mineral resources
Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

DRAFT SCOPING REPORT

FOR HERNIC FERROCHROME (PTY) LTD

DMR REFERENCE NUMBER: NW 30/5/1/2/3/2/1/(308) EM & NW 30/5/1/2/3/2/1/(396) EM

SUBMITTED FOR ENVIRONMENTAL AUTHORIZATIONS IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 AND THE NATIONAL ENVIRONMENTAL MANAGEMENT WASTE ACT, 2008 IN RESPECT OF LISTED ACTIVITIES THAT HAVE BEEN TRIGGERED BY APPLICATIONS IN TERMS OF THE MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT, 2002 (MPRDA) (AS AMENDED).

NAME OF APPLICANT:	Hernic Ferrochrome (Pty) Ltd
TEL NO:	+ 27 12 381 1118
FAX NO:	+ 27 12 381 1111
POSTAL ADDRESS:	P O Box 4534, BRITS, 0250
PHYSICAL ADDRESS:	R/E of Portion 103, De Kroon 444 JQ
FILE REFERENCE NUMBER	NW 30/5/1/2/3/2/1/(308) EM & NW 30/5/1/2/3/2/1/(396) EM

IMPORTANT NOTICE

In terms of the Mineral and Petroleum Resources Development Act (Act 28 of 2002 as amended), the Minister must grant a prospecting or mining right if among others the mining "will not result in unacceptable pollution, ecological degradation or damage to the environment".

Unless an Environmental Authorisation can be granted following the evaluation of an Environmental Impact Assessment and an Environmental Management Programme report in terms of the National Environmental Management Act (Act 107 of 1998) (NEMA), it cannot be concluded that the said activities will not result in unacceptable pollution, ecological degradation or damage to the environment.

In terms of section 16(3)(b) of the EIA Regulations, 2014, any report submitted as part of an application must be prepared in a format that may be determined by the Competent Authority and in terms of section 17 (1) (c) the competent Authority must check whether the application has taken into account any minimum requirements applicable or instructions or guidance provided by the competent authority to the submission of applications.

It is therefore an instruction that the prescribed reports required in respect of applications for an environmental authorisation for listed activities triggered by an application for a right or permit are submitted in the exact format of, and provide all the information required in terms of, this template. Furthermore please be advised that failure to submit the information required in the format provided in this template will be regarded as a failure to meet the requirements of the Regulation and will lead to the Environmental Authorisation being refused.

It is furthermore an instruction that the Environmental Assessment Practitioner must process and interpret his/her research and analysis and use the findings thereof to compile the information required herein. (Unprocessed supporting information may be attached as appendices). The EAP must ensure that the information required is placed correctly in the relevant sections of the Report, in the order, and under the provided headings as set out below, and ensure that the report is not cluttered with un-interpreted information and that it unambiguously represents the interpretation of the applicant.

OBJECTIVE OF THE SCOPING PROCESS

1) The objective of the scoping process is to, through a consultative process—

(a) identify the relevant policies and legislation relevant to the activity;
(b) motivate the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;
(c) identify and confirm the preferred activity and technology alternative through an impact and risk assessment and ranking process;
(d) identify and confirm the preferred site, through a detailed site selection process, which includes an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified alternatives focusing on the geographical, physical, biological, social, economic, and cultural aspects of the environment;
(e) identify the key issues to be addressed in the assessment phase;
(f) agree on the level of assessment to be undertaken, including the methodology to be applied, the expertise required as well as the extent of further consultation to be undertaken to determine the impacts and risks the activity will impose on the preferred site through the life of the activity, including the nature, significance, consequence, extent, duration and probability of the impacts to inform the location of the development footprint within the preferred site; and
(g) identify suitable measures to avoid, manage, or mitigate identified impacts and to determine the extent of the residual risks that need to be managed and monitored.

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DRAFT SCOPING REPORT

HERNIC FERROCHROME (PTY) LTD

JANUARY 2017

Consulting

Purpose of Report

HERNIC FERROCHROME wishes to add/expand/upgrade activities to their current mining and smelting operations which require Environmental Authorization in terms of the provisions of the Mineral and Petroleum Resources Development Act (MPRDA), the National Environmental Management Act (NEMA), the National Environmental Management: Waste Act (NEMWA), the National Environmental Management Air Quality Act (NEMAQA), as well as the National Water Act (NWA).

Based on the nature of the proposed activities, the necessary applications have to be supported *inter alia* by a Scoping and Environmental Impact Assessment and Reporting (S&EIR) Process as provided for in the 2014 EIA Regulations (GNR 982 of 4 December 2014). In view of the fact that HERNIC operates as a mine, the administrative process is that of the "Single Environmental System" with DMR being the Competent Authority.

The DMR has developed Reporting Templates in support of the "Single Environmental System", (Scoping Report, Basic Assessment Report, Environmental Impact Assessment Report as well as Environmental Management Programme Report), with strict instructions of the content requirements. The DMR Templates essentially represent a summary by the Environmental Assessment Practitioner (EAP) of more comprehensive information and requires that supporting details be provided as Appendices to the DMR Template Report.

This Scoping Report emulates the DMR Template for Scoping Report and supporting information is attached as detailed Appendices.

Report Reference Numbers

JMA Project: JMA/10462
JMA Report: Prj6004
DMR Ref: NW 30/5/1/2/3/2/1/(308) EM
& NW 30/5/1/2/3/2/1/(396) EM

Report Status

Draft
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Version – 01

Compiled for

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ABBREVIATIONS

AEL	**:**	Air Emission Licence
BBS	**:**	Behaviour Based Safety
BIC	**:**	Bushveld Igneous Complex
CA	**:**	Competent Authority
CV	:	Curriculum Vitae
CRP	**:**	Chrome Recovery Plant
DEA	:	Department of Environmental Affairs
DEAT	**:**	Department of Environmental Affairs and Tourism
DEDECT	:	Department of Economic Development, Environment, Conservation and Tourism (North West)
DMR	:	Department of Mineral Resources
DMS	:	Dense Medium Separation
DWA	:	Department of Water Affairs
DWAF	:	Department of Water Affairs and Forestry
DWS	:	Department of Water and Sanitation
EA	:	Environmental Authorisation
EAP	:	Environmental Assessment Practitioner
EIA	:	Environmental Impact Assessment
EMP	:	Environmental Management Plan
EMPR	:	Environmental Management Programme Report
GN	:	Government Notice
GNR	:	Government Notice Report
HDPE	:	High Density Polyethylene
HMS	:	Heavy Medium Separation
IAP's	:	Interested and Affected Parties
ISO	:	International Organisation of Standardization
IWULA	:	Integrated Water Use Licence Application
IWWMP	:	Integrated Water and Waste Management Plan
LOM	:	Life of Mine
MG	:	Middle Group
MPRDA	:	Mineral and Petroleum Resources Development Act (Act No. 28 of 2002)
NEMA	:	National Environmental Management Act (Act No. 107 of 1998)
NEMAQA	:	National Environmental Management Air Quality (Act No. 39 of 2004)
NEMWA	:	National Environmental Management: Waste Act (Act No. 59 of 2008)
NWA	:	National Water Act (Act No. 36 of 1998)
OB	:	Ore Beneficiation
OHSAS	:	Occupational Health and Safety Advisory Services
PCD	:	Pollution Control Dam
PGM	:	Platinum Group Minerals
READ	:	Rural, Environmental and Agricultural Development (North West)
RLS	:	Rustenburg Layered Suite
ROD	:	Record of Decision
ROM	:	Run Of Mine
RWD	:	Return Water Dam
SACNASP	:	South African Council for Natural Scientific Professions
SAHRA	:	South African Heritage Resources Agency
SBR	:	Sequencing Batch Reactor
S&EIR	:	Scoping and Environmental Impact Reporting
TSF	:	Tailings Storage Facility
UFS	:	University of the Free State
UG	:	Upper Group
WLA	:	Waste Licence Application

EXECUTIVE SUMMARY

To be compiled after the Public Review Period.

1. INTRODUCTION AND TERMS OF REFERENCE

HERNIC FERROCHROME (PTY) LTD (here after referred to as HERNIC) wishes to add/expand/upgrade activities to their current mining and smelting operations and which may require Environmental Authorization in terms of the provisions of the Mineral and Petroleum Resources Development Act (MPRDA), the National Environmental Management Act (NEMA), the National Environmental Management: Waste Act (NEMWA), the National Environmental Management Air Quality Act (NEMAQA), as well as the National Water Act (NWA).

Based on the nature of the proposed activities, the necessary applications have to be supported *inter alia* by a Scoping and Environmental Impact Assessment and Reporting (S&EIR) Process as provided for in the 2014 Environmental Impact Assessment (EIA) Regulations (GNR 982 of 04 December 2014). In view of the fact that HERNIC operates as a mine, the administrative process is that of the "Single Environmental System" with the Department of Mineral Resources (DMR) being the Competent Authority (CA).

The DMR has developed Reporting Templates in support of the "Single Environmental System", (Scoping Report, Basic Assessment Report, Environmental Impact Assessment Report as well as Environmental Management Programme Report), with strict instructions and content requirements. The DMR Templates essentially represent a summary by the Environmental Assessment Practitioner (EAP) of more comprehensive information and requires that supporting details be provided as Appendices to the DMR Template Report.

This Scoping Report emulates the DMR Template for Scoping Report and supporting information is attached as detailed Appendices.

This report will serve as the main reference for any supporting documentation and specialist studies compiled and conducted in support of the Scoping Process.

The Scoping Process will be conducted as part of the larger S&EIR Process as shown in the diagram presented in Figure 1(a) herein below. Of particular significance is the Process Time Line indicated on the diagram.

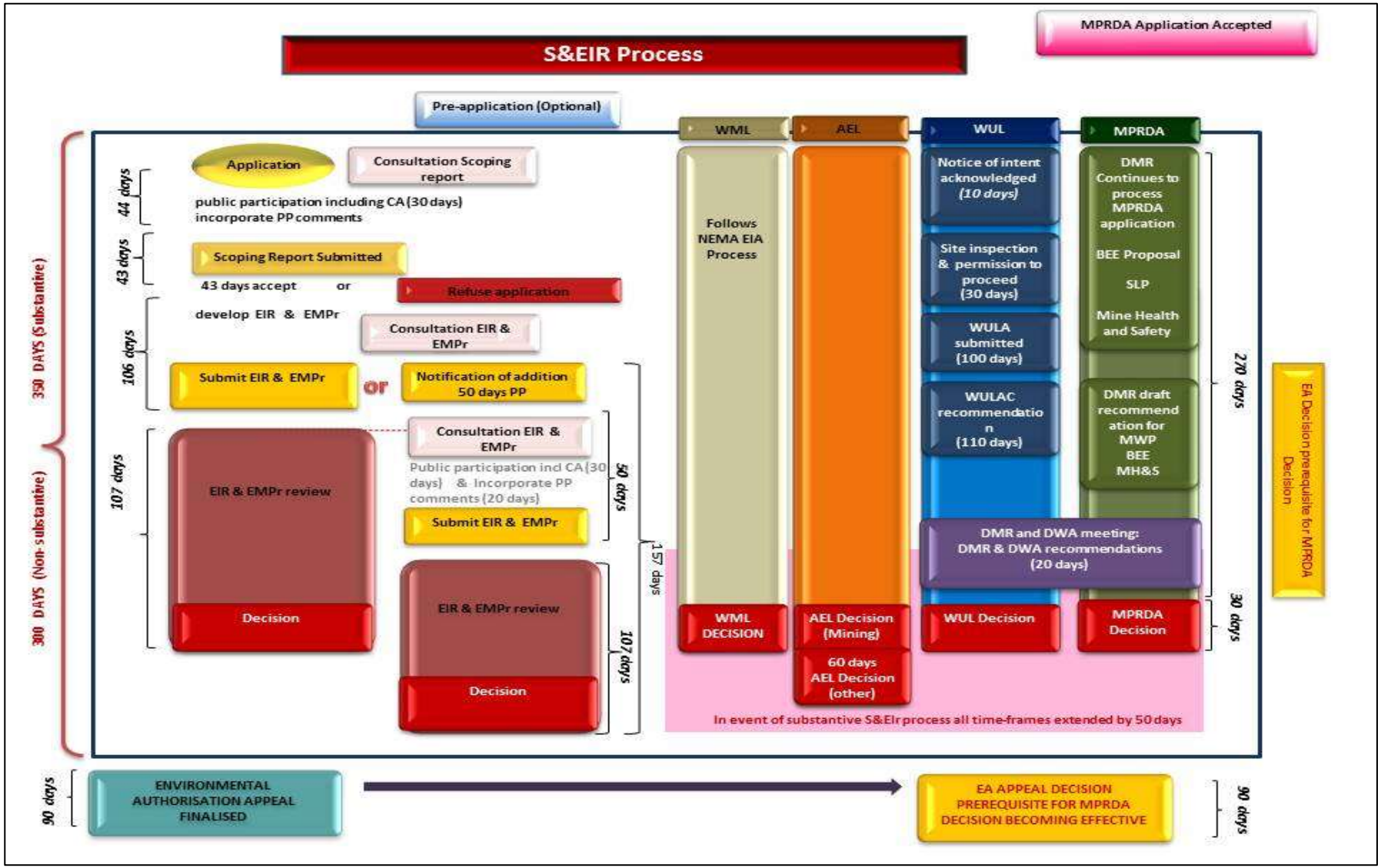

Figure 1(a): The Scoping & Environmental Impact Reporting (S&EIR) Process with the relevant Time Line

2. DETAILS OF ENVIRONMENTAL ASSESSMENT PRACTITIONER

2.1. DETAILS OF THE EAP WHO PREPARED THE REPORT

Table 2.1(a): Details of the Environmental Assessment Practitioner (EAP)

Project Consultancy	JMA Consulting (Pty) Ltd
Company Registration	2005/039663/07
Professional Affiliation	South African Council for Natural Scientific Professions (SACNASP)
Contact Person	Mr Jasper Muller (Pr. Sci. Nat.)
Physical Address	15 Vickers Street DELMAS 2210
Postal Address	P O Box 883 DELMAS 2210
Telephone Number	+27 13 665 1788
Fax Number	+27 13 665 2364
E-mail	jasper@jmaconsult.co.za

2.2. EXPERTISE OF THE EAP

The Environmental Assessment Practitioner (EAP) for this project was Mr Jasper Lodewyk Muller (Pr. Sci. Nat.).

2.2.1. Qualifications of the EAP

Jasper Muller holds the following degrees:

- B.Sc. from the UFS (1979) with major subjects Geology and Geohydrology.
- B.Sc. (Honns) from the UFS (1980) with field of specialization Geohydrology.
- M.Sc. (cum laude) from the UFS (1984) with field of specialization Geohydrology.

Jasper Muller holds a Professional Registration with SACNASP since 1986 – 400073/86. He is registered as a professional scientist in two categories:

- Earth Science
- Environmental Science

2.2.2. Past Experience of the EAP

Jasper Muller started his working career with the then Department of Water Affairs (DWA) in 1981 and was employed as geohydrologist with the Groundwater Division.

Later that year he joined the Institute for Groundwater Studies as a researcher, a position he held until June 1986. During his tenure at the IGS, his field of research was numerical groundwater flow and mass transport modelling.

Upon his registration as Professional Scientist in 1986, he left the IGS and joined the Consulting Firm Terradata (Pty) Ltd where he was in charge of the Groundwater Division.

In 1987 he moved to the consulting firm Environmental Science Services (ESS) where he was appointed as Divisional Manager for the Environmental Water Division. It was during this time at ESS that he started his career in the field of Environmental Science.

In 1988 he started his own consulting firm (JMA) and has been active as the Managing Director of this company for 28 years now.

During these 28 years, Jasper Muller has been involved as Specialist Scientist and/or EAP in the compilation and overall management of projects related to more than 300 Specialist Studies, EIA's, EMP's, EMPR's, IWULA's, IWWMP's and/or WLA's.

2.3. CV OF THE EAP

A Synoptic CV of the EAP is attached as **APPENDIX 2(A)** to this report.

3. LOCATION OF THE ACTIVITY

3.1. ACTIVITY BACKGROUND

HERNIC has been in operation since May 1996. The Operations, which expanded over the years, comprise both mining of Chromite Ore (initially opencast and then later from underground), ore beneficiation to yield feedstock chromite concentrate and lumpy ore, followed by pelletizing and sintering of the fine ore and finally Ferrochrome Smelting in four closed Furnaces, with an *annual* production capacity of 420 000 *tonnes* of ferrochrome. Several chrome recovery operations from chromite containing slag are also active on the site.

As the site expanded and was upgraded since 1996, HERNIC has applied for, and obtained, the required Environmental Authorizations (EA) as and when required. It currently operates under an approved EMPR, which was amended as recently as 2016 and also holds a Water Use Licence, an Atmospheric Emissions Licence (AEL), as well as relevant EIA Authorizations.

The project for which this Report is compiled, relates to further additions /expansions /upgrades of certain activities of HERNIC's Operations and for which EA's are required (primarily an EMPR Addendum in terms of the MPRDA, but also a Waste Licence in terms of NEMWA, Water Use Licence in terms of NWA, EIA Authorizations in terms of NEMA for listed activities and lastly an amendment to their AEL in terms of the NEMAQA. Furthermore the project aims to consolidate the various Environmental Management Programmes obtained for various HERNIC activities over the years (e.g. Consolidated EMPr, PGM EMPr and TSF EMPr).

3.2. CONTACT DETAILS

A summary of the relevant company details and the contact person is indicated in Table 3.2(a) and Table 3.2(b) respectively.

Table 3.2(a): Company Details

Name of Company	HERNIC FERROCHROME (Pty) Ltd
Trading Name	HERNIC FERROCHROME (Pty) Ltd
Registration Number	1994/008293/07
Date Established	1994
Country Established	South Africa
VAT Registration Number	4870146521
Physical Address	R/E of Portion 103, De Kroon 444 JQ

The business registration certificate is attached as **APPENDIX 3(A)** to this report.

Table 3.2(b): Contact Person

Contact Person	Elzanne Moodie
Telephone Number	+ 27 12 381 1118
Cellphone Number	+ 27 82 444 9106
Facsimile Number	+ 27 12 381 1111
Email Address	elzanne.moodie@hernic.co.za
Postal Address	P O Box 4534, BRITS, 0250

3.3. REGIONAL SETTING AND LOCATION OF ACTIVITY

The HERNIC site falls within the Madibeng Local Municipality which is located within the Bojanala District Municipality of the North-West Province of the Republic of South Africa (Refer to Table 3.3(a) and Figure 3.3(a)). The central coordinates of the site are 25°39'40.80"S and 27°50'26.51"E (WGS84).

Table 3.3(a): Summary of the Regional Setting and Location of the Activity

Central Coordinate of the Site	25°39'40.80"S and 27°50'26.51"E
Nearest Town / City	Brits
Local Municipality	Madibeng
District Municipality	Bojanala
Province	North-West
Country	Republic of South Africa

A map/plan depicting the boundary of the proposed activity and the associated infrastructure is shown in Figure 3.3(b). A large scale version of this map is attached as **APPENDIX 3(B)** to this report.

HERNIC is located approximately 7 *km* to the south-east of the town of Brits and 11 *km* to the north-west of the town of Hartbeespoort.

HERNIC is flanked by the Magaliesberg Mountain Range to the south and the smaller Kareepoortberg and the Langberg to the north-west of the site. The land use adjacent to HERNIC is dominated by agricultural and mining related activities. The mining operations take the form of opencast and underground operations that exploit the Rustenburg Layered Suite (RLS) of the Bushveld Igneous Complex (BIC). The complex contains the world's largest reserves of platinum-group metals; namely platinum, palladium, osmium, iridium, rhodium and ruthenium along with vast quantities of iron, tin, chromium, titanium and vanadium.

The greater study area stretches for some 3.5 *km* from west to east and 3.2 *km* from north to south. The surface elevation ranges from 1 145 *mamsl* in the north-west perimeter to 1 200 *mamsl* on the south-east perimeter of the site. The ground surface is gently sloping toward an unnamed non-perennial tributary in the north-northwest which drains towards the Crocodile River and which eventually drains to the Limpopo River downstream (Refer to Figure 3.3(c)).

HERNIC is located in the southern regions of the A21J Quaternary Catchment within the Limpopo River Primary Catchment and within the Crocodile (West) and Marico Water Management Area (Figure 3.3(d) and Figure 3.3(e)).

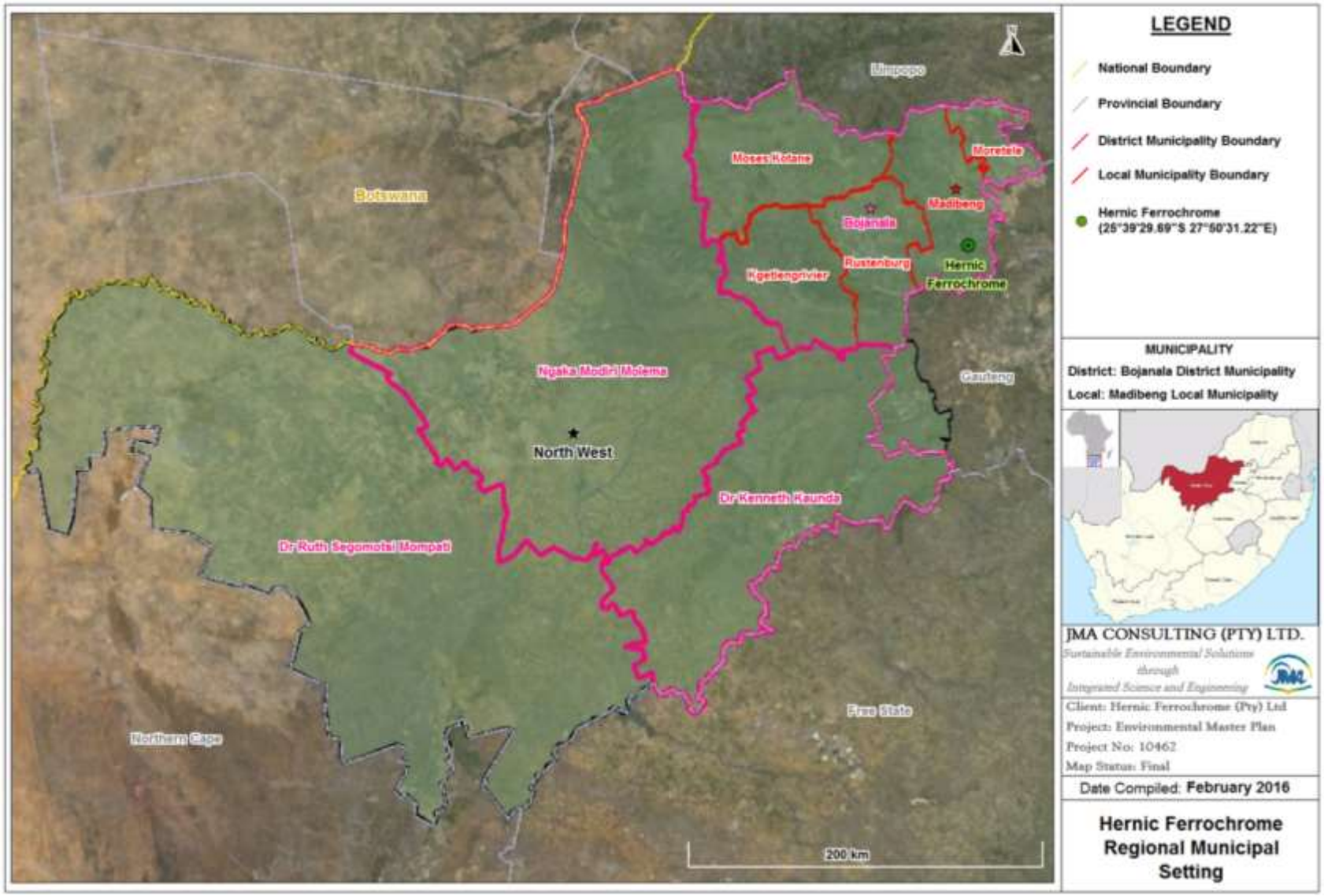

Figure 3.3(a): Regional Locality of the HERNIC Site

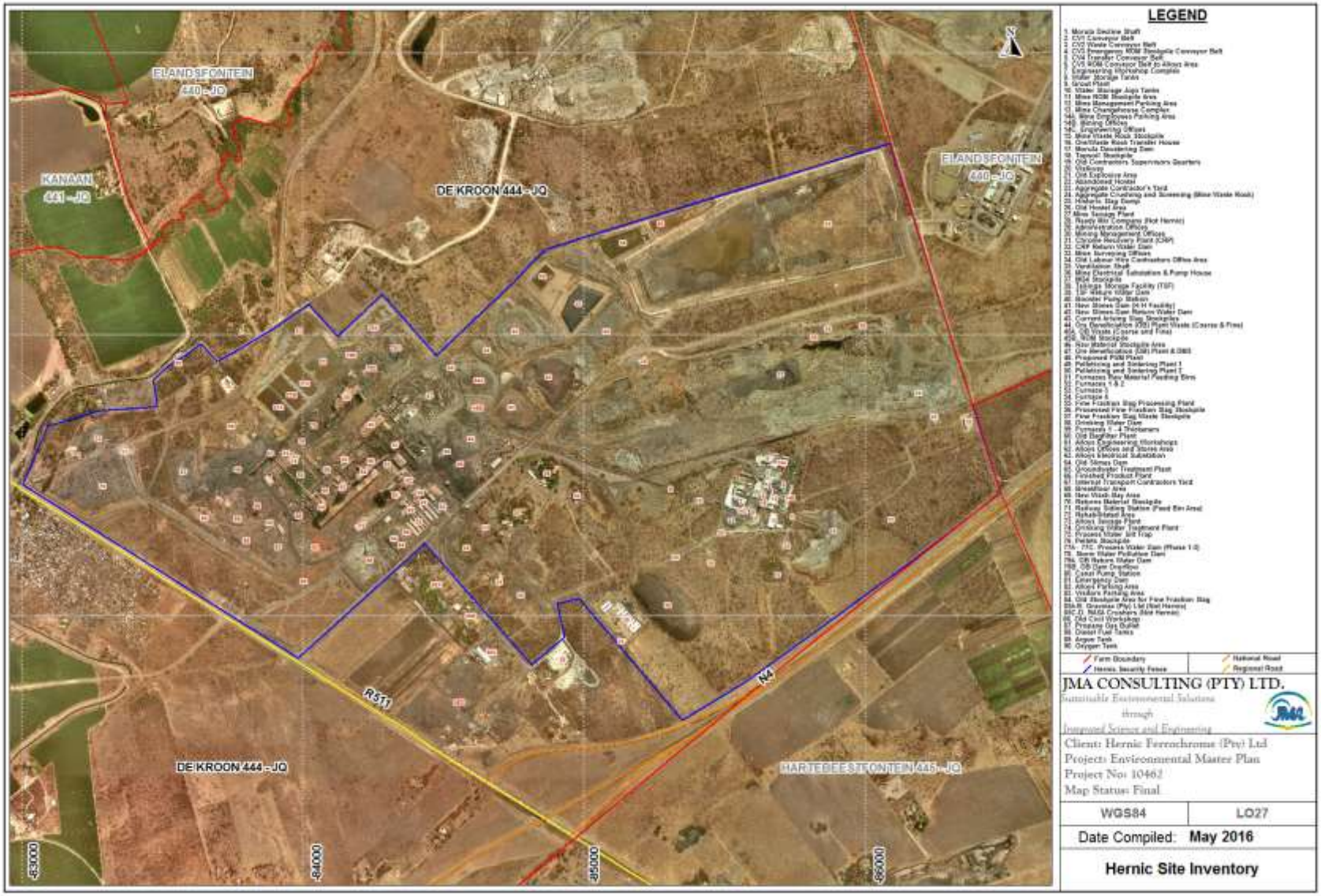

Figure 3.3(b): Site Layout and Infrastructure Map of the HERNIC Site

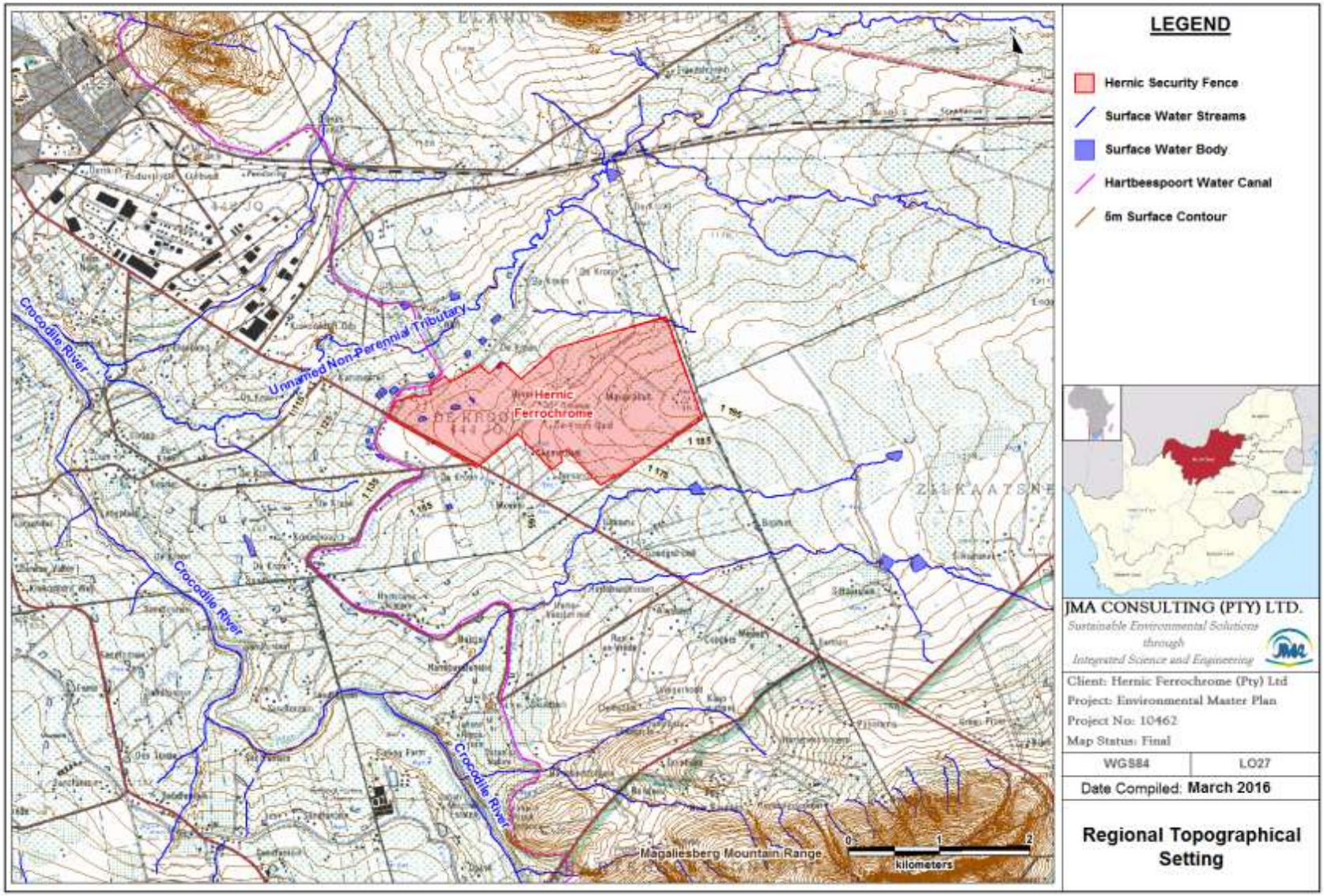

Figure 3.3(c): Regional Topography (Topographical Map 2527 DB)

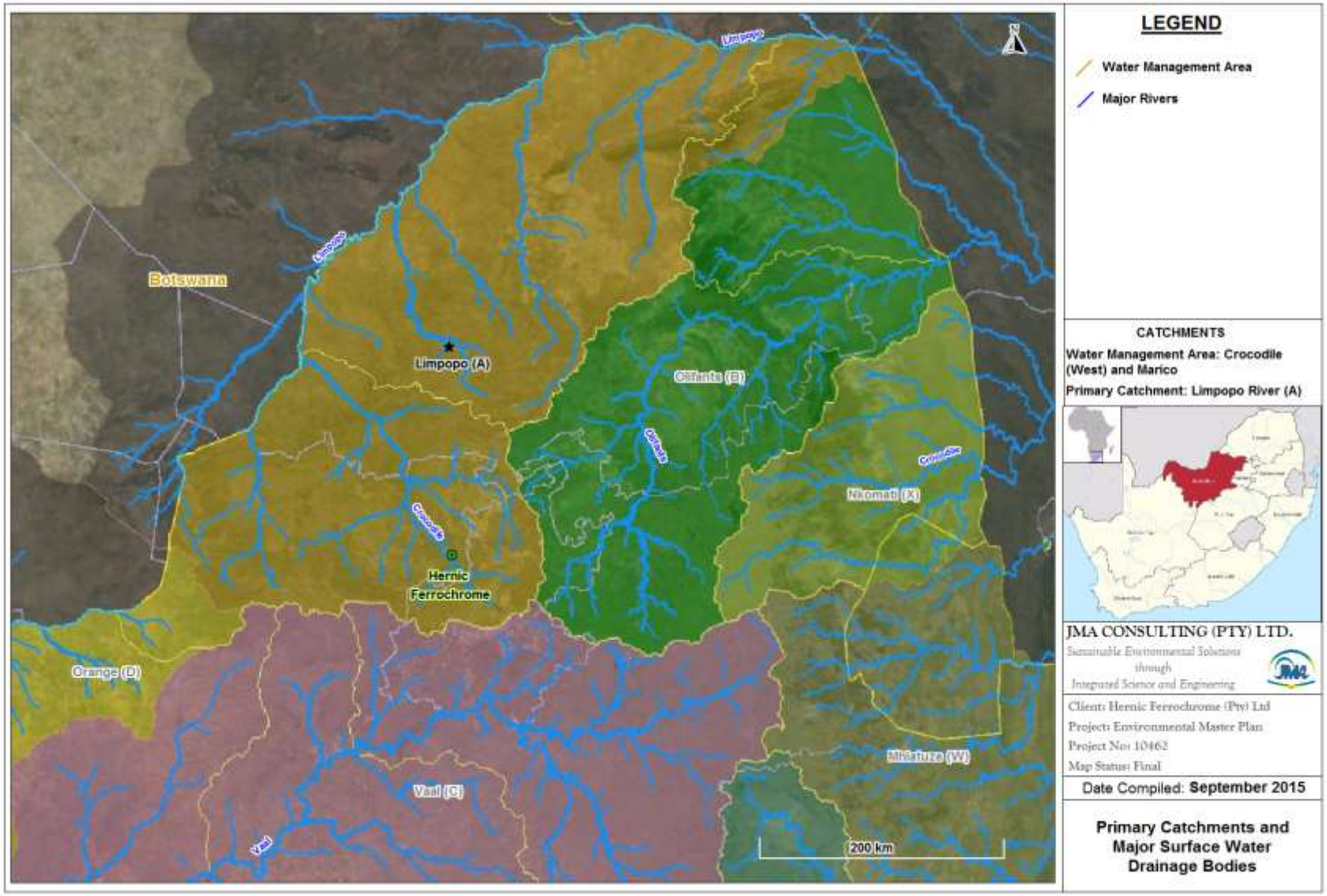

Figure 3.3(d): Primary Catchments and Major Surface Water Drainage Bodies

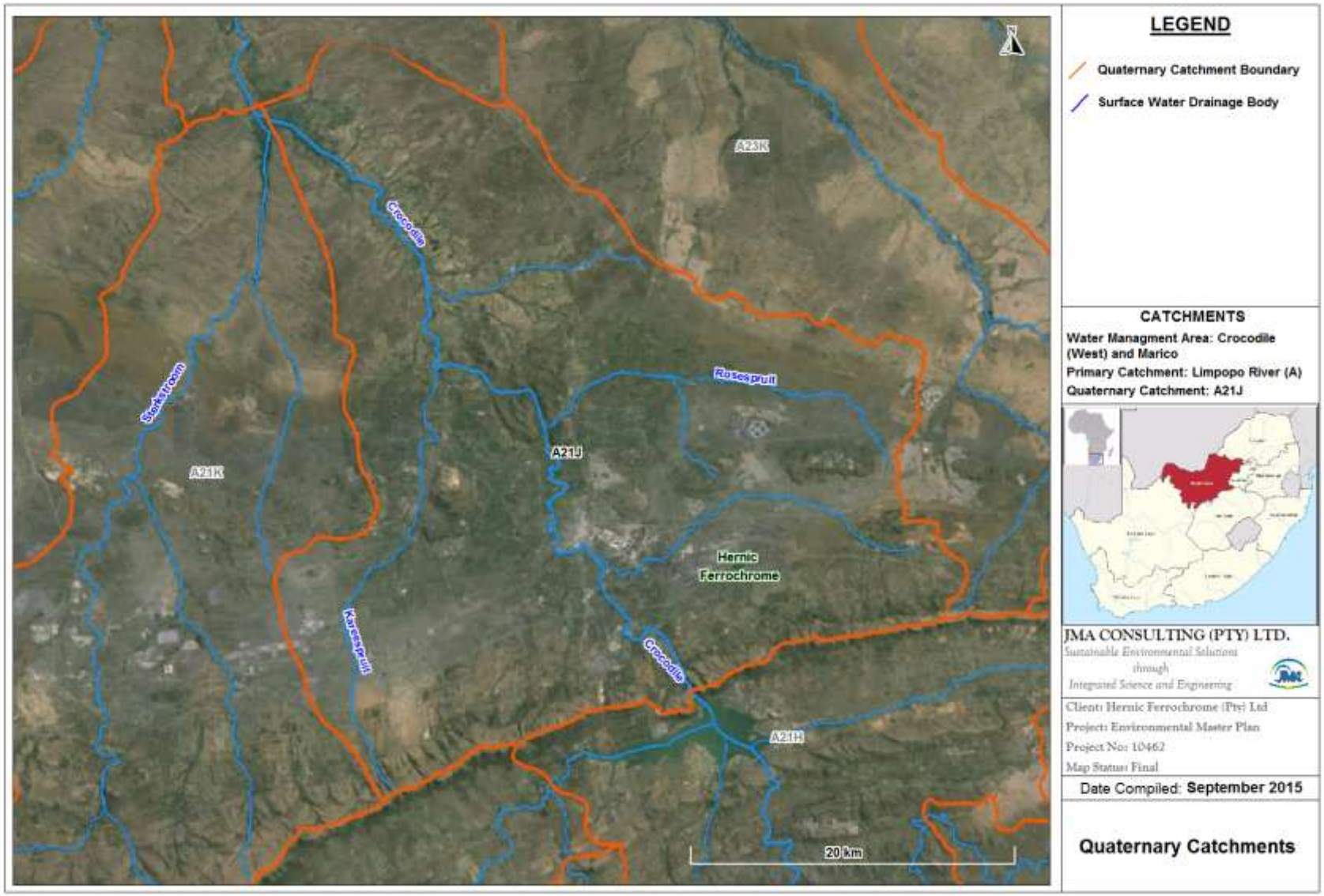

Figure 3.3(e): Delineated Quaternary Catchments

3.4. PROPERTY DESCRIPTION AND LANDOWNER STATUS

A summary of the properties for which HERNIC has mining rights (NW30/5/1/2/2/396MR and NW30/5/1/2/2/308MR) are listed in Table 3.4(a) and Table 3.4(b) for the two mining rights respectively. The 21 digit survey general codes for each land parcel is given in Table 3.4 (c).

It should be noted that HERNIC does not possess all the surface rights for which the mining rights have been issued, most notably the surface rights on the farm Elandsfontein 440 JQ, as well as the northern part of the farm De Kroon 444 JQ.

A comprehensive legal property assessment was conducted by TABACKS (Enviro-Legal Lawyers) and is attached as **APPENDIX 3(C)** to this report. This report deals with property details including Title Deeds and Zoning Certificates and can support future strategic decision making with regards to environmental authorization matters.

Table 3.4(a): Mining Right: NW30/5/1/2/2/396MR

Farm De Kroon 444 JQ	
Portion	**Sub-Portion**
Remaining Extent of Portion 46	
Remaining Extent of Portion 47	
Portion 78	
Remaining Extent of Portion 100	
Portion 104	
Remaining Extent of Portion 105	
Portion 135	
Portion 138	
Remaining Extent of Portion 143	
Portion 169	
Portion 170	
Remaining Extent of Portion 173	
Remaining Extent of Portion 174	
Farm Elandsfontein 440 JQ	
Portion	**Sub-Portion**
Portion 37	
Total Size	**894.9144 ha**

Table 3.4(b): Mining Right: NW30/5/1/2/2/308MR

Farm De Kroon 444 JQ	
Portion	**Sub-Portion**
Portion 47	
Portions of Portion 47	165
	166
	167
	168
Half Share of Remaining Portion of Portion 48	
Portion 297 of Portion 48	199
Portion 49	
Portion 50	
Portion 51	
Portion 52	
Portion 115	
Portion 119	
Portion 120	
Portion 132	Being Portion 267
Portion 122	
Portion 123	
Portion 157	
Portion 159	
Portion 160	
Portion 161	
Total Size	**329.9599 ha**

Table 3.4 (c): 21 Digit Surveyor General Codes for each Cadastral Land Parcel

Farm De Kroon 444 JQ		
Portion	**Sub-Portion**	**21 Digit Surveyor General Code**
Portion 47		T0JQ00000000044400047
Portions of Portion 47	165	T0JQ00000000044400047
	166	T0JQ00000000044400047
	167	T0JQ00000000044400047
	168	T0JQ00000000044400047
Half Share of Remaining Portion of Portion 48		T0JQ00000000044400048
Portion 297 of Portion 48	199	T0JQ00000000044400048
Portion 49		T0JQ00000000044400049
Portion 50		T0JQ00000000044400050
Portion 51		T0JQ00000000044400051
Portion 52		T0JQ00000000044400052
Portion 115		T0JQ00000000044400115
Portion 119		T0JQ00000000044400119
Portion 120		T0JQ00000000044400120
Portion 132	Being Portion 267	T0JQ00000000044400132
Portion 122		T0JQ00000000044400122
Portion 123		T0JQ00000000044400123
Portion 157		T0JQ00000000044400157
Portion 159		T0JQ00000000044400159
Portion 160		T0JQ00000000044400160
Portion 161		T0JQ00000000044400161
Remaining Extent of Portion 46		T0JQ00000000044400046
Remaining Extent of Portion 47		T0JQ00000000044400047
Portion 78		T0JQ00000000044400078
Remaining Extent of Portion 100		T0JQ00000000044400100
Portion 104		T0JQ00000000044400104
Remaining Extent of Portion 105		T0JQ00000000044400105
Portion 135		T0JQ00000000044400135
Portion 138		T0JQ00000000044400138
Remaining Extent of Portion 143		T0JQ00000000044400143
Portion 169		T0JQ00000000044400169
Portion 170		T0JQ00000000044400170
Remaining Extent of Portion 173		T0JQ00000000044400173
Remaining Extent of Portion 174		T0JQ00000000044400174
Farm Elandsfontein 440 JQ		
Portion	**Sub-Portion**	
Portion 37		T0JQ00000000044400037

The properties related to the mining right areas, together with other properties also belonging to HERNIC, are delineated on Figure 3.4(a).

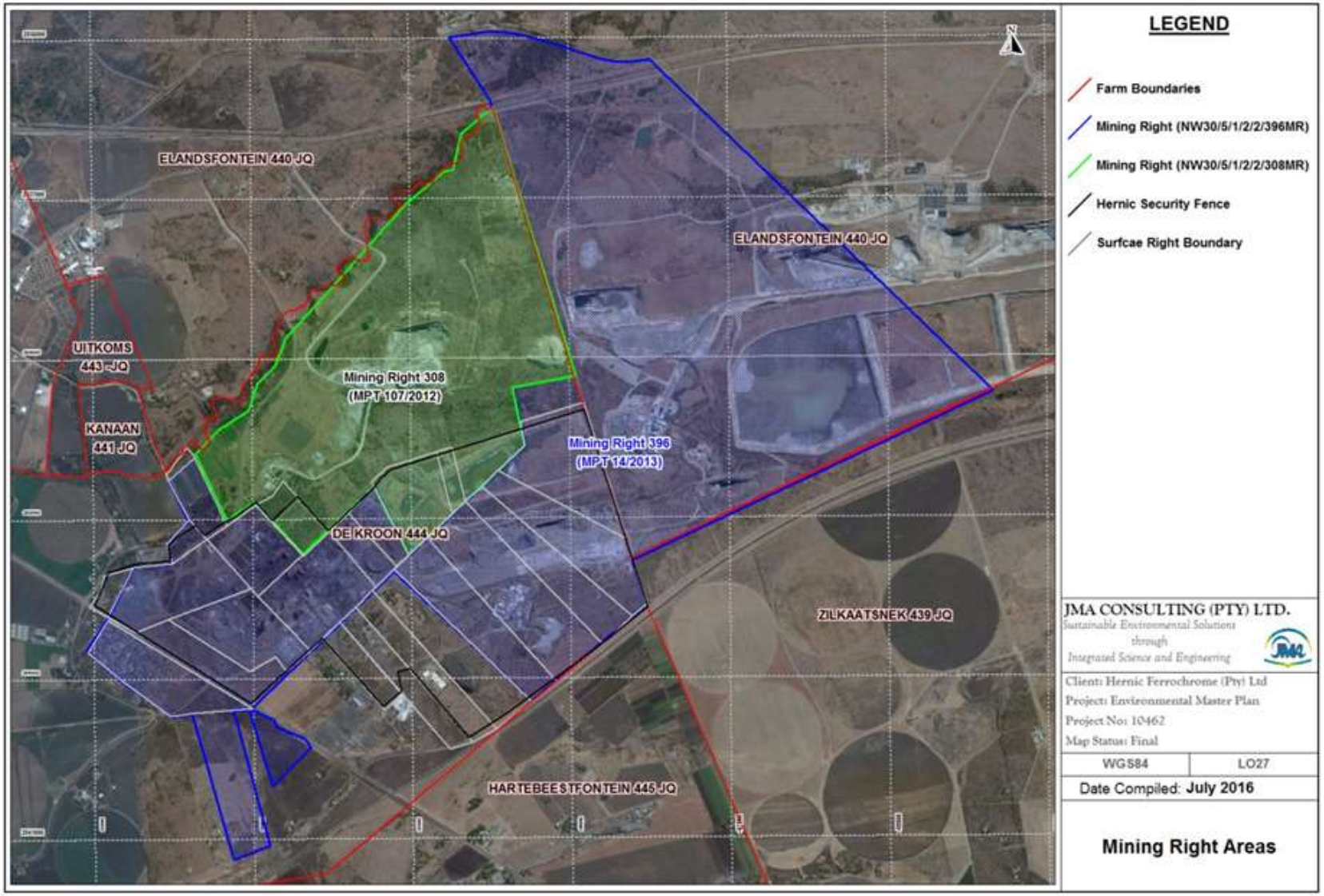

Figure 3.4(a): HERNIC Mining Right/Property Delineation

3.5. IDENTIFIED COMMUNITIES

The DMR Guideline for the compilation of a Scoping Report uses the Mineral and Petroleum Resources Development Act 28 of 2002 (MPRDA) definition for a *community* in relation to environmental matters pertaining to prospecting, mining, exploration, production or a related activity, which reads:

"*community*" means a group of historically disadvantaged persons with interest or rights in a particular area of land on which the members have or exercise communal rights in terms of an agreement, custom or law: Provided that, where as a consequence of the provisions of this act, negotiations or consultations with the community is required, the community shall include the members or part of the community directly affected by mining on land occupied by such members or part of the community.

Based on the definition as detailed in the DMR guidelines', no defined communities were identified in the project area.

3.6. RELEVANT TRADITIONAL AUTHORITY

No traditional authority has jurisdiction on the land on which the HERNIC operations are conducted and to which this application has relevance.

3.7. LAND CLAIMS STATUS

JMA Consulting formally requested the Land Claim Status of the relevant properties from the Land Claims Commissioner.

Formal documentation, confirming this, is attached as **APPENDIX 3(D)** to this report.

The Commission on Restitution of Land Rights indicated that there are currently no land claims on the relevant properties on which HERNIC Ferrochrome operates.

3.8. DETAILS OF RELEVANT MUNICIPALITY

Relevant details of the Local Municipality and the relevant Contact Person is given in Table 3.8(a) and similarly for the District Municipality in Table 3.8(b).

Table 3.8(a): Summary of the Local Municipality Details and Contact Person

Local Authority	Madibeng Local Municipality
Designation	Environmental Services - Environmental Specialist
Contact Person	Thapelo Ngwato
Postal Address	P.O. Box 3132, BRITS, 0253
Telephone Number	+ 27 12 318 9299
Facsimile Number	+ 27 12 318 9665
Email Address	thapelongwato@madibeng.gov.za

Table 3.8(b): Summary of the District Municipality and Contact Person

District Authority	Bojanala District Municipality
Designation	Environmental Management Unit
Contact Person	Thapelo Mathekga
Postal Address	P.O. Box 1993, RUSTENBURG, 0300
Telephone Number	+ 27 14 523 5083
Facsimile Number	+ 27 14 597 0306
Email Address	thapelom@bojanala.gov.za

3.9. DETAILS OF RELEVANT GOVERNMENT AUTHORITIES

3.9.1. National Authorities/Agencies/Institutions

Department of Mineral Resources (DMR)

National Department	Department of Mineral Resources- Head Office - Pretoria
Directorate	Director General's
Contact Person	Khayalethu Matrose
Postal Address	Private Bag X59, ARCADIA, 0007
Telephone Number	+ 27 12 444 3308
Email Address	khayalethu.matrose@dmr.gov.za

Department of Environmental Affairs (DEA)

National Department	Department of Environmental Affairs - Head Office - Pretoria
Directorate	Authorizations and Waste Disposal Management
Contact Person	B R Dlamini
Postal Address	Private Bag X 447, PRETORIA, 0001
Telephone Number	+ 27 12 310 3230
Facsimile Number	+ 27 12 359 3625
Cellular Phone	+ 27 71 872 4637
Email Address	brdlamini@environment.gov.za

Department of Water and Sanitation (DWS)

National Department	Department of Water and Sanitation - Head Office - Pretoria
Postal Address	Private Bag X313, PRETORIA, 0001
Telephone Number	+27 12 336 7500
Facsimile Number	+27 12 336 8664

3.9.2. Provincial/Regional Authorities/Agencies/Institutions

Regional Department of Mineral Resources (DMR)

Provincial Department	North West Regional Office
Directorate	Mineral Regulation North West Region
Contact Person	Christopher Tshisevhe
Postal Address	Private Bag A1, KLERKSDORP, 2570
Telephone Number	+ 27 18 487 4300
Facsimile Number	+ 27 86 710 1017
Email Address	Chris.Tshisevhe@dmr.gov.za

North West Rural, Environmental and Agricultural Development (READ; formerly known as NW DEDECT)

Regional Department	Rural, Environmental and Agricultural Development
Directorate	Environmental Impact Management
Contact Person	Ouma Skosana
Postal Address	Private Bag X 2039, MMABATHO, 2735
Telephone Number	+ 27 18 389 5959
Cellular Phone	+ 27 76 166 7224
Email Address	oskosana@nwpg.gov.za

Regional Department of Water and Sanitation (DWS)

Regional Department	Hartebeespoort Regional Office
Water Management Area	Crocodile (West) and Marico WMA
Contact Person	Thabakgolo Bopape
Postal Address	Private Bag X 357, HARTBEESPOORT, 0216
Telephone Number	+ 27 12 207 9911
Cellular Phone	+ 27 83 884 1937
Email Address	bopapet@dws.co.za

3.9.3. Other Authorities/Agencies/Institutions

South African Heritage Resources Agency (SAHRA)

National Department:	Cape Town, Western Cape
Contact Person	Nokukhanya Khumalo
Postal Address	PO Box 4637, CAPE TOWN, 8000,
Telephone Number	+ 27 21 462 4502
Facsimile Number	+ 27 21 462 4509
Email Address	nkhumalo@sahra.org.za

4. SCOPE OF OVERALL HERNIC ACTIVITIES

Information used to compile these sections of the report was primarily sourced from existing documentation such as the Amended Mining Work Programme, dated March 2013, as well as the Amended Environmental Management Programme dated June 2012. The information was further supplemented with information provided by the applicant and the site inventory and site layout was verified during a site inspections conducted by the EAP and a team of Specialists on several occasions during 2016.

4.1. PROJECT DESCRIPTION

The overall activities at HERNIC comprises the mining of chromite ore through open-cast (now almost completed and partially rehabilitated) and shallow underground mining methods, with the subsequent beneficiation of the ore into Ferrochrome and a number of secondary products including fine slag (slag sand) and waste rock aggregate.

This specific project relates to the application(s) for EA as required to upgrade/expand/add certain activities to the current HERNIC process. This project description will therefore make a distinction in later sections between **existing activities** and those relevant to the **current (new) applications**. The intention of this description is therefore to provide an overall description for the purposes of the EMPR Addendum, as well as descriptions as may be required for the individual new applications required.

4.1.1. Project Resource Attributes

4.1.1.1. Mineral Deposit

The HERNIC mineral deposit consists of the Middle Group (MG) Chromite Seams, specifically the MG-0 to MG-4 seams of the Bushveld Igneous Complex (BIC) in the Brits-Rustenburg area. The ore seams dip northwards at an angle of 10^0-20^0 extending over a strike distance of 3 000 *m* from west to east. They are displaced southwards by a north-south trending fault in the western region of the mining area. The seams extend to a minable depth of some 500 *m*.

The average estimated grade of the ore body is 38% Cr_2O_3 with a Cr:Fe ratio of 1.47:1.

The two Mining Rights (NW30/1/2/3/398MR - De Kroon 444 JQ and Elandsfontein 440 JQ – 894.9144 ha) and (NW30/1/2/3/308 MR – De Kroon 444 JQ – 329.9599 ha) authorizes mining of the following minerals in as far as they are associated with the MG Chromite Seams:

Chromite, Platinum Group Metals (namely, Platinum, Ruthenium, Rhodium, Palladium, Osmium and Iridium), Gold Ore, Silver Ore, Nickel Ore, Copper Ore, Cobalt, Rare Group Elements, Vanadium and Iron Ore as well as non-metallic elements such as Sulphur, Selenium and Tellurium, as well as Sand manufactured from Waste Rocks.

4.1.1.2. Mineable Seam/ Ore Bodies

The overall ore body to be mined is located 10 *kilometres* south of Brits in the North West Province on the farms De Kroon 444 JQ and Elandsfontein 440 JQ. The reef sub-outcrops under a layer of black turf approximately 1 *m* thick and extends to a mineable depth of 500 *m*.

Due to the fact that the ore body outcrops, all five MG Seams (MG-0, MG-1, MG-2, MG-3 and MG-4) are mineable through opencast methods up to depths of 40 *m* below surface. Below mining depths of 40 *m*, two seams (MG-1 and MG-2) are viable through underground mining methods up to depths of some 500 *m* below surface.

The total estimated MG ore body reserves down to 500 *m* below surface for the 1224.8743 *ha* mining right area, was estimated at between 70 000 000 *tonnes* to 85 000 000 *tonnes*.

The remaining ore body as at the end of 2015, is estimated to be some 58 000 000 *tonnes*.

The PGM resource definition was conducted for the tailings stored in the Historical Open Pit, in the HERNIC Tailings Storage Facility (TSF), from the current arisings from HERNIC's mining operations, as well as from external sources such as e.g. the Chemstof Slimes and other external sources. The estimated reserves contained in the Open Pit and on the TSF alone exceeds 2 245 000 *tonnes*, supplemented of course with new arisings from the underground mining over the life of mine.

