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Exxaro Coal (Pty) Ltd Grootegeluk Short-Term Stockpiles Amendment Project – Phase 2 Stockpile Expansion

Section 31 Amendment Application in Terms of the NEMA 2014 Regulations

Project Number:

EXX3666

Prepared for:

Exxaro Coal (Pty) Ltd

September 2016

Digby Wells and Associates (South Africa) (Pty) Ltd
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This document has been prepared by Digby Wells Environmental.

Report Type:	**Section 31 Amendment Application in Terms of the NEMA 2014 Regulations**
Project Name:	**Exxaro Coal (Pty) Ltd Grootegeluk Short-Term Stockpiles Amendment Project – Phase 2 Stockpile Expansion**
Project Code:	**EXX3666**

Name	Responsibility	Signature	Date
Xanthe Taylor	Document Compiler		June 2016
Brett Coutts	Review		September 2016
Renée van Aardt	Exco Review		September 2016

EXECUTIVE SUMMARY

Introduction

Exxaro Coal (Pty) Ltd (Exxaro), Grootegeluk Coal Mine (Grootegeluk) is contracted to supply coal to Eskom's Medupi and Matimba power stations, both in Lephalale, Limpopo Province. Off-take of Eskom coal has slowed and Exxaro requires additional stockpiling space to accommodate the excess coal on site. Digby Wells was requested by Exxaro Coal (Pty) Ltd to carry out for the proposed Short Term Stockpile Amendment at the Grootegeluk Mine.

Digby Wells Environmental (Digby Wells) was appointed by Exxaro (Pty) Ltd, Grootegeluk to amend the environmental authorisations for the Grootegeluk Infrastructure Expansion Project in 2014. The permitting documents were submitted to Limpopo Department of Economic Development, Environment and Tourism (LEDET) and Department of Mineral Resources (DMR).Exxaro were granted an Environmental Authorisation in October 2014 and August 2015.

The approved uses of the stockpile areas will need to be changed to also utilise the laydown Area, GG10B, and multiproduct stockyard footprints to stock excess Eskom-grade coal only (in the form of a compacted coal stockpile), for an approximate period of five years, until Medupi station is fully operational. These changes will also include the extension of the GG10B Stockyard footprint by approximately 12.8 hectares (ha) by including the current D8 rail loop area, which will be decommissioned with the construction of the new loadout area, also referred to as the extension area.

Project applicant

Exxaro is applying for Environmental Authorisation in terms of the National Environmental Management Act (NEMA), 1998 (Act No. 107 of 1998).

Applicant	Exxaro Coal (Pty) Ltd, Grootegeluk Coal Mine.		
Contact person:	Mr. Johan Wepener		
Postal address:	PO Box 178, Grootegeluk Coal Mine		
	Lephalale		
	Postal code:	0555	
Telephone:	014 763 9100		
E-mail:	Johan.Wepener@exxaro.com	Fax:	014 763 9453
Magisterial District or Town:	Lephalale Magisterial District		

Project overview

Exxaro owns multiple mining operations, including Grootegeluk Coal Mine (hereafter Grootegeluk), which has been in operation since 1982 in the Limpopo Province. Grootegeluk is located approximately 18 km outside of Lephalale and is contracted to supply coal to Eskom's Matimba power station and the Medupi power station. Due to delays in the start-up of Medupi the off-take of Eskom coal has slowed and Exxaro requires additional stockpiling space to accommodate the excess coal on site.

Exxaro applied to expand certain infrastructure within the mine boundary area, referred to as the Grootegeluk Coal Mine Infrastructure Expansion Project. Exxaro submitted Applications in terms of the National Environmental Management Act (NEMA), 1998 (Act No. 107 of 1998) and Minerals and Petroleum Resources Development Act (MPRDA), 2002 (Act No. 28 of 2002) to include the following activities / expansions within the mine boundary:

- Expansion of the rail loop, load out stations and associated infrastructure;
- Expansion of the existing coal stockyard and stockpiles;
- Expansion of the fuel storage depot;
- Expansion of beneficiation plants and associated infrastructure;
- New road and conveyors to fines recovery area;
- New gate and hard park area; and
- Expansion of ancillary infrastructure and new 33 kV power line.

The aforementioned 2014 amendment was also associated with the expansion of the existing coal product stockpiles. The following stockpiles and stockyards were included in the applications and approved:

- GG 6/2 stockyard;
- GG 10 stockyards;
  - Conical Stock pile;
  - Stockyard A and
  - Stockyard B;
- Multi-product overflow stockyard

The Grootegeluk Coal Mine Infrastructure Expansion Project was authorised in terms of the NEMA and the Environmental Impact Assessment Regulations of 2010[1], (which have been repealed). The Limpopo Department of Economic Development, Environment and Tourism (LEDET), and the Record of Decision are dated 27 October 2014, with reference number

[1] Dated 18 June 2010

12/1/9/1-W89. The Department of Mineral Resources (DMR) Environmental Management Programme (EMP) Amendment approval was granted on the 28 August 2015.

Exxaro proposed a phased authorisation approach for the amendments that are being requested. Exxaro proposes to amend the existing Authorisation relevant to the Grootegeluk Mine Infrastructure Expansion Project (which included the expansion of the GG10 Stockyards and several other stockpile areas).

The purpose of these amendments is to allow Exxaro to legally stockpile Eskom-grade coal currently being mined from the upper coal benches at the Grootegeluk Mine. In summary the two phases included the following:

- Phase 1: Amendment of the GG10A stockyard for temporary use - The amendment of the GG10A stockyard area with the capacity of 400,000m^3 to include the alternative of a temporary 2 Mt compacted Power Station Coal Stockpile in the same footprint area.
- Phase 2: Amend the GG10B stockyard area - The amendment of the GG10B stockyard to include the additional area inside the loop not originally included. To also amend the use of the multi-product overflow stockpiles to stacking and loading areas. The additional 1.1mil stockpiles area in the footprint of the original Coke and Co-gen area will need to be included as an additional area.

Further to what has been noted above regarding the requested amendment, Exxaro received approval from Department of Water Affairs (DWS) and DMR for Phase 1 of the project on the 5th May 2016 and 7th July 2016 respectively. This part of the project and associated specialist studies conducted is in support of the Phase 2 amendment that is being requested for in terms Section 31 of the 2014 NEMA Regulations applies as this is an amendment to an existing Environmental Authorisation. Thus the information contained within this amendment report is specific to the Phase 2 amendment process, however does make reference to Phase 1 with respect to the areas assessed.

Purpose of this report

The purpose of this Environmental Authorisation Amendment Report is to provide the background of the proposed extension of the GG10B stockpile, the baseline environment prior to the development taking place, the identified environmental impacts associated with the development of the additional stockpile area, and the proposed mitigation measures to manage these identified impacts. The process followed for the compilation of this document is governed by the NEMA, and the Regulations thereunder. The purpose of this report is also to meet these requirements and supply the Competent Authority, in this case the DMR, the required information to reach a decision on the Application.

Environmental consultants

Digby Wells has been appointed as the EAP for this Project.

Company name:	Digby Wells Environmental (South Africa) (Pty) Ltd.

Contact person:	Brett Coutts
Physical address:	48 Grosvenor Road, Turnberry Office Park, Bryanston, Johannesburg
Telephone:	+27 11 789 9495
Cell phone:	+27 72 909 3650
Email:	brett.coutts@digbywells.com

Approach and methodology for the Public Participation Process

The approach to this to the public participation process is governed by the requirements of an Amendment Application process in terms of Section 31 and 32 of NEMA EIA Regulations dated 2014. Prior to the Application form being submitted to the DMR and the Amendment Report being released for public comment, the existing Interested and Affected Parties (I&AP) database was updated and an announcement letter was sent to these I&APs to notify them of the proposed Project, and an advertisement was placed in the local newspaper. The notification letter was sent out informing I&APs of the review dates, in accordance with the legislated 30-day review period.

Once comment has been received from I&APs, a comments and responses report will be compiled and will be submitted to the DMR for their consideration of the Application. At this point, the Final Amendment Report will be placed on the Digby Wells website for stakeholders to review, and stakeholders will be urged to provide further comments to the DMR.

Project alternatives

No alternatives have been considered for this Project, as the extension of the existing stockpile is located in a disturbed mining area and the relevant infrastructure surrounding the existing GG10B stockpile will service the extension area as well.

Conclusions and recommendations

For the Grootegeluk Mine to remain operational, the extension of the GG10B Stockyard and utilising the laydown area and multiproduct stockpile area is required. The proposed impacts as a result of the stockyard extension can be managed and the necessary monitoring procedures already in place will be adapted to include the proposed new stockpile area. It is recommended that Exxaro relocate the protected tree species or ensure that the protected tree permit is in place for the destruction of protected trees.

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Exxaro Coal (Pty) Ltd (hereafter Exxaro), Grootegeluk Mine is contracted to supply coal to Eskom's Medupi and Matimba power stations, both in Lephalale, Limpopo Province. Off-take of Eskom coal has slowed due to construction delays and thus Exxaro requires additional stockpiling space to accommodate the excess coal on site.

Digby Wells Environmental (hereafter Digby Wells) was appointed by Exxaro, Grootegeluk Coal Mine (hereafter Grootegeluk) to amend the environmental authorisations for the Grootegeluk Infrastructure Expansion Project in 2014. The permitting documents were submitted to Limpopo Department of Economic Development, Environment and Tourism (LEDET) and Department of Mineral Resources (DMR). Exxaro were granted an Environmental Authorisation in October 2014 and August 2015.

The approved uses of the stockpile areas will need to be changed to also utilise the laydown Area, GG10B, and multiproduct stockyard footprints to stock excess Eskom-grade coal only (in the form of a compacted coal stockpile) as shown in Figure 5-1, for an approximate period of five years, until Medupi station is fully operational. These changes will also include the extension of the GG10B Stockyard footprint by approximately 12.8 hectares (ha) by including the current D8 rail loop area, which will be decommissioned with the construction of the new loadout area, also referred to as the extension area.

2 Project Applicant

The contact details of the Applicant are contained in Table 2-1 below.

Table 2-1: Details of the Applicant

Project Applicant:	Exxaro Coal (Pty) Ltd. – Grootegeluk		
Registration number (if any):	2000/011078/07		
Trading name (if any):	Exxaro Coal (Pty) Ltd. - Grootegeluk		
Responsible person: ***(E.g. CEO, Director, etc.)***	Mr. JL Wepener (General Manager)		
Contact person:	Filomaine Swanepoel		
Physical address:	Farm Enkelbult 462 LQ		
Postal address:	P.O. Box 178, Lephalale		
Postal code:	0555	**Cell:**	083 662 1104
Telephone:	014 763 9288	**Fax:**	014 763 9453
Email:	Filomaine.Swanepoel@exxaro.com		

2.1 Details of EAP

Refer to Table 2-2 below for the contact details of the EAP.

Table 2-2: Contact Details of the EAP

Name of Practitioner:	Brett Coutts
Telephone:	(011) 789 9495
Fax:	(011) 069 6801
Email:	Brett.Coutts@digbywells.com

2.2 Expertise of the EAP

2.2.1 The Qualifications of the EAP

Brett Coutts has completed a BSc Honours Degree in Ecology, Environment and Conservation from the University of the Witwatersrand. Brett Coutts has also completed several short courses relevant to the environmental industry, including Carbon Footprint Management and Environmental Law. Brett' Curriculum Vitae is attached as **Appendix A**.

2.2.2 Summary of the EAP's past experience

Table 2-3 includes a selection of projects Brett has managed, providing insight into the various projects, roles and locations he has worked in.

Table 2-3: Project Experience

Project	Role	Activities	Resource	Client	Location
Exxaro (portfolio)	Project Manager	Rehabilitation specialist	Coal	Exxaro	South Africa Limpopo and Mpumalanga
Bokoni Platinum Mine	Key Accounts Manager	Overall management and coordination of projects	Platinum	Bokoni Platinum Mine	South Africa
Anker Coal	Project Manager	Rehabilitation specialist	Coal	Namane Resources	South Africa Mpumalanga
Anglo Operations	Key Accounts Manager	Overall management and coordination of projects	Platinum	Anglo American	South Africa
Environmental and Social Impact Assessment	Project Manager	Project Manager	Gold	Aureus mining	Liberia
Thabametsi Coal Mine	Project Manager	Project Manager	Coal	Exxaro	South Africa
Wetland Offset Strategy	Project Manager	Project Manager	Coal	Exxaro	South Africa

3 Location of the Overall Activity

Exxaro owns multiple mining operations, including the Grootegeluk which has been in operation since 1981. Grootegeluk is located on the Remaining Extent of the farm Daarby 458 LQ and the Remaining Extent of the farm Enkelbult 462 LQ, near Lephalale in the Limpopo Province. Grootegeluk is contracted to supply coal to Eskom's and other industries. Refer to Table 3-1 indicating the details and location of Grootegeluk.

Table 3-1: Details of the Affected Farm Portion

Farm Name:	Daarby 458 LQ
Application Area (Ha):	48 ha
Magisterial District:	Lephalale Magisterial District
Distance and direction from nearest town:	Approximately 20 km west of Lephalale
21 digit Surveyor General Code for each farm portion:	T0JQ00000000045800000

3.1 Waterberg- Bojanala Priority Area (WBPA)

The Waterberg-Bojanala Priority Area (WBPA) was declared the third priority area by the Minister in terms of GNR 495 on 15 June 2012. The WBPA encompasses the Waterberg District in Limpopo Province and its six local municipalities and three local municipalities in the Bojanala Platinum District in the North West. The Waterberg is the largest of the 5 provinces in the western side of the Limpopo Province while the Bojanala Platinum is the largest of the four district municipalities within the North West (C&M Consulting Engineers, 2013). The following are the municipalities in the WBPA are shown in Table 3-2.

Table 3-2: Municipalities within the WBPA

Province	District Municipality	Local Municipality
Limpopo	Waterberg	Thabazimbi
		Modimolle
		Mogalakwena
		Bela Bela
		Mookgopong
		Lephalale
North West	Bojanala Platinum	Moses Kotane
		Rustenburg
		Madibeng

Source: Umoya-NILU, 2014

The Waterberg District has three forms of settlements which are villages, informal settlements and farms. The mining activities are located around the periphery while tourism and game farming are located around the centre of the District. This area was considered pristine and after the virgin coal resources were identified, new developments were proposed such as Medupi power station.

4 Locality Map

The location of the Project area is within the Mining Right boundary which is located in the Waterberg District, approximately 20 km east of Lephalale. Refer to Figure 4-1 for the Locality Map and Plan 1 of **Appendix B**.

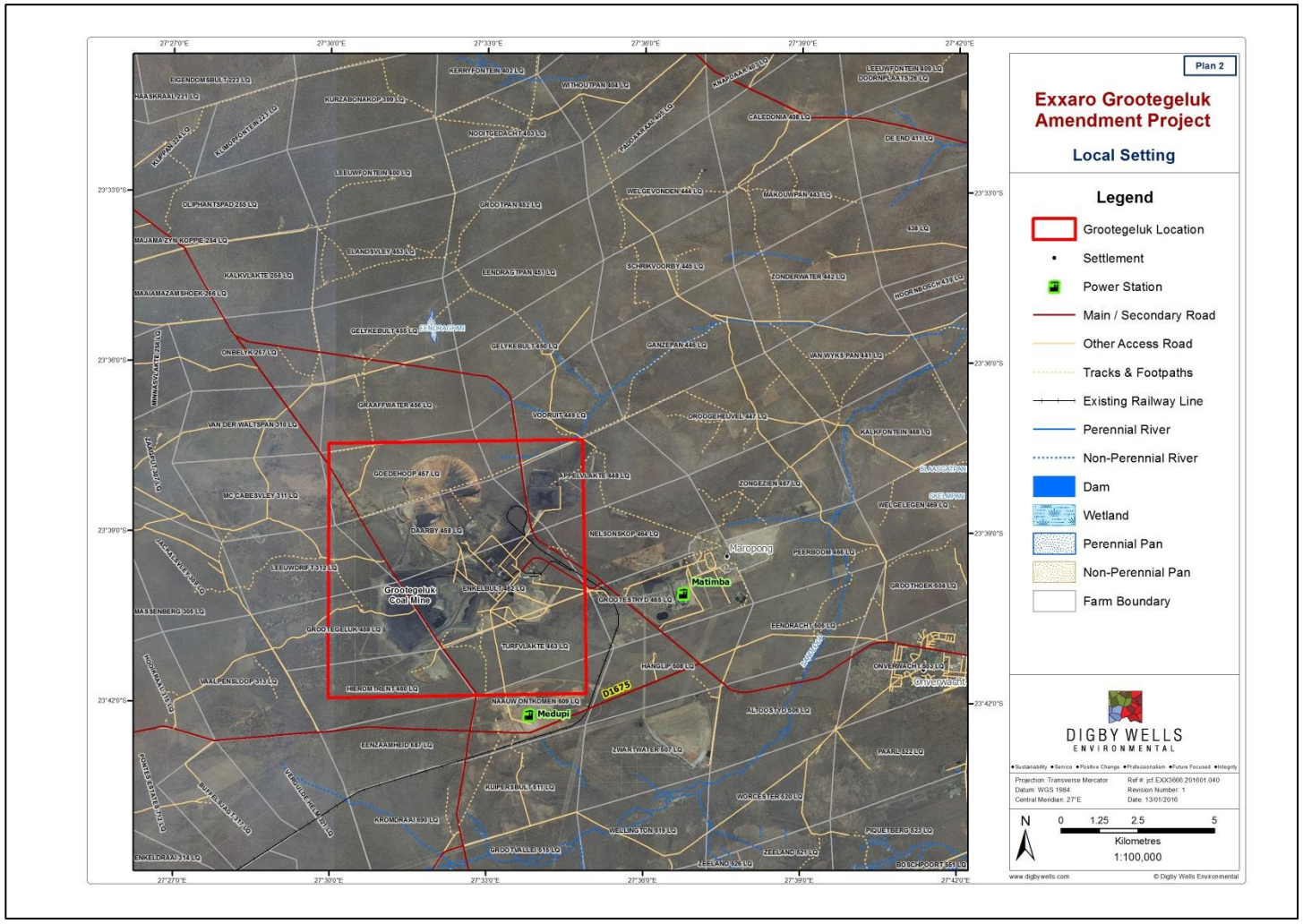

Figure 4-1: Locality Map

5 Description of the Scope of the Proposed Overall Activity

Exxaro previously applied to expand certain infrastructure within the mine boundary area, referred to as the Grootegeluk Coal Mine Infrastructure Expansion Project. Exxaro submitted Applications in terms of the National Environmental Management Act (NEMA), 1998 (Act No. 107 of 1998) and Minerals and Petroleum Resources Development Act (MPRDA), 2002 (Act No. 28 of 2002) to include the following activities / expansions within the mine boundary:

- Expansion of the rail loop, load out stations and associated infrastructure;
- Expansion of the existing coal stockyard and stockpiles;
- Expansion of the fuel storage depot;
- Expansion of beneficiation plants and associated infrastructure;
- New road and conveyors to fines recovery area;
- New gate and hard park area; and
- Expansion of ancillary infrastructure and new 33 kV power line.

The aforementioned 2014 amendment was also associated with the expansion of the existing coal product stockpiles. The following stockpiles and stockyards were included in the applications and approved:

- GG 6/2 stockyard;
- GG 10 stockyards;
  - Conical stockpile;
  - Stockyard A;
  - Stockyard B; and
- Multi-product overflow stockyard

The Grootegeluk Coal Mine Infrastructure Expansion Project was authorised in terms of the NEMA and the Environmental Impact Assessment Regulations of 2010[2], (which have been repealed). The LEDET's Record of Decision is dated 27 October 2014, with reference number 12/1/9/1-W89. The DMR Environmental Management Programme (EMP) Amendment approval was granted on the 28 August 2015.

Exxaro is proposing a phased authorisation approach for the amendments that are being requested for the short-term stockpiles. Exxaro wishes to amend the existing Authorisation relevant to the Grootegeluk Mine Infrastructure Expansion Project (which included the expansion of the GG10 stockyards and several other stockpile areas).

[2] Dated 18 June 2010

The purpose of these amendments is to allow Exxaro to legally stockpile Eskom-grade coal currently being mined from the upper coal benches at Grootegeluk. In summary the two phases included the following:

- Phase 1: Amendment of the GG10A stockyard for temporary use - The amendment of the GG10A stockyard area with the capacity of 400,000m^3 to include the alternative of a temporary 2 Mt compacted Power Station Coal Stockpile in the same footprint area.
- Phase 2: Amend the GG10B stockyard area - The amendment of the GG10B stockyard to include the additional area inside the loop not originally included. To also amend the use of the multi-product overflow stockpiles to stacking and loading areas. The additional 1.1million tonne stockpiles area in the footprint of the original Coke and Co-gen area will need to be included as an additional area.

Further to what has been noted above regarding the requested amendment, Exxaro received approval from Department of Water Affairs (DWS) and DMR for Phase 1 of the project on the 5th May 2016 and 7th July 2016 respectively. This part of the project and associated specialist studies conducted is in support of the Phase 2 amendment that is being requested for in terms Section 31 of the 2014 NEMA Regulations applies as this is an amendment to an existing Environmental Authorisation.

It is important to note that the Amendment to the Authorisation and EMP is to allow Exxaro the *option* to store this coal for a period of five years and then after these five years, construct the permanent stockyards, as per the 2014 authorisation. Therefore, after the five-year period the 2014 EMP will be followed for the construction and operation of the permanent stockyard areas.

