements, but also to give as many stakeholders and I&APs as possible an opportunity to be actively involved in this process.

The PPP will be carried out in accordance with Chapter 6 of NEMA, as amended, and in support of the Environmental Impact Assessments Regulations, 2010 as published in Government Notice Regulation 543 (18 June 2010).

3 ROLE OF I&APS

You are invited to register as an I&AP (see contact details and registration form attached) and to assist us in:

- Identifying issues of concern that need to be investigated as well as possible impacts of the facility/operations on the environment;
- Suggesting alternatives in which to mitigate possible negative impacts and enhance positive impacts.

Your input is considered valuable as:

- It contributes to the decision-making process;
- It contributes to information on public needs, values and expectations; and
- It contributes to local and traditional knowledge.

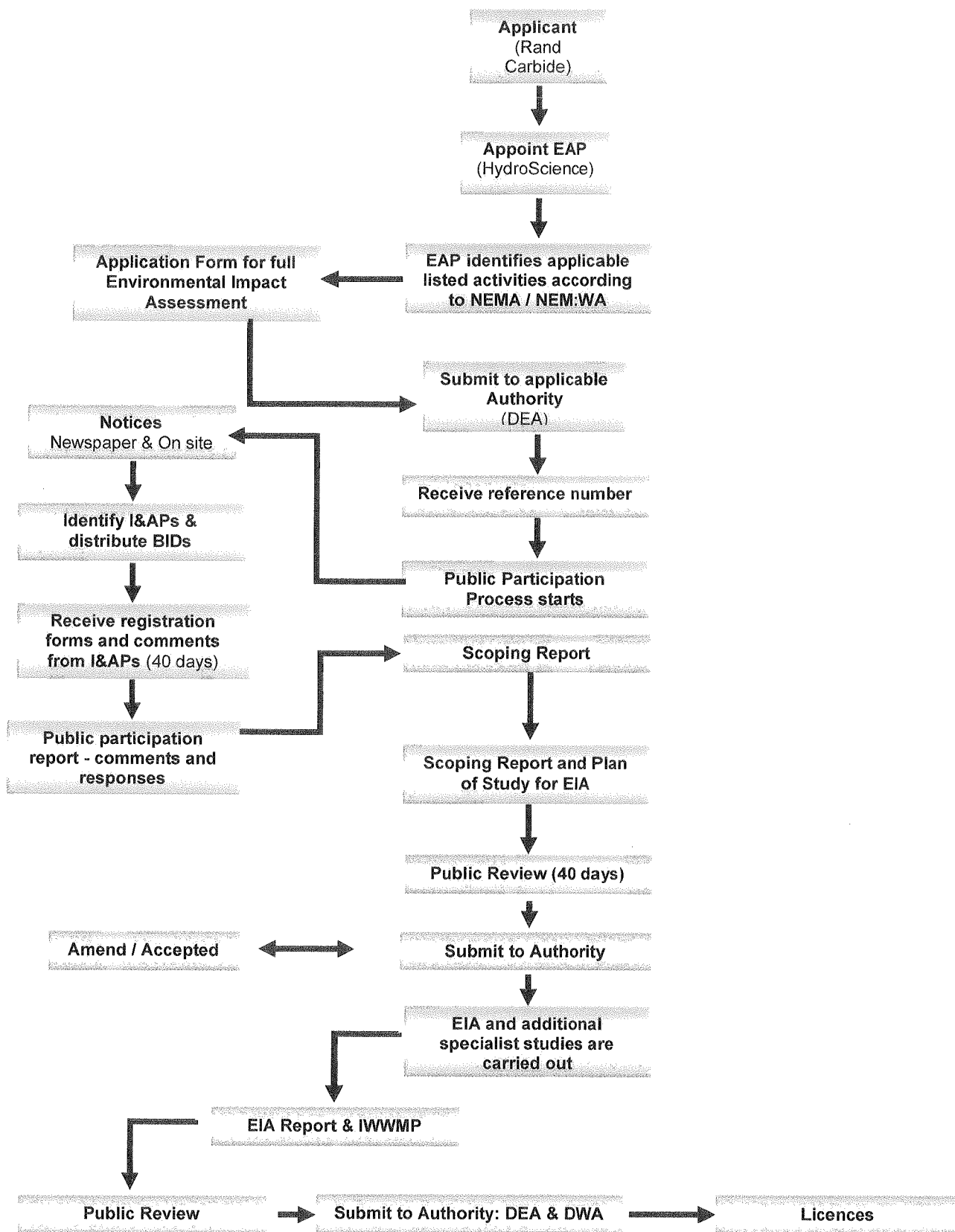


Figure 1: Simplified diagram providing the process

4 SILICON SMELTERS (PTY) LTD - RAND CARBIDE

4.1 Background

Rand Carbide Limited, which came into being in 1918 in Germiston for the production of calcium carbide, moved to Witbank in 1926 to avail itself of cheaper power and because it envisaged the use of coal in the area as a raw material. Since those early days, the production of carbide has been greatly expanded, and the company has diversified into the production of ferrosilicon (Fe-Si), silicon metal, electrically calcined anthracite (E.C.A), electrode paste and silica fume.

Rand Carbide was acquired by Highveld Steel and Vanadium Corporation Ltd in 1978 but was sold in February 2008 to Silicon Smelters (Pty) Ltd, a subsidiary of FerroAtlantica (Spain). The company is now referred to as Silicon Smelters (Pty) Ltd - Rand Carbide (or Rand Carbide).

4.2 Operations and processes

Rand Carbide produces ferrosilicon (Fe-Si), silicon metal and carbonaceous products including electrically calcined anthracite (E.C.A) and electrode paste.

Raw material handling: Raw materials, upon receipt, are stockpiled on site from where the intermediate storage bunkers are fed. Batching of the raw materials take place underneath these storage bunkers where the required ratio's for each of the raw materials are weighed out and dispatched to the furnace bins. Raw material mixture is fed into the furnaces via six chutes.

4.2.1 Fe-Si production

Fe-Si is produced in three furnaces (Furnaces D, E & F).

Raw materials: coal, charcoal, quartz, wood chips, mill scale and ad hoc, in small quantities – barium sulphate, strontium, silicon manganese, zircon sand.