4.1.1.3. Planned Life of Mine/Facility

The initial Life of Mine (LOM) for the proposed opencast and shallow underground mining of the reserves as described in the previous section was 20 *years*. Commencing in 1996, the 20 *year* life of mine projects to 2015. This part of the mining was actually completed in 2014.

The planned future production rates for the mine is 960 000 *tonnes per year* which equates to a remaining (after 2015) potential life of mine of some 60 *years*. This, together with ore from other sources, will enable the plant to produce some 420 000 *tonnes per year* of ferrochrome for as long as the ore body lasts, i.e. 60 *years,* or perhaps even longer provided other ore resources could be sourced. The PGM plant theoretically has the same LOM as the Smelting and Mining operations. In the event that external feed can be sourced, the theoretical life of the PGM Plant could be longer.

4.1.1.4. Product Specifications

Chrome, lumpy ore and ore concentrate will be converted to ferrochrome (also known as charge chrome) for the production of stainless and speciality steels. Ferrochrome increases mechanical properties and corrosion resistance. HERNIC produce and supply ferrochrome to the global stainless steel industry.

Ferrochrome is produced using Electric Submerged Arc Furnaces. The closed furnaces are fed raw materials from various sources including chrome ore, coke, char, coal, quartzite and dolomite via the proportioning system for the production of ferrochrome. The valuable portion of the chromite is converted into a metallic phase. The impurities and higher melting oxides remain in a slag phase.

The furnaces are tapped intermittently. The ferrochrome and slag are separated by means of a skimmer plate. The ferrochrome is tapped into sand moulds or layer casted where it is left for a few hours to cool down and then removed to the breaking floor. The finished product is crushed and screened to exact customer requirements (in terms of size and chemical composition).

Typical specifications for the chrome ore, concentrate and charge chrome produced at HERNIC are listed in Table 4.1.1.4(a) and Table 4.1.1.4(b).

Table 4.1.1.4(a): Typical Specifications for Chrome Ore and Concentrate

	FeO%	Cr_2O_3%	SiO_2%	Al_2O_3%	TiO_2%	MgO%	CaO%	Cr/Fe%
MG-1 ROM	24.0	38.5	6.70	14.5	0.60	10.7	0.60	1.41
MG-2 ROM	23.5	36.0	9.50	14.9	0.70	10.1	0.87	1.35
MG-3 ROM	23.5	35.0	10.7	16.6	0.80	9.00	1.30	1.31
MG-4 ROM	22.0	32.5	13.5	17.4	0.70	10.1	1.40	1.30
Concentrate	27.0	41.5	4.00	16.0	0.70	9.10	0.40	1.33

Table 4.1.1.4(b): Typical Specifications for Charge Chrome (Ferrochrome)

Lumpy Material		**Small Lumpy Material**		**Fines**	
Cr	49% min	**Cr**	48% min	**Cr**	47% min
C	6.0-8.0%	**C**	6.0-8.0%	**C**	6.0-8.0%
Si	3.0-7.0%	**Si**	7.0% max	**Si**	7.0% max
P	0.025% max	**P**	0.025% max	**P**	0.025% max
S	0.060% max	**S**	0.060% max	**S**	0.060% max
Slag 0.5% max		Slag 2.0% max		Slag 3.0% max	
Trace elements available on request		Trace elements available on request		H20 3.0% max ex plant	
Sizing		**Sizing**		**Sizing**	
10 x 80mm		6 x 25mm		6mm with typical 45% 1mm	
10 x 100mm		3 x 25mm		55% as -1mm	
10 x 125mm		(5% over and under)			
Customer to specify (5% over and under)					

In 2012/2013 HERNIC successfully applied for an amendment to their mining rights in order to also mine and process other minerals incidental to the ore body mined. These additional minerals will be extracted from the current ore arisings from the underground mining as well as through re-mining of the fine tailings currently present in both, a section of the backfilled open pit, as well as on the HERNIC TSF.

In addition to the ferrochrome produced from the chrome ore, HERNIC will now also recover/produce:

- Platinum Group Minerals (PGM), (platinum, ruthenium, rhodium, palladium, osmium, iridium)
- Gold Ore
- Silver Ore
- Nickel Ore
- Copper Ore
- Cobalt
- Rare Group Minerals
- Vanadium

- Iron Ore
- Non-Metallic Elements (sulphur, selenium, tellurium)
- Sand manufactured from waste rocks.

The PGM Plant is capable of treating 55 000 *tonnes per month* following the chrome removal step. A saleable PGM concentrate in excess of 100 *gram per tonne* 4E PGM is envisaged and based on a recovery of 55%, a total of 2 582 *ounces per month* is estimated from the PGM operations.

The typical product makeup from the PGM Plant will include:

Platinum	65%
Palladium	23%
Rhodium	12%
Gold	0.4%

4.1.1.5. Product Markets

The total Ferrochrome production from the plant is exported with the target market Europe 37%, America 1% and Far East 62%. The prevailing market for Ferrochrome is the Stainless Steel Producers market, with current usage of 20 million *tonnes per year* with an expected growth between 15% and 30%. This is based on growth within the stainless steel market over the last 30 *years*, particularly the South African contribution towards the international market.

PGM minerals platinum, rhodium and palladium (99% of the product) find their primary application in the manufacture of catalytic converters used in the exhaust systems of vehicles, where the converters convert harmful exhaust gasses into less harmful gasses. These products are therefore mainly exported to the international markets.

4.1.1.6. Product Price

The price of the products produced at HERNIC varies as a function of the international ferrochrome commodity price as well as of course the relevant international monetary exchange rates.

Recent Ferrochrome prices as in January 2016, was quoted at US $ 0.87/ *kg*. At an exchange rate of R 15.50 to the US $, the price approximates R 13.40 / *kg* or R 13 400.00 / *tonne*.

The PGM Plant financial model was done at an average price for the 4E PGM product of 969 US dollar per ounce.

4.1.2. Project Motivation

HERNIC was established in 1995 and has been operational since May 1996. As far as EA's are concerned, the Mine and Smelter operates in terms of an approved EMPR, which has been amended several times to include new activities. HERNIC also operates in terms of other EA's as required in terms of the National Water Act (Water Use Licence), as well as the National Environmental Management Air Quality Act (AEL).

The site does not have a Waste Management Licence in terms of the National Environmental Management Waste Act, as mining related waste was excluded from the NEMWA until as recently as 2014.

HERNIC is currently in the process of planning the upgrading and refining of various management measures as relating to waste and water management. In this regard projects are being designed to cater for *inter alia*:

- Decommissioning of two Historic Slimes Dams
- Decommissioning of Phase 1 of the H:H Slimes Dam
- Development and Expansion of the Site Storm Water and Process Water Management Facilities:
    - Development and Expansion of the Process Water and Storm Water Canal System including Silt Traps
    - Development of the Morula PCD
    - Expansion of Storm Water PCD No.1
    - Development of Storm Water PCD No.2
    - Development of Storm Water PCD No.3
    - Development of Storm Water PCD No.4
    - Expansion of the OB Plant Process Water Dam
    - Expansion of the Plant Process Water Dam
    - Expansion of the CRP Process Water Dam
- Decommissioning of the Morula Dewatering Dam
- Development of a New Salvage Yard
- Expansion of the Tap Hole Fume Extraction System
- Expansion of the Finished Product Plant Dust Abatement System
- Expansion of the HERNIC Tailings Storage Facility (TSF)
- Re-Use (Screening, Stockpiling, Internal Use and /or Selling) of Fine Slag at the Fine Slag Processing Plant
- Re-Use (Screening, Stockpiling, Internal Use and /or Selling) of Coarse Slag at the Chrome Recovery Plant
- Re-Use (Screening, Stockpiling, Internal Use and /or Selling) of Mine Waste Rock at the Mine Waste Rock Stockpile

In view of the fact that the EMPR has to be amended in order to include these activities, and because the previous EMPR consolidation (2012) is now outdated, HERNIC has requested that a full consolidated and amended EMPR be compiled to reflect all the current and proposed new/expanded activities.

This project is therefore aimed at enhancing Environmental Management Efficiency at HERNIC and thereby actually contributing to the sustainability of the operation, the attributes of which are discussed below.

HERNIC is one of the world's largest integrated ferrochrome producer based in the North West Province, South Africa. HERNIC operates 4 furnaces, including the largest ferrochrome furnace in the Southern Hemisphere.

HERNIC is the pioneer in the conversion of semi-closed/open furnaces to closed furnace technology. This conversion brings many benefits, including a reduction in particulate matter (environmental improvement) in atmospheric emissions, better thermodynamic efficiencies and a better work environment for personnel.

HERNIC employs some 670 permanent employees and 1800 contractors with both mines operational. It operates 2 chrome mines which can produce up to 1.5 million *tonnes per annum*, however one shaft is currently on care and maintenance due to the falling commodity prices.
HERNIC operates 4 ferrochrome furnaces with a capacity of 420 000 *tonnes per annum* and these furnaces are in full operation. All ferrochrome are currently exported mainly to Asian and European markets.

Core values of HERNIC are their responsibility toward safety, the environment and society. Compliance with the Mining Charter is an imperative for the business as a South African based mining company. HERNIC strives to be fair and open to all stakeholders in conducting its business.

HERNIC maintains ISO 9001 certification since 1998. A certification of this level is testament to the success of HERNIC's Quality Management System. This strategic framework has enhanced the organisation's culture of promoting the importance of customer satisfaction and the fulfilment of statutory and regulatory requirements.

Through monitored and effective management reviews, HERNIC will ensure that its initiatives to improve quality keep pace with its rapid growth. This commitment will guarantee the continued satisfaction of their current and future customers.

HERNIC implemented the OHSAS 18001 standard during 2009 and has as its vision the achievement of zero harm. This means that the company strive to prevent injuries and ill health to anyone who performs work on its sites, as it is their belief that employees are their key asset and it is the right of every employee to work in a safe and healthy environment whilst in the employment of HERNIC. They are also in the process of implementing a Behaviour Based Safety Program (BBS) to enhance the overall Safety Culture within its operations.

4.1.2.1. Need for Product

Over 80% of the world's ferrochrome is utilised in the production of stainless steel. In 2006 no less than 28 million *tonnes* of stainless steel were produced. Stainless steel depends on chromium for its appearance and its resistance to corrosion. The average chrome content in stainless steel is approximately 18%. It is also used when it is desired to add chromium to carbon steel in order to change the mechanical properties of the carbon steel. FeCr from Southern Africa, known as 'charge chrome' and produced from a Cr containing ore with a low Cr content, is most commonly used in stainless steel production.

Alternatively, high carbon FeCr produced from high grade ore found in Kazakhstan (among other places) is more commonly used in specialist applications such as engineering steels where a high Cr to Fe ratio and minimum levels of other elements such as sulphur, phosphorus and titanium are important and production of finished metals takes place in small electric arc furnaces compared to large scale blast furnaces.

PGM minerals platinum, rhodium and palladium (99% of the product) find their primary application in the manufacture of catalytic converters used in the exhaust systems of vehicles, where the converters convert harmful exhaust gasses into less harmful gasses. These products are therefore mainly exported to the international markets.

4.1.2.2. Strategic Importance of the Resource/Product

Ferrochrome is a corrosion-resistant alloy of chrome and iron containing between 47% and 55% chrome. Over 80% of the world's ferrochrome is utilized in the production of stainless steel. The average chrome content in stainless steel is approximately 18%.

PGM minerals platinum, rhodium and palladium (99% of the product) find their primary application in the manufacture of catalytic converters used in the exhaust systems of vehicles, where the converters convert harmful exhaust gasses into less harmful gasses. These products are therefore mainly exported to the international markets.

HERNIC currently possess the capacity to produce 420 000 *tonnes* of ferrochrome *per annum*. This makes HERNIC one of the world's large and amongst the lowest cost, ferrochrome producers.

HERNIC's chrome mines are either opencast or shallow underground mines. The gently dipping reefs of chromite are accessed by box cuts and decline shafts. Mining is of opencast, conventional or board and pillar nature and is currently conducted at depths ranging from surface (opencast), or from 50 *m* to 500 *m* below surface. Development is done on reef where possible, thereby minimizing waste dilution. In addition to ore from its own mines, ore is purchased from nearby platinum producers, where chrome-rich fines are discarded as a tailings product.

4.1.2.3. Socio-Economic Benefits

HERNIC produces some 420 000 *tonnes* of Ferrochrome *per annum,* all of which is exported, thereby earning vast amounts of foreign currency. Using January 2016 values the total estimated turnover for HERNIC calculates to several R billion *per annum*.

Employing more than 650 full time employees, supporting 1800 service provider employees (in the event that both mines are operating) and having done so for some 20 *years* now, HERNIC's direct and indirect investments into the socio-economic wellbeing of the area, is staggering.

The proposed activities will further enhance HERNIC's sustainability and will provide a solid base from which to operate and manage the site in an environmentally sustainable fashion for the remaining project life which is some 60 *years*.

4.2. CURRENT ACTIVITY INFRASTRUCTURE AND PROCESS

This section deals with the current activities at HERNIC and which are deemed to be already authorized in terms of the MPRDA and other relevant enabling legislation. These activities are described in various amendments of the EMPR and this opportunity will now be used to compile a fully comprehensive description of all the site activities for ease of reference.

A description of the new activities for which environmental authorization is sought in terms of the applications to be lodged as part of this project, will be described in section 4.3 of this report. This may include existing activities deemed to have been authorized in previous EMPR's but subject to recent Enviro-Legal inspections and audits may require additional attention.

4.2.1. Overall Operation at HERNIC FERROCHROME

The overall operations at HERNIC comprise:

- mining of the MG Chromite Seams (MG-0, MG-1, MG-2, MG-3 and MG-4) (open-cast and underground);
- the sourcing of other ore minerals from neighbouring mines (MG-O, MG-1, MG-2, LG-6 and UG-2 ore);
- the procurement of other raw materials (such as dolomite, limestone, quartzite, anthracite, coke);
- the beneficiation and concentration of ore (crushing, screening, spiralling and dense medium separation (DMS)) in an Ore Beneficiation (OB) Plant;
- the pelletizing and sintering of the concentrate ore at two Pelletizing Plants;
- the blending of lumpy ore, pellets and other raw materials in two Proportioning Plants;
- the smelting of these feed materials in four Closed Submerged Arc Furnaces;
- the separation of Ferrochrome and Slag during tapping at the Furnaces;
- the breaking of the Ferrochrome after smelting;
- the recovery of Ferrochrome from Slag at the Primary Chrome Recovery Plant (CRP);
- the recovery of Ferrochrome at the Fine Slag Processing Plant (Secondary CRP);
- the recovery of PGM minerals from re-mined and current tailings
- the final preparation of the Ferrochrome product for dispatch to the markets at the Finished Product Area;

In addition to these production-related activities, ancillary operations relating to environmental management also occur:

- Waste Management
- Process Water Management
- Storm Water Management
- Groundwater Management
- Atmospheric Emissions Control

4.2.1.1. General Site Layout – Activity Areas

A high resolution aerial photograph was commissioned during 2015 and was used to support a full site description and activity inventory for the HERNIC operations. The site was divided into separate operational areas based on the different activities occurring on the site, including *inter alia* the Alloys Smelting Plant, the Tailings Storage Facility (TSF), the Office Complex and Chrome Recovery Plant (CRP), the Morula Mining Opencast Operation and the Morula Mining Shaft Complex, the latter servicing the underground mining operations. Refer to Figure 4.2.1.1(a) for the operational areas and to Figure 4.2.1.1(b) for the location of the different activities occurring on site, i.e. site inventory.

The maps depicted in Figure 4.2.1.1(a) and Figure 4.2.1.1(b) focus on the HERNIC surface located activities which are restricted to the Farm De Kroon 444 JQ, and which covers a total surface area of approximately 386.45 *ha*.

The HERNIC mining right extends onto the neighbouring Farm Elandsfontein 440 JQ as well, but at present no HERNIC related surface activities occur on this property. Historically both open-cast mining (Eland Platinum) as well as underground mining (HERNIC) occurred on Elandsfontein. Whereas the open-cast mining has been completed and is currently in a state of partial rehabilitation (Eland Platinum responsibility), underground mining of the MG-1 and MG-2 seams by HERNIC will continue on this property. The HERNIC mining activities on both properties are described in more detail in section 4.2.2.

A large scale version of Figure 4.2.1.1(b) is attached as **APPENDIX 3(B)** of this report.

4.2.1.2. Access Roads

The site locality in relation to the main access roads is shown on Figure 4.2.1.2(a). Direct access to the site is gained from the R 511 (Pretoria-Brits road) which runs in a north-westerly direction along the western boundary of HERNIC. This road intersects the N4 Pretoria-Rustenburg freeway which essentially forms the southern boundary of the site. The R 566 Rosslyn-Brits road runs some 2 *km* to the north of the site in an east by west direction.

Both these access roads are in acceptable condition with minor maintenance requirements.

4.2.1.3. Railway Lines

The site is serviced by a Railway Siding branching off from the main Pretoria-Rustenburg rail section, and which enters the site through its northern boundary. The Pendoring siding (where the offtake originates) is located in the Brits industrial area.

HERNIC has made provision for the following at the Pendoring Siding:

- Rental of 4 000 m^2 of storage area
- Construction of concrete floors and bunkers in the storage area
- A loop railway line servicing the site
- A diesel rail shunting unit

The rail loop servicing the HERNIC site is indicated on Figure 4.2.1.2(a).

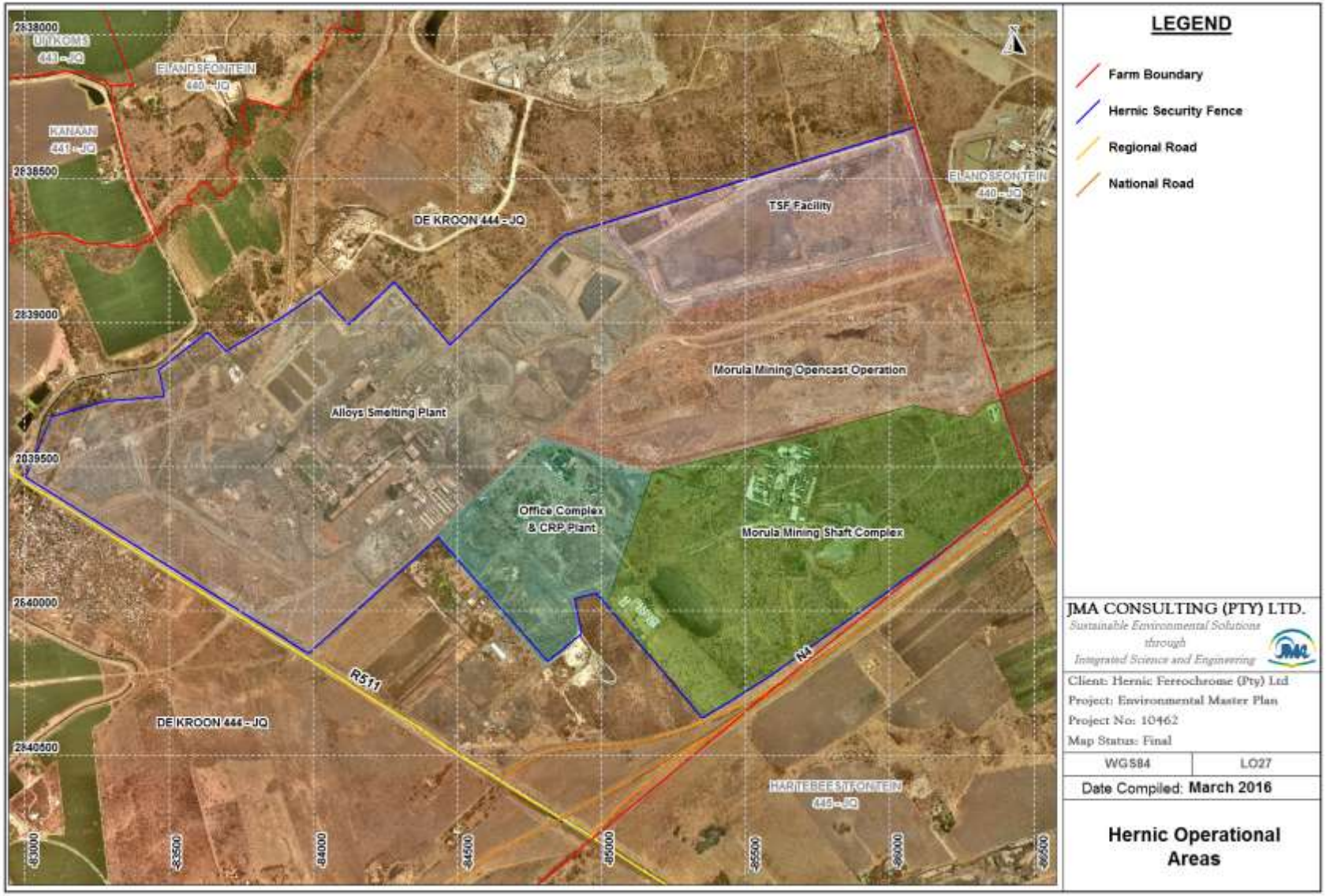

Figure 4.2.1.1(a): Operational Areas of HERNIC on the Farm De Kroon 444 JQ

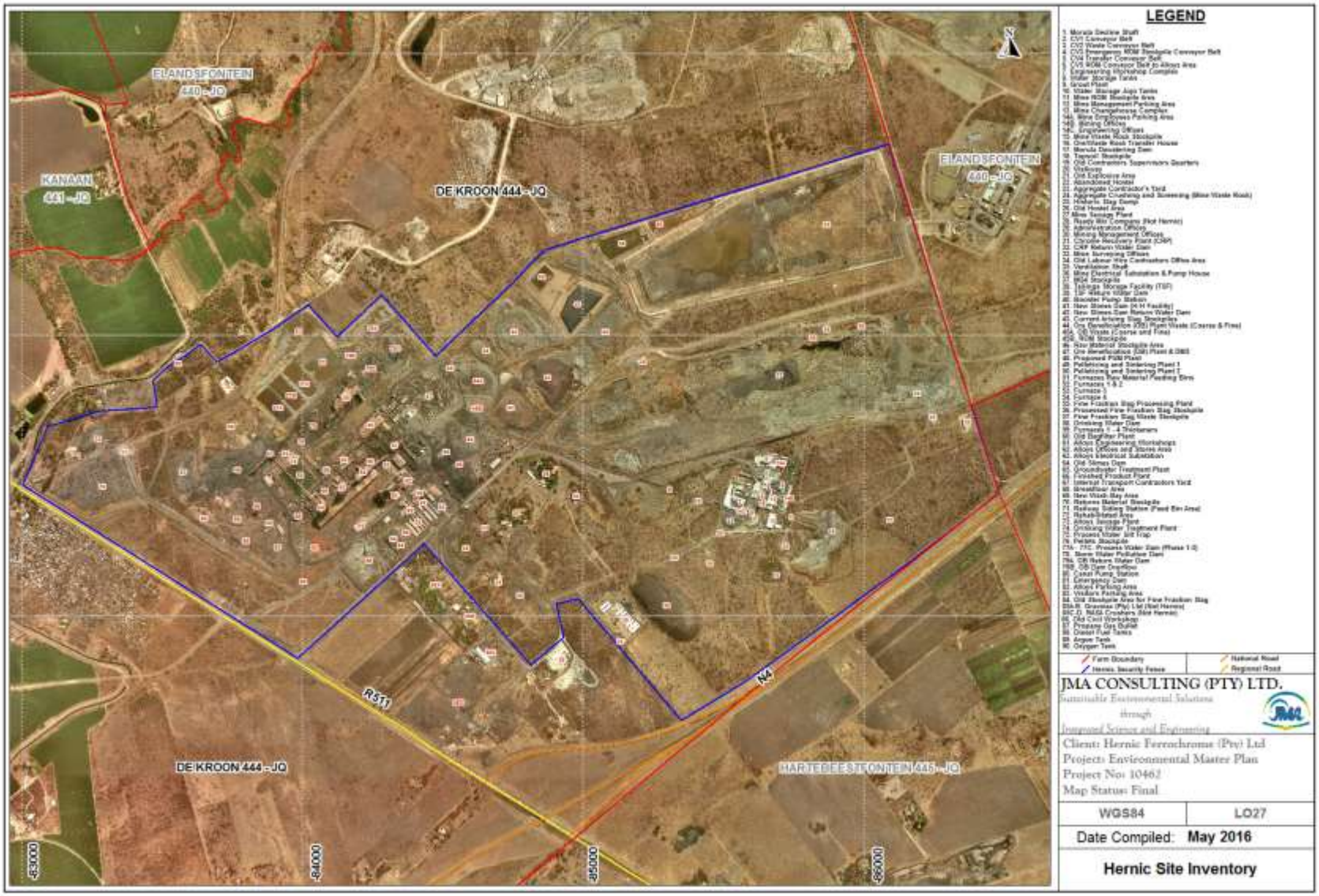

Figure 4.2.1.1(b): Site Infrastructure and Activities (Site Inventory) at HERNIC on the Farm De Kroon 444 JQ

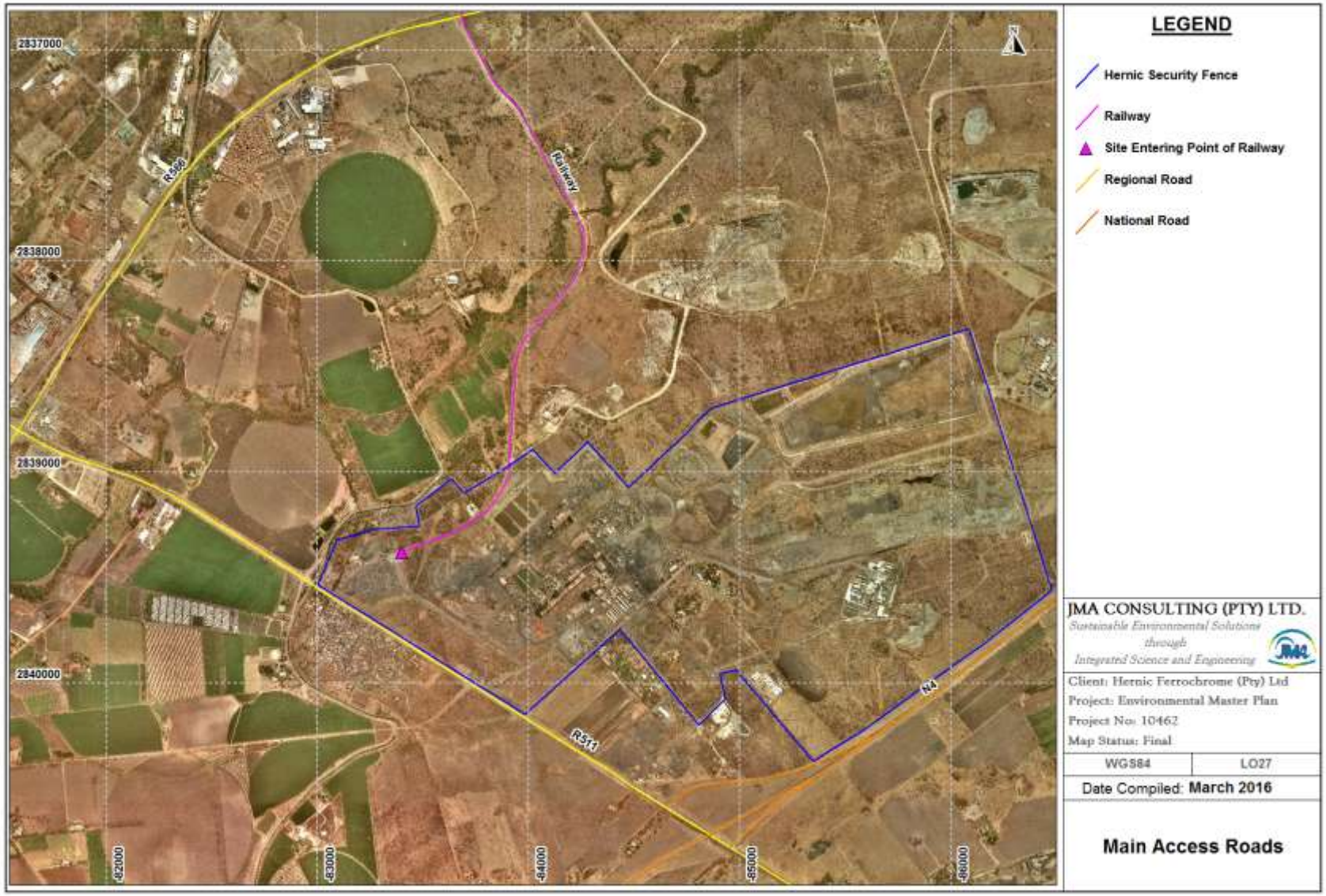

Figure 4.2.1.2(a): Road and Railway Access to the HERNIC Site

4.2.1.4. Security Fence and Access

The HERNIC site is fully fenced with a security fence totalling some 9.76 *km* in length. Access through the security fence onto the site is controlled at 15 main security gates. The delineation of the site perimeter fence, as well as the localities of the main security gates on site are shown on Figure 4.2.1.4(a). Details pertaining to these security access gates are relayed in the Table below. A photograph of the main security gate is shown on Figure 4.2.1.4(b).

Table 4.2.1.4(a): Description and Coordinates of the HERNIC Main Security Gates

Description of Gates	Latitude	Longitude
SG-1 Southern Security Gate at Finished Product Area	25°39'51.95"S	27°50'19.40"E
SG-2 HERNIC Main Security Gate	25°39'44.19"S	27°50'28.72"E
SG-3 Security Gate at CRP Plant	25°39'50.71"S	27°50'32.43"E
SG-4 Security Gate at Visitors Parking	25°39'42.85"S	27°50'30.54"E
SG-5 Security Gate at CRP Loading Area	25°39'41.12"S	27°50'31.89"E
SG-6 Security Gate at Office Complex	25°39'34.84"S	27°50'40.39"E
SG-7 Security Gate at TSF Return Water Dam	25°39'15.36"S	27°50'53.17"E
SG-8 Security Gate at Tailings Storage Facility (TSF)	25°39'18.92"S	27°50'58.77"E
SG-9 Security Gate at Morula Mining Opencast Operations	25°39'23.41"S	27°50'57.14"E
SG-10 Northern Security Gate at Morula Mining Shaft Complex	25°39'37.62"S	27°51'14.24"E
SG-11 Western Security Gate at Morula Mining Shaft Complex	25°39'37.90"S	27°51'9.54"E
SG-12 Southern Security Gate at Morula Mining Shaft Complex	25°39'44.17"S	27°51'10.75"E
SG-13 Security Gate at Historic Slag Dump	25°39'50.55"S	27°50'52.72"E
SG-14 Security Gate at Mine Sewage Plant Area	25°39'56.40"S	27°50'51.70"E
SG-15 Security Gate at Aggregate Plant & Contractors Yard	25°39'29.50"S	27°51'37.26"E
SG-16 Western Security Gate at Finished Product Area	25°39'49.37"S	27°50'16.61"E
SG-17 Security Gate at Raw Materials Stockpile Area 2	25°39'47.10"S	27°50'2.03"E
SG-18 Security Gate North of Alloys Sewage Plant	25°39'25.19"S	27°50'0.82"E

4.2.1.5. Water Supply

The site is supplied with raw water from the Hartbeespoort Irrigation Canal via a canal from the Hartbeespoort Dam.

A copy of the original contract with, and confirmation of the water allocation from, the Hartbeespoort Government Water Scheme, dated 05 January 1995 is attached under **APPENDIX 4(A)** which states that HERNIC may "*abstract a maximum of 876 000 m^3 of un-purified water from the canal for industrial and household purposes for use on Portion 47 of the farm De Kroon 444 JQ in the district of Brits*".

The canal runs along the northern perimeter of the site and a raw water pump station is located along the canal. The locality of the canal and the pump station is shown on Figure 4.2.1.5(a). The centre coordinates of this pump station is relayed in the Table below.

Photographs of the pump station and the ancillary infrastructure and flow meters are depicted in Figure 4.2.1.5(a). Flow meters are installed at this pump station and are calibrated every two years. Water is pumped from the pump station and stored in the Plant Drinking Water Dam.

Table 4.2.1.5(a): Centre Coordinates of the Hartbeespoort Dam Canal Pump Station

Description	Latitude	Longitude
Hartbeespoort Dam Canal Pump Station	25°39'24.67"S	27°49'55.38"E

4.2.1.6. Power Supply

Power is supplied to the site via a 240 MW ESKOM Yard (202 MV nominated max demand as per HERNIC's choice). The locality of this ESKOM Yard is depicted in Figure 4.2.1.6(a) and the centre coordinates are relayed in the Table below. A photograph of the ESKOM Yard is provided in Figure 4.2.1.6(b).

Electricity is distributed to the various activities on site by means of two overhead lines, one for the underground activities and one on the surface activities. Electricity is reticulated from the ESKOM Yard via four transformers (33 *kV* each) to approximately 32 electrical sub-stations distributed around the site.

Table 4.2.1.6(a): Centre Coordinates of the HERNIC ESKOM Yard

Description	Latitude	Longitude
ESKOM Yard	25°39'35.66"S	27°50'16.78"E

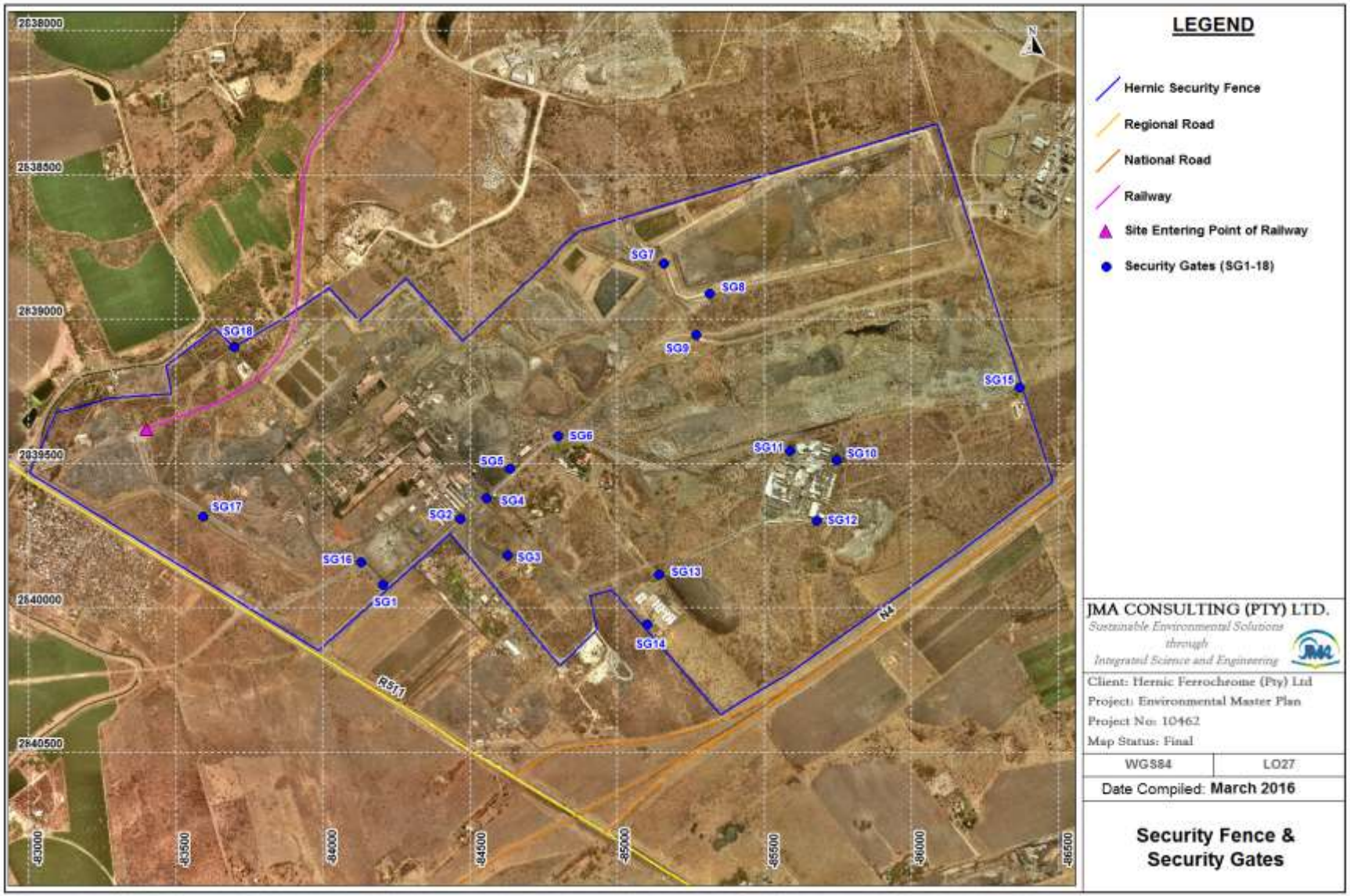

Figure 4.2.1.4(a): Delineation of the HERNIC Perimeter Security Fence also showing the Localities of Secured Access Gates

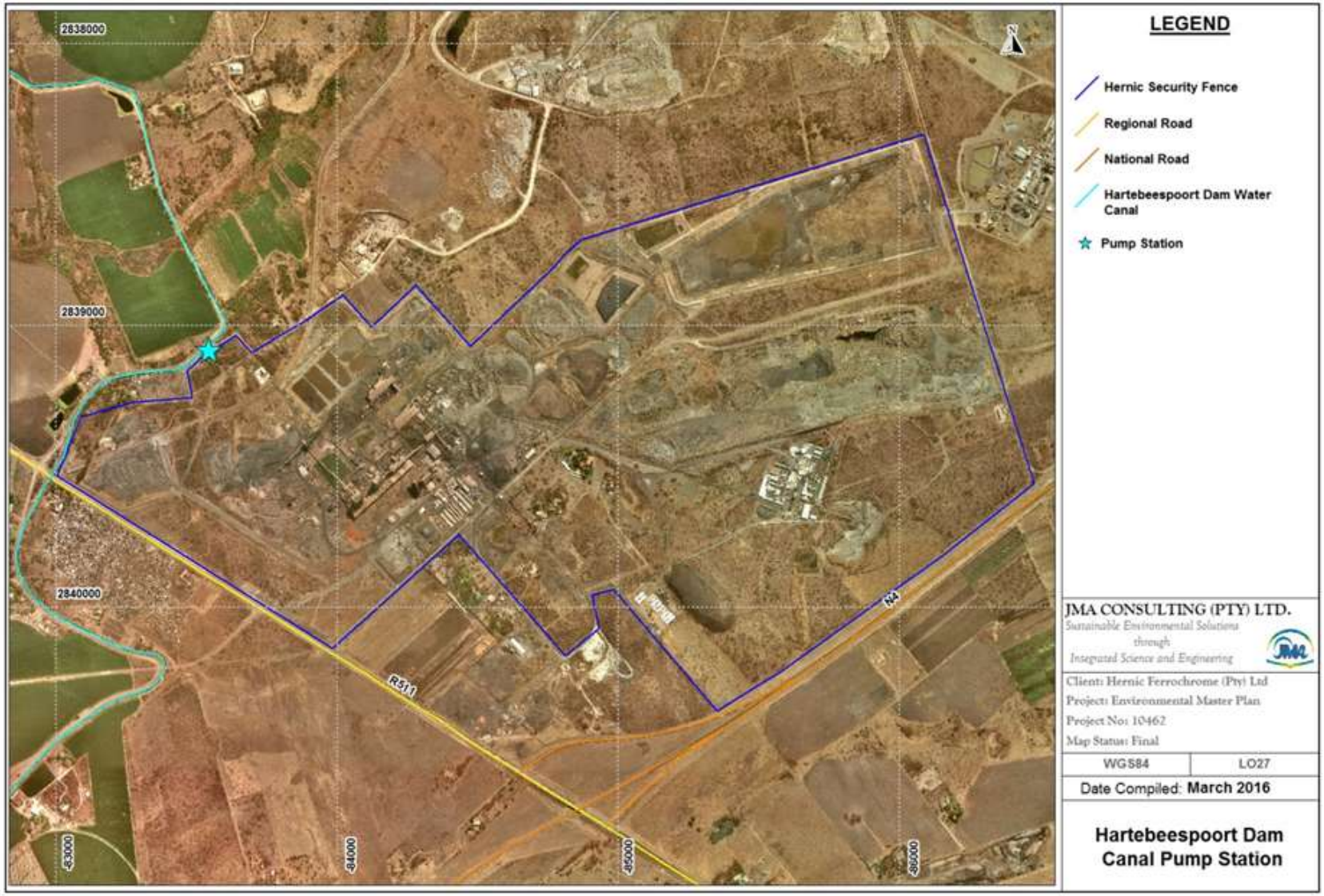

Figure 4.2.1.5(a): Location of the Hartbeespoort Dam Canal and Pump Station

Figure 4.2.1.4(b): Photograph of the HERNIC Main Security Gate

Figure 4.2.1.5(a): Photographs of the Canal Water Supply Pump Station

Figure 4.2.1.6(a): HERNIC ESKOM Yard

Figure 4.2.1.6(b): Photograph of the HERNIC ESKOM Yard

4.2.1.7. Gas Supply

The localities of the HERNIC gas supply tanks on site are shown on Figure 4.2.1.1(b). Photographs of the Propane gas bullets, Oxygen gas tank and Argon gas tank are shown in Figure 4.2.1.7(a). The centre coordinates of the gas supply tanks are relayed in the Table below.

HERNIC utilizes approximately 150 - 200 *tonnes* of propane gas on a monthly basis, which is purchased from external suppliers. The gas is stored in an appropriate gas tank. Access to the propane bullets are controlled with secure fences and locked gates. Fire extinguishers are located next to the propane bullets.

In addition to the above HERNIC also uses Oxygen stored in an Oxygen tank (25 000 *l*) to fire the oxygen lances at the Furnace Tap Holes during tapping, as well as Argon stored in an Argon gas tank (800 *l*) for use in the laboratory at the Smelting Plant.

Table 4.2.1.7(a): Centre Coordinates of the HERNIC Gas Bullet

Description of Gas Bullets	Latitude	Longitude
PSP 1 Tank (Propane Gas)	25°39'35.56"S	27°50'9.72"E
PSP 2 Tank (Propane Gas)	25°39'36.82"S	27°50'22.80"E
Oxygen Gas Tank	25°39'36.11"S	27°50'20.07"E
Argon Gas Tank	25°39'40.15"S	27°50'26.53"E

PSP 1 Tank (Propane Gas)	PSP 2 Tank (Propane Gas)
	
Oxygen Tank	**Argon Gas Tank**
	

Figure 4.2.1.7(a): Photograph of the Gas Supply Tanks

4.2.1.8. Fuel Supply

Three Diesel Fuel Storage tanks are located at two different localities on the HERNIC Site. Each tank has a storage capacity of 23 000 *l*. The locations of these tanks are shown on Figure 4.2.1.1(b). Photographs of the diesel fuel storage tanks are shown in Figure 4.2.1.8(a). The centre coordinates of the two diesel fuel storage tank areas are relayed in the Table below.

Table 4.2.1.8(a): Centre Coordinates of the Diesel Fuel Storage Tank Areas

Description of Fuel Storage Tanks	Latitude	Longitude
Diesel Tank Storage Area 1	25°39'45.28"S	27°50'6.64"E
Diesel Tank Storage Area 2	25°39'40.04"S	27°50'24.42"E

It should be noted that the tanks are located within concrete bunded areas.

Figure 4.2.1.8(a): Photographs of the HERNIC Diesel Storage Areas

4.2.1.9. Internal Roads

Internal roads on site comprise both tar and gravel (more common) roads and are used to move people and materials around. The major internal roads in relation to the nearest national and regional roads are shown on Figure 4.2.1.9(a) with all the major access roads (national and regional) shown on Figure 4.2.1.2(a).

4.2.1.10. Office Complexes

Three office complexes are located on site and their localities are shown on Figure 4.2.1.1(b).

- Administration Offices
- Mine Management Offices
- Mine Surveying Offices

The centre coordinates of these offices are relayed in the table below.

Table 4.2.1.10(a): Centre Coordinates for the Office Complexes on site

Description	Latitude	Longitude
Administration Offices	25°39'37.73"S	27°50'42.75"E
Mine Management Offices	25°39'42.11"S	27°50'39.71"E
Mine Surveying Offices	25°39'39.73"S	27°50'46.75"E

A collage of photographs showing pictures of the three office complexes are shown in Figure 4.2.1.10(a).

Figure 4.2.1.10(a): Photo Collage of three Office Areas

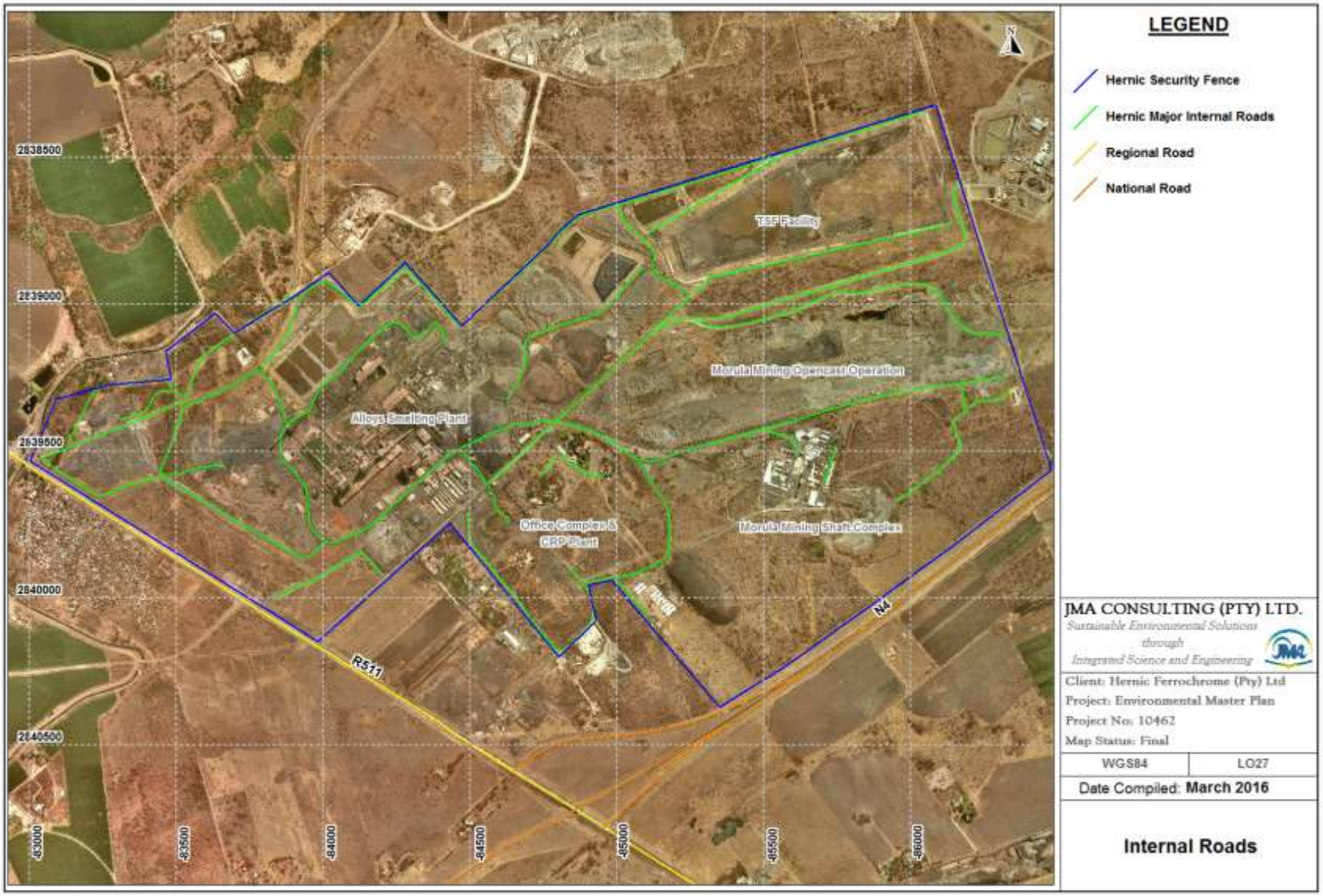

Figure 4.2.1.9(a): Major Internal Roads

4.2.2. Morula Mining Operation

Mining at HERNIC's Morula (Maroelabult) section commenced in 1996. Initially only open-cast mining was conducted with underground operations only commencing in 2002/2003. Open-cast mining was completed in 2007 and the underground mining was temporarily stopped during 2015. Future mining (from 2016 onwards) will be underground only.

The mining operation will be discussed under three headings:

- Morula Mining Shaft Complex
- Morula Mining Opencast Operation
- Morula Mining Underground Operation

4.2.2.1. Morula Mining Shaft Complex

The surface area delineated as applicable to the Morula Mining Shaft Complex, and which covers approximately 88.41 *ha*, is shown on Figure 4.2.1.1(a). A zoomed clip of the area, indicating the relevant surface infrastructure is shown on Figure 4.2.2.1(a), Figure 4.2.2.1(b) and Figure 4.2.2.1(c).

The complex supports access to the underground mining operations through two incline shafts and provides the required ancillary services to the underground mining operation. The following facilities/infrastructure/activities occur within this area:

- Decline Materials Shaft
- Decline People Shaft
- Access Roads
- Water Storage Dams (No. 1, 2 and 3)
- Mining Offices
- Engineering Offices
- Engineering Workshops
- Parking Areas
- Ore/Waste Rock Transfer House
- Change House Complex
- CV1 Conveyor
- CV2 Conveyor
- CV3 Conveyer
- CV4 Conveyor
- CV5 Conveyor
- Grout Plant
- Peoples Walkway (from parking and hostel area to shaft)
- Emergency ROM Stockpile
- Mine Waste Rock Stockpile Area
- Topsoil Stockpile
- Morula Dewatering Dam
- Redundant Explosives Magazine
- Abandoned Hostel
- Old Contractors Supervisors Quarters (Demolished)
- Historic Slag Dump
- Old Hostel Area
- Mine Sewage Plant

Figure 4.2.2.1(a): Morula Mining Shaft Complex Area

Figure 4.2.2.1(b): Relevant Facilities, Surface Infrastructure and Activities in the Morula Mining Shaft Complex Area

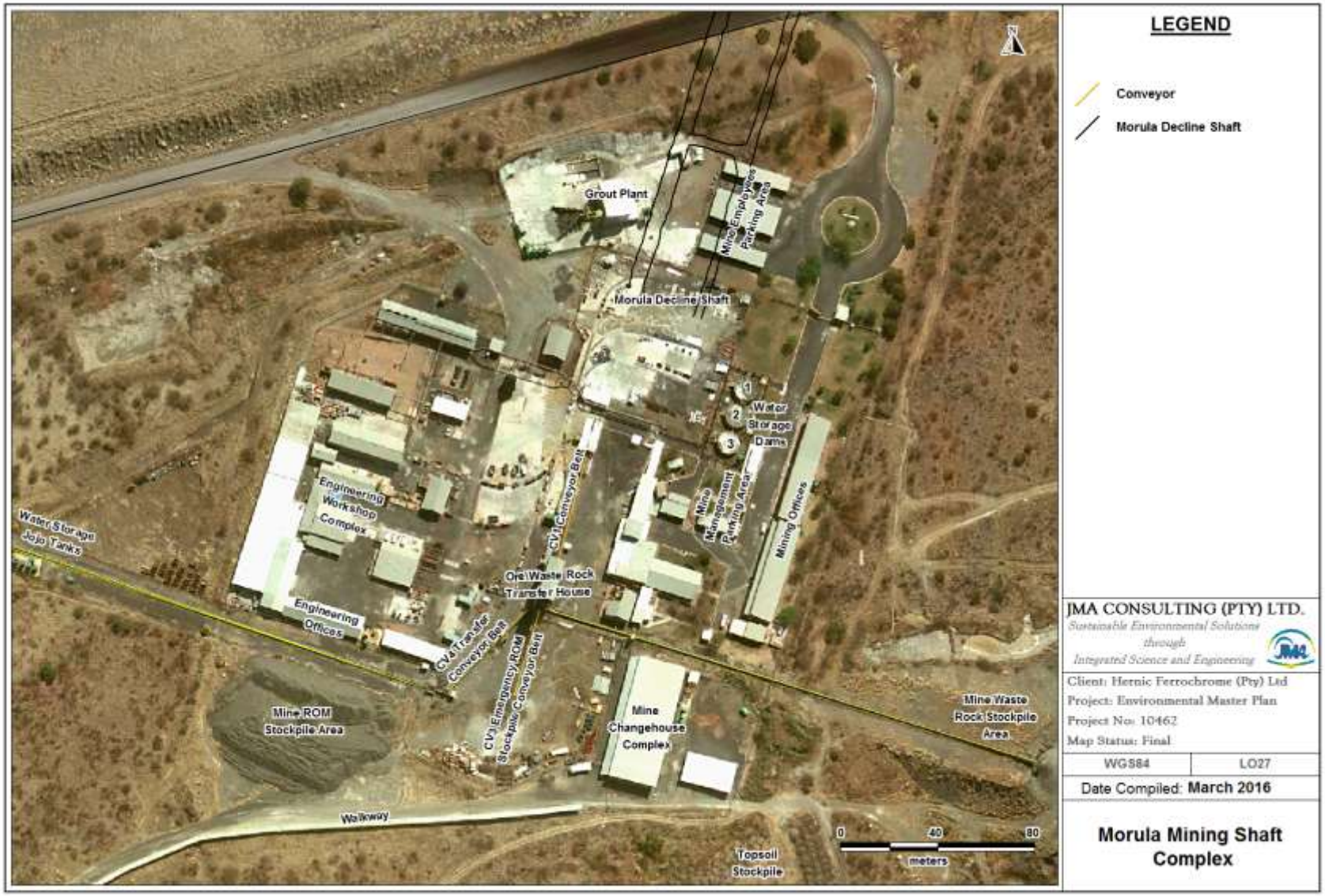

Figure 4.2.2.1(c): Relevant Facilities, Surface Infrastructure and Activities in the Morula Mining Shaft Complex Area

4.2.2.2. Morula Mining Opencast Operation

The opencast mining operation commenced in 1996 and ceased during 2007. Five chromite seams, the MG-0 to MG-4 were mined from surface up to a depth of some 40 *m* below surface. The eventual mining production rate was some 80 000 *tonnes per month*. The lateral extent of the HERNIC opencast workings, which are located on the Farm De Kroon 444 JQ, is shown on Figure 4.2.2.2(a). The indicated open-cast workings on the Farm Elandsfontein 440 JQ are not HERNIC related.

The following facilities/infrastructure/activities occur within this area and are also shown on Figure 4.2.2.2(b) as well as on Figure 4.2.1.1(b):

- Backfilled Open Cast Pit
- OB Plant Coarse Tailings
- OB Plant Fine Tailings
- OB Plant Mixed Tailings
- MG-4 Stockpile
- Final Void
- Re-Mining of Historical OB Fine Tailings
- Water Abstraction
- Water Pipe Lines

The process of open-cast mining followed a sequence of stripping and stockpiling the topsoil, stripping and stockpiling the overburden, drilling, blasting, cleaning out the ore and hauling it on internal roads to the OB Plant.

During mining, concurrent backfilling of the open-pit sections on De Kroon 444 JQ, was done with both coarse overburden mine waste rock which was rolled over during mining as well as with inert fine tailings material from the OB Plant which was slurried into the open pit. The pit is currently backfilled with OB Plant coarse waste.

The fine slurry material comprises *inter alia* of minerals referred to as Platinum Group Minerals. HERNIC has applied for, and has been granted an amendment to their mining right which now permits them to re-mine the fine slurry and to extract a series of economic minerals from the slurry.