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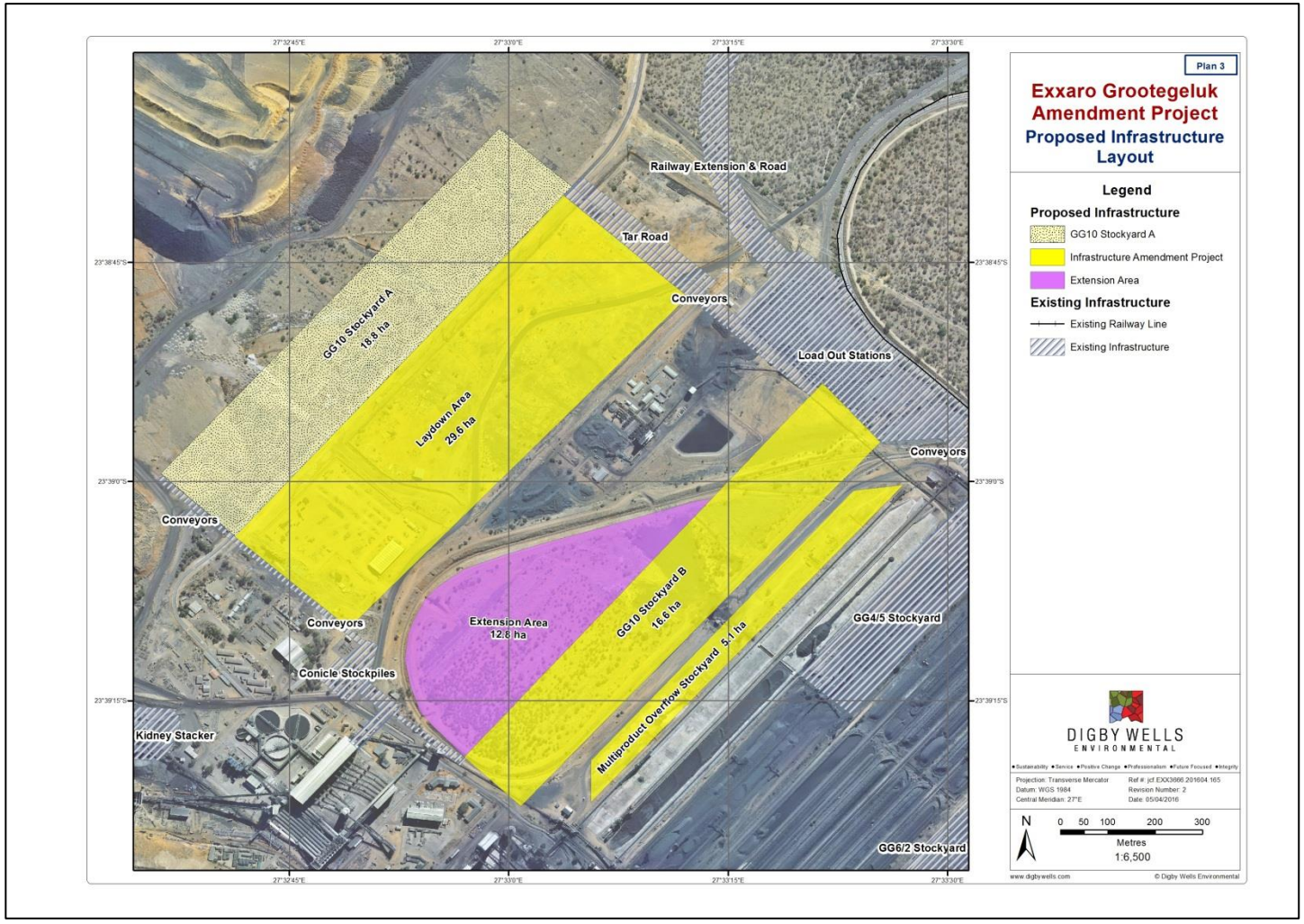

Figure 5-1: Proposed GG10B Short-Term Stockpile layout including expansion area

5.1 Project Activities

Please refer to Table 5-1 for Project activities relevant to the short-term stockpile.

Table 5-1: Project activities

Name of Activity	Aerial Extent of the Activity
Site preparation (extension area)	- 12.8 ha
Construction of stockpile liner	64.1 ha
Operation of stockpiles	64.1 ha
Removal of stockpiles and decommissioning	64.1 ha

5.2 Description of the activities to be undertaken

The proposed amendments to the original Authorisation of 2014 are discussed in this section.

5.2.1 Existing Infrastructure

The following is a list of infrastructure which is already in operation (Plan 4) at Grootegeluk:

- An open cast pit;
- Six coal processing plants (GG1 – GG6);
- Coal stockpiling areas;
- Ten discard dumps of which only Dumps 4 and 5 are active;
- Water management dams and pipelines;
- Four Slimes dams of which only Dams 1 and 2 are active;
- Haul roads and conveyors;
- A railway line;
- Power lines;
- Transformers;
- Locomotive service station;
- An explosives magazine;
- Laboratory, change houses and offices;
- Warehouses;
- Gates, guard houses and car parks;
- A Sasol Nitro storage site;

- A Total fuel depot;
- A temporary waste storage yard;
- Scrap yard/ Reclamation Yard;
- A Reductants plant; and
- A workshop area.

5.2.2 Infrastructure Approved in 2014

The upgrade and construction of all infrastructure associated with the 2014 project is located within Grootegeluk project boundary, and mostly located within the disturbed areas of the mine with the exception of the rail loop and fines recovery conveyor. The infrastructure that was approved in 2014 and has relevance to this Section 31 Amendment is discussed below.

5.2.2.1 Stockyards and Stockpiles

5.2.2.1.1 GG10 Stockyard

Grootegeluk aimed to expand its multi-product coal production by an additional 2 Mt per annum. To achieve this, the GG10 plant was applied for and approved. The required plant modifications for the GG10 Plant were

- Installing of a new product conveyor to take the product to a new crushing and screening plant;
- Construction of a new crushing and screening plant where the products will be split into small nuts, peas and power station coal;
- Construction of three new product conveyors that will take the products to the required stockpiles and yards;
- Construction of two lined conical stockpiles with capacities of approximately 5000 tons each for phase 1 of the project;
- A new multi-product stockyard with stackers and a reclaimer joining up with a new load out system to export the product from the mine via rail; and
- Storm water management infrastructure around the proposed locations of the new plants and stockyards.

5.2.2.1.2 Multi-product Overflow Stockyard

Exxaro applied for a Strategic/Overflow stockyard at Grootegeluk which would supply Matimba with sufficient coal. This stockyard was initially to be used for product stockpiling when the GG7/8 stockyard reached capacity. The Multi-Product Overflow stockyard was approved to be used for a variety of different products and plants and be reclaimed to feed all Load-Out Stations and conveyors, as required.

5.2.3 Proposed New Surface Infrastructure

The purpose of this amendment is to consolidate the approved stockyards and extend the GG10B stockyard footprint into the discontinued rail loop (extension area – 12.8ha). This consolidation will serve as a short-term stockpile area to accommodate the increased amount of coal product on site from GG 1 to GG 8, and will remain as such for a period of approximately five years (temporary stockpile). Once off-take from Eskom resumes as per agreement the short-term stockpiles will be removed and the original stockyards will be constructed as approved in the 2014 Authorisation. The type of coal to be stockpiled in this consolidated short-term stockyard area was tested and found to be Type 3 “waste” which will require the construction of a Class C liner or equivalent liner system, compliant with the DWS requirements. Refer to Section 9.6 for the methodology and results of the geochemical analysis of the coal to be stockpiled.

6 Policy and Legislative Context

Applicable legislation and guidelines used to compile the report	How does this development comply with and respond to the policy and legislative context
The National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA)	Section 31 of the 2014 NEMA Regulations applies as this is an amendment to an existing Environmental Authorisation.
The National Heritage Resources Act, 1999 (Act No. 25 of 1999)	A Heritage survey was undertaken in terms of this Act.
National Environment Management: Air Quality Act (Act No. 39 of 2004)	The Air Quality Assessment was conducted in accordance with the NEM: AQA for the potential impacts as a result of the stockpile area.
Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983) (CARA)	The Fauna & Flora study considered CARA in terms of alien invasive species found on site.
National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004) (NEM:BA)	The Fauna & Flora study considered NEM: BA in terms of sensitive species found on site.
National Forests Act, 1998 (Act No. 84 of 1998) (NFA)	The Fauna & Flora study considered NFA in terms of sensitive tree species found on site.
Waterberg District Municipality Integrated Development Plan (IDP)	The Integrated Development Plan (IDP) was consulted to assist in substantiating the Need and Desirability of the proposed Project.

7 Need and Desirability of the Proposed Amendment

The proposed Project footprint falls within the Mining Right area of Grootegeluk. The proposed amendments to accommodate the short-term stockpiles will not alter the land use. Although the delay in sufficient off-take of coal from Eskom has resulted in the need for this amendment, the proposed change to the stockyard area will meet the requirements of electricity supply for the province in the long term, in line with the IDP. The short-term benefit

of the amendment to the stockyard area will allow mining to continue at the Grootegeluk Mine. Eskom-grade coal occupies the upper benches of the reserve, and Exxaro must be able to access lower benches of coal for the continued supply of other markets. If stockpiling of the upper benches of coal is not possible, Exxaro will no longer be able to supply coal to any clients, resulting in the shutdown of the mine. To avoid shut down and job losses, Exxaro requires authorisation to legally stockpile Eskom-grade coal.

The positioning of the amended stockpile area is located in a disturbed footprint within the existing Mining Right area, thereby reducing the environmental impact of establishing additional stockpile areas in undisturbed areas. The placement of coal in the proposed disturbed area does not disturb culturally sensitive or pristine areas as the entire proposed footprint is currently used for mining-related activities. Refer to Section 9.7 for the Specialist's Assessments of the proposed area.

8 Motivation for the Overall Preferred Site, Activities and Technology Alternatives

The location of the short-term stockpiles took into consideration the existing layout of the Grootegeluk Mine and specifically areas that have or are currently being used for stockpiling or mining-related uses. The selection took into consideration that undisturbed areas should not be affected by stockpiles, despite the short-term requirement of the stockpiles. Exxaro has areas within their mining area footprint which have previously been approved for various infrastructure projects, including the Infrastructure Amendment Project of 2014 and the Coke and Co-Gen Project of 2013 (although this Authorisation has lapsed). Prior to the Coke and Co-Gen Authorisation lapsing, the project footprint was earmarked to be used as the laydown area for the loadout station.

When combined the proposed Project footprints would be sufficient to accommodate the volume of Eskom-grade coal to be stockpiled for a period of approximately five years. The advantage of utilising these earmarked footprint areas is that it will prevent the expansion of the overall mining footprint into undisturbed areas. Furthermore, the proposed short-term stockpile area is located alongside Exxaro's existing stockyard area, further facilitating the reclamation of the short-term stockpile by virtue of the existing infrastructure surrounding the proposed short-term stockpile footprint.

9 Full Description of the Process Followed to Reach the Proposed Preferred Alternatives within the Site

This section further describes the method of establishing the preferred location for the short-term stockpile.

9.1 Details of the Development Footprint Alternatives Considered

The location of the short-term stockpile is within the existing Mining Right area and is located alongside existing infrastructure for the existing stockpiles / stockyards. Placing the short-

term stockpile area alongside existing stockpiles discounts the need for constructing additional associated infrastructure, like roads or conveyors, as this infrastructure is already in place.

9.1.1 The Design or Layout of the Activity

The preferred location of the stockpile is mostly within approved stockyard areas. To accommodate the 1.1 million tonnes of coal, the additional areas inside the discontinued rail loop and the laydown area alongside the GG10B Stockyard (refer to Plan 2 in **Appendix B**) have been included in the design. The areas to be utilised for the proposed short-term stockpiles include the following:

- Laydown area (29.6 ha);
- Multiproduct overflow stockyard (5.1 ha); and
- GG10B Stockyard footprint (16.6 ha) and the extension into the discontinued rail loop (12.8 ha).

Accessibility has also been taken into consideration as existing roads will be utilised for the duration of the short-term stockpiles. In addition, the floor of the stockpile areas needs to be lined to prevent seepage. The type of liner must be compliant with the requirements of a Class C Containment Barrier Requirements or equivalent liner system for a liner as described in the GN R 635 of the NEM:WA.

9.2 Details of the public participation process followed

A notification letter was distributed to Registered Interested and Affected Parties (I&APs) on 28 September 2016. The Amendment Report is available on Digby Wells' website (http://www.digbywellsdocs.com/PublicDocuments) for a period of 30 days from 30 September 2016 to 31 October 2016.

9.3 Summary of issues raised by I&APs

A table of key issues raised by I&APs will be included herein after the legislated 30-day public comment period, and comments and responses have been finalised.

9.4 Baseline environment

This section describes the status quo of the project footprint which comprises the proposed stockpile areas.

9.4.1 Geology

Grootegeluk is located in the Waterberg Coalfield area which extends east to west, towards Botswana, for approximately 80 km. The Waterberg Coalfield is a graben structure surrounded by the Eenzaamheid fault to the south, the rock formation of the Waterberg

Group also to the south and the Karoo formations to the north. The northern boundary is formed by the Zoetfontein fault with the Archeaen granite outcrop north of the fault.

The coalfield is further subdivided by the Daarby fault that delineates a shallower, western part of the coal field, which is suitable for opencast mining and a deep north-eastern part which is unsuitable for opencast mining. The Zoetfontein fault was tectonically active before and during Karoo deposition, while the Eenzaamheid and Daarby faults are younger than the Karoo sequence.

Sedimentation occurred in a shallow east-west striking trough and the general direction of transport was east-north-east to west-south-west. Karoo sediments are deposited on the Waterberg Group in the southern portion of the coalfield, while the basement rocks to the north of the Zoetfontein fault are Archaean rocks. The paleo-floor in the eastern portion consists of granite and basic rocks of the Bushveld Igneous Complex. Relatively few dolerite dykes outcrop in the south-eastern portion of the coalfield and no sills have been intersected in any of the exploration boreholes.

9.4.2 Climate

Grootegeluk is located in a summer rainfall region with warm summers and moderate, dry winters. The area is characterised by summer rainfall with an average rainfall of approximately 466 mm per annum, falling mainly between November and April (Golder, 2009). Temperatures vary between a minimum of 11°C and a maximum of 40°C during summer and a minimum of 0°C and a maximum of 28°C during winter.

9.4.3 Precipitation

Figure 9-1 shows the total monthly rainfall and the annual total for the Project area. Monthly rainfall was heavy in the November, December and January (Table 9-1). The annual total rainfall for the project area is 637 mm.

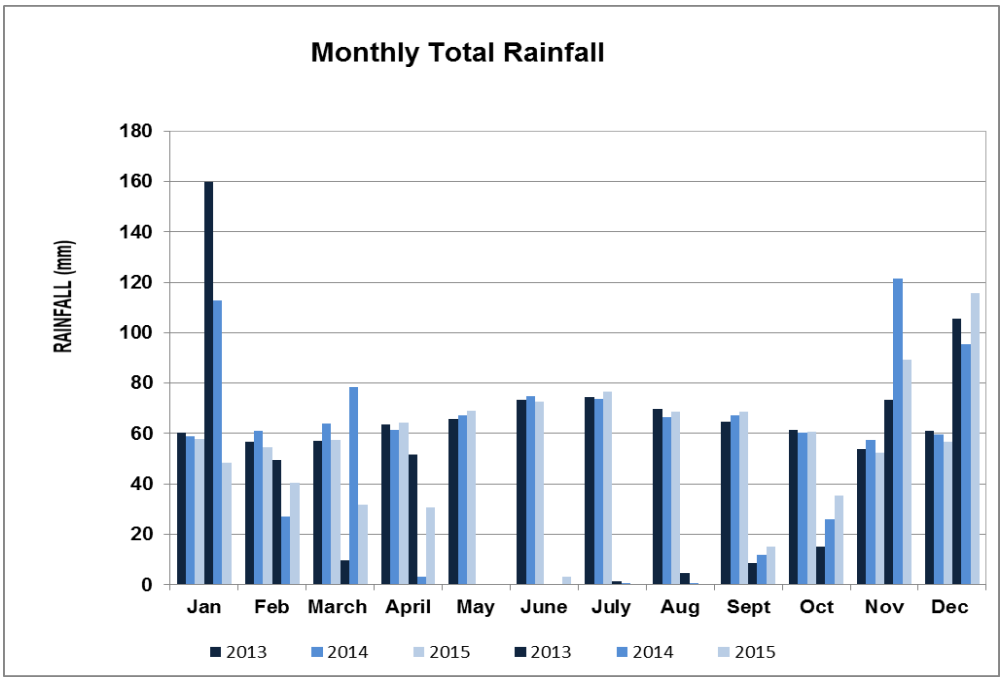

Figure 9-1: Total monthly rainfall

Table 9-1: Monthly precipitation record (mm)

Precipitation	Total Monthly Rainfall (Max)
January	160
February	50
March	78
April	52
May	0
June	3
July	1
August	5
September	15
October	35

November	121
December	116
Annual Total	637

9.4.4 Evaporation

Monthly evaporation data was obtained from the WR2005 manual (WR2005, 2009). The evaporation obtained is based on Symons pan evaporation measurements for the A42J catchment, and needs to be converted to lake evaporation. The Symons pan figure is then multiplied by a lake evaporation factor[3] to obtain the adopted lake evaporation which presents the monthly evaporation rates of a natural open water body.

Table 9-2 is a summary of the evaporation data for the A42J quaternary catchment (from WR2005).

Table 9-2: Summary of Evaporation Data

Months	Lake Evaporation (mm)
January	183.1
February	172.3
March	174.4
April	175.5
May	153.3
June	144.9
July	113.7
August	95.5
September	77.0
October	84.6
November	111.0
December	150.9
Total	**1636**

The evaporation rates presented in

Table 9-2 shows that the highest evaporation rate of 183.1 mm was recorded in January and the monthly minimum, 77.0 mm, occurs in September.

[3] Evaporation factor obtained from WR2005

9.4.5 Temperature

The monthly maximum and average temperature for the Project area is given Figure 9-2. The maximum temperatures were observed from October to February with the month of December recording the highest of 33.6°C.The monthly averages ranged from 12.7°C in July, to 25.4°C in December. Annual average temperature for the Project site is given as 20.2°C.

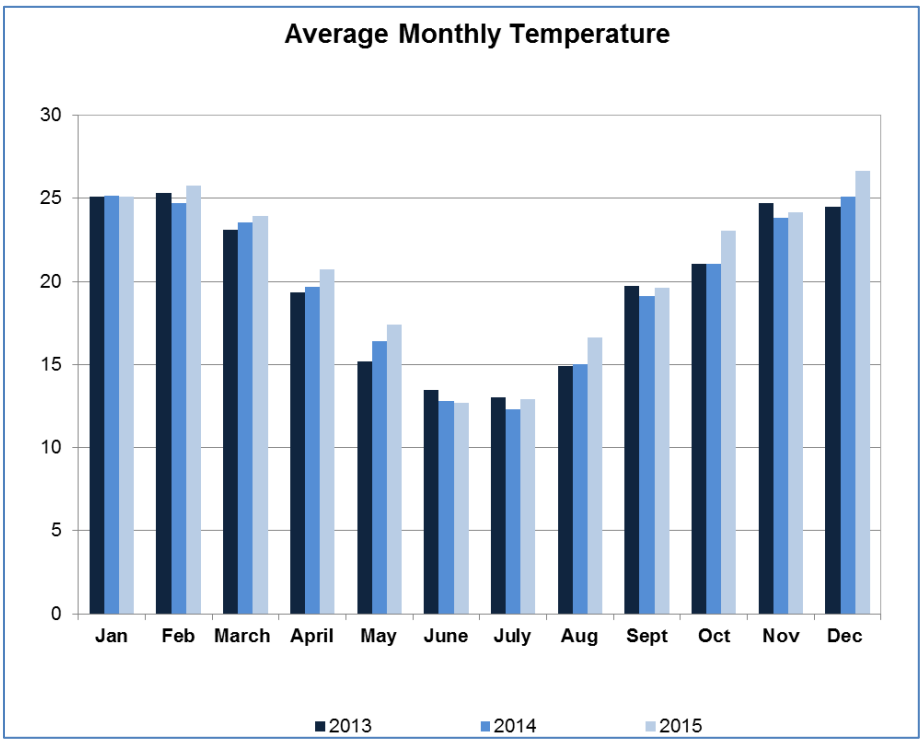

Figure 9-2: Average monthly temperature

9.4.6 Relative Humidity

The annual maximum and the annual average are given as 98.8% and 63.7% respectively. Some days within the months from April to October the relative humidity reaches 100%. However, the monthly averages show the relative humidity is higher in the winter months. In general, the relative humidity is above 50 % for the whole year (Figure 9-3).

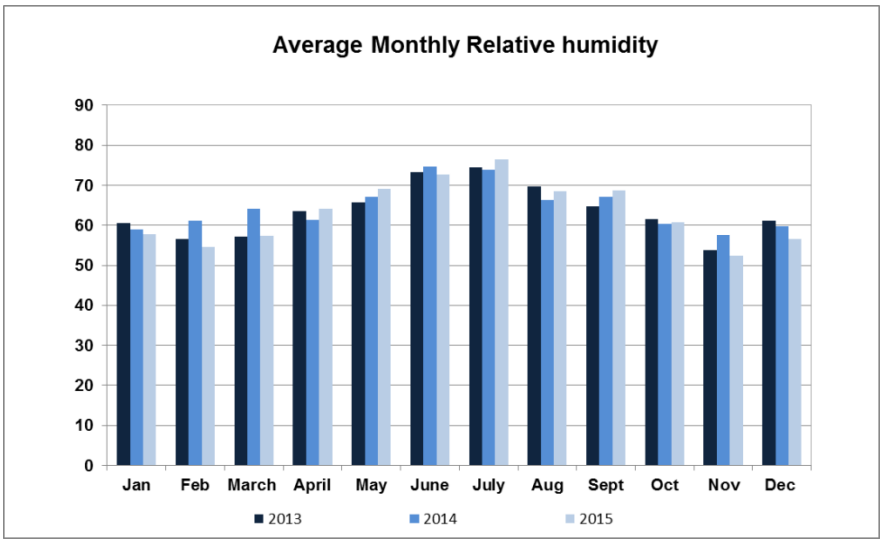

Figure 9-3: Average monthly relative humidity

9.4.7 Wind Direction

The spatial and annual variability in the wind field for the Project area is evident in Figure 9-4. The dominant winds blow from northeast. Diurnal wind variations are provided in Figure 9-5 and seasonal wind variability is provided in Figure 9-6.

