SILICON TECHNOLOGY PTY. LTD

DECOMMISSIONING OF SILTECH WASTE FACILITIES

ENVIRONMENTAL IMPACT ASSESSMENT REPORT (REF: 12/9/11L181015193/4/S24G)

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WSP
BLOCK A, 1 ON LANGFORD
LANGFORD ROAD
WESTVILLE, DURBAN, 3629
SOUTH AFRICA

T: +27 31 240 8800
F: +086 606 7121
WSP.COM

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SIGNATURES

PREPARED BY

Moropa, Alice
(ZAMM04718)
2020.07.13
07:36:24 +02'00'

Alice Moropa, Consultant
Title

REVIEWED BY

Digitally signed by Seed, Nigel (ZANS00325)
DN: cn=Seed, Nigel (ZANS00325), ou=Active, email=Nigel.Seed@wsp.com
Date: 2020.07.13 08:46:06 +02'00'

Nigel Seed, Project Director
Director

PRODUCTION TEAM

SILICON TECHNOLOGY

Environmental Manager	Jan Combrink

WSP

Environmental Assessment Practitioner	Alice Moropa
Environmental Specialist	Nigel Seed

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1 INTRODUCTION

1.1 TERMS OF REFERENCE

WSP has been appointed by Silicon Technology (Pty) Ltd (Siltech), a subsidiary of Ferroglobe, to undertake the required services in order for Siltech to rectify historical environmental legal compliance issues pertaining to the decommissioning of historical waste facilities at its operations in Ballengeich, KwaZulu-Natal (the "Project"). The rectification is both for the authorisation of waste management facilities that were established and closed without permission, and for waste management facilities that were established and operated without permission but have not yet been closed.

1.2 BACKGROUND

The Siltech Complex at Ballengeich has a history extending back to the 1870s and has been used for a number of activities including petrol distillation (petrol from coal), the production of calcium carbide acetylene, acetaldehyde and acetic acid. Most recently, the site was operated by Siltech primarily for the production of ferrosilicon (FeSi). FeSi is an alloy comprising 75% silicon and 25% iron, and is mainly used in the steel and foundry industries as a deoxidizer and alloying element in the production of steel and steel castings.

Partly due to market constraints, the production of FeSi at the facility ceased in 2012 and has since been largely under "Care and Maintenance", with a brief operational stint between 2014 and 2015. The site is occupied by a range of plant areas, equipment and infrastructure, as well as a number of both formal and informal waste, by-product and effluent storage/disposal facilities that are in various stages of decommission and rehabilitation. It is important to understand that many of the activities that are the subject of the Application were not commenced by the current owner of the business, and that this application was made voluntarily, with a view to recommencing the business lawfully. It was not made in response to enforcement action.

Following a review of the decommissioning activities on the waste disposal facilities by WSP and Winstanley Incorporated in 2017, it was identified that certain decommissioning activities had commenced without the required authorisation applicable at the time of decommissioning, and before the current ownership (**Table 1-1**).

Table 1-1: List of Decommissioning Activities Undertaken without Authorisation

ACTIVITY	APPLICABLE LEGISTAION AT THE TIME OF DECOMMISSIONING
Decommissioning of the Ash and Fines Dump, Gas Cleaning Plant Fines Dump and the Solid Waste Landfill, referred to as the 'Consolidated Waste Area' (CWA)	Activities requiring an Environmental Authorisation (EA). Regulations promulgated in terms of the National Environmental Management Act (No 107 of 1998) (NEMA), as amended on or after 03 July 2006 and before end of day 01 August 2010.
Decommissioning of the Historic Power Station Cooling Ponds (as a disposal site) by covering with a lime and ash protective capping	
Decommissioning of the Old Lime Settling Ponds (OLSP)	Activities requiring a Waste Management Licence (WML) in terms of GNR 718 of 3 July 2009 published under the National Environmental Management Waste Act (59 of 2008) (NEMWA)
Removal of the waste, from the ash dump - considered to be a further decommissioning activity	

In order to address the previous unlawful activities, in May 2019, Siltech submitted an application to the Department of Environmental Affairs (DEA) for rectification in terms of Section 24G of the National Environmental Management Act (No. 107 of 1998), as amended, (NEMA). This is referred to as the "Application". In response to the Application the DEA directed Siltech to submit an Environmental Impact Report in accordance with Environmental Impact Assessment (EIA) Regulation GN.R982 (Acknowledgement Letter Ref: 12/9/11/L190709131527/4/NS24G).

This Environmental Impact Report (EIR) contains the findings and recommendations from the EIA process, and will be submitted to the DEA in order to facilitate a decision on the Application.

1.3 THE PURPOSE OF THE IMPACT ASSESSMENT PROCESS

Appendix 3 of EIA Regulation GN.R 326, specifies the objective of the EIA process. That process is prospective, that is, it looks to assess the impacts of a *proposed* activity and its alternatives, and how they might be mitigated. On the other hand, the Application, is, by its very nature, retrospective, because it aims to rectify historical (completed) activities – alternatives are limited. As a result, there is some tension between the process prescribed in GNR 326 and the Application. Both are, however, consultative. The steps required include obligations to:

- Determine the policy and legislative context within which the activities are located and document how the activities complied with and responded to the policy and legislative context;
- Describe the need and desirability of the activity, including the need and desirability of the activities in the context of the development footprint on the site as contemplated in the scoping report;
- Identify the location of the activities' footprints within the site based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives (where this is feasible) focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment;
- Determine the –
  - nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives which, as explained above, will be limited; and
  - degree to which these impacts –
    - can be reversed;
    - may cause irreplaceable loss of resources; and
    - can be avoided, managed or mitigate;
- Identify the most ideal location for the activity within the development footprint of the approved site as contemplated in the accepted scoping report based on the lowest level of environmental sensitivity identified during the assessment (which, self-evidently, cannot be complied with because the waste management facilities have already been established);
- Identify, assess, and rank the impacts the activity has imposed on the development footprint on the site as contemplated in the scoping report through the life of the activity;
- Identify suitable measures to avoid, manage or mitigate identified impacts; and
- Identify residual risks that need to be managed and monitored.

Stakeholder engagement is a requirement of the EIA and consists of a series of inclusive and culturally appropriate interactions aimed at providing stakeholders with opportunities to express their views, so that these can be considered and incorporated into the decision-making process. Effective stake holder engagement requires the prior disclosure of relevant and adequate Project information to enable stakeholders to understand the risks, impacts, and opportunities of the Project. The objectives of the public participation process can be summarised as follows:

- Identify relevant individuals, organisations and communities who or which may be interested in or affected by the Proposed Project;
- Clearly outline the scope of the Project, including the scale and nature of the existing and proposed activities;
- Identify viable Project alternatives that will assist the relevant authorities in making an informed decision;
- Identify shortcomings and gaps in existing information;
- Identify key concerns, raised by Stakeholders that should be addressed in the subsequent specialist studies;
- Highlight the potential for environmental impacts, whether positive or negative; and
- To inform and provide the public with information and an understanding of the Project, issues and solutions.

1.4 ENVIRONMENTAL ASSESSMENT PRACTITIONER

WSP Environmental (Pty.) Ltd (WSP) has been appointed in the role of Independent Environmental Assessment Practitioner (EAP) to undertake the EIA process for the proposed Project. **Table 1-2** outlines the details of the EAP and his expertise.

Table 1-2 Details of the Environmental Assessment Practitioner

NAME OF CONSULTANT:	**WSP ENVIRONMENTAL (PTY.) LTD.**
Contact Person:	Nigel Seed
Postal Address:	Block Knightsbridge Office Park 33 Sloane St, Bryanston, Sandton 2191 South Africa
Telephone:	031 240 8864
Fax:	031 240 8861
E-mail:	Nigel.Seed@wsp.com
Expertise to conduct this EIA	Nigel has 18 years' environmental and social consulting experience. Nigel has led complex Environmental and Social Assessments (ESA) and transaction related due diligence assessments across a range of sectors including aerospace, agro-processing, chemicals, healthcare, infrastructure (ports, roads, waste management), manufacturing, mining and beneficiation, oil & gas, pulp & paper power generation (thermal & renewables), and property development. The EAP Curriculum Vitae is attached in Appendix A.

1.5 REPORT STRUCTURE

For the purposes of demonstrating legal compliance, cross-references the sections within the EIA Report with the requirements as per Appendix 1 of GNR 326 of 2017.

Table 1-3 Legislation Requirements as detailed in Appendix 1 of GNR 326

APPENDIX 3	**LEGISLATED REQUIREMENTS AS PER THE NEMA GNR 326**	**SECTION**
(a)	details of-	
	(i) the EAP who prepared the report; and	Section 1.3
	(ii) the expertise of that EAP to prepare an EMPr, including a curriculum vitae;	Appendix A
(b)	the location of the activity, including:	Section 2.2
	(i) the 21 digit Surveyor General code of each cadastral land parcel;	Not available
	(ii) where available, the physical address and farm name;	**Table 2-1**
	(iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	**Table 2-1**
(c)	a plan which locates the proposed activity or activities applied for as well as associated structures and infrastructure at an appropriate scale; or, if it is—	Figure2-2

	(i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities was undertaken; or	N/A
	(ii) on land where the property has not been defined, the coordinates within which the activity was undertaken;	N/A
(d)	a description of the scope of the proposed activity, including— (i) all listed and specified activities triggered and being applied for; and (ii) a description of the activities undertaken including associated structures and infrastructure;	**Section 4** (Decommissioning Activities)
(e)	(e) a description of the policy and legislative context within which the development is located including—	Section 4 (policy and legislative context)
	(i) an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks, and instruments that are applicable to this activity and have been considered in the preparation of the report; and	
	(ii) how the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools frameworks, and instruments;	
(f)	a motivation for the need and desirability for the development including the need and desirability of the activity in the context of its location;	Section 2.1 (need and desirability)
(g)	a motivation for the site, activity and technology alternative;	Section 3 (alternatives)
(h)	a full description of the process followed to reach the site of the activity, including —	
	(i) details of all the development alternatives considered where that was possible;	
	(ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;	To be included in the Final EIR after the public participation process has been completed
	(iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them;	To be included in the Final EIR after the public participation process has been completed
	(iv) the environmental attributes associated with the activity, focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Section 5 (description of environmental attributes)
	(v) the impacts and risks identified for each s activity, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts— (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated;	Section 7.2 (impact assessment)
	(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the activity;	Section 7.1 (impact assessment / methodology)

	(viii) the possible mitigation measures that could be applied and level of residual risk;	Section 7.2 (impact assessment / impact assessment results)
	(ix) the outcome of the site selection matrix;	No alternatives
	(x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such; and	Section 3.1 (site alternatives)
	(xi) a concluding statement indicating the preferred alternatives,;	
	(vii) positive and negative impacts that the activity will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	No alternatives
(i)	a full description of the process undertaken to identify, assess and rank the impacts of the activity will impose on the receiving environment through the life of the activity, including—	Section 7.1 (impact assessment / methodology)
	(i) a description of all environmental issues and risks that were identified during the environmental impact assessment process; and	Section 6 (Impact Sources)
	(ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures;	Section 7 (impact assessment)
(j)	an assessment of each identified potentially significant impact and risk, including-	Section 7 (impact assessment)
	(i) cumulative impacts;	
	(ii)) the nature, significance and consequences of the impact and risk;	
	(iii) the extent and duration of the impact and risk;	
	(iv) the probability of the impact and risk occurring;	
	(v) the degree to which the impact and risk can be reversed;	
	(vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and	
	(vii) the degree to which the impact and risk can be mitigated;	
(k)	where applicable, a summary of the findings and recommendations of any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final assessment report;	N/A
(l)	an environmental impact statement which contains-	Section 8
	(i) a summary of the key findings of the environmental impact assessment:	
	(ii) a map at an appropriate scale which superimposes the activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and	
	(iii) a summary of the positive and negative impacts and risks of the activities;	

(m)	based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation;	Section 8
(n)	the final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment;	Section 3
(o)	any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation	Section 7.2
(p)	a description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;	Section 1.6
(q)	a reasoned opinion as to whether the activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;	Section 8.2
(r)	where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required and the date on which the activity will be concluded and the post construction monitoring requirements finalised;	A discussion with Siltech in order to agree on reasonable timeframes that will be written into the WML.
(s)	an undertaking under oath or affirmation by the EAP in relation to:	Appendix A
	(i) the correctness of the information provided in the reports;	
	(ii) the inclusion of comments and inputs from stakeholders and l&APs;	
	(iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and	
	(iv) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties;	
(t)	where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;	N/A
(u)	an indication of any deviation from the approved scoping report, including the plan of study, including-	N/A
	(i) any deviation from the methodology used in determining the significance of potential environmental impacts and risks; and	N/A
	(ii) a motivation for the deviation;	N/A
(v)	any specific information that may be required by the competent authority; and	N/A
(w)	any other matters required in terms of section 24(4) (a) and (b) of the Act.	N/A

1.6 ASSUMPTIONS AND LIMITATIONS

General assumptions and limitations relating to the impact assessment study and the EIAR are listed below:

i) The EAP hereby confirms that he has undertaken to obtain Project information from the client that is deemed to be accurate and representative of the Project;

ii) Site visits have been undertaken better to understand the Project and ensure that the information provided by the client is correct, based on site conditions observed;

iii) The EAP hereby confirms his independence and understands the responsibility they hold in ensuring all comments received are accurately replicated and responded to within the EIA documentation; and

iv) The comments received in response to the public participation process, are representative of comments from the broader community.

v) The management of worker health and safety in accordance with the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993) falls outside of the remit of the EIA Regulations and this EIA Report.

Notwithstanding these assumptions, it is the view of WSP that this report provides a good description of the issues associated with the Project and the resultant impacts.

2 PROJECT DESCRIPTION

2.1 PROJECT LOCATION

The Siltech Complex is located in the north-western portion of KwaZulu-Natal near Ballengeich. The Complex falls within the jurisdiction of the Amajuba District Municipality. The district municipality comprises three local municipalities, namely; Newcastle, eMadlangeni and Dannhauser. The Siltech Complex is located within the Newcastle Local Municipality. Newcastle is located approximately 15km to the north of the Complex (**Figure 2-1**).

The main transportation routes linking the district to its surrounds are the N11, which is the alternative route to Johannesburg from Durban, and the rail line, which is the main line from Durban to Gauteng. The R34 also bisects the district in an east-west direction and provides a linkage from the port city of Richards Bay to the interior. **Table 2-1** below provides the required cadastral information for the Siltech Complex.

Table 2-1 Cadastral Information

SITE LOCATION DETAILS SS PER GN.R326 ANNEX 1 (3)

(i) 21 digit Surveyor General code of each cadastral land parcel:	N0HS00000000329900022
(ii) Physical address and farm name:	Portions 2, 17, 20, 21, and 22 of the Farm Ballengeich Number 3299 Blairgowrie Drive, Ballengeich, Newcastle, KwaZulu-Natal, 2942
iii) Where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties	North East Corner: 27°53'25.08"S 29°58'42.35"E South East Corner: 27°55'4.01"S 29°58'36.62" South West Corner: 27°55'9.23"S 29°58'23.82"E North West Corner: 27°53'47.13"S 29°58'14.05"E

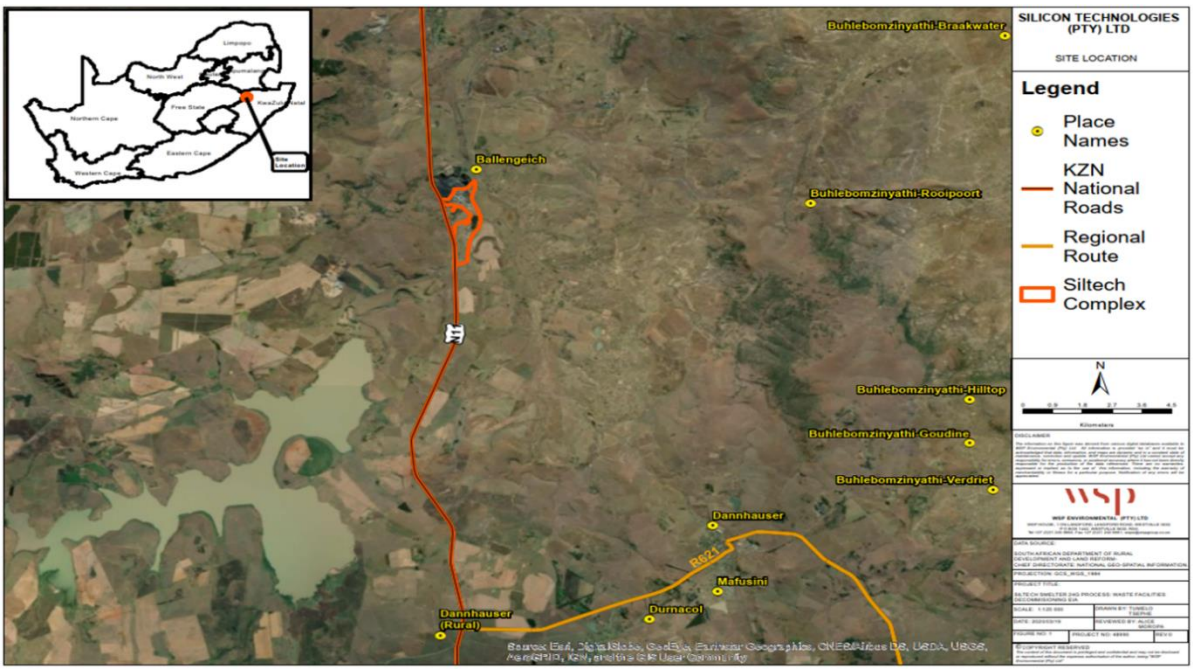

Figure 2-1: Siltech Complex Locality Map

2.2 SITE HISTORY

The Siltech Complex has been used for industrial activities for approximately 150 years, since 1870. In 1992, the plant was sold to Karbochem which subsequently sold it to Siltech. Siltech started producing ferrosilicon on Furnace 4 and Furnace 5 (known as Furnace A and Furnace B). These operations ceased in 2012 and the site was put under care and maintenance.

The owner of the business entity that undertook the decommissioning activities, Globe Speciality Metals, Inc. ("GSM"), bought the shares in Siltech in 2014. Siltech only operated the furnaces under GSM's ownership between October 2014 and May 2015. Siltech's current owner, Ferroglobe, has existed since December 2015, following the merger between GSM and Grupo FerroAtlántica, S.A.U. For most of the time since then, the operation has been in care and maintenance. Siltech has very few employees and the (currently dormant) business is managed by Ferroglobe.