The fine material will therefore be excavated from the open-pit for beneficiation and concentration in a PGM Flotation Plant, after which the open pit will be finally backfilled with inert coarse mine waste rock and OB plant coarse tailings, then shaped to be free draining and finally re-soiled and re-vegetated. The PGM concentrate will be sold to outside buyers.

The open-cast section on De Kroon 444 JQ still has a final void that is filled with water. Water is abstracted from this void and pumped to the Plant where it is used as process water.

A temporary MG-4 ore stockpile has been developed on the partially rehabilitated open pit on the Farm De Kroon 444 JQ.

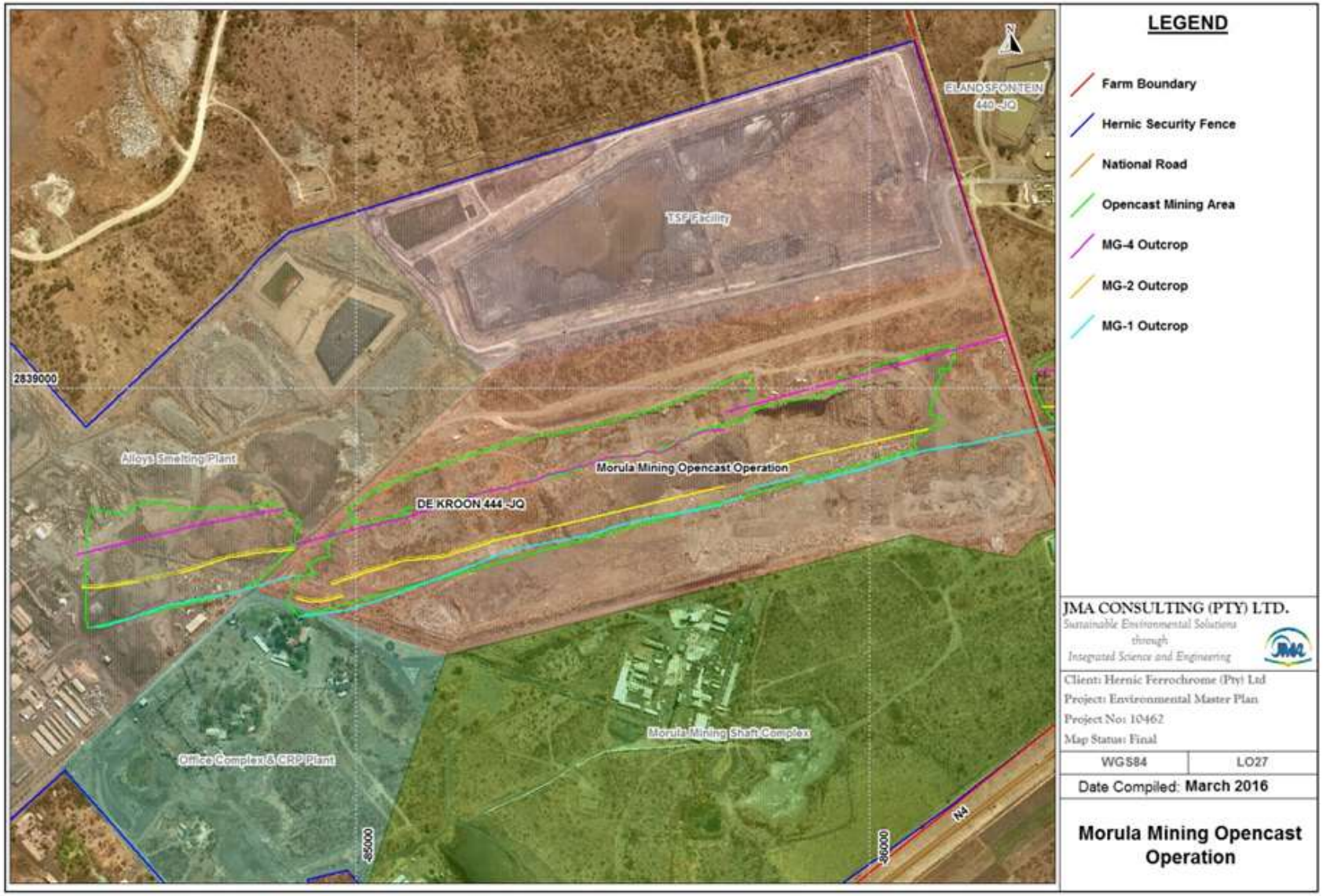

Figure 4.2.2.2(a): The Open-cast Mining Operation on the Farm De Kroon 444 JQ

Figure 4.2.2.2(b): Facilities, Infrastructure & Activities associated with the Morula Open-cast Mining Operation

4.2.2.3. Morula Mining Underground Operation

Shallow underground mining operations commenced in 2002/2003. Access to the underground workings is affected through two decline shafts entering the sub-surface at an angle of some 12°.

The initial underground mining targeted the MG-1 and MG-2 chromite seams on both De Kroon 444 JQ and Elandsfontein 440 JQ, down to depths of 70 *m* below surface. The mining depth has subsequently been increased with current mining at depths below surface of some 200 *m*. It is planned that the two ore seams (chromite and the associated PGM minerals) could be mined with the underground operations down to 450 *m* to 500 *m* below surface.

The current and future mining layout on the MG-1 and MG-2 chromite (and PGM) seams is indicated on Figure 4.2.2.3(a).

The proposed production rate for the underground mining until the end of life of mine is 80 000 *tonnes per month*.

Mining occurs through conventional, as well as future proposed board and pillar mining methods (drilling, blasting and excavation). Active stope and roof support for the conventional mining sections is imported from surface where required. The cement for the support is mixed at the grout plant located on the surface at the Shaft Complex, located due north of the Morula Decline Shaft.

The bulk of waste rock is separated underground from the ore and the ore is transported to the surface along the materials decline shaft. At the surface the ore is directed through the Ore/Waste Transfer House onto a series of conveyers, the final one of which transports the ore over a distance of 1 000 *m* to the OB and PGM Plant.

One of the surface conveyors (CV3) can deposit ore on a surface Run of Mine (ROM) Stockpile at the Shaft Complex in the event that the main conveyor is unserviceable. An aireal photograph of the ROM Stockpile area is shown on Figure 4.2.2.3(b).

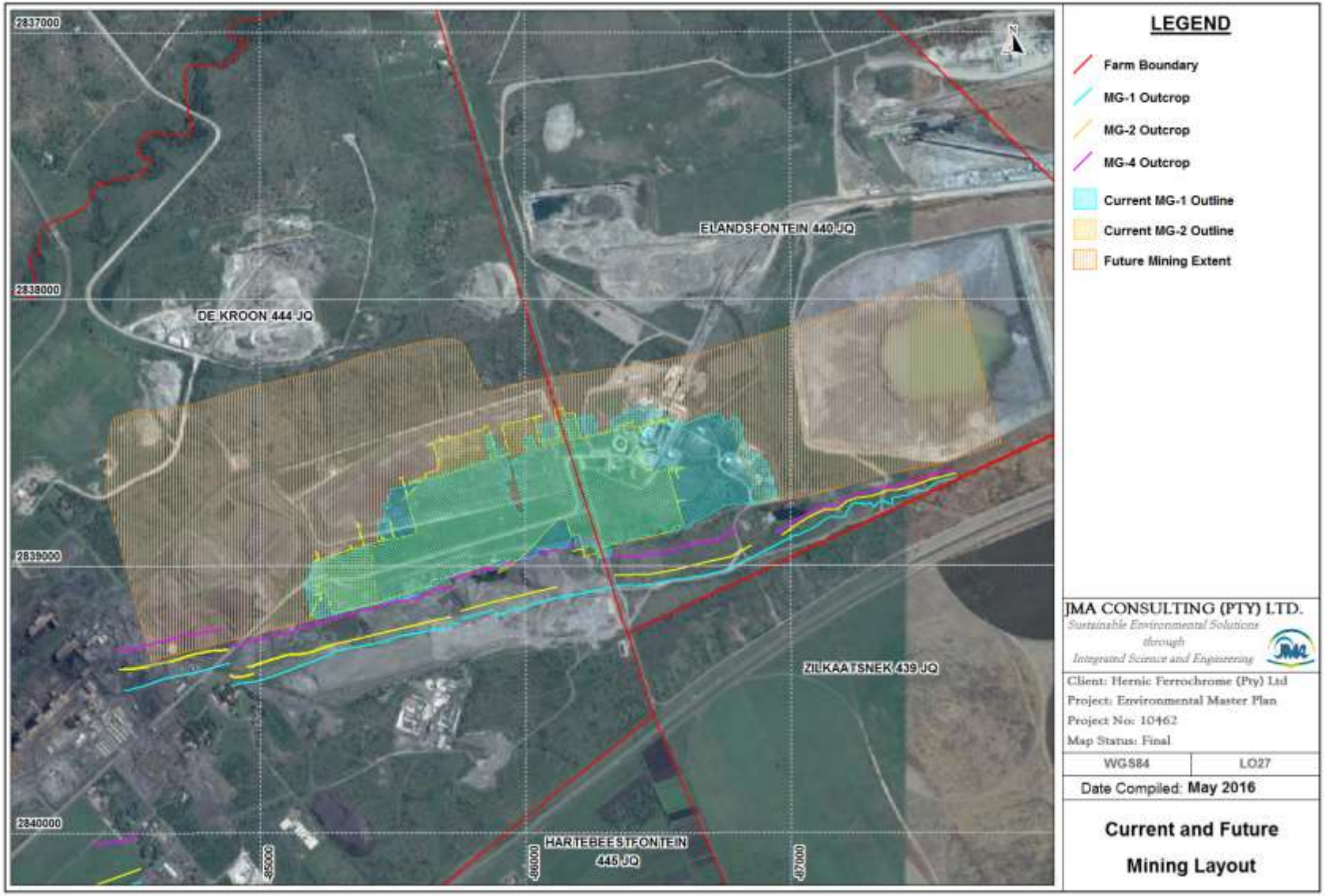

Figure 4.2.2.3(a): Current and Future Mining Layout on the MG-1 and MG-2 Chromite Seams

Figure 4.2.2.3(b): Delineated Area for the ROM Stockpile

4.2.2.4. Morula Mining Accommodation

Two hostel facilities are located within the surface responsibility area of the Morula Mining Shaft Complex, i.e. the Abandoned Hostel on the north-eastern perimeter of the Shaft Complex and the Old Hostel Area to the west of the Historic Slag Dump. The localities of these facilities are indicted on Figure 4.2.1.1(b) and the centre coordinates of these are relayed in the Table below. Photographs of the two sites are shown on Figure 4.2.2.4(a). Although these facilities are still in a good condition, neither of these facilities are currently still in use. Both facilities are fenced and access is controlled by security guards.

Table 4.2.2.4(a): Centre Coordinates of the Morula Mining Accommodation

Description	Latitude	Longitude
Abandoned Hostel	25°39'31.74"S	27°51'36.53"E
Old Hostel Area	25°39'54.05"S	27°50'53.48"E

Abandoned Hostel (North-Eastern Perimeter of Shaft Complex)	Old Hostel Area (West of Historic Slag Dump)
	

Figure 4.2.2.4(a): Currently unused Hostel Facilities at Morula Mining Operation

4.2.2.5. Morula Mining Aggregate Plant

A Mine Waste Rock Aggregate Plant was operational during 2014 within the Morula Mining Opencast Operation Area when mining waste was legislated into the NEMWA. The operation was stopped pending an Enviro-Legal assessment as to how to legalize the operation in terms of the new legislation.

The plant which comprised a small contractor's yard and a crushing and screening plant was located at the south-eastern tip of the opencast mining section on the Farm De Kroon 444 JQ. The localities of these facilities are indicted on Figure 4.2.1.1(b) whilst an aireal photograph of the Aggregate Plant and Contractors Yard is shown on Figure 4.2.2.5(a).

Since the aireal photograph was taken in 2015, the contractor has removed his crushing and screening equipment. At this Plant, crushing and screening of mining waste rock took place, where after the crushed material was sold to third parties as aggregrate. Waste rock was removed with excavators from the Mine Waste Rock Dump and loaded onto a crusher to break it to smaller rocks (product referred to as dump rock and lumpies). The product was screened into different sizes and front-end loaders loaded the smaller rocks onto trucks. Trucks transported the product up to the Aggregate site (located at the Processing Plant) where it was stockpiled. At the Processing plant, the product was screened further to obtain ballast (-40 *mm*), 19 *mm*, 13 *mm*, 9.5 *mm* stone and crusher. A front-end loader transported the finished product onto customer trucks.

Figure 4.2.2.5(a): Delineated Area for the now Redundant Mine Aggregate Plant and Contractors Yard

4.2.3. Morula Mining Waste Management

Mining Waste was until 2014, not defined as a Waste in terms of the National Environmental Management Waste Act (NEMWA). However, mining waste does now require authorization in terms of the NEMWA. Until 2014 when the new legislation became active, stockpiling of this material was authorized in terms of the provisions of the Consolidated EMP.

4.2.3.1. Mine Waste Rock Dump

The Morula Mine Waste Rock Dump is located within the Morula Mining Shaft Complex adjacent to the Topsoil Stockpile and the Morula Dewatering Dam. The bulk of the waste is separated underground from the ore and transported from underground to the surface along the materials decline shafts on a conveyor, and is then directed through the surface located Ore/Waste Transfer House onto a conveyor that transfers the waste rock onto the Mine Waste Rock Dump.

The Mine Waste Rock has been classified as a Type 3 (Inert) Waste. A Summary of the Mine Waste Rock Dump information is relayed in Table 4.2.3.1(a).

The designated area for the Mine Waste Rock Dump (see Figure 4.2.3.1(a)) is some 5.9 *ha* in extent. The mine waste rock currently occupies a footprint of approximately 3.40 *ha* and the volume is estimated at some 680 000 m^3. During active mining the waste rock is deposited at a rate of some 6 700 *tonnes per month*.

An aerial photograph of the Mine Waste Rock Dump is shown on Figure 4.2.3.1(a).

Table 4.2.3.1(a): Summary Details of the Mine Waste Rock Dump

Mine Waste Rock Dump		
Central Coordinates	25°39'45.31"S 27°51'18.04"E	
Footprint Area	3.40 *ha*	
Storage Capacity	680 000 m^3	
Vertical Wall Height	12 *m*	
Classification	Type 3	
Liner	No Liner	
Property Details	Ptn 104 (a ptn of ptn 1) De Kroon 444 JQ	

In the event that an aggregate plant for the manufacturing of mine waste rock aggregate is to be commissioned, it will now be located at the Mine Waste Rock Dump. This proposed activity is dealt with in this report in the section dealing with proposed new activities.

Figure 4.2.3.1(a): Designated Area for the Mine Waste Rock Dump

4.2.3.2. Mine Sewage Plant

The Mine Sewage Plant is located next to the Old Hostel Area discussed previously. The locality of the Sewage Plant is indicted on Figure 4.2.1.1(b).

An aerial photograph, depicting the Mine Sewage Plant area is shown on Figure 4.2.3.2(a). The centre coordinates of this plant is relayed in the Table below.

Table 4.2.3.2(a): Centre Coordinates of the Mine Sewage Plant

Description	Latitude	Longitude
Mine Sewage Plant	25°39'57.07"S	27°50'52.52"E

The Sewage Plant operates through the application of a Sequencing Batch Reactor (SBR) technology. The treatment process comprises raw effluent screening, flow balancing and distribution, aeration in a single SBR reactor, settling, decanting of the treated supernatant, dis-infection of the discharged supernatant, retention of the waste sludge in the aeration tank before discharge and dewatering of the activated sludge on sludge drying beds.

The SBR Sewage Treatment Plant is designed to treat an average of 140 m^3 of domestic sewage *per day*.

The treatment plant is designed to produce an effluent in accordance with the requirements of the General Limits of the General Authorizations in terms of Section 39 of the National Water Act, 1998.

The Sludge Drying Beds are manufactured by PRENTEC, which consist of four beds (4 *m* x 4 *m* x 0.5 *m*). The internal bed specification is 90 *mm* thick 19 *mm* stone (bottom layer), 3 *mm* thick Kaymac matting (middle layer) and finally a 100 *mm* thick 1.3 *mm* sand layer (top layer). Dried sludge is removed from site and sent to an appropriately licensed Waste Disposal Facility through an external Waste Disposal Service Provider on a regular basis.

Figure 4.2.3.2(a): Designated Area for the Mine Sewage Plant

4.2.4. Morula Mining Water Use and Management

4.2.4.1. Storm Water Berms and Canals

Two Storm Water Diversion Drains currently divert storm water around the Morula Mining Shaft Complex in a southerly direction. Rainfall runoff at the opencast section accrues to the un-rehabilitated open pit. Storm Water Management at the Morula Mining Section has been identified for further assessment and possible upgrades and will be discussed as a proposed new activity in section 4.3 of this Scoping Report

4.2.4.2. Morula Dewatering Dam

Water found underground in the mine workings is pumped to surface to ensure the safety of people and to facilitate on-going mining operations. The water is pumped and stored in three surface located concrete water storage reservoirs/dams (Refer to Figure 4.2.2.1(c) for the location of these dams). The capacities of these dams are 146 m^3, 134 m^3 and 127 m^3 respectively. If these dams reach their full capacity, water is pumped to the Morula Dewatering Dam, located due south from the shaft complex.

The locality of the Morula Dewatering Dam is shown in Figure 4.2.4.2(a). Details pertaining to the design and the location of the dam are relayed in the Table below. Safety and security measures relating to this dam include a fence with a lockable gate, security beams, a life jacket and warnings signs posted on the fence.

The dam covers a footprint of approximately 0.5 *ha*, and has an estimated storage capacity of some 12 000 m^3. The dam is unlined.

Water from the Morula Dewatering Dam is reticulated to the primary CRP Plant (approximately 85 045 m^3 *per annum*) and the OB Plant (approximately 491 290 m^3 *per annum*).

Table 4.2.4.2(a): Details of the Morula Dewatering Dam

Morula Dewatering Dam		
Central Coordinates	25°39'48.74"S 27°51'11.95"E	
Footprint Area	0.5 *ha*	
Crest Length	221.90 *m*	
Max Wall Height	-	
Freeboard	-	
Dam Storage Capacity	12 000 m^3	
Wall Type	Earth Fill	
Liner Type	No Liner	

The Morula Dewatering Dam is duly authorized as a Water Use and which is reflected as such in the approved Water Use License for the HERNIC site.

Figure 4.2.4.2(a): Designated Area for the Morula Dewatering Dam

4.2.4.3. Morula Open Cast Final Void

One final void still exists in the now partially rehabilitated Morula Open Pit. Table 4.2.4.3(a) relays the centre coordinates of this void.

Table 4.2.4.3(a): Centre Coordinates of the Morula Final Void

Description	Latitude	Longitude
Morula Open Cast Final Void (HERNIC)	25°39'23.23"S	27°51'18.57"E

The locality of the final void is shown on Figure 4.2.4.3(a).

The void is currently filled with storm water and ground water. Abstraction of this water for use at the Plant is licensed as a section 21(j) water use. The licensed abstraction rate is 238 345 m^3 *per annum*. The storage capacity of the void itself is estimated at 700 000 m^3.

Eventually, the void will be fully backfilled and rehabilitated upon final closure of the Open Pit section.

4.2.5. Morula Mining Water and Salt Balance

4.2.5.1. Water Balance

A new water balance for the Morula Mining operation will be developed as part of the Process Water and Storm Water Management Plan. The updated water balance will be contained in the Draft EMPR for consideration and approval.

4.2.5.2. Salt Balance

A new salt balance for the Morula Mining operation will be developed as part of the Process Water and Storm Water Management Plan. The updated salt balance will be contained the Draft EMPR for consideration and approval.

Figure 4.2.4.3(a): Locality of the Morula Opencast Final Void

4.2.6. Alloys Smelting Plant Facilities

The HERNIC Alloys Smelting Plant comprises a ferrochrome smelting operation. The chromite sourced from the HERNIC Mining operations, as well as from other mining operations, is beneficiated into lumpy and fine ore concentrate, then blended with imported raw materials before being smelted into ferrochrome in 4 closed submerged arc furnaces. The plant is further supported with ancillary processes including a finished product plant, a chrome recovery plant, a fine slag processing plant, waste management facilities, surface water and groundwater management facilities and finally air quality control systems. After the conversion of the open furnaces to closed furnaces, the Bag House Plant and its associated Slimes Disposal Facilities became redundant and were closed down. The following facilities will now be discussed:

- General Plant Infrastructure
- Raw Materials Stockpile Area 1 & 2
- Ore Beneficiation Plant (Spiral and DMS)
- Mixed Materials Stockpiling and Screening Area
- Returns Materials Stockpiles
- Pelletizing Plant 1 & 2
- Furnaces 1, 2, 3 & 4
- Product Break Floor Area
- Finished Product Plant
- Chrome Recovery Plant
- Platinum Group Minerals Plant
- Product Rail Dispatch Area
- Fine Slag Processing Plant
- Internal Transport & Contractors Yard and Wash Bay
- Historic Bag Plant (Not in Use)
- Old Civil Workshop (Not in Use)
- Rehabilitated Quarry
- Alloys Plant Waste Management Infrastructure
- Alloys Plant Surface Water Management Infrastructure
- Alloys Plant Process Water Management Infrastructure
- Alloys Plant Groundwater Management Infrastructure
- Alloys Plant Air Emissions Control Systems

4.2.6.1. General Plant Infrastructure

The following features, the localities of which are shown on Figure 4.2.6.1(a), are deemed to represent General Plant Infrastructure:

- Visitors Parking
- Security Offices
- Alloys Offices
- Clinic
- Laboratory
- Canteen
- Stores
- Change House & Laundry
- Workshops
- Employee Parking
- Capital Yard 1 and 2
- Oil Stores and Fuel Storage Areas

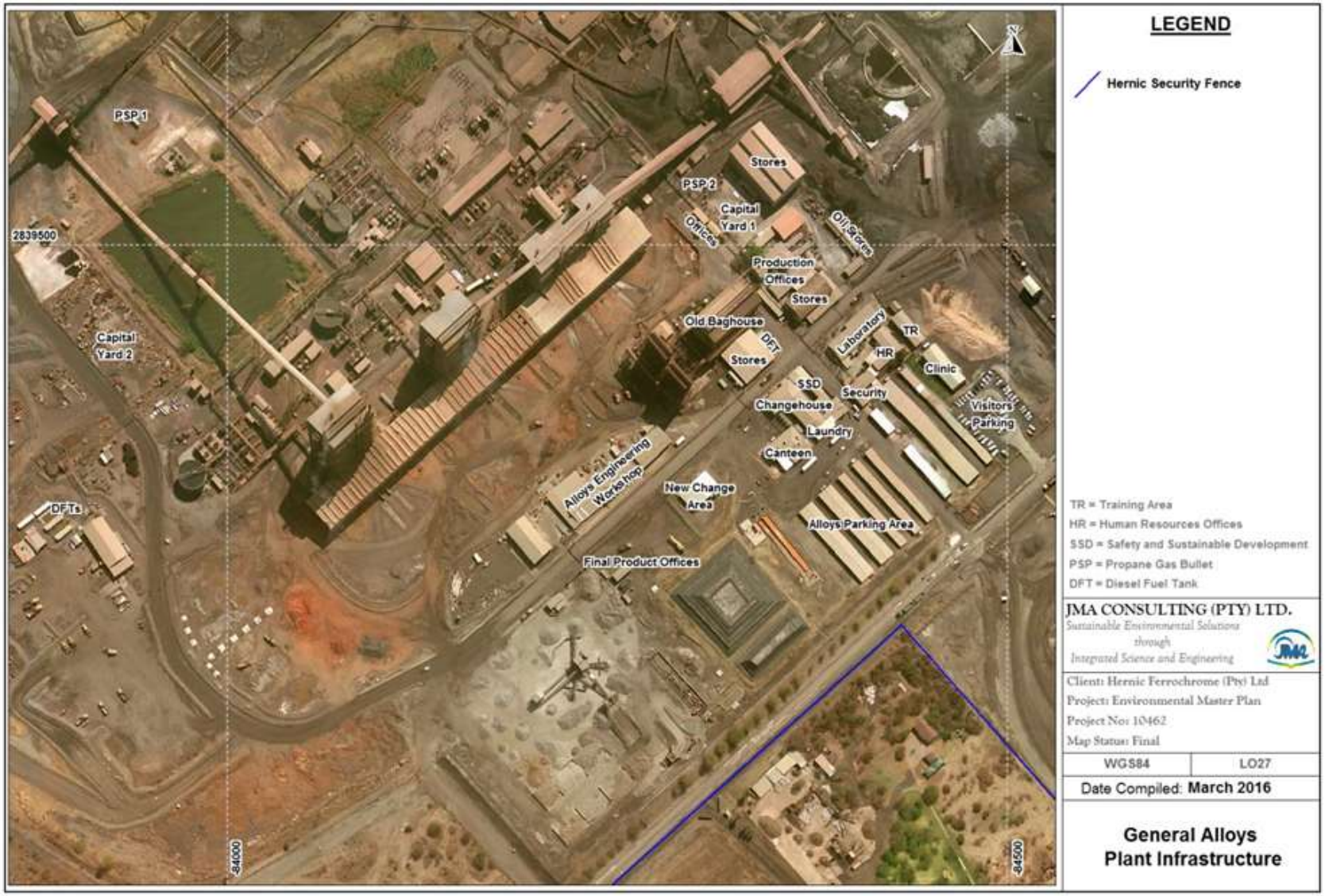

Figure 4.2.6.1(a): General Alloys Plant Infrastructure

4.2.6.2. Raw Materials Stockpile Area 1

In order to facilitate the smelting process, additional materials need to be blended with the beneficiated lumpy ore and concentrated fine ore prior to all being charged into the furnaces. These raw materials are stockpiled on site. Approximately 110 000 *tonnes* of raw materials are stored at any one time on site and between 3 000 - 5 000 *tonnes* of raw materials are transported to the OB Plant per day.

The Raw Materials Stockpile Area 1 services Furnaces 1, 2 and 3. The locality of this facility is shown on Figure 4.2.6.2(a) and is used for the stockpiling of the following raw materials:

- Dolomite
- Quartzite
- Char
- Anthracite Duff
- Coke Nuts (30 - 8 *mm*)
- Coke Peas (30 - 6 *mm*)
- Limestone
- Anthracite Peas
- Chromite Concentrate
- UG-2 Concentrate
- Morula ROM Ore

The Raw Materials Stockpile Area 1 covers a footprint size of approximately 5.14 *ha***.** The raw materials are deemed chemically inert and therefore the footprints are not lined.

4.2.6.3. Raw Materials Stockpile Area 2

The Raw Materials Stockpile Area 2 services Furnace 4. The locality of this facility is shown on Figure 4.2.6.3(a) and is used for the stockpiling of the following raw materials:

- Dolomite
- Quartzite
- Char
- Anthracite Duff
- Coke Nuts (30 - 8 *mm*)
- Coke Peas (30 - 6 *mm*)
- Limestone
- Anthracite Peas
- Chromite Concentrate
- UG-2 Concentrate
- Morula ROM Ore

The Raw Materials Stockpile Area 2 covers a footprint size of approximately 5.48 *ha*. The raw materials are deemed chemically inert and therefore the footprints are not lined.

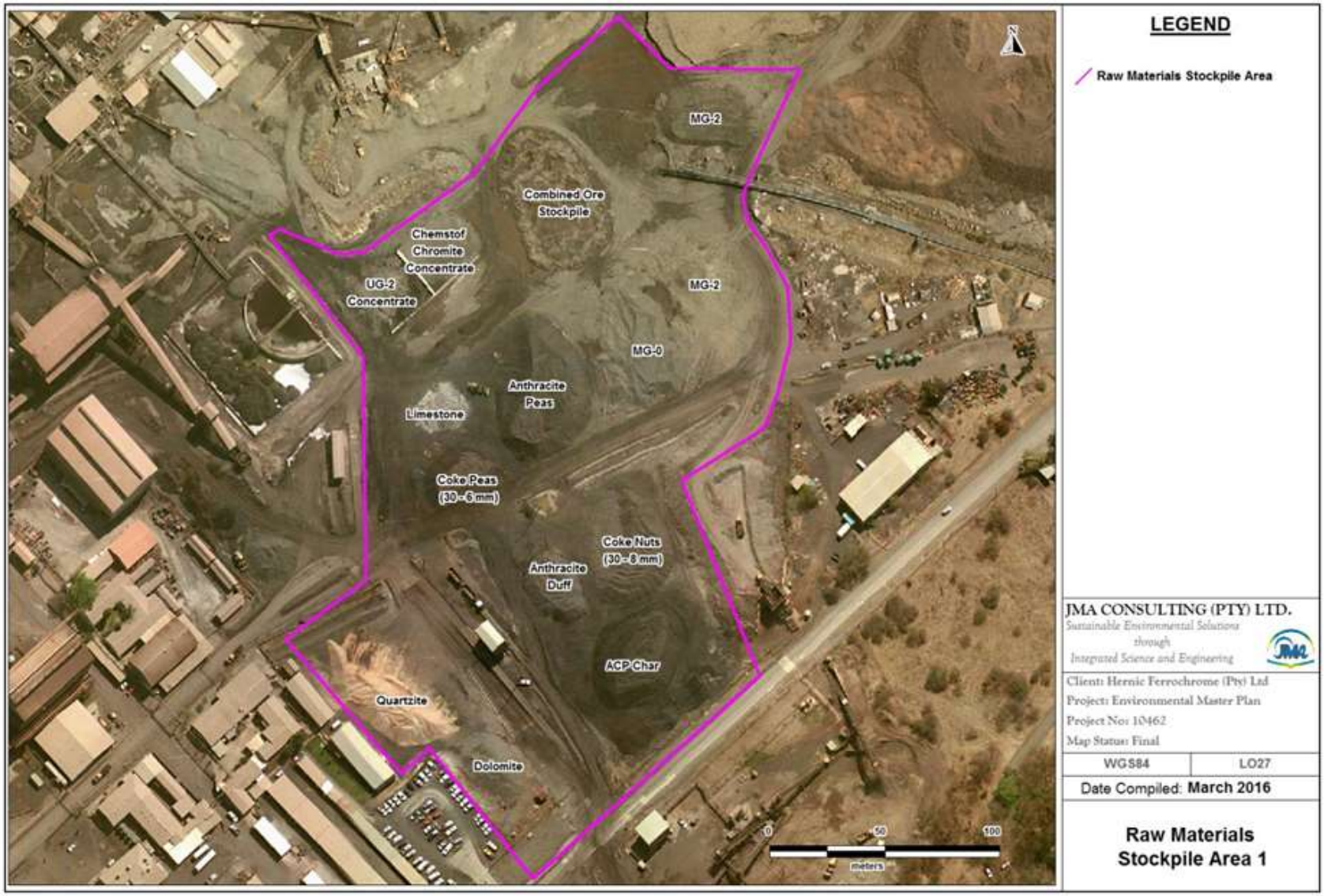

Figure 4.2.6.2(a): Raw Materials Stockpile Area 1

Figure 4.2.6.3(a): Raw Materials Stockpile Area 2

4.2.6.4. Ore Beneficiation (OB) Plant – Crushing and Screening

Chromite ore mined at HERNIC's mining operations is transported to the Smelting Plant via a conveyor (CV5 from MORULA), as well as by road (from BOKONE) and stockpiled on an ore stockpile at the OB Plant.

The ore is loaded by a front-end loader and then deposited into the feeding bunkers of either the Dense Medium Separation (DMS) Plant or the A-Crusher Plant, where it is crushed into workable sizes for further beneficiation.

At the DMS plant, ore is crushed and screened into either lumpy material (-80+30 *mm*), intermediate product (coarse product -30+10 *mm*; fines product -10+1 *mm*) or fines material (-1.25 *mm*). After crushing and screening the two fractions (lumpy and fines) are fed into two respective beneficiation sections, namely the Heavy Medium Separation (HMS) Plant and Spiral Plant A respectively. The intermediate product goes directly to the furnaces for smelting. Coarse and fine waste (referred to as mixed waste) originating from the DMS Plant is deemed inert and is stockpiled for future further beneficiation together with spillings of raw materials occurring in the plant. These stockpiles are designated as Mixed Material Stockpiles. The final destination for OB Plant Waste is fines slurried to the TSF and coarse backfilled into the open pit.

The two fractions (lumpy and fines) of materials which are crushed and screened at the A-Crushers Plant are also similarly fed into the two beneficiation sections (HMS and Spiral Plants A and B).

The locality and layout of the infrastructure associated with this process is shown on Figure 4.2.6.4(a). The OB Plant process flow diagram is depicted in Figure 4.2.6.4(b).

4.2.6.5. Ore Beneficiation (OB) Plant – Lumpy Section (HMS Plant)

The lumpy fraction of the crushed ore (from the DMS Plant and the A-Crusher Plant) is fed via the Lumpy bin (-75+32 *mm*) to the HMS Plant where it is separated by means of a heavy medium separation process into HMS product and HMS waste. The HMS product goes to the furnaces for smelting and the HMS waste (which is deemed inert) is used as aggregate for on-site road building.

4.2.6.6. Ore Beneficiation (OB) Plant – Fines Section (Spiral Plants A and B)

The fine fraction of the crushed ore originating from the DMS Plant and A-Crusher Plant is fed via conveyer to the two spiral plants (Plant A and Plant B) where the fine ore fraction, i.e. concentrate is beneficiated from the feed and separated from non-chromite bearing tailings material. The beneficiated fine ore is fed as concentrate into the two pelletizing plants for pelletizing and sintering. The fines waste is slurried and pumped to the HERNIC TSF and the coarse waste is used as aggregate for onsite road building. Both the fines and coarse waste are deemed as inert.

The infrastructure associated with the two concentrator plants is shown on Figure 4.2.6.4(a).

Figure 4.2.6.4(a): Infrastructure associated with the Ore Beneficiation (OB) Plant.

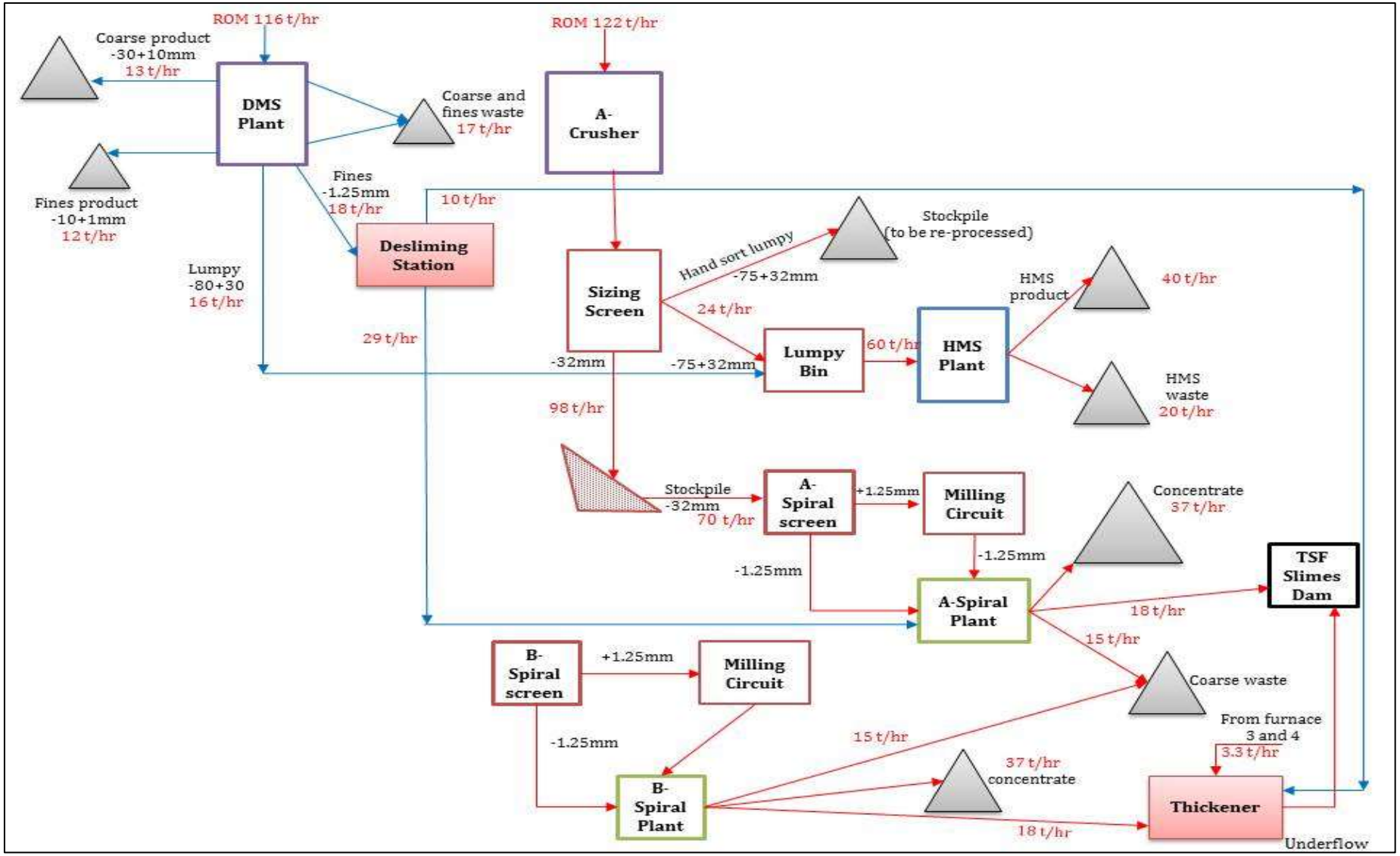

Figure 4.2.6.4(b): OB Plant Schematic Process Flow Diagram

4.2.6.7. Mixed Material Stockpiling and Screening

The Mixed Material Stockpile and Screening Area as well as the mobile screening plant, is shown in Figure 4.2.6.7(a). These facilities are continuously being reworked and therefore their footprints are not static. The footprints are unlined.

Mixed material originates from essentially two sources. The Coarse and fines waste product from the OB Plant (deemed inert), together with spillages of raw materials throughout the plant and process (pellets, concentrate and other raw materials) are all stockpiled in the Mixed Material Stockpile Area. A mobile screening plant, which is moved from stockpile to stockpile, screens and separates the different materials and fractions for re-use and further beneficiation.

The pellets, ore concentrate and other raw materials are fed back into the furnaces, the fines material is stockpiled for future extraction of PGM Group minerals at the new PGM Plant.

The collective footprint designated for Mixed Material Stockpiles is approximately 15.43 *ha* and it is estimated that the six current stockpiles combined contain some 525 000 m^3 of material

The remaining coarse material is disposed of in the open pit as final backfill.

4.2.6.8. Returns Materials Stockpiles

The Plant Process Water Dam is prone to silting up with fine ore concentrate originating from the Concentrator Plant areas. Although a silt trap system has been installed upstream from the Process Water Dam, silt still does enter this facility. Silt build-up in the silt trap as well as in the three compartments of the Process Water Dam is removed from time to time and stockpiled on two Returns Materials Stockpiles. Material is either returned to the concentrator plants for re-blending into the ore feed to the pelletizing plants, or sold to customers.

The location and extent of the two returns materials stockpiles is shown on Figure 4.2.6.8(a). Details pertaining to these two stockpiles are relayed in Tables 4.2.6.8(a) and 4.2.6.8(b). The footprints of these stockpiles are not lined.

The collective footprint occupied by the two Returns Material Stockpiles is approximately 4.23 *ha* and it is estimated that the two facilities combined contain some 28 000 m^3 of material

It should be noted however, that these stockpiles are continuously being re-worked and therefore only the centre coordinates of the designated areas on site for these stockpiles are given in the Table below.

Table 4.2.6.8(a): Details of the Returns Material Stockpile 1

Returns Material Stockpile 1		
Central Coordinates	25°39'39.35"S 27°49'45.81"E	
Footprint Area	3.41 *ha*	
Current Capacity	16 602 m^3	
Vertical Wall Height	3 *m*	
Liner	No Liner	

Table 4.2.6.8(b): Details of the Returns Material Stockpile 2

Returns Material Stockpile 2		
Central Coordinates	25°39'23.65"S 27°50'23.44"E	
Footprint Area	0.82 *ha*	
Current Capacity	10 808 m^3	
Vertical Wall Height	4 *m*	
Liner	No Liner	

4.2.6.9. Pelletizing and Sintering Plants 1 & 2

The pelletizing and sintering process at HERNIC comprises of an Outokompu steel belt sintering process. See Figure 4.2.6.9(a) for a flow diagram depicting a summary of the pelletizing and sintering process. The chrome ore concentrate arriving from the OB Plant Fines sections is ground in a ball mill, dewatered in capillary effect ceramic filters, mixed with bentonite (approximately 400 *tonnes per month*) in day bins, pelletized in a drum and finally sintered in a furnace (temperature of the heating zone controlled by burning CO-gas) to form spherical equally sized hard and porous chromite pellets (1 700 *tonnes per day*) that will be used as a raw material in the Smelter Plant (Furnaces) together with the lumpy ore and other additives.

From time to time the ceramic filters are regenerated by acid wash (nitric acid) to return the fill permeability. Nitric Acid is stored in a sealed tank and pumped once in every three months.

The Pelletizing and Sintering Plant Infrastructure (Plant 1 & 2), as well as the Pellets Stockpile area, is shown on Figure 4.2.6.9(b). In summary the infrastructure comprise of:

- Ball Mill
- Ceramic Filters
- Nitric Acid Storage
- Bentonite Storage
- Day Bins
- Pelletizing
- Sintering
- Pellets Stockpiles

Currently, 756 000 *tonnes* of pellets is being produced by the two Pelletizing and Sintering Plants *per annum* (63 000 *tonnes per month*). The AEL (2015) provides for a maximum pellets production rate of 756 000 *tonnes per annum* (63 000 *tonnes per month)*.

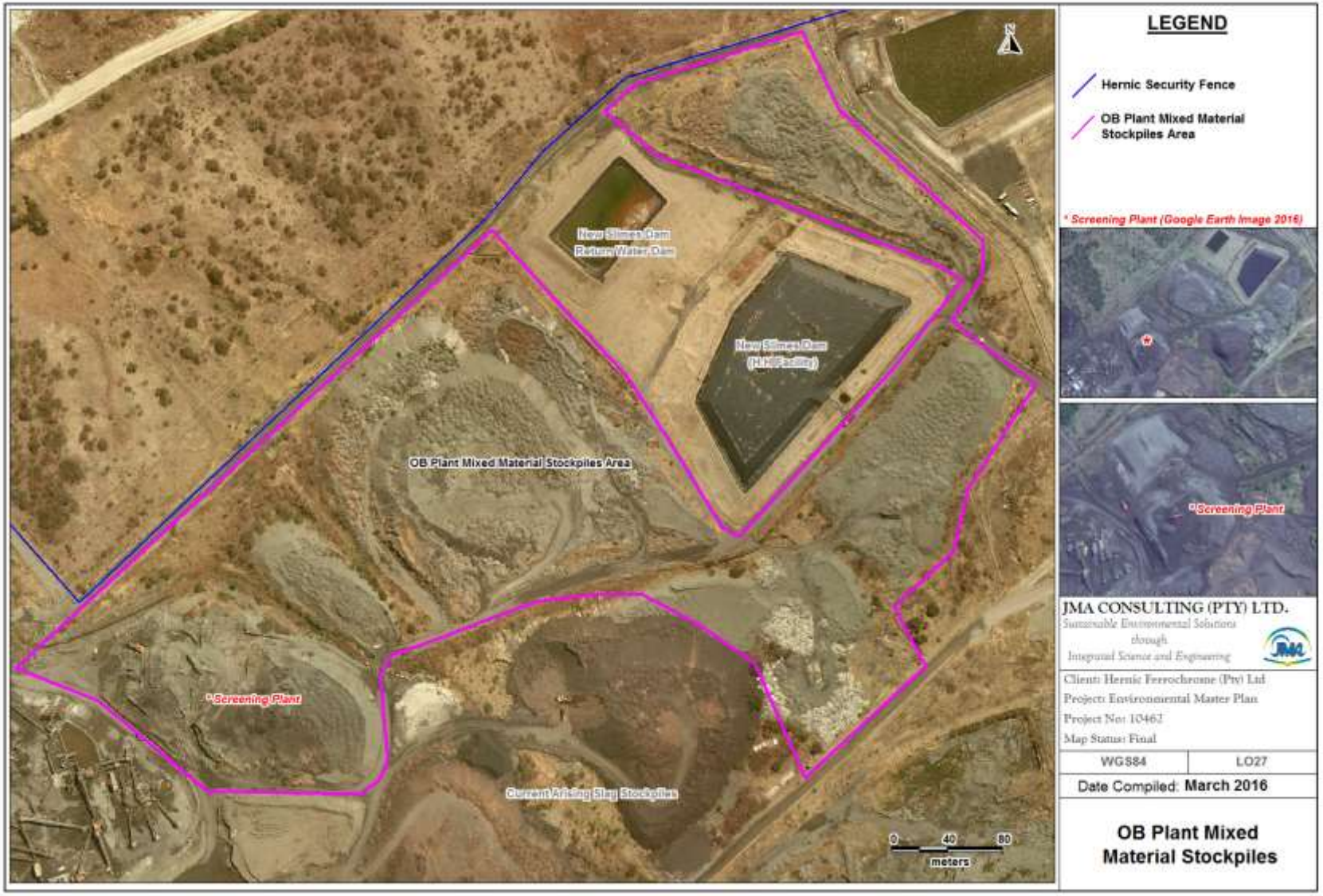

Figure 4.2.6.7(a): Location and Extent of Mixed Material Stockpiling and Screening Operation

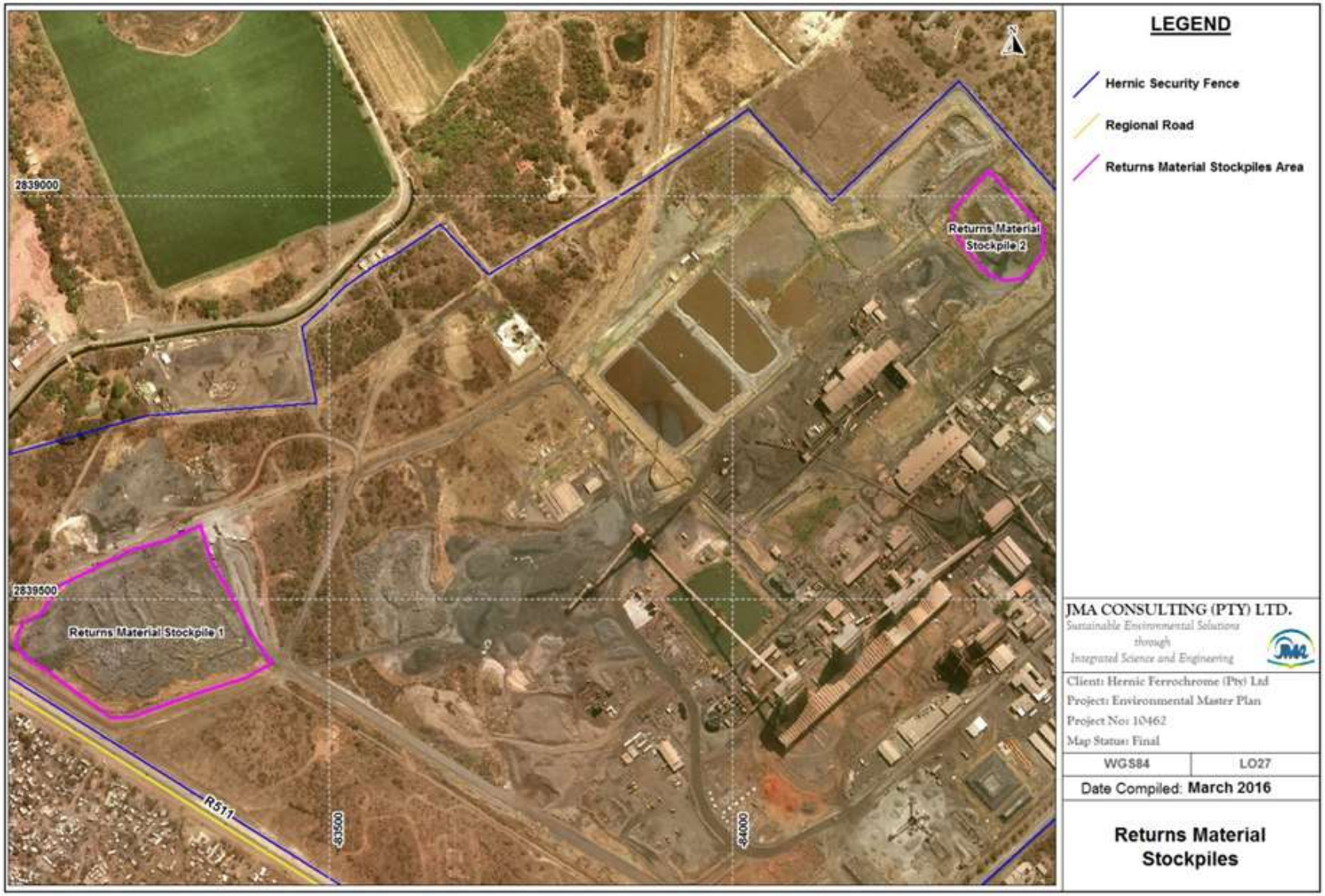

Figure 4.2.6.8(a): Location and Extent of Returns Material Stockpiles

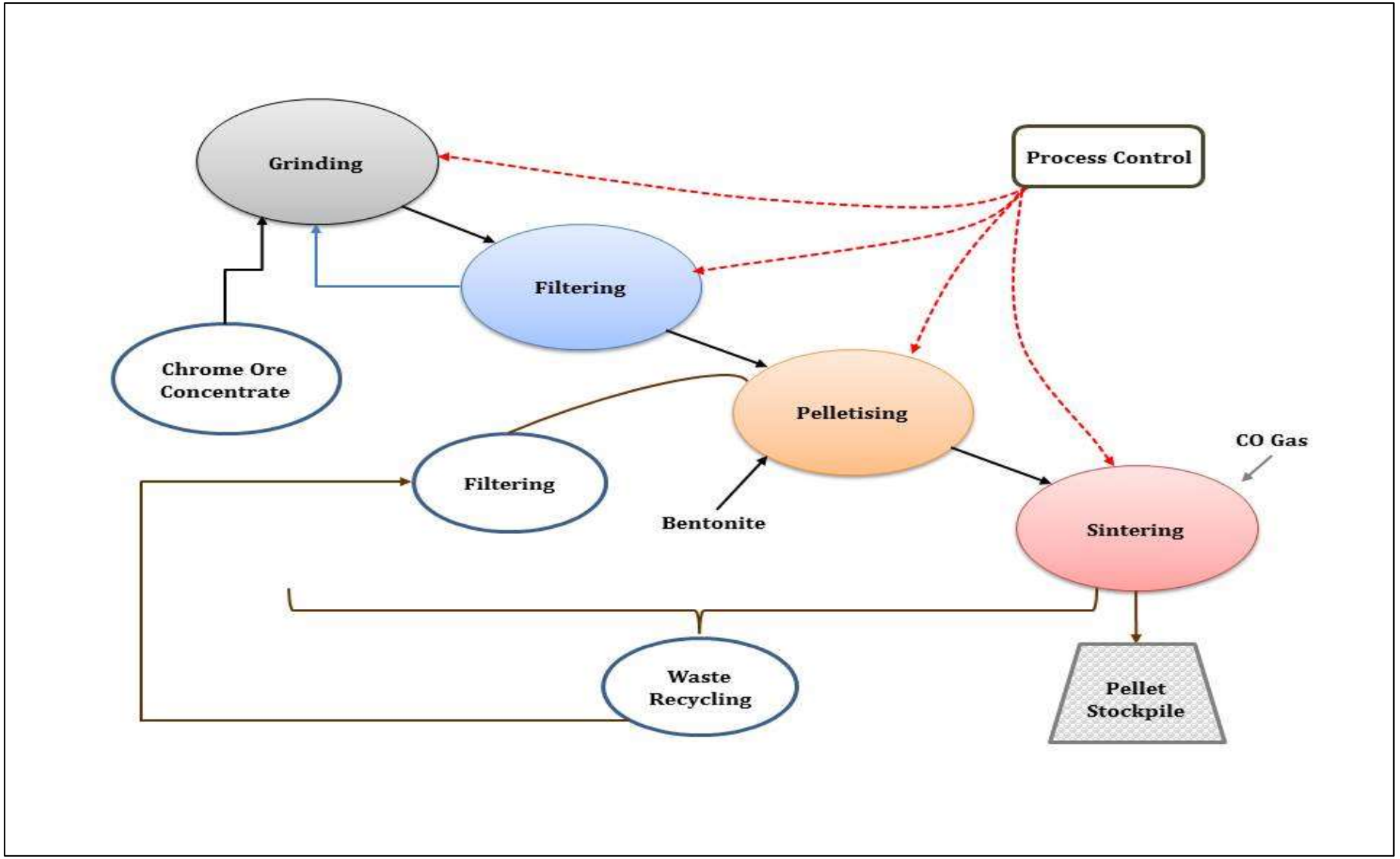

Figure 4.2.6.9(a): Schematic Process Flow Diagram of the Pelletizing and Sintering Process

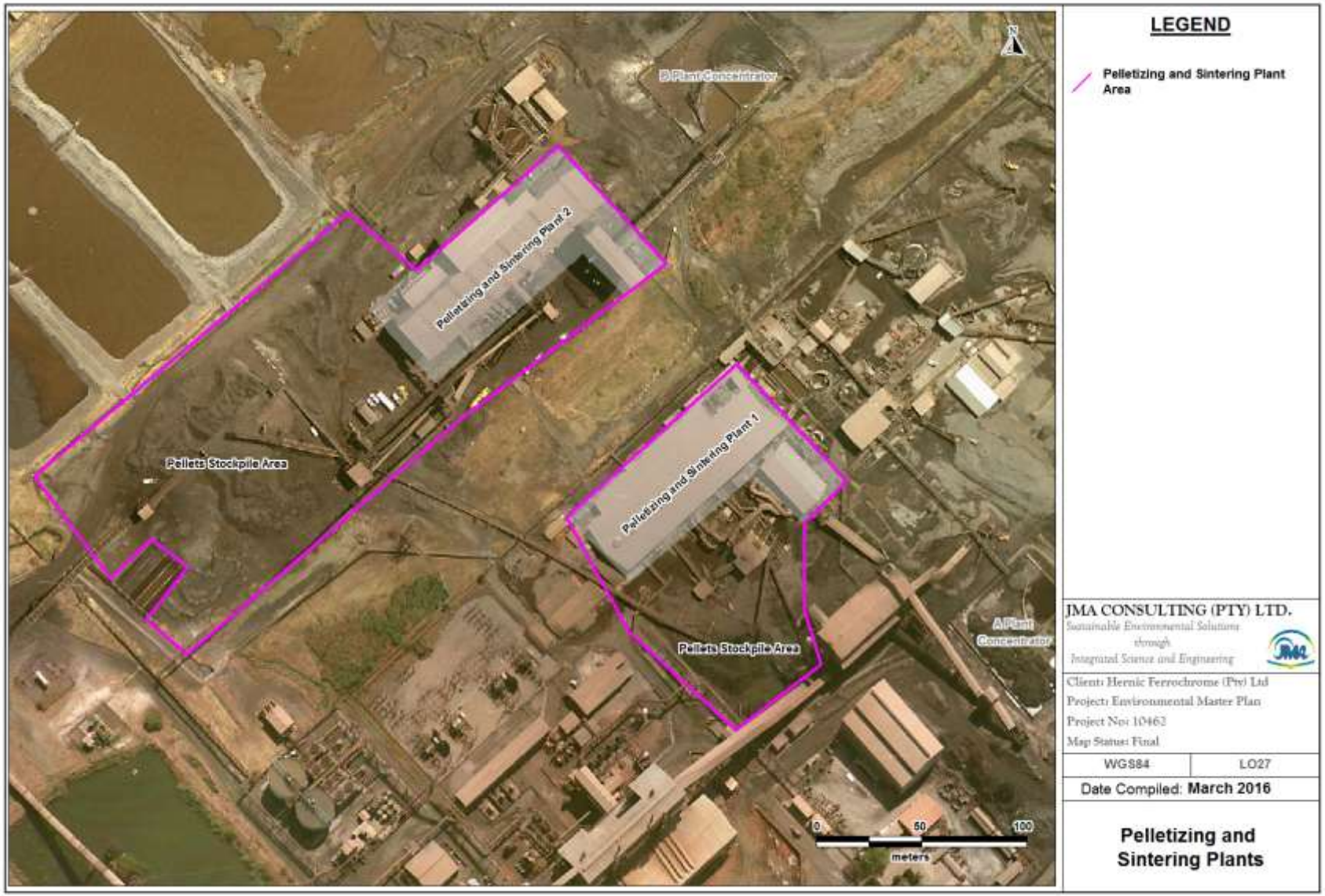

Figure 4.2.6.9(b): The Pelletizing and Sintering Plant Infrastructure (Plant 1 & 2) and the Pellets Stockpile Areas

4.2.6.10. Furnaces 1, 2, 3 and 4

HERNIC operates four Closed Submerged Arc Furnaces. Furnace 1, 2 and 3 are located in line, but Furnace 4, which was only commissioned later, is located separately. The Furnace infrastructure, including the two proportioning plants, as well as the tap floor areas (which is located under roof cover immediately adjacent to the furnaces), is shown on Figure 4.2.6.10(a).