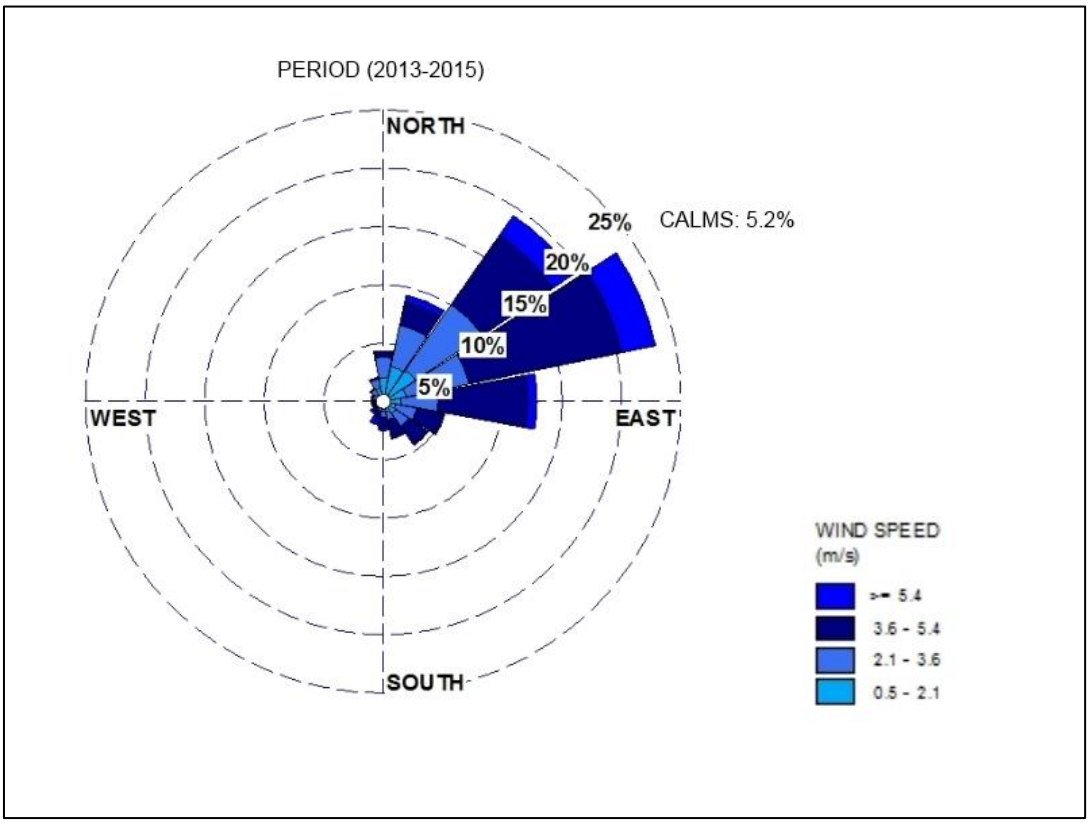

Figure 9-4: Surface wind rose at the Grootegeluk Short Term Stockpile Amendment Project Site

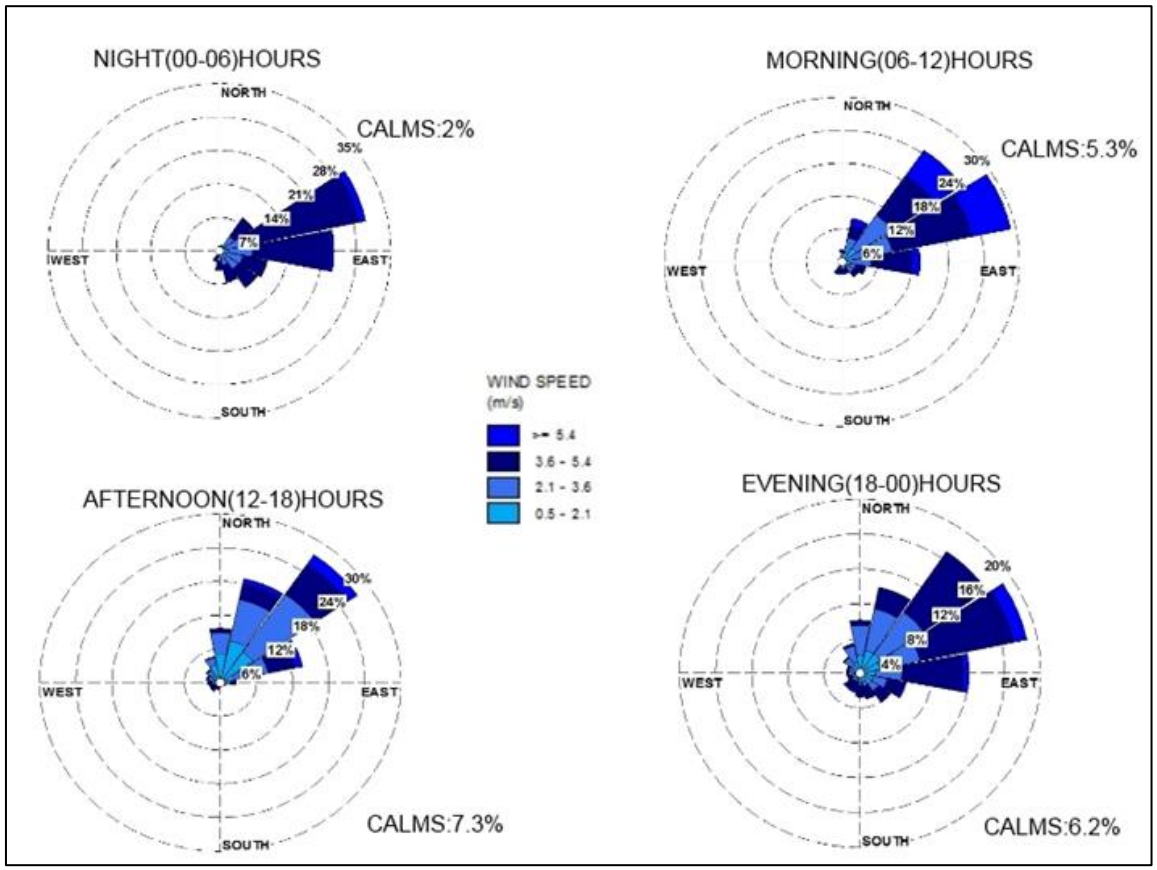

Figure 9-5: Diurnal variations of wind at night-time: 00:00 – 06:00 (top left), morning 06:00 – 12:00 (top right), afternoon 12:00 – 18:00 (bottom left) and evening 18:00 – 00:00 (bottom right).

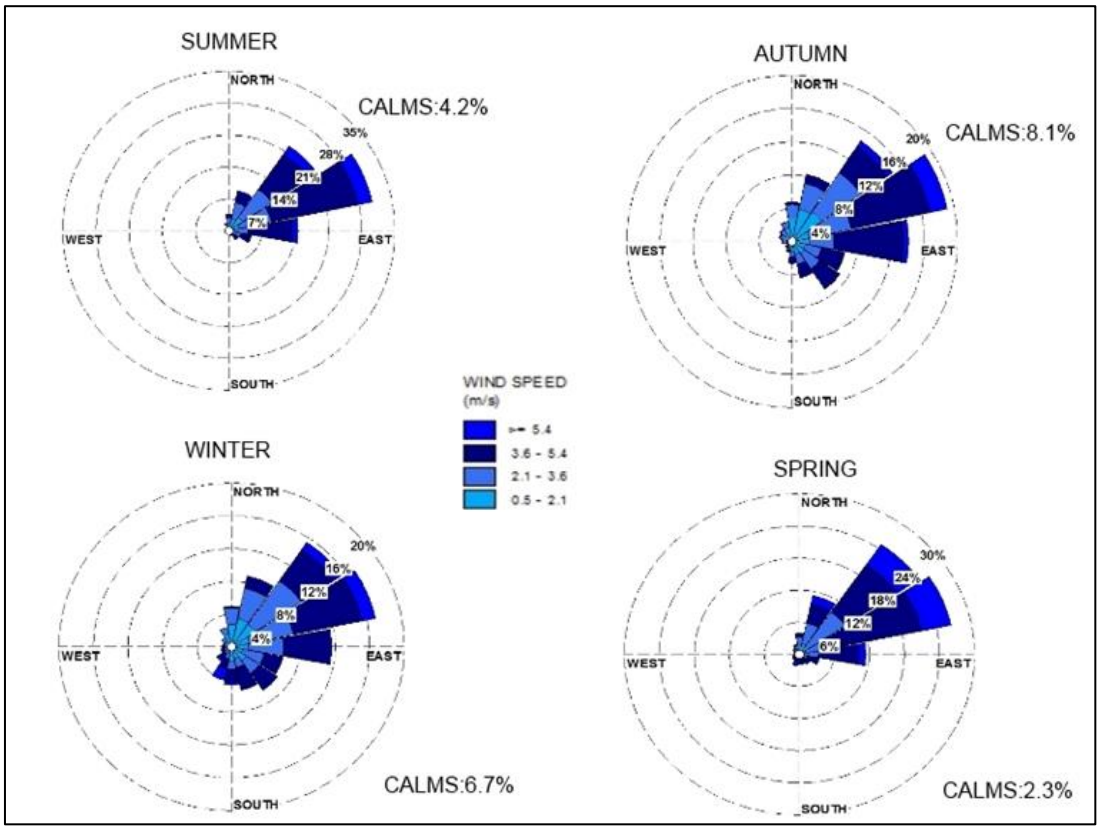

Figure 9-6: Seasonal variability of winds in summer (December – February); autumn (March – May); winter (June – August) and spring (September – November).

9.4.8 Air Quality

The Air Quality Impact Assessment Report is attached hereto as **Appendix C**.

The Bojanala Platinum District has several sources of emissions, such as heavy industry, refineries, power stations, motor vehicles, small industries and households (burning of coal for domestic fuel use). Air pollution sources of concern in the Bojanala District are quite similar to above mentioned.

Due to aforementioned sources of pollutions, it became critical that Priority Air Quality Management Plan for the area be developed. A Priority Air Quality Management Plan includes the establishment of emissions reduction strategies and intervention programmes based on the findings of a baseline characterisation of the area. Grootegeluk is located within the footprint demarcated as the Waterberg Priority Area and a contributing source to ambient air pollution.

The Department of Environmental Affairs operates four ambient monitoring stations in which the priority area which are referred to as the Waterberg-Bojanala Ambient Air Quality Monitoring Network. The following parameters are measured at each station: PM_{10}, $PM_{2.5}$, sulphur dioxide (SO_2), nitric oxide (NO), nitrogen dioxide (NO_2), nitrogen oxides (NO_x), ozone (O_3), carbon monoxide (CO), benzene (C_6H_6), toluene and xylene. In addition to the

above, meteorological data for wind speed; wind direction, ambient temperature, relative humidity, rainfall, solar radiation and barometric pressure are also measured.

Ambient air quality data from the Waterberg Bojanala Priority Area monitoring station in Lephalale (23˚40'77.72", 27 ˚43'19.53"), hosted by South African Air Quality Information System (SAAQIS), was used to assess background air quality scenario in the area for PM_{10} and $PM_{2.5}$ for the period 2012 to June 2016.

9.4.8.1 Background PM_{10} Data (SAAQIS)

Figure 9-7 shows the PM_{10} levels from the Lephalale Station for the period 2012 to 2016. Exceedance of the daily limit of 75 µg/m^3 during the monitoring period was observed in October 2012, May and August 2013. In general, the ambient concentrations of PM_{10} are lower during the summer months.

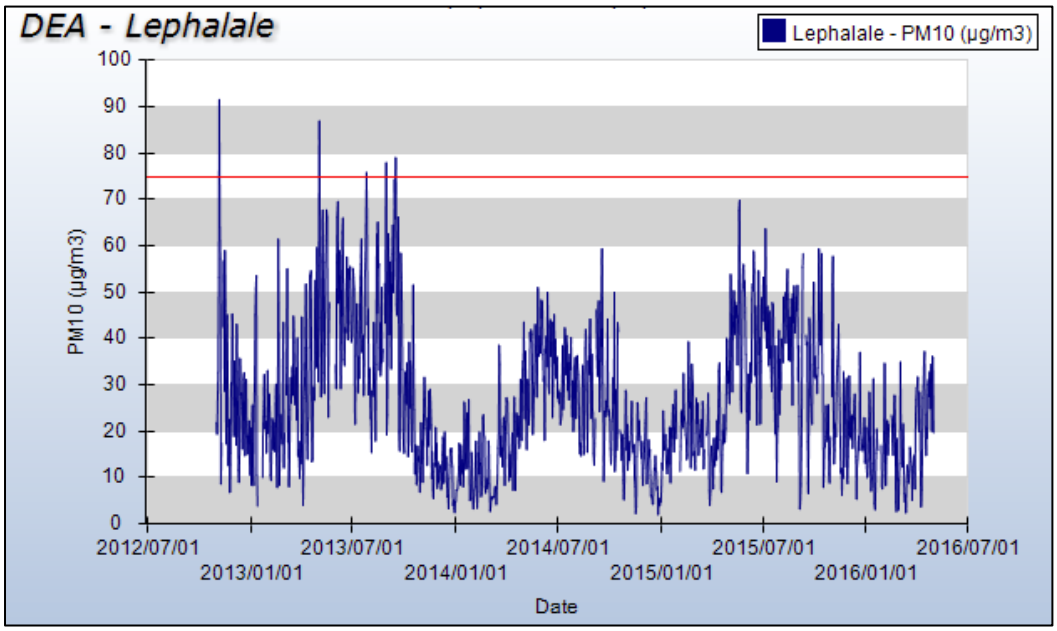

Figure 9-7: Daily PM_{10} averages (SAAQIS, 2016)

9.4.8.2 Background $PM_{2.5}$ Data (SAAQIS)

The daily $PM_{2.5}$ concentrations at the ambient monitoring station are depicted in Figure 9-8 for the period from 2012 to 2016. The highest $PM_{2.5}$ daily levels were experienced in September 2013, September 2014 with the lowest $PM_{2.5}$ levels in from January to March from 2013 to 2016. The red line was the previous standard, which could not be removed as the figure was generated from the SAAQIS website. Concentrations are below the current standard of 40 µgm^{-3}.

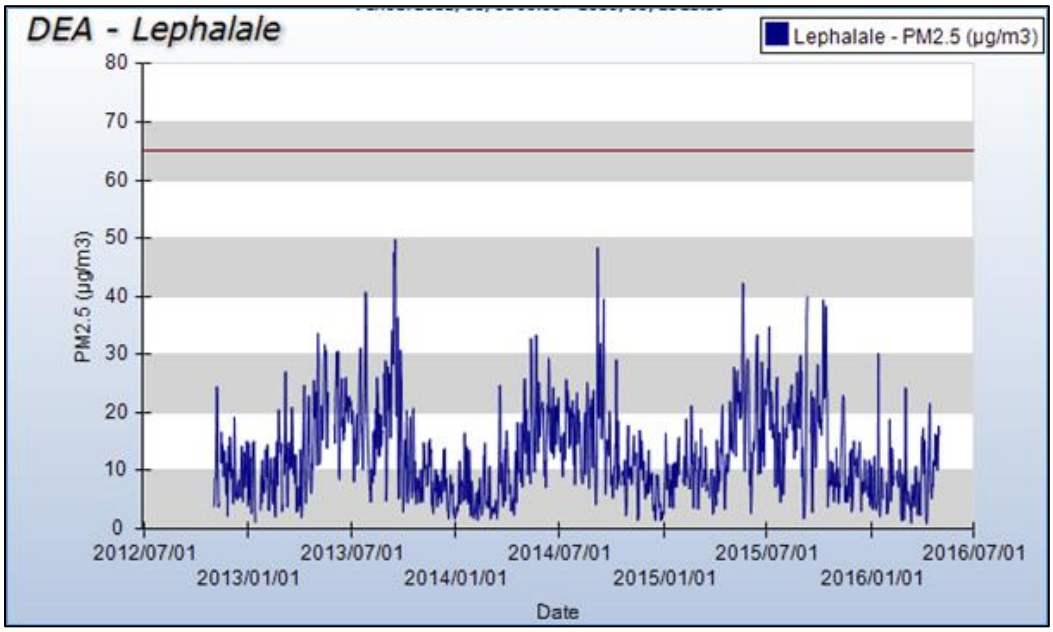

Figure 9-8: Daily $PM_{2.5}$ averages (SAAQIS, 2016)

Section 9 (1) of the National Environmental Management: Air Quality Act (NEM: AQA) establishes the National Ambient Air Quality Standard for particulate matter of aerodynamic diameter less than 2.5 micron metre ($PM_{2.5}$), published in GN R 486 in GG 35463 of 29 June 2012 (Table 9-3).

Table 9-3: National Ambient Air Quality Standard for Particulate Matter $PM_{2.5}$

National Ambient Air Quality Standard for Particulate Matter ($PM_{2.5}$)			
AVERAGING PERIOD	**CONCENTRATION**	**FREQUENCY OF EXCEEDANCE**	**COMPLIANCE DATE**
24 hours	40 µg/m^3	4	1 January 2016 – 31 December 2029
24 hours	25 µg/m^3	4	1 January 2030
1 year	20 µg/m^3	0	1 January 2016 – 31 December 2029
1 year	15 µg/m^3	0	1 January 2030
The reference method for the determination of the $PM_{2.5}$ fraction of suspended particulate matter shall be EN 14907.			

9.4.9 Flora

The Fauna and Flora Report is attached hereto in **Appendix D**. During the site inspection, 14 samples were taken on site within various location of the proposed short-term stockpile area. Six samples were taken within the Laydown Area; six samples were taken within the discontinued rail loop (proposed extension area), and two samples were taken within the GG10B Stockyard footprint (Figure 9-9). Two protected tree species *Vachellia erioloba* (Camel Thorn) and *Sclerocarya birrea subsp. caffra* (Marula) were observed at the following sample points:

- Camel 01,
- Camelt1,
- Camelt2,
- Camel4;
- Mar01; and
- Mar1.

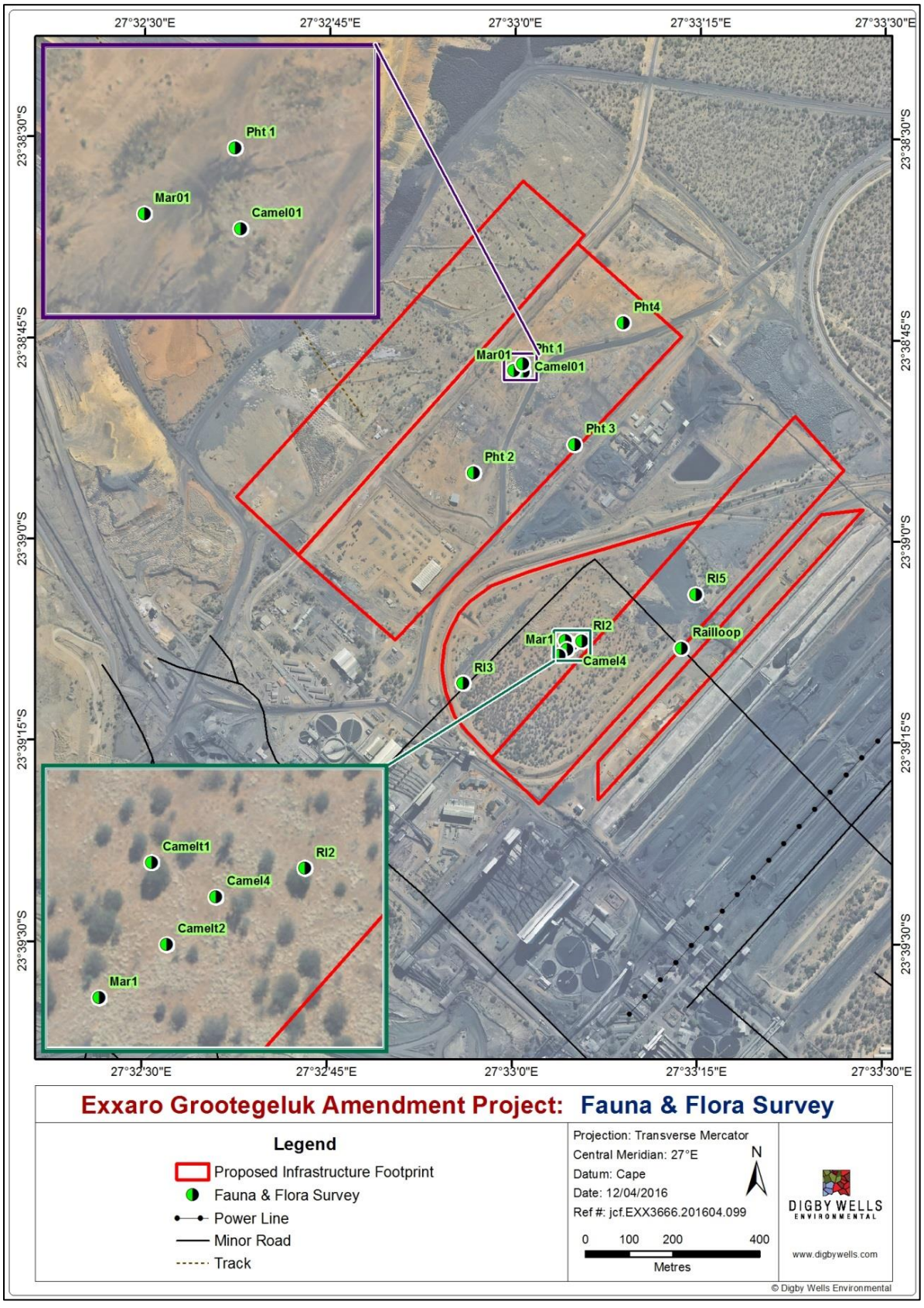

Figure 9-9: Fauna and Flora Sampling Localities

Sixteen plant species were identified, seven tree species, three grass species and three shrubs and three forb species and these species which were recorded during the survey. Based on the current survey and surveys conducted by Digby Wells in 2014, the extent of proposed short-term stockpile area is within disturbed areas. Table 9-4 provides a list of species encountered. The full list of flora species which were recorded on site, as well as expected to occur in the Project area is attached in Appendix A of the Fauna and Flora Report. Overall, the type of species identified also indicates the ingress of vegetation and previous high level of disturbance to the soil and vegetation.

Table 9-4: Identified Species on Site

Scientific name	Common name
Acacia burkei	Black monkey-thorn
Acacia erioloba	Camel Thorn
Vachellia nilotica	Scented thorn
Dichrostachys cinerea	Sickle-bush
Eragrostis curvula	Weeping love grass
Forbes	Unidentified
Gardenia volkensii	Savanna gardenia
Grewia flava	Velvet raisin
Grewia flavescens	Sandpaper raisin
Melinis repens	Natal red-top
Sclerocarya birrea	Marula
Stipagrostis ciliata var. capensis	Tall bushman grass
Tephrosia sp	
Terminalia sericea	Silver cluster-leaf
Ziziphus mucronata	Buffalo thorn

9.4.10 Fauna

The Fauna and Flora Report is attached hereto as **Appendix D**.

The presence and diversity of faunal species on site also took into conisation the findings of the Digby Wells 2014 survey. In 2104, Digby Wells found 13 mammal species, 81 bird species, two reptile and two butterfly species and one including one protected buck species; *Damaliscus lunatus*, recorded within and around the current study area.

9.4.10.1 Mammals

The discontinued rail loop area is known from previous surveys to hold various mammal species and the following mammals were recorded within the rail loop during the 2016 survey (Table 9-5).

Table 9-5: Mammal Species Found During the Survey

Common Name	Scientific Name
Warthog	*Phacochoerus aethiopicus*
Common Tsessebe	*Damaliscus lunatus*
Kudu	*Tregelaphus strepsiceros*
Common Duiker	*Sylvicapra grimmia*

Only warthog (*Phacochoerus aethiopicus*) was encountered outside of the rail loop but unidentified spoor and dung of other mammals were recorded.

9.4.10.2 Birds

Ten bird species were recorded during the 2016 survey which correlate with the previous survey conducted in 2014 (Table 9-6) and no species of special concern were recorded. During the 2014 survey, 81 bird species were recorded in the project area and the lower number of sightings can be ascribed to the time of day the survey was conducted (11am to 3pm) and absence of water in the immediate vicinity.

Table 9-6: Birds recorded at the Project Site on the 12th April 2016

Common Name	Scientific Name
Laughing Dove	*Streptopelia senegalensis*
Bronze Manikin	*Spermestes cucullatus*
Golden Breasted Bunting	*Emberiza flaviventris*
Masked Weaver	*Ploceus velatus*
Blue Waxbill	*Uraeginthus angolensis*
Spotted Flycatcher	*Muscicapa striata*
House Sparrow	*Passer domesticus*
Jameson's Fire Finch	*Lagonosticta rhodopareia*
Red Backed Shrike	*Lanius collurio*
Rattling Cisticola	*Cisticola chiniana*

9.4.10.3 Reptiles and Amphibians

Although some time was taken to search in discarded rock piles no reptiles were found, which may be ascribed to the lack of water in the area.

9.4.10.4 Butterflies

The two species of butterflies, namely the *Danaus chrysippus* (African Monarch) and the *Junonia hierta* (Yellow Pansy), recorded during the 2016 survey were found close to the Laydown Area footprint. Although the area is modified, the presence of butterflies indicates adequate food and habitat availability.

9.4.10.5 Species of Special Concern

One protected species was recorded, a buck commonly known as Tsessebe (scientific name*; Damaliscus lunatus*).This species occurs naturally in the area and was identified during the 2014 survey as occurring in the area (although not observed). The proposed Project site is a known habitat for this species due to and absence of other grazers and food availability. It must be noted that Tsessebe are not limited or restricted to the area and free movement to other areas is possible and does occur with the change is season and the availability of water and food,

9.4.11 Surface Water

The Surface Water Report is attached hereto as **Appendix E**.