2.2.1 *KEY REFERENCE DOCUMENTS*

Many environmental studies have been undertaken at the Siltech complex since 1988. These include, inter alia, groundwater pollution studies, rehabilitation strategies for waste storage and disposal areas, and permit applications. More recent studies undertaken by WSP during the period 2004 – 2017 have focussed mainly on groundwater pollution, subsurface contamination, and environmental management planning. The preparation of this impact report relied extensively on the following key WSP documents:

Table 2-2: Previous Environmental Assessments

DOCUMENT	SUMMARY
Environmental Management Plan (EMP) (WSP, 2005) / (WSP, 2012)	The EMP was first developed in 2005 following an environmental-legal assessment carried out by Cameron Cross Attorneys and remedial objectives were developed for the various waste areas. The EMP considered the operations of both Siltech and SACC to facilitate long-term legal compliance. The remedial objectives targeted the waste disposal/storage areas with the intention of formulating a way forward, acknowledging specific conditions associated with high priority issues. The initial EMP (2005) highlighted the size and use of each waste area alongside timeframes for actions to be taken whilst considering the need for storm water management. It highlighted the environmental impacts of each waste facility, and the need for representative monitoring. The EMP was accepted the predecessor the predecessor to the Department of Water Affairs and Sanitation ("DWS") in 2006. Subsequently, the EMP was reviewed and finalised in 2007 with no substantial amendments. The original objectives of the EMP were reviewed in 2012. Excluding a temporary period of operation between October 2014 and May 2015, the facility ceased operations in 2012, was placed under a care and maintenance programme and has been mothballed ever since. A revised assessment was conducted to identify environmental issues and acknowledged that a number of remedial objectives had been achieved. As a result, the EMP was revised and a summary of the (new) pertinent objectives was included within an appendix.
Contamination Assessment at Ballengeich (WSP, 2017) *Referred to hereafter as 'Contamination Assessment (WSP, 2017)*	A contamination assessment was done on the Siltech Complex in broad accordance with Part 8 of the National Environmental Management: Waste Act of 2008 (NEM: WA). The assessment aimed to refine and update existing information regarding contamination at the facility. The assessment was prepared to support Siltech's engagement with the National Department of Environmental Affairs (DEA), now the Department of Environment, Forestry and Fisheries (DEFF), on the status of contaminated land and the potential requirements for remediation/rehabilitation. The aim of the assessment was to update and refine existing information on contaminated land only, through the closing of data gaps and appraisal of earlier conclusions drawn from a range of previous documents. The report contains reference to an earlier appraisal of the groundwater monitoring (WSP, 2012) which highlighted the loss and/or integrity concerns of a number of sampling positions

DOCUMENT	SUMMARY
	but confirmed that, based on samples taken from available sites ground water quality had not deteriorated. The 2017 investigation identified further sampling positions that had either became compromised or inaccessible in the intervening period. Whilst not reneging on existing commitments, a key recommendation of the report was that a consolidated programme be rationalised across the entire facility to re-establish an effective ground- and surface water monitoring network. It was recommended that the programme should consider the intent of the existing permits/closure acceptance documents alongside the outcomes of the studies for the South Dam Complex and CWA as well as the findings of the contamination assessment efficiently to monitor and manage potential environmental impacts and liability. Updating the earlier appraisal (WSP, 2012), the programme would stipulate the positions and frequency of monitoring/sampling alongside relevant chemical analytical suites and target quality criteria for regular assessment. Where necessary, monitoring wells would either be reinstated or freshly installed to maximise the network's longevity and improve confidence in the results obtained. Thereafter, prior to implementation, it was recommended that the Department would be approached to ensure its agreement with a consolidated approach of improved transparency.
Hydrogeological Assessment, Ballengeich Complex (WSP, 2017)	Hydrogeological assessment of the Siltech Complex was principally reliant on data obtained from the Siltech groundwater monitoring network. The objectives of the hydrogeological assessment were to i) define the hydrogeological setting of the Complex; ii) develop a Conceptual Site Model (CSM) to contextualise and rationalise the site activities in relation to regional water resources; and, iii) to assess the significance of the potential impacts identified of water uses on the associated groundwater receiving environment; and iv) to ascertain management and mitigatory measures to limit impacts to groundwater resources and associated users resulting from water use related activities.
Consolidated Waste Facility Closure Report (WSP, 2017)	Site assessment and development of a closure plan for the Consolidated Waste Facility (CWF) particularly focused on the potential need for augmentation of the surface cover following the decommissioning of the site which commenced in 2008. The aim of the assessment was to update and refine existing information through the closing of data gaps and appraisal of earlier conclusions drawn from a range of previous documents. The assessment was based on factual and interpretive reporting derived from the findings of supplementary investigations and incorporating available pertinent existing data.

2.3 NEED AND DESIRABILTY

The decommissioning activities were undertaken on the basis that the facilities were no longer needed by Siltech. The decommissioning and rehabilitation measures were undertaken with the overall intent of minimising and managing the residual impact of the waste facilities on the environment and were therefore seen as desirable. The desirable environmental outcomes of the decommissioning activities are broadly categorised as follows:

i) Installation of capping and/or surface drainage systems to prevent the generation of leachate into the waste and thereby reducing the risk of groundwater contamination;

ii) Management of surface drainage to prevent the release of potentially contaminated water from the facility from entering into natural watercourses;

iii) In the case of reuse of the ash from the ash disposal site, the reclamation process provides a source of material to third party brick manufacturers and associated economic opportunities; and,

iv) Where waste facilities were consolidated, the objective was to reduce the surface area of waste and the associated potential for surface and groundwater contamination; and to reduce the area of sterilised land.

Despite the positive intention of Siltech, the decommissioning activities may have inadvertently also resulted in undesirable environmental and social impacts, which are assessed in this EIR as they were not previously assessed prior to decommissioning.

2.4 LAYOUT OF ACTIVITIES

The waste facilities are depicted in **Figure 2-2** labelled as follows:

- The CWA: Facility No 68
- The Historic Power Station Cooling Ponds: Facility No 61
- The OLSP: Facility No.64
- The Old Ash Dump: Facility No 60

Figure 2-2: Siltech Complex Waste Facilities

2.5 DECOMMISSIONING ACTIVITIES

In this section, the decommissioning activities that have been undertaken to date are described ('previous decommissioning activities'), as well as additional decommissioning activities that are proposed to be undertaken ('proposed additional decommissioning activities'). The proposed additional decommissioning activities consist of activities that were initially planned by Siltech but not implemented; and, activities that have been recommended by WSP in this EIR and/or in previous studies.

2.5.1 *OLD LIME SETTLING PONDS*

FACILITY OVERVIEW

The old lime settling ponds ("OLSP") were used for the disposal of lime contaminated with mercury for a period of at least 17 years. The OLSP area was last used during the mid-1980s and will not be used for the disposal of lime waste in future.

DECOMMISSIONING REQUIREMENTS AS PER EMP (WSP, 2005)

The EMP (WSP, 2005) detailed management measures to be implemented at the OLSP. These included:

- The placement of topsoil and vegetation over the facility, to reduce the potential for erosion from the surface of the facility.

— The placement of engineering works such as gabions or the use of a binding medium such as Vetiver grass along the boundary of this facility adjacent to the river to protect it from scour during flood events.

The EMP specified that the facility would not require any clay lining due to the impermeable nature of the OLSP and the high pH associated with the waste.

PREVIOUS DECOMMISSIONING ACTIVITIES

In 2009 WSP Consulting Engineers undertook a preliminary design of the civil engineering works required to remediate the OLSP. The design criteria included:

i) Landscaping the area to allow for runoff generated during storm events to drain directly into the Ngagane River; and,

ii) Protection of the boundary of the facility from scouring by placing minor engineering works such as gabions or through the use of a binding medium such as Vetiver grass.

These designs were reviewed and accepted by the Department of Water Affairs (now DWS), in 2009.

Decommissioning and remediation of the facility commenced in August 2012. This included covering the facility with topsoil and grading the area to promote drainage of surface water. Vegetation has established across the facility. To date however, the proposed engineering works have not yet been implemented.

PROPOSED ADDITIONAL DECOMMISSIONING ACTIVITIES

Erosion protection is still required at key points along the river as well as at the relevant surface water discharge points. This will prevent the subsequent deposition and siltation of the waste content into the river and the exposure of waste stored in the ponds.

Figure 2-3: Photographs of the OLSP (Date: 18/03/2020) showing some vegetated and exposed (bare) parts of the ponds' surface near the Ngagane River Banks

2.5.2 *CONSOLIDATED WASTE AREA*

FACILITY OVERVIEW

The CWA is an area where waste from three historical waste disposal facilities (namely, the Ash and Fines Dump, the Gas Cleaning Plant Fines Dump and the Solid Waste Landfill) was consolidated.

— The Ash and Fines Dump was commissioned in the late 1970's and was used for the disposal of ash and fines for at least 23 years. The facility consists mainly soil, with some ash fines and a small quantity of lime fines.

- The Gas Cleaning Plant Fines Dump was used as a furnace dust disposal site for the gas cleaning activities occurring on the Siltech Complex. The facility was commissioned in the 1970's and the disposal ceased in 1988.
- The Solid Waste Landfill site was used by the Siltech Complex and the surrounding communities as a domestic and industrial waste disposal site. The site was operational for around 25 years and the disposal ceased in about 2008.

DECOMMISSIONING REQUIREMENTS AS PER EMP (WSP, 2005)

The EMP (WSP, 2005) highlighted the need to consolidate the three facilities, indicating that the following design measures would be put in place:

- Contouring the facility to promote runoff;
- Capping the facility with clay;
- Covering the facility with topsoil and vegetation (preferably indigenous);
- Directing runoff to the North Dam via a 'dirty' storm water management channel; and
- Undertaking regular surface water monitoring.

PREVIOUS DECOMMISSIONING ACTIVITIES

In June 2008, as part of decommissioning and rehabilitation efforts suggested in the 2005 EMP, the three waste facilities were bulldozed and graded to form a combined waste facility, and contoured to drain all run off emanating from the site into trenches that drain dirty runoff to North Dam. The graded facility was capped with a topsoil layer containing a high clay content, and revegetated with grasses which occur naturally in the area.

PROPOSED ADDITIONAL DECOMMISSIONING ACTIVITIES

Cover Requirement

The information below is extracted from the Consolidated Waste Facility Closure Report (WSP, 2017).

A number of environmental barrier systems can be applied to the closure of hazardous waste sites and 'hotspots' of contaminated land. The selection of barrier systems is based on the specific risks and hazards posed by the contaminants of concern, the requirements to isolate certain exposure pathways and the sensitivity of the receiving environment and the receptors. The components of a comprehensive solution may therefore include capping layers, grading and landscaping for storm water control, gas collection and removal (if necessary), prevention of lateral seepage and migration of leachate, groundwater and gas monitoring measures, security Arrangements and restrictive land use controls.

For waste that is classified as Type 1 due to the presence of asbestos fibres, disposal would require the use of a Class A landfill or a landfill designed in accordance with the requirements for Hh/HH (hazardous) landfills according to the 'Minimum Requirements for Waste Disposal by Landfill'. Since the current regulations do not provide cover design guidelines for different landfill classes, the designs presented in the 'Minimum Requirements for Waste Disposal by Landfill' (DWAF, 1998) for hazardous landfills should be considered.

The cover design presented in **Figure 2-4** is for hazardous landfills. As seen in the design, a gas drainage layer and three (450mm in total) clayey soil sublayers (V layers) are required before a topsoil layer (U layer) of 200m thickness. The requirements specify that V layers should have a plasticity index (PI) of 5-15%, a maximum particle size of 25mm and be compacted to at least 85% of Standard Proctor MDD (maximum dry density). The permeability of the V layer is very important and should be ≤0.5m/year.

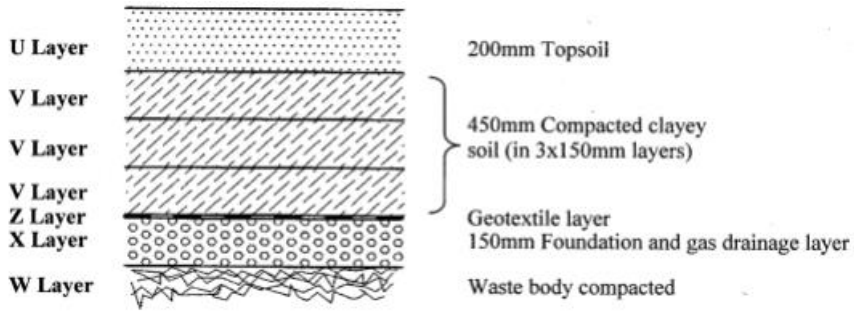

Figure 2-4: Cover design for Hazardous (Hh/HH), G:M:B+ and G:L:B+ landfills (DWAF, 1998)

Assessment of Existing Cover and Recommendations

The Consolidated Waste Facility Closure Report (WSP, 2017) confirmed the following regarding the suitability of the existing cover:

- The current cover of the facility is generally in a good condition over the majority of the area where a slight slope exists. In these parts the grass cover is well established and no areas of ponding surface water are present.
- The eastern edge of the CWF is eroded and limited vegetation is present in the eroded areas. Unless the topsoil is replaced and future erosion is prevented, erosion is likely to continue through the reworked waste layers and expose the waste material.
- Given the variable but generally small thickness of the topsoil, the facility requires additional cover layers to be considered suitably covered.
- The topsoil in the existing cover is mostly sufficiently plastic and of a suitable grading to be considered suitable for use as a clay layer (V Layer). There are however exceptions where the material is excessively plastic or has oversize fragments present. However, the laboratory permeability testing of the material indicates that the topsoil is too permeable, despite the high degree of compaction, to be suitable as a V Layer.
- The existing topsoil has proven itself as a suitable topsoil with grass having become well established well over the majority of the topsoil covered area. The topsoil is, however, susceptible to erosion and should be protected from erosion in steep areas such as those found on the eastern edge of the CWF.

Based on the above findings, the current site condition is not considered suitable as a final closure measure for the waste material in the CWF. The following measures are recommended:

- As the waste in the CWF is only considered Type 1 waste (as defined in the Waste Classification and Management Regulations, 2013 due to the presence of asbestos, it is not considered necessary to incorporate a gas drainage layer into a landfill, as no significant volumes of landfill gas are expected due to the absence of putrescible organic wastes. Furthermore, asbestos waste is hazardous as an airborne particulate and is not leachable and poses no risk as a chemical contaminant dissolved in surface water or groundwater. A modified version of the Hh/HH landfill cover design, that excludes the gas drainage layer, will therefore be sufficient to cover the waste in the consolidated waste facility. The cover design considered suitable for the CWF is presented in **Figure 2-5**, with no gas drainage layer and the number of 150mm thick V layers being 2 rather than 3 as presented in **Figure 2-4**. This design is suitable for G:L:B- landfills and given the lack of leachate being generated by the CWF, this design will fulfil the purpose of preventing the ingress of rainwater into the waste and prevent the erosion and subsequent exposure of the asbestos in the waste layers.
- As an alternate to the cover design described above, the same objectives can also be achieved with the use of engineered, impermeable barrier caps. These capping layers are typically composed of compacted clay, geosynthetic membranes or geosynthetic clay liners (GCLs). A design that ensures the permeability limit is maintained and that is not susceptible to erosion at the final slope angles can therefore be considered as an alternative design option.

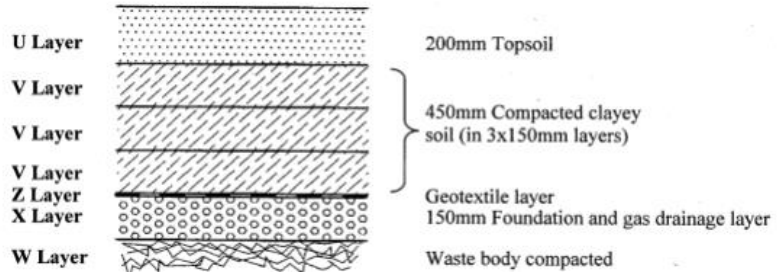

Figure 2-5: Cover design for Hazardous (Hh/HH), G:M:B+ and G:L:B+ landfills (DWAF, 1998)

Figure 2-6: Photographs of the CWA (Date: 18/03/2020) showing the variable surface conditions

2.5.3 *OLD ASH DUMP*

FACILITY OVERVIEW

The Old Ash Dump was used for the disposal of ash generated from the historic power plant located on site.

DECOMMISSIONING REQUIREMENTS AS PER EMP (WSP, 2005)

According to the EMP (WSP, 2005) it would take approximately 35 years (at a reclamation rate of 700 tons per month, at the time) to remove all the ash from the dumps. The EMP required that, should all of the ash not be reclaimed, the following measures are implemented:

- Re-shaping of the facility;
- Lining the facility; and,
- Covering the facility with topsoil and vegetating it.

PREVIOUS DECOMMISSIONING ACTIVITIES

Historically, the ash was sold to a brick maker and used on an ad hoc basis for road construction. Under Care and Maintenance, the facility has been stabilised and shaped. No formalised management practices or reduction methods are currently in place for the facility. Gabions preventing the movement of ash to the storm water perimeter channel have been erected, and the runoff from the facility is directed to the dirty water management system associated with the operations.

PROPOSED ADDITIONAL DECOMMISSIONING ACTIVITIES

Currently, the ash is being reclaimed by third-parties for use as raw material in the block manufacturing process. Reclaiming of ash from the disposal facility by third parties started in about 1992 for use as road construction material, and later in about 1998 for use in ash block manufacturing. Siltech plans to allow reclamation for ash block manufacturing to continue until all of the ash has been removed. The reclamation of the ash by third parties

forms part of the decommissioning and rehabilitation process. Once all the ash has been reclaimed, the base of the facility will then be rehabilitated. It is also worth noting that in view of the recent decision Supreme Court of Appeal decision of *Arcelor Mittal v the Department of Environmental Affairs* it was determined that material produced in the course of a commercial activity and which is unwanted by the generator but which has commercial value is not waste as contemplated in the Waste Act.

Figure 2-7: Photographs of the Ash Dump (Date: 18/03/2020)

2.5.4 *HISTORIC POWER STATION COOLING PONDS*

FACILITY OVERVIEW

The Historic Power Station Cooling Ponds comprise concrete lined 1.8m deep emergency storage facilities that were formerly used for the storage of slurry. In order to allow for the stockpiling of raw materials, including coal, the ponds were backfilled in around 2009/2010 with silica fume and covered with a lime and ash protective capping approximately 300mm thick.

DECOMMISSIONING REQUIREMENTS AS PER EMP (WSP, 2005)

The EMP did not address decommissioning requirements as it was an operational facility at the time (used for slurry storage).

PREVIOUS DECOMMISSIONING ACTIVITIES

As indicated above, the ponds were backfilled in around 2009/2010 with silica fume and covered with a lime and ash protective capping approximately 300mm thick. The area is maintained with little vegetation cover with potential to be used as an operational area due to the semi-hard-standing surface.

PROPOSED ADDITIONAL DECOMMISSIONING ACTIVITIES

In the absence of formal closure designs for the facility, a review of the existing cover material was undertaken by WSP as part of the EIA process. The findings and recommendations are documented below:

Cover Requirement

Silica Fume waste in the South Dam Complex was classified as Type 3 Waste according to the National Norms and Standards for the Assessment of Waste for Landfill Disposal (GN R635 of 2013) (Appendix E). Type 3 classification was assigned due to arsenic and fluoride leachable concentrations exceeding the Leachable Concentration Threshold (LCT0). All other detected contaminant concentrations were below the concentration threshold values. It is assumed that the material in the cooling ponds is similar in nature and has the same classification.

The National Norms and Standards for Disposal of Waste to Landfill (GN R636 of 2013) prescribe a Class C landfill for the disposal of Type 3 waste. If the material had been classified in terms of the Minimum Requirements for the Handling, Classification and Disposal of Hazardous Waste (1998) before the promulgation of the GN R636 requirements, a GLB+ landfill would have been required. Since the current (GN R636) regulations do not provide cover design specifications for different landfill classes, the designs presented in the 'Minimum Requirements for Waste Disposal by Landfill' (DWAF, 1998) for hazardous landfills should be considered.

The cover design presented in **Figure 2-8** is for G:M:B+ and G:L:B+ and hazardous landfills. A gas drainage layer and three (450mm in total) clayey soil sublayers (V layers) are required before a topsoil layer (U layer) of 200m thickness is placed. The requirements specify that V layers should have a PI of 5-15%, a maximum particle size of 25mm and be compacted to at least 85% of Standard Proctor MDD. The permeability of the V layer is very important and should be ≤0.5m/year.