Furnace 1, 2 and 3 are being loaded by their own Proportioning Plant, with Furnace 4 also having its own Proportioning Plant. The lumpy ore, sintered pellets and other raw materials (reductants and fluxes) are blended to specification in these plants before being loaded into the respective furnaces for smelting.

During tapping from the furnaces (optimally each furnace is tapped nine times a day), the ferrochrome product is separated from the slag, the latter which contains all the impurities resulting from smelting, through a skimmer device. The slag is cooled down and broken into lumps and chunks before being transported by road to the Primary (CRPlant) where the residual ferrochrome in the slag is recovered.

In the past, the slag was conveyed to Slag Stockpiles (three of which still exist at HERNIC). The intention is now to also recover the residual ferrochrome from this slag material by also putting the slag material contained on these historic facilities through the Primary CRP.

The fine slag fraction is transported by road to the Fine Slag Processing Plant.

After cooling down in sand chilling pans, the ferrochrome product from the furnaces is transported by front-end loaders from the tapping floors to the Ferrochrome Break Floor Area.

Currently, 420 000 *tonnes per annum* of ferrochrome is being smelted in the four furnaces (35 000 *tonnes per month*). The AEL (2015) provides for a maximum ferrochrome production rate of 440 400 *tonnes per annum* (36 700 *tonnes per month)*.

Currently, 502 056 *tonnes per annum* of slag is being produced in the four furnaces (41 838 *tonnes per month*). The AEL (2015) provides for a maximum ferrochrome production rate of 502 056 *tonnes per annum* (41 838 *tonnes per month)*.

Any increase in ferrochrome and slag production above the AEL limits, will require amendment of the AEL.

A schematic process diagram summarising the process at the furnaces is depicted in Figure 4.2.6.10(b).

Figure 4.2.6.10(a): The Furnace infrastructure, including the two Proportioning Plants

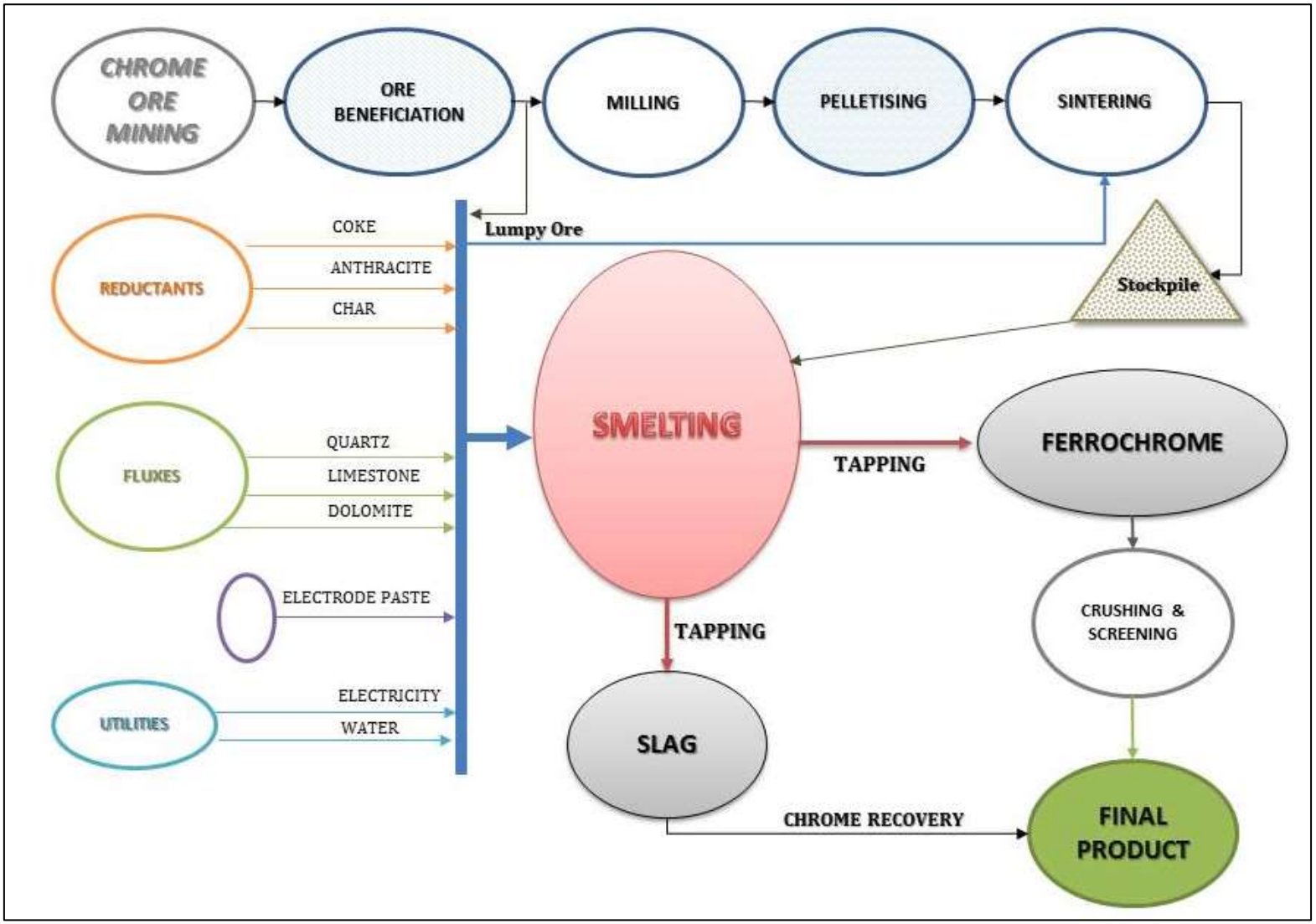

Figure 4.2.6.10(b): Schematic Process Flow Diagram for the Ferrochrome Smelting Plant

4.2.6.11. Ferrochrome Break Floor Area

The locality of the Ferrochrome Break Floor Area is shown on Figure 4.2.6.11(a). The centre coordinates of this facility is relayed in the Table below. Here the smelted ferrochrome is broken down mechanically into smaller chunks and stored on temporary stockpiles, before being loaded and transported to the Finished Product Plant.

Table 4.2.6.11(a): Centre Coordinates of the HERNIC Break Floor Area

Description	Latitude	Longitude
Break Floor Area	25°39'46.36"S	27°50'12.28"E

4.2.6.12. Finished Product Plant

At the Finished Product Plant, the ferrochrome arriving from the Ferrochrome Break Floor Area is crushed and screened to finish the product into different size fractions as required by the markets.

Product arriving from the Break Floor Area is put through the Primary Crushing and Screening section, from where the undersize material (0-6 *mm*) which needs to be reprocessed is stockpiled. In addition, the fines material (0-6 *mm*) which is a saleable product as well as the sized product is also stockpiled. Oversize material (60-120 *mm*) will be crushed and screened through the Secondary Crushing and Screening section, where after it goes through the Primary Crushing and Screening section to produce saleable product (10 – 100 *mm*).

Finished/Saleable product stockpile bins are located on concrete lined areas. Finished/Saleable products are loaded onto trucks for dispatch to customers or onto trucks for dispatch to the railway siding.

The amount of product dispatched per road and rail is more or less an even split (50:50), with some 420 trucks dispatched per month. The Finished Product Plant has the capacity to finish 420 000 *tonnes* of product arriving from the Break Floor Area *per annum*.

The infrastructure associated with the Finished Product Plant is shown on Figure 4.2.6.12(a) and comprise of:

- Offices
- Conveyors
- Primary and Secondary Crushing and Screening Plans
- Product Stockpiles
- Weighbridge

Refer to Figure 4.2.6.12(b) for a schematic process flow diagram illustrating the processes at the Finished Product Plant.

Figure 4.2.6.11(a): Ferrochrome Break Floor Area

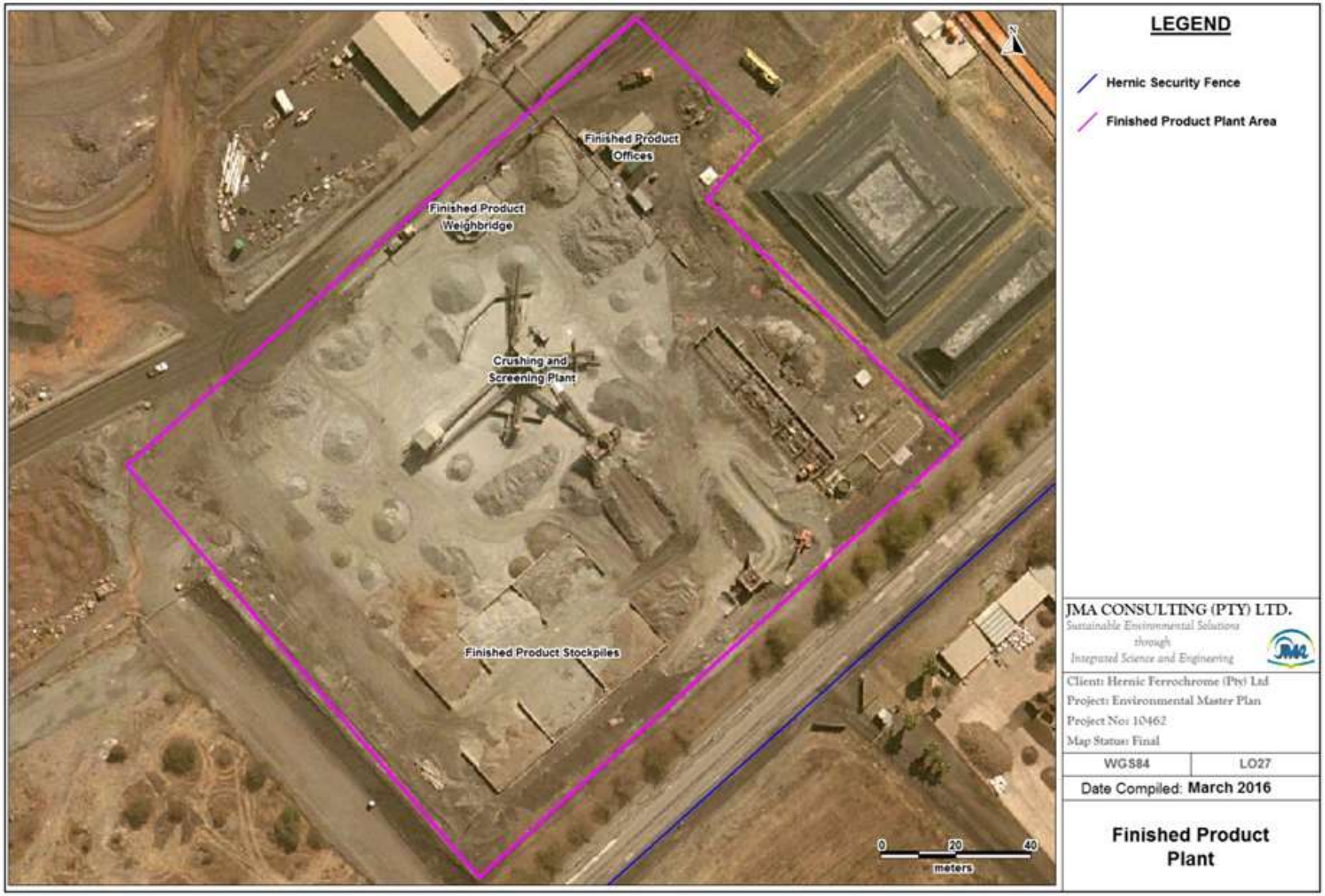

Figure 4.2.6.12(a): The Finished Product Plant

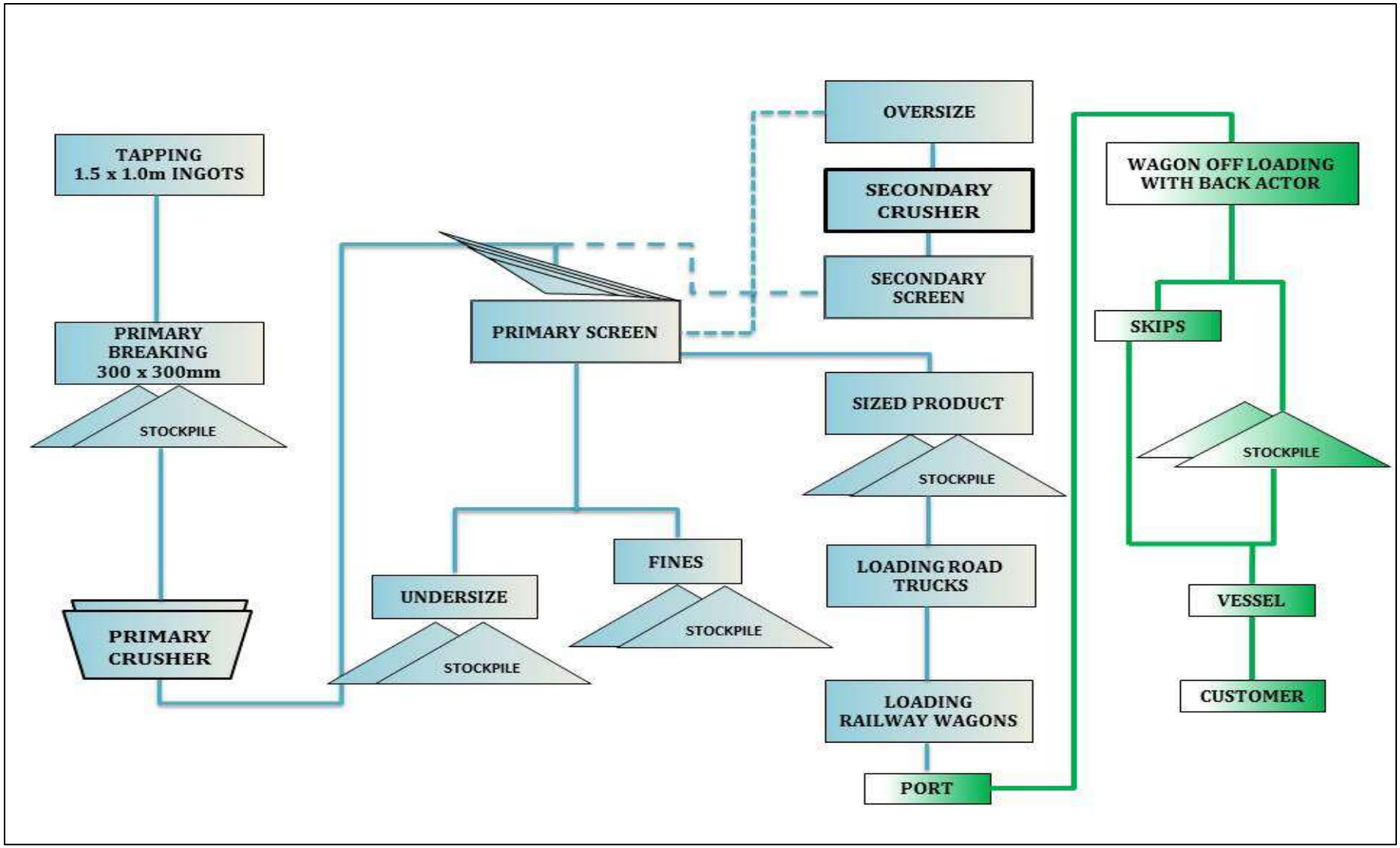

Figure 4.2.6.12(b): Schematic Process Flow Diagram of the Finished Product Plant

4.2.6.13. Slag Stockpiling Areas

Historically, slag collected from the Furnace Tap floors was loaded onto trucks and transported to and deposited on a slag stockpile, now designated the Historic Slag Stockpile. The location and extent of the Historic Slag Stockpile is shown on Figure 4.2.6.13(a). The slag stockpile covers a footprint of approximately 3.84 *ha* and contains an estimated 490 000 m^3 of material. The facility is unlined.

Details pertaining to the Historic Slag Stockpile are relayed in the Table below.

Table 4.2.6.13(a): Details of the Historic Slag Stockpile

Historic Slag Stockpile		
Central Coordinates	25°39'53.00"S 27°50'58.64"E	
Footprint Area	3.84 *ha*	
Storage Capacity	490 000 m^3	
Vertical Wall Height	31 *m*	
Liner	No Liner	
Property Details	R/E of Ptn 103 (ptn of ptn 1) De Kroon 444 JQ	

The intention is to re-process the slag material for ferrochrome recovery through the Primary CRP, with the subsequent rehabilitation and closure of the residual footprint.

Current arisings slag collected from the Furnace Tap Floors is loaded onto trucks and transported to and deposited on two slag storage stockpiles prior to being fed through the Primary CRP. The two facilities are not lined. Due to the continuous feed of slag to the CRP the footprint sizes and tonnages of slag contained on these facilities may vary.

The location and extent of the two current arising slag stockpiles is shown on Figure 4.2.6.13(b). The footprint occupied by the two stockpiles is approximately 4.57 *ha* and it is estimated that the two facilities combined contain some 265 000 m^3 of slag.

A summary of the details pertaining to these two facilities are relayed in the Tables below.

Table 4.2.6.13(b): Details of the Current Arising Slag Stockpile 1

Current Arising Slag Stockpile 1		
Central Coordinates	25°39'26.92"S 27°50'43.76"E	
Footprint Area	2.11 *ha*	
Current Capacity	148 588 m^3	
Vertical Wall Height	24 *m*	
Liner	No Liner	
Property Details	Ptn 296 & Ptn 169	

Table 4.2.6.13(c): Details of the Current Arising Slag Stockpile 2

Current Arising Slag Stockpile 2		
Central Coordinates	25°39'30.50"S 27°50'39.49"E	
Footprint Area	2.46 *ha*	
Current Capacity	113 553 m^3	
Vertical Wall Height	16 *m*	
Liner	No Liner	
Property Details	Ptn 170 (a ptn of ptn 47) De Kroon 444 JQ	

Similar to the slag on the Historic Slag Stockpile, the future intention is to re-process the slag material for ferrochrome recovery through the Primary CRP, with the eventual rehabilitation and closure of the residual footprint.

At the same time of re-processing the existing slag stockpiles, the intention is to feed the new slag arisings directly from the Tap Floors into the Primary CRP for ferrochrome recovery.

4.2.6.14. Primary Chrome Recovery Plant

Slag present on the Current Arisings Slag Stockpiles (and in future also the Historic Slag Stockpile) are collected from these facilities and deposited at the Primary CRP Loading Area after which it is transported via conveyor into the CRP.

The chrome recovery process comprises a crushing (jaw crusher), screening (Gyro 1 and 2) and separation process (jigging). Both coarse and fine material is separated, coarse material through Dense Medium Separation (wet system) and fine material through magnetic separation (dry system). The location of and infrastructure related to the Primary CRP is shown on Figure 4.2.6.14(a). Refer to Figure 4.2.6.14(b) for a schematic process diagram of the chrome recovery process.

The infrastructure comprises of:

- Crushing, Screening and Separation Plant
- Water Storage
- Clarifier
- Process Water Dam (containing Process and Storm Water)
- Product Stockpiles
- Remaining Slag Stockpiles

After separation the recovered product and remaining coarse slag is stockpiled separately, ready for re-use. Fine fraction slag is transported by road to the Fine Slag Processing Plant. Slag not going to the Fine Slag Processing Plant is sold to customers for use as aggregate in the construction industry.

Figure 4.2.6.13(a): Location and Extent of the Historic Slag Stockpile Area

Figure 4.2.6.13(b): Location and Extent of the New Arisings Slag Stockpile Areas

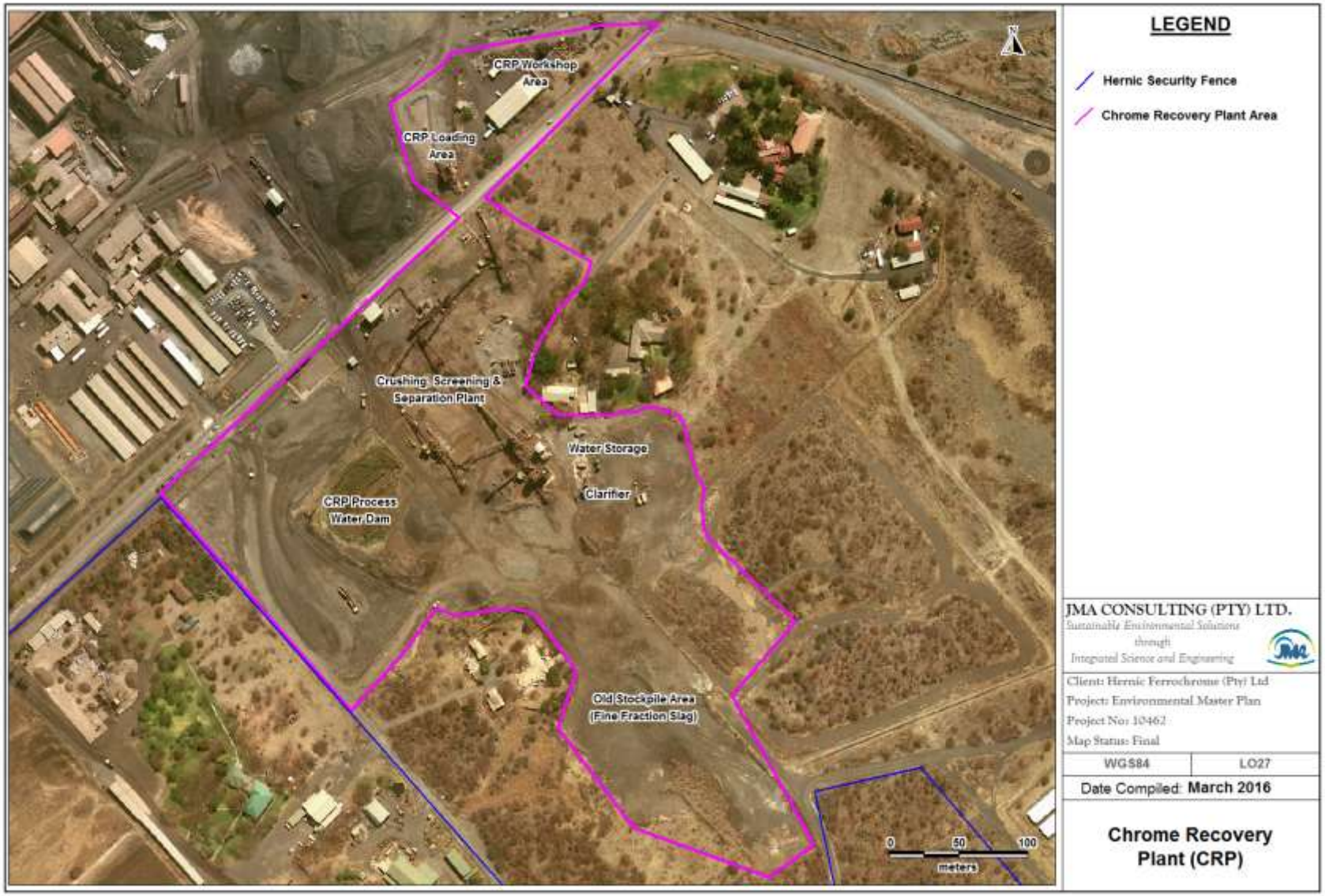

Figure 4.2.6.14(a): Location and Extent of the Chrome Recovery Plant (CRP)

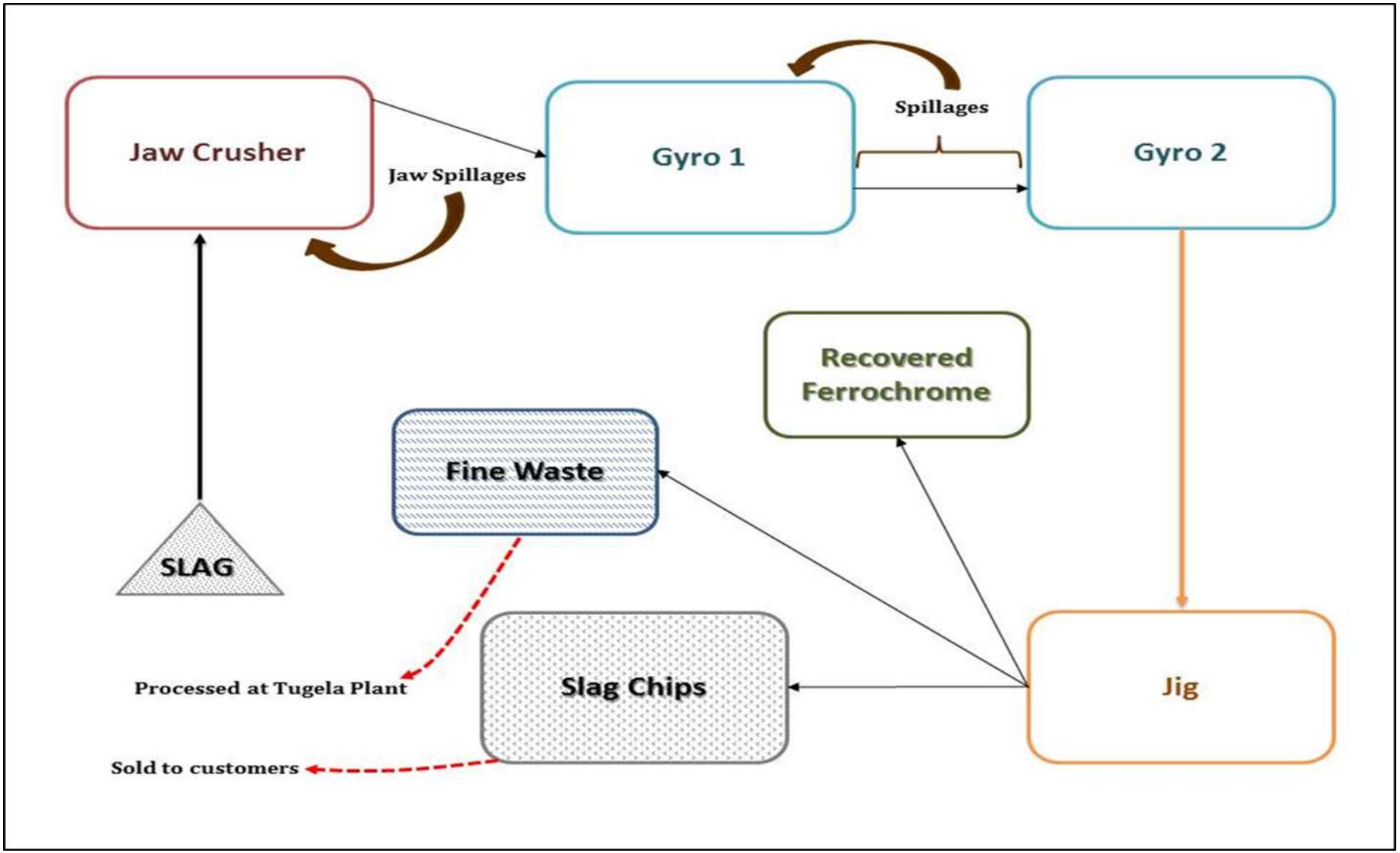

Figure 4.2.6.14(b): Schematic Process Diagram of the CRP Plant

The recovered chrome is transported to the Final Product Area for dispatch. Currently the plant is operating at 85 000 *tonnes per month*, but HERNIC would like to increase the capacity to the plant installed capacity of 186 000 *tonnes per month*.

Process and Storm Water at the Primary CRP is stored in an unlined CRP Process Water Dam. This facility is discussed in more detail under the Water Management section.

The tailings from the CRP are either pumped to the OB Plant tails stream, used as buttressing to stabilize the TSF, pumped to the Fine Slag Processing Plant or dried in an auxiliary process to form part of the Fine Slag Plant feed. The commissioning of a filter press at the CRP to dewater the tailings is currently being investigated.

4.2.6.15. Fine Slag Processing Plant (Secondary CRP)

The fine slag originating from the Primary CRP is picked up from the fine slag stockpiles and transported via road to the Fine Slag Processing Plant for further recovery, resulting in a fine Ferrochrome Product and Fine Fraction Slag, the latter which is re-used or sold to customers.

After separation, the fine ferrochrome fraction is loaded from a recovery bin whilst the fine fraction slag is stockpiled on a series of stockpiles (at the FSP), ready for re-use.

The location of, and the infrastructure related to the Fine Slag Processing Plant is shown on Figure 4.2.6.15(a). Refer to Figure 4.2.6.15(b) for a schematic process diagram of the Fine Slag Processing Plant. The infrastructure comprises of:

- Fine Slag Stockpiles
- Screening and Separation Plant
- Spiral Plant
- Fine Chrome Bin (product)
- Spiral Plant Tailings (fine sand product)
- Water Recovery Sumps

4.2.6.16. Product Rail Dispatch Area

HERNIC operates a Rail Dispatch Area for product transport to international markets mainly via Richards Bay.

The location of, and infrastructure related to, this facility is shown on Figure 4.2.6.16(a). The infrastructure comprises of:

- Temporary Product Stockpiles
- Rail Load out Conveyor
- Railway Siding
- Generator (Diesel Engine)

The centre coordinates of the facility is relayed in the Table below.

Table 4.2.6.16(a): Centre Coordinates of the HERNIC Railway Siding Dispatch Area

Description	Latitude	Longitude
Product Rail Dispatch Area	25°39'35.42"S	27°49'48.89"E

Figure 4.2.6.15(a): Location of and Infrastructure related to the Fine Slag Processing Plant

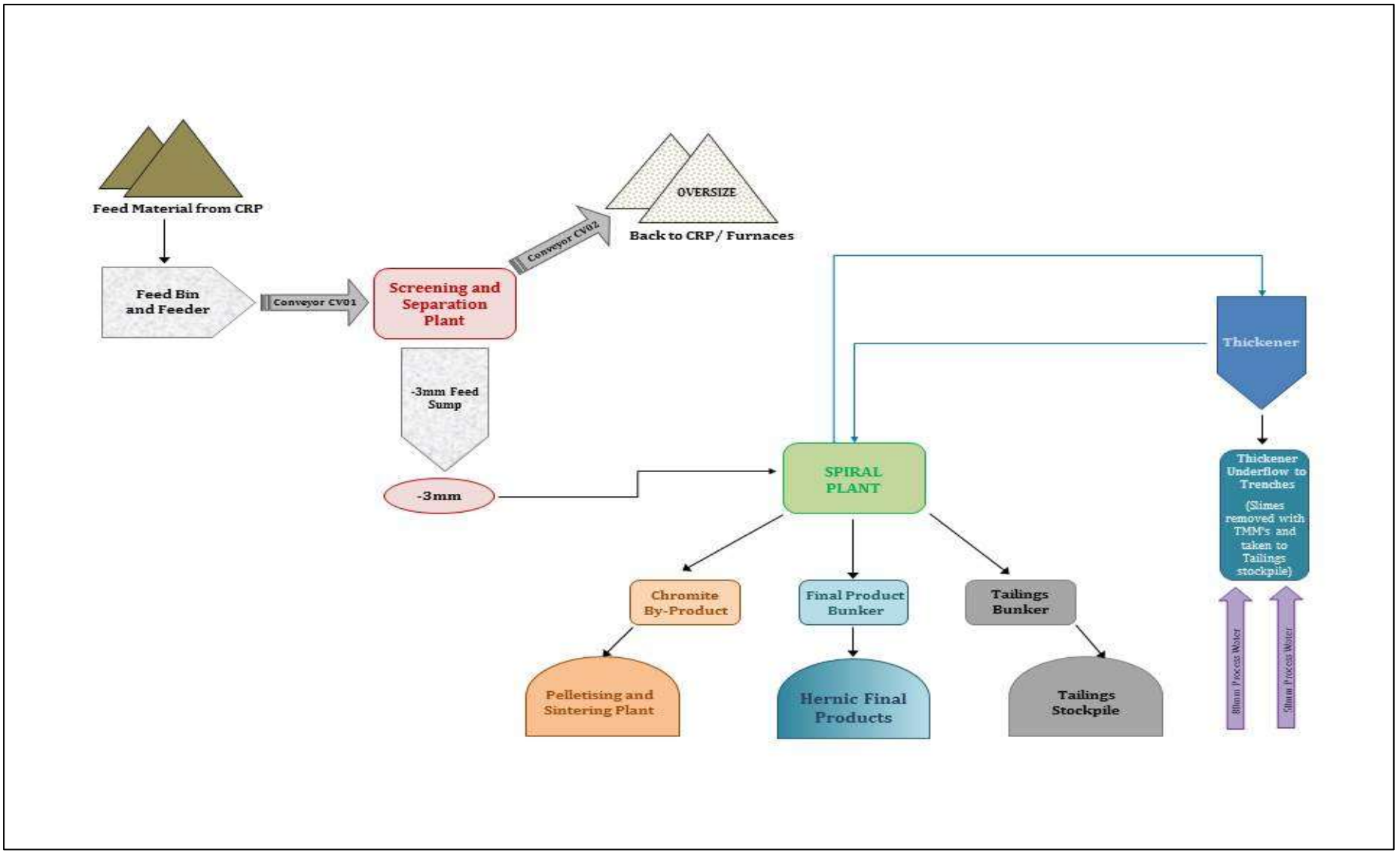

Figure 4.2.6.15(b): Schematic Process Diagram of the Fine Slag Processing Plant

Figure 4.2.6.16(a): Location of and Infrastructure related to the Product Rail Dispatch Area

4.2.6.17. Platinum Group Minerals (PGM) Plant

HERNIC has successfully applied for an amendment to their Mining Right which authorized them to mine and beneficiate the Platinum Group Minerals (PGM) present in existing fine mine tailings in both the Morula open pit as well as in the HERNIC TSF and also present in the MG ore to be mined in future (current arisings). PGM containing feed sourced from external suppliers will also be beneficiated at the PGM Plant.

DMR issued an approved EMPR in 2013 and the plant is currently being constructed. The locality for the PGM Plant, superimposed with a diagrammatic layout of the infrastructure currently constructed, is shown in Figure 4.2.6.17(a), whilst a process flow diagram for the PGM Flotation Plant is shown in Figure 4.2.6.17(b).

The PGM recovery plant has an overall capacity of 55 000 *tonnes per month* of tailings. HERNIC will re-mine the historic tailings and pump it to the PGM Plant. HERNIC will also pump the current arisings tailings via their OB Plant thickener underflow to the PGM Plant. At the re-mining site, several stages of screens will be installed in order to remove tramp material prior to overland pumping to the plant.

The process starts by splitting the feed and classifying it into slimes and fines. Hereafter the slimes and fines go to a separate PGM grinding and flotation recovery process with a 55 000 *tonnes per month* capacity. Additionally the fines portion will, prior to the PGM recovery plant, be subjected to spiral chrome recovery.

The recovery process will extract some 18% of the mass feed to be sold as chromite, some 2% of the feed to be sold as PGM, whilst the remaining 80% of the feed will represent tailings for deposition on the TSF at a deposition rate of some 43 000 *tonnes per month*.

The process steps include:

- Collection in a surge buffer tank
- De-sliming of the feed
- Spiral recovery of chromite from the de-slimed feed
- Primary and secondary ball milling of spiral tailings
- Thickening of slimes
- Ceramic bead milling of thickened slimes
- Separate PGM flotation of slimes and milled spiral tailings
- Thickening of the final PGM concentrate
- Pumping of tailings to the TSF
- Final depositing of the tailings onto the TSF

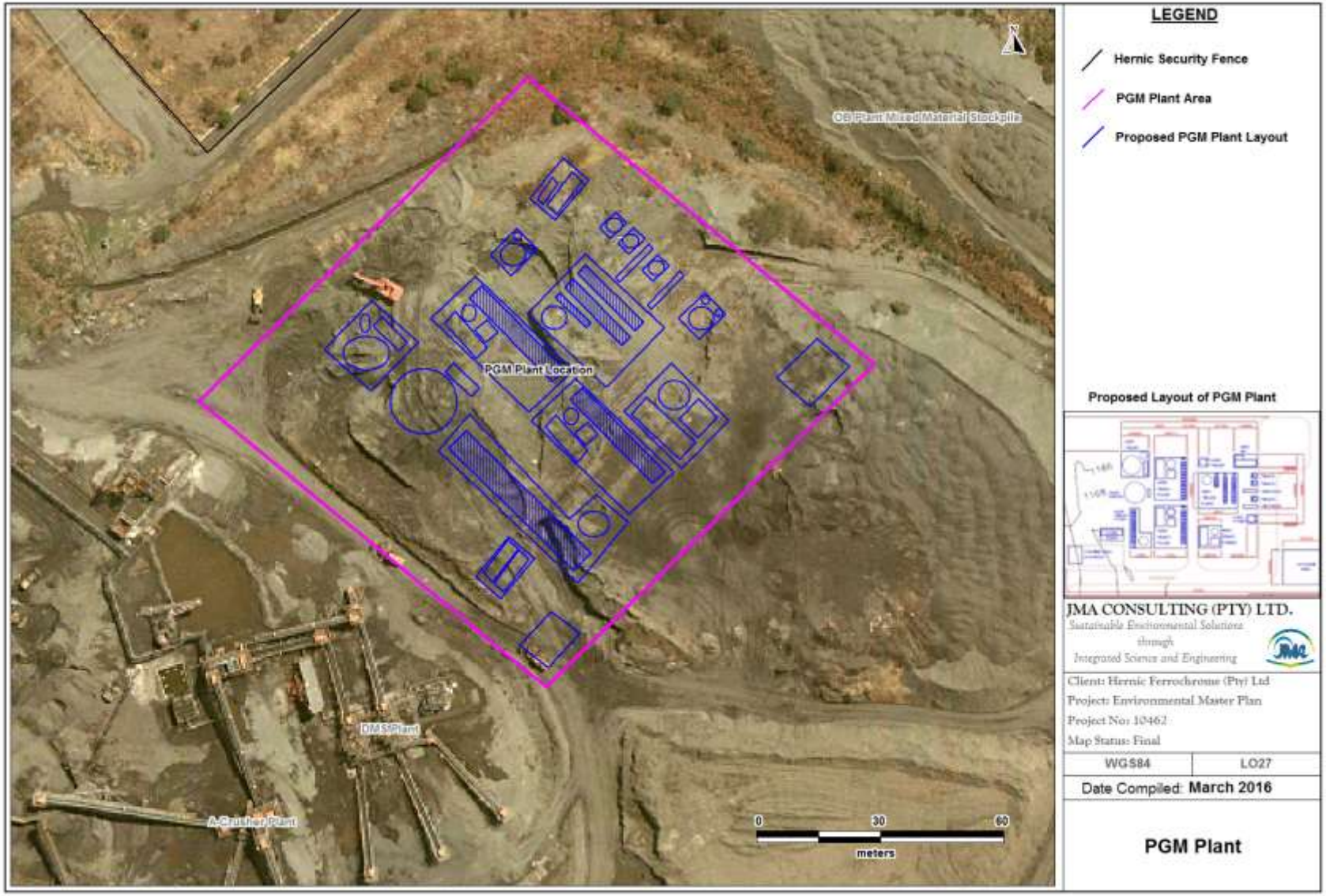

Figure 4.2.6.17 (a): Location of and Infrastructure related to the PGM Flotation Plant

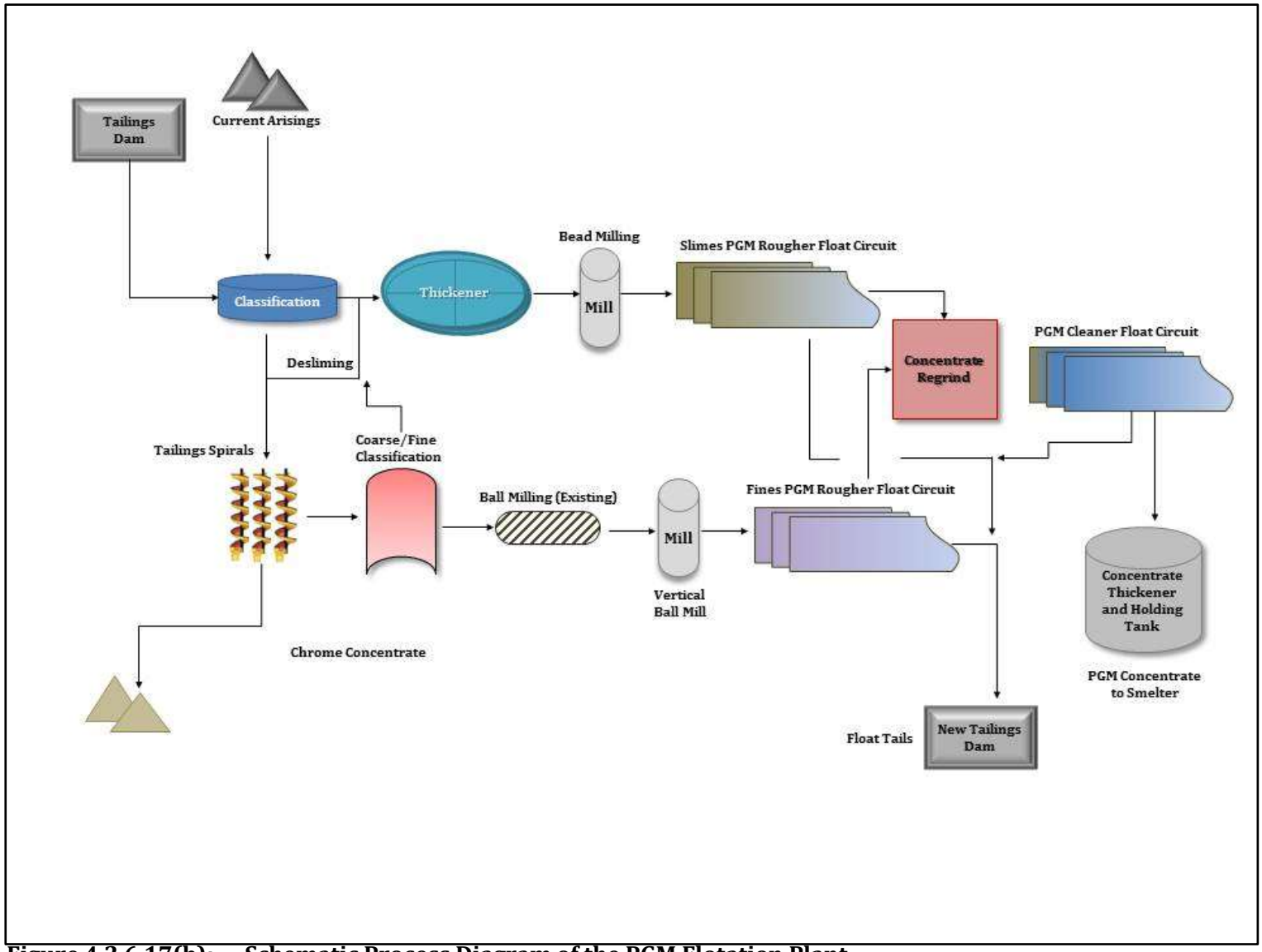

Figure 4.2.6.17(b): Schematic Process Diagram of the PGM Flotation Plant

4.2.6.18. Internal Transport and Contractors Yard and Wash Bay

The location of and Infrastructure related to the Internal Transport and Contractors Yard is shown on Figure 4.2.6.18(a) and the centre coordinates of the Internal Transport and Contractors Yard is relayed in the Table below. The infrastructure comprises of:

- Offices
- Workshops
- Stores
- Parking
- Wash Bay

All HERNIC transport and machinery is washed, serviced and parked here.

Table 4.2.6.18(a): Centre Coordinates of the Internal Transport and Contractors Yard

Description	Latitude	Longitude
Internal Transport and Contractors Yard	25°39'47.32"S	27°50'8.96"E

4.2.6.19. Redundant Historic Bag Plant

Two of the furnaces at HERRNIC used to be open furnaces which required air emissions control equipment which comprised Trombone Coolers and a Bag House Plant for furnace dust. After conversion to closed furnaces, this facility became redundant and was decommissioned.

The location of the Redundant Bag House Plant and the infrastructure related to it is shown on Figure 4.2.6.19(a) and the centre coordinates of this facility is relayed in the Table below.

Table 4.2.6.19(a): Centre Coordinates of the Redundant Historic Bag Plant

Description	Latitude	Longitude
Redundant Historic Bag Plant	25°39'39.74"S	27°50'23.27"E

4.2.6.20. Old Civil Workshop

The Old Civil Workshop comprised the following infrastructure:

- Offices
- Stores
- Workshops
- Parking

This facility is currently not in use and the infrastructure is maintained for a possible future use. The locality of the facility and the infrastructure related to it is shown on Figure 4.2.6.20(a). The centre coordinates of this facility is relayed in the Table below.

Table 4.2.6.20(a): Centre Coordinates of the Old Civil Workshop

Description	Latitude	Longitude
Redundant Old Civil Workshop	25°39'33.43"S	27°50'4.72"E

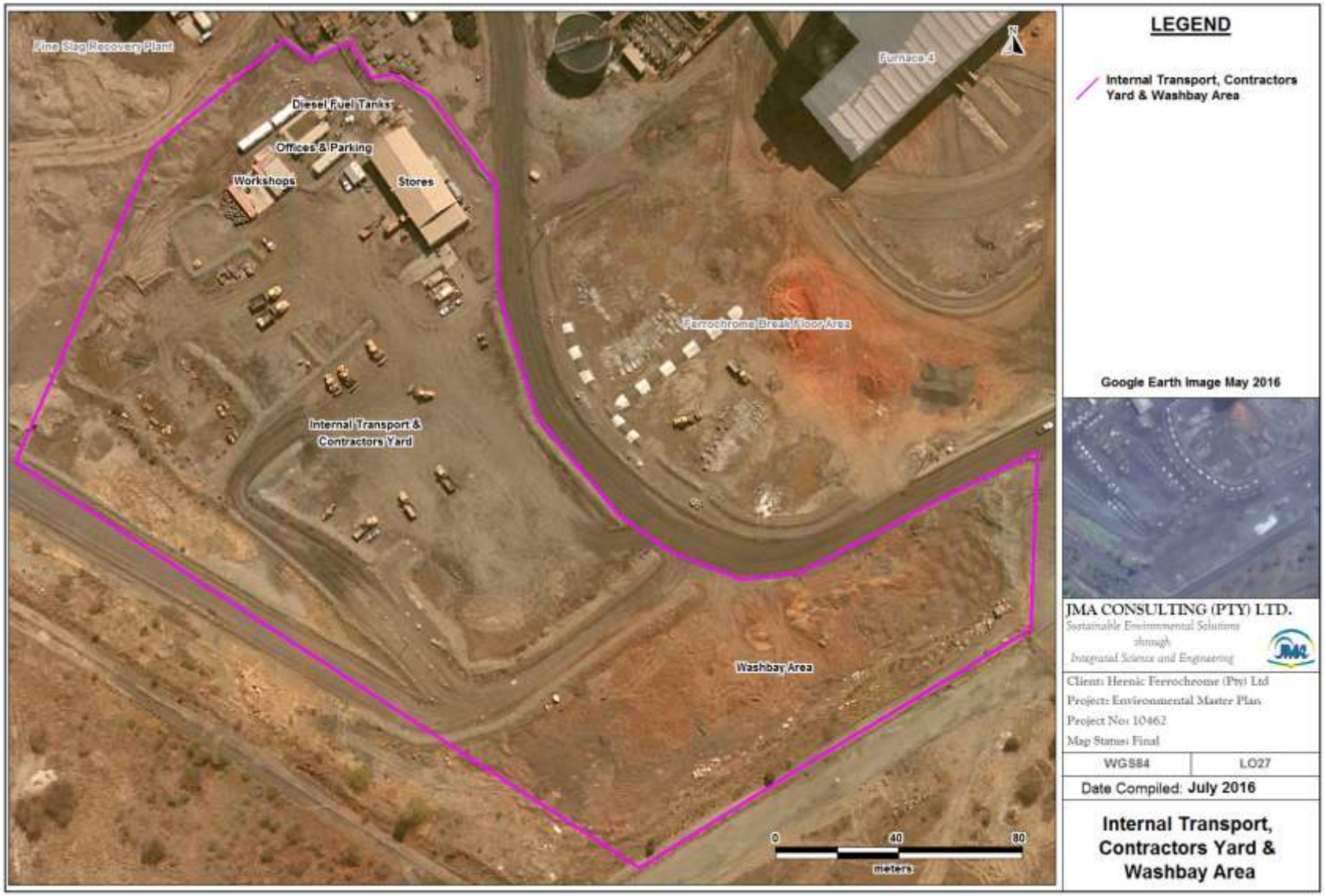

Figure 4.2.6.18(a): Location of and Infrastructure related to the Internal Transport and Contractors Yard and Wash Bay

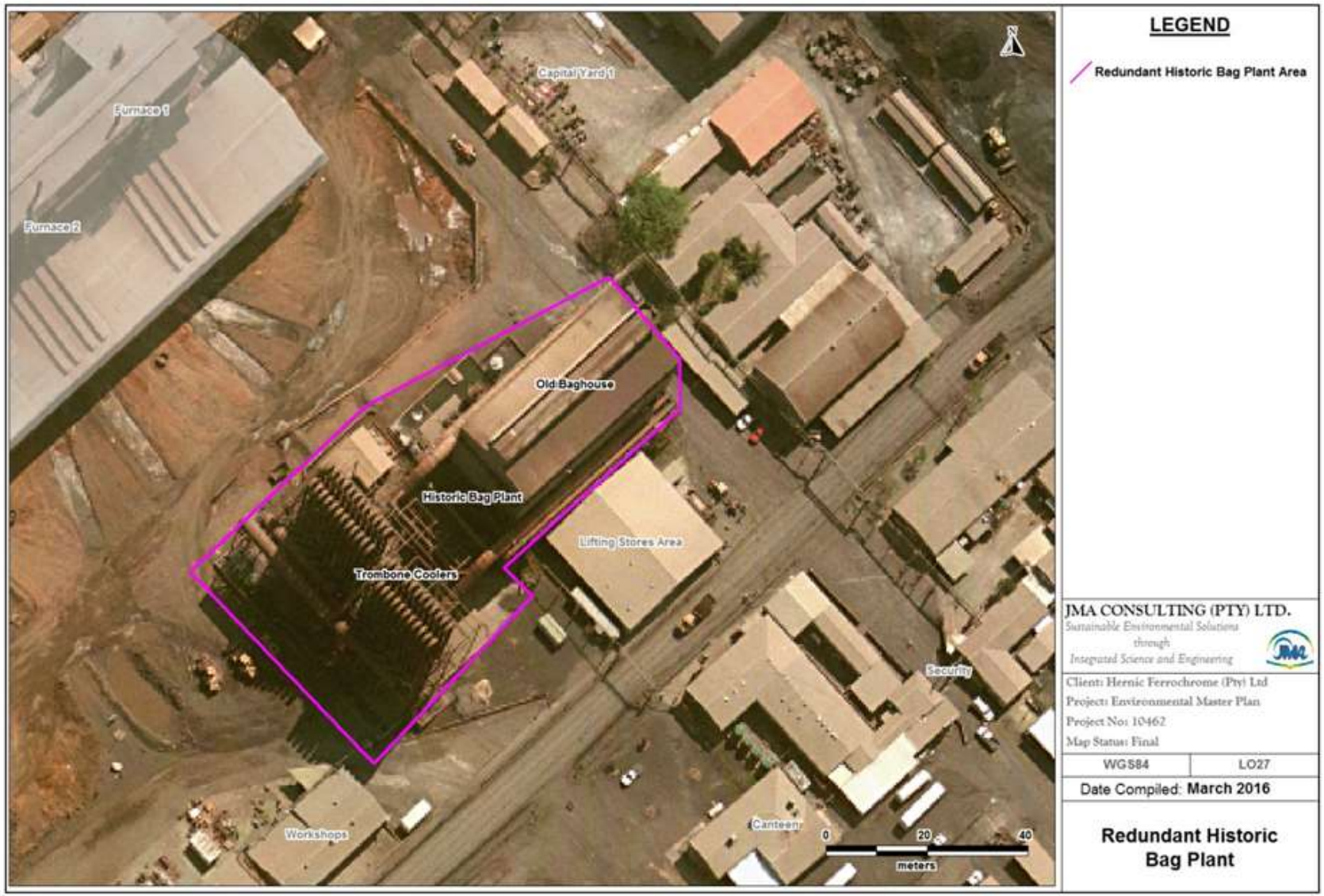

Figure 4.2.6.19(a): Location of and Infrastructure related to the Redundant Historic Bag Plant

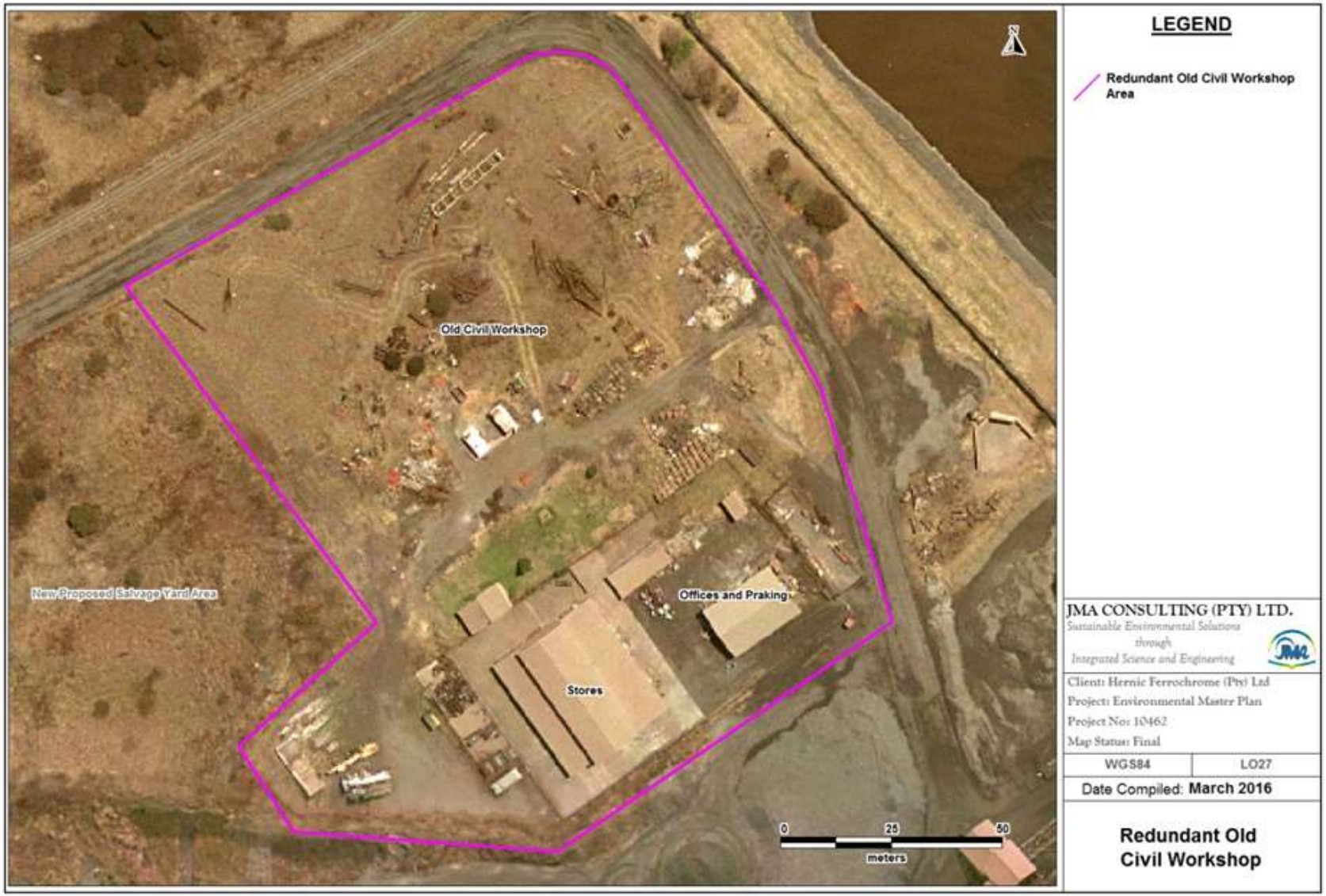

Figure 4.2.6.20(a): Location of and Infrastructure related to the Old Civil Workshop

4.2.6.21. Rehabilitated Quarry Area

The site contained a borrow quarry area from which material was quarried for construction purposes when the HERNIC plant was originally constructed. The quarry is now fully backfilled with inert residue material (coarse waste) and covered with topsoil. Vegetation is currently re-establishing on the area.

