



# DIGBY WELLS

## ENVIRONMENTAL

Name of Applicant:	Glencore Operations South Africa (Pty) Ltd
Telephone Number:	+27 11 772 0680
Fax Number:	+27 11 772 0697
Postal Address:	Suite 19, Private Bag X1, Melrose Arch
Physical Address:	3rd Floor, 23 Melrose Boulevard, Melrose Arch
File Reference No. SAMRAD:	MP30/5/1//2/2/ 289 MR

## Proposed Realignment of the P141-1 Provincial Road, Tweefontein Mine Complex, Mpumalanga Province

## Environmental Impact Assessment and Environmental Management Programme Report

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



**mineral resources**

Department:  
Mineral Resources  
**REPUBLIC OF SOUTH AFRICA**

Digby Wells and Associates (South Africa) (Pty) Ltd  
(Subsidiary of Digby Wells & Associates (Pty) Ltd). Co. Reg. No. 2010/008577/07. Turnberry Office Park, 48 Grosvenor Road, Bryanston, 2191. Private Bag X10046, Randburg, 2125, South Africa  
Tel: +27 11 789 9495, Fax: +27 11 789 9498, info@digbywells.com, www.digbywells.com

Directors: DJ Otto, GB Beringer, LF Koeslag, AJ Reynolds (Chairman) (British)\*, J Leaver\*, GE Trusler (C.E.O)

\*Non-Executive



This document has been prepared by Digby Wells Environmental.

<b>Report Type:</b>	<b>Environmental Impact Assessment and Environmental Management Programme Report</b>
<b>Project Name:</b>	<b>Proposed Realignment of the P141-1 Provincial Road, Tweefontein Mine Complex, Mpumalanga Province</b>
<b>Project Code:</b>	<b>GLE3075</b>

<b>Name</b>	<b>Responsibility</b>	<b>Signature</b>	<b>Date</b>
Vumile Dlamini	Report Compiler	<i>V. Dlamini</i>	June 2015
Kasantha Moodley	Report Review	<i>K. Moodley</i>	August 2015
Michael Hennessy	Quality Review	<i>M. Hennessy</i>	August 2015
Bradly Thornton	Report Sign-Off	<i>B. Thornton</i>	August 2015
Lucy Koeslag	Exco Review	<i>L. Koeslag</i>	August 2015

*This report is provided solely for the purposes set out in it and may not, in whole or in part, be used for any other purpose without Digby Wells Environmental prior written consent.*

## IMPORTANT NOTICE

In terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002 as amended), the Minister must grant a prospecting or mining right if among others the mining “will not result in unacceptable pollution, ecological degradation or damage to the environment”.

Unless an Environmental Authorisation can be granted following the evaluation of an Environmental Impact Assessment and an Environmental Management Programme report in terms of the National Environmental Management Act, 1998 (Act No.107 of 1998) (NEMA), it cannot be concluded that the said activities will not result in unacceptable pollution, ecological degradation or damage to the environment.

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

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

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

## OBJECTIVE OF THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

The objective of the environmental impact assessment process is to, through a consultative process: -

- determine the policy and legislative context within which the activity is located and document how the proposed activity complies with and responds to the policy and legislative context;
- describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;
- identify the location of the development footprint within the preferred site based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment;
- determine the: -
  - nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and
  - degree to which these impacts: -
    - can be reversed;
    - may cause irreplaceable loss of resources, and
    - can be avoided, managed or mitigated.
- identify the most ideal location for the activity within the preferred site based on the lowest level of environmental sensitivity identified during the assessment;
- identify, assess, and rank the impacts the activity will impose on the preferred location through the life of the activity;
- identify suitable measures to manage, avoid or mitigate identified impacts; and
- identify residual risks that need to be managed and monitored.

## EXECUTIVE SUMMARY

### Background

Glencore Operations South Africa (Pty) Ltd (Glencore) acting through its Coal Division is proposing the realignment of a section (approximately 3.4 km) of the P141-1 Provincial Road which traverses through the Tweefontein Mine Complex, situated 8 kilometres (km) east of Ogies in the Mpumalanga Province.