Fe-Si is produced via the carbothermic reduction of quartz in a sub-merged arc furnace (3 phase) requiring approximately 8 000kWh to produce 1 ton of product. Liquid metal is tapped (intermittently) from a taphole at $\pm 1\ 600^{\circ}\text{C}$ into a ladle lined with refractory material. The metal is then cast into a casting dam lined with ferrosilicon fines. The solidified product is then crushed and packed. Fe-Si raises the hardness of steel, increases tensile strength, elasticity, oxidation resistance and flow limits all the while reducing its ductility.

4.2.2 Silicon metal production

Silicon metal is produced in Furnace E.

Raw materials: coal, charcoal, quartz, wood chips, lime stone.

For silicon metal production, composite electrodes are used versus the paste or Soderburg electrodes used for Fe-Si production. Si is produced via the carbothermic reduction of quartz in a sub-merged arc furnace (3 phase) requiring approximately 12 000kWh to produce 1 ton of product. Liquid metal is tapped (continuously) from a taphole at $\pm 1\ 600^{\circ}\text{C}$ into a ladle lined with refractory material. Silicon metal is refined during and after tapping in order to oxidise impurities like Aluminium and Calcium. The metal is then cast into a casting pan lined with silicon fines. The solidified product is then crushed and packed.

4.2.3 Refining of Fe-Si / silicon metal

It is necessary to refine the product in its liquid stage to yield a product with small quantities of impurities (mainly Al and Ca). This can only be done during tapping or afterwards.

Refining during tapping is done via a ceramic plug fitted in the bottom of the ladle through which Oxygen and Nitrogen gasses are purged (low flow rates).

Refining subsequent to tapping can be done in a separate ladle with tuyeres tubes through which Oxygen and Nitrogen gasses are purged at high flow rates.

4.2.4 E.C.A production

Electrically Calcined Anthracite (E.C.A.) is produced in the Calciners (Calciner 1 & 2).

Raw material: Anthracite

Anthracite is fed into a cylindrical furnace and heated by electrical current passing between two electrodes. The calcined anthracite is discharged from the bottom of the furnace and conveyed to storage bunkers for use in the production of paste.

4.2.5 Electrode paste production

Electrode paste is produced at the paste plant.

Raw materials: tar pitch and various fractions of E.C.A.

E.C.A. from the two calcined furnaces is drawn from storage bunkers to three hammer mills and a ball mill for crushing. The crushed E.C.A. is taken via bucket conveyors to two twin deck screens where it is distributed to different bunkers holding the different E.C.A. fraction sizes. The fractions are taken via feed chute to a dry mix scale for batch weighing. The batch is then discharged into two mixers where it is mixed with tar binder from the inside binder tanks to produce paste.