South Africa is divided into 19 Water Management Areas (WMA) (National Water Resource Strategy, 2004), managed by their own water boards. The Grootegeluk Mine is situated in the Limpopo Water Management Area 01 (WMA01); in the A42J quaternary catchment. A summary of the surface water attributes associated with the A42J quaternary catchment is shown in Table 9-7, where:

- MAE refers to the Mean Annual Evaporation;
- MAR refers to Mean Annual Runoff; and
- MAP being the Mean Annual Precipitation.

In this quaternary catchment, the Mokolo River forms the major drainage system. Other surface water resources within proximity to the Grootegeluk Project are the Sandloop Spruit and the Limpopo River.

Table 9-7: Summary of the Surface Water Attributes for the Affected Quaternary Catchments (WRC, 2005)

Quaternary Catchment	Area (km^2)	Rainfall Zone	MAP (mm)	MAR (mm)	MAR $*10^6m^3$	Evaporation Zone	MAE (mm)	% MAR/ MAP
A42J	1812	A4E	428	3.21	5.81	1D	1949	0.7

The A42J quaternary catchment has a net area of 1,812 km^2 and has an MAR of 5.81 million cubic meters (10^6 m^3). Runoff emanating from this area drains into the Limpopo River, bordering the northern part of this region.

9.4.11.1 Local Drainage

The area is relatively dry with no streams or rivers within a 10 km radius from the Mine. The nearest water courses are the Sandloop Spruit, located just over 10 km from site and the Limpopo River is almost 30 km towards the north of Grootegeluk. The mine is located on relatively flat ground with no streams or defined drainage lines within the site.

The onsite runoff and stockpile seepage is managed through a number of existing secondary storm water trenches which drain towards the main storm water drains. The water collected is pumped back for reuse as part of the process water circuit, or allowed to flow to the Bosbok Dam. Any impacts on surface water are anticipated to impact the storm water management system rather than the natural water courses.

9.4.11.2 Water Quality

The water quality results from the Digby Wells 2014 Surface Water study were benchmarked against SANS 241-2 (SANS, 2011). The water quality indicated elevated levels of Sulphates, Calcium (Ca), Magnesium (Mg), Manganese and total hardness; typical of waste water. Surface water is reused with no water released to the environment, but released to in-pit sumps, dams and trenches.

9.4.12 Geohydrology

The Geohydrological (Groundwater) Report is attached hereto as **Appendix F**.

The aquifer underlying the stockpile area is a potential pathway for the migration of contaminants. The regional aquifer systems within the area, as defined by ERM (2012) are described as follows:

- Top weathered aquifer to a depth of approximately 30 m; and
- Fractured aquifer from approximately 30 m to 120 m.

A number of aquifer tests were conducted in the project area over the years. For increased accuracy, results from boreholes located in and within close proximity (no more than 400 m) of the proposed stockpile area have been considered.

The average (harmonic mean) transmissivity value is approximately 3.23 m^2/d. Considering the aquifer thickness of approximately 120 m, the permeability is estimated to be 0.023 m/d.

Measurements conducted in 2014 shows that groundwater levels (in and around the proposed stockpile area) range from 4 to 14 m.

Groundwater levels measured in 2014 (from boreholes WB34, WB59 and WB50) indicate a local groundwater flow direction of south to north.

9.4.12.1 Potential Receptors

Digby Wells carried out a hydrocensus in 2014, within a 2 km radius of the mine. Two private boreholes (AV1S and AV2S shown in Plan 6, Appendix A) were identified as potential receptors, located east northeast in relation to the stockpile area.

Borehole AV1S is no longer in use and therefore not considered as a receptor, however borehole AV2S is used to supply water to a shooting ranch (as confirmed by the hydrocensus conducted by Digby Wells, 2014). Information about these boreholes is listed in Table 9-8. The rest of the boreholes in the area form part of Exxaro's groundwater monitoring network and water quality within these boreholes should be in line with the conditions stipulated within the Water Use Licence.

Table 9-8: Private boreholes in the Grootegeluk Mine area

BH Name	Cape, LO27			Groundwater Level		Comment	Distance from Stockpiles
	X	Y	Z	m bgl	mamsl		
AV1S	58370.26	-2614698	885.43	24.3	861.13	Not in use	2 km
AV2S	58663	-2614726	885.43	18.53	866.9	Domestic use	2 km

9.4.12.2 Geochemical analysis and waste classification

The Geochemical Report is attached hereto as **Appendix G**.

The material from the GG1 to GG6 process plants were sampled and submitted to an accredited laboratory (Jones Environmental Laboratory) for analysis by WSP Environmental (Pty) Ltd. The tests conducted were *aqua regia* digestion for total concentration and reagent water (distilled water) leaching procedure (20:1 ratio) in accordance with the National Environmental NEM:WA guidelines for mono-disposal (DEA, 2013). Based on the outcomes of the test work, the "waste" can be classed (Table 9-9) after comparison with the total concentration threshold (TCT) and leachable concentration threshold (LCT) values.

Table 9-9: Classification of GG1 to 6 materials

Test	Purpose	Results (All parameters considered)	Classification
GG 1- 6			
Aqua regia digestion	Total Concentration (TC)	TC<TCT0	Type 4
Reagent water leach test	Leachable Concentration (LC)	LC<LCT0	Type 4

Based on the above, the material from GG1 to GG6 is classed as a Type 4 waste and should be disposed of or stored at a facility with a Class D liner. A conceptual design for a Class D liner as given by the NEM: WA guidelines (DEA, 2013) are shown below in Figure 9-10. Authorisation for Phase 1 has already been granted by DWS and the DMR respectively allowing them to stockpile coal on the footprint of GG10A.

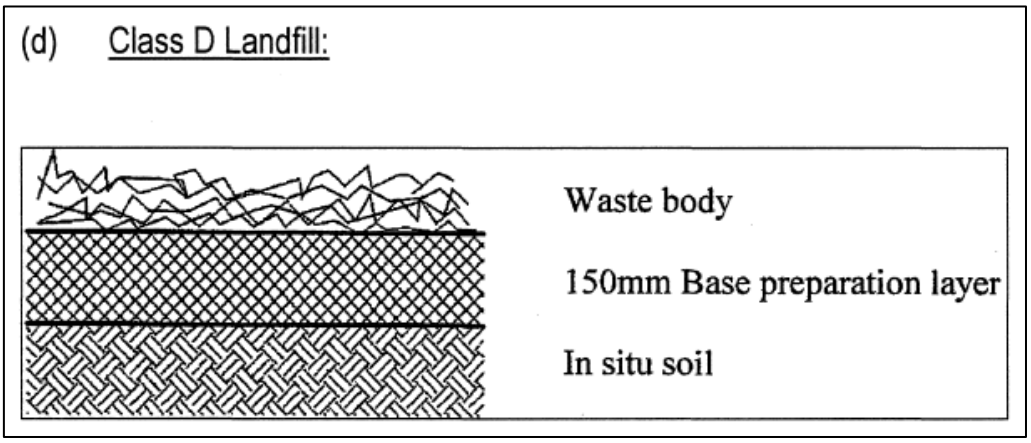

Figure 9-10: Minimum design requirements for a Class D liner (DEA, 2013)

The material from the GG7 to GG8 process plants were sampled and submitted to an accredited laboratory (Jones Environmental Laboratory) by WSP Environmental (Pty) Ltd. The results of the test work are shown in Appendix B of the Geochemical Report attached hereto in **Appendix G**. The tests conducted were *aqua regia* digestion for total concentration and reagent water (distilled water) leaching procedure (20:1 ratio) in accordance with the National Environmental NEM:WA guidelines for mono-disposal (DEA, 2013). Based on the outcomes of the test work, the "waste" can be classed (Table 9-10) after comparison with the total concentration threshold (TCT) and leachable concentration threshold (LCT) values.

Table 9-10: Classification of GG7 to 8 materials

Test	Purpose	Results (All parameters considered)	Classification
GG 7- 8			
Aqua regia digestion	Total Concentration (TC)	TCT0<TC<TCT1	Type 3
Reagent water leach test	Leachable Concentration (LC)	LC<LCT0	Type 4

Based on the above, the material from GG7 to GG8 is classed as a Type 3 waste and should be disposed of or stored at a facility with a Class C liner or a system with similar properties. A conceptual design for a Class C liner as given by the NEM: WA guidelines (DEA, 2013) are shown below in Figure 9-11. This amendment focuses on Phase 2 to obtain authorisation to stockpile the abovementioned coal for a period of five years.

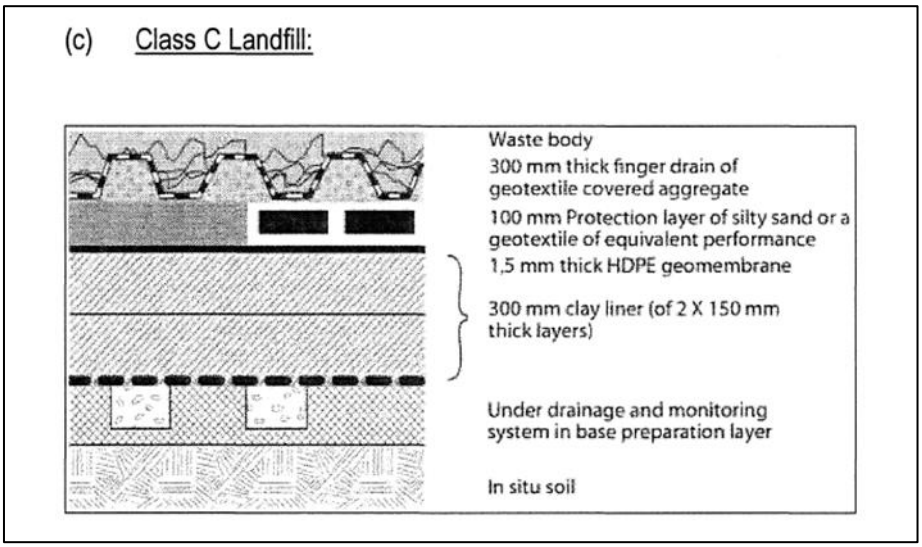

Figure 9-11: Minimum design requirements for a Class C liner (DEA, 2013)

9.4.12.3 Mineralogy

The main minerals are quartz, muscovite, kaolinite, microcline with calcite and pyrite. The dominant mineral or compound is however the carbonaceous material or coal. The mineralogy indicated by the XRD results is typical of the sandstone/siltstone/mudstone formations dominated by clay minerals and feldspar. Inclusions of calcite/dolomite rich in Ca and Mg are evidence of the depositional environment in which the formations formed, with high evaporation and weathering rates.

The combination of the various oxides like Al_2O_3 and Fe_2O_3 combined with the SiO_2 all contribute to the silicate and oxide minerals present in the coal material along with carbon reported in the table as lost on ignition (LOI) due to the carbon being burnt during the analysis. Cl, Ba, La, Zr, Cu, Sr, Zn and Ni are the dominant trace elements as would be expected in a crustal environment with enriched clay and silicate mineralogy.

9.4.12.4 Acid Producing Potential

The paste pH in the ABA results show that there were no acid generation prior to analysis. However based on the paste pH from the NAG results (preparation pH of 4.5) samples GG7-8 A and B and sample GG1-6 A is acid generating with GG1-6 B being a slightly lower risk for acid generation only based on the paste pH results. From the ABA results the total sulphur (>0.3%), NNP (<0) and NPR (<1) shows that all 4 samples are potentially acid generating. This is due the pyrite content and low neutralising potential.

All four samples are classed as acid generating (Rock type I). This is however normal for coal deposits and is the same in most deposits. Surface water management of storm water and runoff from the stockpiles are crucial in managing any acidic water and leachate from toe seepage. These specific stockpiles at Grootegeluk will however be compacted and will only be I operation for short period (5 years) and with the low rainfall in the area the risk of high volumes of AMD formation is low. Although the mean annual precipitation (MAP) in the

Grootegeluk area is low, in some months high intensity rainfall can occur. With the compaction of the coal during the stockpiling process[4] the permeability will be decreased and runoff increased. This last mentioned process will allow lower infiltration, but if high intensity rainfall events do take place for an extended period some AMD formation can potentially be observed as suggested by the lab tests.

9.4.12.5 Leachate Results

Almost all the metals are below detection in both tests with the exception of Ba, Ni and Mn. Ba and Ni are heavy metals commonly associated with the geology as trace elements. In both tests the concentrations leaching was however well below the guideline values and does not pose an environmental or health risk. Over time the load can potentially increase. However, with the continuous stockpiling and reclaiming as well as compaction to take place the risk of seepage is reduced.

The Mn concentrations are however slightly above the guideline values for drinking water. Manganese is a common element enriched in the earth's crust and does easily dissolve into water under a wide range of pH levels. However, at the expected rate of seepage and low rainfall at Grootegeluk the element should not leach out at these concentrations given by the lab tests which simulate a worst case scenario[5]. All other elements are below the guideline values for drinking water.

The TDS values are mostly dominated by the sulphate distribution but do not pose a risk at the levels they are detected in all samples under both test methods. There is not much of a difference between the leachate concentrations of the distilled water tests and that of the SPLP results, even though the SPLP is done at a lower more acidic pH of 4.8.

The above conclusions based on the laboratory results and information at hand show that the metal leach potential of the material is low and will further be reduced by compaction. The environmental risk for contamination of groundwater through seepage is low.

9.4.13 Soils, Land Capability and Land Use

The Soil, Land Use and Land Capability Report is attached hereto as **Appendix H**.

Representative soil samples (10 samples) were collected within the Mining Right Area from the previous assessment that was undertaken in 2014 and the information presented below provides a summary of the findings. These samples were collected from dominant Hutton, Clovelly and Shortlands soil types. The soil samples were analysed for pH, -Phosphorus (P), Potassium (K), Sodium (Na), Ca and Mg. The results are in Table 9-11 below.

[4] Based on information provided by Exxaro the coal will be compacted in line with stockpile management guidelines. The coal will be compacted down to 101% of the natural density and lead to a reduced permeability.

[5] Static leachate tests performed by laboratories are done to simulate a worst case scenario. This involves the milling of samples down to very small particle sizes. This process increases the mineral surface areas open to interact with oxygen and water and in turn increase the reactivity of minerals.

Table 9-11: Soil fertility indicators of the major groups

Sample Number	Description	pH (KCl)	P mg kg^{-1}	K mg kg^{-1}	Na mg kg^{-1}	Ca mg kg^{-1}	Mg mg kg^{-1}
1	Clovelly Topsoil	4,62	0	24	7	49	17
2	Subsoil	4,55	0	27	8	40	15
3	Clovelly Topsoil	5,01	0	31	7	70	18
4	Subsoil	4,42	0	20	8	33	11
5	Shortlands Topsoil	5,84	1	111	16	777	237
6	Subsoil	6,32	0	77	13	529	188
7	Hutton Topsoil	6,00	1	61	11	438	131
8	Subsoil	5,82	0	25	8	181	47
9	Hutton Topsoil	5,98	1	41	9	242	41
10	Subsoil	6,16	0	26	10	263	36

The pH levels were below 7 and thus these soils are acidic. The P levels encountered in the samples from the site were low, thus not well-suited for plant growth and development. Almost all of the soil samples collected on the site exhibit the profile of Ca>Mg>K>Na concentrations. These soils had low fertility content and this is due to poor soil parent materials.

9.4.13.1 Land Capability-Site Specific

The land capability of the surveyed sites is agriculture, limited to grazing animals as the prevailing rainfall limits arable crop production.

9.4.13.2 Current Land Use-Site Specific

The current land use within the proposed project area surrounding Grootegeluk Mine is wilderness while the land use within the proposed stockpile areas is mining related as a result of historical disturbances from mining activities.

9.4.14 Heritage

The Heritage Report is attached hereto as **Appendix I.**

The rail loop and adjacent areas were assessed in 2014 as part of the Infrastructure Expansion Project. Within this assessment, it was noted that the site-specific project area is situated within an existing operation that has been heavily disturbed through time. In addition to this, no heritage resources were identified during the pre-disturbance survey completed on 12 May 2014. Statutory comment issued by the South African Heritage Resources Agency (SAHRA) on 18th August 2014 (cf. Ref 5935) for the Grootegeluk Coal Mine Infrastructure Expansion Project acknowledge that no heritage resources were identified

throughout the proposed developed area and did not object to the proposed amendment. A recommendation for Exemption from further heritage assessment specifically for this Project has been submitted to SAHRA and Limpopo Heritage Resources Authority (LIHRA) on condition that the requirements from SAHRA as issued in the Statutory Comment for Case ID: 5935 remain valid and implemented by the proponent.

9.5 Description of the Current Land Uses

The land capability of the surveyed sites is agriculture, limited to grazing animals as the prevailing rainfall limits arable crop production. As shown in Figure 9-12 below, the proposed expansion of the GG10B stockyard is entirely within the Grootegeluk footprint. The land uses surrounding the proposed Project footprint consist of mining and the mining-related activities. Outside of the Mining Right boundary, the land cover comprise thicket/dense bush and low shrubland and therefore the land use is classed as wilderness or grazing.

9.5.1 Description of specific environmental features and infrastructure on the site

Refer to Section 9.4 above for a description of the current environmental features on site. Currently the areas surrounding the proposed short-term stockpile areas comprise existing stockyards to the south-east of the Project footprint, conveyors and processing plants to the south of the proposed Project footprint, workshops and a pollution control dam to the north of the proposed Project footprint and the new rail loop to the north east. Refer to Plan 2 of **Appendix B**.

9.5.2 Environmental and current land use map

The current land use map is depicted in Figure 9-12 .

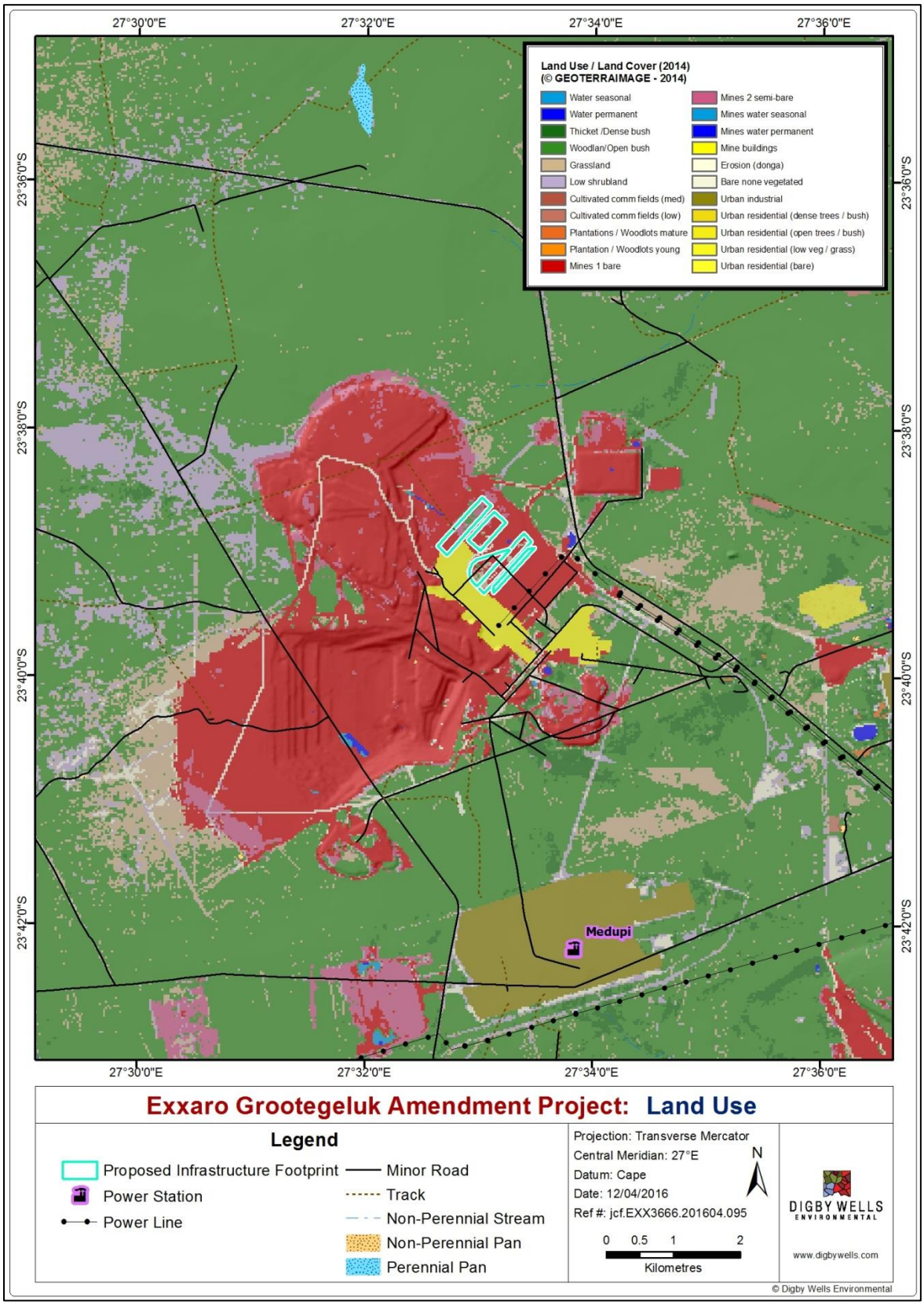

Figure 9-12: Current Land Use Map

9.6 Methodology used in determining and ranking the nature, significance, consequence, extent, duration and probability of potential environmental impacts and risks

Details of the impact assessment methodology used to determine the significance of physical, bio-physical and socio-economic impacts are provided below.

The significance rating process follows the established impact/risk assessment formula:

Significance = Consequence x Probability x Nature

Where

Consequence = Intensity + Extent + Duration

And

Probability = Likelihood of an impact occurring

And

Nature = Positive (+1) or negative (-1) impact

Note: In the formula for calculating consequence, the type of impact is multiplied by +1 for positive impacts and -1 for negative impacts

The matrix calculates the rating out of 147, whereby Intensity, Extent, Duration and Probability are each rated out of seven as indicated in Table 9-14. The weight assigned to the various parameters is then multiplied by +1 for positive and -1 for negative impacts.

Impacts are rated prior to mitigation and again after consideration of the mitigation measure proposed in this EIA/EMP Report. The significance of an impact is then determined and categorised into one of eight categories, as indicated in Table 9-13, which is extracted from Table 9-12. The description of the significance ratings is discussed in Table 9-14.

It is important to note that the pre-mitigation rating takes into consideration the activity as proposed, i.e. there may already be certain types of mitigation measures included in the design (for example due to legal requirements). If the potential impact is still considered too high, additional mitigation measures are proposed.

Table 9-12: Impact Assessment Parameter Ratings

Rating	Intensity/Replacability		Extent	Duration/Reversibility	Probability
	Negative Impacts (Nature = -1)	**Positive Impacts (Nature = +1)**			
7	Irreplaceable loss or damage to biological or physical resources or highly sensitive environments. Irreplaceable damage to highly sensitive cultural/social resources.	Noticeable, on-going natural and / or social benefits which have improved the overall conditions of the baseline.	International The effect will occur across international borders.	Permanent: The impact is irreversible, even with management, and will remain after the life of the project.	Definite: There are sound scientific reasons to expect that the impact will definitely occur. >80% probability.
6	Irreplaceable loss or damage to biological or physical resources or moderate to highly sensitive environments. Irreplaceable damage to cultural/social resources of moderate to highly sensitivity.	Great improvement to the overall conditions of a large percentage of the baseline.	National Will affect the entire country.	Beyond project life: The impact will remain for some time after the life of the project and is potentially irreversible even with management.	Almost certain / Highly probable: It is most likely that the impact will occur. <80% probability.