Glencore currently employs both underground and open pit coal mining activities at its Tweefontein Mine Complex. In 2008, Glencore initiated the Tweefontein Optimisation Project (TOP) which aims to recover the remaining strategic coal reserves within the mine complex. As part of the TOP, Glencore had identified that a portion of the strategic coal reserve is located beneath the existing P141-1 Provincial Road which forms part of Mpumalanga's strategic public transport network. In light of this, Glencore proposed the realignment of the P141-1 Provincial Road in 2010 to enable the undertaking of the TOP. This was termed the Tweefontein Road Realignment Project (TRRP). For planning purposes, the road realignment was separated into two phases, as follows:

- **Phase 1:** Realignment of the P141-1 Provincial Road (5.5 km) from the north eastern portion of the Tweefontein dam, to just beyond the Phoenix dam. The Environmental Impact Assessment (EIA) and Water Use Licence (WUL) process for this section of the road was undertaken in 2014 with the Environmental Authorisation granted in November 2014 (17/2/3N-260). Construction for Phase 1 has already commenced with the length of the full road being completed, with the exception of the water crossings (i.e. culvert construction).
- **Phase 2:** Realignment of the P141-1 Provincial Road from the D2769 extension road (currently under construction as Part of Phase 1) following a north westerly direction for approximately 3.4 km to join the existing P 141-1 road. As part of the proposed Project, the P141-1 Provincial Road between the P29-1 (R555) and D2770 (R547) will be permanently closed. Furthermore, the D2770 (R547) Road between the P141-1 Provincial Road and the N12 will be permanently closed. This application for environmental authorisation relates to Phase 2 only and is hereafter referred to as the proposed Project.

Glencore holds an approved Mining Right for the Tweefontein Mine Complex, dated 19 August 2010 with reference MPT 36/2012 MR (MP30/5/1//2/2/ 289 MR). The proposed realignment of the P141-1 Provincial Road Project is part of the mining area<sup>1</sup> as defined in

---

<sup>1</sup> "mining area" -

- (a) in relation to a mining right or a mining permit, means the area on which the extraction of any mineral has been authorised and for which that right or permit is granted;
- (b) in relation to any environmental, health, social and labour matter and any residual, latent or other impact thereto, including-

terms of the MPRDA which include any road which is under the control of the mining right holder and which the holder is entitled to use in connection with the operations to be performed under the mining right.

This report considers all those activities associated with the road alignment, activities associated with the removal of Waterpan No 1a dump and its re-deposition as well as the closure requirements associated with the existing roads, and the amendment to the Mine Works Programme (MWP) associated with these activities does not form part of this report.

### Legislative Requirement

To obtain environmental authorisation for the proposed Project, Glencore is required to undertake an EIA process in terms of the EIA Regulations, December 2014 (GN R. 982 of 4 December 2014), promulgated in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended. The Competent Authority (CA) is the Department of Mineral Resources (DMR). The proposed Project also requires a Water Use Licence (WUL) in terms of the National Water Act, 1998 (Act No. 36 of 1998), as amended.

Digby Wells and Associates South Africa (Pty) Ltd has been appointed as the independent Environmental Assessment Practitioner (EAP) to undertake the EIA process and associated WULA.

A Public Participation Process (PPP) has been initiated, which is central to the investigation of environmental and social impacts, as it is important that stakeholders who are affected by the proposed Project are given an opportunity to identify concerns and to ensure that local knowledge, needs and values are understood and taken into consideration as part of the impact assessment process. The comments of stakeholders have been included in the Comments and Responses Report (CRR) (Appendix E6).

### Project Location and Description

The proposed Project is located upon the Remaining Extent and Portion 1 of the Farm Tweefontein 13 IS. The sections of the proposed roads that are to be closed are located on the following properties:

- Remaining Extent and Portion 1 of the Farm Tweefontein 13 IS
- Portion 1 of the Farm Vlaklaagte 330 JS
- Portion 2 of the Farm Vlaklaagte 330 JS

- 
- (i) any land or surface adjacent or non-adjacent to the area as contemplated in subsection (i) but upon which related or incidental operations are being undertaken;
- (ii) any surface of land on which such road, railway line, powerline, pipe line, cableway or conveyor belt is located, under the control of the holder of such a mining right or a mining permit and which such holder is entitled to use in connection with the operations performed or to be performed under such right or permit; and
- (iii) all buildings, structures, machinery, residue stockpiles, or objects situated on or in the area as contemplated in subsections (ii)(a) and (ii)(b).

[Definition of "mining area" substituted by s. 1 of Act 49/2008 w.e.f. 7 June 2013]



- Portion 40 of the Farm Vlaklaagte 330 JS
- Portion 41 of the Farm Vlaklaagte 330 JS
- Portion 2 of the Farm Waterpan 8 IS

A plan of the proposed Project site showing the proposed alignment and associated activities to be applied for has been attached as Plan 4 in Appendix B of this document. The Project's activities are listed below:

- Contractor Camp (temporary structure during construction phase);
- Site clearance;
- Construction of realigned Provincial Road P141-1 (3.4 km);
- Construction of a culvert and bridge;
- Permanent closure of a section of the existing Provincial Road P141-1 alignment and a section of the D2770 (R547);
- Maintenance and upgrade of the realigned road; and
- Employment (about 250 employees).