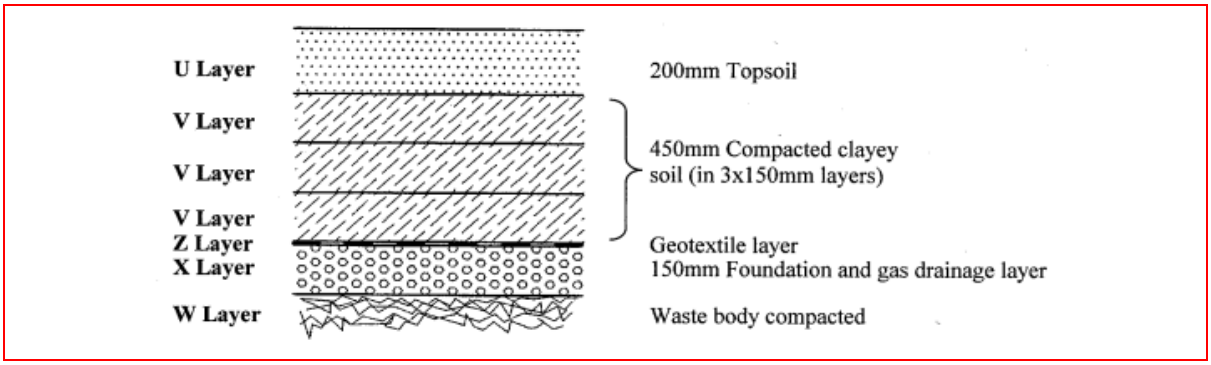

Figure 2-8: Cover design for Hazardous (Hh/HH), G:M:B+ and G:L:B+ landfills (DWAF, 1998)

G:L:B- landfills do not require a gas drainage layer and only 2 V layers (300mm total) are required (**Figure 2-9**). As the waste is only considered Type 3 waste due to the presence of leachable contaminants, it is not considered necessary to incorporate a gas drainage layer into a landfill. A modified version of the G:L:B+ landfill cover design, that excludes the gas drainage layer, is therefore likely sufficient to cover the waste.

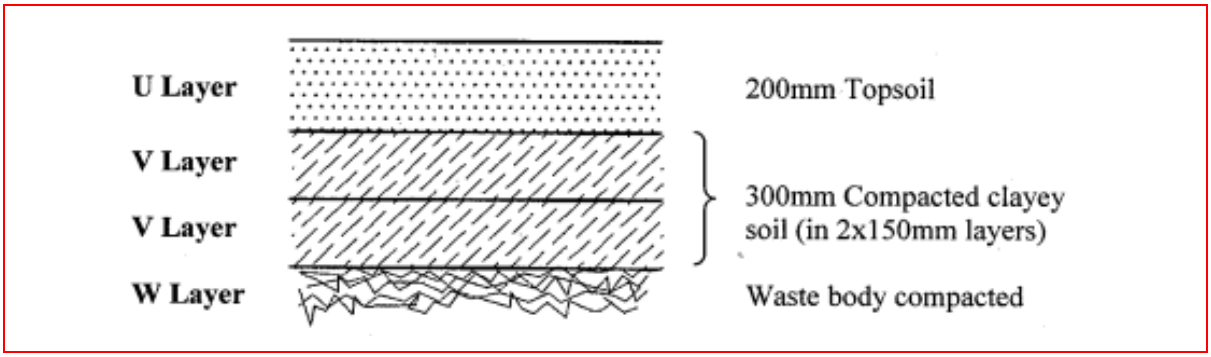

Figure 2-9: Cover design for G:S:B+, G:M:B- and G:L:B- landfills (DWAF, 1998)

The waste material observed in the ponds was visually very similar to that observed in the South Dam Complex during previous investigations. The assumption that the waste has a similar classification therefore appears to be justified. The waste was seen during the recent investigation (18 March 2020) to be moist but is not expected to produce significant leachate if the capping is correctly applied and maintained. A G:L:B- cover design is therefore considered suitable for the cooling ponds with no gas drainage layer and the number of 150mm thick V layers being 2 rather than 3.

Assessment of Existing Cover and Recommendations

During the assessment of the existing capping during the EIA process, it was noted that the capping could be excavated with a pick and shovel and therefore does not appear to be of suitable strength. The capping was of variable thickness and was up to 600mm thick in places. The surface has also not been shaped to prevent ponding efficiently or to ensure that surface water flows off the area.

The capping was composed of a single soil layer in most areas but in one investigated area, the capping had been stabilized sufficiently to allow it to behave as a weak concrete, breaking out in fragments, rather than a soil. The soil capping material was dark in colour and included scattered hard gravel.

Based on the above findings, the current site condition is not considered suitable as a final closure measure for the waste material in the Historic Power Station Cooling Ponds Facility. The area must be landscaped to create a consistent gradient of at least 1% in a direction corresponding to the site wide surface drainage plan. The current capping material is not considered sufficiently impermeable and is allowing the waste material to remain moist. Additionally, the current capping material is also composed of lime containing waste ash material that has the potential to be a similar waste classification to the underlying materials themselves, therefore needing to be capped. The following measures are recommended:

- The waste material and current capping material on the area of interest must be comprehensively assessed in terms of GN. R635 (Norms and Standards for the Assessment of Waste for Landfill Disposal) to determine the classification of the waste materials and the associated facility capping / closure requirement.
- Once completed, the area should be shaped and capped with a suitable capping system according to the waste classification. The proposed capping presented above will result in the area being sterilized and not available for use.
- An alternative capping design, should the use of the area for material handling be required, can be developed by shaping the area before developing an engineered impermeable pavement system with a gravel wearing course or, depending on required strength, concrete hardstanding surface. Should this option be required, the investigation of the area should include a geotechnical assessment of the current material strengths and suitability for re-compaction to load-bearing densities.

Figure 2-10: Photographs of the Historic Power Station Cooling Ponds (Date: 18/03/2020)

3 ALTERNATIVES

An environmental impact assessment process ordinarily has to include an analysis of reasonable alternatives to the proposed Project such as alternative sites, routes, engineering options, layouts and technologies in terms of their potential Environmental and Social impacts, the feasibility of avoiding these impacts and where this is not possible the approach to mitigating the identified impacts. As mentioned in section 1.3, a consideration of alternatives is constrained where the activity for which authorisation has already taken place.

The higher level concept alternatives are addressed in this section as detailed level alternatives are addressed through the identification and implementation of mitigation measures. The objective of the comparison of alternatives is to outline how the Project represents an optimised design that is technically and financially feasible whilst minimising overall environmental and social impacts. As part of the alternatives assessment, it is important to consider the proposed Project not being implemented and therefore the 'Do Nothing' or 'No Go' alternative. The concept level alternatives are presented in this section below.

3.1 EVALUATION OF ALTERNATIVES

3.1.1 *NO-GO ALTERNATIVE*

The no-go alternative for this Project would entail continuation of the status quo. The following negative impacts would result:

- The potential decommissioning phase latent and residual impacts identified in this report may impact on the receiving and surrounding environment. These include:
  - Groundwater contamination;
  - Surface water contamination (including contamination of the Ngagane River); and,
  - Erosion and loss of topsoil.
- There would be no contribution to the brick manufacturing industry through the reclamation of ash from the old Ash Dump, which may potentially affect the sustenance of the jobs, profitability and income generated.

3.1.2 *SITE ALTERNATIVES*

The Siltech Complex site is an existing site with all its facilities and infrastructure already in place. The waste facilities to be decommissioned through to completion were established in their respective locations during the plant operational phase, and so no site alternatives can be assessed.

3.1.3 *LAYOUT ALTERNATIVES*

As with the location of the facilities, the layout of each facility was designed and established during the plant operational phase when waste was being discarded at each site. The only changes to be made to the layouts of the sites, are those of potentially augmenting the capping at the waste facilities, grading and shaping the sites (i.e. the CWF, OLSP and the Historic Power Station Cooling Ponds) to a suitable gradient and enable proper drainage of surface runoff and prevent erosion.

3.1.4 *METHODOLOGY ALTERNATIVES*

Alternative cover material options are presented for the proposed additional decommissioning activities at the CWF and the Historic Power Station Cooling Ponds – See 'Assessment of Cover Material and Recommendations in **Sections 2.5.2** and **2.5.4**.

3.2 JUSTIFICATION FOR SELECTION OF THE PREFERRED ALTERNATIVE

The decommissioning and rehabilitation measures proposed are justified on the basis of mitigating existing and potential long term latent (and in some cases, patent) impacts associated with the facilities.

4 POLICY AND LEGISLATIVE CONTEXT

The Project will be carried out with due regard to local and international applicable legal and other environmental requirements. This section identifies of all legislation applicable to the Project. No additional policies, plans, guidelines, spatial tools, municipal development planning frameworks, and instruments were identified as being applicable to the Project.

THE CONSTITUTION OF THE REPUBLIC OF SOUTH AFRICA, 1996

The Bill of Rights in the Constitution of South Africa, 1996), states that everyone has a right to an environment which is not harmful to health or well-being and requires that reasonable measures are applied to protect this right. This protection encompasses preventing pollution and promoting conservation and environmentally sustainable development. These principles are embraced in NEMA and given further expression.

Applicability

This report is aligned with the constitutional requirements in that it identifies activities that may cause environmental and socio-economic damage from the associated impacts occurring as a result of the waste disposal and decommissioning activities.

The impacts are evaluated and mitigation measures developed to minimise the negative impacts and promote positive impacts associated with the Project, thereby ensuring that the Project is undertaken in a sustainable manner. This also ensures that the Project proponent does not contravene Section 24 of the Constitution.

NATIONAL ENVIRONMENTAL MANAGEMENT ACT (NO. 107 OF 1998)

The National Environmental Management Act (No. 107 of 1998), as amended, (NEMA) is South Africa's overarching environmental statute concerned with integrated environmental management (IEM) and the underlying principles by which environmental management must be undertaken. One of its primary objective is to provide for co-operative governance, thus binding all organs of state by establishing principles for decision making on matters affecting the environment, institutions that will promote co-operative governance, and procedures for co-ordinating environmental functions exercised by organs of state and to provide for matters connected therewith

NEMA requires that measures are taken to prevent pollution and ecological degradation; promote conservation; and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.

The Act also requires that all environmental impacts (including social impacts) caused by a proposed development and/or its activities are assessed and where possible, minimised or mitigated.

Applicability

The decommissioning and rehabilitation of the waste facilities seeks to ensure that all existing, residual, latent and patent impacts that result from the waste facilities are mitigated, and that the surrounding environment is protected as far as possible.

NATIONAL ENVIRONMENTAL MANAGEMENT ACT EIA REGULATIONS 2014

In terms of Section 24(2) of the NEMA, the Minister may identify activities which may not commence without prior authorisation. The Minister thus published GNR 983 (Listing Notice 1), 984 (Listing Notice 2) and 985 (Listing Notice 3) listing activities that may not commence prior to authorisation (4 December 2014).

These regulations outlining the procedures required for authorisation were published in GNR 982 (Environmental Impact Assessment (EIA) Regulations] (4 December 2014).

Listing Notice 1 identifies activities that require a Basic Assessment (BA) process to be undertaken, in terms of the EIA Regulations, prior to commencement of that activity. Listing Notice 2 identifies activities that require an

S&EIR process to be undertaken, in terms of the EIA Regulations, prior to commencement of that activity. Listing Notice 3 identifies activities to be undertaken within specific areas that require a BA process to be undertaken, in terms of the EIA Regulations, prior to commencement of that activity.

Applicability

The EIA Regulations are applicable insofar that the EIA process being undertaken as part of the 24G rectification process is being conducted (as far as possible, given that it is a retrospective process and the EIA Regulations are prospective) in accordance with EIA Regulations.

NATIONAL WATER ACT, 1998 (ACT NO. 36 OF 1998)

The National Water Act, 1998 (Act No. 36 of 1998) (NWA) provides the framework to protect water resources against over exploitation and water pollution and to ensure that there is water for social and economic development, human needs and to meet the needs of the aquatic environment.

The Act defines water resource to include watercourses, surface water, an estuary or an aquifer. A watercourse is defined in the Act as a river or spring, a natural channel in which water flows regularly or intermittently, a wetland, lake or dam into which or from which water flows, and any collection of water which the Minister may declare a watercourse.

Section 21 of the Act outlines a number of categories which require a water user to apply for a Water Use Licence (WUL) and Section 22 requires water users to register a use that meets the requirements of a General Authorisation (GA) with DWS.

Applicability

The establishment and ongoing existence of waste disposal facilities is a regulated water use, a licence for which has been applied and is currently being considered by the DWA. No new water uses will be triggered by the decommissioning activities. Measures for protecting and managing impacts on surface and groundwater resources from potential pollution have been included in the EMPr, which may need to be amended when the licence is granted

NATIONAL ENVIRONMENTAL MANAGEMENT: WASTE ACT (NO 59 OF 2008)

The National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) (NEM:WA) is supporting legislation to the NEMA. The Act is a framework legislation that provides the basis for the regulation of waste management. The Act also contains policy elements and gives a mandate for further regulations to be promulgated.

On 29 November 2013 GNR 921 was promulgated (repealing GN R718) which contains a list of waste management activities that if triggered require a Waste Management Licence (WML) and in turn a Basic Assessment (Category A activities) or Scoping and EIA (Category B activities) process to be undertaken in terms of the NEMA EIA Regulations. Category C activities are required to comply with the Norms and Standards for Storage of Waste 2013 (GN. 926) and do not require authorisation.

Applicability

The 24G Rectification process (including the EIA) is being undertaken in order to obtain a Waste Management Licence (WML) for the decommissioning activities as follows:

i) Applicable to the decommissioning of the OLSP: GN: R.921 Category A, Activity (14): The decommissioning of a facility for a waste management activity listed in Category A or B of this Schedule viz: Category B, Activity (7) the disposal of any quantity of hazardous waste to land.

ii) Applicable to the removal of the waste, from the ash dump: GN: R.921 Category A, Activity (14): The decommissioning of a facility for a waste management activity listed in Category A or B of this Schedule viz: Category B, Activity (7) the disposal of any quantity of hazardous waste to land.

iii) Applicable to the decommissioning of the Historic Cooling Ponds: GN: R.921 Category A, Activity (14) the decommissioning of a facility for a waste management activity listed in Category A or B of this Schedule viz: Category B, Activity (8) the disposal of general waste ** to land covering an area in excess of 200m2 and with a total capacity exceeding 25 000 tons.

iv) Applicable to the decommissioning of the Consolidated Waste Area: GN: R.921 Category A, Activity (14) the decommissioning of a facility for a waste management activity listed in Category

A or B of this Schedule [viz: Category B, Activity (7) the disposal of any quantity of hazardous waste to land].

NATIONAL ENVIRONMENTAL MANAGEMENT: BIODIVERSITY ACT, 2004 (ACT NO. 10 OF 2004)

The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA) was promulgated in June 2004 within the framework of NEMA to provide for the management and conservation of national biodiversity. The NEMBA's primary aims are for the protection of species and ecosystems that warrant national protection, the sustainable use of indigenous biological resources. Regulations made under this Act require land owners to eradicate or control alien invasive species growing on land. The obligations to remove or control those species depends on the category of species

Applicability

Specific management measures for the protection and rehabilitation of impacted natural habitats have been included in the Environmental Management Programme (EMPr).

NATIONAL ENVIRONMENTAL MANAGEMENT: AIR QUALITY ACT (NO 39 OF 2004)

The National Environmental Management Air Quality Act (Act No. 39 of 2004), seeks to reform the law regulating air quality to protect the environment by providing reasonable measures for i) the prevention of pollution and ecological degradation; and ii) securing ecologically sustainable development while promoting justifiable economic and social development. The act also seeks to provide for national norms and standards regulating air quality monitoring, management and control by all spheres of government; for specific air quality measure; and for matters incidental thereto.

According to Section 22 of the NEMAQA, no person may without a provisional atmospheric emission licence or an atmospheric emission licence (AEL) conduct an activity that is i) listed on the national list anywhere in the Republic; or ii) listed on the list applicable in a province anywhere in that province.

Listed activities and associated minimum emission standards (MES) were published in Government Notice 248 of 2010, Government Gazette 33064 in-line with Section 21 of NEMAQA. An amended list of activities was published in Government Notice 893 of 2013, Government Gazette 37054, in Government Notice 551 of 2015, Government Gazette 38863 and further in Government Notice 1207 of 2018, Government Gazette 42013.

The National Dust Control Regulation (Government Notice.827), which were promulgated on 1 November 2013, define acceptable dust fall rates for residential and non-residential areas.

Applicability

Siltech holds an AEL for its operations, when they recommence. Although it will not require an AEL for the decommissioning activities, measures have been detailed in the EMPr to ensure that the emission of dust is controlled and that the Dust Control Limits are not exceeded.

OCCUPATIONAL HEALTH AND SAFETY ACT (NO 85 OF 1993)

The Occupational Health and Safety Act, 1993 (Act No. 85 of 1993) (OHSA) was created to provide for the health and safety of persons at work, and for the health and safety of persons in connection with the use of plant and machinery. The OHSA aims to protect people (other than the employee) against hazards to their health and safety arising out of or in connection with activities of persons at work.

Applicability

The management of worker health and safety falls outside of the remit of the EIA Regulations and this EIA Report. To ensure that worker health and safety is addressed in accordance with the OHSA, it is recommended that Siltech appoints a third party contractor with specialist knowledge about the required PPE and other Occupational Health and Safety measures to be taken for the project. These measures are likely to include *inter alia*:

- Detailed Project / activity specific hazard identification and risk assessment (HIRA) process; and;
- Implementation of appropriate mitigation measures e.g. safe work procedures, use of PPE; design safety, occupational monitoring, training and awareness programmes, and performance assessment and reporting.

NATIONAL HERITAGE RESOURCES ACT, 1999, (ACT NO. 25 OF 1999)

A heritage impact assessment is required for Projects at locations where there are culturally or historically significant elements including archaeological or palaeontological sites, on or near the site.

Applicability

No recent heritage investigations have been carried out at the Siltech complex. A letter from the heritage resources authority in KwaZulu-Natal (called AMAFA) was obtained in 2004 confirming that no heritage resources were present at the site of a planned furnace expansion. However this did not specifically assess the waste disposal facilities. While AMAFA will be consulted during the EIA, it is unlikely that the decommissioned facilities were located within the area of influence of heritage resources.

5 DESCRIPTION OF THE ENVIRONMENT

This section includes a description of geographical, physical, biological and socio-economic aspects of the receiving environment.

5.1 CLIMATE AND METEOROLOGY

Meteorological conditions affect how pollutants emitted into the air are directed, diluted and dispersed within the atmosphere. Dispersion comprises vertical and horizontal components of motion. The stability of the atmosphere and the depth of the atmospheric mixing layer control the vertical component. The horizontal dispersion of pollution in the boundary layer is primarily a function of the wind field. The wind speed determines both the distance of downwind transport and the rate of dilution as the plume 'stretches' away from its source. In the case of Siltech's decommissioning activities, dust particles are the key pollutants likely to be released into the atmosphere. A discussion of the local climate in Newcastle is provided below.

The site falls within the Central KwaZulu Natal climate region and receives predominantly summer rainfall (between October and March). The area experiences warm to hot summers (October to March), which are characterised by low to moderate humidity and a relatively low diurnal temperature range.

5.1.1 *NEWCASTLE TEMPERATURE AND RAINFALL*

TEMPERATURE

The annual average temperatures in New Castle is about 17^0C.Mean minimum and maximum temperatures during the summer months are approximately 15°C and 28°C respectively. Winters (April to September) are mild and the area experiences frost occasionally. Mean minimum and maximum temperatures during winter are approximately 4°C and 22°C respectively. The lowest temperatures are experienced in June and the highest temperatures in January. **Table 5-1** details the mean monthly minimum and maximum temperatures, as well as mean monthly rainfall.

RAINFALL

The Mean Annual Precipitation at Newcastle is approximately 779 mm. The greatest amount of rainfall is experienced in January, with an average of 134mm, and the least amount of rainfall is experienced in July, with an average of about 6mm. The variation in the precipitation between the driest and wettest months is approximately 125 mm.