The location and extent of the rehabilitated quarry is shown on Figure 4.2.6.21(a) and the centre coordinates of the quarry is relayed in the Table below.

The footprint occupied by the rehabilitated quarry is approximately 2.00 *ha*.

Table 4.2.6.21(a): Centre Coordinates of the Rehabilitated Quarry

Description	Latitude	Longitude
Rehabilitated Quarry	25°39'34.48"S	27°49'44.59"E

Figure 4.2.6.21(a): Location and Extent of the Rehabilitated Quarry Area

4.2.7. Alloys Smelting Plant Waste Management Facilities

Up till 02 September 2014, mining residue was deemed not to be subject to the requirements of the National Environmental Management Waste Act.

For this reason, waste management activities at HERNIC have been authorized primarily in terms of the MPRDA through approval in the EMPR.

However, these facilities were also authorized as Water Uses through the issued Water Use License for the site.

4.2.7.1. Historic Slimes Dams (1 & 2)

The location and extent of the two Historic Slimes Dams are shown on Figure 4.2.7.1(a). Details pertaining to these two facilities are relayed in the Tables below.

These two facilities were used since the commissioning of the first two furnaces at HERNIC for the disposal of the Bag House Dust that was collected as part of the furnace off-gas emissions control systems.

Both facilities were provided with compacted clay and HDPE liner systems and also had drainage layers below the HDPE and above the compacted clay.

Upon reaching their end of life, these two facilities were taken out of operation and replaced with a new H:H Slimes Disposal Facility. At this time the two Historic Slimes Dams were covered with HDPE capping liner systems as a temporary measure to prevent water ingress and dust generation pending their final rehabilitation and closure.

The intention is to remove the slimes contained in these facilities for final disposal at the now redundant H:H Slimes Disposal Facility, or alternatively for re-use (pelletizing and re-feed) into the Smelting Plant for ferro-chrome production. The footprints will be rehabilitated and finally closed in compliance with the requirements of the NEMWA Regulations.

Table 4.2.7.1(a): Details for Historic Slimes Dam 1

Historic Slimes Dam 1		
Central Coordinates	25°39'45.44"S 27°50'23.52"E	
Footprint Area	2 920.25 m^2	
Final Maximum Height	8 m	
Liner	Combined Clay and HDPE Liner with Drainage Layer	

Table 4.2.7.1(b): Details for Historic Slimes Dam 2

Historic Slimes Dam 2		
Central Coordinates	25°39'46.41"S 27°50'24.46"E	
Footprint Area	922.84 m^2	
Final Maximum Height	7 m	
Liner	Combined Clay and HDPE Liner with Drainage Layer	

Figure 4.2.7.1(a): Location and Extent of the two Historic Slimes Dams

4.2.7.2. H:H Slimes Dam and Return Water Dam (RWD)

The location and extent of the H:H Slimes Dam and its associated Return Water Dam (RWD) is shown on Figure 4.2.7.2(a). Although only Phase 1 of this facility was developed, the approved footprint area for a possible future Phase 2 is also shown on Figure 4.2.7.2(a). This facility was primarily used for the disposal of the Bag House Dust that was collected as part of the furnace off-gas emissions control systems for the old open furnaces.

This facility replaced the two Historic Slimes Dams and was constructed in accordance with waste disposal regulatory requirements to exacting specifications for the protective footprint liners for both the Waste Site itself as well as the associated RWD.

The facility became redundant when the open furnaces were converted to closed furnaces after which the H:H Waste Site as well as the RWD, were temporarily covered with HDPE Capping Liners to prevent water ingress and dust generation pending their final rehabilitation and closure.

The intention is to dispose of the Old Historic Slimes Dams material on Phase 1 of this appropriately lined facility, after which Phase 1 will be fully rehabilitated and closed in full compliance with regulatory requirements.

The footprint occupied by the H:H Slimes Dam is approximately 1.35 *ha* and that of the downstream associated RWD approximately 0.3765 *ha*.

The liner system for the H:H Slimes Dam consists of 2 *mm* FML / geomembrane, 600 *mm* compacted clay liner (in 4 x 150 *mm* layers), geotextile layer, 150 *mm* leakage detection and collection layer, 300 *mm* compacted clay liner (in 2 x 150 *mm* layers) and a 150 *mm* base preparation layer.

Table 4.2.7.2(a): H:H Slimes Dam Design Specifications

H:H Slimes Dam		
Central Coordinates	25°39'18.46"S 27°50'46.93"E	
Footprint Area	1.35 *ha*	
Final Maximum Height	15 *m*	
Limiting Rate of Rise	0.7 *m/y*	
In Situ Density	2.1 t/m^3	
Storage Capacity	52 000 m^3	
Liner Type	H:H Liner	

The liner system for the H:H Slimes Dam RWD consists of a 2 *mm* FML/geomembrane, 600 *mm* compacted clay liner (in 4 x 150 *mm* layers), geotextile layer, 150 *mm* leakage detection and collection layer, 100 *mm* cushion layer, 1.5 *mm* FML/geomembrane, 300 *mm* compacted clay liner (in 2 x 150 *mm* layers) and a 150 *mm* base preparation layer.

Table 4.2.7.2(b): H:H Slimes Dam RWD Design Specifications

H:H Slimes Dam Return Water Dam		
Central Coordinates	25°39'15.13"S 27°50'42.27"E	
Footprint Area	3765.15 m^2	
Crest Length	244.86 *m*	
Top of Wall Level	1163.25 *mamsl*	
Full Supply Level	1162.85 *mamsl*	
Freeboard	0.4 *m*	
Dam Storage Capacity	6130 m^3	
Wall Type	Composite	
Liner Type	H:H Liner	

Figure 4.2.7.2(a): Location and Extent of the H:H Slimes Dam and Return Water Dam

4.2.7.3. HERNIC Tailings Storage Facility (TSF) and Return Water Dam (RWD)

The fine tailings generated at the OB Plant, the PGM Plant, as well as fine clarifier underflow from the air scrubbing and bag house systems at the furnaces and the pelleting plants, are slurried and pumped to a fully designed Tailings Storage Facility (TSF) for disposal. The option to dispose of fine slag from the Primary CRP onto the TSF also exists and is currently being investigated. The supernatant water is decanted from the slurry dam through an intermediate and final penstock system. The water then reports to the silt trap where suspended solids are allowed to settle out. The water subsequently is reticulated to a dedicated Return Water Dam. The water is re-cycled back to the OB Plant for re-use via a dedicated pump station.

The location and extent of the TSF and associated RWD is shown on Figure 4.2.7.3(a). The TSF footprint comprises of the following components; a starter wall embankment of 6.7 *m* high to elevation 1173.70 *mamsl*, catchment paddocks, 5 *m* wide toe drains, 5 *m* wide blanket drains, pool wall, an enclosed solution collector system, final and intermediate penstocks, catwalks, an access road, silt trap (HDPE and concrete lined) with a concrete division wall, a Return Water Dam (HDPE lined) with an approximate capacity of 24 000 m^3, pump station, storm water diversion trench and bund wall and a TSF division wall.

The footprint occupied by the TSF and the RWD is approximately 31.14 *ha* and 0.9486 *ha* respectively. The TSF is an upstream impoundment and has to accommodate an average deposition rate of 26 000 *tonnes* of fine tailings *per month* with and estimated final storage capacity of 7 800 000 *tonnes.* The TSF is constructed on a gradient which implies that there is a catchment area upstream of the TSF. Any storm water generated upstream of the TSF is diverted around the facility by means of a storm water diversion trench and is discharged at the north western and north eastern corners of the dam. The location of the slurry pool on top is controlled by the deposition of the slurry from the edge of the walls. As the slurry is deposited, the pool tends towards the centre of the dam. Alternate deposition points must be utilised in order to keep the pool in the centre of the dam.

Table 4.2.7.3(a): Details of the Tailings Storage Facility

Tailings Storage Facility		
Central Coordinates	25°39'10.49"S 27°51'11.71"E	
Footprint Area	31.14 *ha*	
Lifespan	10 - 25 *years*	
Ave Deposition Rate	26 000 *tpm*	
Ave Slurry Relative Density	1.2 t/m^3	
Solids Specific Gravity	3.6 t/m^3	
In Situ Dry Density	2.043 t/m^3	
Tailings Upper Cut-off	0.5 *mm*	
Final Maximum Height	39 *m*	
Limiting Rate of Rise	3 *m/y*	
Design Storm	1:50 *yr* : 121 *mm*	
Minimum Decant Period	72 *hours*	
Liner	No Liner	

Table 4.2.7.3(b): Details of the TSF Return Water Dam

TSF associated Return Water Dam		
Central Coordinates	25°39'11.16"S 27°50'52.39"E	
Footprint Area	9486.50 m^2	
Crest Length	420 m	
Max Wall Height	3.8 m	
Freeboard	0.8 m	
Dam Storage Capacity	24 000 m^3	
Wall Type	Composite	
Liner Type	HDPE Liner	

4.2.7.4. Salvage Yard

HERNIC operates a salvage yard and two capital yards. The two capital yards are used to store new items purchased for use in the Plant and should not be confused with salvage operations. It is for this specific reason that they are mentioned and shortly discussed here but they are not waste management related.

The location and extent of the salvage yard is shown on Figure 4.2.7.4(a). Centre coordinates of the Salvage Yards is given in the Table below.

The current HERNIC salvage yard is the location on site where all re-useable wastes are collected and sorted before being directed to either a landfill or to recycling companies.

The footprint occupied by the current HERNIC salvage yard is some 7 526.30 m^2.

Table 4.2.7.4(a): Centre Coordinates of the of the HERNIC Salvage Yard

Description	Latitude	Longitude
Salvage Yard	25°39'35.13"S	27°50'36.61"E

Figure 4.2.7.3(a): Location and Extent of the HERNIC TSF and its associated RWD

Figure 4.2.7.4(a): Location and Extent of the Salvage Yard

4.2.7.5. Sewage Plant

The locality and extent of the HERNIC Alloys Plant Sewage Plant is indicted on Figure 4.2.7.5(a).

Table 4.2.7.5(a): Centre Coordinates of the Alloys Sewage Plant

Description	Latitude	Longitude
Alloys Sewage Plant	25°39'27.68"S	27°50'2.18"E

The Sewage Plant operates through the application of a Sequencing Batch Reactor (SBR) technology. The treatment process comprises raw effluent screening, flow balancing and distribution, aeration in a single SBR reactor, settling, decanting of the treated supernatant, dis-infection of the discharged supernatant, retention of the waste sludge in the aeration tank before discharge and dewatering of the activated sludge on sludge drying beds.

The SBR Sewage Treatment Plant is designed to treat an average of 140 m^3 of domestic sewage *per day*. The treatment plant is designed to produce an effluent in accordance with the requirements of the General Limits of the General Authorizations in terms of Section 39 of the National Water Act, 1998.

The Sludge Drying Beds are manufactured by PRENTEC and which consist of four beds (4 *m* x 4 *m* x 0.5 *m*). The internal bed specification is 90 *mm* thick 19 *mm* stone (bottom layer), 3 *mm* thick Kaymac matting (middle layer) and finally a 100 *mm* thick 1.3 *mm* sand layer (top layer). Dried sludge is removed from site and sent to an external licensed Hazardous Waste Disposal Facility (Class H:H Landfill Facility) via an external Waste Disposal Service Provider on a regular basis.

4.2.7.6. OB Plant Fines in Open Pit (Slurry)

During mining, concurrent backfilling of the open-pit sections on De Kroon 444 JQ, was done with both coarse overburden waste rock which was rolled over during mining as well as with inert fine tailings material from the OB Plant which was slurried into the open pit.

The locality and extent of the portions of the open pit backfilled with this fine material is shown on Figure 4.2.7.6(a).

The fine slurry material comprises *inter alia* of minerals referred to as Platinum Group Minerals. HERNIC has applied for, and has been granted an amendment to their mining right which now permits them to re-mine the fine slurry and to extract a series of economic minerals from the slurry.

The fine material will therefore be re-mined from the open-pit for beneficiation in a new PGM Plant, after which the open pit will be finally backfilled with inert coarse mine waste rock, as well as with coarse waste from the OB Plant.

4.2.7.7. OB Plant Coarse Waste in Open Pit (Trucks)

Areas available for final backfilling in the Morula open pit are currently also backfilled with coarse waste from the OB Plant.

The locality and extent of the portions of the open pit backfilled with this coarse material is also shown on Figure 4.2.7.6(a). The coarse material essentially represents mining waste and is deemed inert.

Figure 4.2.7.5 (a): Location and Infrastructure related to the HERNIC Alloys Plant Sewage Plant

Figure 4.2.7.6(a): Location and Extent of Deposition of OB Plant Fines and Coarse Waste in the Morula Open Pit

4.2.8. Alloys Smelting Plant Process Water Management Facilities

All aspects related to water use and water management will be regulated through the Integrated Water Use Licence for the site.

4.2.8.1. Hartbeespoort Canal Pump Station

The site is supplied with raw water for process and potable purposes from the Hartbeespoort Irrigation Canal via a canal from the Hartbeespoort Dam. A copy of the original contract with and confirmation of the water allocation from the Hartbeespoort Government Water Scheme, dated 05 January 1995 is attached as **APPENDIX 4(A)** and states that HERNIC may "*abstract a maximum of 876 000 m³ of unpurified water from the canal for industrial and household purposes for use on Portion 47 of the farm De Kroon 444 JQ in the district of Brits*".

This water use has however since been authorised in the Water Use Licence issued 18 December 2015 (03/A21J/ABGJ/4196), attached as **APPENDIX 4(B)**, which states that *"Hernic may take a maximum of **870 000 m³** of water per annum from the Hartbeespoort Irrigation Canal for domestic, mining and industrial purposes at the mine".*

The canal runs along the northern perimeter of the site and a raw water pump station is located along the canal. The centre coordinates of this pump station is relayed in the Table below. The infrastructure associated with the pump station is shown in Figure 4.2.8.1(a) and its locality in Figure 4.2.8.1(b).

Table 4.2.8.1(a): Centre Coordinates of the Hartbeespoort Dam Canal Pump Station

Description	Latitude	Longitude
Hartebeespoort Dam Canal Pump Station	25°39'24.67"S	27°49'55.38"E

Figure 4.2.8.1(a): Pump Station Infrastructure

Figure 4.2.8.1(b): The location and extent of the Hartbeespoort Dam Canal Pump Station

4.2.8.2. Plant Drinking Water Dam

The water pumped from the Hartbeespoort Dam Canal is stored in the Plant Drinking Water Dam on site.

The location and the extent of the Plant Drinking Water Dam is shown on Figure 4.2.8.2(a). The dam covers a footprint area of approximately 9 120.95 m^2 and has an estimated storage capacity of 30 000 m^3.

Table 4.2.8.2(a): Details of the Plant Drinking Water Dam

Plant Drinking Water Dam		
Central Coordinates	25°39'38.44"S 27°50'11.35"E	
Footprint Area	9120.95 m^2	
Crest Length	338.72 m	
Max Wall Height	-	
Freeboard	-	
Dam Storage Capacity	30 000 m^3	
Wall Type	Earth Fill	
Liner Type	No Liner	

4.2.8.3. Plant Drinking Water Treatment Plant

The water sourced from the Hartbeespoort Dam canal is treated at an on-site water treatment plant (Mintek Water Treatment Plant) to produce potable water. The potable water is distributed from the treatment plant to the various points for domestic use.

The location of and the infrastructure associated with the Plant Drinking Water Treatment Plant is shown on Figure 4.2.8.3(a) and the centre coordinates of the facility is relayed in the Table below.

The treatment process comprises a series of sand filters followed by chlorination. More specifically, the raw water passes through the filter bed in a down flow direction and gradually distributes the turbidity throughout the filtering mass. The first layer of filter media holds large suspended particles, while the finer and progressively more compact underlying strata hold smaller particles. The chemical dosing systems are made up of one flocculent, one polyelectrolyte as well as a chlorine dosing pump. Water is dosed with flocculent and hypochlorite. The plant has a capacity to treat 75 m^3 per hour.

Table 4.2.8.3(a): Centre Coordinates of the Plant Drinking Water Treatment Plant

Description	Latitude	Longitude
Plant Drinking Water Treatment Plant	25°39'36.42"S	27°50'10.64"E

Figure 4.2.8.2(a): The location and the extent of the Plant Drinking Water Dam

Figure 4.2.8.3(a): The location of and infrastructure associated with the Plant Drinking Water Treatment Plant

4.2.8.4. Plant Process Water Dam and Silt Traps

The Plant Process Water Dam comprises of a series of upstream silt traps and three storage cells, i.e. Phase 1, Phase 2 and Phase 3. The three phases actually also serve as silt settlement dams. The location and extent of the Plant Process Water Dam and Silt Traps is shown on Figure 4.2.8.4(a). A summary of the details pertaining to this dam is relayed in the Table below. The dam covers a footprint area of 3.06 *ha* and has a total storage capacity of 76 000 m^3, and has a composite liner.

The silt comprises primarily fine ore concentrate and originates from the general areas of the concentrator, pelletizing and furnace proportioning plants. The spillages at these plants are washed with water into the process water dam circuit. The silt therefore actually represents fine ore and is recycled back into the process once it is removed from the silt traps and the process water dam.

Table 4.2.8.4(a): Details of the Plant Process Water Dam

Plant Process Water Dam		
Central Coordinates	25°39'28.51"S 27°50'10.19"E	
Footprint Area	3.06 *ha*	
Crest Length	671.45 *m*	
Max Wall Height	-	
Freeboard	0.95 *m*	
Dam Storage Capacity	76 000 m^3	
Wall Type	Earth Fill	
Liner Type	Composite Liner	

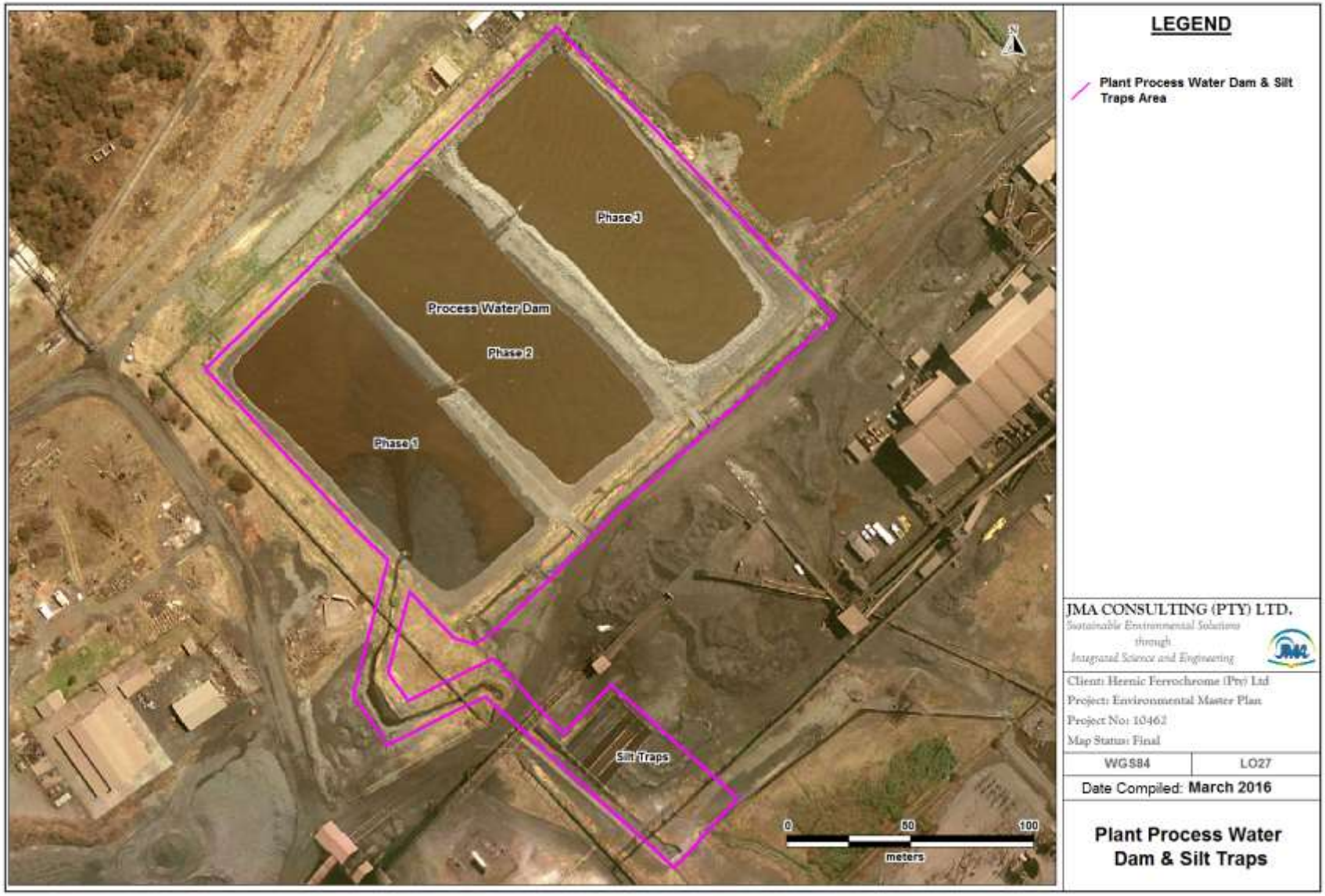

Figure 4.2.8.4(a): The location of and infrastructure associated with the Plant Process Water Dam and Silt Traps

4.2.8.5. OB Plant Return Water Dam (RWD)

The purpose of the OB Plant RWD is to capture and store all dirty surface storm water run-off from the OB Plant area, from where it is recycled back into the slurry process for OB Plant Fines disposal. The location and extent of the OB Plant RWD is shown on Figure 4.2.8.5(a).

The dam covers a footprint area of 1.72 *ha* and has a total storage capacity of 25 000 m^3. The OB Plant RWD does not have a liner system.

Table 4.2.8.5(a): Details of the OB Plant Return Water Dam

OB Plant Return Water Dam		
Central Coordinates	25°39'20.93"S 27°50'20.50"E	
Footprint Area	1.72 *ha*	
Crest Length	420.11 *m*	
Max Wall Height	-	
Freeboard	-	
Dam Storage Capacity	25 000 m^3	
Wall Type	Earth Fill	
Liner Type	No Liner	

Due to the fact that the solids suspended in the storm water run-off from the OB Plant, essentially represent fine inert mine waste rock, the OB Plant RWD is not lined.

4.2.8.6. Chrome Recovery Plant Process Water Dam

The purpose of the Primary CRP Process Water Dam is primarily to serve as a reticulation facility for process water at the Primary CRP, as well as to capture and store all dirty surface storm water run-off from the facility. The location and extent of the Primary CRP Process Water Dam is shown on Figure 4.2.8.6(a). The dam covers a footprint area of 3 462.70 m^2 and has a total storage capacity of 9 000 m^3. The Primary CRP Process Water Dam does not have a liner system.

Table 4.2.8.6(a): Details of the Primary CRP Process Water Dam

Primary CRP Process Water Dam		
Central Coordinates	25°39'46.09"S 27°50'32.85"E	
Footprint Area	3462.70 m^2	
Crest Length	204.83 *m*	
Max Wall Height	-	
Freeboard	-	
Dam Storage Capacity	9 000 m^3	
Wall Type	Earth Fill	
Liner Type	No Liner	

Figure 4.2.8.5(a): The location of and infrastructure associated with the OB Plant Return Water Dam

Figure 4.2.8.6(a): The location of and infrastructure associated with the Primary CRP Process Water Dam

4.2.9. Alloys Smelting Plant Storm Water Management Facilities

4.2.9.1. Storm Water Management Berms and Canals

A series of storm water management berms and canals are present within the HERNIC Alloys Plant area. These features are intended to separate clean and dirty storm water and to ensure that all dirty storm water is conveyed towards the Plant Storm Water Pollution Control Dam (PCD).

The current storm water management canal system, as well as the general surface flow directions for storm water run-off for the HERNIC plant areas is shown on Figure 4.2.9.1(a). This system is in need of an upgrade. The upgraded HERNIC Storm Water Management Plan/System is currently being designed and will form part of the proposed new activities to be authorized as part of the current process. More details will be given in section 4.3 of this report.

4.2.9.2. Plant Storm Water Pollution Control Dam (PCD)

The purpose of the Plant Storm Water PCD is to capture and store all dirty surface storm water run-off from the Alloys Plant area.

The location and extent of the Plant PCD is shown on Figure 4.2.9.2(a). A summary of the details pertaining to the Plant PCD is relayed in the Table below.

The dam covers a footprint area of 1.71 *ha* and has a total storage capacity of 38 000 m^3. The PCD does not have a liner system.

Table 4.2.9.2(a): Details of the Plant Storm Water Pollution Control Dam

Plant Pollution Control Dam		
Central Coordinates	25°39'24.95"S 27°50'14.25"E	
Footprint Area	1.71 *ha*	
Crest Length	488.44 *m*	
Max Wall Height	-	
Freeboard	-	
Dam Storage Capacity	38 000 m^3	
Wall Type	Earth Fill	
Liner Type	No Liner	

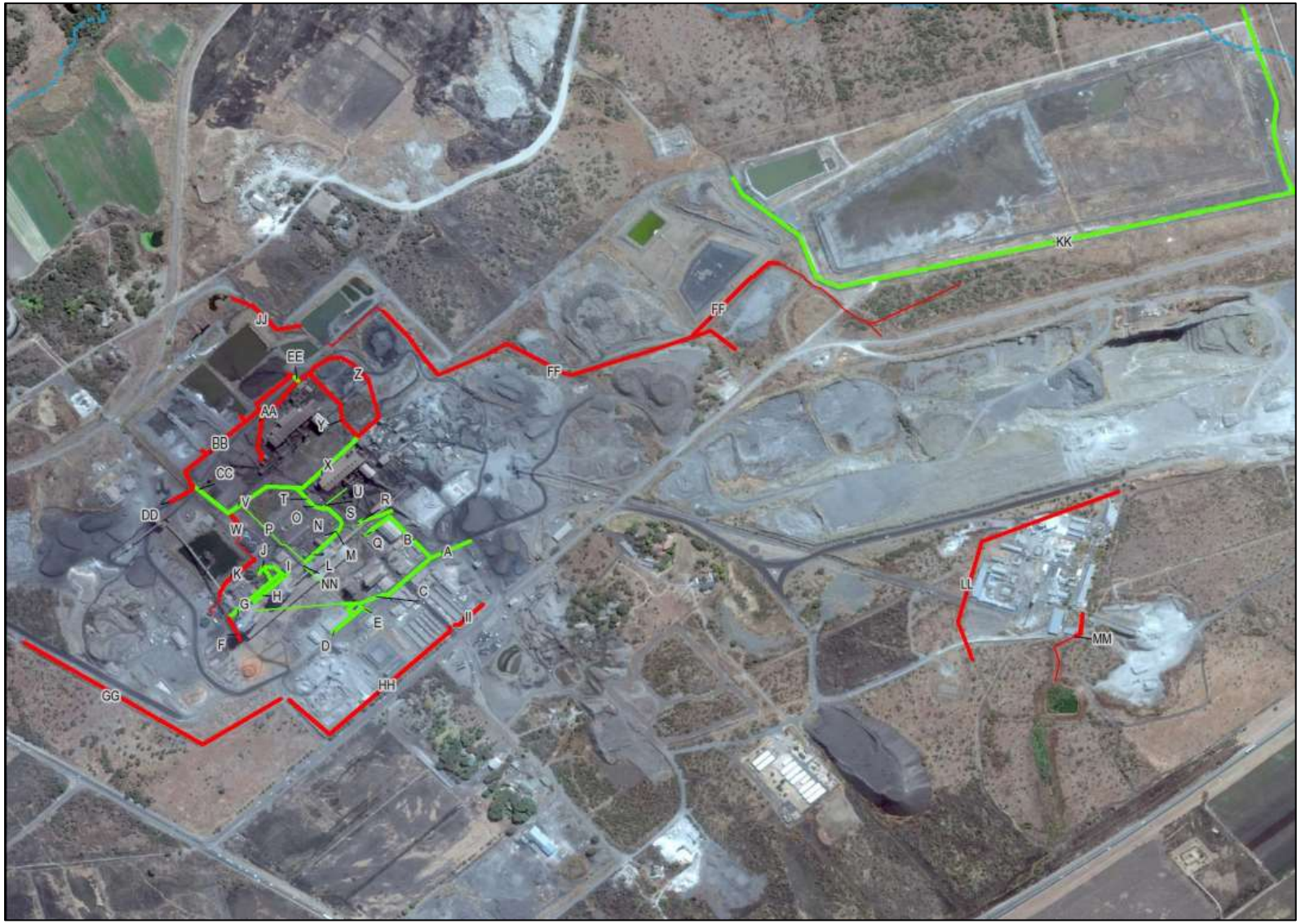

Figure 4.2.9.1(a): Current Storm Water Canals at HERNIC (Alloys Plant and Morula Mining)

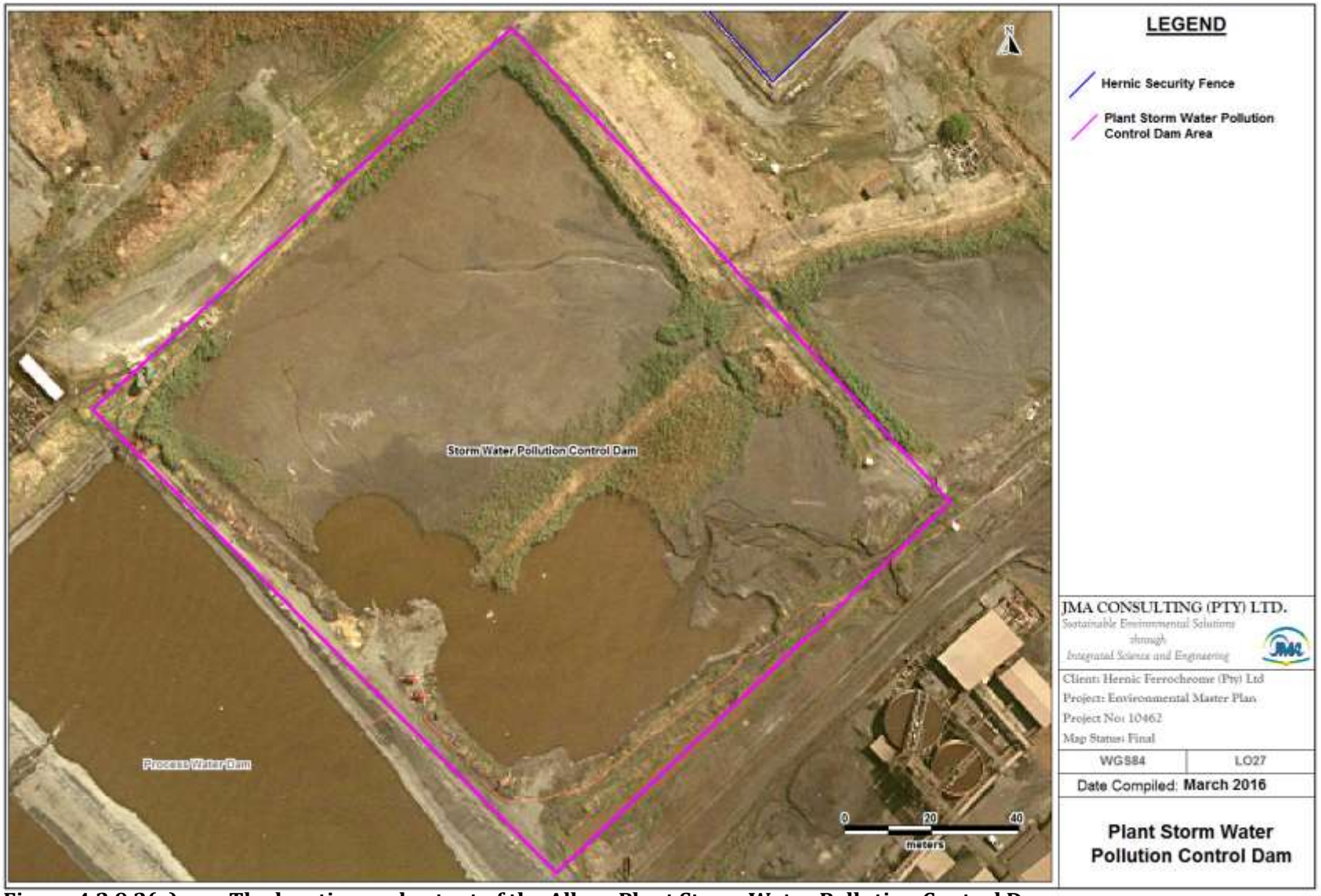

Figure 4.2.9.2(a): The location and extent of the Alloys Plant Storm Water Pollution Control Dam

4.2.9.3. Emergency Dam

The purpose of the Emergency Dam is to capture and store all dirty surface storm water run-off from the HERNIC Alloys Plant area in the event that extreme/upset run-off conditions cause the upstream storage facilities to overflow.

The location and extent of the Emergency Dam is shown on Figure 4.2.9.3(a). A summary of the details pertaining to the Emergency Dam are relayed in the Table below.

The dam covers a footprint area of 9 760.12 m^2. This dam is a man-made feature and no formal designs are in place, hence no accurate volume estimate is available. The dam does not have a liner system.

Table 4.2.9.3(a): Details of the Emergency Dam

Emergency Dam		
Central Coordinates	25°39'21.39"S 27°50'11.76"E	
Footprint Area	9760.12 m^2	
Crest Length	316.64 m	
Max Wall Height	-	
Freeboard	-	
Wall Type	Earth Fill	
Liner Type	No Liner	

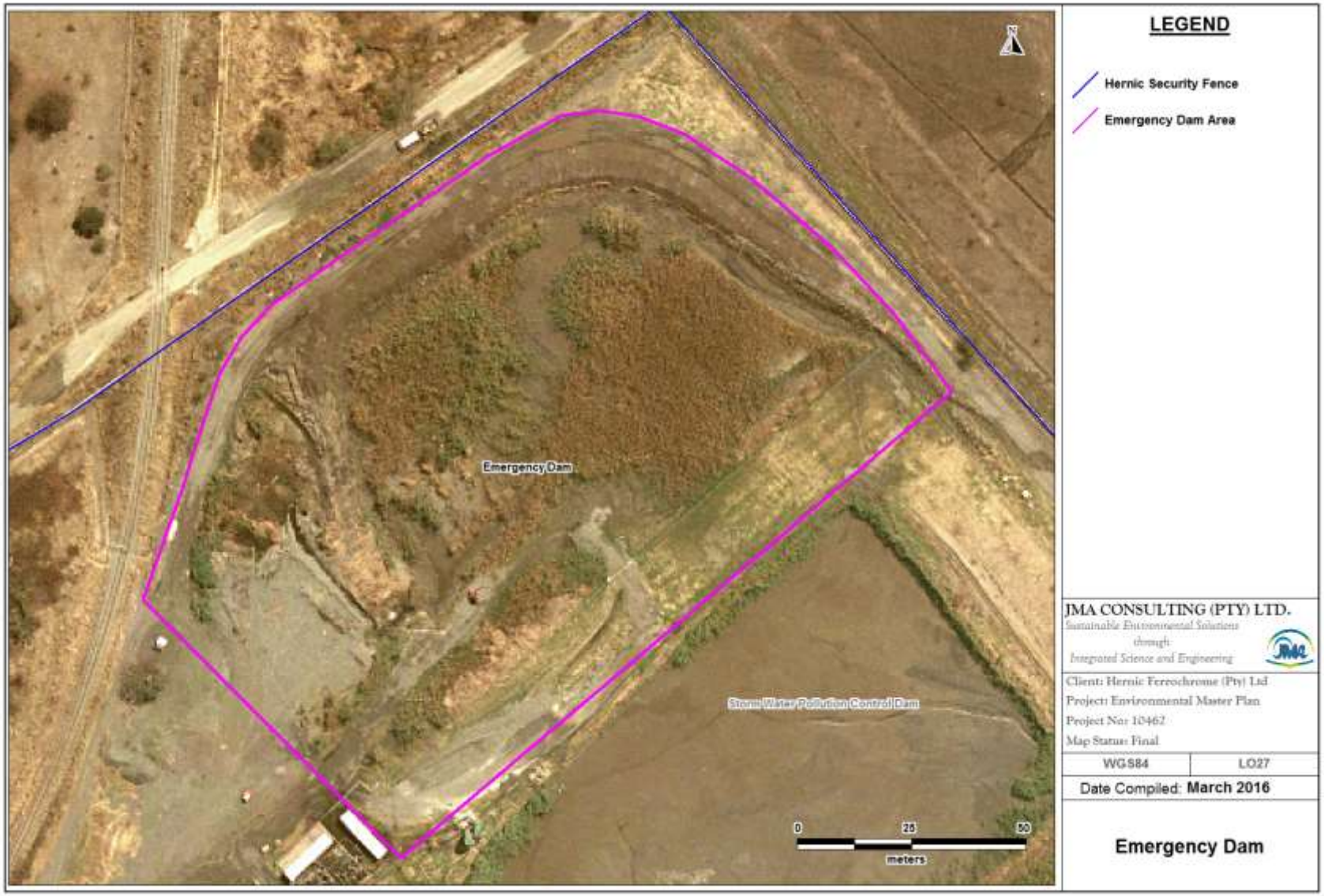

Figure 4.2.9.3(a): The Location and Extent of the Emergency Dam

4.2.10 Alloys Smelting Plant Groundwater Management Facilities

HERNIC has commissioned a groundwater remediation scheme to address groundwater contamination present in a groundwater pollution plume underlying sections of the site.

The scheme comprises three groundwater abstraction boreholes, the water from which is then pumped to a groundwater treatment plant. Water is used for process water and dust suppression after being treated.

4.2.10.1 Abstraction Boreholes

The locations of the groundwater remediation abstraction boreholes (HER BH-1, HER MA and HER MB) are shown on Figure 4.2.10.1(a).

4.2.10.2 Groundwater Treatment Plant

The location of and infrastructure associated with the Groundwater Treatment Plant, is shown on Figure 4.2.10.2(a) and the centre coordinates of the plant is relayed in the Table below.

Table 4.2.10.2(a): Centre Coordinates of the Groundwater Treatment Plant

Description	Latitude	Longitude
Groundwater Treatment Plant	25°39'43.86"S	27°50'24.18"E

The remediation process comprises of the following steps:

1) Pumping of 130 m^3 *per day* of groundwater from boreholes (HER BH-1, HER MA and HER MB) into a Settling Pond (Settling Pond A) filled with chromite ore and scrap metal. Cr^{6+} reacts with the chromite ore and scrap metal to precipitate Cr^{3+}.
2) Following the reaction with chrome ore in Settling Pond A, the water is pumped through a dosing pump system of which 0.1 m^3 Fe_2S for every 100 m^3 of water is dosed. ($FeCl_2$ also used).
3) The treated water is then pumped into Settling Pond B which is filled with scrap iron metal to further reduce Cr^{6+} to Cr^{3+}.
4) It is estimated that HERNIC pumps a volume of 130 m^3 *per day* from Settling Pond B.

Settling Pond A has a maximum available capacity of 160 m^3. Groundwater flows from the abstraction boreholes into Settling Pond A at a rate of 100 - 130 m^3 *per day*. Water is allowed to react with the chrome and scrap metal over a period of 10 *hours*. Chrome ore and scrap metal placed at the bottom of Settling Pond A is replaced every three months.

The dosing pump system is mounted between Settling Pond A and B. Water is abstracted from Settling Pond A through a centrifugal pump into a pipe at a rate of 5 000 *litres per hour* (5 m^3/h). The dosing pump is connected to this pipe at the connection where dosing with ferrous sulphate (or $FeCl_2$) takes place, at a rate of 4.5 *litres per hour.* The dosing pump abstracts the ferrous sulphate (or $FeCl_2$) from two 10 m^3 storage tanks located in a bund wall next to Settling Pond A. The water is pumped to Settling Pond B while dosing takes place.

Settling Pond B has a maximum available capacity of 160 m^3. After water from Settling Pond A has been treated, water is pumped to Settling Pond B at a flow rate of between 100 – 130 m^3 *per day*.

Figure 4.2.10.1(a): Location of the Groundwater Remediation Abstraction Boreholes

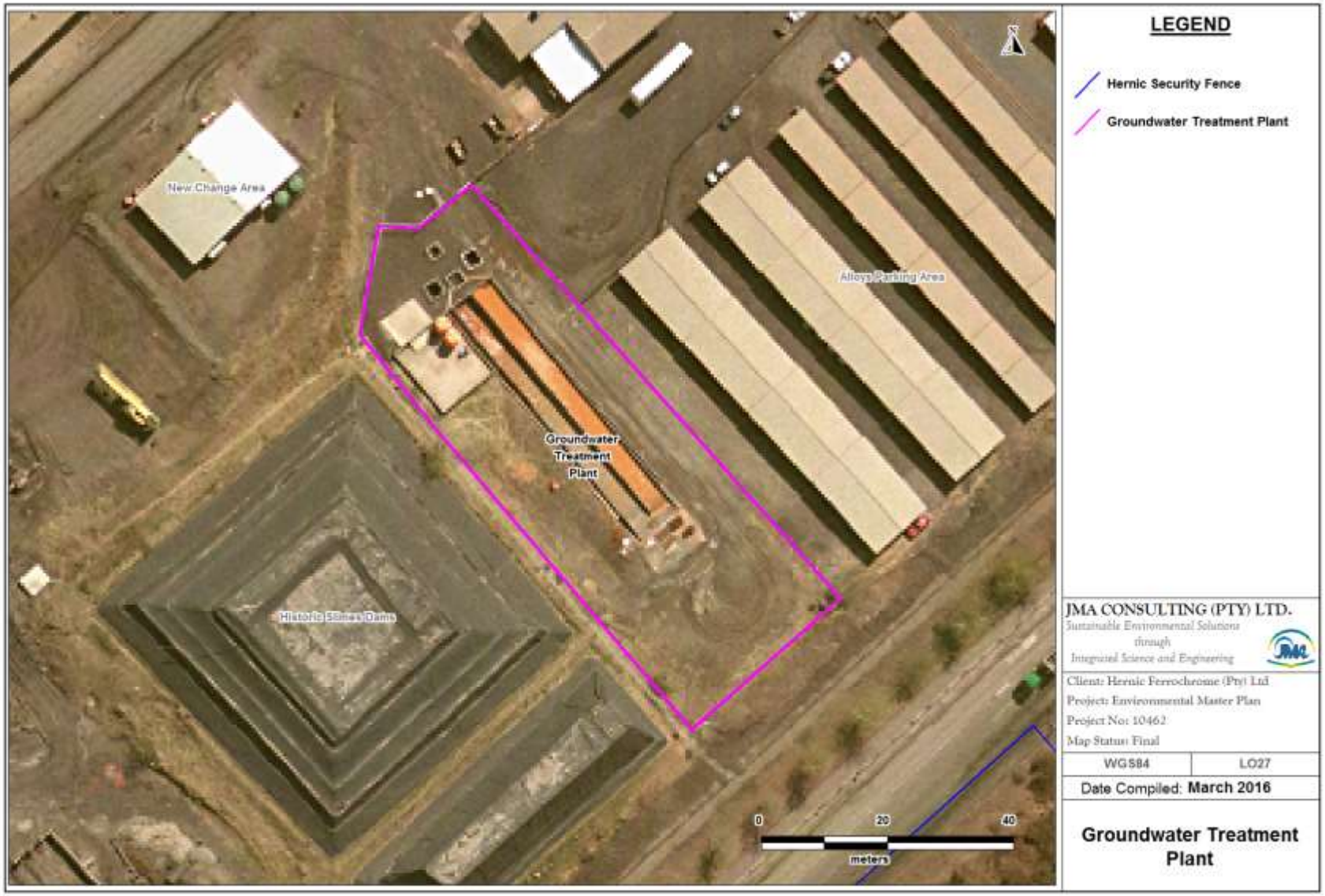

Figure 4.2.10.2(a): Location of and Infrastructure related to the Groundwater Treatment Plant

4.2.11 Alloys Smelting Plant Water and Salt Balance

4.2.11.1 Water Balance

A detailed water balance will be developed for the HERNIC operations as part of the upgrade project.

4.2.11.2 Salt Balance

A detailed salt balance will be developed for the HERNIC operations as part of the upgrade project.

4.2.12 Alloys Smelting Plant Air Quality Control Systems

The HERNIC Alloys Plant operates a number of Air Quality Control Systems to manage Atmospheric Emissions in accordance with the requirements of the NEMAQA and the conditions of the AEL for the HERNIC site.

Air quality control/abatement equipment has been installed at the two Pelletizing and Sintering Plants, as well as at the four Furnaces. The air quality control measures are designed to control conveyer dust emissions, building fugitives as well as gaseous emissions. A diagram, indicting the potential air emissions sources, as well as point sources for gaseous emissions (stacks) at the Pelletizing Plants and the Furnaces is shown in Figure 4.2.12 (a).

The following Air Quality Control Systems (Stack Emission Point Number in Brackets) are currently active (included in AEL) at the Smelting Plant:

Pelletizing Plant 1 (H_01PS1_CG)

- Outokumpu Cyclone
- Titaco Bagfilter
- Outokumpu Wet Scrubber

Pelletizing Plant 2 (H_02PS2_CG) and (H_02PS2_CDE)

- Outotech Wet Scrubber
- Conveyor Dust Extraction System

Furnace 1 (H_03F1_CG)

- No.1 Outokumpu Wet Scrubber
- No.2 Outokumpu Wet Scrubber

Furnace 2 (H_04F2_CG)

- No.1 Outokumpu Wet Scrubber
- No.2 Outokumpu Wet Scrubber

Furnace 3 (H_05F3_CG) and (H_05F3_PH)

- No.1 Outokumpu Wet Scrubber
- No.2 Outokumpu Wet Scrubber

Furnace 4 (H_06F4_CG) and (H_06F4_PH)

- No.1 Outokumpu Wet Scrubber
- No.2 Outokumpu Wet Scrubber

In addition to the above, an existing dust abatement system in the form of a small bag plant and stack is present at the Finished Product Plant.

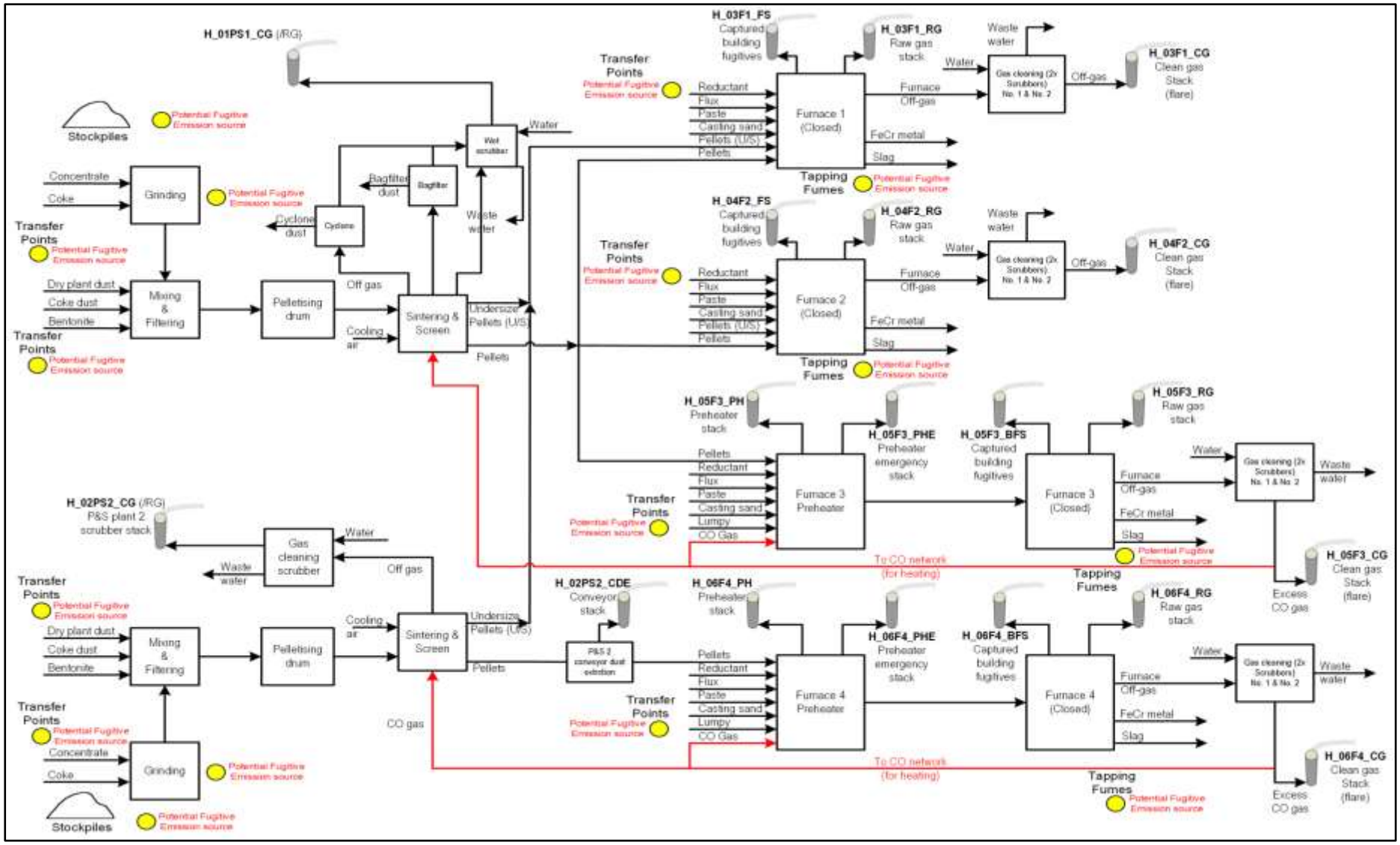

Figure 4.2.12(a): Location of all Potential Atmospheric Emission Sources and Points at the HERNIC Smelting Plant

4.3 PROPOSED NEW ACTIVITIES/EXPANSIONS/UPGRADES

The following proposed new activities at HERNIC are part of this current EA project.

- Decommissioning of two Historic Slimes Dams
- Decommissioning of Phase 1 of the H:H Slimes Dam
- Development and Expansion of the Site Storm Water and Process Water Management Facilities:
    - Development and Expansion of the Process Water and Storm Water Canal System including Silt Traps
    - Development of the Morula PCD
    - Expansion of Storm Water PCD No.1
    - Development of Storm Water PCD No.2
    - Development of Storm Water PCD No.3
    - Development of Storm Water PCD No.4
    - Expansion of the OB Plant Process Water Dam
    - Expansion of the Plant Process Water Dam
    - Expansion of the CRP Process Water Dam
- Decommissioning of the Morula Dewatering Dam
- Development of a New Salvage Yard
- Expansion of the Tap Hole Fume Extraction System
- Expansion of the Finished Product Plant Dust Abatement System
- Expansion of the HERNIC Tailings Storage Facility (TSF)
- Re-Use (Screening, Stockpiling, Internal Use and /or Selling) of Fine Slag at the Fine Slag Processing Plant
- Re-Use (Screening, Stockpiling, Internal Use and /or Selling) of Coarse Slag at the Chrome Recovery Plant
- Re-Use (Screening, Stockpiling, Internal Use and /or Selling) of Mine Waste Rock at the Mine Waste Rock Stockpile

4.3.1 Listed and Specified Activities Triggered

A Table was compiled for all the activities taking place on the HERNIC site. These activities were categorised into the activities associated with the **current infrastructure and processes** and the **new proposed activities** associated with the developments/expansions.

The Table provides a Description of the Activity Area, a list of the Activities associated with a particular area, the section in the Scoping Report where this activity is discussed, the Aerial Extent of the Activity, an indication of the Existing Authorisation Status, i.e. if the activity has been authorised or if it needs to be authorised in terms of the MPRDA as well as any other Environmental Legislation, as well as the Listed Activity triggered and the Applicable Listing Notice in terms of the 2014 EIA Regulations and waste management activities listed in terms of GNR 921 of 29 November 2013 and GNR 633 of 24 July 2015.

Table 4.3.1(a): Listed and Specified Activities Associated with the HERNIC site.