The planned construction and road closure timeframes are indicated in the table below.

**Table I: Project Schedule**

Phase/Activity	Timeframe
Construction There will be no road closures during construction.	Q4 of 2015 – Q4 of 2016 (1 year)
Permanent road closure and decommissioning of current P141-1 alignment and a section of the R547	Q4 of 2016 (on completion of the Phase 2 of the realignment of the P141-1)

### Potential Project Impacts

In terms of project alternatives, two proposed route alternatives were identified and were assessed against the no-go alternative. The potential positive and negative impacts of the proposed Project are listed below along with the no-go alternative.

### Positive Impacts

Positive impacts of the proposed Project can be summarised as follows:

- **Skills development due to employment** in the construction phase – Approximately 250 job opportunities will be created during the construction phase of the road realignment. Seventy percent (70%) of the employment opportunities will be for both skilled and semi-skilled workers which will mostly be sourced from the local Ogies community. . Although the construction phase will be completed within 1 year, the road construction employment opportunity will result in skills development;

- **Generation of income due to employment** in the construction phase - a number of employment opportunities will be created for the local community during the construction phase of the proposed Project. It is anticipated that approximately 250 employees will be employed during the construction phase of the proposed Project (approximately 1 year). Approximately 70 % of employees appointed for the construction of Phase 1 are employed directly from the local communities. The extension of employment or opportunity for employment to work on the proposed Project will result in the generation of income and spending capacity;
- **Extension of benefits from the extension of LoM:** The proposed Project will result in a significant increase of the Run of Mine (RoM) coal produced per annum at the Tweefontein Mine Complex (12.5 million tonnes per annum) thus extending the LoM of the Tweefontein Mine Complex and the associated benefits including:
  - Increase of revenue for Glencore and associated government taxes;
  - Increased period of employment at the Tweefontein Mine Complex which will impact the families of these employees directly, thereby having an impact on the community;
  - Increase of potential income for all contractors associated with the construction of the road, the culverts and associated bridges; and
  - An increase in coal production will impact electricity supply from Eskom's coal-fired power stations, as Eskom relies on coal supplied by Glencore.
- **Improved road condition and capacity for road users** during the operational phase - mine related traffic will be separated from public traffic, an improved road condition can be expected.

Positive impacts of the no-go alternative is summarised below:

- The various negative impacts identified as part of the proposed Project will not occur, including loss of habitat, reduction of surface water flow and quality and dust emissions.

## Negative Impacts

Negative impacts of the proposed Project can be summarised as follows:

- **Loss of topsoil material** during construction, when topsoil is removed from a soil profile, the profile loses effective rooting depth, water holding capacity and fertility. The largest volumes of topsoil will be removed in preparation for the road foundation. The removed soil will be stockpiled for later rehabilitation purposes, although it can still be lost through inappropriate management;
- **Loss of land capability**, excessive compaction of soil during the construction of the road may result in the degradation, densification and distortion of the soil. This, in turn, may reduce biological activity, porosity and permeability of the soil, and result in



a change of the soil structure. This may result in the impacts on soil quality as well as the capability of the soil to support other land uses;

- **Loss of vegetation**, the removal of vegetation from the proposed route alignment, particularly grassland and cultivated crops. The removal of vegetation will also result in a potential loss of Species of Special Concern (SSC);
- **Habitat fragmentation**, resulting from the establishment of the new route alignment, thus creating further isolated habitat;
- **Increase in sedimentation load**, the footprint of the realigned route will be exposed, thereby increasing water and wind erosion of soils;
- **Flow reduction of the Tweefontein spruit** during construction, water from the tributary will need to be dammed/ diverted to allow for the establishment of the culvert for the water crossing;
- **Loss of wetland habitat**, the proposed road will traverse the identified hillslope seepage wetland, thus resulting in the loss of wetland habitat;
- **Deterioration of wetland through poor water quality**, the wetlands may be affected as a result of site clearance and topsoil removal, movement of vehicles and the construction of the culvert which may lead to an increase in suspended solids, which may reduce water quality of the tributary and ultimately the Tweefontein spruit;
- **Reduction in quality of aquatic habitat**, the Tweefontein dam has impacted water availability which has led to impacts regarding habitat availability and migration. The increased presence of alien fish species within the Tweefontein spruit has also impacted the indigenous fish population through disrupting breeding patterns and competing for resources within the Tweefontein spruit;
- **Potential impact on air quality** is only associated with site clearing and construction activities that may result in fugitive dust emissions such as PM<sub>10</sub> PM<sub>2.5</sub> and Total Suspended Particulates (TSP). This is considered to be a cumulative impact in relation to the existing mining activities and agricultural activities;
- **Direct and indirect impacts on grave sites** can include damage to or destruction of surface dressings caused by diverse actions such as construction activities. Another impact includes the loss or restricted access to gravesites, degradation of the intrinsic cultural significance (CS) of gravesites associated with living heritage due to loss of access, and health and safety risks to any visitors to gravesites that may be located within mining properties.
- **Increase in traffic and disruption of traffic flow** - the construction activities may disrupt the daily movement patterns of road-users. Traffic will need to be diverted during the construction activities. Furthermore, the closure of the affected roads will also result in disruption of traffic flow as road users become more familiar with the new proposed routes. During construction, material and employees will also be transported to the project site thus generating additional traffic on the road network;