The Mean Annual Evaporation (MAE) for the Siltech Complex was determined using the Chelmsford Dam Evaporation Station (V3E002) (i.e. Ntshingwayo Dam). The mean annual A-Pan evaporation for this gauge was measured as 2 093mm, which far exceeds the mean annual rainfall of 799mm. The average monthly evaporation for the area is given in **Table 5-2**.

Table 5-1: Mean Monthly Climate Information (Station: Utrecht V3E004)

MONTH	MEAN MAX TEMPERATURE ^{O}C	MEAN MIN TEMPERATURE ^{O}C	MEAN RAINFALL (MM)
January	29.1	16.3	133.1
February	27.9	15.5	102.7
March	27.4	14.0	76.8

MONTH	MEAN MAX TEMPERATURE ^{O}C	MEAN MIN TEMPERATURE ^{O}C	MEAN RAINFALL (MM)
April	24.8	10.3	28.5
May	22.3	6.2	12.7
June	20	2.2	14.6
July	20.7	2.8	5.7
August	23.0	5.8	16.4
September	25.3	9.8	20.3
October	26.2	12.0	87.1
November	27.4	13.8	88.0
December	29.0	15.4	104.2

Table 5-2: Monthly Average A-pan Evaporation

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
% of MAE	9.93	10.38	11.07	10.76	9.36	9.01	7.25	6.00	5.06	5.56	7.17	8.45	100
E (mm)	208	217	232	225	196	189	152	126	106	116	150	176	2 093

5.2 GEOLOGY AND SOILS

5.2.1 *SITE DESCRIPTION*

According to the 1:250 000 geological map titled 2728 Frankfort (1992), the regional geology consists of a sequence of interbedded sandstone, mudstone and carbonaceous shale of the Vryheid Formation, which is part of the Ecca Group of the Karoo Supergroup (**Figure 5-1**). A large Karoo Dolerite sill is mapped approximately 1km west of the site.

The Karoo sedimentary units are known to be intruded by numerous dolerite dykes and sills which have resulted in localised shearing and metamorphism adjacent to the contact zones. During the geophysical survey a number of small dolerite dykes were located, and a 1–2m thick highly weathered and fractured dyke was intercepted at depths of 16–24m below ground level (bgl) during the installation of a groundwater monitoring well (Jasper Muller and Associates [JMA], 2001).

Consistent with the geological map, alluvial deposits were reported by JMA (2001) along the Ngagane River bordering the site to a depth of approximately 14m bgl; these are usually limited in aerial extent and occur on the inner bank of meanders.

Bedrock is masked throughout the area by a pedogenic horizon of variable thickness consisting of weathered and decomposed bedrock, as well as colluvial and hillwash material from upslope. Although not ubiquitous, both nodular and hardpan ferricrete occur in the area.

A number of coal seams occur within the sediments of the Vryheid Formation and constitute the Vryheid coal fields. From the neighbouring colliery it is known that coal seams are present beneath Siltech's facility. The outcrop of the main coal seam appears along the Ngagane River and at various points along the Horn River. One major seam occurs under the facility which varies from 2.4m to 3.4m in thickness; this seam is overlain by a characteristic laminated sandstone and shale roof (JMA, 2001).

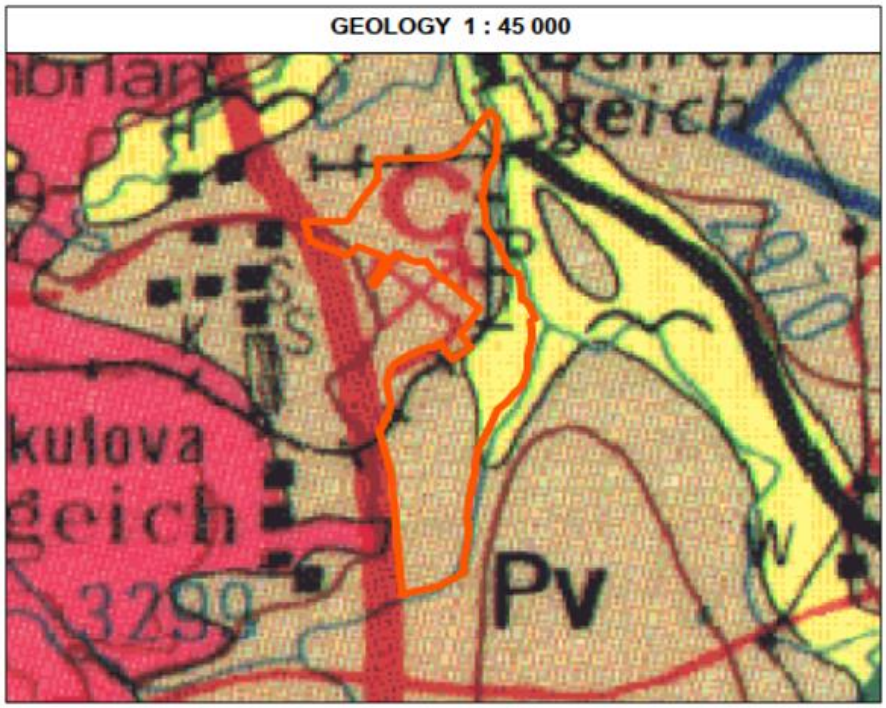

Figure 5-1: Siltech Complex Geology

5.3 HYDROLOGY

5.3.1 *REGIONAL DESCRIPTION*

At a regional level, Siltech forms part of the Ngagane River Catchment (Quaternary Catchment (QC) V31G), and is located in the Pongola-Mtamvuna Water Management Area (WMA 4).

The Pongola Mtamvuna WMA comprises the Mhlatuze, Pongola, Mkuze, Mfolozi, Thukela, Mngeni, Mvoti, Mkomazi, Mtamvuna and Mzimkulu systems. These systems vary in size from medium to very large catchment areas, with all rivers flowing directly into the sea, apart from the Pongola River which confluences with the Maputo River in Mozambique. The Pongola-Mtamvuna WMA is especially complex, as it covers an area of high season rainfall, with heavy demands on water resources from the agricultural sector, industrial, mining and urban domestic sectors. Rivers, dams, and freshwater resources in this WMA accounts for 40% of South Africa's total water resources. In addition, certain rivers within the WMA are classified as international as their catchments are shared by the neighbouring countries of Mozambique, Lesotho or Swaziland.

The WMA's primary water transfer is the transfer of water from the Thukela system to the Vaal system, with additional water being reserved for long term requirements. Currently the most critical issue facing the WMA is the additional water supply needed to meet the growing requirements of the KwaZulu-Natal Coastal Metropolitan Area (Durban-Pietermaritzburg, KwaDukuza in the north to Amanzimtoti in the south). Water requirements are continuously increasing, whilst the system is already in deficit.

5.3.2 *SITE DESCRIPTION*

The closest watercourse to the site is the Ngagane River. The river is perennial and runs parallel to the east of the site from the outlet of the Ntshingwayo Dam in a northerly direction. With an upstream catchment area of approximately 225km^2, the Ngagane River drains into the Buffalo River, approximately 30km downstream of the site, which subsequently drains into the Thukela River which has a catchment area of 29 046km^2 and a Mean Annual Runoff (MAR) of 3 994 million cubic meters, before entering the Indian Ocean.

The topography of the area surrounding the Complex is gently to moderately undulating. The site is located toward the base of an east facing slope of a north/south trending ridge (sloped towards the Ngagane River). The natural slope of the site is approximately 1 in 50. The elevation of the Siltech Complex is 1 200m above mean sea level. The topography of the area was altered during site development, which resulted in a series of near level cut to fill building platforms.

The site has a clean and dirty water separation system in the form of clean and dirty water trenches. A concrete lined perimeter channel (trench) has been constructed around the Plant Area to collect all "dirty" runoff generated on the Plant Area and diverts it to the North Dam. The trench is integrated with the existing Complex storm water management infrastructure. Runoff generated upslope of the Complex, which is considered clean, is diverted via a series of berms and channels to the Ngagane River.

All of the waste facilities barring the Ash Dump are constructed on the natural ground surface on the western bank of the Ngagane River. The OLSP, North Dam and the South Dam Complex are located directly on the alluvium of the floodplain of the Ngagane River. The remaining facilities are located further upslope from the river floodplain and are included in the dirty water management system. **Figure 5-2** shows the movement of storm water and groundwater on site.

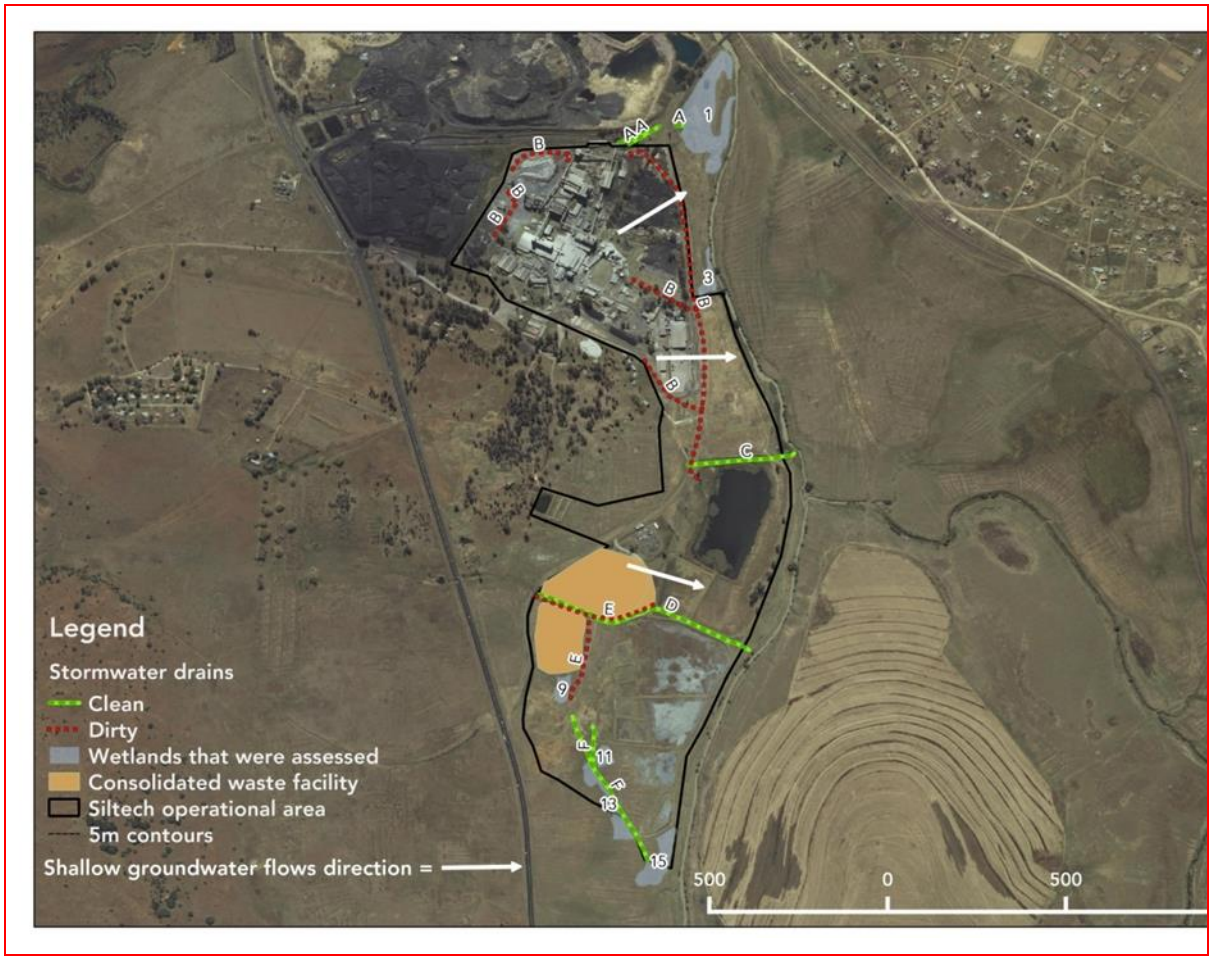

Figure 5-2: The movement of surface storm water and ground water at the site in relation to the wetlands on site (Source: Ikhwane Wetland Science, 2020)

SURFACE WATER QUALITY

Surface water quality information was obtained from a Hydrological study carried out by WSP in 2019. The study assessed background water quality data along the Ngagane River, obtained between the 2004 and 2017 sample period. The surface water sample points were placed adjacent to the groundwater monitoring wells to allow for comparison between surface water and groundwater quality, thereby determining any potential impacts of base flow on surface water quality. The sample locations are depicted in **Figure 5-3.**

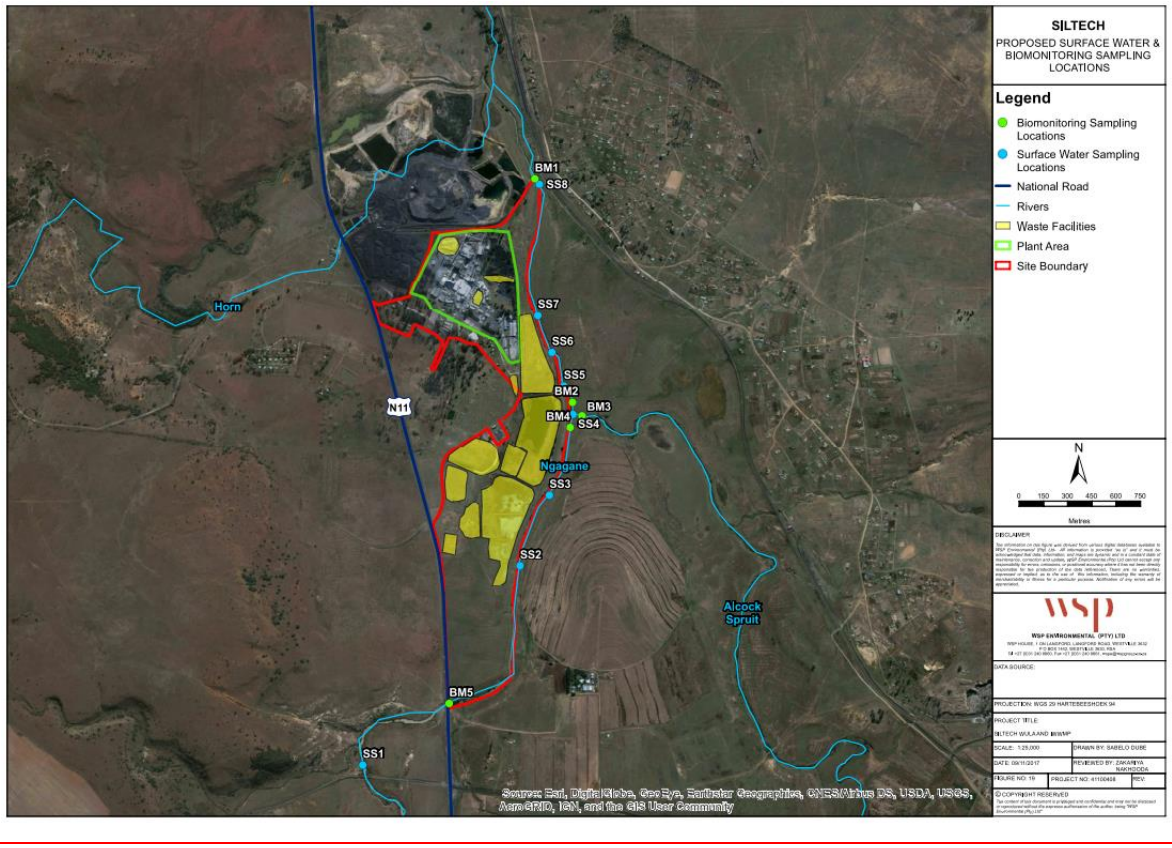

Figure 5-3: Surface Water Quality Points

The average yearly water quality results for the period were compared to the Water Quality Guidelines as set by the DWS through their Resource Water Quality Objectives for the Ngagane River. The results obtained can be summarised as follows:

- Fluoride (F) concentrations marginally exceeded the water quality guidelines at SS8 in 2014. This was a once off occurrence, and was therefore assumed to be of no major concern.
- Iron (Fe) concentrations exceeded the guidelines through the sampling period. A comparison between the upstream and downstream sample points indicated that there are marginal increases downstream, which could be attributed to the Siltech Operations, as well as the colliery located at the Northern border of Siltech Complex further downstream.
- Manganese (Mn) concentrations exceeded the guidelines throughout the sampling period. Based on the comparison between upstream and downstream sampling points, there are increases in Mn concentrations at the sampling points directly adjacent to the Siltech Complex. These are directly attributed to the Siltech operations and are not influenced by the colliery which is located downstream of the sampling points. Samples lower down the Ngagane River indicate a decrease in Mn concentrations.
- The ammonium (NH_4^+) concentrations exceed the guidelines throughout the sampling period. The comparison between the downstream and upstream sampling points indicate that the Siltech Operations appear to have marginal impact on the concentration of NH_4^+ with the exception of 2011, where NH_4^+ exceedance was significant. The results are not influenced by the colliery which is located downstream of the sampling points

- Chemical oxygen demands (COD) concentrations exceeded the guidelines at SS3 in 2012. This was a once off occurrence and was assumed to be of no major concern.
- Phosphate concentrations exceed the guidelines since sampling began in 2015. A comparison between upstream and downstream sampling locations indicated that the Siltech Operations have minimal impacts on the concentrations of phosphate.

5.4 HYDROGEOLOGY

5.4.1 *REGIONAL DESCRIPTION*

On a regional scale, the area is characteristic of a regional aquifer host rock that comprises predominantly of sedimentary rocks belonging to the Dwyka, Ecca, Beaufort and Stormberg Series .These sedimentary rocks have been intruded by a number of dolerite dykes and sills. Geohydrological investigations conducted in the Newcastle area indicate that the aquifers are closely associated with weathering and the presence of these dolerite intrusions.

5.4.2 *SITE DESCRIPTION*

The geological and topographical features in the area of the Siltech Complex site have given rise to a relatively small groundwater catchment area, which is restricted by well-defined hydrological boundaries. These include dolerite dykes to the north and south of the site; a prominent ridge to the western side of the catchment; and the Ngagane River to the east. These boundary conditions in the area result in the aquifer having low groundwater utilisation potential, and it is unlikely that the aquifer will be used for water supply purposes.

The site geohydrology information was derived from the information relating to the 21 deep (30m) and 21 shallow (5m) monitoring wells installed on site by JMA in 2001. The information gathered during the monitoring well installation was used to describe all four of the aquifer types present on the site, namely, perched aquifers, shallow weathered zone aquifers, and deep fractured rock aquifers as well as alluvial aquifers. These are discussed below.

AQUIFERS

Perched Aquifers

These aquifers occur in the soft overburden occurring on the site. The profile of the overburden varies between 1 and 14m in depth with an average depth of approximately 2.9m. A layer with low permeability forms the base of the overburden resulting in the perched aquifer.

The depth of the water table ranges between 0.0 (i.e. surface seepage) and 4.3m below ground level (bgl). The perched aquifers occurring on the site have a geometric mean permeability of 0.066m/day. This permeability increases along the banks of the Ngagane River between the Old Lime Ponds, North Dam, South Dam Complex and the river to 0.123m/day.

Shallow Weathered Zone Aquifers

The shallow weathered zone aquifers occurring on the site comprise weathered shale, siltstone, sandstone and weathered dolerite. The average weathering thickness is approximately 25m. The aquifers are hydraulically highly heterogeneous, as the varying degree of weathering of the different lithological units result in a large variety of physical and hydraulic end products (e.g. sands, clay, and fractured shale/sandstone/coal/dolerite).