Rating	Intensity/Replacability		Extent	Duration/Reversibility	Probability
	Negative Impacts (Nature = -1)	**Positive Impacts (Nature = +1)**			
5	Serious loss and/or damage to physical or biological resources or highly sensitive environments, limiting ecosystem function. Very serious widespread social impacts. Irreparable damage to highly valued items.	On-going and widespread benefits to local communities and natural features of the landscape.	Province/ Region Will affect the entire province or region.	Project Life (>15 years): The impact will cease after the operational life span of the project and can be reversed with sufficient management.	Likely: The impact may occur. <65% probability.
4	Serious loss and/or damage to physical or biological resources or moderately sensitive environments, limiting ecosystem function. On-going serious social issues. Significant damage to structures / items of cultural significance.	Average to intense natural and / or social benefits to some elements of the baseline.	Municipal Area Will affect the whole municipal area.	Long term: 6-15 years and impact can be reversed with management.	Probable: Has occurred here or elsewhere and could therefore occur. <50% probability.

Rating	Intensity/Replacability		Extent	Duration/Reversibility	Probability
	Negative Impacts (Nature = -1)	**Positive Impacts (Nature = +1)**			
3	Moderate loss and/or damage to biological or physical resources of low to moderately sensitive environments and, limiting ecosystem function. On-going social issues. Damage to items of cultural significance.	Average, on-going positive benefits, not widespread but felt by some elements of the baseline.	Local Local extending only as far as the development site area.	Medium term: 1-5 years and impact can be reversed with minimal management.	Unlikely: Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur. <25% probability.
2	Minor loss and/or effects to biological or physical resources or low sensitive environments, not affecting ecosystem functioning. Minor medium-term social impacts on local population. Mostly repairable. Cultural functions and processes not affected.	Low positive impacts experience by a small percentage of the baseline.	Limited Limited to the site and its immediate surroundings.	Short term: Less than 1 year and is reversible.	Rare / improbable: Conceivable, but only in extreme circumstances. The possibility of the impact materialising is very low as a result of design, historic experience or implementation of adequate mitigation measures. <10% probability.

Rating	Intensity/Replacability		Extent	Duration/Reversibility	Probability
	Negative Impacts (Nature = -1)	**Positive Impacts (Nature = +1)**			
1	Minimal to no loss and/or effect to biological or physical resources, not affecting ecosystem functioning. Minimal social impacts, low-level repairable damage to commonplace structures.	Some low-level natural and / or social benefits felt by a very small percentage of the baseline.	Very limited/Isolated Limited to specific isolated parts of the site.	Immediate: Less than 1 month and is completely reversible without management.	Highly unlikely / None: Expected never to happen. <1% probability.

Table 9-13: Probability/Consequence Matrix

Significance

Probability																																						
7	-147	-140	-133	-126	-119	-112	-105	-98	-91	-84	-77	-70	-63	-56	-49	-42	-35	-28	-21	21	28	35	42	49	56	63	70	77	84	91	98	105	112	119	126	133	140	147
6	-126	-120	-114	-108	-102	-96	-90	-84	-78	-72	-66	-60	-54	-48	-42	-36	-30	-24	-18	18	24	30	36	42	48	54	60	66	72	78	84	90	96	102	108	114	120	126
5	-105	-100	-95	-90	-85	-80	-75	-70	-65	-60	-55	-50	-45	-40	-35	-30	-25	-20	-15	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105
4	-84	-80	-76	-72	-68	-64	-60	-56	-52	-48	-44	-40	-36	-32	-28	-24	-20	-16	-12	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72	76	80	84
3	-63	-60	-57	-54	-51	-48	-45	-42	-39	-36	-33	-30	-27	-24	-21	-18	-15	-12	-9	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60	63
2	-42	-40	-38	-36	-34	-32	-30	-28	-26	-24	-22	-20	-18	-16	-14	-12	-10	-8	-6	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42
1	-21	-20	-19	-18	-17	-16	-15	-14	-13	-12	-11	-10	-9	-8	-7	-6	-5	-4	-3	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
	-21	-20	-19	-18	-17	-16	-15	-14	-13	-12	-11	-10	-9	-8	-7	-6	-5	-4	-3	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21

Consequence

Table 9-14: Significance Rating Description[6]

Score	Description	Rating
109 to 147	A very beneficial impact that may be sufficient by itself to justify implementation of the project. The impact may result in permanent positive change	Major (positive) (+)
73 to 108	A beneficial impact which may help to justify the implementation of the project. These impacts would be considered by society as constituting a major and usually a long-term positive change to the (natural and / or social) environment	Moderate (positive) (+)
36 to 72	A positive impact. These impacts will usually result in positive medium to long-term effect on the natural and / or social environment	Minor (positive) (+)
3 to 35	A small positive impact. The impact will result in medium to short term effects on the natural and / or social environment	Negligible (positive) (+)
-3 to -35	An acceptable negative impact for which mitigation is desirable. The impact by itself is insufficient even in combination with other low impacts to prevent the development being approved. These impacts will result in negative medium to short term effects on the natural and / or social environment	Negligible (negative) (-)
-36 to -72	A minor negative impact requires mitigation. The impact is insufficient by itself to prevent the implementation of the project but which in conjunction with other impacts may prevent its implementation. These impacts will usually result in negative medium to long-term effect on the natural and / or social environment	Minor (negative) (-)
-73 to -108	A moderate negative impact may prevent the implementation of the project. These impacts would be considered as constituting a major and usually a long-term change to the (natural and / or social) environment and result in severe changes.	Moderate (negative) (-)
-109 to -147	A major negative impact may be sufficient by itself to prevent implementation of the project. The impact may result in permanent change. Very often these impacts are immitigable and usually result in very severe effects. The impacts are likely to be irreversible and/or irreplaceable.	Major (negative) (-)

[6] It is generally sufficient to only monitor impacts that are rated as negligible or minor

9.7 Identified Impacts and Proposed Mitigation

This section provides the impact assessment undertaken by the Specialists involved in the Project, the methodology used, and a summary of the positive and negative impacts.

9.7.1 Air Quality

The AERMOD model predicts the one-hour average concentration at each receptor grid point specified, for each hour of the year's meteorological data. The highest ground level concentration is established for each hour and is referred to as the peak hourly concentration.

The daily values option controls the output options for tables of concurrent values summarised by receptor for each day processed. For each averaging period for which the daily values option is selected, the model will print in the main output file the concurrent averages for all receptors for each day of data processed. Results are output for each source group.

The ground level concentration of pollutants follow closely the main wind directions. Numerical values of maximum depend on the emission rate and the meteorological data used. Simulations were undertaken to determine the concentrations of PM_{10}, $PM_{2.5}$, and dust (TSP) from sources associated with the proposed amendment at Grootegeluk.

9.7.1.1 Isopleth Plots and Evaluation of Modelling Results

A summary of ground level concentrations predicted at the mine boundary for the different pollutants are presented in Table 9-15.

Table 9-15: South African ambient air quality standards versus predicted concentrations at the mine boundary.

Pollutant	Averaging period	Guideline (µg/m³)	Ground level concentrations at the mine boundary?	Figure
	Unmitigated concentrations			
PM_{10}	24 Hours	75 (1)	10.2	9-16
	1 Year	40(1)	0.9	9-17
$PM_{2.5}$	24 Hours	40(1)	3	9-18
	1 Year	20(1)	0.3	9-19
Dust deposition	Maximum 24 Hours	600(2)	3	9-20

	Mitigated concentrations			
Dust Deposition	Maximum 24 Hours	600(2)	3	9-21

(1) South African- 1 January 2016 National Ambient Air Quality Standards (NAAQS)
(2) South African- National Ambient Air Quality Standards (NAAQS) – National Dust Control Regulation 2013

9.7.1.2 PM_{10} Predicted Impacts

The isopleth and predicted 24-hour ground concentrations due to wind erosion from the proposed stockpiles and the material handling processes are given in Figure 9-13 and Table 9-16. The predicted highest of 10.2 µg/m³ at the mine boundary is within the current standard of 75 µg/m³. Concentrations at the sensitive receptors are very low and will have negligible impacts on background air quality.

Table 9-16: Predicted 24 hour concentrations at sensitive receptors

Sensitive Receptors	Ground level concentration (µg/m³)
Grootegeluk Mine boundary	10.2
Marapong community	1.69
Matimba Power Station	2.9
Medupi Power Station	4.2

The highest annual concentration of PM_{10} predicted as a result of wind erosion from the proposed stockpiles of 0.9 µg/m³ at the mine boundary is below the current standard of 40 µg/m³ (Figure 9-14). Table 9-17 shows the predicted concentrations at the selected sensitive receptors.

Table 9-17: Predicted concentrations at sensitive receptors

Sensitive Receptors	Ground level concentration (µg/m³)
Grootegeluk Mine boundary	0.9
Marapong community	0.06
Matimba Power Station	0.08
Medupi Power Station	0.2

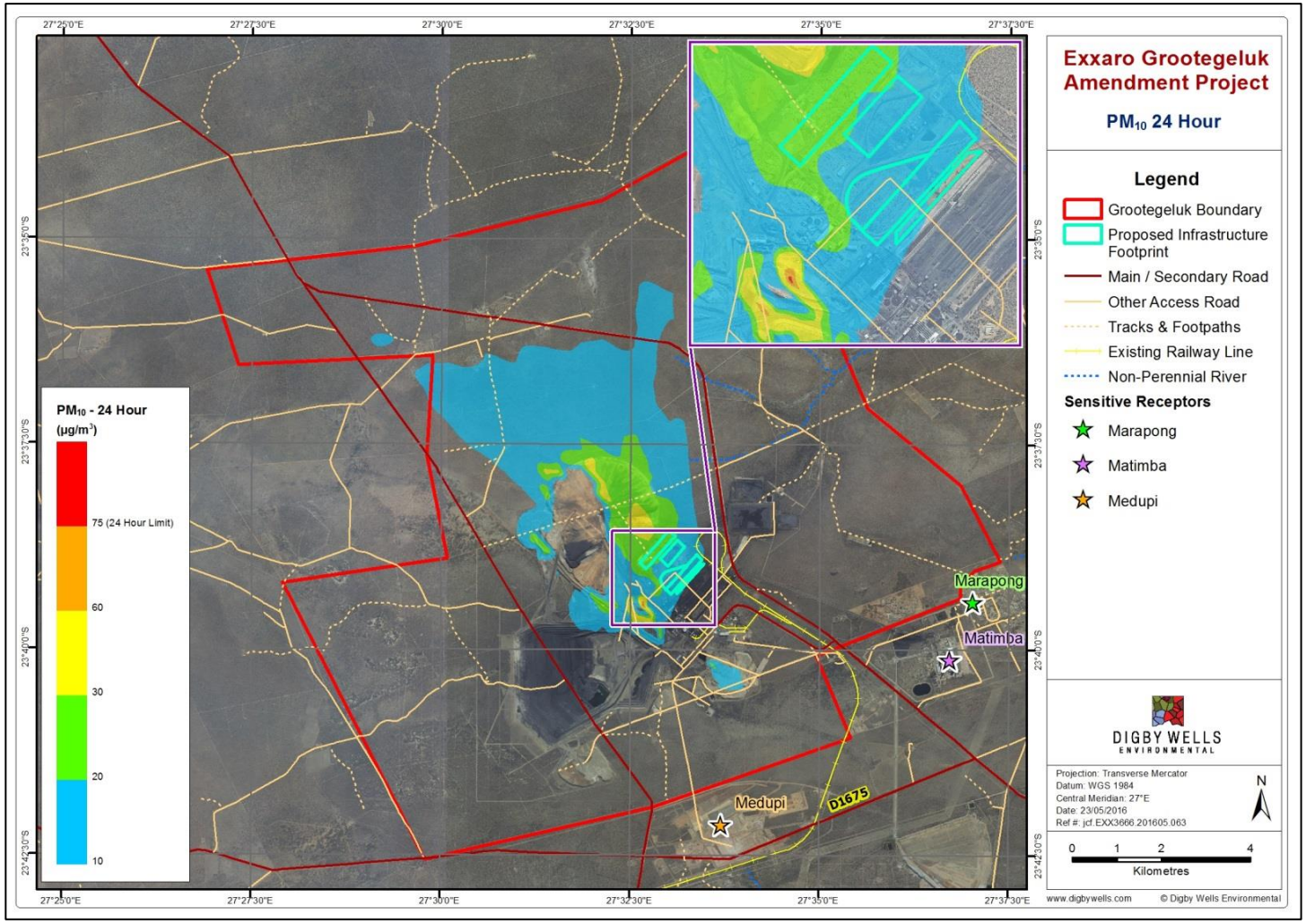

Figure 9-13: Predicted 24-hour average PM_{10} concentrations, 99th percentile (µg/m^3)

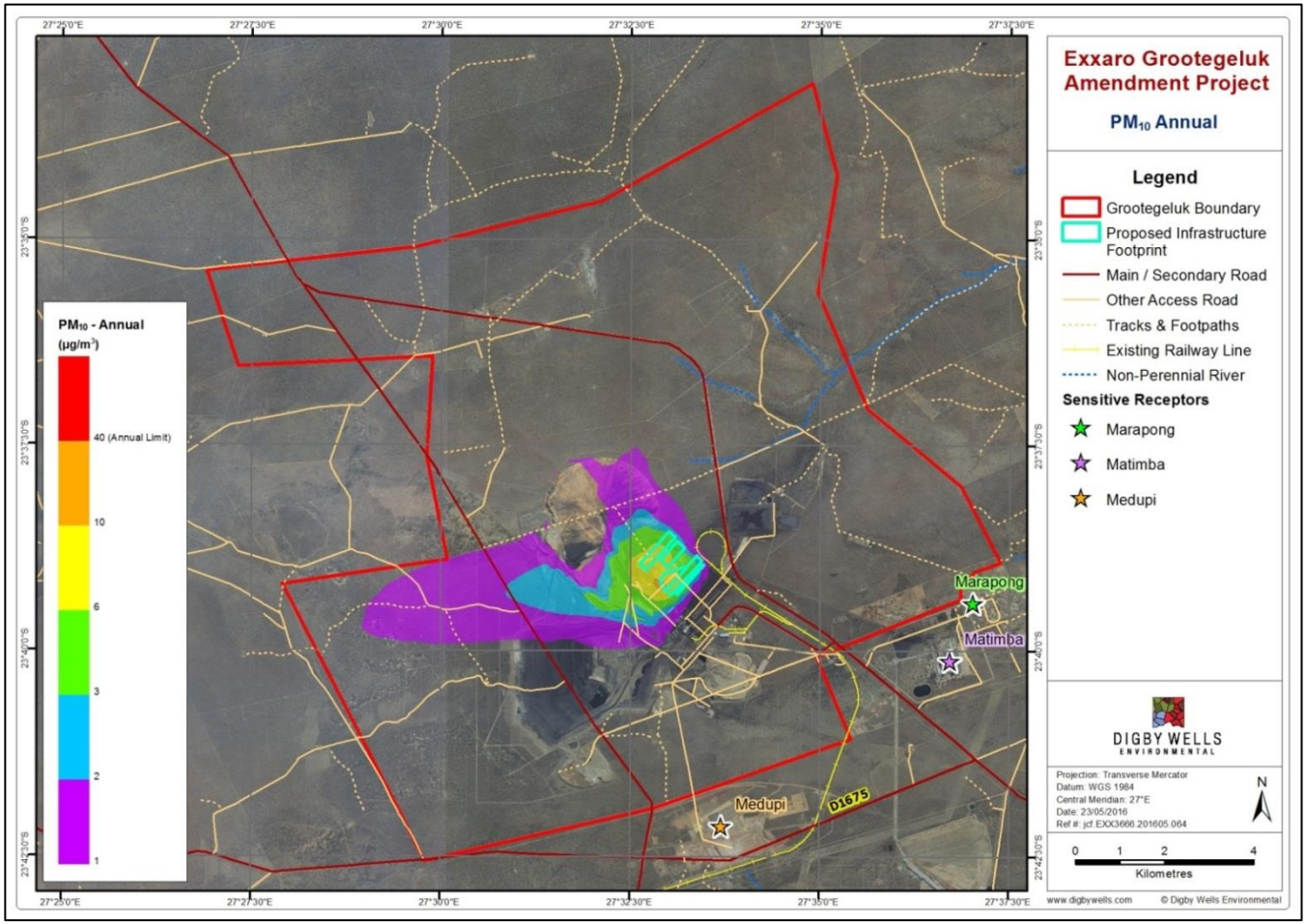

Figure 9-14: Predicted annual average PM_{10} concentrations (µg/m^3)

9.7.1.3 $PM_{2.5}$ Predicted Impacts

The isopleth and predicted 24-hour $PM_{2.5}$ ground level concentrations from the stockpiles and the material handling processes are given in Figure 9-15 and Table 9-18. The predicted highest of 3 µg/m³ at the mine boundary is within the current standard of 40 µg/m³. Concentrations at the sensitive receptors are very low and will have negligible impact on background air quality.

Table 9-18: Predicted 24 hour average $PM_{2.5}$ concentrations at sensitive receptors

Sensitive Receptors	(µg/m³)
Grootegeluk Mine boundary	3.0
Marapong community	0.6
Matimba Power Station	0.9
Medupi Power Station	1.4

The predicted highest annual concentration of $PM_{2.5}$ anticipated from the proposed stockpiles is 0.3 µg/m³ at the mine boundary and within the standard of 20 µg/m³ (Figure 9-16). Table 9-17 shows the predicted ground level concentrations at the selected sensitive receptors. Concentrations at the sensitive receptors are very low and will have negligible impact on background air quality.

Table 9-19: Predicted annual average $PM_{2.5}$ concentrations at sensitive receptors

Sensitive Receptors	Ground level concentration (µg/m³)
Grootegeluk Mine boundary	0.30
Marapong community	0.02
Matimba Power Station	0.02
Medupi Power Station	0.06

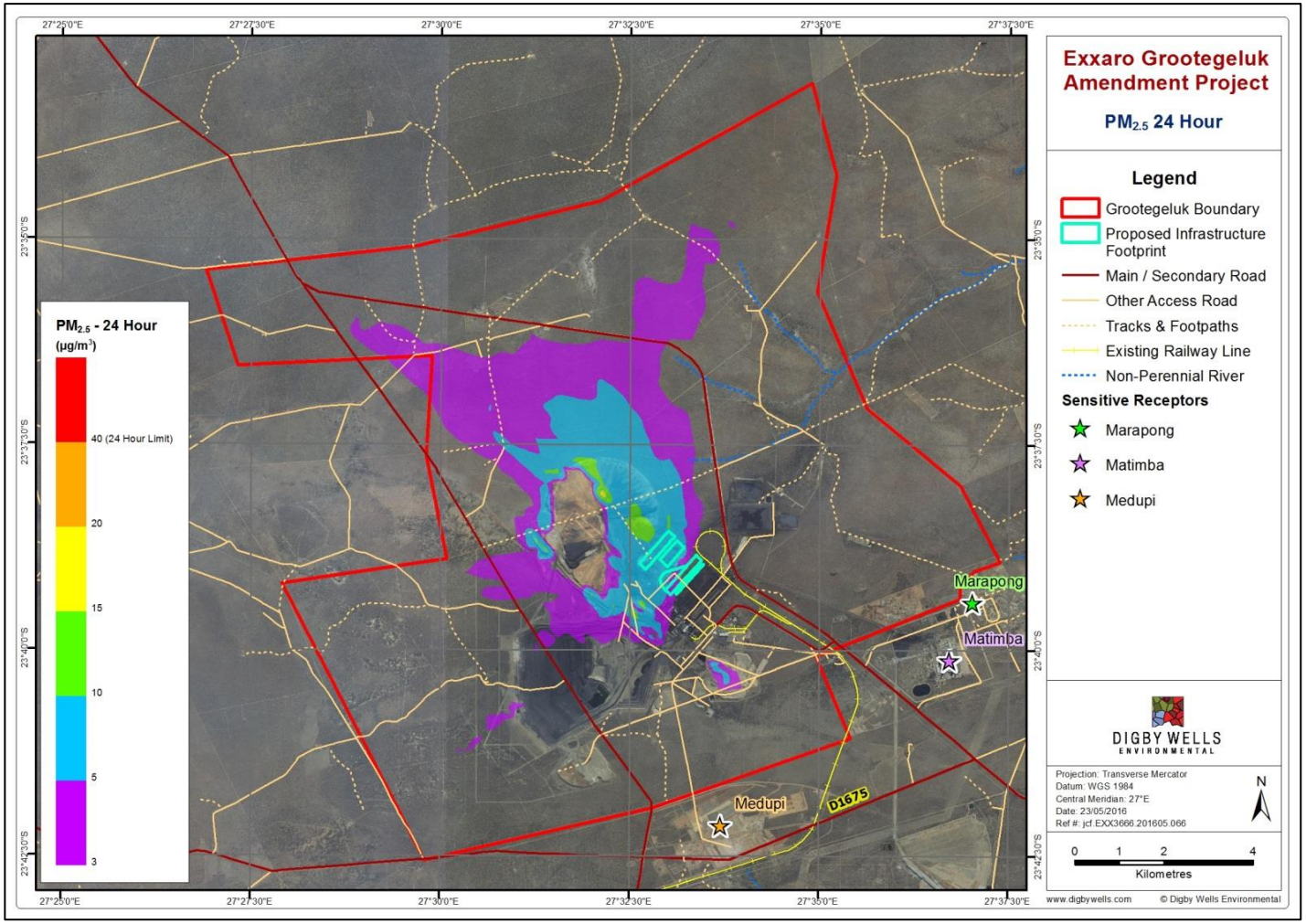

Figure 9-15: Predicted 99th percentile monthly average $PM_{2.5}$ concentrations (µg/m³)

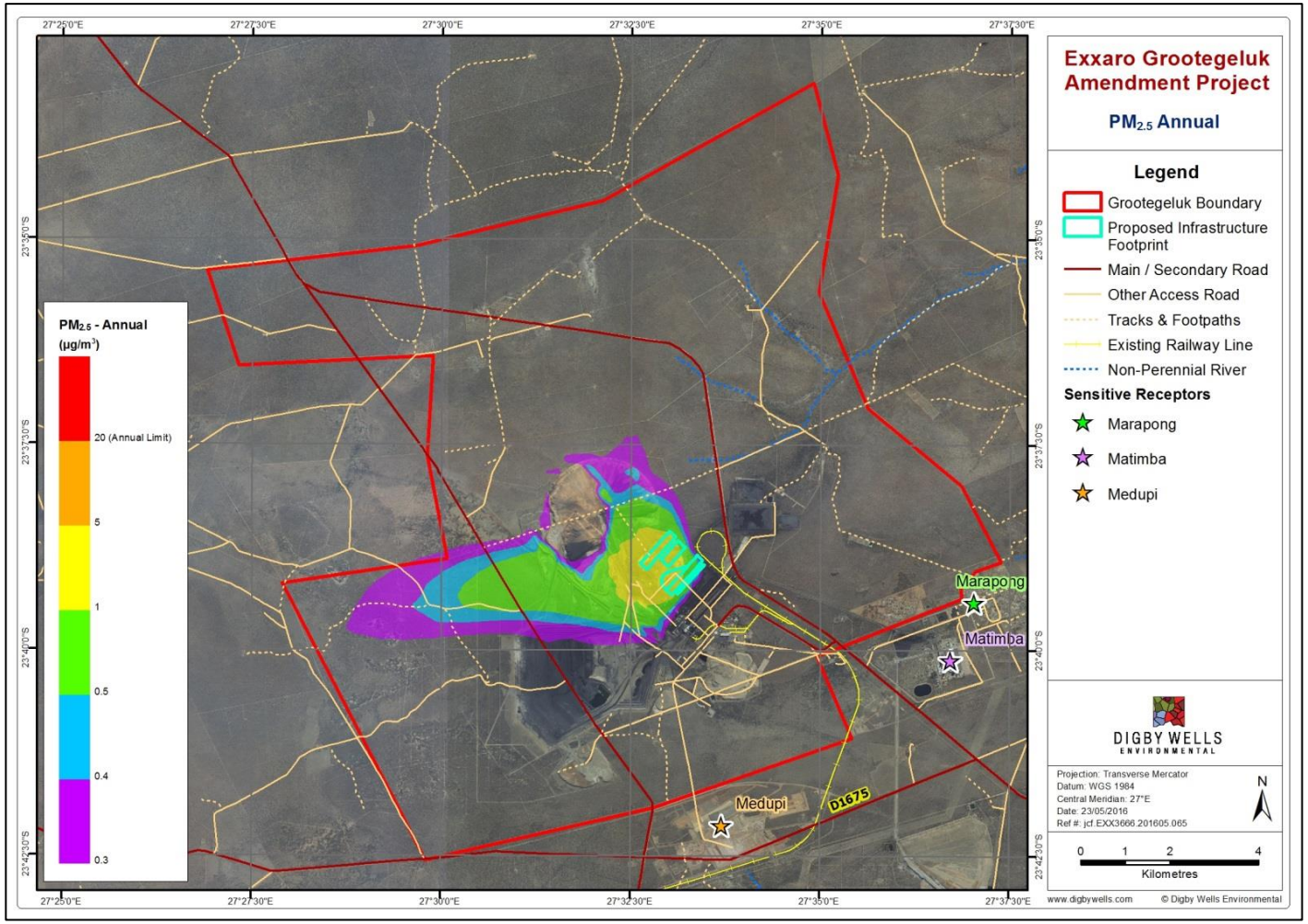

Figure 9-16: Predicted annual average $PM_{2.5}$ concentrations (µg/m^3)

9.7.1.4 Dust deposition predicted impacts

The maximum dust deposition rate predicted by the model of 352 mg/m²/day at point 555879.00, 7384059 within the mine operations is well within the residential standard (600 mg/m²/day). The highest predicted at the mine boundary of 3 mg/m²/day (Figure 9-17) without mitigation measures will exert negligible impact on background air quality. Dust deposition rates predicted at the sensitive receptors are presented in Table 9-20.