- **Establishment and spread of alien invasive vegetation**, with stockpiling and earth moving activities being undertaken in the construction activities, the potential for alien invasive plant species to establish along the road reserve may exist; and
- **Loss of fauna**, the establishment of the new realigned road with the movement of traffic along this road may result in potential killing of fauna attempting to cross the road.

Negative implications of the No-go Option are summarised below:

- The safety risk associated with poor road condition of the existing alignment will persist; and
- The life of mine at the Tweefontein Mine Complex would be reduced as the current P141-1 Provincial Road will continue to sterilise a valuable coal resource. The total effects of this coal reserve being sterilised involve:
  - Loss of revenue for Glencore and associated government taxes;
  - Reduced period of employment at the Tweefontein Mine Complex which will impact the families of these employees directly, thereby having an impact on the community;
  - Loss of potential income for all contractors associated with the construction of the road, the culverts and associated bridges; and
  - A decrease in coal production will impact electricity supply from Eskom's coal-fired power stations, as Eskom relies on coal supplied by Glencore.

## **Project Risks**

The following project risks have been identified for the proposed Project:

- Spills and leaks occurring during the construction phase as well as once the road is operational (during maintenance or just use of the road to transport materials in the region);
- Risk of flooding due to crossing during the operational phase of the road; and
- Safety risk in terms of accidents during construction and operation of the road.

## **Conclusion and Recommendations**

The authorisation of this Project will allow Glencore to continue with their mining operations. Continuing with the production of coal from the mining area can contribute to meeting the objective of the MPRDA (2002) which is to maximise the benefit of the nation's mineral resources for all South Africans whilst meeting the objectives of the Constitution of South Africa as well as the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended (NEMA). Both of which requires that environmental management must place

people and their needs at the forefront of its concern, and serve their physical, psychological, developmental, cultural and social interests equitably.

The findings of the impact assessment have shown that the proposed Project may result in certain negative impacts to the environment, including potential safety risks; however, adequate mitigations measures have been included into this EIA and EMP Report to reduce the significance of all the identified negative impacts and associated risks.

The positive impacts associated with the proposed Project include the continued (and potentially improved) economic benefit associated with the construction of the road, as well as an improved road condition. To ensure that the impact of the proposed Project does not result cause irreversible damage to the receiving environment, the following conditions of the Environmental Management Programme Report (EMPR) must be adhered to:

- In general, where mitigation measures have been suggested, these measures must be implemented and adhered to throughout the life of the project;
- Monitoring procedures must be carried out and the results thereof be made available to the relevant authorities;
- The Water Use Licence associated with the proposed construction of the road must be granted before construction of the culvert may commence, or the construction of the road encroaches on the wetland; and
- No deviations from the approved realignment route, or additional Listed Activities may be undertaken without prior consultation and consent from the Competent Authority.

## TABLE OF CONTENTS

<b>Part A: Scope of Assessment and Environmental Impact Assessment Report .....</b>	<b>1</b>
1 Introduction .....	1
2 Item 3: Project Applicant.....	3
2.1 <i>Item 3(a)(i): Details of EAP</i> .....	4
2.2 <i>Item 3(a)(ii): Expertise of the EAP</i> .....	4
2.2.1 The Qualifications of the EAP .....	4
2.2.2 Summary of the EAP's Past Experience .....	4
3 Item 3(b): Description of the Property .....	5
4 Item 3(c) of Appendix 3: Regional and Locality Map .....	6
5 Description of the Scope of the Proposed Overall Activity .....	6
5.1 <i>Item 3(d)(i): Listed and Specified Activities</i> .....	6
5.2 <i>Item 3(d)(ii): Description of the Activities to be Undertaken</i> .....	7
5.2.1 Proposed Route Alignment .....	9
5.2.2 Road Closures.....	9
5.2.3 Road Design.....	10
5.2.4 Associated Structures.....	10
5.2.5 Waste Management.....	11
5.2.6 Water Use and Management .....	11
5.2.7 Project Phases and Associated Activities .....	11
5.2.8 Project Staffing .....	14
5.2.9 Project Schedule.....	14
6 Item 3(e): Policy and Legislative Context.....	14
7 Item 3(f): Need and Desirability of the Proposed Activities .....	30
7.1 Economic Consideration .....	30
7.2 Development Consideration.....	31
7.2 Environmental Consideration .....	31
7.3 Socio-economic Consideration .....	32