4.2.6 Reprocessing of waste and waste management

Reprocessing of waste takes place at the Chargold plant.

Raw materials: Waste material (approximately 500 000 tons of dry waste material) from historic operations dumped on the waste dump of 2.25ha from 1926 until 2006 as well as current waste arisings.

No waste is currently going onto the dump. Chargold is processing the waste material and extracts about 50% of the material on the dump for placement back into the Rand Carbide processes. The entire dump will be reworked over the next 8 years and materials that cannot be utilised will be disposed off site.

4.3 Locality

Rand Carbide is situated on Portions 60 and 101 of the farm Joubertsrust 310 JS within the eMalahleni (Witbank) Municipal area of the Nkangala District, Mpumalanga Province, South Africa (Figure 2). Site coordinates are as follows: 25° 51.738' South; 29° 13.731' East (centre of property). The site can be accessed from Voortrekker Road on the west of the plant, also known as the Old Middelburg Road or R 555. Christiaan de Wet Street (south), Swartbos/OR Tambo Road (north and east) also borders the property. The site, which extends over 56.2810 ha, is situated approximately 2 km north east of the eMalahleni Central Business District (CBD). The site is zoned as industrial and is surrounded by industrial/commercial and residential properties.

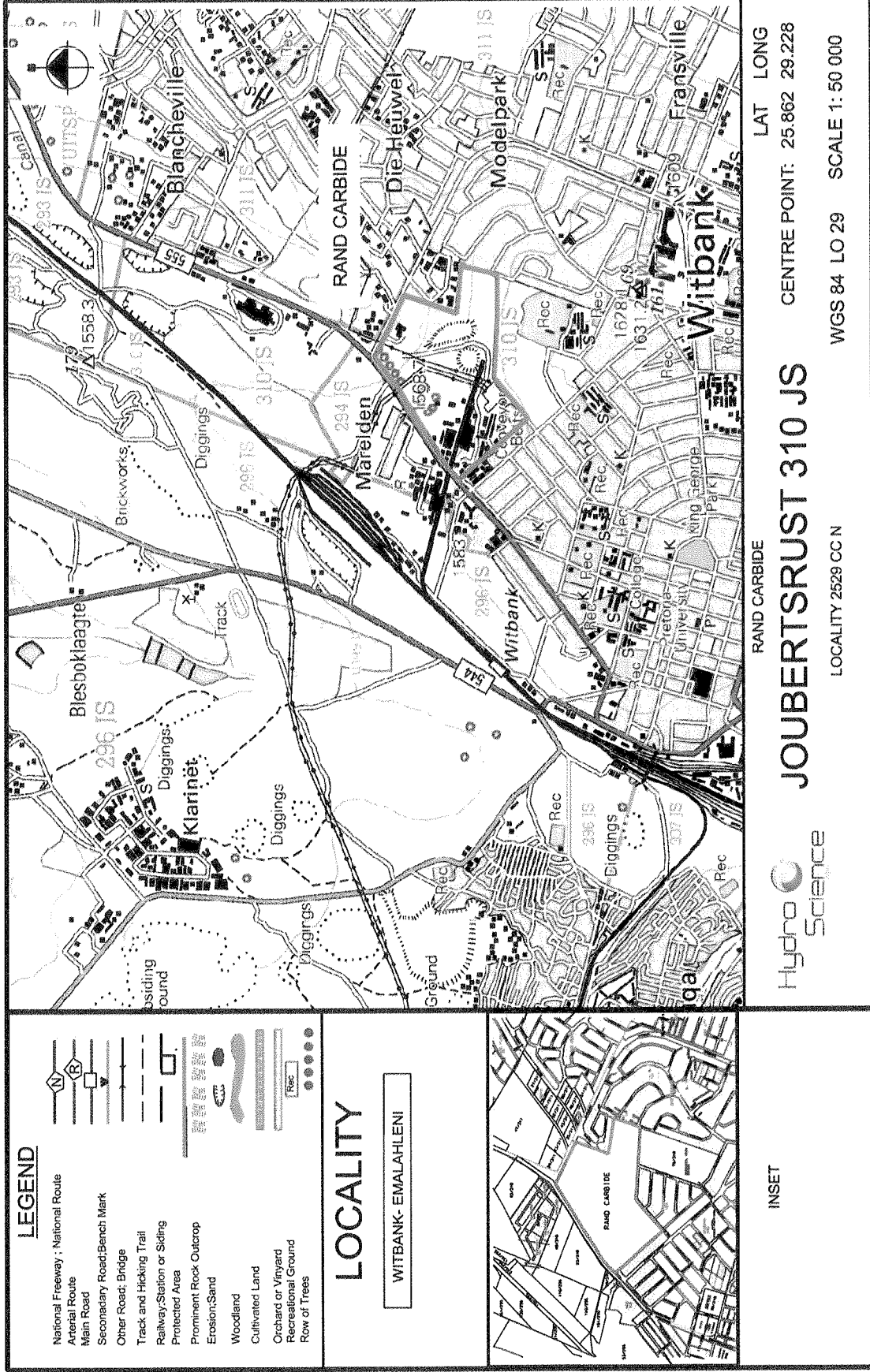


Figure 2: Locality map

4.4 Existing infrastructure

Existing infrastructure include:

- Fe-Si furnaces (3 furnaces) with cooling facilities and dust plants for emissions control
- Calcine furnace building
- Fe-Si crushing/screening plant
- Support: Laboratory, Canteen, First aid, Training Centre, Change room, Laundry, Parking, General administration and Office building
- Substations for provision of electricity
- Storage buildings/areas/bunkers – raw materials, scrap metal, equipment etc
- Compressor house (air compressors for dust plants and instrumentation)
- Workshops (electrical services, mechanical, carpentry, paste plant, instrumentation)
- Wash bay for vehicles
- Waste dump (currently being processed by Chargold)
- Chargold plant (processing of waste material)
- Underground storage tanks (UST): Petrol (14m³; 1983); diesel (23m³; 1979)

4.5 Additional business ventures operating on site

- Chargold (Pty) Ltd.
- Bakwena Ready Mix Concrete

4.6 Water management

Rand Carbide falls within the B11K quaternary catchment of the Olifants River Water Management Area (WMA). The closest surface water course is a seasonal stream arising from a spring 200 metres north east of the site which discharges into the Olifants River 5km north east of the site.