When mitigation measures were applied, the dust deposition maximum deposition rate decreased to 227 mg/m²/day at point 555879.00, 7384059. The predicted dust deposition rates at the sensitive receptor sites are shown in Table 9-20. Isopleths showing the zones of impact are presented below (Figure 9-17 and Figure 9-18).

Although deposition rates predicted are within the recommended residential limit, mitigation measures should form part of the day-to-day operation once operation commences.

Table 9-20: Dust deposition rate at sensitive receptors

Receptor point	Dustfall with no mitigation (mg/d/m^2, 30-day average)	Dustfall with mitigation (mg/d/m^2, 30-day average)
NEM:AQA Standard Residential	600	600
NEM:AQA Standard Industrial	1 200	1 200
Grootegeluk Mine boundary	3	3
Marapong community	0.7	0.5
Matimba Power Station	0.9	0.6
Medupi Power Station	1.1	0.8

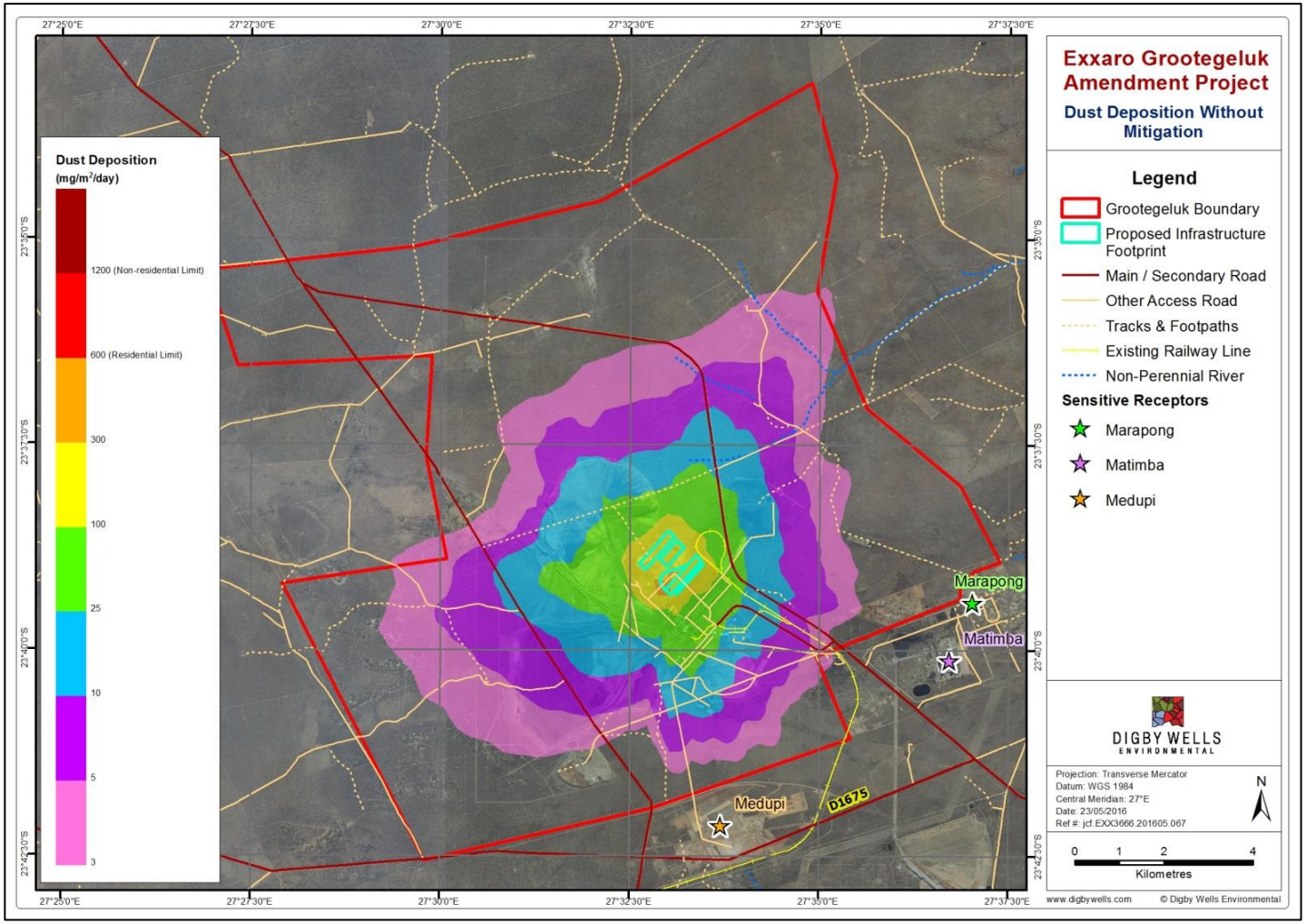

Figure 9-17: Predicted dust fallout average over 30 days (mg/m^2/d) no mitigation

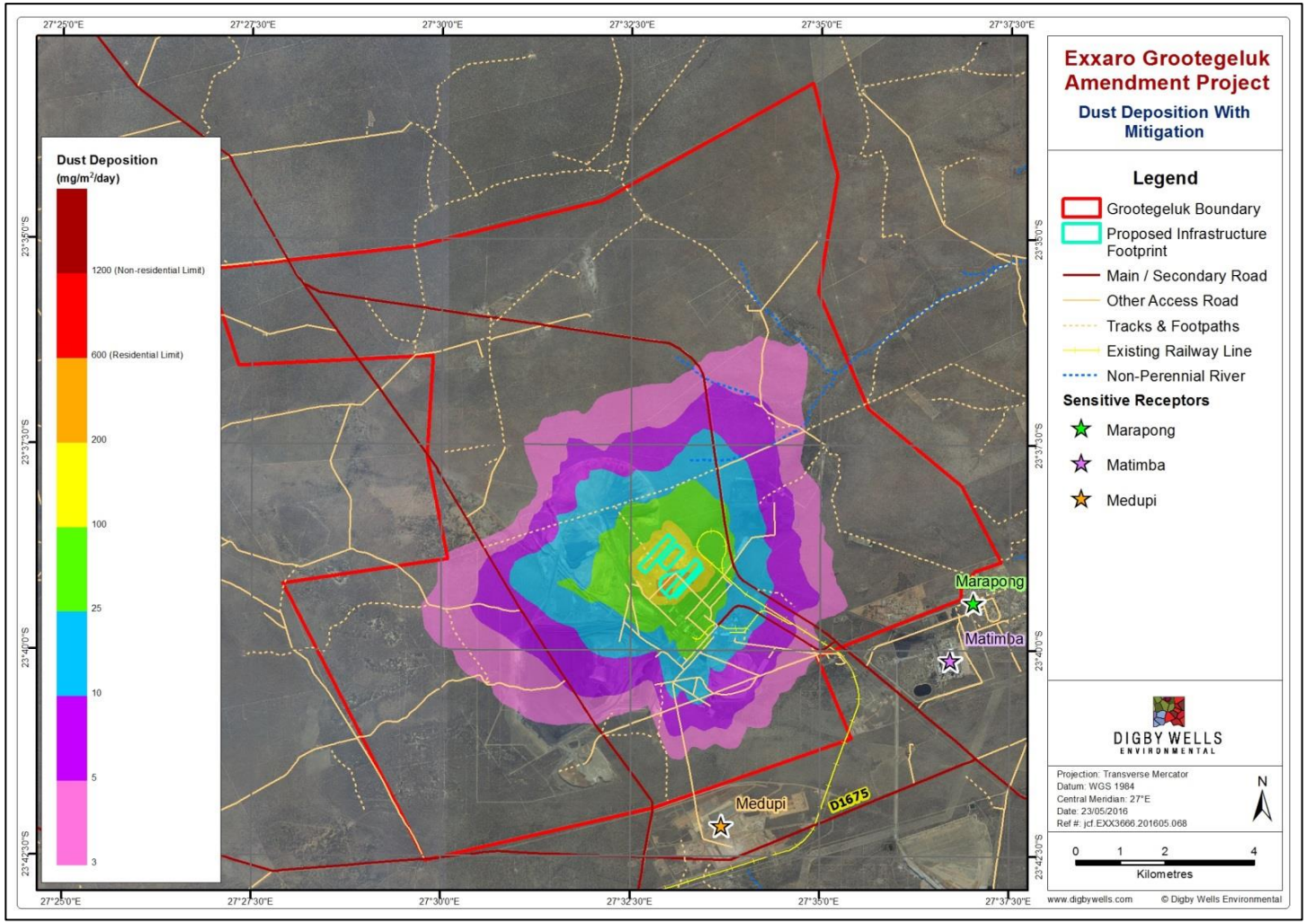

Figure 9-18: Predicted dust fallout average over 30 days (mg/m^2/d) with mitigation

9.7.1.5 Project Activities Assessed

The following are the activities which were assessed in this air quality study:

- Wind erosion of the following sources: Laydown area, GG10A, GG10B, extension area and Multiproduct stockyard; and
- The materials handling (offloading) of coal from trucks onto the various stockpiles.

9.7.1.5.1 Potential Impacts anticipated

The following impacts are anticipated:

- Emissions of dust, PM_{10} and $PM_{2.5}$ to the atmosphere attributed to offloading activities and wind erosion processes; and
- A reduction in the quality of ambient air.

9.7.1.6 Wind Erosion Impacts

Wind erosion of the various stockpiles will occur due to the availability of granular material - ranging from a wide range of particle size distribution. With high wind speed (≥ 5 m/s), the fine materials are airborne, and travel varying distances depending on the aerodynamic diameter. The heavier particulates are deposited closer to the source and vice versa.

9.7.1.6.1 Management Objectives/ Mitigation Measures

- To ensure that on-site and off-site emissions are within the South African air quality standard;
- To explore adequate mitigation measures for the protection of the environment, human health and wellbeing i.e. wetting of stockpile and use of suppressants ;
- Implement an emissions management programme once operation commence;
- Monitoring air quality on site, at upwind and downwind locations; and
- Regular review of monitoring data to ensure compliance with the standard.

9.7.1.6.2 Impact Ratings

Table 9-21: Wind erosion of stockpiles

Impact Description: Reduction in air quality due to airborne dust from wind erosion			
Dimension	**Rating**	**Motivation**	**Significance**
Pre-Mitigation			
Duration	Medium term: 1-5 years (3)	As these stockpiles will be functional for 5 years, wind erosion will occur for the life of the stockpile.	Minor Negative (-42)

Extent	Limited (2)	The impacts will be limited to the site and its immediate surroundings	
Intensity x type of impact	Minor (2)	There will be minor impact on air quality	
Probability	Almost certain (6)	It is most certain that the wind erosion will occur.	
Mitigation/ Management actions			
▪ Minimise drop heights when offloading material; ▪ Set maximum speed limits and have these limits enforced on stockpiles.			
Post-Mitigation			
Duration	Medium term: 1-5 years (3)	As these stockpiles will be functional for 5 years, wind erosion will occur for the life of the stockpile.	Negligible Negative (-24)
Extent	Limited (2)	The impacts will be limited to the development area	
Intensity	Minimal (1)	Minimal impact on baseline air quality	
Probability	Probable (4)	When the above mitigation measures are implemented,	

9.7.1.7 Materials handling (offloading) coal onto stockpiles

The material handling process focused on the offloading of coal i.e. tipping of coal onto stockpiles from haul trucks. This is not a continuous process, as it happens at intervals. Depending on the moisture content and the wind speed intensity at the time, fine coal can be airborne leading to fugitive emissions.

9.7.1.7.1 Management Objectives/ Mitigation Measures

- To ensure that on-site and off-site emissions are within the South African air quality standard;
- To explore adequate mitigation measures for the protection of the environment, human health and wellbeing;
- Implement an emissions management programme once operation commence i.e. increase the moisture content of transported material;
- Monitoring air quality on site, at upwind and downwind locations; and
- Regular review of monitoring data to ensure compliance with the standard.

9.7.1.7.2 Impact Ratings

Table 9-22: Materials handling (offloading)

Impact Description: Reduction in air quality due to fugitive emissions from off loading			
Dimension	**Rating**	**Motivation**	**Significance**
Pre-Mitigation			
Duration	Medium term: 1-5 years (3)	As these stockpiles will be functional for 5 years, materials handling will take place for the life of the stockpile.	Minor Negative (-35)
Extent	Limited (2)	The impacts will extend as far as the development site area	
Intensity	Minor (2)	There will be minor impact on air quality	
Probability	Likely (5)	The impact is likely to occur.	
Mitigation/ Management actions			
▪ Dust suppression at offloading points			
Post-Mitigation			
Duration	Medium term: 1-5 years (3)	As these stockpiles will be functional for 5 years, materials handling will take place for the life of the stockpile.	Negligible Negative (-20)
Extent	Very Limited (1)	The impacts will be very limited to isolated areas	
Intensity x type of impact	Minimal (1)	There will be minor impact on air quality	
Probability	Probable (4)	When the above mitigation measures are implemented, it is probable that erosion might still occur.	

9.7.2 Flora and Fauna

The following section describes the flora and fauna issues and impacts for;

- Current land use (existing railway loop, unused capital yard and roads and the no-go option) and

- Proposed new Grootegeluk Coal Mine stockpile area GG10 A, B, Laydown and Extension Area.

9.7.2.1 Impacts of the Proposed Stockpiling Activities

9.7.2.1.1 Issue 1: Loss of Plant Communities

Stockpiling will lead to the direct loss of the vegetation on site. This is regarded as a concern because the natural vegetation is in the process of re-establishing itself; the extent of anticipated disturbance will be over the entire project boundary.

9.7.2.1.2 Mitigation and Management

There is no mitigation for the loss of habitat; however, efforts can be made to reduce the overall impact. Areas that are not directly affected by the proposed activities should be conserved. This entails removal of the topsoil for rehabilitation elsewhere, restricting access, and controlling any alien invasive plants as well as keeping clearing to a minimum.

According to Digby Wells, 2014, Exxaro currently manages the Manketti Nature Reserve the Waterberg region as wildlife areas and is currently not considered as an official offset area, even though it is currently managed as such. Fourteen of the nineteen farms that form part of Manketti are part of the approved mining authorisations and/or earmarked for future development in the forms of Mining and the development of Independent Power Producers.

Offsets can be an unsustainable solution in many cases, owing to the lack of formal protection of areas that are demarcated for offsetting. As a consequence, offset areas may be utilised in future for further development, resulting in a loss of funds, time and expert advice invested in the initial offset establishment. The benefit of the Manketti Nature Reserve, however, is that it is currently being managed by Exxaro and this offers some control over the management of biodiversity. It is important that the Manketti Nature Reserve is conserved as far as possible and that future development within this area be controlled as far as practicable. It is recommended that should future developments by Exxaro, in the Waterberg region, exceeds the capacity of the area set aside as official offset area, additional land should be encompassed into an offset strategy. The overall aim of biodiversity offsetting, in accordance with the guidelines stipulated by the international Business and Biodiversity Offsets Programme (BBOP) and the DEA (2003) is a ‘no-net-loss’ approach.

9.7.2.1.3 Impact Rating

Refer to the impact rated below in the table.

Table 9-23: Loss of Habitat

IMPACT DESCRIPTION: Loss of Habitat as a result of Stockpiling Activities			
Dimension	**Rating**	**Motivation**	**Significance**
Pre-Mitigation			
Duration	Medium Term (3)	Equal to the duration of the construction and operation phases which will be a medium period	Minor Negative (-63)
Extent	Site Area (3)	The impacts will be limited to the project area	
Intensity of type of impact	Moderate (3)	This will have impacts on the recovering plant community within the project area	
Probability	Almost certain (7)	Without appropriate mitigation there will loss of habitat that could extend beyond the project area.	
Mitigation/ Management actions			
▪ Clearing of vegetation must be limited to the project site and the cleared area; and ▪ Conservation of surrounding areas such as the Manketti Reserve.			
Post-Mitigation			
Duration	Medium Term (3)	Equal to the duration of the construction and operation phases which will be a medium period	Negligible Negative (-27)
Extent	Site Area (3)	The impacts will be limited to the project area	
Intensity of type of impact	Moderate (3)	Impacts experience within the stockpile areas	
Probability	Probable (3)	Necessary mitigations will reduce the significance of the impact and limit the impact to the project area	

9.7.2.1.4 Issue 2: Loss of Biodiversity

The loss of vegetation due to site clearing and stockpiling will result in a reduction in biodiversity on a local scale. Loss of vegetation will in turn cause a loss of habitat for birds, mammals and herpetofauna that make use of the area. This is particularly applicable to the loss of Species of Conservation Concern (SSC). With regard to faunal SSC, it is expected that red-data birds will move on to a different area during the stockpiling activities. Further to this, they will make use of natural habitat elsewhere in the greater study area.

9.7.2.1.5 Mitigation and Management

Efforts should be made not to exceed the footprint area as far as reasonably practicable. However, post the stockpiling activities, which may be for a duration of 5 years, the site is earmarked for future mine development.

Therefore those ecological attributes, such as soil and the flora SCC that can be recovered prior to the stockpiling commencing should be extracted for use elsewhere.

Although there is no mitigation for the loss of SSC, there are management measures in place to ensure that there is a 'no-net-loss' approach.

- Faunal SCC, such as Tsessebe (*Damaliscus lunatus*), can be captured and relocated to Manketti should they be present during the clearing of the area (however it is expected that these animals will move during the construction process). These animals move freely within the larger Grootegeluk area and an encouraged to move across to the Manketti areas during the winter months where water is more freely available;
- Flora SCC recorded for the site, namely: *Vachellia erioloba (Camel Thorn), Combretum imberbe* (*Leadwood:* Digby Wells,2014) and *Sclerocarya birrea* (Marula) are of varying ages; and
- Adult *Vachellia erioloba* (Camel Thorn), *Combretum imberbe* (Leadwood) are notoriously difficult to transplant, whereas *Sclerocarya birrea* (Marula) less so.

Should a nursery not be established for the replanting of affected trees the trees impacted and removed will need to be replaced as per the requirements of the Protected tree licenses issued by Department of Forestry and Fisheries.

9.7.2.1.6 Impact Rating

Refer to the impact rated below in the table.

Table 9-24: Loss of Biodiversity

IMPACT DESCRIPTION: Loss of Biodiversity as a result of Stockpiling Activities			
Dimension	**Rating**	**Motivation**	**Significance**
Pre-Mitigation			
Duration	Medium Term (3)	Equal to the duration of the construction and operation phases which will be a medium period	Minor Negative (-54)
Extent	Site Area (3)	The impacts will be limited to the project area	
Intensity of type of impact	Moderate (3)	This will have impacts on the recovering plant community within the project area	
Probability	Almost certain (6)	Without appropriate mitigation there will loss of habitat that could extend beyond the project area.	
Mitigation/ Management actions			
▪ Clearing of vegetation must be limited to the project site and the cleared area; and ▪ Conservation of surrounding areas such as the Manketti Reserve; ▪ Planting of protected trees that could be lost as a result of clearing activities; and ▪ Establishment of a nursery for species that can be grown and re-planted.			
Post-Mitigation			
Duration	Medium Term (3)	Equal to the duration of the construction and operation phases which will be a medium period	Minor Negative (-36)
Extent	Site Area (3)	The impacts will be limited to the project area	
Intensity of type of impact	Moderate (3)	Impacts experience within the stockpile areas	
Probability	Probable (4)	Necessary mitigations will reduce the significance of the impact and limit the impact to the project area	

9.7.2.2 Issue 3: Loss of Ecosystem Function

Ecosystem function is the measure of the combined functioning of the vegetation and associated species and faunal habitats, all of which result in the ecosystem health. (Digby Wells, 2014.) The stockpiling of coal on the site will affect the ecosystem function, stockpiling will result of the loss of biotic (fauna and flora) components as the land surface changes, this

will sterilise the site until the stockpiles are removed and rehabilitation measures are instituted.

9.7.2.2.1 Mitigation and Management

Due to the fact that site will be used for some considerable time, either for stockpiling or mine infrastructure and rehabilitation of the site may only take place at mine closure, it is unlikely that the ecosystem function will be restored in the near future.

However this loss, as with the other losses in fauna and flora, must be offset in a manner which serves the greater conservation of the ecosystem.

A review of the extent of the mine development, quantification of the loss of ecosystem functions in the development area and identification of similar habitat as an offset should be considered, such as areas located within Manketii,

9.7.2.2.2 Impact Rating

Refer to the impact rated below in the table.