8	Item 3(g): Motivation for the Preferred Development Footprint within the Approved Site Including a Full Description of the Process Followed to reach the Proposed Development Footprint within the Approved Site .....	33
8.1	<i>Item 3(g)(i): Details of the Development Footprint Alternatives Considered ....</i>	33
8.1.1	Location Alternative .....	33
8.1.2	Design Alternative.....	34
8.1.3	Activity Alternative .....	35
8.1.4	Routing Alternative .....	35
8.1.5	The No-Go Alternative .....	36
8.2	<i>Item 3(g)(ii): Details of the Public Participation Process Followed.....</i>	37
8.2.1	Stakeholder Identification.....	37
8.2.2	Consultation with I&APs.....	40
8.2.3	Particulars of the Public Participation Process with Regard to the Impact Assessment Process that will be Conducted.....	43
8.3	<i>Item 3(g)(iv): The Environmental Attributes Associated with the Development Footprint Alternatives.....</i>	54
8.3.1	Baseline Environment.....	54
8.4	<i>Item 3(g)(vi): Methodology used in Determining and Ranking the Nature, Significance, Consequence, Extent, Duration and Probability of Potential Environmental Impacts and Risks.....</i>	93
8.5	<i>Item 3(g)(v): Impacts and Risks Identified Including the Nature, Significance, Consequence, Extent, Duration and Probability.....</i>	104
8.5.1	Construction Phase .....	104
8.5.2	Operational Phase .....	124
8.5.3	Decommissioning/Closure Phase .....	128
8.5.4	Project Related Risks .....	128
8.6	<i>Item 3(g)(vii): The Positive and Negative Impacts that the Proposed Activity (in Terms of the Initial Site Layout) and Alternatives Will Have on the Environment and the Community that may be Affected .....</i>	129
8.6.1	Positive Impacts.....	129
8.6.2	Negative Impacts.....	130
8.7	<i>Item 3(g)(viii): The Possible Mitigation Measures that could be Applied and the Level of Risk.....</i>	132
8.6	<i>Item 3(g)(ix): Motivation where no Alternative Sites were Considered .....</i>	137

8.7	<i>Item 3(g)(x): Statement Motivating the Alternative Development Location within the Overall Site.....</i>	137
9	Item 3(h): Full Description of the Process Undertaken to Identify, Assess and Rank the Impacts and Risks the Activity will Impose on the Preferred Site (In Respect of the Final Site Layout Plan) Through the Life of the Activity .....	138
10	Item 3(i): Assessment of Each Identified Potentially Significant Impact and Risk.	139
11	Item 3(j): Summary of Specialist Reports .....	143
12	Item 3(k): Environmental Impact Statement.....	147
12.1	<i>Item 3(k)(i): Summary of the Key Findings of the Environmental Impact Assessment.....</i>	147
12.1.1	Terrestrial Biodiversity .....	147
12.1.2	Aquatic Ecology .....	147
12.1.3	Surface Water:.....	147
12.1.4	Wetlands .....	147
12.1.5	Community/Traffic.....	148
12.2	<i>Item 3(k)(ii): Final Site Map.....</i>	149
12.3	<i>Item 3(k)(iii): Summary of the Positive and Negative Implications and Risks of the Proposed Activity and Identified Alternatives .....</i>	149
13	Item 3(l): Proposed Impact Management Objectives and the Impact Management Outcomes for Inclusion in the EMPR .....	149
13.1	<i>Environmental Objectives and Goals.....</i>	149
13.2	<i>Socio-economic Objectives and Goals .....</i>	149
14	Item 3(m): Final Proposed Alternatives.....	150
15	Item 3(n): Aspects for Inclusion as Conditions of Authorisation .....	150
16	Item 3(o): Description of any Assumptions, Uncertainties and Gaps in Knowledge 151	
17	Item 3(p): Reasoned Opinion as to Whether the Proposed Activity should or should not be Authorised .....	152
17.1	<i>Item 3(p)(i): Reasons why the Activity should be Authorised or not .....</i>	152
17.2	<i>Item 3(p)(ii): Conditions that must be Included in the Authorisation .....</i>	152
17.2.1	Specific Conditions to be Included into the Compilation and Approval of EMPR .....	152
17.2.2	Rehabilitation Requirements.....	153
18	Item 3(q): Period for which Environmental Authorisation is Required.....	153