Rand Carbide is supplied with municipal water for human consumption and industrial use. Sewage effluent feeds into the municipal sewage management system. Some storm water also discharges to the municipal storm water system while some storm water is contained on the site in an unlined earth dam (Harry's dam). A storm water management plan, which separates dirty and clean water, discharges clean water and contains dirty water for reuse will be developed as part of this project. Process water is contained (closed concrete tank) on the site for recycling.

5 OBJECTIVE AND MOTIVATION

The objective of this project is twofold:

1. Obtain a Waste Management Licence (WML) for the storage, recycling and/or recovery and treatment (through reprocessing) of waste material;
2. Obtain an Integrated Water Use Licence (IWUL) for the abstraction and use of water (spring water used for dust suppression) as well as disposal and re-use of wastewater (process water and contaminated storm water).

5.1 Waste Management Licence (WML)

The application for a Waste Management Licence (WML) will be done in accordance with NEM:WA, 2008, for the closure and rehabilitation of the historic waste dump located on site which is already being processed as part of its closure and consequent rehabilitation. A

WML is also required for the Chargold (Pty) Ltd plant which currently processes the historic waste dump.

5.2 Integrated Water Use Licence (IWUL)

An application for an Integrated Water Use Licence (IWUL) and the associated IWWMP as technical support and motivation will be required in accordance with the NWA, 1998 in terms of the Section 21 water uses identified. These identified water uses include:

- The abstraction of water originating from springs (Section 21j);
- The use of water from springs for dust suppression purposes (Section 21a);
- The storage of water for emergency situations (Section 21b); and
- The disposal of wastewater and waste (Section 21g).

6 POTENTIAL IMPACTS

No potential negative impacts have been identified as this project relates firstly to the legalisation of current activities in terms of the latest environmental legislation, and secondly, to the improvement of storm water, effluent and waste management which will benefit the environment.

7 APPLICABLE LEGISLATION

7.1 Public Participation Process

Notification, in the form of site notices and BIDs (on the 20th of July 2011) as well as an advertisement placed in the Witbank News (21/22 July 2011), has been given to all I&APs in terms of Regulation 56, informing them that a Scoping Report, EIA Report, EMPr, waste management licence application and water use licence application will be submitted to the relevant authorities (Department of Environmental Affairs and Department of Water Affairs).