Activity Area	Activity	Reference in Scoping Report	Aerial Extent	Existing Authorisation Status	MPRDA	Environmental Legislation	Authorisation/ Approval Required	Listed Activity	Listing Notice
CURRENT ACTIVITY AND INFRASTRUCTURE AND PROCESS (SECTION 4.2 IN SCOPING REPORT)									
General	Access Roads	4.2.1.2		Approved EMPR	Consolidated EMPR (2012)	Section 12(4) of the NEMAA. EMPR now deemed to be an EMPR approved in terms of the NEMA.	None	N/A	N/A
	Railway Lines	4.2.1.3		Approved EMPR	Consolidated EMPR (2012)	Section 12(4) of the NEMAA. EMPR now deemed to be an EMPR approved in terms of the NEMA. See also EA issued in terms of the Environment Conservation Act for railway siding dated 23 June 2006 (As amended)	None	N/A	N/A
	Security Fence and Access	4.2.1.4		Approved EMPR	Consolidated EMPR (2012)	Section 12(4) of the NEMAA. EMPR now deemed to be an EMPR approved in terms of the NEMA.	None	N/A	N/A
	Water Supply	4.2.1.5		Approved EMPR	Consolidated EMPR (2012)	Section 12(4) of the NEMAA. Licensed water use in Water Use Licence of 2015. EMPR now deemed to be an EMPR approved in terms of the NEMA.	None	N/A	N/A
	Power Supply	4.2.1.6		Approved EMPR	Consolidated EMPR (2012)	Section 12(4) of the NEMAA. EMPR now deemed to be an EMPR approved in terms of the NEMA.	None	N/A	N/A
	Gas Supply	4.2.1.7		Not approved in Consolidated 2012 EMPR	Section 102 amendment of 2012 Consolidated EMPR to include gas supply infrastructure.	NEMA Amendment in terms of the EIA Regulations 2014 Part 1 or Part 2 of Chapter 5			
	Fuel Supply	4.2.1.8		Not approved in Consolidated 2012 EMPR	Section 102 amendment of 2012 Consolidated EMPR to include fuel supply infrastructure	NEMA Amendment in terms of the EIA Regulations 2014 Part 1 or Part 2 of Chapter 5	None EA issued in terms of the NEMA for installation of three aboveground diesel tanks with capacity of 23 000 litres each.	N/A	N/A
	Internal Roads	4.2.1.9		Approved EMPR	Consolidated EMPR (2012)	Section 12(4) of the NEMAA. EMPR now deemed to be an EMPR approved in terms of the NEMA.	None	N/A	N/A
	Office Complexes	4.2.1.10		Approved EMPR	Consolidated EMPR (2012)	Section 12 (4) of the NEMAA. EMPR now deemed to be an EMPR approved in terms of the NEMA.	None	N/A	N/A
Morula Mining Operation	Morula Mining Shaft Complex	4.2.2.1	88.41 ha	Approved EMPR	Consolidated EMPR (2012)	Section 12(4) of the NEMAA. EMPR now deemed to be an EMPR approved in terms of the NEMA.	None	N/A	N/A
	Morula Mining Opencast Operation	4.2.2.2	67.58 ha	Approved EMPR	Consolidated EMPR (2012)	Section 12(4) of the NEMAA. EMPR now deemed to be an EMPR approved in terms of the NEMA.	None	N/A	N/A
	Morula Mining Underground Operation	4.2.2.3	MG-1 / MG-2	Approved EMPR	Consolidated EMPR (2012)	Section 12(4) of the NEMAA. EMPR now deemed to be an EMPR approved in terms of the NEMA.	None	N/A	N/A

Activity Area	Activity	Reference in Scoping Report	Aerial Extent	Existing Authorisation Status	MPRDA	Environmental Legislation	Authorisation/ Approval Required	Listed Activity	Listing Notice
	Morula Mining Accommodation	4.2.2.4	1.91 ha	Approved EMPR	Consolidated EMPR (2012)	Section 12(4) of the NEMAA. EMPR now deemed to be an EMPR approved in terms of the NEMA.	None	N/A	N/A
	Morula Mining Aggregate Plant Discontinued but possible re-commissioning	4.2.2.5	5.12 ha	Not approved in EMPR	Section 102 amendment of 2012 Consolidated EMPR to include gas supply infrastructure.	NEMWA for recommissioniong and NEMA Amendment in terms of the EIA Regulations 2014 Part 1 or Part 2 of Chapter 5 to reflect presence of facility on mininig area and to consolidate with management measures associated with recommencement.	WML	Listed waste management activity 3, 4 or 5 or 7 of Category A alternatively activity 2 or 3 or 4 of Category B of GN 921 if deemed hazardous. Activity 11 in Category B namely: reclamation of a residue stockpile resulting from activities which require a mining right (Category B waste management activities) may be triggered. Also construction of a waste management facility in activity 12 of Category A or 10 in Category B.	GN 921 read with GNR 633
Morula Mining Waste Manage-ment	Mine Waste Rock Dump	4.2.3.1	5.89 ha	Approved EMPR	Consolidated EMPR (2012)	Section 12(4) of the NEMAA. EMPR now deemed to be an EMPR approved in terms of the NEMA.	None	N/A	N/A
	Mine Sewage Plant	4.2.3.2	0.18 ha	Approved EMPR	Consolidated EMPR (2012)	Section 12(4) of the NEMAA. EMPR now deemed to be an EMPR approved in terms of the NEMA.	None	N/A	N/A
Morula Mining Water Use and Manage-ment	Storm Water Berms and Canals	4.2.4.1		Approved EMPR	Consolidated EMPR (2012)	Section 12(4) of the NEMAA. EMPR now deemed to be an EMPR approved in terms of the NEMA.	GNR 704 Exemption from complying with clean and dirty water separation.	N/A	GNR 704
	Morula Dewatering Dam	4.2.4.2	1.05 ha	Approved WUL / Not Approved in Consolidated 2012 EMPR	Section 102 amendment of 2012 Consolidated EMPR to include Morula Dewatering Dam	NWA: WUL 03/A21J/ABGJ/4196 (December 2015) approved as section 21(g) water use / NEMA Amendment in terms of the EIA Regulations 2014 Part 1 or Part 2 of Chapter 5	None	N/A	N/A
	Morula Open Cast Final Void	4.2.4.3	0.43 ha	Approved WUL / Not Approved in Consolidated 2012 EMPR	Section 102 amendment of 2012 Consolidated EMPR to include Morula Dewatering Dam	NWA: WUL 03/A21J/ABGJ/4196 (December 2015) approved as section 21(j) water use / NEMA Amendment in terms of the EIA Regulations 2014 Part 1 or Part 2 of Chapter 5	None	N/A	N/A
Alloys Smelting Plant Facilities	General Plant Infrastructure	4.2.6.1	4.8 ha	Approved EMPR	Consolidated EMPR (2012)	Section 12(4) of the NEMAA. EMPR now deemed to be an EMPR approved in terms of the NEMA.	None	N/A	N/A
	Raw Materials Stockpile Area 1	4.2.6.2	5.15 ha	Approved EMPR	Consolidated EMPR (2012)	Section 12(4) of the NEMAA. EMPR now deemed to be an EMPR approved in terms of the NEMA.	None	N/A	N/A

Activity Area	Activity	Reference in Scoping Report	Aerial Extent	Existing Authorisation Status	MPRDA	Environmental Legislation	Authorisation/ Approval Required	Listed Activity	Listing Notice
	Raw Materials Stockpile Area 2	4.2.6.3	4.68 ha	Approved EMPR	Consolidated EMPR (2012)	Section 12(4) of the NEMAA. EMPR now deemed to be an EMPR approved in terms of the NEMA.	None	N/A	N/A
	Ore Beneficiation Plant – Crushing and Screening	4.2.6.4	5.57 ha	Approved EMPR	Consolidated EMPR (2012)	Section 12(4) of the NEMAA. EMPR now deemed to be an EMPR approved in terms of the NEMA.	None	N/A	N/A
	Ore Beneficiation Plant – Lumpy Section (HMS Plant)	4.2.6.5		Approved EMPR	Consolidated EMPR (2012)	Section 12(4) of the NEMAA. EMPR now deemed to be an EMPR approved in terms of the NEMA.	None	N/A	N/A
	Ore Beneficiation Plant – Fines Section (Spiral Plants A and B)	4.2.6.6		Approved EMPR	Consolidated EMPR (2012)	Section 12(4) of the NEMAA. EMPR now deemed to be an EMPR approved in terms of the NEMA.	None	N/A	N/A
	Mixed Material Stockpiling and Screening	4.2.6.7	15.43 ha	Approved EMPR	Consolidated EMPR (2012)	Section 12(4) of the NEMAA. EMPR now deemed to be an EMPR approved in terms of the NEMA.	None	N/A	N/A
	Returns Materials Stockpiles	4.2.6.8	5.44 ha	Not approved in Consolidated 2012 EMPR	Section 102 amendment of 2012 Consolidated EMPR to include Morula Dewatering Dam	We are of the view that the returns material received at the Pelletizing Plant for further processing does not constitute waste as defined as the returns material, at this point in the Hernic process, is not "unwanted, rejected, abandoned, discarded or disposed of".	None: Although the return material is not considered to be waste, the statutory duty of care in terms of section 28 of the NEMA and section 19 of the NWA find application and Hernic must take all reasonable measures to ensure that the storage of the return material does not cause pollution or degradation of the environment or a water resource from occurring, continuing or recurring.	Consider incorporation of returns material into an amendment of the 2012 Consolidated EMPR in terms of section 102 of the MPRDA	N/A
	Pelletizing and Sintering Plants 1 & 2	4.2.6.9	4.14 ha	Approved EMPR/ AEL	Consolidated EMPR (2012)	Section 12(4) of the NEMAA. EMPR now deemed to be an EMPR approved in terms of the NEMA. REC 386; AEL (September 2015)	None	N/A	N/A
	Furnaces 1, 2, 3 and 4	4.2.6.10	1.30 ha	Approved EMPR/ AEL	Consolidated EMPR (2012)	Section 12(4) of the NEMAA. EMPR now deemed to be an EMPR approved in terms of the NEMA. EIA 225/2003NW; RDNW (KL) 6/2/2/2515; REC 386; NWP/EIA/262/2008; AEL (September 2015)	None	N/A	N/A
	Ferrochrome Break Floor Area	4.2.6.11	1.30 ha	Approved EMPR	Consolidated EMPR (2012)	Section 12(4) of the NEMAA. EMPR now deemed to be an EMPR approved in terms of the NEMA.	None	N/A	N/A
	Finished Product Plant	4.2.6.12	2.50 ha	Approved EMPR	Consolidated EMPR (2012)	Section 12(4) of the NEMAA. EMPR now deemed to be an EMPR approved in terms of the NEMA.	None	N/A	N/A

Activity Area	Activity	Reference in Scoping Report	Aerial Extent	Existing Authorisation Status	MPRDA	Environmental Legislation	Authorisation/ Approval Required	Listed Activity	Listing Notice
	Slag Stockpiling Areas (Coarse and Fine Fraction Slag)	4.2.6.13	6.30 ha	Approved EMPR	Consolidated EMPR (2012)	Section 12(4) of the NEMAA. EMPR now deemed to be an EMPR approved in terms of the NEMA.	Reference to the slag stockpile is a reference to the Current Arising Slag Stockpile and not the Historic Slag Stockpile. The pre-recovery slag stockpiled for further processing at the CRP does not constitute waste as defined as the slag, at this point in the Hernic process, is not "unwanted, rejected, abandoned, discarded or disposed of". Although the pre-recovery slag is not considered to be waste, the statutory duty of care in terms of section 28 of the NEMA and section 19 of the NWA find application and Hernic must take all reasonable measures to ensure that the storage of the pre-recovery slag does not cause pollution or degradation of the environment or a water resource from occurring, continuing or recurring. The fine fraction slag is also not considered to be a waste, however the statutory duty of care in terms of section 28 of the NEMA and section 19 of the NWA find application and Hernic must take all reasonable measures to ensure that the storage of the fine fraction slag does not cause pollution or degradation of the environment or a water resource from occurring, continuing or recurring.	N/A	N/A
	Chrome Recovery Plant	4.2.6.14	10.58 ha	Approved EMPR	Consolidated EMPR (2012)	Section 12(4) of the NEMAA. EMPR now deemed to be an EMPR approved in terms of the NEMA.	None	N/A	N/A

Activity Area	Activity	Reference in Scoping Report	Aerial Extent	Existing Authorisation Status	MPRDA	Environmental Legislation	Authorisation/ Approval Required	Listed Activity	Listing Notice
	Product Rail Dispatch Area	4.2.6.15	1.0 ha	Approved EMPR	Railway Siding EMPR (2006)	Section 12(4) of the NEMAA. EMPR now deemed to be an EMPR approved in terms of the NEMA. EIA 268 /2005NW	None	N/A	N/A
	Fine Slag Processing Plant	4.2.6.16	3.24 ha	Approved EMPR	Consolidated EMPR (2012)		In the Consolidated EMP there is no distinction between slag and fine fraction slag. The fine fraction slag is reprocessed at the Fine Slag Recovery Plant whereas the slag is reprocessed at the CRP. As with the CRP, we could not identify specific environmental management measures applicable to the Fine Slag Recovery Plant. Although the fine fraction slag is not considered to be waste, the statutory duty of care in terms of section 28 of the NEMA and section 19 of the NWA find application and Hernic must take all reasonable measures to ensure that the storage of the fine fraction slag does not cause pollution or degradation of the environment or a water resource from occurring, continuing or recurring.		
	Platinum Group Minerals (PGM) Plant	4.2.6.17	1.22 ha	Approved EMPR 2013	Amendment to Mining Right (December 2012)	NW30/5/1/2/2/308MR; NW30/5/1/2/2/396MR	EA in terms of the NEMA. WML in terms of the NEMWA.	LN 2 activity 6. The development of facilities or infrastructure for any process or activity which requires a permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent, excluding-activities which are included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case the	

Activity Area	Activity	Reference in Scoping Report	Aerial Extent	Existing Authorisation Status	MPRDA	Environmental Legislation	Authorisation/ Approval Required	Listed Activity	Listing Notice
								National Environmental Management: Waste Act, 2008 applies. WML in terms of the NEMWA. Activity 21 in Listing Notice 2 NEMA: Any activity including the operation of that activity associated with the primary processing of a mineral resource including winning, reduction, extraction, classifying, concentrating, crushing, screening and washing but excluding the smelting, beneficiation, refining, calcining or gasification of the mineral resource in which case activity 6 in this Notice applies. See also Category A activity 5 except if the exclusion finds application	
	Internal Transport and Contractors Yard and Wash Bay	4.2.6.18	3.81 ha	Approved EMPR	Consolidated EMPR (2012)	None	N/A	N/A	
	Redundant Historic Bag Plant	4.2.6.19	0.43 ha	Approved EMPR	Consolidated EMPR (2012)	None	N/A	N/A	
	Redundant Old Civil Workshop	4.2.6.20	1.92 ha	Approved EMPR	Consolidated EMPR (2012)	None	N/A	N/A	
	Rehabilitated Quarry Area	4.2.6.21	2.60 ha	Approved EMPR	Consolidated EMPR (2012)	None	N/A	N/A	
Alloys Smelting Plant Waste Management Facilities	Historic Slimes Dams (1 & 2)	4.2.7.1	0.44 ha	Approved EMPR/ Approved WUL	Consolidated EMPR (2012)	Section 12(4) of the NEMAA. EMPR now deemed to be an EMPR approved in terms of the NEMA. WUL 03/A21J/ABGJ/4196 (December 2015) section 21(g)	WML / Possible Section 102 amendment of EMPR / Amendment of WUL to reflect rehabilitated facilities and removal of water use.	Final disposal of hazardous waste at H:H Slimes Disposal Facility. Category B activity 7.	
	H:H Slimes Dam and Return Water Dam (RWD)	4.2.7.2	4.52 ha	Approved WUL / Approved EMPR	Consolidated EMPR (2012)	Section 12(4) of the NEMAA. EMPR now deemed to be an EMPR approved in terms of the NEMA.WUL 03/A21J/ABGJ/4196 (December 2015)	See above	See above.	

Activity Area	Activity	Reference in Scoping Report	Aerial Extent	Existing Authorisation Status	MPRDA	Environmental Legislation	Authorisation/ Approval Required	Listed Activity	Listing Notice
	HERNIC Tailings Storage Facility (TSF) and Return Water Dam (RWD)	4.2.7.3	37.24 ha	Approved EMPR/ Approved WUL	TSF EMPR (November 2015)	Section 12(4) of the NEMAA. EMPR now deemed to be an EMPR approved in terms of the NEMA. NWP/EIA/46/2010; WUL 03/A21J/ABGJ/4196 (December 2015)	With regard to the use of OB plant course waste and slag to stabilise the facility we conclude that an amendment to the TSF EMPR is required ito section 102 of the MPRDA read with Part 1 and Part 2 of Chapter 5 of the EIA Regulations and a variation application in terms of section 54(1)(e) of the NEMWA. An amendment to the WUL will also be required. With regard to the expansion of the TSF an amendment of the TSF EMPR ito section 102 of the MPRDA read with Part 1 and Part 2 of Chapter 5 of the 2014 EIA Regulations as well as an application for the variation of a WML ito section 54(1) of the NEMWA.	N/A	N/A
	Salvage Yard	4.2.7.4	0.68 ha	Approved EMPR	Consolidated EMPR (2012)	None	N/A	N/A	
	Sewage Plant	4.2.7.5	0.28 ha	Approved EMPR S24G approval	Consolidated EMPR (2012)	Section 12(4) of the NEMAA. EMPR now deemed to be an EMPR approved in terms of the NEMA. Section 21(g) water use ito the NWA - sludge drying beds.	WUL / EMPR Amendment	N/A	N/A
	OB Plant Fines in Open Pit (Slurry)	4.2.7.6		DME Letter of Approval 8 March 2001. Approved EMPR WUL	Consolidated EMPR (2012)	Section 12(4) of the NEMAA. EMPR now deemed to be an EMPR approved in terms of the NEMA.(RDNW (KL) 6/2/2/518) – 08 March 2001			
	OB Plant Coarse Waste in Open Pit (Trucks)	4.2.7.7		Approved EMPR/ Approved WUL	Consolidated EMPR (2012)	Section 12(4) of the NEMAA. EMPR now deemed to be an EMPR approved in terms of the NEMA.WUL 03/A21J/ABGJ/4196 (December 2015)	Hernic requires exemption in terms of section 3 of GN 704 of 4 June 1999from the prohibition contained in 4(c) of the Regulations.		

Activity Area	Activity	Reference in Scoping Report	Aerial Extent	Existing Authorisation Status	MPRDA	Environmental Legislation	Authorisation/ Approval Required	Listed Activity	Listing Notice
Alloys Smelting Plant Process Water Manage-ment Facilities	Hartbeespoort Canal Pump Station	4.2.8.1	0.33 ha	Approved EMPR/ Approved WUL	Consolidated EMPR (2012)	Section 12(4) of the NEMAA. EMPR now deemed to be an EMPR approved in terms of the NEMA.WUL 03/A21J/ABGJ/4196 (December 2015)	None	N/A	N/A
	Plant Drinking Water Dam	4.2.8.2	1.05 ha	Approved WUL		WUL 03/A21J/ABGJ/4196 (December 2015) Section 21(b) water use.	None	N/A	N/A
	Plant Drinking Water Treatment Plant	4.2.8.3	0.06 ha	Approved EMPR	Consolidated EMPR (2012)	Section 12(4) of the NEMAA. EMPR now deemed to be an EMPR approved in terms of the NEMA.	None	N/A	N/A
	Plant Process Water Dam and Silt Traps	4.2.8.4	3.63 ha	Approved EMPR / Approved in the WUL as a section 21(g) water use	Consolidated EMPR (2012)	Section 12(4) of the NEMAA. EMPR now deemed to be an EMPR approved in terms of the NEMA.	None	N/A	N/A
	OB Plant Return Water Dam	4.2.8.5	1.73 ha	Approved WUL / Not Approved in Consolidated 2012 EMPR	N/A	WUL 03/A21J/ABGJ/4196 (December 2015)	Section 102 amendment to amend EMPR		
	Chrome Recovery Plant Process Water Dam	4.2.8.6	0.57 ha	Approved WUL / Not Approved in Consolidated 2012 EMPR	N/A	WUL 03/A21J/ABGJ/4196 (December 2015) Section 21(g) water use.	Section 102 amendment to amend EMPR		
Alloys Smelting Plant Storm Water Manage-ment Facilities	Storm Water Management Berms and Canals	4.2.9.1	-	Approved EMPR	Consolidated EMPR (2012)	Section 12(4) of the NEMAA. EMPR now deemed to be an EMPR approved in terms of the NEMA.	GNR 704 Exemption from complying with clean and dirty water separation.	N/A	N/A
	Plant Storm Water Pollution Control Dam (PCD)	4.2.9.2	1.92 ha	Approved EMPR/ Approved WUL	Consolidated EMPR (2012)	Section 12(4) of the NEMAA. EMPR now deemed to be an EMPR approved in terms of the NEMA.WUL 03/A21J/ABGJ/4196 (December 2015) approved as a section 21(g) water use	None	N/A	N/A
	Emergency Dam	4.2.9.3	1.62 ha	Not approved in the 2012 Consolidated EMPR / Not approved in a WUL	N/A	Amendment of EMPR in terms of section 102 of MPRDA required.	Section 102 amendment to amend EMPR / section 21g WUL	Section 21(g) water use	
Alloys Smelting Plant Ground-water Manage-ment Facilities	Abstraction Boreholes	4.2.10.1	3 x Boreholes	Approved WUL	N/A	WUL 03/A21J/ABGJ/4196 (December 2015) section 21(a)	None	N/A	N/A
	Groundwater Treatment Plant	4.2.10.2	0.17 ha	Approved WUL	N/A	WUL 03/A21J/ABGJ/4196 (December 2015)	None	N/A	N/A
Alloys Smelting Plant Air Quality Control Systems		4.2.12		Approved EMPR/ AEL	Consolidated EMPR (2012)	AEL (September 2015)	None	N/A	N/A

Activity Area	Activity	Reference in Scoping Report	Aerial Extent	Existing Authorisation Status	MPRDA	Environmental Legislation	Authorisation/ Approval Required	Listed Activity	Listing Notice
PROPOSED NEW ACTIVITIES/ EXPANSIONS/ UPGRADES (SECTION 4.3 IN SCOPING REPORT)									
Proposed New Activities, Developments and Expansions	Decommissioning of Two Historic Slimes Dams	4.3.2.1	0.44 ha	N/A	Amendment to the Consolidated 2012 EMPR in terms of section 102 of the MPRDA	NEMA / NEMWA	Yes – EA / WML	NEMA Activity 22 NEMWA Activity 14 (Category A) NEMWA Activity 7 (Category B)	NEMA GNR 983 (Listing Notice 1) NEMWA GNR 921
	Decommissioning of Phase 1 of the H:H Slimes Dam	4.3.2.2	1.35 ha	N/A	Amendment to the Consolidated 2012 EMPR in terms of section 102 of the MPRDA	NEMA / NEMWA	Yes – EA / WML	NEMA Activity 22 NEMWA Activity 14 (Category A) NEMWA Activity 7 (Category B)	NEMA GNR 983 (Listing Notice 1) NEMWA GNR 921
	Development and Expansion of the Process Water and Strom Water Canal System including Silt Traps	4.3.2.3	Total length of canal system exceeds 1000 m and the peak throughput exceeds 120 l/s	N/A	Amendment to the Consolidated 2012 EMPR in terms of section 102 of the MPRDA	NEMA / NWA	Yes - EA / WUL	NEMA Activity 9, 10, 12, 34, 45, 46, 48/ Section 21(g) water use.	NEMA GNR 983 (Listing Notice 1)
	Development of the Morula PCD	4.3.2.3	0.60 ha (25 000m³)	N/A	Amendment to the Consolidated 2012 EMPR in terms of section 102 of the MPRDA	NEMA / NWA	Yes - EA / WUL	NEMA Activity 12, 13 / Section 21(g) or section 21(b) water use.	NEMA GNR 983 (Listing Notice 1)
	Expansion of Storm Water PCD No.1	4.3.2.3	2.30 ha (73 400m³)	N/A	Amendment to the Consolidated 2012 EMPR in terms of section 102 of the MPRDA	NEMA / NWA	Yes - EA / WUL	Activity 34, 48, 50 / Section 21(g) or section 21(b) water use.	NEMA GNR 983 (Listing Notice 1)
	Development of Storm Water PCD No.2	4.3.2.3	2.20 ha (65 600 m³)	N/A	Amendment to the Consolidated 2012 EMPR in terms of section 102 of the MPRDA	NEMA / NWA	Yes - EA / WUL	Activity 12, 13 / Section 21(g) or section 21(b) water use.	NEMA GNR 983 (Listing Notice 1)
	Development of Storm Water PCD No.3	4.3.2.3	0.60ha (23 020 m³)	N/A	Amendment to the Consolidated 2012 EMPR in terms of section 102 of the MPRDA	NEMA / NWA	Yes - EA / WUL	Activity 12, 13 / Section 21(g) or section 21(b) water use.	NEMA GNR 983 (Listing Notice 1)
	Development of Storm Water PCD No.4	4.3.2.3	0.05 ha (275 m³)	N/A	Amendment to the Consolidated 2012 EMPR in terms of section 102 of the MPRDA	NEMA / NWA	Yes - EA / WUL	Activity 12, 13 / Section 21(g) or section 21(b) water use.	NEMA GNR 983 (Listing Notice 1)
	Expansion of the OB Plant Process Water Dam	4.3.2.3	1.82 ha (45 300 m³)	Approved in the WUL	Amendment to the Consolidated 2012 EMPR in terms of section 102 of the MPRDA	WUL granted section 21(g) water use.	Yes - EA / WUL	Activity 34, 48, 50 / Section 21(g) or section 21(b) water use.	NEMA GNR 983 (Listing Notice 1)
	Expansion of the Plant Process Water Dam	4.3.2.3	3.35 ha (76 000 m³)	Approved in the WUL	Amendment to the Consolidated 2012 EMPR in terms of section 102 of the MPRDA	NEMA / NWA	Yes - EA / WUL	Activity 34, 48, 50 / Section 21(g) or section 21(b) water use.	NEMA GNR 983 (Listing Notice 1)
	Expansion of the CRP Silt Trap	4.3.2.3	0.27 ha (9000 m³)	Approved in the WUL	Amendment to the Consolidated 2012 EMPR	NEMA / NWA	Yes - EA / WUL	Activity 34, 48, 50 / Section 21(g) or section 21(b) water	NEMA GNR 983 (Listing Notice 1)

Activity Area	Activity	Reference in Scoping Report	Aerial Extent	Existing Authorisation Status	MPRDA	Environmental Legislation	Authorisation/ Approval Required	Listed Activity	Listing Notice
	Process Water Dam				in terms of section 102 of the MPRDA			use.	
	Decommissioning of the Morula Dewatering Dam	4.3.2.3	0.5 ha (12 000 m^3)	Approved in the WUL	Amendment to the Consolidated 2012 EMPR in terms of section 102 of the MPRDA	NEMA / NWA	Yes - EA / WUL	NEMA Activity 22	NEMA GNR 983 (Listing Notice 1)
	Development of a New Salvage Yard	4.3.2.4	0.70 ha	N/A	Amendment to the Consolidated 2012 EMPR in terms of section 102 of the MPRDA	Norms and Standards for the storage of waste	Yes	-	-
	Expansion of the Tap Hole Fume Extraction System	4.3.2.5	-	Not authorised	Amendment to the Consolidated 2012 EMPR in terms of section 102 of the MPRDA	Amendment of EMPR in terms of section 102 of MPRDA required.	Yes - EA	NEMA Activity 34	NEMA GNR 983 (Listing Notice 1)
	Expansion of the Finished Product Plant Dust Abatement System	4.3.2.6	-	Not authorised	Amendment to the Consolidated 2012 EMPR in terms of section 102 of the MPRDA	Amendment of EMPR in terms of section 102 of MPRDA required.	Yes - EA	NEMA Activity 34	NEMA GNR 983 (Listing Notice 1)
	Expansion of the HERNIC Storage Facility (TSF)	4.3.2.7	Approx-imately 8 ha	Not authorised	Amendment to the TSF EMPR in terms of section 102 of the MPRDA	NEMA: Amendment application in terms of Part 1 or Part 2 of Chapter 5 of the 2014 EIA Regulations under the NEMA / Section 12(4) of the NEMAA. EMPR now deemed to be an EMPR approved in terms of the NEMA. / NEMWA application for the variation of a WML as contemplated in section 54(1)(e) of the NEMWA. / NWA amendment of the WUL. Currently listed as section 21(g) water use in the WUL.	Yes – EA / WML	NEMA Activity 27, 34, 48 NEMWA Activity 13 (Category A)	NEMA GNR 983 (Listing Notice 1) NEMWA GNR 921)
	Re-Use of Fine Slag at the Fine Slag Processing Plant	4.3.2.8	-	Not authorised	Amendment to the Consolidated 2012 EMPR in terms of section 102 of the MPRDA	Amendment of EMPR in terms of section 102 of MPRDA required.	Yes	-	-
	Re-Use of Coarse Slag at the Chrome Recovery Plant	4.3.2.9	-	Not authorised	Amendment to the Consolidated 2012 EMPR in terms of section 102 of the MPRDA	Amendment of EMPR in terms of section 102 of MPRDA required.	Yes	-	-
	Re-Use of Mine Waste Rock at the Mine Waste Rock Stockpile	4.3.2.10	3.4 ha	Not authorised	Amendment to the Consolidated 2012 EMPR in terms of section 102 of the MPRDA	Amendment of EMPR in terms of section 102 of MPRDA required.	Yes – EA / WML	NEMWA Activity 12 (Category B)	NEMWA GNR 921)

4.3.2 Description of Activities to be undertaken

The proposed new activities to be undertaken at HERNIC and for which authorization is sought will now be discussed with reference to their infrastructure, associated structures and processes (where applicable).

- Decommissioning of two Historic Slimes Dams
- Decommissioning of Phase 1 of the H:H Slimes Dam
- Development and Expansion of the Site Storm Water and Process Water Management Facilities:
    - Development and Expansion of the Process Water and Storm Water Canal System including Silt Traps
    - Development of the Morula PCD
    - Expansion of Storm Water PCD No.1
    - Development of Storm Water PCD No.2
    - Development of Storm Water PCD No.3
    - Development of Storm Water PCD No.4
    - Expansion of the OB Plant Process Water Dam
    - Expansion of the Plant Process Water Dam
    - Expansion of the CRP Process Water Dam
- Decommissioning of the Morula Dewatering Dam
- Development of a New Salvage Yard
- Expansion of the Tap Hole Fume Extraction System
- Expansion of the Finished Product Plant Dust Abatement System
- Expansion of the HERNIC Tailings Storage Facility (TSF)
- Re-Use (Screening, Stockpiling, Internal Use and /or Selling) of Fine Slag at the Fine Slag Processing Plant
- Re-Use (Screening, Stockpiling, Internal Use and /or Selling) of Coarse Slag at the Chrome Recovery Plant
- Re-Use (Screening, Stockpiling, Internal Use and /or Selling) of Mine Waste Rock at the Mine Waste Rock Stockpile

4.3.2.1 Decommissioning of Two Historic Slimes Dams

Background

The location and extent of the two Historic Slimes Dams are shown on Figure 4.3.2.1(a). These two facilities were used since the commissioning of the first two furnaces at HERNIC for the disposal of the Bag House Dust that was collected as part of the furnace off-gas emissions control systems.

The dams consist of two small dams and have been taken out of operation but have not been formally decommissioned. A geomembrane of HDPE type was used to cover both dams. Whirlybird wind driven ventilators that removes stale air and provides ventilation has been installed on the crest of the dams. These whirlybirds are waterproof and are venting the dams promoting drying out of the trapped slimes moisture.

Table 4.3.2.1(a): Relevant Details for Historic Slimes Dam 1

Historic Slimes Dam 1		
Central Coordinates	25°39'45.44"S 27°50'23.52"E	
Footprint Area	2 920.25 m^2	
Final Maximum Height	12 m	
Liner	Combined Clay and HDPE Liner with Drainage Layer	

Table 4.3.2.1(b): Relevant Details for Historic Slimes Dam 2

Historic Slimes Dam 2		
Central Coordinates	25°39'46.41"S 27°50'24.46"E	
Footprint Area	922.84 m^2	
Final Maximum Height	8 m	
Liner	Combined Clay and HDPE Liner with Drainage Layer	

The temporary capping of the dams was necessary as a pollution plume has developed in the groundwater regime downstream of these two dams. The barrier system used on the base of the dams comprises 4 x 150 *mm* turf layers with a 75 *mm* course sand layer and 0.75 *mm* thick geomembrane. See Figure 4.3.2.1 (b) below.

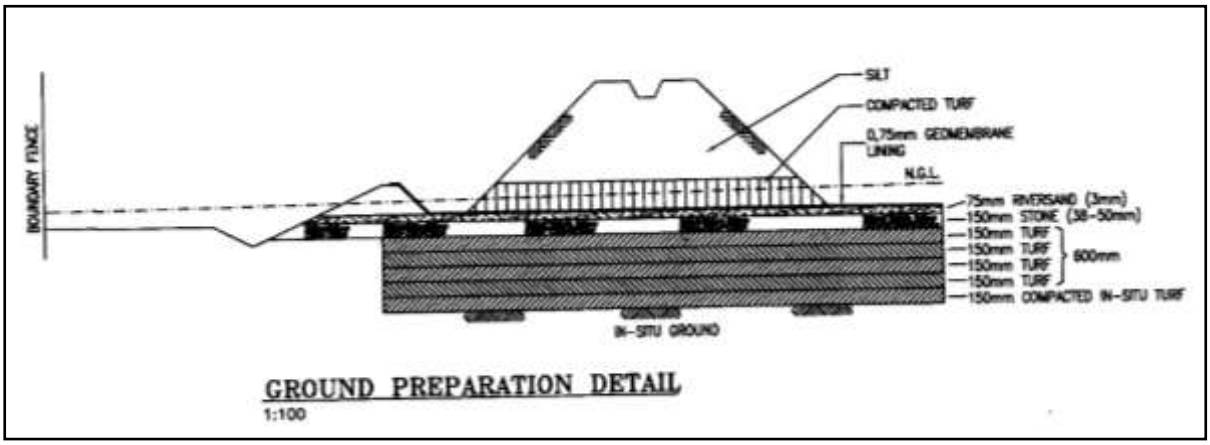

Figure 4.3.2.1(b): Base Liner Details for the two Historic Slimes Dams

It is evident that the barrier is not complying with current requirements and HERNIC has decided to clear the stockpiles and re-move the slimes. Furthermore it could not be verified if both dams were equipped with penstocks. This would have an effect on the current slimes moisture content.

Spatial Parameters

The Historical Slimes Dams consists of two small stockpiles that cover an area of approximately 0.4 *ha*. The total volume of the two dams is close to 20 000 m^3 with the larger dam volume as 16 400 m^3. The larger west dam has a maximum height of +-12 *m* and the east dam 8 *m*. The side slope of the west dam is 1v:1.52h and of the east dam 1v:0.55h.

These slopes are considered very steep with the west dam side slopes considered as extremely steep. The west dam is close to twice the design height as indicated in the drawings.

Stability

The stability needs to be verified of both dams. A visual inspection will not be possible as both dams are covered with membrane. A geotechnical survey will include verification of the slimes physical and strength parameters. 50 *mm* diameter holes will be augered from the crest to determine the in-situ density and moisture content.

The stability will also have an impact on the method of excavating the slimes from the stockpile to either feed into a feed bin or to load haul trucks.

Figure 4.3.2.1(a): Location and Extent of the two Historic Slimes Dams

Disposal/Re-cycling of the Slimes

Two options currently exist for disposal/re-cycling of the material, both of which are currently being investigated for feasibility and practicability. Both options entail the full removal of the slimes and the subsequent rehabilitation of the footprints.

- **Option 1** is removal of the slimes and final disposal there-of on Phase 1 of the H:H Slimes Dam. The H:H Slimes Dam is an appropriately constructed and lined facility that is authorized to dispose of the Slimes material.
- **Option 2** is to pelletize the Slimes at the current site and then to transport it to the furnaces for recycling and extraction of the residual chrome content.

Option 1 – Removal and Disposal at the H:H Slimes Dam

Two methods are available to move the slimes from the stockpiles to the H:H Slimes Dam facility. These two methods are:

- to excavate and cart it by haul trucks over a distance of 1.5 *km* and place it mechanically in layers on the crest of the H:H Slimes Dam facility
- to slurry and hydraulically pump the slimes to the H:H Slimes Dam facility and deposit it on the crest.

Either method requires that the slimes at the old dams must be excavated by excavator or front end loader to load trucks or hopper for the slurrying process.

Hydraulic mining of the slimes dams to dislodge the slimes, draining the slimes slurry to a sump is also a technical possibility, but probably not the preferred alternative from an environmental perspective due to the questionable base liner type and condition and difficulty to control the hazardous slurry without spilling or fuelling the groundwater pollution situation.

The stability of the slimes dams will determine the measures required for containing and supporting the walls whilst excavating the slimes. The geotechnical investigation activated will determine if the slimes is dry enough for handling without spilling.

It is anticipated that a slag and soil buttress wall be constructed on the down slope and adjacent sides to support and contain. A ramp built with soil slag mix accessing to the buttress will allow excavation to proceed from top to bottom as part of containing and operating the loading in a safe manner. The slimes can be moist but dry enough for excavation and loading. It should not be saturated causing spilling during excavating, moving and loading of slimes.

Truck Haul Method:

Excavated slimes can be loaded into sealed ADT bins and hauled to the H:H Slimes Dam facility. The loading area must be isolated with berms. The moving of slimes should be during the dry season. Using 10 *tonne* ADT's, it is estimated that the historical slimes will take 8 weeks to clear.

Slurrying Method:

This method requires a loading bin, mixing plant and pump system consisting of centrifugal pumps (boosters included) in series with 1.5 *km* main pressure diameter +-150 *mm* to 250 *mm* pipe line.

Deposition will be via a ring pipe system at the crest. Water should be supplied from the plant to the historical dams for the slurry makeup. The penstock of the new dam should be made operational again and also the pump system recycling from the RWD back to the plant. The historical dam sites need to be equipped as a slimes transfer site to accommodate slurry pumping and interception of water spilling.

Option 2 – Pelletizing and Recycling through the Furnaces

Provided that the Slimes is at a favourable consistency, the Slimes can be excavated mechanically followed by a rudimentary pelletizing operation located at the two Historic Slimes Dams, during which the excavated Slimes are rolled into pellets. These pellets can then be transported via truck to the Smelting Plant for recycling through the furnaces resulting in the extraction of the residual chrome content from the Slimes.

Dam Basin Rehabilitation

When all slimes are removed and the footprint cleared the base soils will be tested for hazardous elements (inorganic). It is envisaged that the base layers will be removed to a depth of some 600 *mm*. The land use for this site must be confirmed by HERNIC but it is currently envisaged that a storm water silt trap will be developed at the site.

The surface rehabilitation will be aligned with the proposed land use. The excavated contaminated base soils will be transported to and disposed of at the H:H Slimes Dam and the void will either be back filled with 4 x 150 *mm* of clean turf layers or if bearing forces are required like for heavy equipment or loads, a GCL will be placed followed by a 150 *mm* protection sand layer, waste rock bulk fill and a 200 *mm* selected wear course.

Feasibility, Preferred Alternative Selection and Design

Consulting Civil and Environmental Engineers, INPROCON, have been appointed to conduct a Detailed Feasibility Study and to compile a Preliminary Engineering Design Report for the Decommissioning of the two Historic Slimes Dams.

To this effect a geotechnical assessment is currently underway and a pelletizing feasibility assessment is being conducted. Once these are completed, an environmental alternatives assessment will be done to select the preferred alternative method of decommissioning.

Once the preferred alternative has been selected, the engineers will compile a design report and operational plan for the decommissioning of the two Historic Slimes Dams.

4.3.2.2 Decommissioning of Phase 1 of the H:H Slimes Dam

The location and extent of the H:H Slimes Dam and its associated RWD is shown on Figure 4.3.2.2(a). This facility was also used for the disposal of the Bag House Dust that was collected as part of the furnace off-gas emissions control systems.

Background

This facility replaced the two Historic Slimes Dams and was constructed in accordance with waste disposal regulatory requirements to exacting specifications for the protective footprint liners for both the Waste Site itself as well as the associated RWD.

The facility became redundant when the open furnaces were converted to closed furnaces after which the H:H Waste Site as well as the RWD, were temporarily covered with HDPE Capping Liners to prevent water ingress and dust generation pending their final rehabilitation and closure.

One of the options for decommissioning of the two Historic Slimes Dams is to dispose of the Old Historic Slimes Dams material on this appropriately lined facility, after which it will be fully rehabilitated and closed in full compliance with regulatory requirements. Another option is to only dispose of the contaminated footprint material of the two Historic Slimes Dams here.

The only difference between the two options would be the volume of material to be considered in the decommissioning design. The decommissioning (closure and rehabilitation) of this facility will require the necessary NEMA and NEMWA approvals and due process will be followed for that.

The existing H:H Slimes Dam is a H:H lined facility complying with the waste regulations for the storing of hazardous waste. The dam is also currently covered with a HDPE geomembrane and equipped with Whirlybirds similar to those at the Historic Slimes Dams.

It is not proposed to decommission the RWD as yet.

Spatial Parameters

The slimes footprint excluding the perimeter paddocks is close to 1.7 *ha* in area. The maximum current height is +- 7.5 *m*. The existing crest is 0.86 *ha*. The outside slope is close to 1v:1.9h. The footprint occupied by the H:H Slimes Dam is approximately 1.35 *ha* and that of the downstream associated RWD approximately 0.38 *ha*.

The liner system for the H:H Slimes Dam consists of 2 *mm* FML / geomembrane, 600 *mm* compacted clay liner (in 4 x 150 *mm* layers), geotextile layer, 150 *mm* leakage detection and collection layer, 300 *mm* compacted clay liner (in 2 x 150 *mm* layers) and a 150 *mm* base preparation layer.

The liner system for the H:H Slimes Dam RWD consists of a 2 *mm* FML/geomembrane, 600 *mm* compacted clay liner (in 4 x 150 *mm* layers), geotextile layer, 150 *mm* leakage detection and collection layer, 100 *mm* cushion layer, 1.5 *mm* FML/geomembrane, 300 *mm* compacted clay liner (in 2 x 150 *mm* layers) and a 150 *mm* base preparation layer.

Table 4.3.2.2(a): Relevant Details for the H:H Slimes Dam

New H:H Slimes Dam		
Central Coordinates	25°39'18.46"S 27°50'46.93"E	
Footprint Area	1.35 *ha*	
Final Maximum Height	15 *m*	
Limiting Rate of Rise	0.7 *m/y*	
In Situ Density	2.1 t/m^3	
Storage Capacity	52 000 m^3	
Liner Type	H:H Liner	

Table 4.3.2.2(b): Relevant Details for the H:H Slimes Dam RWD

H:H Slimes Dam Return Water Dam		
Central Coordinates	25°39'15.13"S 27°50'42.27"E	
Footprint Area	3765.15 m^2	
Crest Length	244.86 *m*	
Top of Wall Level	1163.25 *mamsl*	
Full Supply Level	1162.85 *mamsl*	
Freeboard	0.4 *m*	
Dam Storage Capacity	6130 m^3	
Wall Type	Composite	
Liner Type	H:H Liner	

Slimes Deposition

The intention is that this facility must stockpile the slimes from the historic slimes dams prior to rehabilitation of this facility. The final landform must accommodate the historic slimes as well as the requirement to have the crest sloped to 3 % as part of the closure drainage requirements.

Figure 4.3.2.2(b) below indicates a cross section of the H:H Slimes Dam, showing the current and post deposition profile with the additional slimes fill.

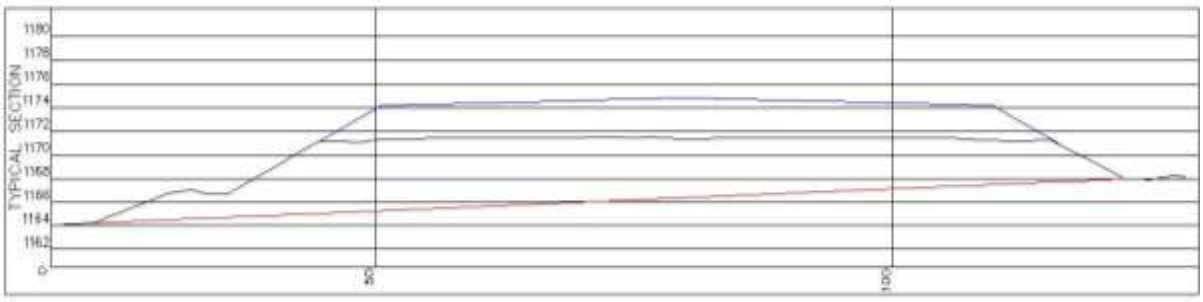

Figure 4.3.2.2(b): Proposed Profile for the H:H Slimes Dam

Figure 4.3.2.2(a): Location and Extent of the H:H Slimes Dam and RWD

Table 4.3.2.2 (c) indicates the fill between contours when raising the existing H:H Slimes Dam with slimes from the Old Historic Slimes Dams. The maximum fill height with the old slimes is 4 *m* and the final H:H Slimes Dam maximum crest height close to 11 *m*.

Table 4.3.2.2(c): Old Slimes Fill Placement Details

---------- MODEL MAKER ----------
Inprocon 0836593475 Date : 29/7/2016 Time : 17:27

System Settings : Southern Hemisphere - Degrees - Clarke - LO29

			Volume per contour		Cumulative Volume		Area per contour	
Number	Between contour	& contour (m)	Cut m3	Fill m3	Cut m3	Fill m3	Cut m2	Fill m2
01	1170.500	1171.000	0.000	1.953	0.000	1.953	0.000	32.000
02	1171.000	1171.500	8.381	753.389	8.381	755.342	104.00	5428.0
03	1171.500	1172.000	0.000	3785.388	8.381	4540.729	0.000	8268.0
04	1172.000	1172.500	0.000	3845.773	8.381	8386.502	0.000	7888.0
05	1172.500	1173.000	0.000	3660.931	8.381	12047.433	0.000	7512.0
06	1173.000	1173.500	0.000	3480.173	8.381	15527.606	0.000	7132.0
07	1173.500	1174.000	0.000	3297.848	8.381	18825.454	0.000	6768.0
08	1174.000	1174.500	0.000	2339.720	8.381	21165.173	0.000	6432.0
09	1174.500	1175.000	0.000	333.046	8.381	21498.220	0.000	2324.0

Closure Capping

The H:H Slimes Dam has a base barrier system that is a double composite composition complying with Minimum Requirements for Waste Disposal by Landfill. The capping works in conjunction with the liner by limiting the long term generation of leachate. Hence the cap is also made out of a series of elements.

The cap is to protect and isolate the waste body from the long term effects of wind and water erosion, burrowing animals, etc. Furthermore the cap must be stable against slide failure and the side slope against slope or slip failure. The slope angles must be such to sustain a vegetation cover. The minimum capping requirement is shown in Figure 4.3.2.2(c) below.

	200 *mm* Topsoil
	150 *mm* Compacted Clayey soil
	150 *mm* Compacted Clayey soil
	150 *mm* Compacted Clayey soil
	Geotextile on 150 *mm* gas drainage layer if required
	Waste body compacted

Figure 4.3.2.2(c): Schematic Layout of the Capping Requirements

The material disposed represents a fine sand to slimes material and doesn't produce gas. The gas drainage layer is therefore not required but a capillary break that prevents hazardous moisture to move into the clayey capping soil via capillary action will be required.

The clayey soil can be replaced with a GCL in the absence of sufficient clayey soil. The side slope requires investigation as to capping slide stability. The temporary HDPE liner can be utilized to further shed ingress of precipitation.

The proposed cap to be considered not to enlarge the hazardous footprint and isolate and secure the waste body may consist of the following elements:

	450 *mm* processed slag fill layer at crest and thicker on side slopes to function as buttressing 1.5 *mm* FM Re-instated
	GCL layer
	Waste body compacted

Figure 4.3.2.2(d): Schematic Layout of the Proposed Capping

The existing FM layer can be re-instated on top of a GCL and processed slag will be the protection layer against burrowing animals and UV exposure. A perimeter toe drain that intercepts precipitation inside the slag will be directed to the exiting PCD.

All stability checks need to be verified.

Feasibility and Design

Consulting Civil and Environmental Engineers, INPROCON, have been appointed to conduct a Detailed Feasibility Study and to compile a Preliminary Engineering Design Report for the Decommissioning (Rehabilitation and Closure) of Phase 1 of the H:H Slimes Dam.

The report will consider the preferred option for decommissioning of the two Historic Slimes Dams and the design will be completed accordingly. The report will be completed as part of the Plan of Study for the EIA Phase of the project.

4.3.2.3 Development and Expansion of the Site Storm Water and Process Water Management Facilities

INPROCON Environmental and Civil Engineers conducted a preliminary assessment to determine the requirements and overall design objectives for activities that would be required to fully upgrade (development and expansion) the HERNIC Process Water and Storm Water Management System.

The HERNIC Plant operations can in general terms be classified as a dirty site area that poses a risk to surface water, soil and groundwater pollution. The affected plant facility area and mining area have been inspected to assess the surface water management infrastructure and general management at the site. With the Regulations pertaining to the Management of Water at Mines (Regulation GN704) as primary requirement, the short comings have been identified and conceptual betterment measures have been developed.

The study includes the evaluation of the runoff management situation at the site and ultimately has to comply with regulations promulgated under the Water Act. Furthermore it should be noted that certain parts of the HERNIC Process Water Management System is integrated with the HERNIC Storm Water Management System, and vice versa. The two systems will therefore be assessed together.

The objective of this assignment was to identify all risk areas pertaining to current Storm Runoff and Process Water Management Measures and to develop a concept management plan addressing the present short comings. The following principles were applied:

- Keep clean water clean;
- Collect & contain dirty water;
- Sustainability over mine life cycle; and
- Consideration of regulations and stakeholders.

This was done by following a catchment-based approach as input to the HERNIC SWMP (Storm Water Management Plan) culminating in identification of current and potential future water management issues on a sub-catchment basis. This is followed by devising proactive measures and solutions complying with relevant regulations and procedures.

The assessment and improvements to the SWMP include the following considerations:

- Assessment of the layout of existing mining sites and surface water management infrastructure;
- Site assessments and verifications;
- Delineation of clean and dirty water management areas (including process water);
- Determination of all relevant catchment and sub-catchment boundaries;
- Perform a surface runoff water balance for all impoundments;
- Hydrological assessment of flood peaks and capacity requirements;
- Hydraulic assessment / confirmation of sizing requirements;
- Perform a gap analyses on non-compliances; and
- Develop pre-feasibility Storm Water Management Layout Plan.

The pre-feasibility Storm Water Management Layout Plan will include all primary Storm Water Management Measures.

Sub-Catchment Delineation

The main sub-catchment areas at HERNIC are delineated on Figure 4.3.2.3(a). These sub-catchments are indicated by the red polylines. The site boundary is a magenta polyline with the site area hatched in solid shades indicating the site areas within each main sub-catchment. The HERNIC site is also sub-divided into 4 areas, each of which falls within the main sub-catchments and which are labelled as Hernic 1, Hernic 2, Hernic 3 and Hernic 4.

Hernic 1 is the smelter site that includes the Offices, Raw Materials Yards, Waste Stockpiles, Primary CRP Plant, Historic Slimes Dams, Process Water Dams and Storm Water Dams as well as a portion of the Opencast Mine. Hernic 2 is the remaining portion of the Opencast Mine and the property that houses the Underground Mining Facility.

Hernic 3 is the most eastern site area with the TSF and H:H Slimes Dam. Hernic 4 is regarded a clean area that is the western property. Hernic 1 to 3 accommodates all operational infrastructure with areas that are classified as moderate dirty and dirty.

The main drainage directions are indicated with the arrows on Figure 4.3.2.3(a).

Existing Storm/Process Water Drainage System

The HERNIC site has a few Storm and Process Water Drains as indicated on Figure 4.3.2.3(b). Drains HH and AE are the only drains that can be regarded as proper concrete drains. The internal drains (indicated light green) are a combination of storm water drains and process water drains from the Furnaces and Pelletizing areas that link up to discharge into the process water dams.

All existing drains have been designed to deal with normal rain events with a typical design recurrence period of 2 years. Hence the drains are relatively small and shallow. Most of the drains observed are blocked or obstructed with sediments or process/waste material. The process water and storm water are not clearly separated and regarded as an integrated system.

This is acceptable as long as the storage capacities of impoundments and conveyance drains are designed to be compliant in terms of capacity and sufficient barrier systems. The development of the Storm Water Management Master Plan will also accept this as a site specific property and measure.

Clean runoff diversion at the TSF (drain KK) and at the mine surface infrastructure (drain LL) are with earth canals of suitable size and layout. Some additions at the mine surface are necessary to contain all dirty runoff from temporary stockpile and crusher area.

An aspect that requires provisional measures is sediment control as sources of sediment are situated close to the Storm Water PCD's and OB Plant Process Water Dam. The main Storm Water PCD as well as the OB Pant Process Water Dam are silted up and acts currently as silt traps also.

The dirty storm water system currently also covers the central furnace area whilst the south-western area where the Fine Slag Processing Plant is situated falls beyond the catchment area of the storm water dams.

The Primary CRP Plant site located to the south of the main entrance road has no formal storm water management system. The Plant process water recovering drains are vulnerable to storm runoff and regular spilling from the site is evident.

HERNIC Existing Clean & Dirty Areas

When homing in to the site in distinguishing clean, moderately dirty and dirty areas the following areas that also relates to the main drainage sub-catchments have been delineated. Refer to Figure 4.3.2.3(c). These are tabulated below.

Table 4.3.2.3(a): HERNIC Demarcated Clean and Dirty Water Areas

Area	Description	Size (Ha)	Classification
A1	Primary CRP Plant and Slag Stockpile	12.3	Dirty
A2	Final Product & Historic Slimes Dams	6.0	Dirty
A3	Fine Slag Processing Plant & Site Area	12.7	Dirty
A4	Furnaces, Pelletizing, OB Plant & Raw Materials	15.72	Dirty
A5	Mixed Materials Stockpiles, Slag Stockpiles, etc.	19.7	Moderate Dirty
A6	HH Slimes Dam Site	13.88	Moderate Dirty
A7	U/G Mine Surface Infrastructure Site	18.7	Moderate Dirty
A8 & A9	Uphill of Primary CRP	17.66	Clean
A10	Open Cast Mine	52.9	Dirty
A11	TSF Area	53.9	Moderate Dirty
A12	Storm Water PCD's & Process Water Dams Area	9.45	Dirty
Total		**232.91**	

The dirty classified areas have impacted water qualities and with an extremely high sediment (& silts) loads. The moderate dirty areas include old dump sites with a lesser degree of sediment. Besides all other clean areas, A8 & A9 are clean up-gradient areas that require additional measures to divert it past the affected down-gradient Primary CRP Plant area.

Shortcomings of Existing Site Storm Water Drainage

The following issues were observed regarding the Storm Water Management System and are regarded as shortcomings with regards to the objectives of Regulation GN 704 that resorts under the Water Act.

CRP Plant Area (A1)

The Primary CRP Plant area that accommodates all crushing, screening, spirals, slimes dam and tailing slag stockpile yard has no storm water management measures in place. Runoff discharges in a north and west direction off the site uncontrolled.

Final Product & Historic Slimes Dams (A2)

This area has been isolated with berms on the south and west boundary. A new truck wash bay is also in this catchment. Runoff drains mainly north towards the smelter cool down area and towards the west discharging from the property. Ponding at the cool down area occurs that could impact on the groundwater. Runoff interception and directing to a containment impoundment is lacking.

Fine Slag Processing Plant & Site Area (A3)

The Fine Slag Processing Plant site that stockpiles various sand piles and the raw materials for the pelletizing plant is not isolated with interception and runoff management infrastructure. Runoff discharges in a west to northerly direction off the property and can't be directed to the existing SW Dams due to the natural fall of the topography towards the northwest. Sediment loads and affected runoff is expected from this area.

Furnaces, Pelletizing, OB Plant & Raw Materials (A4)

This area forms the central area that houses the furnaces, pelletizing plants, OB Plant, DMS Plant and raw materials stockpiles. The existing salvage yard without any interception and containment measures is situated towards the southeast corner. Most of the site is unpaved. Runoff is directed with formal and unformal drains towards the Process Water Dams, OB Palnt Process Water Dam and the Storm Water PCD's. The silting up of dams are evident and a threat to capacity requirements. Spilling is unavoidable due to available storage capacity that is impeded by sediment loads in the runoff that settles in the impoundments.

The main storm water earth drain that runs from southwest to northeast next to dams (Figure 4.3.2.3(b): (DD to BB to EE) is obstructed with sediments.

Mixed Materials and Current arisings Slag Stockpiles (A5)

This area contains mixed materials and the current arisings slag stockpiles as well as the PGM Plant. Runoff and seepage leach water from the stockpiles and discharges north without any management measures. The site is regarded as moderate dirty due to sediment laden runoff and leach water that contains contaminants.