19	Item 3(r): Undertaking .....	153
20	Item 3(s): Financial Provision .....	153
20.1	<i>Item 3(s)(i): Explain how the Aforesaid Amount was Derived.....</i>	153
20.2	<i>Item 3(s)(ii): Confirm that this Amount can be Provided for from Operating Expenditure .....</i>	153
21	Item 3(t): Deviations from the Approved Scoping Report and Plan of Study .....	154
21.1	<i>Item 3(t)(i): Deviations from the Methodology used in Determining the Significance of Potential Environmental Impacts and Risks .....</i>	154
21.2	<i>Item 3(t)(ii): Motivation for the Deviation .....</i>	154
22	Item 3(u): Other Information Required by the Competent Authority .....	154
22.1	<i>Item 3(u)(i)(1): Impact on the Socio-economic Conditions of any Directly Affected Person.....</i>	154
22.2	<i>Item 3(u)(i)(2): Impact on any National Estate Referred to in Section 3(2) of the National Heritage Resources Act.....</i>	155
22.2.1	Impacts on Burial Grounds and Graves .....	155
22.2.2	Heritage Impacts vs Sustainable Socio-Economic Benefits .....	156
23	Item 3(v): Other Matters Required in terms of Sections 24(4)(a) and (b) of the Act	157
<b>Part B: Environmental Management Programme Report.....</b>		<b>158</b>
1	Item 1(a): Details of the EAP .....	160
2	Item 1(b): Description of the Aspects of the Activity .....	160
3	Item 1(c): Composite Map .....	160
4	Item 1(d): Description of Impact Management Objectives including Management Statements.....	160
4.1	<i>Item 1(d)(i): Determination of Closure Objectives .....</i>	160
4.2	<i>Item 1(d)(ii): The Process for Managing any Environmental Damage, Pollution, Pumping and Treatment of Extraneous Water or Ecological Degradation as a Result of Undertaking a Listed Activity.....</i>	160
4.2.1	Communication of Environmental Emergencies.....	161
4.3	<i>Item 1(d)(iii): Potential Risk of Acid Mine Drainage.....</i>	162
4.4	<i>Item 1(d)(iv): Steps taken to Investigate, Assess, and Evaluate the Impact of Acid Mine Drainage .....</i>	162
4.5	<i>Item i(d)(v): Engineering or Mine Design Solutions to be Implemented to Avoid or Remedy Acid Mine Drainage .....</i>	162

4.6	<i>Item 1(d)(vi): Measures that will be put in place to Remedy any Residual or Cumulative Impact that may Result from Acid Mine Drainage.....</i>	162
4.7	<i>Item 1(d)(vii): Volumes and Rate of Water Use Required for the Mining, Trenching or Bulk Sampling Operation .....</i>	162
4.8	<i>Item 1(d)(viii): Has a Water Use Licence been Applied for.....</i>	162
4.9	<i>Item 1(d)(ix): Impacts to be Mitigated in their Respective Phases.....</i>	163
5	Item 1(e): Impact Management Outcomes.....	168
6	Item 1(f): Impact Management Actions .....	173
7	Financial Provision .....	178
7.1	<i>Item (i)(1): Determination of the Amount of Financial Provision .....</i>	178
7.1.1	Item (i)(1)(a): Describe the Closure Objectives and the Extent to which they have been Aligned to the Baseline Environment Described under Regulation 22 (2) (d) as described in 2.4 herein .....	178
7.1.2	Item (i)(1)(b): Confirm Specifically that the Environmental Objectives in Relation to Closure have been Consulted with Landowner and Interested and Affected Parties .....	178
7.1.3	Item (i)(1)(c): Provide a Rehabilitation Plan that Describes and Shows the Scale and Aerial Extent of the Main Mining Activities, Including the Anticipated Mining Area at the Time of Closure .....	179
7.1.4	Item (i)(1)(d): Explain why it can be Confirmed that the Rehabilitation Plan is Compatible with the Closure Objectives .....	181
7.1.5	Item (i)(1)(e): Calculate and State the Quantum of the Financial Provision Required to Manage and Rehabilitate the Environment in Accordance with the Applicable Guideline .....	181
7.1.6	Item (i)(1)(f): Confirm that the Financial Provision will be Provided as Determined.....	182
8	Monitoring Compliance with and Performance Assessment .....	182
8.1	<i>Item 1(g): Monitoring of Impact Management Actions.....</i>	182
8.2	<i>Item 1(h): Monitoring and Reporting Frequency.....</i>	182
8.3	<i>Item 1(i): Responsible Persons.....</i>	184
8.4	<i>Item 1(j): Time Period for Implementing Impact Management Actions .....</i>	185
8.5	<i>Item 1(k): Mechanism for Monitoring Compliance .....</i>	185
8.5.1	Performance Assessments .....	185
9	Item 1(l): Indicate the Frequency of the Submission of the Performance Assessment Report .....	190