The depth to the water table as observed during monitoring well installation ranged between 0.0 and 9.3m bgl (averaging at 2.2m). The average thickness of the saturated zone of the aquifer (i.e. from the water table down to the fresh parent rock) is approximately 22m. The permeabilities of the shallow weathered zone aquifer are heterogeneous with a calculated representative mean permeability of 0.05m/day beneath the site.

Deep Fractured Aquifers

The deeper fractured Karoo aquifers comprise of fractures occurring in the fresh host rock at depths usually deeper than 30m. The two supply wells that were installed by JMA resulted in estimated yields of between 0.2 and 0.5l/s.

The depth to the water table observed in the boreholes averaged at 7.61m bgl. Water intersections during drilling in the hard rock sediments were encountered at approximately 35m and 50m respectively. Fractures were recorded in the fresh hard rock sediments below the shallow weathered zone in at least two boreholes. The permeability values observed for the boreholes calculated to a geometric mean of 0.015m/day.

Alluvial Aquifers

Localised alluvial aquifers occur on the site within the floodplain of the Ngagane River. The floodplain consists of alluvial deposits of clay, silt and sand overlying residual soils and bedrock. The average depth of these deposits is approximately 10m. The water levels as observed in the boreholes and discussed under the heading "perched aquifers" are also believed to be representative of the alluvial aquifers i.e. because the uppermost water table in the primary alluvial aquifer (i.e. in the sediments along the river) is in hydraulic continuity with the perched water table sitting in the clay and upper weathered rock layer across the upper parts of the site. In the JMA model one groundwater unit is considered comprising two different formations (or aquifer units), distinguished from the deeper regional aquifer in the fractured rock

The depth of the observed water table averaged approximately 1.9m bgl.

The alluvial aquifers are thought to be linked to the river system and water level fluctuations will be influenced by river level fluctuations; this is because they occur along the floodplain and their water levels are influenced by recharge from the river system, and vice versa.

GROUNDWATER LEVELS

A professional land surveyor was contracted as part of the Contamination Assessment (WSP, 2017) to determine accurate geographical co-ordinates and elevations for groundwater wells that were suitable for sampling. These elevations were then used, together with the measured depth to groundwater, to determine the levels above mean sea level of the static water level in each monitoring well. Based on the piezometric gradients derived, the anticipated direction of groundwater flow is typically towards the Ngagane River to the east of the Complex. Groundwater contours and anticipated flow directions for shallow and deep groundwater conditions are depicted in **Figure 5-4** and **Figure 5-5** respectively**.**

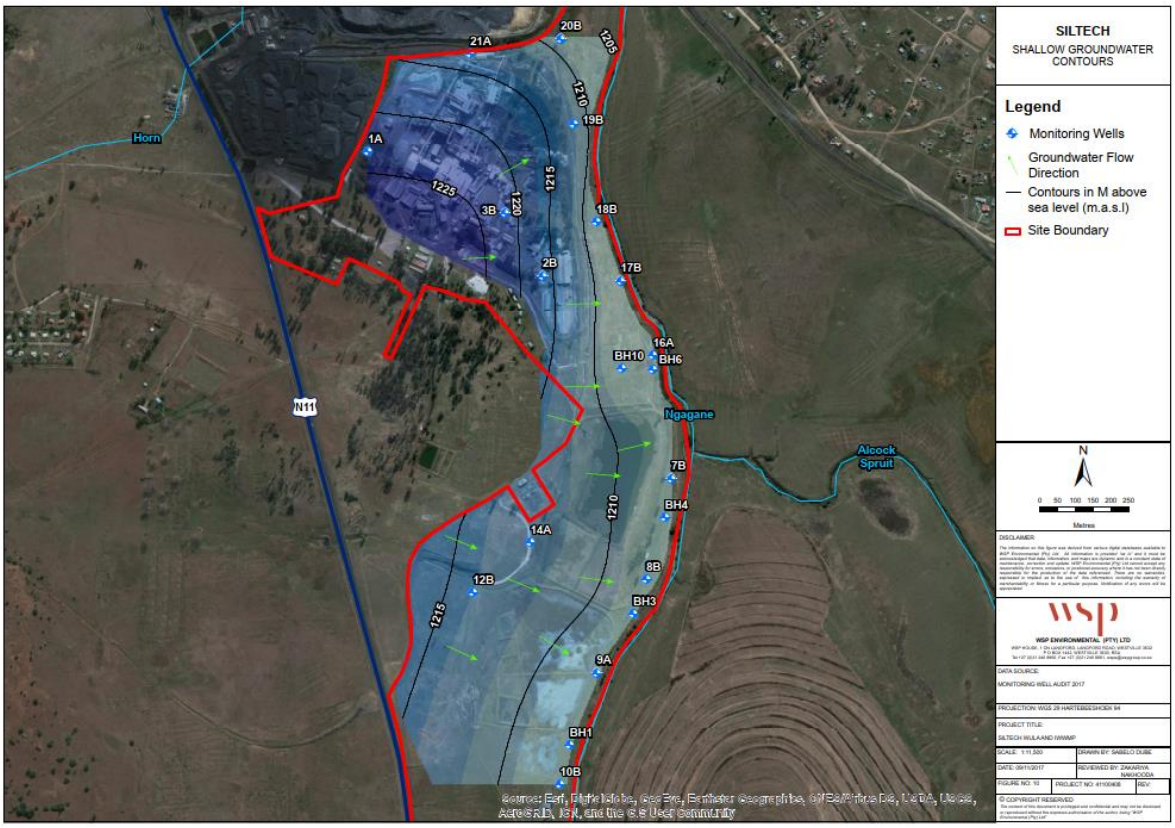

Figure 5-4: Siltech shallow aquifer groundwater monitoring network

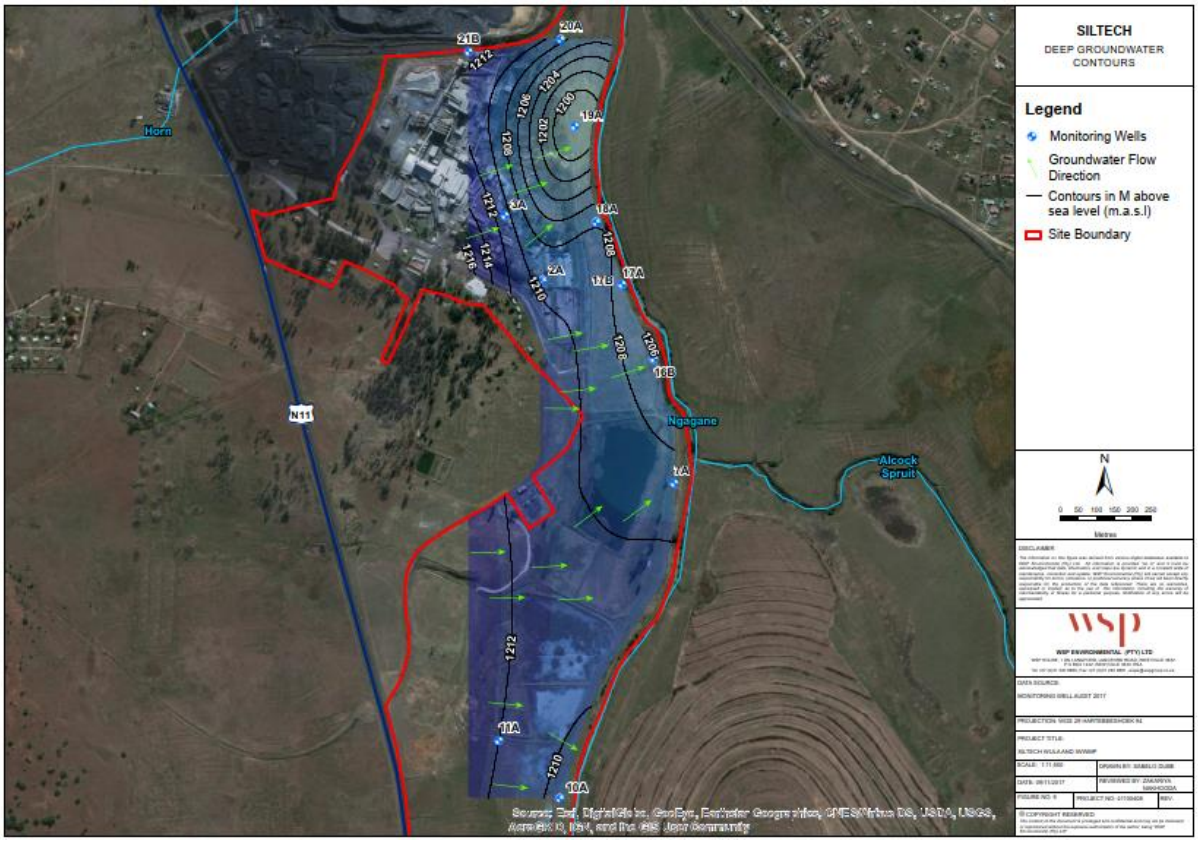

Figure 5-5: Siltech deep aquifer groundwater monitoring network

GROUNDWATER QUALITY

The assessment relied on data obtained from the Siltech groundwater monitoring network (**Figure 5-6**).

As part of the assessment, the potential contaminants of concern associated with historical activities at the Complex were reappraised (following an assessment carried out by WSP Walmsley in 2004). The potential primary contaminants of concern were rationalised based on historical processes occurring at the Complex and included the following:

- Metals and Metalloids: arsenic, cadmium, calcium, chromium (total and hexavalent), cobalt, copper, iron, lead, magnesium, manganese, mercury (via ICP-OES and CVAF), nickel, potassium, selenium, sodium, vanadium and zinc;
- Physicochemical: alkalinity, electrical conductivity and pH;
- Inorganics: chloride, cyanide, fluoride, nitrate, nitrite, silica and sulphate;
- Alkanes: C7–C9, C10–C14 and C15–C36;
- VOC and SVOC (including acetaldehyde);
- PAHs; and
- PCBs.

Water samples collected as part of the Contamination Assessment (WSP, 2017) were analysed for these potential contaminants. The results of the assessment indicated various exceedances associated with the plant and waste facilities as summarised in Error! Reference source not found..

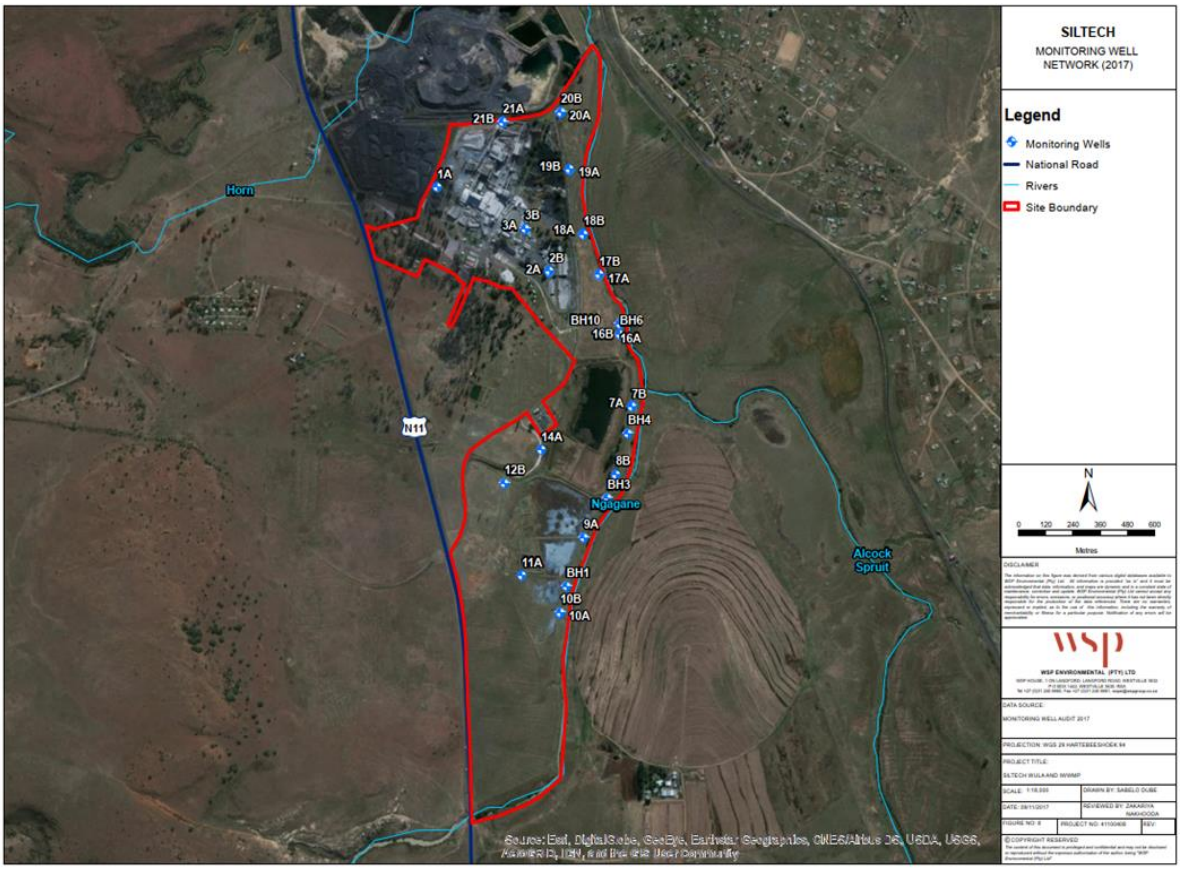

Figure 5-6 Monitoring Well Network (2017)

The impact of the four decommissioned waste facilities on groundwater quality is discussed below based on the Hydrogeological Assessment (WSP, 2017).

Old Lime Settling Ponds

Representative monitoring wells are located to the east of the OLSP on the western bank of the Ngagane River (BH10, 16A, 16B, 17A, 17B and 18B). Being immediately down-hydraulic gradient the monitoring results at these locations are representative of contamination that may have come from the OLSP and other facilities located up-hydraulic-gradient. Within these monitoring wells arsenic, copper, iron, manganese, mercury, nickel, vanadium and zinc, as well as naphthalene, were variously recorded above their respective guidelines. Potential sources of groundwater contamination located up-hydraulic-gradient of the OLSP include the southern portion of the plant area comprising a large number of raw material and product storage and production facilities. There are no boreholes located directly in-between the OLSP and potential up-hydraulic-gradient contamination sources; and, the Hydrogeological Assessment did not differentiate between potential contamination from these collective sources. Notwithstanding this, the assessment determines that the groundwater contamination is plausibly derived from the OLSP and that the source remains active.

Consolidated Waste Facility

Naphthalene, manganese, zinc, and C7–C9 hydrocarbons was recorded in monitoring well 14A located down-hydraulic-gradient of the CWA; however, only naphthalene was present above its guideline. There are no potential sources of groundwater contamination located up-hydraulic-gradient of the CWA; this implies that the CWA is the only contributor to potential groundwater contamination. Based on the groundwater monitoring results, the assessment concluded that the risk of contamination from the facility is likely to have been effectively managed by the former consolidation of wastes.

Old Ash Dump

Cobalt, copper, iron, manganese, potassium, zinc and fluoride was recorded in monitoring well 21A located generally down-hydraulic-gradient of the ash dump; however, only zinc was present above its guideline. The assessment does not specifically discuss the ash dump in terms of its impact on groundwater.

Historic Power Station Cooling Ponds

The potential impact of the Historic Power Station Cooling Ponds on groundwater is not discussed in the Hydrogeological Assessment (WSP, 2017).

The following observations are however made by the EAP:

- There are no monitoring wells in the immediate vicinity of the Historic Power Station Cooling Ponds that would give meaningful representation of the contribution of potential groundwater contamination from the facility.
- The closest up-hydraulic-gradient well (1A) is located approx. 120m to the west-southwest. The closest down-hydraulic-gradient well (19B) is located approx. 500m to the east. These monitoring wells are unlikely to be representative of potential contamination from the Historic Power Station Cooling Ponds as several other potential sources of groundwater contamination exist between these two points including the furnace operations and various raw material storage areas.

5.5 ECOLOGY

5.5.1 *SITE DESCRIPTION*

TERRESTRIAL ECOLOGY

The site is located within the KwaZulu-Natal Highveld Thornveld vegetation unit (**Figure 5-7**). The vegetation unit is found in the central-northern regions of Kwa Zulu Natal (most extensively in the region between in the region from Ladysmith, Winterton, Estcourt and Colenso, between Mooi River and Greytown and further north in a triangle between Vryheid, Paulpietersburg and Louwsburg as well as a large patch around Newcastle), and primarily occurs in a series of patches on dry valleys and moist uplands (Mucina and Rutherford, 2006).

The KwaZulu Natal Highland Thornveld is classified as Least Threatened with a national conservation target of 23%, and only about 2% of the unit is statutorily conserved. The conserved areas include the Spioenkop, Weenen, Ntinini, Wagendrift, Moor Park and Tugela Drift Nature Reserves. More than 16% has been transformed by cultivation and has been subjected to urban sprawl and the construction of dams (Craigie Burn, Spioenkop, Wagendrift and Windsor).

Alien plant species common in this unit include Opuntia, Eucalyptus, Populus, Acacia and Melia. Alien invasion and bush encroachment are reported to be a major threat to the remaining natural areas of this unit (Mucina and Rutherford, 2006). The most predominant alien vegetation that was identified on site include the black jack as well as the prickly purple thistle (Scottish Thistle).

Worthy of noting is that much of Sitlech Complex has been transformed by the developments and activities that have been carried out on the plant over the years. The site primarily consists of buildings and concrete surfaces, with the only vegetated areas remaining being those of the vegetated waste facilities on the western part of the site, along the Ngagane River boundary.

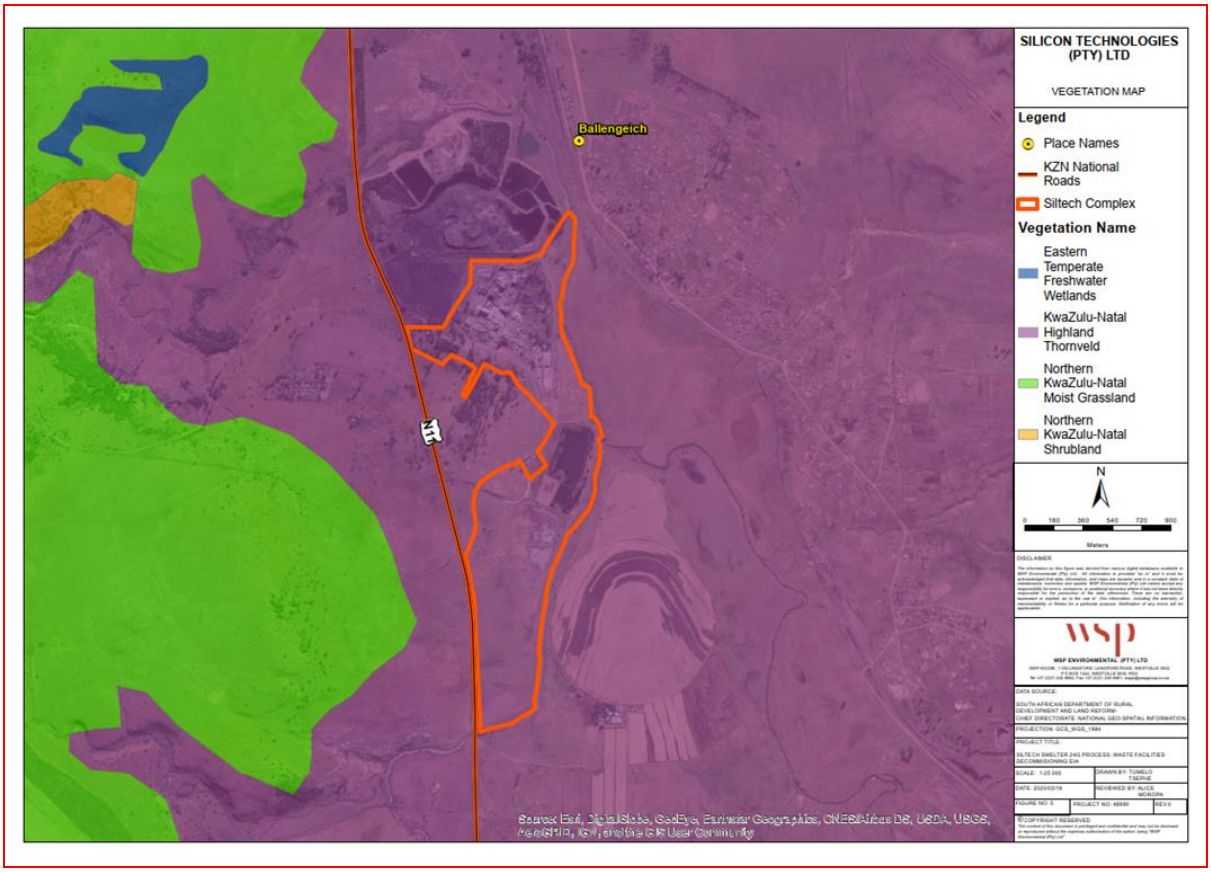

Figure 5-7 Siltech Complex Vegetation Cover

WETLAND ECOLOGY

A wetland delineation study and riparian impact assessment was undertaken by Ikhwane Wetland Science in March 2020. A total of six wetlands with a combined surface area of 8.6 hectares were delineated in the area within which habitats could reasonably be expected to be impacted by the activities at the study site. The five wetlands shown in **Figure 5-8** (Wetland 1, 3, 11, 13, and 15) that could be or are impacted by the ongoing operation or due to their close proximity to the proposed activities and were assessed further. The wetlands within the study site exist in a landscape that has been altered over the last 147 years. Currently, all of the wetlands at the site are either a product of or are significantly altered due to the current or historic land use.