Table 9-25: Loss of Ecosystem Function

<table>
<tr><th colspan="4">IMPACT DESCRIPTION: Loss of Ecosystem Function as a result of Stockpiling Activities</th></tr>
<tr><th>Dimension</th><th>Rating</th><th>Motivation</th><th>Significance</th></tr>
<tr><td colspan="4">Pre-Mitigation</td></tr>
<tr><td>Duration</td><td>Medium Term (3)</td><td>Equal to the duration of the construction and operation phases which will be a medium period</td><td rowspan="4">Minor Negative (-36)</td></tr>
<tr><td>Extent</td><td>Site Area (3)</td><td>The impacts will be limited to the project area</td></tr>
<tr><td>Intensity of type of impact</td><td>Moderate (3)</td><td>This will have impacts on the recovering plant community within the project area</td></tr>
<tr><td>Probability</td><td>Probable (4)</td><td>Without appropriate mitigation there will loss of habitat that could extend beyond the project area.</td></tr>
<tr><td colspan="4">Mitigation/ Management actions</td></tr>
<tr><td colspan="4">▪ Clearing of vegetation must be limited to the project site and the cleared area; and
▪ Conservation of surrounding areas such as the Manketti Reserve;
▪ Planting of protected trees that could be lost as a result of clearing activities;
▪ Consider the establishment of a nursery for species that can be grown and re-planted; and
▪ Rehabilitation at end of life of mine to restore loss of ecosystem function.</td></tr>
<tr><td colspan="4">Post-Mitigation</td></tr>
</table>

Duration	Medium Term (3)	Equal to the duration of the construction and operation phases which will be a medium period	Negligible Negative (-32)

9.7.3 Surface Water

The nearest rivers are the Sandloop Spruit, located just over 10 km from site and the Limpopo River at almost 30 km away. The absence of rivers in the immediate vicinity implies contaminated runoff from the site is anticipated to have minimal regional surface water impacts.

Based on the current management and storm water infrastructure the impacts are anticipated to have very low significance due to availability of infrastructure and that activities are in existing disturbed areas with existing mitigation.

9.7.3.1 Site Clearing Impacts

9.7.3.1.1 Impact Description: Runoff Contamination from Eroded Sediments

Clearing or removal of vegetation from the proposed footprint and stockpiling of the topsoil leaves the soils prone to erosion during heavy rainfall events, and as a result runoff from these areas which will be high in suspended solids will cause an increase in turbidity in storm water management systems.

The runoff will not report to the natural water courses and the downstream receptors as they are far; however, it could report into the storm water management system and result in siltation. Siltation reduces the capacity of the water conveyance and storage infrastructure.

9.7.3.1.2 Management/ Mitigation Measures

The following mitigation measures are recommended:

- Clearing of vegetation must be limited to the stockpile footprint;
- The removed topsoil must be vegetated as soon as possible to prevent sediment erosion;
- All silted runoff emanating should be collected in trenches and passed through silt traps before discharge to containment facility e.g. PCD's; and
- The routine cleaning of storm water drains and containment dams is essential as part of a storm water management system maintenance.

9.7.3.1.3 Impact Ratings

This impact is rated in Table 9-26.

Table 9-26: Siltation of runoff

IMPACT DESCRIPTION: Siltation of runoff leading to siltation of storage dams and conveyance channels			
Dimension	**Rating**	**Motivation**	**Significance**
Pre-Mitigation			
Duration	Short term: Less than 1 year (2)	Equal to the duration of the construction phase which will be a short period	Negligible Negative (-35)
Extent	Limited (2)	The impacts will be limited to the nearby conveyance channels and the immediate containment facility	
Intensity x type of impact	Minor- negative (3)	This will have impacts on the capacity of the storm water if it occurs over long enough time to cause accumulation	
Probability	Likely (5)	Without appropriate mitigation there will definitely be erosion	
Mitigation/ Management actions			
▪ Clearing of vegetation must be limited to the project site and the cleared area should not be left exposed for too long to the elements of erosion. ▪ The removed topsoil must be vegetated as soon as possible to prevent sediment erosion. ▪ A storm water management system should include a silt trap and undergo regular cleaning.			
Post-Mitigation			
Duration	Short term: Less than 1 year (2)	Equal to the duration of the construction phase which will be a short period	Negligible Negative (-15)
Extent	Limited (1)	Minimal impacts to conveyance channels and the immediate containment facility	
Intensity x type of impact	Negative (2)	Impacts experience within the stockyards	
Probability	Probable (3)	Necessary mitigations will reduce the erosion probability significantly	

9.7.3.2 Water Drain Contamination

9.7.3.2.1 Impact Description: Increased Water Contamination from Carbonaceous Material

Contaminated runoff emanating from the coal fines and stockyards has the potential to contaminate water in the storm drains and potentially silt up the drains.

This impact will lead to contamination of the water in the storm water system and can reduce the potential of the water being reused in the system. The clogged drains and water holding dams will reduce their water holding capacity and pose greater risk of overflowing into clean system in extreme rainfall events.

However, this can be prevented and/or reduced if the following recommended measures are implemented.

9.7.3.2.2 Management / Mitigation Measures

These impacts can be prevented and/or reduced by implementing the following measures:

- Ensure that the plant's storm water drains are regularly cleaned as per management schedule. Cleaned systems will ensure that impacts are retained within a controlled environment with no potential impacts to clean storm water drainage systems;
- The stockyards should be operated within capacity to ensure that coal does not spill into the water management drains and result in siltation;
- Storm water management channels should be extended to include the GG10 Stockyard A & B extension Areas; and
- Water will be channelled to the pit or Bosbok dam for reuse in the beneficiation process.

9.7.3.2.3 Impact Ratings

This impact is rated in Table 9-27.

Table 9-27: Water Drains Contamination

IMPACT DESCRIPTION: Contaminated Runoff reporting into water drains resulting in siltation and poor water quality.			
Dimension	**Rating**	**Motivation**	**Significance**
Pre-Mitigation			
Duration	Medium term: (3).	The project will last for 5 years and the impact can occur over the project life	Negligible negative (-16)
Extent	Limited (3)	Limited to the site and its immediate surroundings	

Intensity	Minor - negative (2)	If runoff is not diverted over long periods it could completely clog the drains and result in overflow that will contaminate groundwater	
Probability	Improbable (2)	The impact may occur, but only in extreme rainfall events	
Mitigation/ Management actions			
▪ The stockyards should be operated within capacity to ensure that coal does not spill into the water management drains and result in siltation. ▪ Ensure that the plant's storm water drains are regularly cleaned as per management schedule on site.			
Post-Mitigation			
Duration	Immediate (1)	Impact can occur over the project life	Negligible negative (-3)
Extent	Very limited (1)	Limited to specific isolated parts of the site	
Intensity	Low Level - negative (1)	Replaceable damage with no change to the baseline	
Probability	Highly unlikely (1)	The possibility of the impact materialising is expected never to happen as water resources are far away	

9.7.4 Groundwater

Groundwater impacts may potentially arise from the following activities:

- Utilising the Laydown Area, GG10 Stockyard B, and Multiproduct Stockyard footprints (to stock excess Eskom-grade coal) to stockpile coal for approximately 5 years; and
- Extending GG10 Stockyard B footprint by approximately 12.8 ha.

9.7.4.1 Potential Impacts of Infrastructure

The potential impacts of the proposed infrastructure relate to leachate emanating from the stockpiles and migrating into the local aquifer where it might reach sensitive receptors such as humans that make use of groundwater.

9.7.4.2 Site Clearing Impacts

9.7.4.2.1 Impact Description: Removal of topsoil and vegetation

The activity has no impact on the groundwater as the water table is 4 m bgl (at the shallowest point). However, in the unlikely event that the site clearing extends beyond 4 m,

the impact to the groundwater will increase. The impact could either be in the form of increased natural groundwater recharge or enhanced seepage rate from the stockpile.

9.7.4.2.2 Impact Description Management/ Mitigation Measures

The following mitigation measures are recommended:

- Vegetation and top soil removal not to take place below 4 m;
- If the stockpile area is low-lying and site clearing intercepts the water table, it is recommended to rather build up the area with soil to ensure that the construction takes place above the water table; and
- Groundwater monitoring to assess the time water level and quality impacts.

9.7.4.2.3 Impact Ratings

This impact is rated as shown in Table 9-28.

Table 9-28: Removal of topsoil and vegetation

IMPACT DESCRIPTION: Removal of topsoil and vegetation			
Dimension	**Rating**	**Motivation**	**Significance**
Pre-Mitigation			
Duration	Short term: Less than 1 year (2)	Equal to the duration of the construction phase which will be a short period	Negligible Negative (-20)
Extent	Limited (1)	The impacts will be limited to the stockpile area	
Intensity x type of impact	Negative (2)	This will have impacts on groundwater recharge rate in the area of the stockpiles only	
Probability	Likely (4)	It may occur depending on the depth at which the removal will extend to, 4 m provides for relatively sufficient thickness to work with	
Mitigation/ Management actions			
■ If the stockpile area is low-lying and site clearing will intercept the water table, levelling of the area with soil is recommended to ensure that the construction takes place above the water table. ■ Groundwater monitoring around and downstream of the stockpiles.			
Post-Mitigation			
Duration	Short term: Less than 1 year (2)	Equal to the duration of the construction phase which will be a short period	Negligible Negative (-4)
Extent	Limited (1)	Impacts reduced to isolated parts	

IMPACT DESCRIPTION: Removal of topsoil and vegetation			
Dimension	**Rating**	**Motivation**	**Significance**
Pre-Mitigation			
Intensity x type of impact	Negative (1)	Impacts reduced to isolated parts therefore intensity reduced significantly	
Probability	Probable (1)	Likelihood of impacts occurring is minimal	

9.7.4.3 Impact Description: Hydrocarbon spillage

Hydrocarbon spillage may occur as a result of oil or fuel spillages from site machinery may collect in the soils.

The water table in the project area is relatively shallow; it is possible that the spilled organic compounds can reach the groundwater environment. During rainfall events, hydrocarbon compounds from oil and fuel in the soils may migrate to the aquifers with water infiltrating through these polluted areas.

9.7.4.4 Impact Description Management/ Mitigation Measures

The following mitigation measures are recommended:

- Machinery should be maintained properly, diesel or other chemicals be handled appropriately and not spilled. Re-fuelling protocols must also be followed to ensure no diesel is spilled during filling;
- Reservoirs must be in a bunded area;
- If a considerable amount of fluid is accidentally spilled, the contaminated soil should be scraped off and disposed at an acceptable dumping facility; and
- Groundwater monitoring, to assess water quality.

9.7.4.5 Impact Ratings

This impact is rated in Table 9-29.

Table 9-29: Hydrocarbon spillage

IMPACT DESCRIPTION: Siltation of runoff leading to siltation of storage dams and conveyance channels			
Dimension	**Rating**	**Motivation**	**Significance**
Pre-Mitigation			
Duration	Short term: Less than 1 year (2)	Equal to the duration of the construction phase which will be a short period	Negligible Negative (-24)

IMPACT DESCRIPTION: Siltation of runoff leading to siltation of storage dams and conveyance channels			
Dimension	**Rating**	**Motivation**	**Significance**
Pre-Mitigation			
Extent	Limited (2)	The impacts will be limited to the site	
Intensity x type of impact	Negative (2)	This will have impacts on groundwater quality. Very little change to the baseline.	
Probability	Likely (4)	It may occur depending on protocol followed on-site	
Mitigation/ Management actions			
■ Machinery should be maintained properly and re-fuelling protocols must also be followed. ■ Reservoirs must be in a bunded area. ■ In the event of accidental spillage, the contaminated soil should be scraped off and disposed at an acceptable dumping facility. ■ Groundwater monitoring.			
Post-Mitigation			
Duration	Short term: Less than 1 year (2)	Equal to the duration of the construction phase which will be a short period	Negligible Negative (-4)
Extent	Limited (1)	Impacts reduced to isolated parts	
Intensity x type of impact	Negative (1)	Impacts reduced to isolated parts therefore intensity reduced significantly	
Probability	Probable (1)	Likelihood of impacts occurring is minimal	

9.7.4.6 Stockpile Seepage

9.7.4.6.1 Impact Description: Groundwater Contamination from Stockpile Leachate Migrating to Aquifer

The geochemistry study (Digby Wells, 2016) identified Mn as a potential contaminant of concern that would seep from the stockpile. However, at the expected rate of seepage and low rainfall at Grootegeluk, the element should not leach out at these concentrations given by the laboratory tests which simulate a worst case scenario.

In the event that any leachate seeps from the stockpile, it could migrate to the aquifer. A liner has been proposed that will reduce the rate and volume of leachate entering the aquifer.

With the compaction of the coal during the stockpiling process[7] the permeability will be decreased and runoff increased. This last mentioned process will allow lower infiltration, but if high intensity rainfall events do take place for an extended period some AMD formation can potentially be observed as suggested by the lab tests contained within the geochemistry report (Digby Wells 2016).

9.7.4.6.2 Impact Description Management/ Mitigation Measures

The following mitigation measures are recommended:

- Coal stockpile compaction to reduce the hydraulic conductivity of the material, therefore reducing seepage rates inhibiting leachate migration. Based on information provided by Exxaro the coal will be compacted in line with stockpile management guidelines. The coal will be compacted down to 101% of the natural density and lead to a reduced permeability.
- Installation of a liner as recommended according to the type of leachate predicted to emanate from the stockpiles (based on geochemical studies); and
- Groundwater monitoring to keep a record of the groundwater levels and quality.

9.7.4.6.3 Impact Ratings

This impact is rated in Table 9-30.

Table 9-30: Stockpile leachate seepage

IMPACT DESCRIPTION: Groundwater Contamination from Stockpile Leachate Migrating to Aquifer			
Dimension	**Rating**	**Motivation**	**Significance**
Pre-Mitigation			
Duration	Project Life (>15 years) (5)	Project Life of approximately 5 years	Minor Negative (-44)
Extent	Municipal Area (4)	The impacts may extend beyond development site area	
Intensity x type of impact	Minor- negative (2)	Comparing baseline water quality and geochemistry results: Very little change to the baseline groundwater quality will be encountered, as leachate is not quantified as contamination	
Probability	Likely (4)	Without appropriate mitigation leachate will discharge into local aquifer, however	

[7] Based on information provided by Exxaro the coal will be compacted in line with stockpile management guidelines. The coal will be compacted down to 101% of the natural density and lead to a reduced permeability.

		no serious changes to baseline groundwater quality as the leachate is not quantified as contamination	
Mitigation/ Management actions			
■ Coal compaction to reduce the permeability of the material. ■ Installation of a liner recommended according to the type of material stocked. ■ Groundwater monitoring.			
Post-Mitigation			
Duration	Project Life (>15 years) (5)	Project Life of approximately 5 years	Negligible Negative (-30)
Extent	Municipal Area (3)	The impacts will extend as far as development site area	
Intensity x type of impact	Minor- negative (2)	Comparing baseline water quality and geochemistry results: Very little change to the baseline groundwater quality will be encountered, as leachate is not quantified as contamination	
Probability	Likely (3)	Leachate discharge into local aquifer highly reduced, impacts remain minimal leachate is not quantified as contamination	

9.7.5 Soil, Land Use and Land Capability

Carbonaceous material spillage on site has been identified as a risk. Spillages are common at mine sites due to the large volumes of diesel and oil consumed by construction vehicles. Hydrocarbon spills can occur where heavy machinery are parked such as the hard park area because they contain large volumes of lubricating oils, hydraulic oils and diesel to run. The following applies to avoid this risk:

- Emergency spill response plan is required to handle any unplanned spillages;
- If a spill occurs it is to be cleaned up immediately;
- All vehicles are to be serviced in a designated area or offsite at a workshop;
- Place drip trays where the leak is occurring if vehicles are leaking; and

Ensure spill clean-up kits are readily available in the event of a spillage.

During the construction phase, the work carried out will mainly be related to the construction of stockpiles. The development of stockpiles will require the removal of all soil materials to a depth of at least 1.5m. This activity will provide needed soil cover material for rehabilitation purposes. The impact will be loss of topsoil as a result of erosion and possible contamination of the soil by fuel and oils. Also soil compaction caused by heavy machinery.

9.7.5.1 Impact Description: Loss of topsoil as a resource

The movement of heavy machinery on the soil surface causes compaction, which reduces the vegetation's ability to grow and as a result erosion could occur. Areas of land will be

cleared increasing the runoff potential of the area. During any excavation activity the soil physical and chemical properties are impacted on.

9.7.5.1.1 Impact Description Management/ Mitigation Measures

The following mitigation measures are recommended:

- Topsoil is to be stripped when the soil is dry, as to reduce compaction, if possible;
- Soils to be stripped according to the soil stripping ratios and stockpiled accordingly;
- Prior to stockpiles being utilised for rehabilitation purposes, fertility analysis should be conducted on these stockpiles to determine the fertiliser requirements;
- Prevent unauthorised borrowing of stockpiled soil;
- Ensure proper storm water management designs are in place; and
- Only the designated access routes are to be used.

9.7.5.1.2 Impact Ratings

The site clearing impacts described are rated in Table 9-31

Table 9-31: Impact Rating

Activity and Interaction: Site clearing and vegetation removal; topsoil removal and stockpiling.			
Dimension	**Rating**	**Motivation**	**Significance**
Impact Description: The movement of heavy machinery on the soil surface causes compaction, which reduces the vegetation's ability to grow and as a result erosion could occur. Areas of land will be cleared increasing the runoff potential of the area. During any excavation activity the soil physical and chemical properties are impacted on.			
Prior to mitigation/ management			
Duration	Medium/Long terms (4)	Usable soil will be stripped and stockpiled if this is done without following the mitigation measures the impact will have a long term effect.	Moderate (-77)
Extent	Local (3)	Loss of usable soil will only occur within the Project	
Intensity	Serious (4)	Loss of usable soil may result in loss of land capability and land use	
Probability	Definite (7)	By excavating the soil it will certainly impact on the soil	

Nature	Negative		
Mitigation/Management actions			
■ The topsoil will be stripped by means of an FEL or similar equipment and loaded onto dump trucks; ■ Topsoil is to be stripped when the soil is dry, as to reduce compaction, if possible; ■ Prior to stockpiles being utilised for rehabilitation purposes, fertility analysis should be conducted on these stockpiles to determine the fertiliser requirements; ■ The handling of the stripped topsoil will be minimised to ensure the soil's structure and quality does not deteriorate; ■ Compaction of the removed topsoil should be avoided by prohibiting traffic on stockpiles; ■ Prevent unauthorised borrowing of stockpiled soil; ■ If erosion occurs, corrective actions must be taken to minimise any further erosion from taking place; and ■ Soils will be stripped according to the soil types and recommended depths.			
Post- mitigation			
Duration	Medium/Long terms (4)	Loss of usable soil makes land less productive.	Negligible (-36)
Extent	Limited (2)	Loss of usable soil will occur within the project	
Intensity	Moderate (3)	Loss of usable soil may result in loss of land capability and land use	
Probability	Probable (4)	If the mitigation is followed then the probability of the impact can be reduced.	
Nature	Negative		

9.7.5.2 Impact: Land Capability and Land Use

Removal of soil layers will impact on the land capability and land use thus altering the potential for the area to be utilised for other purposes. It must be noted that that the area has been previously impacted upon, thus the impact to the land use and land capability for the proposed stockpiling activities is seen as minor.

9.7.5.2.1 Impact Description Management/Mitigation Measures

The following mitigation measures are recommended:

- No land capability mitigation is possible during construction phase because the land capability will be significantly reduced, however could be reinstated when rehabilitation is undertaken.

9.7.5.2.2 Impact Rating

This impact rated is shown in Table 9-32

Table 9-32: Impact Rating

Activity: Impacts to Land capability and land use			
Dimension	**Rating**	**Motivation**	**Significance**
Prior to mitigation/ management			
Duration	Short term (2)	Removal of soil reduces the land capability to non-classifiable and the impact is permanent if not mitigated	Minor (-40)
Extent	Very limited (1)	Impact will occur on the project area	
Intensity	Serious (5)	Land capability will be reduced	
Probability	Likely (5)	Removing the usable soil, the impact on land capability is certain	
Nature	Negative		
Mitigation/ Management actions			
No land capability mitigation is possible during construction phase because the land capability will be significantly reduced, however could be reinstated when rehabilitation is undertaken.			

9.7.5.3 Impact Description: Loss of topsoil

Topsoil losses can occur during the operational phases as a result of rain water runoff and wind erosion, especially from roads and soil stockpiles where steep slopes are present. Prevention is especially important because the dominant soils in the area.

9.7.5.3.1 Impact Description Management/Mitigation measures

Maintenance on the stockpiles must be done regularly to check for compaction and erosion has not occurred which may result in the loss of usable soil as a resource. The maintenance

will include inspection for erosion and loss of soil, fertility of stockpiles and vegetation establishment on these stockpiles.

9.7.5.3.2 Impact Ratings

The impacts described are rated in Table 9-33.

Table 9-33: Impact Rating during Operational Phase

Activity: Hydrocarbon pollution and loss of stockpiled topsoil			
Dimension	**Rating**	**Motivation**	**Significance**
Prior to mitigation/ management			
Duration	Short term (2)	Loss of soils due to wind erosion	Minor-low(-40)
Extent	Very limited (1)	The impact is limited to the project area	
Intensity	Serious (5)	The impact is very significant on soils and damaged can be not reversible	
Probability	Likely (5)	The impact it is most likely to occur on soils	
Nature	Negative		
Mitigation/ Management actions			
Maintenance on the stockpiles must be done regularly to check for compaction and erosion has not occurred which may result in the loss of usable soil as a resource. The maintenance will include inspection for erosion and loss of soil and vegetation establishment on these stockpiles. Prior to stockpiles being utilised for rehabilitation purposes, fertility analysis should be conducted on these stockpiles to determine the fertiliser requirements;			
Post- mitigation			
Duration	Short term (2)	If the mitigation measures are implemented the impact will be for less	Negligible (-24)
Extent	Very limited (1)	Impact is limited to the project area	
Intensity	Serious (5)	Contamination of soils is serious	
Probability	Unlikely (3)	The impact is certain that it will occur if mitigation measures are not followed	
Nature	Negative		

9.7.6 Heritage

No impact assessment was undertaken for this aspect as no heritage or cultural resources are located in or within close proximity to the proposed stockpile footprint.

9.8 Motivation where no alternative sites were considered

Alternative sites have not been considered for the placement of the stockpiles, as the proposed site will result in the least impact to the environment. The relevant infrastructure associated with the development of stockpiles is in place at the preferred location, thus negating the need for the development of additional infrastructure. The stockpile area, however, will require the construction of a Class C liner / barrier to prevent seepage from the stockpiles entering ground- or surface water resources.

9.9 Statement motivating the alternative development location within the overall site

Refer to section 9.8 for the motivation for the final site.

10 Environmental Management Plan

Table 10-1 below consolidates the impacts and proposed mitigation and management measures for the identified impacts.

Table 10-1: Proposed Mitigation Measures

Environmental Aspect	Project Activity	Potential Impact	Mitigation / Management Measure
Air Quality	▪ Wind erosion of the following sources: Laydown Area, GGA, GG10B, extension area and Multiproduct Stockyard; and ▪ The materials handling (offloading) of coal from trucks onto the various stockpiles.	Reduction in air quality due to airborne dust from wind erosion	▪ Minimise drop heights when offloading material. ▪ Set maximum speed limits and have these limits enforced on stockpiles.
	▪ Offloading of coal onto stockpiles	Reduction in air quality due to fugitive emissions from off loading	▪ Watering (dust suppression) at offloading points.
Fauna and Flora	▪ Removal of vegetation	Loss of plant communities	▪ Clearing of vegetation must be limited to the project site and the cleared area. ▪ Conservation of surrounding areas such as the Manketti Reserve.