10	Item 1(m): Environmental Awareness Plan.....	190
10.1	<i>Item 1(m)(1): Manner in which the Applicant Intends to Inform his or her Employees of any Environmental Risk which may Result from their Work....</i>	191
10.2	<i>Item 1(m)(2): Manner in which Risks will be Dealt with in Order to Avoid Pollution or the Degradation of the Environment.....</i>	192
11	Item 1(n): Specific information Required by the Competent Authority .....	193
12	Item 2: Undertaking .....	193
13	References.....	194

## LIST OF FIGURES

Figure 8-1: Seasonal Wind Rose for Ogies .....	56
Figure 8-2: Geology of the Tweefontein Mine Complex.....	58
Figure 8-3: Soil Types Found Within the Tweefontein Mine Complex.....	61
Figure 8-4: Land-uses from top left to right: Waterpan Dump, View of Proposed Alignment looking West, Grazing and Maize Land (from bottom left to right) .....	63
Figure 8-5: Land Capability within the Tweefontein Mine Complex.....	64
Figure 8-6: Land Use within the Tweefontein Mine Complex.....	65
Figure 8-7: Groundwater Flow Direction within the Tweefontein Mine Complex .....	70
Figure 8-8: Unmitigated Dust Dispersion Model (2013) .....	72
Figure 8-9: Daily PM10 Concentrations Monitored at Two Stations in ELM (2008 and 2012) .....	73
Figure 8-10: Vegetation Units within the Tweefontein Mine Complex .....	75
Figure 8-11: Delineated Wetlands of the Study Area.....	78
Figure 8-12: Ecosystem Services Associated with the P141-1 Realignment .....	79
Figure 8-13: Present Ecological Status of the Tweefontein spruit.....	80
Figure 8-14: Ecological Importance and Sensitivity of the Tweefontein spruit .....	81
Figure 8-15: General Views of GY 01.....	89
Figure 8-16: Palaeo-sensitivity Map with Approximate Location of the Tweefontein Mine Complex in White.....	90
Figure 8-1: Environmental Monitoring Process Flow .....	184
Figure 8-2: Performance Assessment Process Flow .....	187

## LIST OF TABLES

Table 1-1: Summary of Overall Tweefontein Road Realignment Project .....	2
Table 2-1: Contact Details of the Project Applicant .....	4
Table 2-2: Contact Details of the EAP .....	4
Table 3-1: Property Details .....	5
Table 5-1: Project Activities.....	7
Table 5-2: List of Activities for the Proposed Project .....	13
Table 5-3: Project Schedule .....	14
Table 6-1: Relevant National Legislation .....	15
Table 6-2: Relevant Provincial Legislation.....	25
Table 6-3: Local by-laws .....	26
Table 6-4: Project Specific Policies and Guidelines.....	27
Table 8-1: Landowners and Properties Directly Affected.....	38
Table 8-2: Directly / Adjacent Landowners and Farms .....	39
Table 8-3: Summary of PPP Activities During Scoping Phase.....	40
Table 8-4: Interested and Affected Parties .....	44
Table 8-5: Other Affected Parties .....	50
Table 8-6: Interested parties .....	52
Table 8-7: Summary of Specialist Studies.....	54
Table 8-8: Rainfall as a Percentage of MAP per Month for the B1A Rainfall Zone .....	55
Table 8-9: Soil Associations for Land Types .....	59
Table 8-10: Summary of Surface Water Quality Results for the Tweefontein spruit.....	68
Table 8-11: Industry distribution within the Nkangala district municipality.....	82
Table 8-12: Highest Form of Education for the Local Study Area and the Local and District Municipalities .....	83
Table 8-13: Household Monthly Income by Wards, Municipalities and Province .....	84
Table 8-8-14: Impact Assessment Parameter Ratings .....	95
Table 8-8-15: Probability / Consequence Matrix.....	102
Table 8-8-16: Significance Rating Description.....	103

---

Table 8-17: List of Activities during Construction.....	106
Table 8-18: List of Activities during Operation .....	124
Table 8-19: Associated Project Related Risks.....	128
Table 10-1: Impact Assessment Summary.....	139
Table 11-1: Summary of Specialist Studies.....	145
Table 1-1: Contact Details of the EAP.....	160
Table 8-1: Monitoring and Management of Environmental Impacts.....	189

## LIST OF APPENDICES

- Appendix A: EAP CV and Qualifications
- Appendix B: Project Plans
- Appendix C: Authority Correspondence
- Appendix D: Specialist Studies
- Appendix E: Public Participation Documentation