Riparian habitat (Ngagane River, along the length of the Siltech operational boundary) that could be impacted by the operational activities at the study site was also identified. Although the riparian habitat was delineated, the 1:100 years flood line was found to the wider of the two and was thus used as the regulated area for the Ngagane River. The riparian habitat (as opposed to the instream habitat) has significantly disturbed of the last 147 years. This is demonstrated by the presence a large portion of the Waste Facility Area that is located within the 1:100 year flood line and in several instances (South Dam Complex, North Dam and the lime ponds) located within 20-30 meters of the edge of the macro channel. At a finer scale, there is evidence of excavation and infilling in several locations along or just adjacent to the channel.

Three of the wetlands assessed are considered natural (Wetlands 1, 13 and 15) while the remaining three (3,9 and 11)are artificial. The natural wetlands are significantly altered with PES scores of a D, E and D respectively. Wetlands 3, 9 and 11 are considered to be artificial and are dependent on anthropogenic activities causing changes to local hydrology for their existence. Wetland 9 is located at the southern end of the Consolidated Waste Facility, and was seemingly formed as a result of the dirty surface runoff that flows through a trench near the facility, to the Northern Dam. The wetland most likely to be impacted upon by the decommissioning activities.

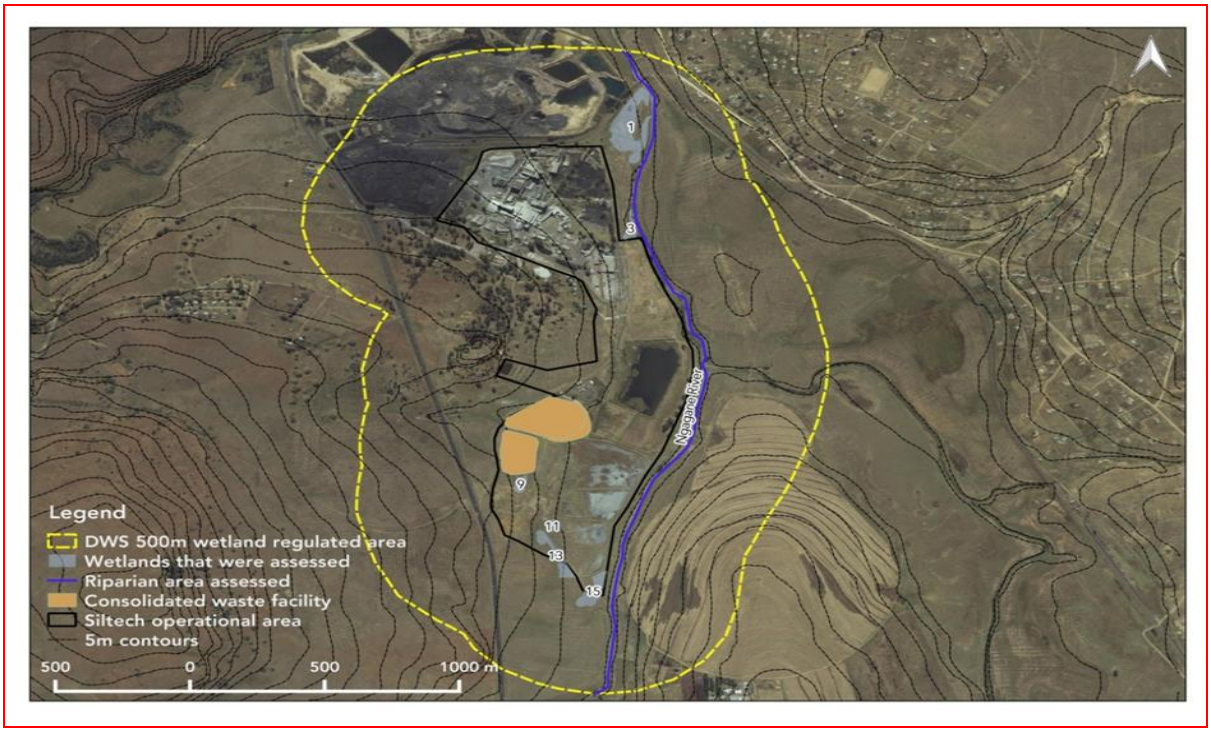

Figure 5-8: Project Layout Superimposed on Environmental Sensitivities (Wetlands) (Source: Ikhwane Wetland Science, 2020)

5.6 THE SOCIO-ECONOMIC ENVIRONMENT

5.6.1 *REGIONAL DESCRIPTION*

According to the Newcastle Local Municipality (NLM) IDP (2012-2017) (2013/2014 review), the 2011 census data estimates the total population of the NLM to 363 236 people. This marks a net population increase of 0.87% per annum between 2001 and 2011. It is estimated that the population has grown further to 334 001 people between 2011 and 2012. The population is relatively young, with 46% of the population being younger than 19 years of age, and 27% of the population aged between 20 and 34 years. The municipality is therefore under pressure to meet the great need of educational facilities, social welfare, health services and the stimulation of the economy to provide job opportunities and economic development.

The municipality population is reported to have an upward trajectory with the majority of the growth occurring mainly in the eastern areas – around Madadeni and Osizweni Townships, which are largely underdeveloped areas occupied mainly by low income and poor communities. There is an increased immigration as a result of perceived urban opportunities, poor access to services and lack of employment opportunities.

The unemployment rate in Newcastle Municipality is estimated at 37.4%, which marks a slight decline from 54.1% recorded in 2001.Similarly, youth unemployment (persons between ages 15 to 34 years) has also declined from 64% in 2001 down to 49% in 2011.

Within Amajuba District Municipality, the Newcastle Municipality accounts for 82.9% and 76% of the total informal and total formal employment respectively. This makes the municipality a key economic hub within the district. The municipality does however have a generally low income population with a large number of people (R15 196) living in abject income poverty as they do not have a reliable source of income. Those who earn some income earn less than R38 200 per annum or R3 183.33 per month.

There is an almost equal share of skilled and semi/unskilled persons within Newcastle, consisting 44% and 43% of those employed in the formal economy, respectively. Only 13% of those employed in the formal economy are classified as highly skilled. The manufacturing sector contributes 17.9% to the total employment (11,453 people)

within the municipality, and has experienced negative growth with an average annual decline in employment of 5.2% since 2000.The agricultural sector contributes to employment for 1.3% (800 people) and mining 0.7% (426 people). The average annual growth rate of employment within the agriculture and mining sectors has also declined by 16% and 7.5% per annum since 2000 respectively, which has raised a great concern. Before its mothballing, Siltech employed approximately 100 people.

6 IMPACT ASSESSMENT

6.1 ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT METHODOLOGY

6.1.1 *ASSESSMENT OF IMPACTS AND MITIGATION*

The assessment of impacts and mitigation evaluated the likely extent and significance of the potential impacts on identified receptors and resources against defined assessment criteria to develop and describe measures that will be taken to avoid, minimise or compensate for any adverse environmental impacts, to enhance positive impacts, and to report the significance of residual impacts that occur following mitigation.

The key objectives of the risk assessment methodology are to validate impacts identified through a matrix, identify any additional potential environmental issues and associated impacts likely to arise from the proposed Project, and to propose a significance ranking. Issues / aspects will be reviewed and ranked against a series of significance criteria to identify and record interactions between activities and aspects, and resources and receptors to provide a detailed discussion of impacts.

A standard risk assessment methodology was used for the ranking of the identified environmental impacts pre- and post-mitigation. The significance of environmental aspects was determined and ranked by considering the criteria presented in **Table 6-1**. Detailed scoring tables for each impact assessed in the EIA report are contained in **Appendix C.**

Table 6-1: Impact Assessment Criteria and Scoring System

CRITERIA	SCORE 1	SCORE 2	SCORE 3	SCORE 4	SCORE 5
Impact Magnitude (M) The degree of alteration of the affected environmental receptor	Very low	Low	Medium	High	Very high
Impact Extent (E) The geographical extent of the impact on a given environmental receptor	Site: Site only	Local: Inside activity area	Regional: Outside activity area	National: National scope or level	International: Across borders or boundaries
Impact Reversibility (R) The ability of the environmental receptor to rehabilitate or restore after the activity has caused environmental change	Reversible: Recovery without rehabilitation		Recoverable: Recovery with rehabilitation		Irreversible: Not possible despite action
Impact Duration (D) The length of permanence of the impact on the environmental receptor	Immediate: On impact	Short term: 0-5 years	Medium term: 5-15 years	Long term: Project life	Permanent: Indefinite
Probability of Occurrence (P) The likelihood of an impact occurring in the absence of pertinent environmental management measures or mitigation	Improbable	Low Probability	Probable	Highly Probably	Definite
ENVIRONMENTAL SIGNIFICANCE (S) = (MAGNITUDE + EXTENT + REVERSIBILITY + DURATION) x PROBABILITY					
TOTAL SCORE	4 to 15	16 to 30	31 to 60	61 to 80	81 to 100

CRITERIA	SCORE 1	SCORE 2	SCORE 3	SCORE 4	SCORE 5
ENVIRONMENTAL SIGNIFICANCE RATING (-)	Very low	Low	Moderate	High	Very High
ENVIRONMENTAL SIGNIFICANCE RATING (+)	Very low	Low	Moderate	High	Very High

6.1.2 *IMPACT MITIGATION*

The following mitigation hierarchy (illustrated in **Figure 6-1**) was applied when proposing prevention, compensation and mitigation measures:

- **Avoid / Prevent:** Avoidance or prevention refers to the consideration of options in Project location, siting, scale, layout, technology and phasing to avoid impacts on biodiversity, associated ecosystem services, and people. This is referred to as 'the best option', but it is acknowledged that avoidance or prevention is not always possible, particularly where the waste management activities for which the Application is made have already been established and, in some cases, partially decommissioned.
- **Minimise:** Minimisation refers to the consideration of alternatives in the Project location, siting, scale, layout, technology and phasing that would minimise impacts on biodiversity, ecosystem services and people. As defined in IFC PS1; "acceptable options to minimise will vary and include: abate, rectify, repair, and/or restore impacts, as appropriate".
- **Rehabilitate / Restore:** Rehabilitation refers to the consideration of the rehabilitation of areas where impacts are unavoidable and measures are provided to return impacted areas to a near-natural state or an agreed land use.
- **Offset:** Offsetting refers to the consideration of measures over and above rehabilitation to compensate for the residual negative effects on biodiversity ecosystem services and people, after every effort has been made to minimise and then rehabilitate impacts.

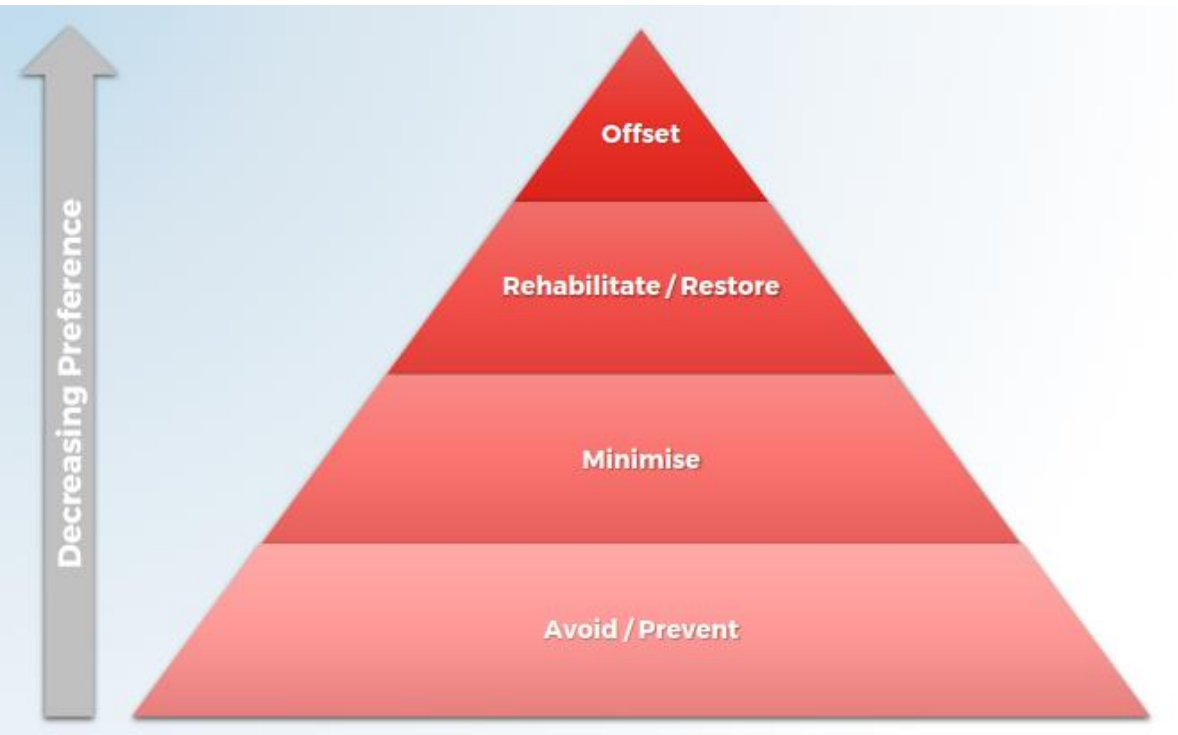

Figure 6-1: Impact Assessment Mitigation Hierarchy

6.2 OLD LIME SETTLING PONDS

a) OLSP - Groundwater contamination associated with the existing cover material

Impact Source(s):	The hydrogeology assessment (WSP, 2017) identified the presence of copper and mercury within the cover materials as a potential risk to freshwater aquatic. The pH of the previously installed engineered lime liner for the facility was noted as being hazardous. The Contamination Assessment (WSP, 2017) also identified the presence of copper and mercury in the waste at concentrations in excess of soil screening value (SSV) 1[1], as well as additional pollutants in excess of SSV1 including for arsenic, iron, lead, and manganese. The report further noted that calcium was recorded within the waste. This is consistent with the known residual lime within each facility and is was considered to represent a significant source of risk to human health under the anticipated ongoing land-use. The presence of calcium was seen as beneficial in the context because it supports the chemical fixation of mercury.
Impact Description:	The Hydrogeology Assessment (WSP, 2017) identifies monitoring wells to the east of the OLSP on the western bank of the Ngagane River (BH10, 16A, 16B, 17A, 17B and 18B). Being immediately down-hydraulic gradient the monitoring results at these locations are representative of contamination that may have come from the OLSP and other facilities located up-hydraulic-gradient. Within these monitoring wells arsenic, copper, iron, manganese, mercury, nickel, vanadium and zinc, as well as naphthalene, were variously recorded above their respective guidelines. Potential sources of groundwater contamination located up-hydraulic-gradient of the OLSP include the southern portion of the plant area comprising a large number of raw material and product storage and production facilities. There are no boreholes located directly in-between the OLSP and potential up-hydraulic-gradient contamination sources; and, the Hydrogeological Assessment did not differentiate between potential contamination from these collective sources. Notwithstanding this, the assessment determines that the groundwater contamination is plausibly derived from the OLSP and that the source remains active. The Contamination Assessment (WSP, 2017) determines that the facility does not present an immediate risk to the environment. This is on the basis that mercury is chemically fixed within the lime; and, that in addition, the facility has been reshaped and capped. No evidence of detrimental impact to the Ngagane River has been recorded.
Mitigation:	i) Implement measures specified in the hydrological assessment (WSP, 2017), including: — Monitor the cover integrity to ensure free drainage and infiltration is kept to a minimum. As per DWAF (Ref. 16/2/7/V301/B8, April 2009) acceptance of the closure of the OLSP, integrity assessment must be done biannually and include the embankment, topsoil and vegetation. — Continue undertaking groundwater monitoring to monitor the possible impacts on groundwater quality by contaminants emanating from the waste site. As per DWAF (Ref. 16/2/7/V301/B8, April 2009) acceptance of the closure of the OLSP, the groundwater monitoring must be undertaken biannually.

[1] *"Soil Screening Value (SSV) 1" means soil quality values that are protective of both human health and eco-toxicological risk for multi-exposure pathways, inclusive of contaminant migration to the water resource. The SSVs a tiered system of priority soil contaminants promulgated in terms of the National Norms and Standards for the Remediation of Contaminated Land and Soil Quality in The Republic of South Africa (GN.R331, 2014), made under the Waste Act. The SSV's facilitate the determination of sensitivity of the relevant receptor which may be subject to exposure. These are defined as follows:*

- *SSV1 represents the lowest value calculated for each parameter from both the human health and water resource protection pathways. SSV1 values are not land-use specific.*
- *SSV2 represents the land-use specific soil concentration and are appropriate for screening level site assessment in cases where protection of water resources is not a consideration.*

ii) Implement measures specified in the Contamination Assessment (WSP, 2017), including:

- DWAF (Ref. 16/2/7/V301/B8, April 2009) has accepted the closure of the OLSPs with the following stipulations to be addressed within the EMP:
  (1) Biannual groundwater monitoring
  (2) Biennial integrity assessment of embankment, topsoil and vegetation
  (3) Siltech should comply with these conditions and ensure that results are reported to inform the regulator and adequately retained.
- Monitoring wells 17A and 17B (nested pair) were installed into a known area of mercury contamination, these should be formally abandoned. Abandonment should include backfilling of the wells with bentonite or concrete to prevent these positions acting as a preferential pathway for the migration of contamination. A new nested well should be reinstated in the same general location.