7.2 NEM:WA

An application in terms of the NEM:WA, 2008 will be submitted to the National DEA.

The following listed activities which require environmental authorisation and a waste management licence have been identified in terms of NEM:WA Government Notice Regulation 718 (3 July 2009), Category B:

Activity 2: The reuse and recycling of hazardous waste.

Activity 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.

7.3 NWA:

Registration and licencing forms in terms of the NWA, 1998 will be submitted to the DWA.

An IWUL application and associated IWWMP will be compiled in accordance with the NWA, 1998 in terms of Section 21 for the following uses:

Section 21 (a): Taking water from a water resource

- Section 21 (b):** Storing water
- Section 21 (g):** Disposing of waste in a manner which may detrimentally impact on a water resource
- Section 21 (j):** Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people

8 PROCESS AND WAY FORWARD

- An application for environmental authorisation and a waste management licence will be submitted to National DEA (Contact telephone number: 012 310 3920).
- Notices have been placed in the Witbank News (21/22 July 2011) and on the site (20 July 2011).
- Further notification and BIDs are to be delivered by hand, fax or email to all identified I&APs, including neighbours, authorities and other stakeholders.
- Initial comments and/or registration forms from I&APs should be received on or before 31 August 2011.
- A draft Scoping Report will be available for public review for a period of forty (40) days in 2012.
- A final Scoping Report will thereafter be submitted to the authority (DEA) for their review.
- Once the authority (DEA) has given approval for the Scoping report and Plan of study for EIA, the EAP will proceed with the EIA process which includes the EIR and EMPr.
- During the months of July through to November, specialist studies regarding storm water management and process water management will be conducted.
- An air quality impact study and Atmospheric Emissions Licence application have already been completed.
- A geohydrological study (groundwater) will also be conducted.
- The IWUL application and IWWMP will be completed and submitted towards the end of 2011.

9 CONTACT DETAILS

Please complete the attached form or contact the person below should you wish to be registered as an I&AP or make any comments regarding this project.

HydroScience cc

Person: Paulette Jacobs
Tel: 082 850 5482
Fax: 086 692 8820
E-mail: paulette@hydroscience.co.za
Postal address: P.O. Box 1322, Ruimsig, 1732

COMPLETE & FAX OR E-MAIL TO:

HYDROSCIENCE 086 692 8820 / paulette@hydroscience.co.za

**ENVIRONMENTAL IMPACT ASSESSMENT, WASTE MANAGEMENT LICENCE APPLICATION
AND WATER USE LICENCE APPLICATION FOR ACTIVITIES AT SILICON SMELTERS (PTY)
LTD - RAND CARBIDE, EMALAHLENI, MPUMALANGA PROVINCE**

INTERESTED AND AFFECTED PARTY REGISTRATION AND COMMENT SHEET

| | | | | | | |
|---|-----------------------------|------------------------------|-----------------------------------|---|----------------------|----------------------|
| Title: | <input type="checkbox"/> Mr | <input type="checkbox"/> Mrs | <input type="checkbox"/> Ms | <input type="checkbox"/> Dr | | |
| Surname: | <input type="text"/> | | First name & initials: | <input type="text"/> | | |
| Organisation / Company: | <input type="text"/> | | | | | |
| Postal / physical address: | <input type="text"/> | | | Postal code: | <input type="text"/> | |
| | | | | | | |
| Tel: | <input type="text"/> | | Fax: | <input type="text"/> | | |
| Email: | <input type="text"/> | | Cell: | <input type="text"/> | | |
| Interest in approval or refusal: | Business: | <input type="checkbox"/> YES | <input type="checkbox"/> NO | Preferred method of notification / communication | Post/mail: | <input type="text"/> |
| | Financial: | <input type="checkbox"/> YES | <input type="checkbox"/> NO | | Fax: | <input type="text"/> |
| | Personal: | <input type="checkbox"/> YES | <input type="checkbox"/> NO | | Email: | <input type="text"/> |
| Details of interest | | | | | | |
| Waste Licence Application | | | Water Use Licence Application | | | |
| Name of other I&APs to be contacted: | | <input type="text"/> | | | | |
| Contact details: | <input type="text"/> | | | | | |

Comments: (please use separate sheets if you wish/require)

Thank you for your comments, participation and time. Your contribution is appreciated and will form part of the final submission to the authority for decision-making.