Environmental Aspect	Project Activity	Potential Impact	Mitigation / Management Measure
	▪ Removal of vegetation	Loss of biodiversity	▪ Clearing of vegetation must be limited to the project site and the cleared area. ▪ Conservation of surrounding areas such as the Manketti Reserve. ▪ Planting of protected trees that could be lost as a result of clearing activities.
	▪ Removal of vegetation	Loss of ecosystem function	▪ Clearing of vegetation must be limited to the project site and the cleared area; and ▪ Conservation of surrounding areas such as the Manketti Reserve; ▪ Replacement & Planting of protected trees that could be lost as a result of clearing activities; and ▪ Rehabilitation at end of life of mine to restore loss of ecosystem function.

Environmental Aspect	Project Activity	Potential Impact	Mitigation / Management Measure
Groundwater	▪ Construction phase activities	Hydrocarbon spillage. Siltation of runoff leading to siltation of storage dams and conveyance channels.	▪ Machinery should be maintained properly and re-fuelling protocols must also be followed. ▪ Reservoirs must be in a bunded area. ▪ In the event of accidental spillage, the contaminated soil should be scraped off and disposed at an acceptable dumping facility. ▪ Groundwater monitoring.
	▪ Operation of stockpile	Groundwater contamination from stockpile leachate migrating to aquifer	▪ Coal compaction to reduce the permeability of the material. ▪ Installation of a liner recommended according to the type of material stocked. ▪ Groundwater monitoring.

Environmental Aspect	Project Activity	Potential Impact	Mitigation / Management Measure
Surface Water	▪ The construction and operation of stockpiles (the Laydown Area, GG10B, and Multiproduct Stockyard footprints) to stock excess Eskom-grade coal, for an approximate period of five years; and ▪ The extension of the GG10B Stockyard footprint by approximately 8 ha by including the internal area of the discontinued rail loop.	Siltation of runoff leading to siltation of storage dams and conveyance channels	▪ Clearing of vegetation must be limited to the project site and the cleared area should not be left exposed for too long to the elements of erosion. ▪ The removed topsoil must be vegetated as soon as possible to prevent sediment erosion. ▪ A storm water management system should include a silt trap and undergo regular cleaning
		Contaminated Runoff reporting into water drains resulting in siltation and poor water quality.	▪ The stockyards should be operated within capacity to ensure that coal does not spill into the water management drains and result in siltation. ▪ Ensure that the plant's storm water drains are regularly cleaned as per management schedule on site.

Environmental Aspect	Project Activity	Potential Impact	Mitigation / Management Measure
Soil	▪ Expansion of the coal stockyard and stockpiles ▪ Site clearing and vegetation removal; topsoil removal and stockpiling.	The movement of heavy machinery on the soil surface causes compaction, which reduces the vegetation's ability to grow and as a result erosion could occur. Areas of land will be cleared increasing the runoff potential of the area. During any excavation activity the soil physical and chemical properties are impacted on.	▪ The topsoil will be stripped by means of an FEL or similar equipment and loaded onto dump trucks; ▪ Topsoil is to be stripped when the soil is dry, as to reduce compaction, if possible; ▪ Prior to stockpiles being utilised for rehabilitation purposes, fertility analysis should be conducted on these stockpiles to determine the fertiliser requirements; ▪ The handling of the stripped topsoil will be minimised to ensure the soil's structure and quality does not deteriorate; ▪ Compaction of the removed topsoil should be avoided by prohibiting traffic on stockpiles; ▪ Prevent unauthorised borrowing of stockpiled soil; ▪ If erosion occurs, corrective actions must be taken to

Environmental Aspect	Project Activity	Potential Impact	Mitigation / Management Measure
			minimise any further erosion from taking place; and ▪ Soils will be stripped according to the soil types and recommended depths.
Soil	▪ Operation of topsoil stockpiles	Topsoil losses can occur during the operational phases as a result of rain water runoff and wind erosion, especially from roads and soil stockpiles where steep slopes are present. Prevention is especially important because the dominant soils in the area**.**	▪ Maintenance on the stockpiles must be done regularly to check for compaction and erosion has not occurred which may result in the loss of usable soil as a resource. The maintenance will include inspection for erosion and loss of soil, and vegetation establishment on these stockpiles.
Soil	▪ Decommissioning of infrastructure	Should rehabilitation not take place immediately and the site is not backfilled and levelled prior to the high rainfall event, soils could be washed away. This will result in the permanent loss of valuable topsoil and sedimentation of rivers streams. The site will be compacted due to heavy	▪ Follow rehabilitation guidelines; ▪ Backfill areas using stockpiled soil material; ▪ Stockpiles are to be revegetated and erosion free; ▪ Soil stockpiles are to be used for their designated uses only;

Environmental Aspect	Project Activity	Potential Impact	Mitigation / Management Measure
		machinery on the site, affecting land capability.	▪ All compacted areas will be ripped to loosen the soils during rehabilitation and vegetation cover re-instated; and ▪ All hydrocarbons are to be removed from the site and disposed of at a registered municipal waste handling facility.
Land Use and Land Capability	▪ Alteration of land capability and land use	Removal of soil layers will impact on the land capability and land use thus altering the potential for the area to be utilised for other purposes. It must be noted that that the area has been previously impacted upon, thus the impact to the land use and land capability for the proposed stockpiling activities is seen as minor.	▪ No land capability mitigation is possible during construction phase because the land capability will be significantly reduced, however could be reinstated when rehabilitation is undertaken.

11 Financial Provision

The financial provision estimate was calculated using Digby Wells Matrix Model which is based on first principals. The battery limits of the financial provision calculation were set to only include expansion areas not previously provided for existing Grootegeluk financial provisions. The only area currently note provided for, is the extension area inside the rail loop. This chapter describes the methodology used in calculating the financial provision and a summary breakdown of the provision estimate. The closure report is attached hereto as **Appendix J**.

11.1 Infrastructure Measurement

Using the block layout plan provided, the footprint of the extension area was measured using ArcGIS. Measurements that were taken have been standardised to ensure that the costs calculated are easily updatable and that they are consistent.

11.2 Rates and Cost Calculation

The Digby Wells Matrix format makes use of a set template for which using market related rates. The rate

Quantities for certain defined items e.g. plant and related infrastructure, are then inserted and the cost for closure is calculated. Contingencies and VAT are applied to the cost.

11.3 Assumptions

The assumptions made as part of the financial provision estimate are the following:

- Due to the temporary nature of the activities it has been assumed that the removal of the stockpile will form part of the operational costs;
- Although the footprint will be reutilized after the removal of the temporary stockpile, it has been assumed that the liner will be removed and the site shaped to ensure free drainage and vegetation establishment on 50% of the footprint area;
- Maintenance and aftercare costs of rehabilitation have been excluded as the footprint will be reutilized once the temporary stockpile has been removed;
- Survey data (footprints, volumes, etc.) provided by the mine's surveyor is correct;
- No due diligence was undertaken to determine whether the proposed project may be responsible for any other areas not specified in this report.

11.4 Summary of Financial Provision

The 2016 financial provision estimate was calculated by means of the DMR standard method for assessment of mine closure for the end of life of mine. A summary of the calculated environmental liability costs is presented in Table 11-1. The cost for rehabilitation

and closure of the extension area is **R4 955 974.90 (Incl. VAT)**. The following assumptions were made in the calculation of the estimate:

- The liner for the entire area will be removed and disposed of at the appropriate site;
- The provision is only for the extension area inside the rail loop (extension area – 12.8 ha) as the additional areas such as laydown yard and multiproduct and GG10B stockyards have been provided for under the existing Grootegeluk Financial Provision.

Table 11-1: Summary of the Financial Provision Estimate for the Proposed Grootegeluk Amendments

Extension Area					
Rehabilitation					
Remove liner	112	128000	m²	R5.15	R658,831.03
General clean up of stockpile area	124	128000	m²	R23.75	R3,039,773.52
Shaping of stockpile area (to level ground)	123	12.80	ha	R1,897.96	R24,293.91
Laying of soil for vegetation establishment	126	64000	m²	R16.31	R1,043,719.38
Vegetation establishment	128	6.40	Ha	R29,587.04	R189,357.06
Rehabilitation Total					**R 4,955,974.90**

11.5 Recommendations

To improve the accuracy of the financial provision estimate the following actions are recommended once the mine has been commissioned:

- Digby Wells would recommend that a detailed groundwater study be undertaken five years before closure to monitor pollution plumes entering surface and groundwater resources from the open pit. This will enable the refinement of future mitigation measures;
- Concurrent rehabilitation must continue where possible so as to reduce the liability burden when the mine ceases to operate; and
- The liability figures need to be updated on an annual basis as a requirement of the NEMA. This will ensure that costs become more accurate over time and will reflect current market conditions.

The proposed Project should also take cognisance of the regulations pertaining to the financial provision for the rehabilitation and management of negative environmental impacts associated with prospecting, exploration, mining and production operations which came into effect on 20 November 2015 (GN R1147).

The Regulations, which apply to a holder under the MPRDA, regulates the “method for determining and making financial provision for the costs associated with the management of environmental impacts” caused by mining activities and operations.

The Regulations require holders to make financial provision for:

- Annual rehabilitation;
- Final rehabilitation, decommissioning and closure at the end of the life of a mine; and
- Remediation and management of latent or residual environmental impacts, which may become known in the future. This includes the pumping and treatment of polluted or extraneous water.

This report is based on the Regulations applicable as at 1 December 2014. The following Liability Assessment Report will have to be based on the requirements of GN R1147. In terms of the new Regulations, a holder will have 15 months to assess, review and adjust the sum of the financial provision in accordance with Regulation 9. Failure to do so will mean that the existing approved financial provision will lapse after 45 calendar days after the lapsing of the 15 months period.

12 Impact on any national estate referred to in section 3(2) of the National Heritage Resources Act.

No impact is anticipated in terms of the NHRA. This site has been investigated and findings submitted to SAHRA and LIHRA (case ID: 5935) in 2014. Due to the nature of the stockpile expansion into anthropomorphically disturbed areas, Exemption has been applied for to refrain from further HIAs

13 Other matters required in terms of sections 24(4)(a) and (b) of the Act

Considering this is an application to amend the existing Environmental Authorisation, no alternatives have been considered for the increased footprint of the stockpile area. The selected area has been previously impacted by the current mining operations.

14 Has a water use licence has been applied for

The Water Use Licence Application to amend the water uses for the project area has been compiled and will be submitted to the Department of Water and Sanitation (DWS) once the 30 day Public Participation Process has been complete.

15 Environmental impact statement

15.1 Summary if the key findings of the environmental impact assessment

Based on the findings of the Specialists' studies, the Camel Thorne tress located in the proposed footprint of the GG10B Stockpile area will need to be relocated which requires a permitting process (which Exxaro currently have in place). The impacts to groundwater,

surface water and soil were all found to be negligible and can be managed appropriately with the mitigation provided. The dust deposition modelling projects that fallout will remain mostly within the Mining Right boundary area, and should not reach the surrounding receptors (Marapong, Medupi power station, Matimba power station and other sensitive receptors, such as farmers).

16 Proposed Impact Management Objectives and the Impact Management Outcomes

The Impact and mitigation tables provided in Section 9.7 provide an assessment of each proposed impact, and the significance thereof with and without the proposed mitigation measures.

17 Aspects for Inclusion as Conditions of Authorisation

Exxaro must ensure that the correct permitting procedures are undertaken for the removal of protected tree species, in terms of the National Forests Act, 1998 (Act No. 84 of 1998).

18 Reasoned Opinion as to whether the Proposed Activity should or should not be Authorised

The proposed impacts associated with the increased size of the stockpile can be mitigated and is proposed to be placed in the general stockyard area of Grootegeluk which is already impacted by mining activities.

19 Period for which the Environmental Authorisation is Required

The proposed temporary stockpiles will need to be constructed and operational for a period of approximately five years.

20 Specific Information required by the competent Authority

20.1 Impact on the socio-economic conditions of any directly affected person

An amendment to the layout of the Stockyard area at Grootegeluk will not result in a negative socio-economic impacts as no person is directly affected.

21 Monitoring compliance with and performance assessment

Exxaro will be responsible for the implementation of all of the monitoring of mitigation and management measures, as well as compliance with the EMP. The recommended monitoring for the identified impacts is detailed below. Exxaro will keep a record of all environmental monitoring undertaken on site.

21.1 Monitoring of impact management actions

The Environmental Manager on site will be responsible for ensuring the proposed mitigation measures are adhered to during construction and the Consultants appointed for the EMP audit will provide feedback to the Environmental Manager to ensure compliance for the period the stockpile will be operational.

21.2 Monitoring and reporting frequency

The proposed extension of the GG10B Stockyard will be incorporated in all the existing monitoring programmes. The environmental aspects that will be monitored are:

- Dust Monitoring (Air Quality)
- Soil;
- Surface Water;
- Groundwater; and
- Fauna and Flora.

21.2.1 Dust Monitoring Programme

Grootegeluk Mine management should continue the current dust and PM^{10} monitoring programmes that are in place and for project life in order to amass historical dust deposition data that will feed into management plans and practices aimed at reducing impacts from their operations on ambient air quality.

21.2.2 Soil

Soils monitoring which is currently in place must continue, and should involve the following:

- Inspection of soil stockpiles to check degradation and/or pollution (these are stockpiles that have been created from areas where soil has been stripped); as well as signs of erosion & alien vegetation.
- Fertility analysis and amelioration procedures prior to re-vegetation; and
- Evaluating and readjusting the rehabilitation plan should it be required.

21.2.3 Surface water

21.2.3.1 Water Quality

There are no gaps within the current surface water monitoring programme and should be maintained as is (Table 21-1). Since there are no surface water streams, monitoring occurs at process water dams, storm water collection dams and conveyances and drinking water reservoirs and taps. The current monitoring can be maintained and supported with requirements of a salt and water balance.

Table 21-1: Surface Water Quality Monitoring Locations

Surface water quality monitoring points		Latitude	Longitude
BSB	Bosbok Dam	-23.647603	27.562937
CHA	Char Return Water Dam	-23.648672	27.553878
CNL	Canal near new Laboratory	-23.661922	27.556982
CTL	Control Sample	-23.662453	27.56065
CWS	Central Workshop Separator	-23.665615	27.56201
CWSS	Central Workshop Separator Inflow	-23.665615	27.56201
D6D	Dam next to 6 Dump	-23.667833	27.561315
GEO	Geohydrological Cut Off Trench	-23.634272	27.574703
MMB	Mamba Dam	-23.636472	27.572763
OLI	Olifantskop Dam	-23.667365	27.558415
OXI	Oxidation Dams	-23.675848	27.559458
PIT	Pit Water - Bench 11	-23.67746	27.546118
PIT S13	Pit Sump Bench 13	-23.676987	27.529012
PSP	Product Stockpile Point	-23.655307	27.559277
PSS	Pit Service Station	-23.669233	27.551575
PWDS	Pool Workshop Dam with New Separator	-23.661663	27.565022
TDB	Total Depot Bridge	-23.66587	27.556817
VTJ	Voeltjie Dam	-23.679272	27.558818
WWTW	Waste Water Treatment Works	-23.670322	27.554469

The storm water management plan needs to be monitored for aspects such as its efficiency, as well as de-silting so that it remains effective. These can be performed on monthly check and de-silting carried out when necessary.

21.2.3.2 Water Quantity

The water balance needs to be updated from time to time as specified in WULA conditions. It is therefore important that volumes related to water make and water use, are recorded throughout the Life of Mine. The water volumes that should be considered in the operation of stockyards include, but not limited to:

- Seepage collected in drains;
- Dust suppression volumes; and
- Product moisture content.

In the event of any technology changes, through monitoring, some changes in the water balance will therefore be documented and assist in the water management on the mine.

21.2.4 Groundwater

This practice provides for early detection of water quality deterioration and thereafter implementation of management measures, avoiding harmful impacts to the affected parties and the operators of the activities (in the event that contamination does emanate from the stockpiles).

Furthermore, for verification and increased confidence in the geochemistry results, it is advised that continuous monitoring of the groundwater quality be conducted. This will

provide for a sufficient database to assess the potential impact of the stockpiles on the groundwater environment in terms of quality.

Existing boreholes are recommended to be used for monitoring. They are located in suitable places which will be sufficient for monitoring purposes of the proposed activities. The recommended monitoring boreholes are: boreholes WBR15, WBR28, WB33 and WB35.

21.2.5 Fauna and Flora

Cleared areas should be monitored for colonisation by alien species and a proactive approach should be undertaken to control alien species as soon as they are established. Monitoring and eradication of alien species is part of the mine's responsibility and failure to do so in the early stages will result in greater investments of resources to remove them at a later stage.

22 Indicate the frequency of the submission of the performance assessment/ environmental audit report

Reviews of the project's performance and Environmental Audits are necessary during all mining phases to ensure that procedures are appropriate and to ensure the desired environmental outcomes are being achieved. It is recommended that regular Environmental Audits be conducted to assess the performance of the EMP. The current Grootegeluk standard is that an annual EMP Performance Assessment is conducted and the results submitted to the DMR. The Assessments alternate on a yearly basis between an internal assessment and an external assessment.

A competent Internal Environmental Specialist or external Environmental Consultant is used to evaluate if the EMP is effective and relevant, and provide recommendations for improvement.

Specific requirements for environmental management relative to specific areas of construction and subsequent operation will be detailed in the respective contracts of sub-contractors (which will be defined during the pre-construction and construction phase). Continual evaluation measures must be implemented to ensure that performances with regard to social, health and well-being of the environment are improved and environmental management is effectively implemented throughout the lifespan of the development. Environmental Awareness Plan

23 Manner in which the applicant intends to inform his or her employees of any environmental risk which may result from their work

All personnel appointed will be suitably qualified and trained to in order to ensure competence within their position.

Employees will be mentored by their line managers through the Individual Development Plans, which records training needs and career aspirations. The employee and his or her mentor will review the Individual Development Plans annually, decide on the training needs for the coming year and mutually agree on an implementation plan. Growth in leadership and managerial skill will be the main focus for employees at supervisor levels and above. Below supervisor levels the main focus will be on the employee achieving excellence in her or his job.

The Environmental Awareness Plan forms part of the mine's safety, health and environmental (SHE) training. All personnel, as a minimum, undergo general SHE induction and awareness training. The managers responsible for environmental management identify the SHE training requirements for all Exxaro personnel and contractors. The training requirements are recorded in a training needs matrix indicating particular training that must be undertaken by identified personnel and contractors and at what intervals.

The Training Programme consists of the following components or modules:

- General Awareness Training:
  - A general environmental awareness training module has been developed and integrated into the general induction programme. The general awareness training includes the Exxaro Environmental Policy, a description of the environmental impacts and aspects and the importance of conformance to requirements, general responsibilities of mine personnel with regard to the environmental requirements and a review of the emergency and corrective action processes; and
  - A Training Practitioner conducts the general awareness training. The Training Practitioner keeps a record of the details of all persons attending general awareness training. Such attendance registers indicate the names of attendees and their organisations, the date and the type of training received.
- Specific Environmental Training:
  - Specific environmental training will be in line with the requirements identified in the training matrix and frequencies; and
  - Personnel whose work tasks can impact on the environment will be made aware of the requirements of appropriate procedures/work instructions. The responsible Manager will communicate training requirements to responsible supervisors to ensure that personnel and contractors are trained accordingly.
- Training Evaluation and Re-training:
  - Effectiveness of the environmental training will be reflected by the degree of conformance to EMPR requirements, the result of annual internal audits and the general environmental performance achieved for the project;

- Incidents and non-conformances raised against the EMPR will be assessed through the Internal Incident Investigation and Reporting System to determine the root cause, including the possible lack of awareness/training;
- Should it be evident that re-training is required, the Environmental Manager(s) will inform the Exxaro management team of the need and take the appropriate actions;
- General awareness training of all personnel shall be repeated every two years; and
- The re-induction shall take into consideration changes made in the EMPR, changes in legislation, Exxaro's current levels of environmental performance, and areas of improvement.

Competence and awareness training of staff will focus on the ability of people to perform their assigned functions or duties to the best of their ability in accordance with given instructions. Personnel not able or equipped to fully conform to requirements will be given the opportunity, support and assistance to achieve whatever is required or expected from them.

Personnel will be interviewed and appointed in relation to applicable education, training, competency and work-related experience. Training will focus on the understanding, application and maintenance of the Safety, Health, Environmental and Quality (SHEQ) Systems at various levels and functions throughout the organization to the benefit of both employer and employee.

Apart from formal or informal internal and external training and re-training; internal auditing, investigations and management reviews will serve as part of establishing training needs and in assisting personnel in achieving set goals, objectives and targets. Records of all training together with any related evaluation and/or qualification tests will be kept on personal files to serve as a basis for continuous development and enlistment. In addition to training, rotation of staff will take place on an ongoing basis to ensure flexibility and the development of expertise within Exxaro.

24 Manner in which risks will be dealt with in order to avoid pollution or the degradation of the environment

Risk avoidance or mitigation will be managed in accordance with the EMP but Exxaro does have internal communication procedures to provide feedback on the environmental risks on site and for potential risks surrounding the mine.

Consultation with employees in regards to feedback on standards, procedures and SHEQ related programmes will be done through the various SHEQ Forums and SHEQ Participative Structure meetings.

All communication documents received from external parties including the Authorities will be handed over to the SHEQ secretary for record keeping. All communications received from

the Authorities (e.g. DWA, DEA, DMR) or I&AP will be officially answered on an Exxaro letterhead approved and signed by the General Manager of the Mine.

Both hard and electronic copies of all communications with external parties will be filed in the I&AP folder/files managed by the SHEQ Systems Coordinator.

Information regarding significant environmental aspects as well as safety hazards shall be communicated to external parties on request as per the decision reached in the management review meeting.

The communication in regards to emergency issues that have the potential to impact on the surrounding communities will also be discussed as part of the management review, where management will make the decision on how these issues will be communicated.

The mine will have an annual information session with the I&APs where information affecting them will be communicated openly in regard to the environmental issues addressed by the mine as well as to give feedback on the steps taken to address any complaints received during the year. During this meeting the safety and health issues that relate to the community will also be discussed.

The following will be regarded as communication records:

- Minutes of SHEQ forum meetings;
- Management review meeting minutes;
- Environmental Incidents Reports;
- External communication with I&AP's, including authorities;
- Newsletters;
- SHEQ monthly and annual reports; and
- Minutes of the yearly I&AP Information session.

All information provided through the communications processes will be recorded and used to avoid potential risks in future.

25 Specific information required by the Competent Authority

This application serves an amendment to allow Exxaro to legally stockpile excess coal within a disturbed footprint, within the Mining Right boundary. (Among others, confirm that the financial provision will be reviewed annually)

26 Undertaking

The EAP herewith confirms:-

- the correctness of the information provided in the reports
- the inclusion of comments and inputs from stakeholders and I&APs ;

- the inclusion of inputs and recommendations from the specialist reports where relevant; and
- the acceptability of the project in relation to the finding of the assessment and level of mitigation proposed.

Signature of the Environmental Assessment Practitioner:	
Name of Company:	Digby Wells Environmental (Pty) Ltd.
Date:	26 September 2016

27 References

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Appendix A: EAP CV

Appendix B: Locality and Infrastructure Layout Plan

Appendix C: Air Quality Report

Appendix D: Fauna and Flora Report

Appendix E: Surface Water Report

Appendix F: Groundwater

Appendix G: Geochemical Report

Appendix H: Soil, Land Use and Land Capability Report

Appendix I: Heritage Report

Appendix J: Closure Report