Significance Rating:

Pre-Mitigation							Post-Mitigation						
(M +	E +	R +	D) x	P =	S	Rating	(M +	E +	R +	D) x	P =	S	Rating
4	3	3	2	3	**36**	**N3**	2	2	3	2	3	**27**	**N2**
N3 – Moderate							**N2 – Low**						

- The pre-mitigation impact on groundwater is assessed as being (**Moderate (-)**. The facility has impacted on groundwater quality, but this impact is likely to have been limited due to the previous decommissioning and capping of the facility. While source-pathway and receptor links exist, there is currently no evidence of detrimental impact to the Ngagane River (ecological receptor).
- With mitigation, the integrity of the cover material will be maintained and groundwater contamination associated with the facility is not expected to increase. It is possible that groundwater quality could show an improvement trend as a latent effect of the previous closure activities. Accordingly, due to potential reduced extent and duration of impacts overall significance reduces to **Low (-)**.

b) OLSP - Surface water contamination and secondary impacts on riverine ecology and human water users

Impact Source(s):

The ponds are located directly adjacent to and within the Ngagane River floodplain, therefore making the sidewalls susceptible to scouring during high flooding events.

Several patches of bare ground were observed at the surface of the ponds. Such areas with no vegetation cover are susceptible to erosion of topsoil by surface runoff during floods or heavy rainfall events when there is increased runoff.

The Contamination Assessment (WSP, 2017) indicated high levels of mercury recorded in the OLSP waste. Should the walls of the facility along the river be eroded through constant lateral erosion during flood events, the waste (and mercury contained therein) may be exposed.

Impact Description:

The release of waste into the river has the potential to result in contamination of the river and associated impacts on downstream human users and ecological systems within the river.

Mitigation:

i) Protect the boundary of the facility from scouring by placing minor engineering works such as gabions or through the use of a binding medium such as Vetiver grass in those areas.

ii) Grade/landscape the slopes of the sidewalls, thereby to reduce the impact of lateral erosion on the sidewalls, by the river.

iii) Vegetate the parts of the facility surface that have no vegetation cover in order to retain the topsoil cover and reduce the erosivity of the area.

iv) Continue undertaking surface water monitoring.

Significance Rating:

Pre-Mitigation							Post-Mitigation						
(M +	E +	R +	D) x	P =	S	Rating	(M +	E +	R +	D) x	P =	S	Rating
4	3	3	2	4	**48**	**N3**	2	2	3	2	3	**27**	**N2**

	N3 – Moderate **N2 - Low** – Pre-mitigation surface water contamination impact significance is regarded as **Moderate (-)** due to the severity and downstream extent of potential impacts on human water users and ecological systems. – With mitigation, the impact significance is regarded as **Low (-)** on the basis that the potential consequence and probability of the impact is reduced.

c) OLSP - Occupational health & safety risks to site workers during the installation of remedial measures

Impact Source(s):	The Contamination Assessment (WSP, 2017) indicated high levels of mercury recorded in the OLSP waste. The facility is therefore regarded as a potential source of risk to human health and the environment.
Impact Description:	During the installation of the proposed erosion protection at key points along the river there is potential for workers to be exposed to the underlying waste. The inhalation of mercury vapour can produce harmful effects on the nervous, digestive and immune systems, lungs and kidneys, and may be fatal.
Mitigation:	i) Siltech is required to manage worker health and safety in accordance with the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993). It is recommended that Siltech appoints a third party contractor with specialist knowledge about the required PPE and other Occupational Health and Safety measures to be taken for the project.
Significance Rating:	**Pre-Mitigation** / **Post-Mitigation** **(M +** | **E +** | **R +** | **D) x** | **P =** | **S** | **Rating** / **(M +** | **E +** | **R +** | **D) x** | **P =** | **S** | **Rating** 5 | 1 | 3 | 5 | 2 | **28** | **N2** / 3 | 1 | 3 | 2 | 1 | **9** | **N1** **N2 – Low** / **N1 - Very Low** – Pre-mitigation occupational health and safety impact significance is regarded as **Low (-)** on the basis that the impact intensity is high, but the extent and probability of exposure is low as the waste is not currently exposed. – With mitigation, the impact significance is regarded as **Very Low (-)** principally on the basis that consequence and probability of exposure will be further reduced.

6.3 CONSOLIDATED WASTE FACILITY

a) CWA - Groundwater impacts due to the permeability characteristics of the existing cover material

Impact Source(s):	The Contamination Assessment (WSP, 2017) identified the presence of copper, iron, lead, manganese and mercury in the waste body in excess of SSV1. The report further noted that calcium was recorded within the waste. This is consistent with the known residual lime within each facility and is considered to represent a significant source of risk to human health and the environment under the anticipated ongoing land-use. The presence of calcium was seen as beneficial in the context because it supports the chemical fixation of mercury. The Consolidated Waste Facility Closure Report (WSP, 2017) provides a more detailed analysis of potential contaminants of concern within the facility. Based on the current and historical operations at the facility, and taking account of the mixed origin of the waste in the facility, the primary contaminants of concern are related to the historical production of petroleum products and various industrial waste products from the production/disposal of calcium carbide, acetic acid, acetaldehyde and ferrosilicon. Therefore the principal contaminants of concern are: – Metals: aluminium, calcium, copper, iron, lead, manganese, mercury, sodium and zinc – Inorganics: acids/bases, chloride, cyanide, fluoride, nitrate, nitrite, silicon and sulphur – Petroleum hydrocarbons

<table>
<tr><td></td><td>
— Volatile Organic Compounds (VOCs) including acetylene and acetaldehyde, as well as benzene, toluene, ethylbenzene and xylene (BTEX) compounds
— Semi-Volatile Organic Compounds (SVOCs) including Polycyclic Aromatic Hydrocarbons (PAH)
— Polychlorinated Biphenyls (PCBs)
</td></tr>
<tr><td>Impact Description:</td><td>
The Hydrogeological Assessment (WSP, 2017) indicated the presence of naphthalene, manganese, zinc, and C7–C9 hydrocarbons in monitoring well 14A located down-hydraulic-gradient of the CWA; however, only naphthalene was present above its guideline. There are no potential sources of groundwater contamination located up-hydraulic-gradient of the CWA; this implies that the CWA is the only contributor to potential groundwater contamination. Based on the groundwater monitoring results, the assessment concluded that the risk of contamination from the facility is likely to have been effectively managed by the former consolidation of wastes.

The Contamination Assessment (WSP, 2017) indicated that the consolidated waste facility has not significantly impacted on groundwater and does not present an immediate risk in terms of the human health and water resource protection pathways, but that measures are required to address the monitoring and management of that risk. The report further notes that while closure activities were initiated by Siltech in 2009, the original requirement (2005) for clay capping was not implemented. It was therefore recommended that cognisance must be taken of the consolidated waste facility closure assessment (WSP, 2017) underway at the time which was to determine whether the closure actions that have been implemented are adequate to ensure overall environmental protection (the closure report subsequently found that the current site condition is not considered suitable as a final closure measure for the waste material in the CWF).
</td></tr>
<tr><td>Mitigation:</td><td>
i) Implement the following recommendations contained in the Consolidated Waste Facility Closure Report (WSP, 2017):
— The reworked waste layers are generally suitable for Vs (shaped and compacted waste) but, since these are not present across the entire site, the upper surface of the waste materials should be reshaped and compacted before V layers are placed.
— It is recommended that the topsoil currently present on the CWF be removed and stockpiled while the cover is upgraded. Once exposed the upper surface of the facility waste should be shaped to a suitable gradient (<3%) and lightly compacted.
— Once the shaped surface is complete, V layer materials should be placed in 150mm layers, compacted to at least 85% Standard Proctor maximum dry density at a moisture content of OMC to OMC+2%.
— Alternatively, suitable engineered barrier solutions that provide similar protection to that of a V layers should be placed on the prepared upper surface of the facility. The stockpiled topsoil can then be replaced and lightly compacted and vegetated.
— While vegetation is establishing erosion by wind and water should be prevented using suitable methods such as soil mats/blankets.

i) Siltech is required to continue undertaking groundwater monitoring to monitor the possible impacts on groundwater quality by contaminants emanating from the waste site (WSP Hydrogeological Assessment, 2017).
</td></tr>
<tr><td>Significance Rating:</td><td>
<table>
<tr><th colspan="7">Pre-Mitigation</th><th colspan="7">Post-Mitigation</th></tr>
<tr><th>(M +</th><th>E +</th><th>R +</th><th>D) x</th><th>P =</th><th>S</th><th>Rating</th><th>(M +</th><th>E +</th><th>R +</th><th>D) x</th><th>P =</th><th>S</th><th>Rating</th></tr>
<tr><td>3</td><td>3</td><td>3</td><td>4</td><td>3</td><td>39</td><td>N3</td><td>2</td><td>2</td><td>3</td><td>2</td><td>2</td><td>18</td><td>N2</td></tr>
<tr><td colspan="7">N3 – Moderate</td><td colspan="7">N2 - Low</td></tr>
</table>
— The status quo impact on groundwater is assessed as being Low (-) with only naphthalene above its guideline. The facility does not pose an immediate risk to health and water resource protection pathways. However, as the existing cover is not suitable as a final closure measure for the waste material in the CWF the residual impact without mitigation has the potential to increase to Medium (-) due to a potential increase in groundwater pollution intensity, extent and duration in the long term.
— With the proposed mitigation (including the installation of the improved capping recommended in the Consolidated Waste Facility Closure Report (WSP, 2017) the significance of long term/latent impacts is predicted to remain as Low (-) due to reduced consequence and probability.
</td></tr>
</table>

b) CWA – Existing alien vegetation invasion, and potential for further infestation during augmentation of cover material

Impact Source(s):	Alien vegetation has colonised certain areas around the facility, probably as a result of disturbance of the site during rehabilitation. This colonisation is however generally consistent with alien encroachment in open areas broadly across the complex (**See Section 5.5.1**). In the absence of disturbance to the vegetation and topsoil since the rehabilitation of the site, it is likely that vegetative equilibrium has been reached in terms of the presence of the composition of alien and natural species. The facility in its current state is therefore unlikely to cause a proliferation of alien species in the Project area. However, there is a legal obligation under NEM:BA requiring a landowner to remove or control alien invasive species (depending on the category of invasive) unless it has authorisation to grow them. Additional closure measures have been recommended to ensure that the facility is suitably sealed, capped and landscaped, thereby ensuring that very little or no latent and residual impacts occur post closure. When carrying out additional decommissioning activities on the facility, more invasive species may be introduced to site by additional construction persons and vehicles operating on site, as well as the disturbance of the area.
Impact Description:	When carrying out additional decommissioning activities on the facility, more invasive species may be introduced to the Project area and the surrounding areas. Without proper management of the revegetation process after closure augmentation, alien vegetation is likely to rapidly outcompete indigenous vegetation, thereby affecting the diversity of indigenous vegetation in the Project area. The proliferation of alien vegetation may have secondary impacts in terms of increasing erosion potential, affecting the quality of storm water runoff, and depleting soil nutrients.
Mitigation:	i) Conserve topsoil resources for use in rehabilitation ii) Undertake a revegetation programme using appropriate species that are consistent with the naturally occurring vegetation in the area (i.e. KwaZulu Natal Highland Thornveld) iii) Develop and implement an alien invasive management plan to remove (Category1 alien vegetation) or control (Category2 alien vegetation) the alien species iv) Monitor the establishment of alien vegetation on site post decommission as part of after care
Significance Rating:	**Pre-Mitigation**: (M + 2, E + 2, R + 3, D) x 2, P = 3, S 27, **Rating N2 – Low** **Post-Mitigation**: (M + 2, E + 1, R + 3, D) x 2, P = 1, S 8, **Rating N1 - Very Low** – The pre-mitigation alien invasion impact significance is regarded as **Low (-)** principally due to the limited extent of the impact within the surrounding area. – With mitigation, the potential impact significance will reduce to **Low (-)** principally due to reduced probability.

c) CWA - Potential surface water and groundwater contamination during augmentation of cover material

Impact Source(s):	Potential sources of surface water and groundwater pollution during cover material augmentation includes i) small quantities of oil and grease from vehicles and machinery, ii) exposed waste during the removal of the existing cover material, and iii) temporarily stockpiled contaminated material.
Impact Description:	There is potential localised contamination of surface water and groundwater from the above sources during cover material augmentation. Notwithstanding the above, it is understood that surface water runoff from the facility collects in a dirty water trench south and east of the facility and is transferred to the North Dam. The risk of contamination outside of the Siltech complex (including the Ngagane River) is therefore low.

<table>
<tr><td>Mitigation:</td><td>i) Ensure adequate storm water management controls are employed during the re-construction of the facility cap. All run off from the site should be directed to the dirty water trench.
ii) If possible, undertake construction activities during the dry season to avoid the control of excess surface runoff during high rainfall events.
iii) Provide and utilise dip trays for immobile vehicles and machinery that will be operated on site
iv) Undertake the Spill and Incident Measures as detailed in the EMP.
v) During cover material augmentation, all potentially contaminated material (e.g. temporarily stockpiled) must be contained within the disposal site footprint. Should temporary stockpiling be required outside of the footprint, it must be i) tested to determine the presence of potential contaminants, and ii) stored in a manner that prevents secondary contamination of the environment.</td></tr>
<tr><td>Significance Rating:</td><td>
<table>
<tr><th colspan="7">Pre-Mitigation</th><th colspan="7">Post-Mitigation</th></tr>
<tr><th>(M +</th><th>E +</th><th>R +</th><th>D) x</th><th>P =</th><th>S</th><th>Rating</th><th>(M +</th><th>E +</th><th>R +</th><th>D) x</th><th>P =</th><th>S</th><th>Rating</th></tr>
<tr><td>4</td><td>3</td><td>3</td><td>2</td><td>4</td><td>48</td><td>N3</td><td>2</td><td>2</td><td>3</td><td>2</td><td>3</td><td>27</td><td>N2</td></tr>
<tr><td colspan="7">N3 – Moderate</td><td colspan="7">N2 - Low</td></tr>
</table>
— The pre-mitigation surface water impact significance is regarded as Medium (-) associated with the potential spreading of contamination beyond the immediate disposal facility footprint (albeit contained within the surrounding area).
— With mitigation, the impact reduces to Low (-) significance on the basis that the consequence and probability of the potential impacts are reduced.
</td></tr>
</table>

d) CWA - Damage to wetlands during augmentation of cover material

<table>
<tr><td>Impact Source(s):</td><td>A total of six wetlands were delineated in the area within which habitats could reasonably be expected to be impacted by the activities at the Siltech complex (wetlands 1,3,9,11,13 and 15).
Wetland 9 in particular, is located directly south of the facility, and as such, may be directly impacted upon or disturbed by vehicles operating on site; and as a result of surface water contamination.</td></tr>
<tr><td>Impact Description:</td><td>Physical disturbance of wetlands by the workforce. Damage to ecological functionality due to the potential in-flow of contaminated surface water,</td></tr>
<tr><td>Mitigation:</td><td>i) Demarcate the potentially affected wetland areas and sign-post them as ‘No-Go Areas’ to prevent encroachment by the workforce.
ii) Implement measures to prevent the contamination of surface water that could potentially flow into wetland 9 (see Section 6.3 (d)).</td></tr>
<tr><td>Significance Rating:</td><td>
<table>
<tr><th colspan="7">Pre-Mitigation</th><th colspan="7">Post-Mitigation</th></tr>
<tr><th>(M +</th><th>E +</th><th>R +</th><th>D) x</th><th>P =</th><th>S</th><th>Rating</th><th>(M +</th><th>E +</th><th>R +</th><th>D) x</th><th>P =</th><th>S</th><th>Rating</th></tr>
<tr><td>3</td><td>2</td><td>3</td><td>3</td><td>4</td><td>44</td><td>N3</td><td>2</td><td>1</td><td>3</td><td>2</td><td>3</td><td>24</td><td>N2</td></tr>
<tr><td colspan="7">N3 – Moderate</td><td colspan="7">N2 - Low</td></tr>
</table>
— The pre-mitigation wetland impact significance is regarded as Medium (-) due to the importance of wetlands (high intensity impact) and the reasonable probability of the wetlands being encroached on by the workforce.
— With mitigation the potential impact significance reduces to Low (-) principally due to reduced probability.
</td></tr>
</table>

e) CWA – Fragmentation of vegetation and associated habitat impacts during augmentation of cover material

Impact Source(s):	The vegetation community that has been established over the facility will be removed during cover material augmentation.
Impact Description:	During the augmentation of cover material natural vegetation occurring on the facility will be temporarily lost reducing the availability of habitat for fauna (anticipated to be small mammals and invertebrates). The loss of habitat is however very small in relation to the surrounding undeveloped land within the Siltech Complex and in the surrounding areas and as a result no significant impacts on fauna are anticipated. The revegetation of the facility following cover material augmentation has the potential to improve vegetation composition and habitat potential due to reduced alien invasive species.
Mitigation:	i) Ensure the area is revegetated following the construction (cap augmenting) activities. ii) Vegetate the area with vegetation homogenous to the surrounding vegetation communities.
Significance Rating:	**Pre-Mitigation** / **Post-Mitigation** **(M + E + R + D) x P = S Rating** / **(M + E + R + D) x P = S Rating** 2 2 3 2 3 **27** **N2** / 1 1 3 2 3 **21** **P2** **N2 – Low** / **P2 - Low** — Without mitigation the impact on vegetation and associated habitat function is considered **Low (-)** due to the relatively small area of disturbance. — With successful re-vegetation (and reduced alien species) there is potential for a positive impact on vegetation species composition and habitat potential i.e. **Low (+)**.

f) CWA – Air quality impacts and potential community nuisance factor caused by dust emissions during augmentation of cover material

Impact Source(s):	The operation of excavators and large earthworks machinery during cover material augmentation may result in the release of dust into the surrounding atmosphere.
Impact Description:	Dust emissions will reduce the air quality in the vicinity of the facility as well as off-site due to wind vectors. There are no sensitive receptors to dust (community areas) within a 1km radius of the facility therefore it is unlikely that potential dust emissions would result in a nuisance factor community.
Mitigation:	iii) Implement general dust suppression measures specified in the EMPr. iv) Implement the grievance procedure specified in the EMPr.
Significance Rating:	**Pre-Mitigation** / **Post-Mitigation** **(M + E + R + D) x P = S Rating** / **(M + E + R + D) x P = S Rating** 2 2 3 1 5 **40** **N3** / 1 1 3 1 3 **18** **N2** **N3 – Moderate** / **N2 - Low** — Without mitigation, air quality impacts are regarded as having **Moderate (-)** significance due to limited consequences (community impact (nuisance factor) is not anticipated) but high probability. — With mitigation the intensity, probability and extent of dust emissions may reduce. Impact significance reduces to **Low (-)**.

g) CWA – Occupational health and safety risks to workers due to exposure to asbestos during augmentation of cover material

<table>
<tr><td>Impact Source(s):</td><td>The Contamination Assessment (WSP, 2017) indicated the presence of Asbestos fibres recorded in the Consolidated Waste. The augmenting or re-construction of the capping could expose the waste layer resulting in the release of asbestos fibre into the atmosphere.</td></tr>
<tr><td>Impact Description:</td><td>When handled, asbestos can separate into microscopic-size particles that remain in the air and are easily inhaled. Persons occupationally exposed to asbestos have developed several types of life-threatening diseases, including asbestosis, lung cancer and mesothelioma (National Institute for Occupational Safety and Health (NIOSH) Research Programs).</td></tr>
<tr><td>Mitigation:</td><td>i) Siltech is required to manage worker health and safety in accordance with the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993). It is recommended that Siltech appoints a third party contractor with specialist knowledge about the required PPE and other Occupational Health and Safety measures to be taken for the project.
ii) In addition to compliance with the OHSA implement the following measures to reduce minimise the risk of asbestos being released:
— Ensure that the waste is not exposed during the removal of the existing topsoil layer. This must be monitored by a suitably trained person.
— Employ dust suppression methods during cover material augmentation to further reduce the potential for airborne asbestos.</td></tr>
<tr><td>Significance Rating:</td><td>
<table>
<tr><th colspan="7">Pre-Mitigation</th><th colspan="7">Post-Mitigation</th></tr>
<tr><th>(M +</th><th>E +</th><th>R +</th><th>D) x</th><th>P =</th><th>S</th><th>Rating</th><th>(M +</th><th>E +</th><th>R +</th><th>D) x</th><th>P =</th><th>S</th><th>Rating</th></tr>
<tr><td>5</td><td>1</td><td>3</td><td>5</td><td>2</td><td>28</td><td>N2</td><td>3</td><td>1</td><td>3</td><td>2</td><td>1</td><td>9</td><td>N1</td></tr>
<tr><td colspan="7">N2 – Low</td><td colspan="7">N1 - Very Low</td></tr>
</table>
— Without mitigation occupational health and safety impact significance is regarded as Low (-) notably due to the significant potential health impacts of asbestos.
— With the appropriate OHSA risk assessment and mitigation measures the impact is Low (-) principally due to the reduced probability.</td></tr>
</table>

6.4 OLD ASH DUMP

a) Old Ash Dump - Groundwater contamination associated with the status quo and future reclamation of the facility

<table>
<tr><td>Impact Source(s):</td><td>The Contamination Assessment (WSP, 2017) identified the presence of arsenic, copper, iron, lead, manganese, and mercury in excess of SSV1. The foot of the facility is located on the natural ground surface and no capping has been installed. The facility therefore poses a potential risk to the subsurface environment through groundwater contamination by leachate.</td></tr>
<tr><td>Impact Description:</td><td>The Hydrogeological Assessment (WSP, 2017) indicated the presence of cobalt, copper, iron, manganese, potassium, zinc and fluoride in monitoring well 21A located generally down-hydraulic-gradient of the ash dump; however, only zinc was present above its guideline. The assessment does not specifically discuss the ash dump in terms of its impact on groundwater.