H:H Slimes Dam Site (A6)

The H:H Slimes Dam has been temporarily closed with a HDPE geomembrane. This area is also classified as moderate dirty due to Mixed Materials Stockpiles to the south and north of the site. This site is a closed system when in operation with the Slimes Dam and RWD liner compliant with regulations. Clearing of the rather small stockpiles would declare the surrounding areas as clean.

U/G Mine Surface Infrastructure Site (A7)

The U/G mine facility with workshops, stores, offices and mine related gear is also classified as moderate dirty. Some ROM stockpiles to be transferred to the smelter raw materials yard area also located in this sub-catchment. A mine dewatering dam is also located in the site. Runoff from the yards and stockpiles will be silt loaded with a possibility of the presence of bio-carbons. However, no downstream catchment/ RWD serves as precaution to intercept affected runoff from this area.

Up-gradient of Primary CRP (A8 & A9)

Up-gradient of the Primary CRP Plant site where the main admin offices also resides is regarded clean area and currently clean runoff is not adequately directed past the Primary CRP Plant area. Diversion of clean runoff is required.

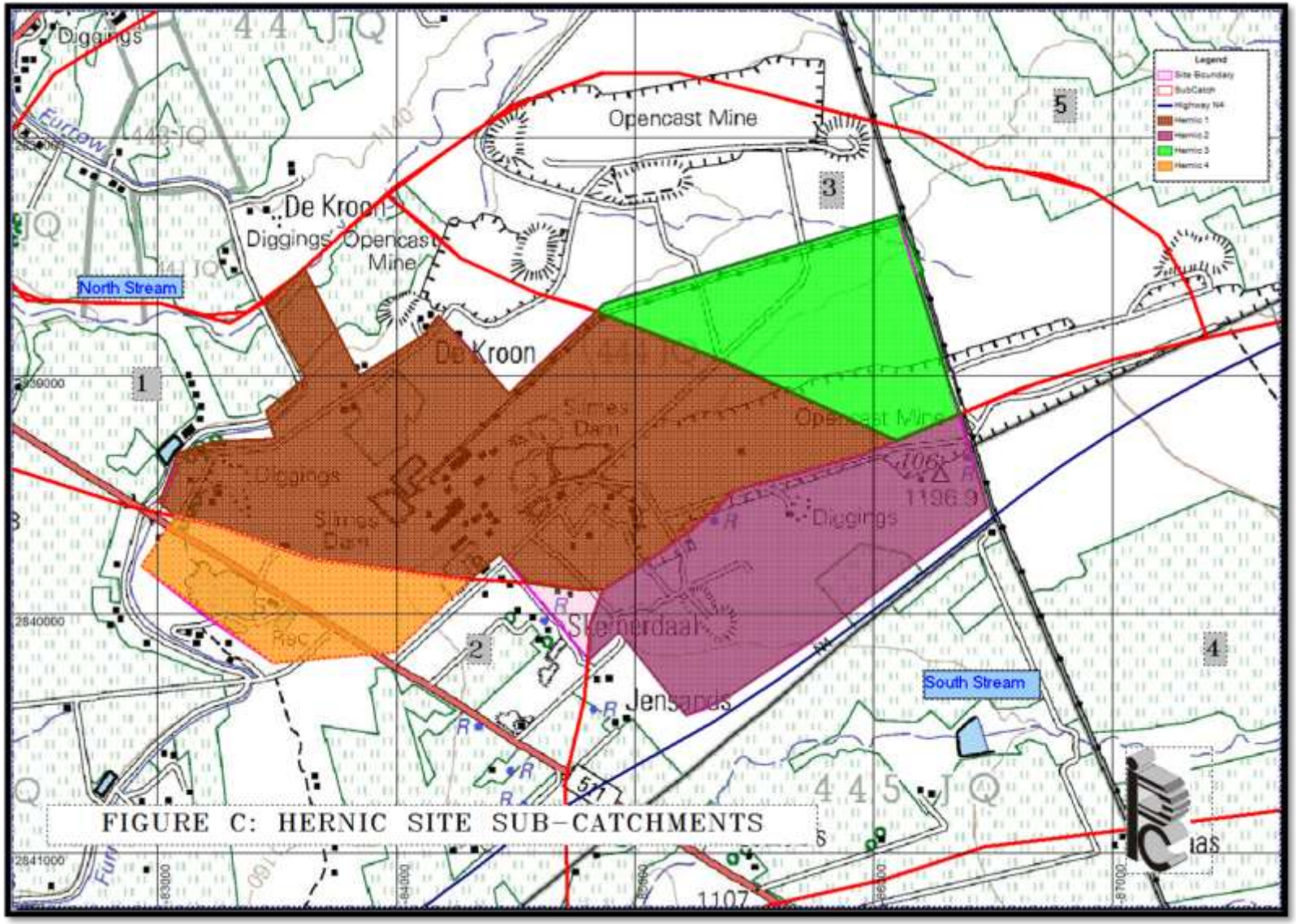

Figure 4.3.2.3(a): HERNIC Sub-Catchment Delineation

Figure 4.3.2.3(b): Existing Storm Water and Process Water Drains

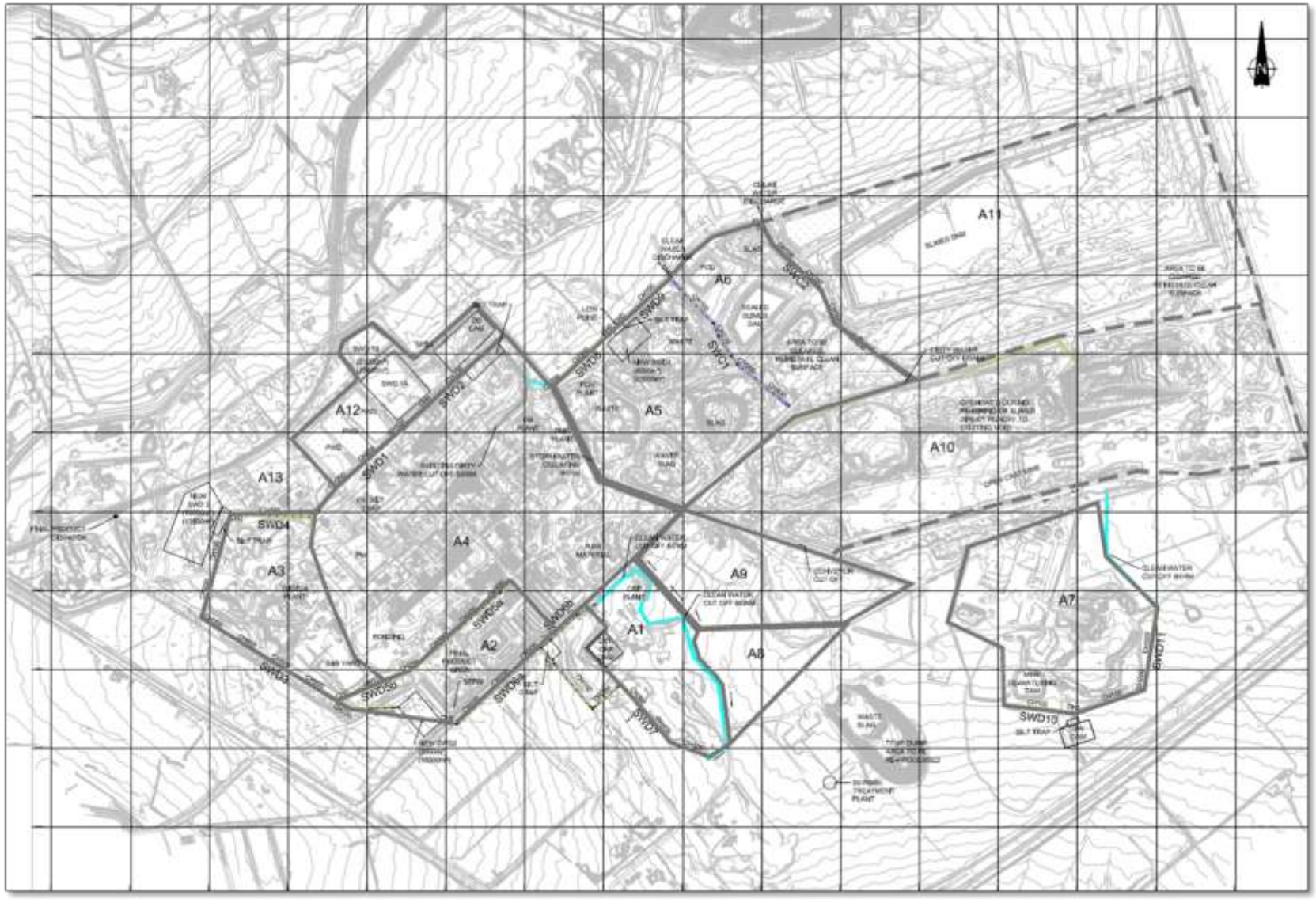

Figure 4.3.2.3(c): HERNIC Existing Clean and Dirty Water Areas

Open Cast Mine (A10)

Open cast mining has seized. Some slimes previously dumped in the open cast is going to be re-processed at the PGM Plant. An open void is situated to the northeast axis of the mine. Any runoff from this site is sediment and silt loaded. Rehabilitation will not commence soon. Runoff should be managed and contained within the open cast area.

TSF Area (A11)

The TSF site mainly exists of the Slimes Dam with RWD. Runoff from the surrounding area of this site is moderately affected by few smaller Mixed Materials Stockpiles. This site with marginal effort may be regarded as clean. This is true if the TSF is properly managed and zero spillages from the decant system manholes can be guaranteed.

Storm Water Pollution Control Dams & Process Water Dams Area (A12)

The water qualities for the Process Water Dams and Storm Water PCD's are virtually the same and it is suggested that this must be managed as one impoundment management area. Only the Process Water Dams consisting of three in series cells are recently HDPE lined. The first receiving cell is already filled with sediments from the process water circuit.

The Storm Water PCD's are also silted up and requires constant clearing. The same applies for the OB Plant Process Water Dam that is overloaded with sediments. Spilling occurred at the time of the inspection.

All dams in this area are excessively exposed to sediments and silts. The existing sediment/silt traps in the process water circuit close to the process water dams are not adequate to manage the high loads of sediment.

The management of sediments requires a comprehensive solution to be compliant. All canals leading to these impoundments should be concrete lined.

Proposed Storm Water Drainage Master Plan

Demarcated Drainage Management Areas

The sub-drainage areas delineated in Figure 4.3.2.3(c) also forms the master drainage areas taken up in the master drainage plan. Figure 4.3.2.3(d) indicates the drainage master plan with primary storm water canals and storm water impoundments. The primary storm water drainage system allows for the classification in terms of clean or dirty runoff and primary storm water measures are proposed to manage these areas accordingly.

These drainage areas will be isolated by a combination of natural surface gradients, man-made berms, main storm water surface drains and existing or new impoundments. The filling of depressions caused by unintentional excavation during scooping up of materials (e.g. at the raw materials yard, OB Plant, slag cooling bays, etc.) will also be necessary.

Primary Drainage System Elements

A1: The Primary CRP Plant will require an interception drain (SWD7) and an upslope diversion berm. The site is limited in area and a containment Storm Water PCD (SW-PCD2) to contain runoff from this site is proposed in the A3 area. The water would be reticulated from SWD7, via SWD14, SWD5b, SWD3b and SWD3a into this new Storm Water PCD2. A sediment trap should be located immediately downgradient from the Primary CRP area to prevent down-gradient drains to block and spill. The proposed site for this silt trap is in area A2 on the rehabilitated footprint of the two Historic Slimes Dams, linking SWD7 and SWD14.

A2: This site drainage requires that runoff emanating from this area be intercepted and directed down to new Storm Water PCD2, via drains SWD14, SWD5b, SWD3b and SWD3a. This includes run-off from the rehabilitated Slimes Dams, the Final Product Area, as well as the new Wash Bay.

A3: Runoff from this site is isolated with a natural divide along the east of the Fine Slag Processing Plant and a new drain SWD3a and SWD3b. Runoff is intercepted by providing a new Storm Water PCD2. SWD4 is the north drain that cuts off runoff discharging to the north of this site and directs to new Storm Water PCD2.

A4: The existing drains SWD1 and SWD2 require upgrading and the incorporation of a series of accessible silt traps before discharging into the relevant Process Water and Storm Water Dams. Runoff from this site will discharge into the upgraded Plant Process Water Dams and upgraded Storm Water PCD1A and 1B. Sediment management of the up-gradient and adjacent yard areas must be pursued. This includes that stockpile yards be levelled and concrete paved and regular area clean-ups must be instituted.

A5: This area will accommodate the new PGM Plant. The site is also covered with Mixed Materials Stockpiles as well as the two current arising Slag Stockpiles. The north boundary is also a natural low point where a new Storm Water PCD3 will intercept runoff from this area. This drainage area must be isolated with a west earth berm preventing more surface runoff from the raw material yard to drain towards the new Storm Water PCD3 area. Runoff from this area can only be directed to the existing Storm Water PCD's with deep and wide drains at the downstream side. This is avoided due to cost an available space required by providing Storm Water PCD3.

A6: The H:H Slimes Dam has been temporarily closed. The decision to finally close or to keep the facility mothballed will determine the future actions. Clearing of the rather small Mixed Materials Stockpiles is necessary to declare the surrounding areas as clean. Space for an extension of the slimes dam is available. The RWD will remain in place either for future operation or monitoring of the leachate from the underdrainage system. When permanently closed and rehabilitated and no leachate emanating from the drains the RWD can also be rehabilitated.

New Salvage Yard: A small settling pond, new Storm Water PCD4, will be required to capture and contain storm water run-off from the area of the proposed new Salvage Yard. Due to topographical constraints, the run-off from this site cannot be reticulated towards new Storm Water PCD2. The dam will occupy a footprint of 685 m^2 and have a capacity of 275 m^3.

A7: Runoff from the Crusher Yard, the ROM Stockpile and the Mine Waste Rock stockpile should be intercepted. The existing mine dewatering dam should be decommissioned and replaced by a new Morula Storm Water PCD, that can also accommodate the de-watering component from the underground operations. The water abstracted from the mine must be treated for Cr^{6+} prior to being discharged into the new Morula Storm Water PCD. Isolation and diversion berms should be constructed to limit the size of the site and maximize clean runoff. The Morula Storm Water PCD should provide capacity over and above the storm water run-off requirements for an additional storage of 15 extra days of reserve capacity for the underground extraction at a discharge flow at 600 m^3 *per day* – 9 000 m^3.

A8 & A9: Earth drains must direct clean runoff towards the north and south of the Primary CRP area. The existing main road can serve to direct clean runoff past the A1 and A4 dirty areas. A road side drain will serve the purpose.

A10: The open cast mine requires temporary drains and grading to direct surface runoff towards the open void. Water from the void must be extracted for use in the Smelter Facility. Rehabilitation of the surface should be done once the slimes placed at the open cast has been re-mined and processed at the PGM Plant.

A11: The TSF in terms of runoff management is a closed system and if operated accordingly and the surrounding area cleared from stockpiles, no particular additional Storm Water measures are required.

A12: The Process Water Dams, Storm Water PCD's 1A & 1B and the OB Plant Process Water Dam should be upgraded and lined with a Class C liner system. The existing Emergency Dam should be converted to Storm Water PCD1B that links up with Storm Water PCD1A. The Process Water Dams and the OB Plant Process Water Dam should be able to discharge in case of excessive storms to the Storm Water PCD's via emergency spillways. As part of sediment management the first cell of the Process Water Dams and intake of the Storm Water PCD1A should be lined with concreted multi-cells to trap sediments and allow access for dredging equipment and TLBs to clear sediments without damaging the liners. A large sediment trap must be provided at the OB Plant Process Water Dam inlet.

A13: New Proposed salvage Yard: A new salvage yard will make it possible to intercept dirty runoff and wash water for re-use without the risk of spilling. The existing yard has not enough space to install proper drainage and intercept impoundment. This area also includes the Civils Yard that is regarded clean area.

<u>Peak Flows</u>

Utilising the Rational Method for small catchments and obtaining catchment parameters from the inspection and survey the following peak flows have been calculated for the sizing of the primary storm water canals anticipated for the master Storm Water Plan.

Table 4.3.2.3(b): HERNIC Storm Water Peak Flows

Project: HERNIC SW System					
HydroCube HQ3.005			Ser: 3504610481		
Total Area; 146.89 ha			Strom Shape: Triangular		
MAP: 649 mm			Recurrence Interval: 50 years		
Sub-Catchment	Area (ha)	Peak-Outlet (m^3/sec)	% Imp (Present)	% Imp (Future)	Storm Duration (min)
A1	9.56	2.84	10	10	20
A2	7.90	2.62	35	10	25
A3	11.57	4.77	2	10	25
A4	42.20	15.72	35	10	25
A5	30.39	11.79	15	10	25
A6	21.17	7.89	6	10	25
A7	18.70	7.25	10	10	25
A8	5.40	2.05	2	10	25
A9	10.54	3.97	2	10	25

Drain Sizing

The sizes of the drains envisaged are indicated in Figure 4.3.2.3(d). Trapezoidal forms are used for the primary drains with the exception of a rectangular drain to join with an existing drain or where space doesn't permit a trapezoidal drain.

Runoff Interception Water Balances & Storm Water Containment Capacity Requirements

Preliminary runoff water balances have been compiled based on monthly runoff for each of the dirty sub-catchments. The sizing of the storm water impoundments was based on sustainable extraction rates for re-cycling to the process water circuit. On top of the average maximum operational capacity required, an additional 1 in 50 year, 24 hour, flood volume was added.

Five Storm Water impoundments or temporary intercept measures are required enabling interception of all affected runoff from the identified dirty areas. These impoundments with the catchment areas that they service are listed below.

Table 4.3.2.3(c): HERNIC Impoundment Catchment Areas

Impoundment Ref.	Sub-Catchment	Sub-Catchment Area (ha)
Storm Water PCD1A & 1B	A4	42.2
Storm Water PCD2	A1, A2 & A3	31.0
Storm Water PCD3	A5	18.2
Storm Water PCD 4	New Salvage Yard	0.65
Morula PCD	A7	5.7
Open Cast Void	A10	51.8

The following feasible extraction rates for the Storm Water PCD's have been adopted. These rates correlate with the current water balance for HERNIC.

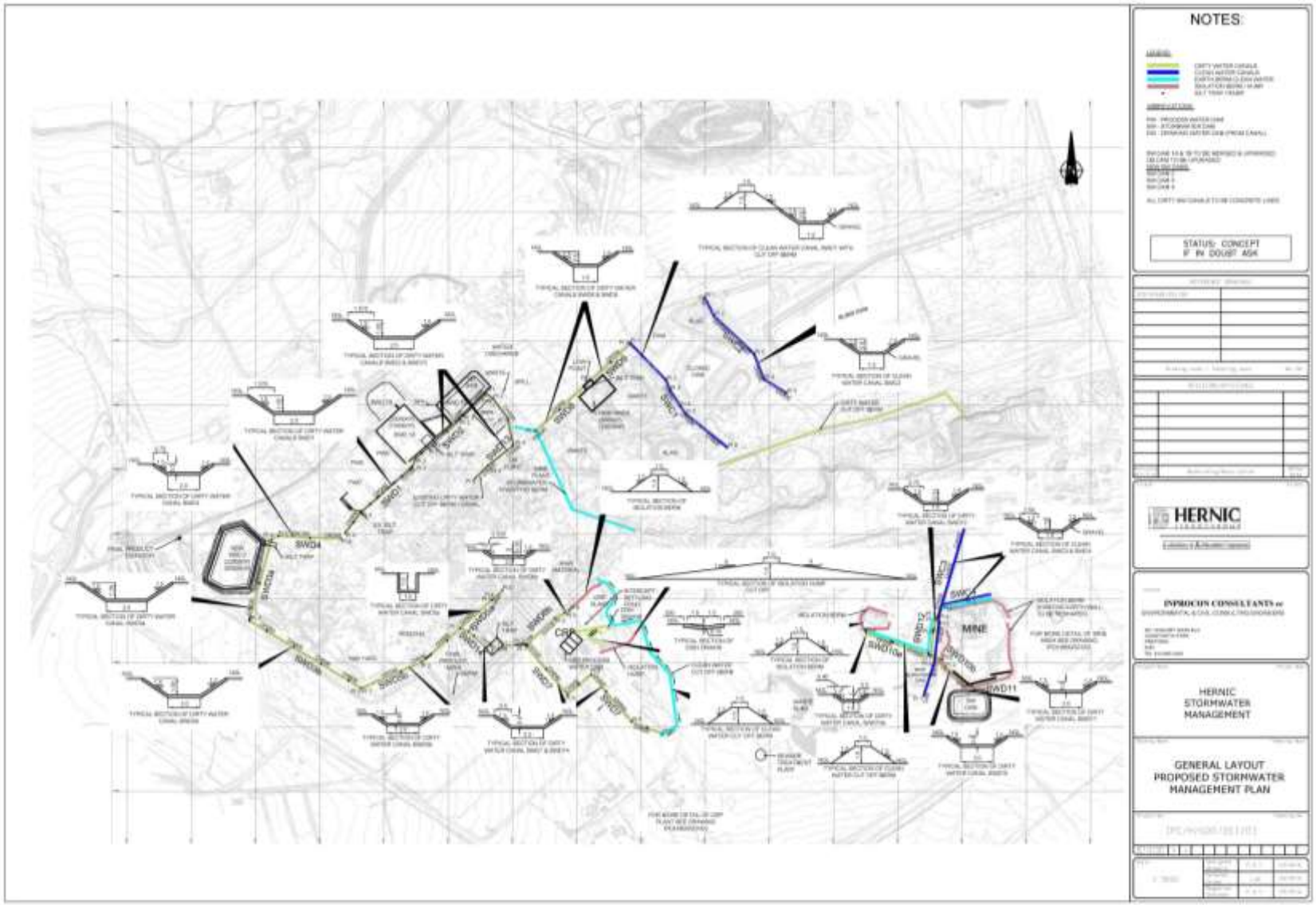

Figure 4.3.2.3(d): Conceptual Layout of Infrastructure required for a Storm/Process Water Management Plan Upgrade

Table 4.3.2.3(d): HERNIC Impoundment Extraction Rates

Impoundment Ref.	Extraction Rates m^3/month	Extraction Duration (months)
Storm Water PCD1A & 1B	6000	8
Storm Water PCD2	3000	9
Storm Water PCD3	2700	9
Storm Water PCD4	0	0
Morula PCD	18500	12
Open Cast Void	5500	9

The flood volumes (1 in 50 year occurrence 24 hour duration) to be allowed for interception by the impoundments are as follows:

Table 4.3.2.3(e): HERNIC Impoundment 1:50 year Flood Volumes

Impoundment Ref.	Volume (m^3)
Storm Water PCD1A & 1B	45 833
Storm Water PCD2	36 450
Storm Water PCD3	18 009
Storm Water PCD4	180
Morula PCD	7 733
Open Cast Void	-

The impoundment sizing derived from balancing monthly runoff, evaporation rates, extraction rates and flood volumes (freeboard of 0.8 *m* included) are as follows:

Table 4.3.2.3(f): HERNIC Impoundment Required Storage Capacities

Impoundment Ref.	Capacity Volume (m^3)	Average Area (m^2)
Storm Water PCD1A & 1B	73 400	23 000
Storm Water PCD2	65 600	22 000
Storm Water PCD3	23 020	6 000
Storm Water PCD4	275	685
Morula PCD	25 000	6 000
Open Cast Void	64 000	4 000

Barrier Class

The storm water quality analyses indicate all Storm Water PCD's need to be lined with a Class C liner system.

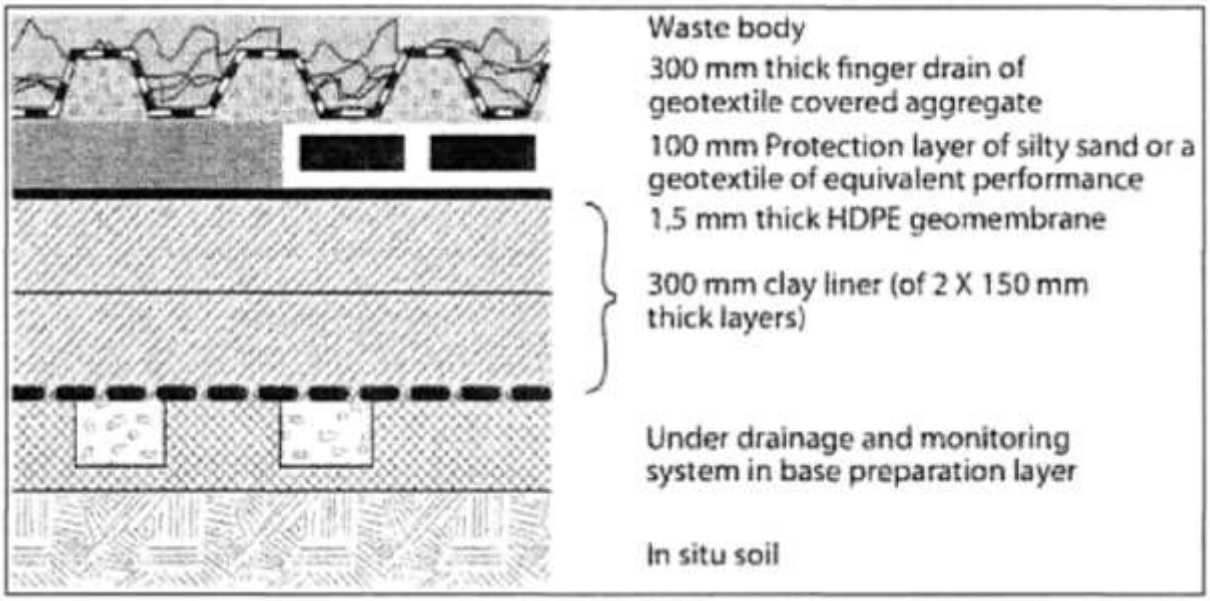

Figure 4.3.2.3(e): Schematic Profile of a Class C Liner System

Process Water Dams

OB Plant Process Water Dam

The existing OB Plant Process Water Dam together with the adjacent overflow will be indicated as a combined but single OB Plant Process Water Impoundment. Process water from the OB Plant will in future be pumped to these impoundments. No surface storm water runoff inflow will be allowed into this facility.

Plant Process Water Dam

The Plant Process Water Dam comprises of three adjacent storage cells connect by spillways, i.e. Stage 1, Stage 2 and Stage 3. These cells are HDPE membrane lined without any underdrainage system.

Fine ore concentrate spillages at the concentrator, pelletizing and furnace proportioning plants are washed down and the wash water ends up in small concrete drains that feeds to a collection drain that discharges into the process water dam. Water is recycled from the process water dam to the aforementioned areas. Treated sewage water is also pumped to the Process Water Dam. Water from the canal as replenishment and water from OB Dam are pumped to the PWD.

There is a silt trap battery positioned on the side of the collector drain closer to the Pelletizing plant. The capacity and operation of these silt traps are insufficient and causes the silts to end up in the process water dams.

Fine ore recovered from the traps and dam is recycled back into the process once it is removed from the silt traps and the process water dam. This is done when dry enough to allow handling. It is also required that a dedicated and suitable drying pad be provided.

The sediment or ore bearing fines has a SG exceeding 4 with the result that the settling velocity is high. This is evident from the settled loads only in the first cell of the process water dam facility. These lined cells are not equipped to remove settled ore without the risk of damaging the membrane liner.

The process water compares with the water in the storm water dams as almost similar in quality. This is expected due to the process water and storm water runoff that both come in contact with the same ore materials. Spillages of process water in the various plant areas can eventually also discharge in to the Storm Water Dams.

The management of sediments/ore in the process water circuit needs to be improved by installing a suitable size silt trap with two large cells that is located next to the process water dams. This will enable routing the runoff via any one of the cells at a time and allowing a cell to dry out for clearing.

The current location of the Process Water Dams is downhill of the processing plant area and suitable to intercept all process water surface runoff.

These dams have a combined total capacity of 76 000 m^3 that includes the freeboard volume with freeboard height of 0.8 m.

The water quality stockpiled in the PWD is high in TDS and requires a Class C liner system comprising a composite barrier of clay and flexible membrane. A seep detection sub-drainage system is also included in the Class C liner specification.

Impoundment Reference	Capacity Volume (m^3)	Average Water Surface Area (m^2)	Dam Footprint Area
Plant Process Water Dam	76 000	26 500	33 500

CRP Process Water Dam

The CRP Processing area is where chrome particles from the furnace slag is recovered by means of crushing and screening operations. The Jig Plant thickener traps fine sands and the underflow is pumped to the CRP Process Water dam. The CRP Process Water Dam hence acts as sand/sediment trap and contains liberated slurry water which is recycled to the screening process. Settled sand is removed by excavator and transported to the Tugela Plant near the furnaces for further reclaiming of the finer fractions of chrome and chromite.

The existing Process Dam is a sunken into the turf earth dam. The current operations demand some adjustments to the current dam and comprises the following:

A 3 cell equal size configuration of the dam where underflow is continuously pumped to. The cells act as sand settlement and drying trap. Liberated water overflows to adjacent cells and is recycled to jig plant.

The existing licenced volume is 9 000 m^3 and this volume will be adequate for current and future operations.

Operation: Start at Cell1 sliming and liberated water discharge to Cell2 till Cell1 is silted up. Move slimming to Cell 2 and the process repeats. Liberated water in cell 3 will drain to a sump.

The water quality requires a liner system and due to the regular clearing of sands a water tight concrete structure will be necessary.

In future when a Filter Press might be commissioned less sands will need to be trapped. However the dam will still be utilized for process water replenishment.

The CRP Process Water Dam doesn't act as a storm water runoff interception dam. The topography, location of the impoundment and available space at the site has opted the dam to be a process water dam only facility. The new storm water management plan provides that runoff from the CRP area will be is intercepted with a canal system running at the down slope perimeter of the CRP site.

The new upgraded CRP Process Water facility will hence be a concrete impoundment allowing access by excavator with the layout and dimensions as indicated below. Furthermore the water quality will require a Class C or equivalent barrier system. The water tight concrete structure will meet requirements.

Feasibility and Design

Consulting Civil and Environmental Engineers, INPROCON, have been appointed to conduct a Detailed Feasibility Study and to compile a Preliminary Engineering Design Report for the upgrading of the Site Process and Storm Water Management Plan. This report will be completed as part of the Plan of Study for the EIA Phase of the project.

4.3.2.4 Development of a New Salvage Yard

HERNIC operates a small Salvage Yard for domestic waste and waste produced in the operational activities of the ferrochrome smelter facility. An appointed waste contractor manages and removes waste at and from the Salvage yard. The locality and extent of the current Salvage Yard is shown on Figure 4.3.2.4(a).

The operating of a Salvage Yard requires compliance with the Waste Management Legislation as prescribed by the National Environmental Management Waste Act, 2008 (Act 59 of 2008) - NEMWA. More specifically the HERNIC Salvage Yard must be operated in terms of the National Norms & Standards for the Storage of Waste under the NEMWA.

In order to give compliance with said Norms and Standards, HERNIC appointed INPROCON to conduct an assessment to determine the requirements to upgrade the existing Salvage Yard at HERNIC to be fully compliant with the legal requirements.

The assessment concluded that the existing Salvage Yard had various constraints as far as upgrading was concerned, especially in terms of the available footprint size required to accommodate all the required infrastructure and its related storm water control measures, and HERNIC therefore requested INPROCON the expand their assessment to assess the requirements for the development of a new Salvage Yard facility.

- Engineered Platform for the Salvage Yard Footprint
- Wash Bay Slab
- Tip and Sort Slabs
- Oil Drum Storage
- Dirty Runoff Drainage System & Interception
- Office
- Mess
- Hazardous Bunded Slab

In order to accommodate the above, a site of at least 0.65 *ha* would be required. An assessment of site alternatives was conducted and the proposed preferred site for the new Salvage Yard is an area located next to the now redundant Old Civil Workshop area. This site is located out of sight, close to access roads, out of the way of existing activities and is located optimally from a surface water run-off management perspective.

The proposed site locality and extent is shown on Figure 4.3.2.4(b). The proposed New Salvage Yard layout is shown on Figure 4.3.2.4(c).

Feasibility and Design

Consulting Civil and Environmental Engineers, INPROCON, have been appointed to conduct a Detailed Feasibility Study and to compile a Preliminary Engineering Design Report for the construction of the New Salvage Yard. This report will be completed as part of the Plan of Study for the EIA Phase of the project.

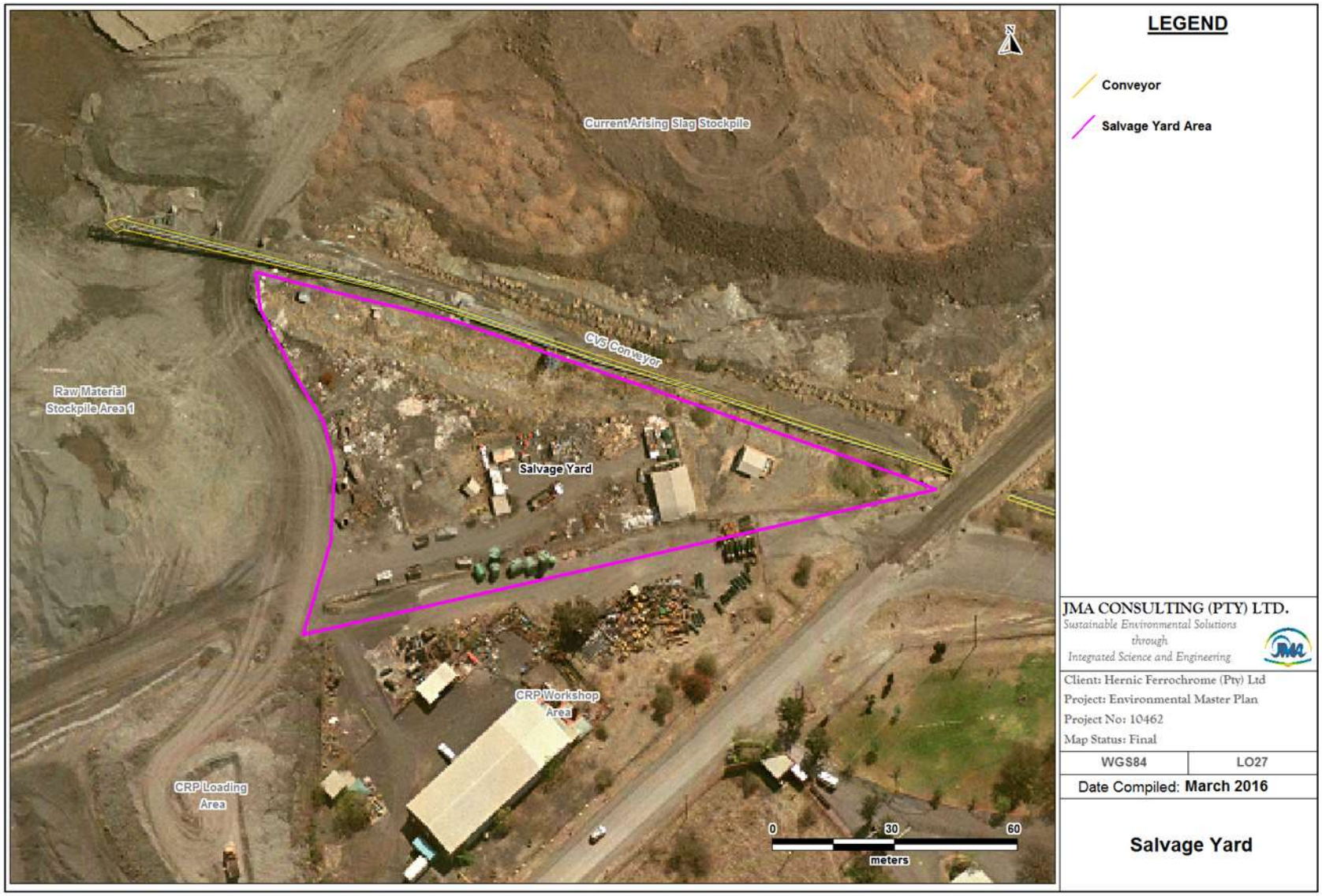

Figure 4.3.2.4(a): The Locality and Extent of the Existing Salvage Yard

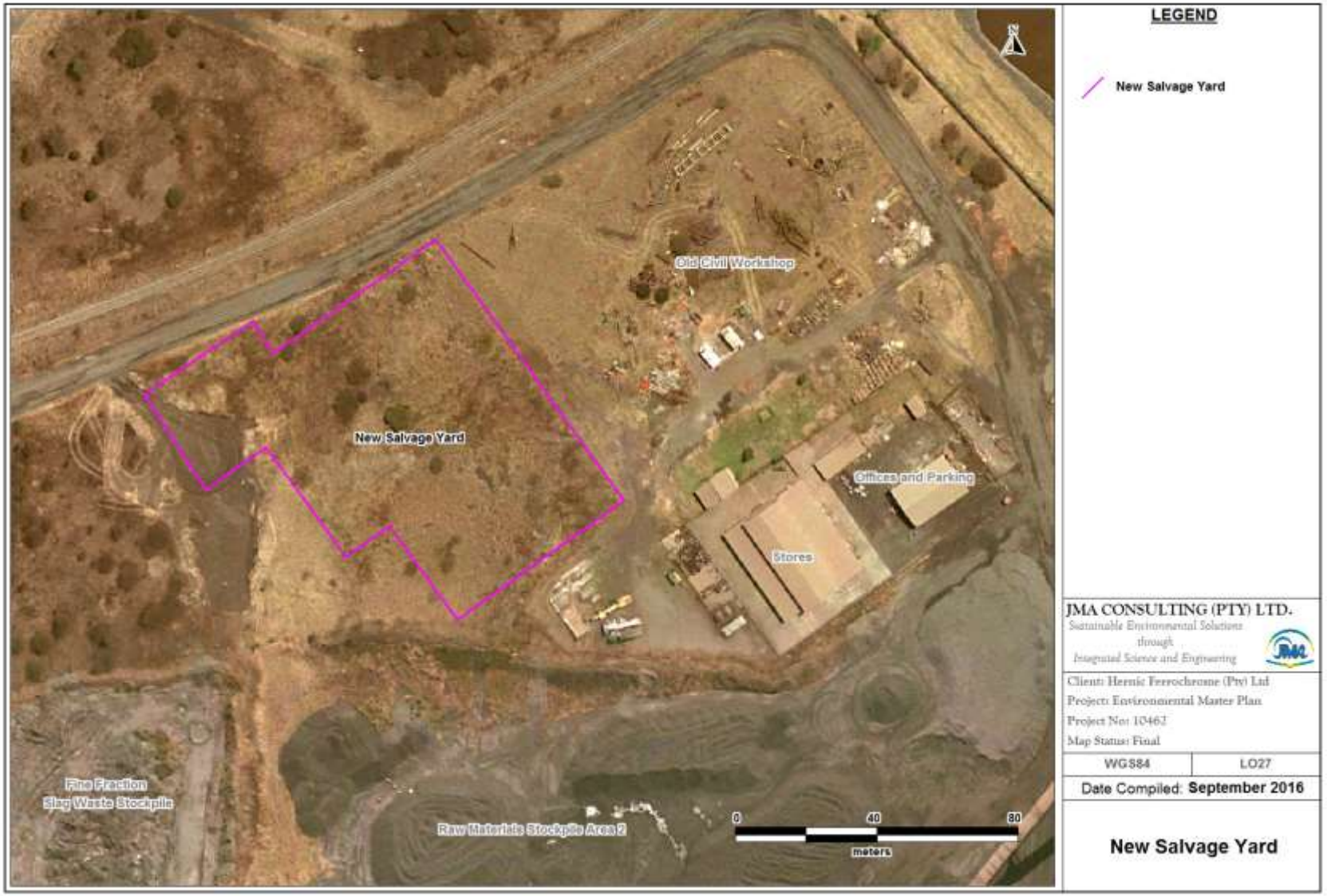

Figure 4.3.2.4(b): Proposed Locality and Extent of the New Salvage Yard

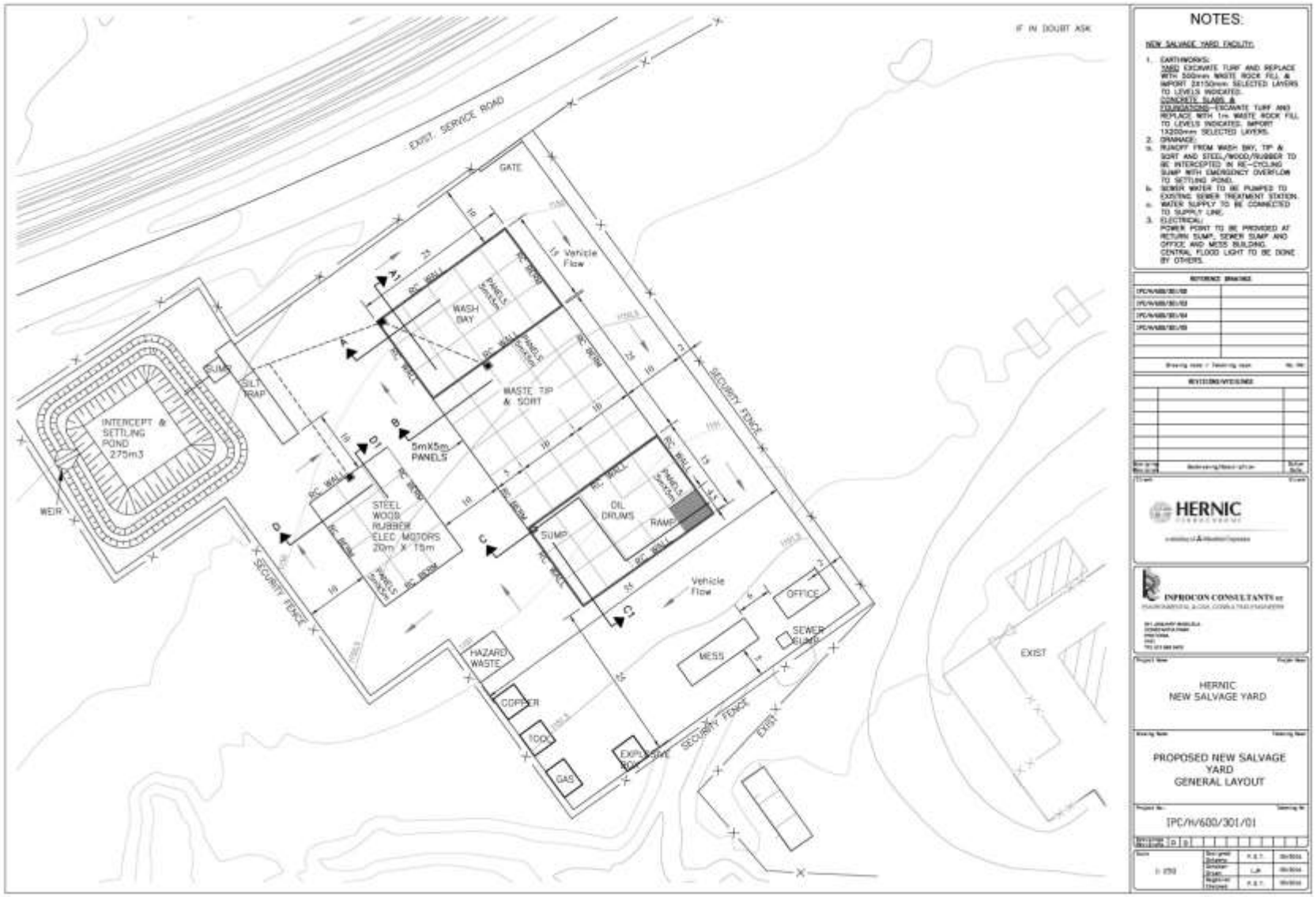

Figure 4.3.2.4(c): Conceptual Design Layout of the New Proposed Salvage Yard

4.3.2.5 Expansion (upgrading) of the Tap Hole Fume Extraction System

During tapping of the ferrochrome at the Furnaces, dust laden gas, known as tap hole fumes, escapes from the tap hole into the environment. In order to capture the gas and treat it before it is released into the atmosphere, HERNIC proposes to upgrade the tap hole fume extraction and gas cleaning system at all four Furnaces.

The technology comprises three main elements:

- Tap Hole Fume Extraction Hood and de-pressurized Gas Pipe Line
- Particulate Matter Abatement Equipment
- Cleaned Gas Stack

Tap Hole Fume Extraction Hood and de-pressurized Gas Pipe Line

The escaping tap hole fumes are captured into a tap hole fume hood installed right at the tap hole of each Furnace and which is connected to a de-pressurized gas pipe line which conveys the captured gas to the particulate matter abatement equipment. A photograph of such a typical tap hole extraction hood and pipe line is shown in Figure 4.3.2.5(a).

Figure 4.3.2.5(a): Typical Tap Hole Fume Extractor Hood and Gas Pipe Line

<u>Particulate Matter Abatement Equipment</u>

<u>Furnaces 1 & 2: Expansion/Upgrading of the Wet Scrubber System</u>

This very simple type of scrubber comprises a convergent inlet section which leads into a Venturi throat. The scrubbing liquid is fed into the inlet section tangentally through a number of pipes and ensures that the whole surface area of the section is flooded with the scrubbing liquid. This ensures that there is no dry/wet transitional zone which could lead to a build-up of a crust of solids, which would interfere with the operation of the scrubber.

The dust laden gas enters the scrubber vertically from the top and immediately hits the film of scrubbing water, where some separation takes place. The gas then enters the Venturi throat which has an annular shape. This ensures that the highest possible volume of water is taken up by the gas, which becomes saturated in this area.

At the narrowest cross section of the throat there is a sharp "tear off" edge where because of the sudden change in gas speed, the scrubbing water is atomised into tiny droplets. Because of the relative speed between the gas/dust mixture and droplets, the dust particles strike the droplets at high speed and are entrained by them. The droplets carry on through the throat and coalesce into bigger droplets and are carried on by the air stream and out of the Venturi scrubber.

The Venturi scrubber would normally be followed by a centrifugal droplet separator, where the water droplets are removed from the gas stream by high centrifugal forces. However, at HERNIC it is proposed to use a ZD droplet separator. Although designed like a centrifugal separator, the gas enters the droplet separator tangentally at the bottom and flows up into the outlet in a spiral shaded path. Through high centrifugal forces the liquid particles are separated from the gas. The hitched dust will be separated with the water and an apex cone guarantees that the removed droplets do not once again enter the system. While the waste water leaves the separator at the bottom, the clean gas enters the top through a vertical or horizontal gas outlet.

The VW Venturi scrubber is very suitable for use with hot and corrosive gasses and similar demanding applications. The materials of construction are chosen to suit the various parameters and may require a special line of ceramic tiles of other hardwearing materials to ensure long life. The cleaned gas is vented to the atmosphere through a Cleaned Gas Stack and the scrubber effluent is disposed of through the furnace clarifiers for disposal on the TSF.

Furnaces 3 & 4: Expansion/Upgrading of the Bag Filter System

Bag filters (fabric filters) are a popular means of separating particulate matter from a gas stream due to their relatively high efficiency and applicability for many cases. The gas containing dust is drawn through the bag (fabric) filter by means of a fan. The bag is responsible for some filtration, but it rather supports the dust layer that accumulates on it, which becomes a filter cake and serves as the main filter. The spent filter bags are removed periodically and disposed of at an appropriate disposal facility through a service provider.

Cleaned Gas Stacks

Options to vent the cleaned gas to the atmosphere are currently investigated. Basically two options exist:

- There are existing clean gas stacks which are currently not in use which can be re-commissioned for this purpose.
- The cleaned gas can be vented together with other clean gas through already operational clean gas stacks.

Feasibility Assessment and Air Quality Impact Assessment

Air Quality Specialists EnviroNgaka, has been appointed by HERNIC to assess to what extent the tap hole fume extraction systems will impact on the quality of ambient air by means of conducting an air quality impact assessment for both gas venting options. Specialist service providers, RESONANT, is currently compiling a detailed feasibility design report for the upgrading of these systems. These reports will be completed as part of the Plan of Study for the EIA Phase of the project.

4.3.2.6 Expansion of the Finished Product Plant Dust Abatement System

Currently dust generated from the crushing and screening operation at the Finished Product Plant, is managed through utilization of a small bag plant and stack system located at the crushing and screening section. The system will be expanded/upgraded in order to increase its capacity and efficiency.

Specialist service providers, RESONANT, is currently compiling a detailed feasibility design report for the upgrading of the system. The report will be completed as part of the Plan of Study for the EIA Phase of the project.

4.3.2.7 Southern Expansion of the HERNIC Tailings Storage Facility (TSF)

HERNIC has requested JMA Consulting to include an expansion of the TSF into the current EA Application Process. The current location and extent of the TSF is shown on Figure 4.3.2.7(a). All of HERNIC's tailings (underflow from the various process clarifiers – Furnaces, Primary CRP and OB Plant) from the Alloys site are currently disposed onto the TSF.

The southern expansion to the TSF is required to accommodate disposal of fine tailings from the new PGM Plant. The proposed expansion of the TSF footprint towards the south is shown in Figure 4.3.2.6(b). The TSF is designed to hold a total of 7.8 *mega tonnes* of tailings at a deposition rate of 26 000 *tonnes per month* for 25.5 *years*. All of HERNIC's tailings (underflow from the various process clarifiers) from the Alloys site are disposed onto the TSF.

The TSF has two compartments. Compartment 1 will contain 1 *mega tonnes* of tailings when the PGM Plant starts operation in February 2017 and there is also 1.4 *mega tonnes* of tailings in the Morula Open Cast Pit. The 2.4 *mega tonnes* of historic tails will be hydraulically mined and processed through the PGM Plant along with current arising tails.

The PGM Plant will process 55 000 *tonnes per month* of tails that will be made up of around (depending on current arising production) 22 000 *tonnes per month* of current arising tails from the OB Plant and 33 000 *tonnes per month* of historic tails. HERNIC will therefore process the 1 *mega tonnes* of tails in Compartment 1 of the TSF within 3 *years* where after HERNIC will process the 1.4 *mega tonnes* of tails in the open pit for another 3.5 *years* along with the monthly 22 000 *tonnes per month* current arising tails.

The PGM Plant will produce 12 000 *tonnes per month* of Chromite, a few *kilograms* of PGM and around 42 000 *tonnes per month* of tails for the first 6.5 *years* and thereafter around 5 000 *tonnes per month* of Chromite and 17 000 *tonnes per month* of tails.

HERNIC will be depositing 42 000 *tonnes per month* of tails into Compartment 2 for the first 3 *years* (while HERNIC removes 33 000 *tonnes per month* from Compartment 1) – therefore the net deposition rate is around 9 000 *tonnes per month*. HERNIC will then deposit 42 000 *tonnes per month* of tails into Compartment 1 for the next 3.5 years; and thereafter 17 000 *tonnes per month* of tails into either compartments for the remainder of its lifetime (270 *months* or 22 *years*).

The challenge will be to cope with the rate of rise for the first 3 *years* (into Compartment 2), and the next 3.5 *years* (into Compartment 1) from a TSF stability perspective. The solution is to build a support wall with either waste rock or slag and to compact it so that it interlocks and carries the tails. There will also be a layer of bidim placed between the tails and the rocky wall to prevent any seepage of tails through the rock. Alternatively, OB Plant coarse waste will also be suitable material for the wall. The wall will take up approximately 800 000 *tonnes* of the total capacity of the TSF which has already been included in the calculations above (28.5 *year* lifetime = 3+3.5+22 *years*).

The TSF was commissioned in 2012 and is currently operated and managed in terms of the following authorisations:

- An EMPR titled "The Mineral and Petroleum Resources Development Act 28 of 2002 section 102 Environmental Management Plan Amendment" ("the TSF EMPR")." A section 102 EMP Amendment to include the TSF on various portions of the farm De Kroon 444 JQ was prepared by ENVASS Environmental Assurance (Pty) Ltd and submitted to the DMR during 2012. The TSF EMPR was approved on the 3rd of November 2015;

- An EA granted in terms of section 24 of the NEMA read with the EIA Regulations 2006 authorising the TSF.

Feasibility and Design

Consulting Civil and Environmental Engineers, INPROCON, have been appointed to conduct a Detailed Feasibility Study and to compile a Preliminary Engineering Design Report for the expansion of the TSF. This report will be completed as part of the Plan of Study for the EIA Phase of the project.

Figure 4.3.2.7(a): Locality and Extent of the HERNIC Tailings Storage Facility (TSF)

Figure 4.3.2.7(b): Proposed Footprint Expansion of the HERNIC Tailings Storage Facility (TSF)

4.3.2.8 Re-use of Fine Slag at the Fine Slag Processing Plant

HERNIC generates a large volume of Slag during the Ferrochrome Smelting process.

Currently the coarse Slag, which comes directly from the Furnace Tap Floors, is stockpiled in two areas, namely the Historic Slag Stockpile (see Figure 4.2.6.13(a)) and the Current Arisings Slag Stockpiles (see Figure 4.2.6.13(b)), prior to being fed to the Primary CRP for further processing and ferrochrome recovery.

The Primary CRP conducts the first phase (primary) of chrome recovery from the coarse Slag, and the fine Slag resulting from this process, is then fed to the Fine Slag Processing Plant where the finer fraction of Slag is processed for further (secondary) recovery of ferrochrome. The remaining fine Slag from this process, referred to as Fine Slag is stockpiled in an area adjacent to the Fine Slag Processing Plant – see Figure 4.3.2.8(a).

Slag is described as an inert material in the approved HERNIC EMPR (2012) and was deemed to be fit for recovery and re-use. A current market exists for these materials to be used in the construction industry as aggregate and sand and which creates an economic opportunity to add value to the HERNIC resource.

Significant opportunity also exists for the re-use of the material on site at HERNIC, with the expansion of the TSF a good example of where the material could be used beneficially.

Feasibility and Motivation

JMA Consulting has been appointed to conduct a feasibility study to investigate the legal re-use of the Slag material, both for on-site, as well as for off-site purposes. The assessment will include a full geochemical classification (as per NEMWA requirements) of the Fine Slag and will also include an Impact Assessment to motivate its beneficial use. The outcome of this study will be completed as part of the Plan of Study for the EIA Phase of the project.

Figure 4.3.2.8(a): Stockpiles for Re-Use of Fine Slag at the Fine Slag Recovery Plant

4.3.2.9 Re-use of Coarse Slag at the Chrome Recovery Plant

HERNIC generates a large volume of Slag during the Ferrochrome Smelting process.

Currently the Coarse Slag (slag chips), which comes directly from the Furnace Tap Floors, is stockpiled in two areas, namely the Historic Slag Stockpile (see Figure 4.2.6.13(a)) and the Current Arisings Slag Stockpiles (see Figure 4.2.6.13(b)), prior to being fed to the Primary CRP for further processing and ferrochrome recovery.

The Primary CRP conducts the first phase (primary) of chrome recovery from the Coarse Slag, and the fine Slag resulting from this process, is then fed to the Fine Slag Processing Plant where the finer fraction of Slag is processed for further (secondary) recovery of ferrochrome. The remaining Coarse Slag from the Primary CRP process, is stockpiled in an area adjacent to the Primary CRP -see Figure 4.3.2.9(a).

Here the slag is sorted through a screening process into different fraction sizes, ready for re-use as aggregate for a wide variety of applications.

Slag is described as an inert material in the approved HERNIC EMPR (2012) and was deemed to be fit for recovery and re-use. A current market exists for these materials to be used in the construction industry as aggregate and which creates an economic opportunity to add value to the HERNIC resource.

Significant opportunity also exists for the re-use of the material on site at HERNIC, with the expansion of the TSF a good example of where the material could be used beneficially.

Feasibility and Motivation

JMA Consulting has been appointed to conduct a feasibility study to investigate the legal re-use of the Slag material, both for on-site, as well as for off-site purposes. The assessment will include a full geochemical classification (as per NEMWA requirements) of the Coarse Slag (slag chips) and will also include an Impact Assessment to motivate its beneficial use. The outcome of this study will be completed as part of the Plan of Study for the EIA Phase of the project.