It is noted by the EAP that potential sources of groundwater contamination located generally up-hydraulic-gradient of the ash dump area including raw materials storage areas and the adjacent colliery; therefore it is unlikely that the ash dump is the only contributor to groundwater contamination recorded in monitoring well 21A.

The Contamination Assessment (WSP, 2017) indicated that the ash dump is contaminated, but does not present an immediate risk in terms of the human health and water resource protection pathways, but that measures are required to address the monitoring and management of that risk.</td></tr>
</table>

Mitigation:	i) Continue undertaking groundwater monitoring to monitor the possible impacts on groundwater quality by contaminants emanating from the waste site. Ensure that monitoring wells are placed directly adjacent to the facility for access of ground water samples of water flowing from the facility (WSP EMP, 2012). ii) Continue with the ash reclamation operations to completion, for sale to block manufacturers as this will eliminate the dumps as a source of groundwater contamination (WSP EMP, 2012). As it has been determined by the Supreme Court of Appeal in the *Arcelor Mittal* case, referred to above, that any material generated in the course of production and which has commercial value is not waste, this activity is lawful. iii) Implement relevant measures specified in the Contamination Assessment (2017) including: – Development of a formal plan allowing provision for the removal of any significantly contaminated residual material, suitable capping and vegetation, as well as monitoring requirements. This plan should be developed by a suitably qualified independent specialist; and, as this requires an assessment of the residual contamination beneath the facility the development of the detailed plan should be deferred until the completion of reclamation.
Significance Rating:	**Pre-Mitigation** / **Post-Mitigation** **(M +** | **E +** | **R +** | **D) x** | **P =** | **S** | **Rating** | **(M +** | **E +** | **R +** | **D) x** | **P =** | **S** | **Rating** 3 | 3 | 3 | 4 | 3 | **39** | **N3** | 2 | 2 | 3 | 2 | 2 | **18** | **N2** **N3 – Moderate** / **N2 - Low** – The pre-mitigation impact on groundwater is assessed as being (**Moderate (-)**. The facility has not significantly impacted on groundwater with only zinc above its guideline. The facility does not pose an immediate risk to health and water resource protection pathways. The recommended measures are required in order to manage the potential risk of the facility on a long term basis (after completion of ash reclamation). – With the proposed mitigation (including the removal of the waste body over time, assessment of residual contamination of the base, and the development of a detailed closure plan), potential impact significance in the long term is predicted reduce to **Low (-)**.

b) Old Ash Dump – Spread of contaminants due to flow of surface water from the facility into the surrounding area

Impact Source(s):	Potential sources of spread of contaminants which impact surface water and eventually groundwater pollution during cover material augmentation includes i) small quantities of oil and grease from vehicles and machinery during reclamation, ii) entrainment of the ash with contaminants in storm water flow and as on vehicle tyres as they drive off, iii) settlement of ash material on exposed surfaces following reclamation which eventually gets entrained by surface water runoff.
Impact Description:	There is potential for localised contamination of surface water and groundwater from the above sources during reclamation activities. Notwithstanding the above, it is understood that surface water runoff from the facility collects in a dirty water trench south and east of the facility and is transferred to the North Dam. The risk of contamination outside of the Siltech complex (including the Ngagane River) is therefore low.
Mitigation:	i) Ensure adequate storm water management controls are employed during the re-construction of the facility cap. All run off from the site should be directed to the dirty water trench. ii) If possible, undertake construction activities during the dry season to avoid the control of excess surface runoff during high rainfall events. iii) Provide and utilise dip rays for immobile vehicles and machinery that will be operated on site iv) Undertake the Spill and Incident Measures as detailed in the EMP.
	Pre-Mitigation / **Post-Mitigation** **(M +** | **E +** | **R +** | **D) x** | **P =** | **S** | **Rating** | **(M +** | **E +** | **R +** | **D) x** | **P =** | **S** | **Rating**

Significance Rating:	2	2	3	2	3	27	N2	1	1	3	2	2	14	N1
	N2 – Low							N1 - Very Low						

— The pre-mitigation surface water impact significance is regarded as **Low (-)** due to the existence of the dirty water control measures around the site footprint.

— With mitigation, the impact reduces to **Very Low (-)** significance on the basis that the probability and extent of impacts outside of the catchment area are reduced.

c) Old Ash Dump – Air quality impacts and community nuisance factor due to potential dust emissions during reclamation

Impact Source(s):	Ash dust particles have the potential to be emitted into the surrounding atmosphere during the reclamation process (typically hauling) by the block manufacturers.
Impact Description:	Dust emissions will reduce the air quality in the vicinity of the facility as well as off-site due to wind vectors. There are no sensitive receptors to dust (community areas) within a 1km radius of the facility therefore it is unlikely that potential dust emissions would result in a nuisance factor community.
Mitigation:	i. Implement general dust suppression measures specified in the EMPr. ii. Implement the grievance procedure specified in the EMPr. iii. In addition to general dust suppression methods, ensure that all ash loads leaving the site are covered with tarpaulins. Siltech to monitor all outgoing loads to ensure compliance.

Significance Rating:	Pre-Mitigation							Post-Mitigation						
	(M +	E +	R +	D) x	P =	S	Rating	(M +	E +	R +	D) x	P =	S	Rating
	3	3	3	1	5	50	N3	2	1	3	1	3	21	N2
	N3 - Moderate							N2 – Low						

— Without mitigation, air quality impacts are regarded as having **Moderate (-)** significance due to limited consequences (community impact (nuisance factor) is not anticipated) but high probability.

— With mitigation the intensity, probability and extent of dust emissions may reduce. Impact significance reduces to **Low (-)**.

d) Old Ash Dump – Occupational health and safety risks to third parties during ash reclamation / risks to ash end-users

Impact Source(s):	The Contamination Assessment (WSP, 2017) indicated high levels of Mercury recorded at the Old Ash Dumps. There is potential for occupational exposure risks to third parties during the reclamation process. During reclamation activities, workers operating the machinery used to reclaim ash may be exposed to safety risks and hazards that may cause harm and injuries.
Impact Description:	Some of the health effects exposure to mercury may cause include: irritation to the eyes, skin, and stomach; cough, chest pain, or difficulty breathing, insomnia, irritability, indecision, headache, weakness or exhaustion, and weight loss. Workers may be harmed from exposure to mercury. The level of exposure depends upon the dose, duration, and work being done (National Institute for Occupational Safety and Health (NIOSH) Research Programs).
Mitigation:	i) Siltech is required to manage worker health and safety in accordance with the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993). It is recommended that Siltech appoints a third party contractor with specialist knowledge about the required PPE and other Occupational Health and Safety measures to be taken for the project. ii) Implement general dust suppression measures specified in the EMPr.

	iii) It is noted that the use of the waste by third parties is legal and does not require permission in view of the recent Supreme Court of Appeal decision of Arcelor Mittal v the Department of Environmental Affairs, where it was determined that material produced in the course of a commercial activity and which is unwanted by the generator but which has commercial value is not waste as contemplated in the Waste Act.

Significance Rating:

Pre-Mitigation							Post-Mitigation						
(M +	E +	R +	D) x	P =	S	Rating	(M +	E +	R +	D) x	P =	S	Rating
5	1	3	5	2	28	N2	3	1	3	2	1	9	N1
N2 – Low							N1 - Very Low						

- Without mitigation occupational health and safety impact significance is regarded as **Low (-)** notably due to the significant potential health impacts of mercury.
- With the appropriate OHSA risk assessment and mitigation measures the impact is **Low (-)** principally due to the reduced probability.

e) Old Ash Dump - Traffic impacts associated with the road hauling of ash by reclamation companies

Impact Source(s):	Currently only one vehicle (truck) accesses the Siltech Complex to reclaim the ash dump. The truck collects 3 loads of approximately 8 tons of ash of ash per load, on average three times a week. It is anticipated that an increase in demand in future may see the number of trucks accessing the site rise to about 5 trucks.
Impact Description:	The addition to the number of vehicles will result in a slight increase in traffic on the N11. The road network is well developed and is currently not congested, therefore no significant impacts are anticipated.
Mitigation:	i. As best practice, the collection of ash should be done during off peak traffic hours, between 8am and 4pm, when there is less movement of other vehicles on the road.

Significance Rating:

Pre-Mitigation							Post-Mitigation						
(M +	E +	R +	D) x	P =	S	Rating	(M +	E +	R +	D) x	P =	S	Rating
0	0	0	0	0	0	#N/A	0	0	0	1	0	0	#N/A
#N/A							#N/A						

- N/a – no anticipated impacts

f) Old Ash Dump – Socio-economic impacts related to reclamation of the ash dump by third parties and ash block manufacturing

Impact Source(s):	Ash reclaimed from the dump is a raw material in the block manufacturing process undertaken by third parties, and is thus vital to the sustenance of third parties' businesses and employment they provide.
Impact Description:	Continuation of local economic benefits.
Mitigation:	i) None required

Significance Rating:

Pre-Mitigation							Post-Mitigation						
(M +	E +	R +	D) x	P =	S	Rating	(M +	E +	R +	D) x	P =	S	Rating
2	2	3	2	5	45	N3	3	3	1	2	3	27	P2
N3 - Moderate							P2 – Low						

	— Without mitigation the impact has potential to change from Low (+) under the status quo to **Moderate (-)** due to the loss of economic activity (albeit of a small number of individuals) and employment related livelihoods. — With mitigation the impact has the potential to be **Low (+)** as there is a possibility for the growth in ash-off takers and associated direct and indirect economic and employment opportunities.

6.5 HISTORIC POWER STATION COOLING PONDS

a) Historic Power Station Cooling Ponds - Groundwater impacts due to the permeability characteristics of the existing cover material

Impact Source(s):	During excavations into the waste body as part of the Contamination Assessment (WSP, 2017) ash was evident throughout the excavation to the full depth of 3m bgl; however, from 0.3m to 2m bgl this included a mixture of construction debris, wood and silcrete. Potential contaminants identified in the waste body (Trial Pit 3) included arsenic, copper, lead, and mercury
Impact Description:	The Hydrogeological Assessment (WSP, 2017) does not specifically discuss the potential impact of the Historic Power Station Cooling Ponds on groundwater monitoring data. The following observations are however made by the EAP: — There are no monitoring wells in the immediate vicinity of the Historic Power Station Cooling Ponds that would give meaningful representation of the contribution of potential groundwater contamination from the facility. — The closest up-hydraulic-gradient well (1A) is located approx. 120m to the west-southwest. The closest down-hydraulic-gradient well (19B) is located approx. 500m to the east. These monitoring wells are unlikely to be representative of potential contamination from the Historic Power Station Cooling Ponds as several other potential sources of groundwater contamination exist between these two points including the furnace operations and various raw material storage areas. The Contamination Assessment (WSP, 2017) and Hydrogeological Assessment (WSP, 2017) recognise that the Historic Power Station Cooling Ponds are concrete lined and, whilst the integrity of the liner could not be assured in the assessments, the deeper materials were observed to be saturated and, therefore, this will likely mitigate the vertical migration of contamination from the facility. The Contamination Assessment (WSP, 2017) concludes that the facility (referred to as Emergency Water Pond) is contaminated, but does not present an immediate risk to human health and water resource protection pathways. Although filled, the report recommended that a study be undertaken to define capping and cover requirements to inform closure. During the assessment of the existing capping during the EIA process (see **Section 2.5.4**) it was concluded that the capping is not considered suitable as a final closure measure for the waste material in the Historic Power Station Cooling Ponds Facility with potential groundwater pollution implications.
Mitigation:	i) Implement the following measures recommended by WSP during the EIA process (see **Section 2.5.4**): — The waste material and current capping material on the area of interest be comprehensively investigated to determine the nature and classification of the waste materials and the groundwater conditions associated therewith. — Once completed the area should be shaped and capped with a suitable capping system according to the waste classification. The proposed capping presented above will result in the area being sterilized and not available for use. — An alternative capping design, should the use of the area for material handling be required, can be developed by shaping the area before developing an engineered impermeable pavement system with a gravel wearing course or, depending on required strength, concrete hardstanding surface. Should this option be required, the investigation of the area should include a geotechnical assessment of the current material strengths and suitability for re-compaction to load-bearing densities.
	Pre-Mitigation | **Post-Mitigation**

Significance Rating:	**(M +**	**E +**	**R +**	**D) x**	**P =**	**S**	**Rating**	**(M +**	**E +**	**R +**	**D) x**	**P =**	**S**	**Rating**
	4	3	3	4	3	**42**	**N3**	2	1	3	2	2	**16**	**N2**
	N3 – Moderate							**N2 - Low**						
	— The facility does not pose an immediate risk to health and water resource protection pathways, therefore the impact significance is considered to be Low (-). However, as the existing cover has been determined as unsuitable as a final closure measure the residual impact without mitigation has the potential to increase to Medium (-) or conservatively to **Moderate (-)** due to a potential increase in groundwater pollution intensity, extent and duration in the long term. — With the proposed mitigation (including the installation of improved cover material) the significance of long term/latent impacts is predicted to remain as **Low (-)**.													

b) Historic Power Station Cooling Ponds - Air quality impacts and potential community nuisance factor caused by dust emissions during augmentation of cover material

Impact Source(s):	The operation of excavators and large earthworks machinery during cover material augmentation may result in the release of dust into the surrounding atmosphere.													
Impact Description:	Dust emissions will reduce the air quality in the vicinity of the facility as well as off-site due to wind vectors. There are no sensitive receptors to dust (community areas) within a 1km radius of the facility therefore it is unlikely that potential dust emissions would result in a nuisance factor to the community.													
Mitigation:	i) Implement general dust suppression measures specified in the EMPr. ii) Implement the grievance procedure specified in the EMPr.													
Significance Rating:	**Pre-Mitigation**							**Post-Mitigation**						
	(M +	**E +**	**R +**	**D) x**	**P =**	**S**	**Rating**	**(M +**	**E +**	**R +**	**D) x**	**P =**	**S**	**Rating**
	2	2	3	1	5	**40**	**N3**	1	1	3	1	3	**18**	**N2**
	N3 - Moderate							**N2 - Low**						
	— Without mitigation, air quality impacts are regarded as having **Moderate (-)** significance due to limited consequences (community impact (nuisance factor) is not anticipated) but high probability. — With mitigation the intensity, probability and extent of dust emissions may reduce. Impact significance reduces to **Low (-)**.													

7 CONCLUSION AND RECOMMENDATIONS

The essence of any impact assessment process is aimed at ensuring informed decision-making, environmental accountability, and to assist in achieving environmentally sound and sustainable development. In terms of NEMA, the commitment to sustainable development is evident in the provision that "development must be socially, environmentally and economically sustainable…. and requires the consideration of all relevant factors…" NEMA also imposes a duty of care, which places an obligation on any person who has caused, is causing, or is likely to cause damage to the environment to take reasonable steps to prevent such damage. Although Ferroglobe was not the entity responsible for the contamination it acted immediately and showed its willingness to address the problems of the previous ownership, in a transparent and proactive manner with the DEA.

In terms of NEMA's preventative principle, potentially negative impacts on the environment and on people's environmental rights (in terms of the Constitution of the Republic of South Africa, 1996) should be anticipated and prevented, and where they cannot be prevented altogether, they must be minimised and remedied in terms of "reasonable measures".

In assessing the environmental feasibility of the proposed Project, the requirements of all relevant legislation have been considered. The identification and development of appropriate mitigation measures that should be implemented in order to minimise potentially significant impacts associated with the Project, has been informed by best practice principles, past experience and the relevant legislation (where applicable).

The overall objective of the EIR is to provide sufficient information to enable informed decision-making by the authorities. This was undertaken through consideration of the proposed Project components, identification of the aspects and sources of potential impacts and subsequent provision of mitigation measures.

18 potential impacts on various aspects of the environment were identified associated with the status quo of the existing facilities, as well as the proposed additional closure measures. Of these impacts:

- 11 were evaluated as having **Moderate (-)** significance (approx. 61%)
- 6 were evaluated as having **Low (-)** significance (approx. 33%)
- 1 was evaluated as having **Neutral / No** significance (approx. 6%)

Mitigation measures have been developed where applicable for the above aspects and are presented in this EIR and the EMPr (Appendix B). It is imperative that all impact mitigation recommendations contained in this EIR and the EMPr, of which the environmental impact assessment took cognisance, are legally enforced.

On the basis of the proposed mitigation, most of the potential impacts fall within the categories of **Low (-) or Very Low (-)**; whilst the significance of some impacts changes in character to **Low (+)**.

- 10 were evaluated as having **Low (-)** significance (approx. 55%)
- 5 were evaluated as having **Very Low (-)** significance (approx. 27%)
- 1 was evaluated as having **Neutral / No** significance (approx. 6%)
- 2 were evaluated as having **Low (+)** significance (approx. 12%)

On the basis of the EIR, WSP is of the opinion that the Application should be authorised. This is predicated on all impact mitigation recommendations contained in this EIR and the EMPr being implemented. To this end the following conditions of authorisation should be specified:

i) All impact management measures stipulated in this Impact Report and the accompanying EMPr should be adhered to.

ii) As per the recommendation in the Contamination Assessment (WSP, 2017), a consolidated programme must be rationalised across the entire facility to re-establish an effective ground- and surface water monitoring network. This is key groundwater impact management measure for the Siltech complex as a whole, including the decommissioned waste facilities. The programme must consider the intent of the existing permits/closure acceptance documents alongside the outcomes of the studies for the South Dam Complex and CWA as well as the findings of the contamination

assessment to efficiently monitor and manage potential environmental liability. The programme must stipulate the positions and frequency of monitoring/sampling alongside relevant chemical analytical suites and target quality criteria for regular assessment. Where necessary, monitoring wells must either be reinstated or freshly installed to maximise the network's longevity and improve confidence in the results obtained. Thereafter, prior to implementation, the Department must be approached to ensure its agreement with a consolidated approach of improved transparency.

It is the opinion of WSP that the information contained in this EIR (read in conjunction with the EMPr) is sufficient for the DEFF to make an informed decision for the environmental authorisation being applied for in respect of this Project and that the Application should be granted, subject to the conditions stipulated above.

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APPENDIX

A EAP CURRICULUM VITAE

APPENDIX

B

ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPR)

APPENDIX

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