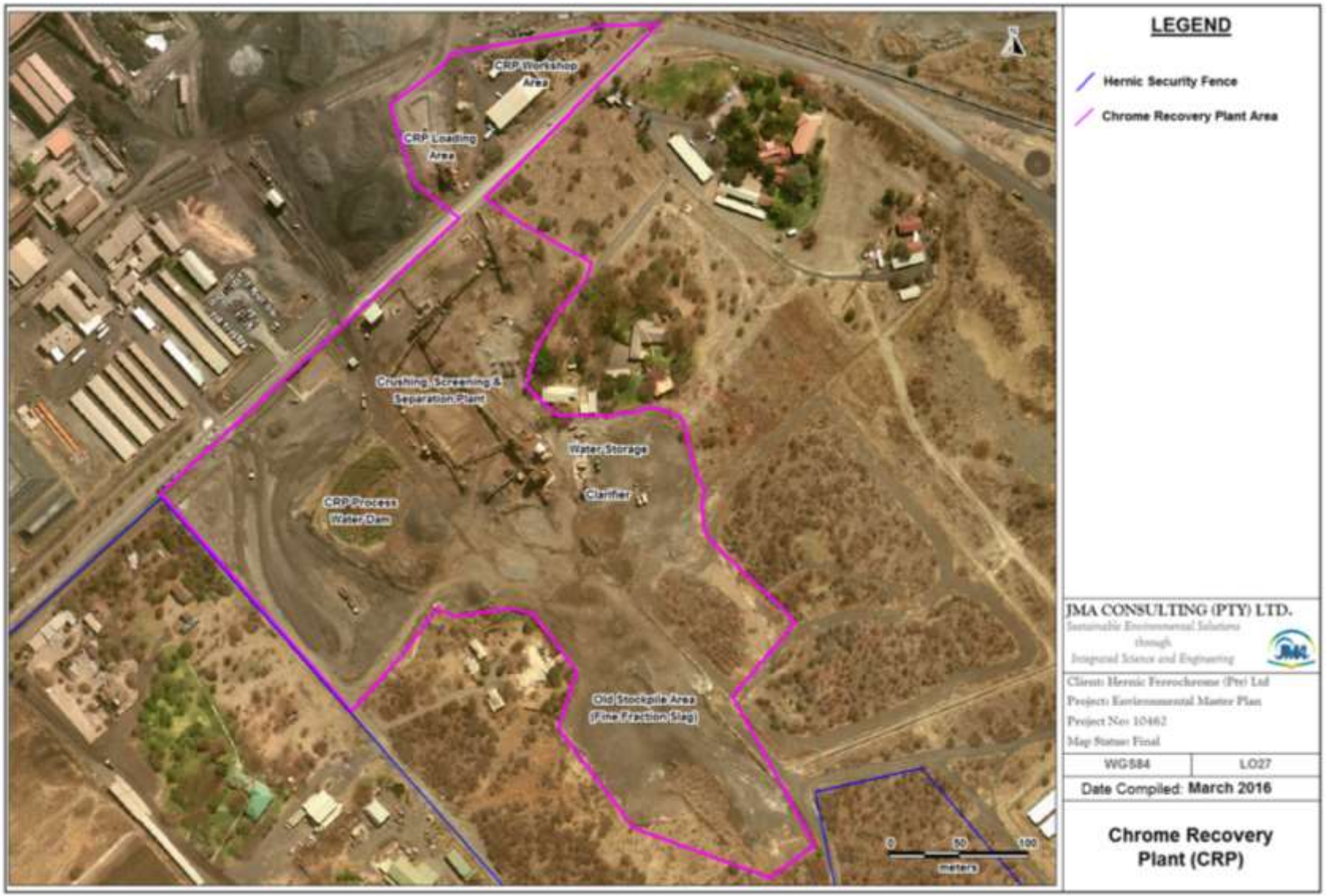

Figure 4.3.2.9(a): Stockpiles for Re-Use of Coarse Slag at the Chrome Recovery Plant

4.3.2.10 Re-use of Mine Waste Rock at the Mine Waste Rock Stockpile

HERNIC generates a large volume of Mine Waste Rock during the Mining Process.

Currently the Mine Waste Rock is stockpiled in a designated area at the Morula Shaft. The Mine Waste Rock was deemed an inert material and HERNIC has been authorized to manufacture sand from the Waste Rock. The re-use is facilitated through the crushing and screening of the mine waste rock into different fractions of aggregate within in the area designated for Mine Waste Rock Stockpiling – see Figure 4.3.2.10(a).

Being authorized to manufacture sand from the waste rock, the waste rock was deemed to be fit for recovery and re-use. A current market exists for aggregate materials manufactured from the waste rock to be used in the construction industry as aggregate and sand and which creates an economic opportunity to add value to the HERNIC resource.

Significant opportunity also exists for the re-use of the material on site at HERNIC, with the expansion of the TSF a good example of where the material could be used beneficially.

Feasibility and Motivation

JMA Consulting has been appointed to conduct a feasibility study to investigate the legal recovery and re-use of the Mine Waste Rock, both for on-site, as well as for off-site purposes. The assessment will include a full geochemical classification (as per NEMWA requirements) of both the aggregate and sand and will also include an Impact Assessment to motivate its beneficial use. The outcome of this study will be completed as part of the Plan of Study for the EIA Phase of the project.

Figure 4.3.2.10(a): Area Designated for Re-use of the Mine Waste Rock – Aggregate Production

5. POLICY AND LEGISLATIVE CONTEXT

All relevant Acts, Regulations, Formal Departmental Guidelines and Templates, as well as Formal Provincial and Municipal Regulatory Frameworks are considered routinely during the compilation of a Scoping Report. In addition, JMA formally requested a detailed Enviro-Legal Assessment by TABACKS (Enviro-Legal Lawyers) for the purposes of this project. The comprehensive report compiled in this regard is attached as **APPENDIX 5(A).**

HERNIC wishes to add/expand/upgrade activities to their current mining and smelting operations which will require EA and Amendment of the EMPR in terms of the provisions of the Mineral and Petroleum Resources Development Act (MPRDA), the National Environmental Management Act (NEMA), the National Environmental Management: Waste Act (NEMWA), the National Environmental Management Air Quality Act (NEMAQA), as well as the National Water Act (NWA).

An extract was made from the above mentioned Enviro-Legal Assessment Report in terms of the Amendment of the existing HERNIC EMPR and is relayed in the sections below.

With the commencement of the "*One Environmental System*" the NEMA regulates the approval, amendment and compliance assessment of HERNIC's Consolidated, Tailing Storage Facility (TSF) and Platinum Group Minerals (PGM) EMPRs. Any amendment to a HERNIC EMPR will have to be subjected to the amendment process prescribed in terms of the NEMA as well as section 102 of the MPRDA.

The provisions in the NEMA that are relevant to an approved EMPR and any amendment thereof are sections 24N(6) which states that the Minister responsible for mineral resources may at any time after he or she has approved an application for an EA approve an amended EMPR and the 2014 EIA Regulations. Section 24N(7) of the NEMA states that a holder must manage all environmental impacts in accordance with an approved EMPR and as an integral part of the mining operations. A holder must also monitor compliance with the requirements of the EMPR. Section 49A(c) of the NEMA states that failure to comply with an approved EMPR is an offence.

The 2014 EIA Regulations regulate procedures and criteria for the submission, processing, consideration and decision of applications for EA of activities and for matters pertaining thereto as well as the amendment of EMPRs. The transitional provisions in the NEMA are central to the identification of the appropriate procedure by which an EMPR should be amended.

Chapter 5 of the EIA Regulations 2014 concerns the amendment, suspension, withdrawal and auditing of compliance with an EA and an EMPR. In addition, regulation 54(2) of the transitional provisions in the 2014 EIA Regulations states as follows:

"An application submitted after the commencement of these Regulations for an amendment of an Environmental Management Programme, issued in terms of the Mineral and Petroleum Resources Development Act, 2002, must be dealt with in terms of Part 1 or Part 2 of Chapter 5 of these Regulations."

It follows that any amendments to the abovementioned HERNIC EMPRs must be dealt with in accordance with Part 1 or Part 2 of Chapter 5 of the EIA Regulations 2014. Part 1 in Chapter 5 concerns amendments to an EMPR where no scope change or a change of ownership occurs. Part 2 in Chapter 5 of the 2014 EIA Regulations concerns amendments where a change in scope occurs. While these regulations refer to an EA throughout, it is inferred that a reference to an EA should, for present purposes, be read as a reference to an EMPR.

In terms of regulation 31 of the 2014 EIA Regulations, a change in scope of an EMPR will occur in circumstances where such change will result in an increased level or nature of impact where such level or nature of impact was not (a) assessed and included in the initial application for an EMPR; or (b) taken into consideration in the initial EMPR and the change does not, on its own, constitute a listed or specified activity.

Following the Enviro-Legal Framework Assessment performed for HERNIC, an application to amend any approved EMPR held by HERNIC will be three fold.

- Firstly, the EMPR is deemed to be issued as a Waste Management Licence in terms of the NEMWA and therefore such an EMPR (as a WML) will have to be also be amended in accordance with section 54(1)(e) of the NEMWA.
- Secondly, by virtue of the transitional provisions in the 2014 EIA Regulations which state that an application submitted after the commencement of the 2014 EIA Regulations for an amendment of an EMPR issued in terms of the MPRDA, must be dealt with in terms of Part 1 or Part 2 of Chapter 5 of those Regulations.
- Thirdly, the MPRDA retains a section which continues to be applicable to EMPRs. Section 102 of the MPRDA states that an EMPR may not be amended or varied without the written consent of the Minister responsible for mineral resources.

After due consideration of the relevant Acts, Regulations, Formal Departmental Guidelines and Templates, Formal Provincial and Municipal Regulatory Frameworks and the Enviro-Legal Assessment Report (**APPENDIX 5(A)**), a Table was compiled to summarise the Policy and Legislative Context of the project which was considered in terms of the new activities that will be applied for, the amendment of the existing EMPR, variations to the existing licences and new licences that will be applied for (Table 5(a)).

The first column of this table references the Applicable Legislation and Guidelines used to determine the legislative background and context of the project and the second column gives a brief description of how, when and where is has been considered/applied during the scoping phase of the project.

Table 5(a): Policy and Legislative Context of the HERNIC project.

Applicable Legislation and Guidelines used to Compile the Report	Reference where Applied
Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996) Section 24 of the Constitution states that everyone has the right to an environment that is not harmful to their health or well-being; and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that - • *prevent pollution and ecological degradation;* • *promote conservation; and* • *secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.*	An EIA Process will be undertaken to identify the impacts associated with the HERNIC project. An associated Environmental Management Programme, which in this case will be updated and amended to incorporate existing and new activities, will address the overall environmental management of the site by including mitigation measures as well as monitoring plans that will ensure that the relevant environment is managed in a sustainable manner to support the rights as enshrined in the Constitution.
Mineral and Petroleum Resource Development Act, 2002 (Act No. 28 of 2002) The MPRDA is the central Act governing mining in South Africa and the preamble to the MPRDA affirms the State's obligation to protect the environment for the benefit of present and future generations, to ensure ecologically sustainable development of mineral and petroleum resources and to promote economic and social development. Section 5A(a) of the MPRDA, which commenced on the 7th of December 2014, states that no person may mine for and produce any mineral or commence with any work incidental thereto without an EA granted in terms of the NEMA, *inter alia* a mining right and giving the landowner or lawful occupier of the land in question at least 21 days written notice. An EA is defined in section 1 of the MPRDA to have the meaning ascribed to the term in the NEMA and the NEMA defines the term to mean an authorisation by a competent authority of a listed or specified activity in terms of the NEMA and includes a similar authorisation contemplated in a specific environmental management Act. Section 25(2)(e) of the MPRDA states that the holder of a mining right must *inter alia* comply with the requirements of its approved EMPR. In terms of section 12(4) of the National Environmental Management Amendment Act, any EMPR approved in terms of the MPRDA immediately before the commencement date of the provisions in the National Environmental Management Amendment Act (i.e. 1 May 2009) dealing with, *inter alia*, prospecting, mining and related activities, must be regarded as having been approved in terms of the NEMA as amended. The transitional provisions in the National Environmental Management Amendment Act, as set out above, presently provides for EMPRs approved in terms of the MPRDA to be approved as EMPRs (and not EAs) in terms of the NEMA. As a result, the substantive and procedural requirements of the NEMA find application to those EMPRs which have been approved in terms of the MPRDA.	With the commencement of the "*One Environmental System*" the NEMA regulates the approval, amendment and compliance assessment of HERNIC's Consolidated EMPR, as well as the Tailing Storage Facility (TSF) and Platinum Group Minerals (PGM) EMPRs. Any amendment to a HERNIC EMPR will have to be subjected to the amendment process prescribed in terms of the NEMA as well as section 102 of the MPRDA. Relevant guidelines and templates provided by DMR were used to compile a Scoping Report, Environmental Impact Assessment Report and an Environmental Management Programme Report.

Applicable Legislation and Guidelines used to Compile the Report	Reference where Applied
With regard to the management of mine residue and other waste types on mines, the following definitions have been retained in the MPRDA notwithstanding the transition of waste management at mines to the NEMWA: *"residue deposit" means any residue stockpile remaining at the termination, cancellation or expiry of a prospecting right, mining right, mining permit, exploration right, production right or and old order right; "residue stockpile" means any debris, discard, tailings, slimes, screening, slurry, waste rock, foundry sand, beneficiation plant waste, ash or any other product derived from or incidental to a mining operation and which is stockpiled, stored or accumulated for potential re-use, or which is disposed of, by the holder of a mining right, mining permit, production right or an old order right.* On 24 July 2015, GNR 633 introduced transitional provisions that seek to regulate the transition of waste management at mines from an EMPR approved in terms of the MPRDA to a WML in terms of the NEMWA. In this regard the transitional provisions state as follows:*"An environmental management programme or plan approved in terms of the Mineral and Petroleum Resources Development Act, 2002 shall be deemed to have been approved and issued in terms of the NEMWA. The Minister responsible for mineral resources may direct any holder of a prospecting right, mining permit, mining right, exploration right, or production right, if he or she is of the opinion that the residue stockpile or residue deposit in question is likely to result in significant pollution, degradation or damage to the environment, to take such action to upgrade the environmental management programme or plan to address any deficiency in the environmental management programme or plan. An environmental management programme or plan submitted in terms of the Mineral and Petroleum Resources Regulations, 2004 and which is pending when the Notice took effect, must despite the repeal of the Mineral and Petroleum Resources Regulations, 2004 be dispensed with in terms of the Mineral and Petroleum Resources Regulations, 2004 as if those regulations were not repealed."* Section 102 of the MPRDA states that an EMPR or an EA issued in terms of the NEMA as the case may be, may not be amended or varied (including by extension of the area covered by it or by the addition of minerals or a shares or seams, mineralised bodies or strata, which are not at the time the subject thereof) without the written consent of the Minister responsible for mineral resources. **MPRDA Regulations** ▪ *Mineral and Petroleum Resources Development Regulations – GNR 527 of 23 April 2004*	

Applicable Legislation and Guidelines used to Compile the Report	Reference where Applied
DMR Templates and Guidelines ➢ *DMR Templates for a Scoping Report, Environmental Impact Assessment and Environmental Management Programme Report and DMR Guidelines for the compilation of these reports.* ➢ *DMR Guidelines for Consultation with Communities and Interested and Affected Parties and to Determine the Quantum for Closure.*	
National Environmental Management Act, 1998 (Act No 107 of 1998) – NEMA Section 24 of the NEMA, headed "Environmental Authorisations" sets out the provisions which are to give effect to the general objectives of Integrated Environmental Management, and laid down in Chapter 5 of the NEMA. In terms of section 24(1), the potential impact on the environment of listed activities must be considered, investigated, assessed and reported on to the competent authority charged by the NEMA with granting of the relevant environmental authorisation. In terms of section 24F(1) of the NEMA no person may commence an activity listed or specified in terms of section 24(2)(a) or (b) unless the competent authority has granted an environmental authorisation for the activity. **NEMA Regulations** ▪ *EIA Regulations, 2014 – GNR 982 of 04 December 2014* ▪ *EIA Regulations: Listing Notice 1 of 2014 – GNR 983 of 04 December 2014* ▪ *EIA Regulations: Listing Notice 2 of 2014 – GNR 984 of 04 December 2014* ▪ *EIA Regulations: Listing Notice 3 of 2014 – GNR 985 of 04 December 2014* ▪ *Financial Provisioning Regulations – GNR 1147 of 20 November 2015* ▪ *National Exemption Regulations in terms of the National Environmental Management Act 1998 (Act No 107 of 1998) 2014 – GNR 994 of 08 December 2014* ▪ *National Appeal Regulations in terms of the National Environmental Management Act 1998 (Act No 107 of 1998) 2014 – GNR 993 of 08 December 2014* ▪ *Public Participation Guideline – GNR 807 of 10 October 2012* **DEA Guidelines** ➢ *Need and Desirability Guideline in terms of the Environmental Impact Assessment Regulations 2014*	The EIA Process will be undertaken in accordance with the principles of Section 2 of NEMA as well as with the EIA 2014 Regulations, promulgated in terms of NEMA. The Listing Notices have been reviewed against the project activities to determine the listed activities triggered. Based on the listed activities triggered, a Scoping and Environmental Impact Assessment and Reporting (S&EIR) Process will be followed for the HERNIC project. An Application for the listed activities will be submitted to the DMR who is the relevant Competent Authority in terms of this application for Environmental Authorisation. Costs/Financial Provisioning associated with the environmental management of all the life cycle phases of the project was considered following the Financial Provisioning regulations. The Exemption and Appeal regulations were considered during the outset of the project to determine the necessary processes to be followed and applications that need to be followed and also to familiarise the project team with the appeal process should that be required. The Public Participation Programme was designed following the Public Participation Regulations. The Need and Desirability of the Project was discussed following the guidelines provided by the DEA.

Applicable Legislation and Guidelines used to Compile the Report	Reference where Applied
National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) – NEMWA Since its commencement on 01 July 2009, the generation and management of waste have been governed in terms of the NEMWA. In terms of section 4 of the NEMWA, certain waste streams including, amongst others, residue stockpiles and residue deposits as defined in terms of the MPRDA, were excluded from the ambit of the NEMWA. As such, mining companies continued with the generation, storage, recovery and disposal of its mine residue in terms of the MPRDA. As from the 2nd of September 2014 the statutory dispensation regarding environmental management on mines, including waste management, changed with the implementation of the *"One Environmental System".* The Waste Amendment Act introduces a new waste classification regime in terms whereof types of waste are no longer defined in the definitions section of the NEMWA, but listed and described in a Schedule to the Act as either hazardous or general waste. Residue stockpiles and residue deposits together with wastes from mineral excavation, wastes from physical and chemical processing of metalliferous minerals, wastes from physical and chemical processing of non-metalliferous minerals and wastes from drilling muds and other drilling operations are all listed in Category A of the Schedule and therefore classified as hazardous wastes. Whereas the management of residue stockpiles and residue deposits have been undertaken in accordance with commitments in an approved EMPR under the MPRDA, as from 2 September 2014 (implemented by Government as from 8 December 2014) management of these types of waste must be undertaken in accordance with the provisions in the NEMWA. The Environmental Laws Amendment Act states the Minister of Mineral Resources is the competent authority to give effect to the provisions of the NEMWA. Furthermore, the Minister of Mineral Resources is the licensing authority where the waste management activity is or is directly related to prospecting, extraction and primary processing of a mineral or residue deposits and residue stockpiles from prospecting and mining. In order for the NEMWA to find application to the management and disposal of a waste stream, the waste stream under consideration must qualify as "waste" as defined. In terms of the NEMWA *"waste"* is defined as follows: *a. any substance, material or object, that is unwanted, rejected, abandoned, discarded or disposed of, or that is intended or required to be discarded or disposed of, by the holder of that substance, material or object, whether or not such substance, material or object can be re-used, recycled or recovered and includes all wastes as defined in Schedule 3 to this Act; or*	The Act, Regulations and Guidelines were all considered when identifying and classifying the listed waste activities associated with the project and subsequently the type of EIA Process to be followed. Additionally, they were consulted to support the application process for the waste licences associated with the project and to identify and propose appropriate waste management objectives and measures.

Applicable Legislation and Guidelines used to Compile the Report	Reference where Applied
b. any other substance, material or object that is not included in Schedule 3 that may be defined as a waste by the Minister by notice in the Gazette, but any waste or portion of waste, referred to in paragraphs (a) and (b), ceases to be a waste- *i. once an application for its re-use, recycling or recovery has been approved or, after such approval, once it is, or has been re-used, recycled or recovered;* *ii. where approval is not required, once a waste is, or has been re-used, recycled or recovered;* *iii. where the Minister has, in terms of section 74, exempted any waste or a portion of waste generated by a particular process from the definition of waste; or* *iv. where the Minister has, in the prescribed manner, excluded any waste stream or a portion of a waste stream from the definition of waste."* Schedule 3 as referred to in the definition of waste provides for categories of hazardous waste (as defined) in Category A to the Schedule which includes, amongst others, residue stockpiles and residue deposits together with wastes from mineral excavation, wastes from physical and chemical processing of metalliferous minerals, wastes from physical and chemical processing of non-metalliferous minerals and wastes from drilling muds and other drilling operations. In this regard, Schedule 3 provides for, amongst others, the following definitions: *"residue stockpiles" means any debris, discard, tailings, slimes, screening, slurry, waste rock, foundry sand, mineral processing plant waste, ash or any other product derived from or incidental to a mining operation and which is stockpiled, stored or accumulated within the mining area for potential re-use, or which is disposed of, by the holder of a mining right, mining permit or, production right or an old order right, including historic mines and dumps created before the implementation of this Act" and "residue deposits" means any residue stockpile remaining at the termination, cancellation or expiry of a prospecting right, mining right, mining permit, exploration right or production right."* The inclusion of residue stockpiles and residue deposits into Category A of Schedule 3 results in such types of waste prima facie being classified as hazardous. Accordingly, in respect of waste types or residue stockpiles which have been considered to be inert or general waste, Hernic will have to consider re-classifying the particular waste type or residue stockpile following the classification process prescribed in terms of the Regulations published in terms of the NEMWA to less hazardous or general types of waste. Following the re-classification, Hernic may consider applying for exemption as contemplated in sub-paragraph (iii) of the definition of waste. Alternatively, once the Regulations to Exclude a Waste Stream or a Portion of a Waste Stream from the Definition of Waste have been promulgated, Hernic may consider applying to the Minister of Mineral Resources to exclude its existing residue stockpiles from the definition of waste.	

Applicable Legislation and Guidelines used to Compile the Report	Reference where Applied
The aforesaid Regulations are still in draft form and were published for public comment on 14 November 2014. According to regulation 4 of the draft Regulations the general approach will be that any portion of a waste generated from a source listed in Category A of Schedule 3 of the NEMWA may be excluded from being defined as hazardous on demonstration that such portion of waste is non-hazardous in accordance with the Waste Management and Classification Regulations. Furthermore, any waste or portion of a waste generated from a source listed in Schedule 3 of the Act may be excluded from the definition of waste where such waste will be used in a manner that will not have a significant adverse impact on the environment. **NEMWA Regulations** ▪ *List Of Waste Management Activities That Have, Or Are Likely To Have, A Detrimental Effect On The Environment – GNR 921 of 29 November 2013* ▪ *National Environmental Management: Waste Act (59/2008): Regulations Regarding The Planning And Management Of Residue Stockpiles And Residue Deposits – GNR 632 of 24 July 2015* ▪ *Amendments To The List Of Waste Management Activities That Have, Or Are Likely To Have, A Detrimental Effect On The Environment – GNR 633 of 24 July 2015* ▪ *Waste Classification And Management Regulations – GNR 634 Of 23 August 2013* ▪ *National Norms And Standards For The Assessment Of Waste For Landfill Disposal – GNR 635 of 23 August 2013* ▪ *National Norms And Standards For Disposal Of Waste To Landfill – GNR 636 of 23 August 2013* ▪ *Norms and Standards for Storage of Waste –GNR 926 of 29 November 2013* ▪ *Standards for Extraction, Flaring or Recovery of Landfill Gas - GNR 924 of 29 November 2013* ▪ *Standards for Scrapping or Recovery of Motor Vehicles - GNR 925 of 29 November 2013* **DEA Guidelines** ➢ *The Waste Licensing Application Process In Terms Of The National Environmental Management: Waste Act 2008 (No. 59 Of 2008).* ➢ *Framework for the Management of Contaminated Land of May 2010* **SANS Guideline** ➢ *South African National Standard, SANS 10234:2008, Edition 1.1, Globally Harmonized System of Classification and Labelling of Chemicals (GHS), SABS Standards Division*	

Applicable Legislation and Guidelines used to Compile the Report	Reference where Applied
Local Authority Regulatory Framework: Madibeng Local Municipality ➢ *Madibeng Local Municipality Waste Management By-Law 1 of 2008 published in LAN 23 of 06 February 2009*	
National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) – NEMAQA Section 21 read with section 22 of the NEMAQA states that that the Minister responsible for Environmental Affairs may publish a list of activities which result in atmospheric emissions and which the Minister reasonably believes has or may have a significant detrimental effect on the environment. Section 22 of the NEMAQA states that no person may without a provisional atmospheric emission licence or an atmospheric emission licence conduct an activity listed on a national or provincial list published in terms of the Act. The National Ambient Air Quality Standards were published on 24 December 2009 and provide *inter alia* for national ambient air quality standards for PM10. In addition to the above, the National Ambient Air Quality Standards for PM2.5 came into effect on 29 June 2012. While the NEMAQA does not require industry or mining companies to comply with the standards as published, Provincial and Local Authorities have the authority to ensure compliance with the standards. Section 19 and 20 of the NEMAQA provides for the management of priority areas. The national air quality officer, after consulting with the provincial and local air quality officer, must prepare an air quality management plan ("AQMP") in respect of a priority area. The AQMP must be submitted to the Minister for approval within 6 months after the declaration of the area as a priority area. Prior to approval of an AQMP the Minister must follow a consultative process as prescribed in section 56 and 57 of the NEMAQA. The Minister may prescribe regulations necessary for implementing and enforcing approved AQMPs, including: • *funding arrangements;* • *measures to facilitate compliance with such plans;* • *penalties for any contravention of or any failure to comply with such plans; and* • *regular review of such plans* The Minister of Environmental Affairs declared the Waterberg Bojanala National Priority Area in terms of section 18 of the NEMAQA.	An Air Quality Assessment was undertaken to determine the baseline conditions. An AEL was issued to HERNIC on the 2nd of September 2015. The project activities will be set out to abide by the NEMAQA, AEL and the National Ambient Air Quality Standards. The required measures will be included in the EMP and a variation will be applied for in terms of the AEL if deemed necessary.

Applicable Legislation and Guidelines used to Compile the Report	Reference where Applied
In terms of the notice, the ambient air quality within the Waterberg District Municipality in the Limpopo Province may exceed the national ambient air quality standards in the near future; and that a trans-boundary situation exists between the Waterberg District Municipality and the Bojanala Platinum District Municipality in the North West Province which may cause a significant negative impact on air quality in both areas. The area therefore requires specific national air quality management action to ensure that air pollution levels remain within the national ambient air quality standards. The areas affected include the Madibeng Local Municipality in the North West Province. **NEMAQA Regulations** ▪ *National Dust Control Regulations – GNR 827 of 01 November 2013* ▪ *National Ambient Air Quality Standards – GNR 1210 of 24 December 2009* ▪ *National Ambient Air Quality Standard for particulate matter with aerodynamic diameter less than 2.5 micron metres (PM 2.5) – GNR 486 of 29 June 2012* ▪ *Regulations Regarding Air Dispersion Modelling – GNR 533 of 11 July 2014* ▪ *Regulations Prescribing the Format of the Atmospheric Impact Report – GNR 747 of 11 October 2013* ▪ *Declaration of the Waterberg National Priority Area – GNR 495 of 15 June 2012. See also Correction Notice: Waterberg-Bojanala National Priority Area – GNR 154 in Government Gazette No. 36207 dated 8 March 2013* **Local Authority Regulatory Framework: Madibeng Local Municipality** ➢ *Air Quality Management By-Law published in LAN 95 in the North West Provincial Gazette 7308 of 04 July 2014* **Local Authority Regulatory Framework: Bojanala District Municipality** ➢ *Air Quality Management By-Law published in LAN 230 of 15 November 2013*	
National Water Act, 1998 (Act No. 36 of 1998) – NWA The purpose of the NWA, as set out in section 2 thereof, is to ensure that the country's water resources are protected, used, developed, conserved, managed and controlled, in a way which, *inter alia*, takes into account the reduction and prevention of pollution and degradation of water resources.	The Act and Regulations as well as the issued Water Use Licence (18 December 2015) were consulted during the onset of the project to ensure that all water uses associated with the project were addressed. DWS Guidelines were used when compiling management

Applicable Legislation and Guidelines used to Compile the Report	Reference where Applied
The NWA states, in section 3 thereof, that the National Government is the public trustee of the Nation's water resources. The National Government must ensure that water is protected, used, developed, conserved, managed and controlled in a sustainable and equitable manner for the benefit of all persons and in accordance with its constitutional mandate. **NWA Regulations** ▪ *General Authorisations - GNR 398 and 399 of 26 March 2004* ▪ *Replacement Of General Authorisation In Terms Of Section 39 Of The National Water Act, 1998 (Act No. 36 Of 1998) – GN 1199of 18 December 2009* ▪ *Regulations requiring that a water use be registered – GNR 1352 of 12 November 1999* ▪ *Regulations on use of water for mining and related activities aimed at the protection of water resources – GNR 704 of 4 June 1999* **DWS Guidelines** ➢ *Water Conservation and Water Demand Management Guideline for the Mining Sector in South Africa; DWA, 2011.* ➢ *Guidelines for the Utilization and Disposal of Wastewater Sludge – Volume 1: Selection of Management Options; 2006.* ➢ *Guidelines for the Utilization and Disposal of Wastewater Sludge – Volume 2: Requirements for the Agricultural Use of Sludge; 2006.* ➢ *Guidelines for the Utilization and Disposal of Wastewater Sludge – Volume 3: Requirements for the On-site and Off-site Disposal of Sludge; 2006.* ➢ *Guidelines for the Utilization and Disposal of Wastewater Sludge – Volume 4: Requirements for the Beneficial Use of Sludge; 2006.* ➢ *Guidelines for the Utilization and Disposal of Wastewater Sludge – Volume 5: Requirements for Thermal Sludge Management Practices and for Commercial Products Containing Sludge; 2006.* ➢ *DWAF, Second Edition, 1998. Waste Management Series. Minimum Requirements for the Handling, Classification and Disposal of Hazardous Waste.* ➢ *DWAF, Second Edition, 1998. Waste Management Series. Minimum Requirements for Waste Disposal by Landfill.* ➢ *DWAF, Second Edition, 1998. Waste Management Series. Minimum Requirements for Water Monitoring at Waste Management Facilities.* ➢ *External Guideline: Generic Water Use Authorisation Application Process, 2007* ➢ *Internal Guideline: Generic Water Use Authorisation Application Process, 2007*	objectives and measures for the water management of the HERNIC site.

Applicable Legislation and Guidelines used to Compile the Report	Reference where Applied
➢ *Internal Guideline: Section 21(a) and (b) Water Use Authorisation Application Process (taking and/or storing water)* ➢ *Internal Guideline: Section 21(c) and (i) Water Use Authorisation Application Process (impeding or diverting the flow of water in a watercourse and /or altering the bed, banks, course or characteristics of a watercourse)* ➢ *Internal Guideline: Section 21(e), (f), (g), (h) and (j) Water Use Authorisation Application Process (waste discharge related)* ➢ *Operational Guideline: Integrated Water and Waste Management Plan, 2010* ➢ *Best Practice Guideline A1 – Small-Scale Mining (Standard format); 2006* ➢ *Best Practice Guideline A1.1 – Small-Scale Mining (User Format); 2006* ➢ *Best Practice Guideline A2 – Water Management for Mine Residue Deposits; 2008* ➢ *Best Practice Guideline A3 – Water Management in Hydrometallurgical Plants; 2007* ➢ *Best Practice Guideline A4 – Pollution Control Dams; 2007* ➢ *Best Practice Guideline A5 – Water Management for Surface Mines; 2008* ➢ *Best Practice Guideline A6 – Water Management for Underground Mines; 2008* ➢ *Best Practice Guideline G1 – Storm Water Management; 2006* ➢ *Best Practice Guideline G2 – Water and Salt Balances; 2006* ➢ *Best Practice Guideline G3 – Water Monitoring Systems; 2007* ➢ *Best Practice Guideline G4 – Impact Prediction; 2008* ➢ *Best Practice Guideline G5 – Water Management Aspects for Mine Closure; 2008* ➢ *Best Practice Guideline H1 – Integrated Mine Water Management; 2008* ➢ *Best Practice Guideline H2 – Pollution Prevention and Minimization of Impacts; 2008* ➢ *Best Practice Guideline H3 – Water Reuse and Reclamation; 2006* ➢ *Best Practice Guideline H4 – Water Treatment; 2007*	
Water Services Act, 1997 (Act No. 108 of 1997) – WSA The main objects of the WSA are to, *inter alia*, provide for the right of access to basic water supply and the right to basic sanitation necessary to secure sufficient water and an environment not harmful to human health or wellbeing. Section 7 pertains to the industrial use of water and section 7(1) states that subject to subsection (3), no person may obtain water for industrial use from any source other than the distribution system of a water services provider nominated by the water services authority having jurisdiction in the area in question, without the approval of that water services authority.	The Act as well as the issued Water Use Licence (18 December 2015) were consulted during the onset of the project to ensure that all water uses associated with the project was addressed and accounted for.

Applicable Legislation and Guidelines used to Compile the Report	Reference where Applied
Subsection (2) states that subject to subsection (3), no person may dispose of industrial effluent in any manner other than that approved by the water services provider nominated by the water services authority having jurisdiction in the area in question. Subsection (4) states that no approval given by a water services authority under this section relieves anyone from complying with any other law relating to the use and conservation of water and water resources or the disposal of effluent. Section 22(1) of the WSA provides that no person may operate as a water services provider without the approval of the water services authority having jurisdiction in the area in question. In this regard a "water services provider" is defined in section 1 of the WSA and means "any person who provides water services to consumers or to another water services institution, but does not include a water services intermediary."	
National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) – NEMBA The purpose of the NEMBA is to provide for the management and conservation of South Africa's biodiversity within the framework of the NEMA so as to protect species and ecosystems that warrant national protection. The NEMBA gives effect to ratified international agreements affecting biodiversity to which South Africa is a party, and which bind the Republic. The NEMBA must be read together with the NEMA and in particular, must be guided by the principles set out in Section 2 of the NEMA, as set out above. It is important to note that the NEMBA will find applicability throughout the lifetime of a project, from the commencement of operations to the decommissioning. The NEMBA provides for the publishing of various lists of species and ecosystems by the Minister of Environmental Affairs as well as by the Member of an Executive Council ("MEC") responsible for the conservation of biodiversity of a province in relation to which certain activities may not be undertaken without a permit. In terms of Section 57 of the NEMBA, no person may carry out any restricted activity involving any species which has been identified by the Minister as "critically endangered species", "endangered species", "vulnerable species" or "protected species" without a permit. The NEMBA defines "restricted activity" in relation to such identified species so as to include, but not limited to, hunting, catching, capturing, killing, gathering, collecting, plucking, picking parts of, cutting, chopping off, uprooting, damaging, destroying, having in possession, exercising physical control over, moving or translocating.	The Act and the Regulations were consulted as part of the Ecological Baseline studies conducted at the onset of the project. Ecological baseline studies included a Floral Assessment, Faunal Assessment, Wetlands Assessment and an Aquatic Ecosystem Assessment. These Assessments were undertaken to determine the current status of the environment and to determine any potential ecological sensitivity to be avoided and mitigated. In addition, this legislation were consulted in order to determine if any permits, authorisations, licences and/or consents needed to be obtained in order to commence/continue with the project and relevant activities.

Applicable Legislation and Guidelines used to Compile the Report	Reference where Applied
NEMBA Regulations ▪ *Threatened and Protected Species Regulations, 2007 – GNR 152 of 23 February 2007* ▪ *Publication of National List of Invasive Species – GNR 507of 19 July 2013* ▪ *Publication of Prohibited Alien Species – GNR 508 of 19 July 2013* ▪ *Alien and Invasive Species Regulations, 2014 – GNR 598 of 01 August 2014* ▪ *Alien and Invasive Species Lists, 2014 – GNR 599 of 01 August 2014.* ▪ *Publication of lists of critically endangered, endangered, vulnerable and protected species - GNR 151 of 23 February 2007* ▪ *National List of Ecosystems that are Threatened and in need of Protection – GNR 1002 of 09 December 2011* **Provincial Regulatory Framework** ➢ *The Transvaal Nature Conservation Ordinance, 12 of 1983*	
Conservation of Agricultural Resources Act 43 of 1983 (CARA) The purpose of the Conservation of Agricultural Resources Act ("**CARA**") is to provide for the control over the utilisation of the natural agricultural resources of the Republic so as to promote the conservation of the soil, the water sources and the vegetation and the combating of weeds and invader plants. Biological control reserve is defined in GNR1048 as "*an area designated by the executive officer in terms of regulation 15D of the regulations for the breeding of biological control agents*". **CARA Regulations** ▪ *Regulations – GNR 1048 of 25 May 1984* ▪ *Weed Control Scheme - Establishment – GNR 1044 of 25 May 1984*	This Act and Regulations were consulted at the onset of the project when conducting baseline assessments to determine the current status of the environment and to determine any potential ecological sensitivity to be avoided and mitigated.
National Forests Act 84 of 1998 (NFA) In terms of section 15(3) of the National Forests Act ("NFA") four lists of protected trees belonging to a particular species under section 12(1)(d) of the Act have been published with the most recent list published on 13 September 2013.	The Act and Regulations were consulted at the onset of the project to determine if any protected trees are present before commencing with the clearing of areas associated with the Project; otherwise a licence will be required as provided for in the NFA.

Applicable Legislation and Guidelines used to Compile the Report	Reference where Applied
The effect of declaring these trees as protected is that in terms of section 15(1) of the NFA no person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree or forest product derived from a protected tree, except under a licence granted by the Minister to an applicant and subject to such period and conditions as may be stipulated. **NFA Regulations** ▪ *Notice of declaration of particular groups of trees "Champion Trees" under the National Forests Act, 1998 (Act No. 84 of 1998), as amended – GNR 677 of 13 September 2013*	
National Heritage Resources Act, 1999 (Act No. 25 of 1999) – NHRA The NHRA aims to, inter alia, promote good management of the national estate, and to enable and encourage communities to nurture and conserve their legacy so it may be bequeathed to future generations. The preamble to the NHRA states that our heritage is unique and precious and it cannot be renewed. The national estate means the "national estate" defined in section 3 of the NHRA. This section states that those heritage resources of South Africa which are of cultural significance or other special value for the present community and for future generations must be considered as part of the national estate and fall within the sphere of operations of heritage resources authorities. Section 3 (3) read with section 2 provides that cultural significance, for purposes of the NHRA, means aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance. Section 34 of the NHRA provides for a mechanism for protecting immovable property by providing for an outright prohibition on altering or demolishing any structure or part of any structure, which is older than 60 years, without a permit issued by the relevant provincial heritage resources authority. If a permit is refused, consideration must be given to designating the place concerned as a heritage site, or protected area or heritage area within three months of such refusal. An important provision in the NHRA is section 38 of the Act which states that any person who intends to undertake developments categorised in the section must at the very earliest stages of initiating such development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.	A Phase I Heritage Impact Assessment (HIA) study was done according to Section 38 of the National Heritage Resources Act (No 25 of 1999). The aims with the Phase I HIA study were to establish whether any of the types and ranges of heritage resources as outlined in Section 3 of the National Heritage Resources Act (No 25 of 1999) do occur in the Project Area and, if so, to determine the nature and the extent of these remains. In addition, to establish whether any of the types and ranges of heritage resources which have been identified in the Project Area will be affected by Hernic's operations and, if so, to establish appropriate mitigation and management measures for these heritage resources.

Applicable Legislation and Guidelines used to Compile the Report	Reference where Applied
Environment Conservation Act (Act No. 73 of 1989) - ECA In terms of section 21 of the ECA, the Minister may identify activities that may have a substantial detrimental effect on the environment, whether in general or in respect of certain areas. Such activities were identified during 1997. Section 22 of the ECA *inter alia* states that no person shall undertake an activity identified in terms of section 21(1) of the Act, or cause such an activity to be undertaken except by virtue of a written authorisation issued by the relevant government authority. The erstwhile Minister of Environmental Affairs and Tourism identified the activities which may have a substantial detrimental effect on the environment in terms of section 21 of the ECA and which accordingly required authorisation by government prior to the undertaking of the identified activities. These activities and the prescribed authorisation process were identified in regulations promulgated in terms of the Act and were referred to as the "listed activities" and the "EIA Regulations" respectively. The listed activities included, amongst others, item 8 which provided for the disposal of waste in terms of section 20 of the ECA, excluding domestic waste, but including the establishment, expansion, upgrading or closure of facilities for all wastes, ashes and building rubble. If any one or more of the listed activities were undertaken during the course of a project at any time after 8 September 1997 (note that certain activities commenced on later dates such as item 8 which commenced on 2 March 1998 as indicated in Schedule 2 of GNR 1182), without an EA, an offence was committed which rendered the proponent of the activity liable to a fine and imprisonment in terms of section 29(4) of the ECA. The provisions in the regulations containing the listed activities and the EIA Regulations have all, with the exception of section 22 in the ECA read with section 29(4), been repealed, with the commencement of the listed activities in terms of the NEMA in 2006. Having regard to the listed activities in the ECA, it must be emphasised that the Government Notice in which the listed activities were published indicated that: "…this Notice is not applicable to an activity that was commenced with before the date of commencement fixed in respect of that activity as indicated in the said Schedule". At the time, the pre-amble to these listed activities expressly stated that the listed activities do not find retrospective application and accordingly, had construction commenced prior to the commencement of these activities and should a listed activity apply no obligation arose to obtain a Record of Decision ("RoD"). As was mentioned above, Hernic operations were commissioned during 1996 and therefore construction of the initial plant infrastructure commenced prior to 1997.	The ECA was consulted as this Act still has a Regulation relevant to the project to be undertaken, i.e. Noise Regulations. These Regulations were consulted as part of the Noise baseline study and will be applied during the impact assessment as well as when appropriate management objectives and measures will be proposed during the compilation of the EMP.

Applicable Legislation and Guidelines used to Compile the Report	Reference where Applied
In any event, at the time, neither the national department concerned with environmental affairs nor the relevant provincial environmental departments enforced the listed activities in GNR 1182 to the mining sector. **ECA Regulations** ▪ *Noise control regulations in terms of section 25 of the Environment Conservation Act, 1989 – GNR 154 of January 1992* **ECA Guidelines** ➢ *SANS 10103:2008. 'The measurement and rating of environmental noise with respect to annoyance and to speech communication'.* ➢ *SANS 10210:2004. 'Calculating and predicting road traffic noise'.* ➢ *SANS 10328:2008. 'Methods for environmental noise impact assessments'.* ➢ *SANS 10357:2004. 'The calculation of sound propagation by the Concave method'.* ➢ *The World Health Organization's (WHO) document on the Guidelines for Community Noise is the outcome of the WHO- expert task force meeting held in London, United Kingdom, in April 1999*	
National Land Transport Act (Act No 5 of 2009) – NLTA The purpose of this Act is to further the process of transformation and restructuring the national land transport system initiated by the Transition Act, to give effect to national policy; 45, to prescribe national principles, requirements, guidelines, frameworks and national norms and standards that must be applied uniformly in the provinces and other matters contemplated in section 146 (2) of the Constitution; and finally to consolidate land transport functions and locate them in the appropriate sphere of government. **Transport Guidelines** ➢ *Committee of Transport Officials (COTO), September 2012, TMH 17, Volume 1, "South African Trip Data Manual"* ➢ *Transportation Research Board. "Highway Capacity Manual, 2010"* ➢ *COTO, December 2011, TMH 26, "South African Road Classification and Access Management Manual"*	This Act and Guidelines relevant to this Act were consulted during the Roads and Traffic Assessment. It was used as reference when determining the impact of the project on the relevant roads and traffic as well as when proposing management objectives and measures during the compilation of the EMP.

Applicable Legislation and Guidelines used to Compile the Report	Reference where Applied
Existing Environmental Authorisations • *Environmental Management Programme Report for the Maroelabult Mining Operation and Ferrochrome Plant (PWV 6/2/2/549) – 23 October 1995* • *Environmental Management Report for extension of the existing Hernic Ferrochrome Operations – 28 July 1998* • *Amendment to the Environmental Management Report: Disposal of Fine and Coarse Waste (RDNW (KL) 6/2/2/518) – 08 March 2001* • *Authorisation for the Fourth Ferrochrome Closed Furnace (EIA 225/2003NW) for HERNIC Ferrochrome (Pty) Ltd – 23 February 2004* • *Amendment to the Approved Environmental Management Programme in terms of Section 39(1) of the Minerals Act (Act 50 of 1991) for Hernic Ferrochrome (Pty) Ltd Fourth Furnace on Portion 103 of the Farm De Kroon 444 JQ in the Magisterial District of Brits (RDNW (KL) 6/2/2/2515) – 01 April 2004* • *Rectification of the Unlawful Commencement of a Listed Activity (REC 386): Scheduled Processes listed in the second schedule to the Atmospheric Pollution Prevention Act, 1965 (Act No. 45 of 1965) as contemplated in Section 24G of the National Environmental Management Act, 1998 as amended (Act No. 107 of 1998). The Development entails existing Ferrochrome Smelter (Furnace 1, 2 and 3), Pelletizing and Sintering plant, Hazardous chemical storage area and sewage work– 10 November 2006* • *Authorisation for the Construction of a Railway Siding between the Hernic Ferrochrome Plant and Pendora Station on Spoornet's Rosslyn Line on Portion 51 Uitkoms 443 JQ, RE of Portion 80 of the Farm Elandsfontein 440 JQ, Portions 51, 52, 231 and RE 1 of the De Kroon 444 JQ, Madibeng Local Municipality, North West Province (EIA 268 /2005NW) – 23 June 2006* • *Environmental Impact Assessment and Environmental Management Programme for a Railway Siding in terms of section 22 of the Environment Conservation Act 73 of 1989 (ECA) – 23 June 2006* • *Environmental Authorisation for the Hernic Electricity Generation on Remainder of Portion 103 of the Farm De Kroon 444 JQ, Activity Number 1(a)(i), 1(e), and 1(l) in Government Notice R387, Madibeng Local Municipality, North West Province (NWP/EIA/02/2008) – 04 May 2009* • *Environmental Authorisation for the Enclosing of HERNIC Ferrochrome's Existing Open Furnaces (NWP/EIA/262/2008) in terms of section 24(2) of the National Environmental Management Act, 1998 as amended (Act No. 107 of 1998) in respect of GNR 386 of 21 April 2006 – 13 August 2009*	All the Existing Environmental Authorisations obtained by HERNIC was consulted at the onset of the project when a complete site inventory list was compiled. In addition, the authorisations were also consulted to determine if all the current activities on site were authorised and the details pertaining to these authorisations.

Applicable Legislation and Guidelines used to Compile the Report	Reference where Applied
• *Environmental Authorisation for the Construction of HERNIC Tailing Storage Facility (NWP/EIA/46/2010 in terms of Section 24(2) of the National Environmental Management Act (Act No. 107 of 1998) in respect of GNR 386 of 21 April 2006 – 11 August 2011* • *Mining Right in terms of Section 22(1) of the Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002): Portions 51, 52, 122, 121, 123, 132 (Being Portion 267), 115, 160, 159, 161, 157, 50, 49, 120, 119, 47, Half Share of the Remaining Portion of Portion 48, Portions 199 (Portion 297 of Portion 48), 168, 167, 166, 165 (Portions of Portion 47) all of the Farm De Kroon 444 JQ; situated in the Magisterial District of Brits (NW30/5/1/2/2/308MR J2006/06/09/001) – 25 June 2012* • *Approval of Environmental Management Programme in terms of Section 39(6) of the Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002): for Hernic Ferrochrome (Pty) Ltd in respect of portions 52, 51, 122, 121, 123, 132, 115, 160, 159, 161, 157, 50, 49, 120, 119, 47, half share of remainder of Portion 48, Portions 119, 168, 167, 166, 165 (Portion of Portion 47) of the Farm De Kroon 444 JQ, situated in the Magisterial District of Brits, North West Region (NW 30/5/1/2/3/2/1/308 EM) - 26 June 2012* • *Converted Mining Right in terms of Item 7 of Schedule II of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (NW30/5/1/2/2/396MR J2008/03/28/001) – 31 July 2012* • *Amendment of an Environmental Authorisation for the Hernic Electricity Generation on remainder of Portion 103 of the Farm De Kroon 444 JQ, Activities Number 1(a)(i), 1(e) and 1(l) in Government Notice Number R 387, Madibeng Local Municipality, North West Province (NWP/EIA/02/2008) – 18 October 2012* • *Amendment/Variation of a Mining Right (NW30/5/1/2/2/308MR) granted in terms of section 102 of the Mineral and Petroleum Resources Development Act 2002 (Act No. 28 of 2002) – 24 May 2013* • *Amendment/Variation of a Mining Right (NW30/5/1/2/2/396MR) granted in terms of section 102 of the Mineral and Petroleum Resources Development Act 2002 (Act No. 28 of 2002) – 24 May 2013* • *Approval of the Amended Environmental Impact Assessment (EIA) and Environmental Management Programme (EMPr) Reports in terms of Section 102 of the Mineral and Petroleum Resources Development Act, (Act 28 of 2002) which are now regarded as an Environmental Authorisations issued in terms of Regulation 25(1) of the National Environmental Management Act, 1998 (Act 107 of 1998): Environmental Impact Assessment Regulations 2014, Regarding the Inclusion of additional Minerals which are Platinum, Ruthenium, Rhodium, Palladium, Osmium, Iridium, Gold Ore, Silver Ore, Nickel Ore, Copper Ore, Cobalt, Vanadium, Iron Ore, Rare Group Elements and Non-Metallic Elements being Sulphur, Selenium and Tellurium (in respect	

Applicable Legislation and Guidelines used to Compile the Report	Reference where Applied
of middle group chromitite seams) and sand manufactured from waste rocks (excluding Portion 37 of the Farm Elandsfontein 440JQ (only chrome contained in the MG Chromitite seams in respect of Portion 37 of the farm Elandsfontein 440JQ) in respect of various portions of various farms as described on the issued mining rights, all situated in the Magisterial District of Brits, North West Region (NW 30/5/1/2/3/2/1/(308) EM & NW 30/5/1/2/3/2/1/ (396) EM) – 25 October 2016. • *Extension of an Environmental Authorisation for the Hernic Electricity Generation on Remainder of Portion 103 of the Farm De Kroon 444 JQ, Listed Activity Number 1(a)(i), 1(e) and 1(l) in Government Notice Number R 387, Madibeng Local Municipality, North West Province (NWP/EIA/02/2008) – 10 September 2014* • *Approval of an Amendment to the Approved Environmental Management Programme in terms of Section 102 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) to include Tailing Storage Facility in respect of Portions 49, 50, 78, 104, 105, 135, 132, 151 and 199 of the Farm De Kroon 444 JQ, situated in the Magisterial District of Brits (NW 30/5/1/2/3/2/1/308 EM) – 03 November 2015* • *Water Use Licence (03/A21J/ABGJ/4196) in terms of the National Water Act, 1998 (Act No. 36 of 1998) – 18 December 2015* • *Atmospheric Emission Licence (NWPG/HERNIC/AEL 4.5 & 4.9/ FEB13) issued to Hernic Ferrochrome, in terms of Section 40 (1) (a) read with Sections 41 and 42 of the National Environmental Management: Air Quality Act, 2004 (Act 39 of 2004), in respect of Listed Activities Sub-category 4.5 and 4.9 – 02 September 2015.*	

6. NEED AND DESIRABILITY OF THE PROJECT

The section below was compiled with reference to the Guideline on Need and Desirability in terms of the Environmental Impact Assessment (EIA) Regulations, 2010 – GN 891 in Government Gazette No. 38108 dated 20 October 2014.

6.1. NEED AND DESIRABILITY FOR PROPOSED DEVELOPMENT

6.1.1 Need for the Project (Timing)

The current chrome mining and ferrochrome smelting operations at HERNIC were authorized through various EA mechanisms since 1996 up until the present. During those applications motivations were given for the original start-up of the operations as is well documented in the approved EMPR for the site.

The obvious positive socio-economic contributions associated with the HERNIC operations throughout its operational life span is graphically demonstrated by the fact that the site provides employment to more than 650 permanent and 1000 service provider employees. The proven positive contribution of the operation as part of the broader mining sector to the socio-economic well-being of the region is obvious.

The project to be motivated here essentially relates to the rehabilitation and closure of redundant infrastructure as well as the upgrade of water and waste management measures and is therefore required not for expansion purposes, but essentially represent activities required to ensure continued operation of the site. Should these activities not be authorized, the HERNIC operations will not have the benefit of effective water and waste management and it also may introduce a legal compliance risk to HERNIC.

The proposed activities are required in order to sustain the current land use which has been active since 1996. The activities are intended to prolong the current beneficial land use and are similar to what already exists at the site. The proposed activities will not require additional resources or services and will in fact continue to support on-going service delivery from a municipal perspective.

6.1.2 Desirability for the Project (Placing)

As stated above, the current chrome mining and ferrochrome smelting operations at HERNIC were authorized through various environmental authorization mechanisms since 1996. During those applications motivations were given for the original start-up of the operations as is well documented in the approved EMPR for the site.

The proposed activities which form the subject matter of the current applications, will be located within the boundary of the existing HERNIC Mine and Plant and will therefore neither compromise the current land use, as approved for the site, nor will it compromise the broader land use context of the existing mining belt as present for the broader area.

The proposed activities relate primarily to upgrades, extensions, as well as new water and waste management facilities for the Smelter Plant and which are required essentially for Water Management and Waste Management, and will therefore support the existing environmental management for the site and the region as a whole.

It is not expected that any of the activities will impact on sensitive natural and cultural areas or on people's health or wellbeing, nor is it expected that it will result in unacceptable opportunity costs.

Detailed impact assessments will be conducted during the investigative phase for socio-cultural, heritage, socio-economic and a host of biophysical environmental components to ensure that the proposed activities can be constructed, operated, decommissioned and closed within acceptable environmental objectives.

6.2 NEED AND DESIRABILITY OF THE ACTIVITY IN CONTEXT OF PREFERRED LOCATION

The proposed activities are all required for water and waste management measures at specific localities within the HERNIC mine and plant surface area. The measures are required as soon as possible to support legal compliance with regulatory approval conditions.

6.3 MOTIVATION OF PREFERRED DEVELOPMENT WITHIN APPROVED SITE

The proposed measures are all required at specific existing sites within the HERNIC operational area in order to support legal compliance with environmental authorization conditions.

7. PERIOD OF ENVIRONMENTAL AUTHORIZATION REQUIRED

The HERNIC operations are quite dynamic and alterations, expansions, upgrades and additions are required almost on an ongoing basis, implying that amendments, variations and new applications are lodged on a regular basis. However, the expected Life of Mine for HERNIC is some 60 years, but the Life of the Ferrochrome Smelting Plant can be longer and is primarily a function of market conditions.

Most of the designs for operational facilities are done for time periods varying between 20 years and 25 years. It would therefore seem realistic to request that whichever authorizations are granted, they be granted for time periods of at least 20 to 25 years.