---

## LIST OF PLANS

- Plan 1: Regional Locality
- Plan 2: Site Locality
- Plan 3: Land Tenure
- Plan 4: Preferred Route Alignment and Activities
- Plan 5: Initial Route Alignment
- Plan 6: Surface Water Monitoring Points
- Plan 7: Groundwater Monitoring Points
- Plan 8: Wetlands
- Plan 9: Regional Geology
- Plan 10: Identified Heritage Resources
- Plan 11: Environmental and Current Land-use
- Plan 12: Composite Site
- Plan 13: Site Notices



## LIST OF ACRONYMS AND ABBREVIATIONS

BID	Background Information Document
CA	Competent Authority
CMP	Conservation Management Plan
CRR	Comments and Response Report
CSR	Corporate Social Responsibility
dBA	Decibels
DEA	Department of Environmental Affairs
DMR	Department of Mineral Resources
DoE	Department of Energy
DWS	Department of Water and Sanitation (previously Department of Water Affairs)
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EC	Electrical Conductivity
EIA	Environmental Impact Assessment
ELM	Emalahleni Local Municipality
EMPR	Environmental Management Programme
GN R.	Government Notice Regulation
Ha	Hectare
HIA	Heritage Impact Assessment
HPA	Highveld Priority Area
I&APs	Interested and Affected Parties
IDP	Integrated Development Plan
IWUL	Integrated Water Use Licence
IWWMP	Integrated Water and Waste Management Plan
LED	Local Economic Development
m <sup>3</sup>	Cubic Metres
masl	Metres above sea level
MAP	Mean Annual Precipitation
MDEDET	Mpumalanga Department of Economic Development, Environment and Tourism
Mg/l	Milligrams per litre

Mm	Millimetres
MPWRT	Mpumalanga Public Works Roads and Transport
MPDPWRT	Mpumalanga Provincial Government Department of Public Works, Roads and Transport
MPRDA	Mineral and Petroleum Resources Development Act, Act No. 28 of 2002
NAAQS	National Ambient Air Quality Standards
NDM	Nkangala District Municipality
NEMA	National Environmental Management Act, Act No. 107 of 1998
NEMBA	National Environmental Management: Biodiversity Act, Act No. 10 of 2004
NEMWA	National Environmental Management: Waste Act, Act No. 59 of 2008
NFEPA	National Freshwater Ecosystem Priority Area
NGO	Non-Governmental Organisation
NWA	National Water Act, Act No. 36 of 1998
PM	Particular Matter
PPP	Public Participation Process
SAHRA	South African Heritage Resources Agency
SAWS	South African Weather Service
SCC	Species of Special Concern
TOP	Tweefontein Optimisation Project
TOR	Terms of Reference
TRRP	Tweefontein Road Realignment Project
TSP	Total Suspended Particulates
WULA	Water Use Licence Application

# Part A: Scope of Assessment and Environmental Impact Assessment Report

## 1 Introduction

Glencore Operations South Africa (Pty) Ltd (Glencore) acting through its Coal Division is proposing the realignment of a section of the P141-1 Provincial Road which traverses through the Tweefontein Mine Complex, situated 8 kilometres (km) east of Ogies in the Mpumalanga Province.

Glencore currently employs both underground and open pit coal mining activities at its Tweefontein Mine Complex. In 2008, Glencore initiated the Tweefontein Optimisation Project (TOP) which aims to recover the remaining strategic coal reserves within the mine complex.

The existing alignment of road P141-1 extends between the Klipplaat East and Klipplaat West open pits (strategic coal reserves). As part of the TOP activities, these two pits will be mined as one super pit. Therefore the portion of the P141-1 which extends through these two pits must be realigned around these pits. The existing P141-1 Provincial Road forms part of Mpumalanga's strategic public transport network. In light of this, Glencore proposed the realignment of the P141-1 Provincial Road in 2010 to enable the undertaking of the TOP. This was termed the Tweefontein Road Realignment Project (TRRP). For planning purposes, the road realignment was separated into two phases, as follows:

- **Phase 1:** Realignment of the P141-1 Provincial Road from the north eastern portion of the Tweefontein dam, to just beyond the Phoenix dam. The Environmental Impact Assessment (EIA) and Water Use Licence (WUL) process for this section of the road was undertaken in 2014 with the Environmental Authorisation granted in November 2014 (17/2/3N-260). Construction for Phase 1 has already commenced with the length of the full road being completed, with the exception of the water crossings (i.e. culvert construction).
- **Phase 2:** Realignment of the P141-1 Provincial Road from the D2769 extension road (currently under construction as Part of Phase 1) following a north westerly direction for approximately 3.4 km to join the existing P 141-1 road. As part of the proposed Project, the P141-1 Provincial Road between the P29-1 (R555) and D2770 (R547) will be permanently closed. Furthermore, the D2770 (R547) Road between the P141-1 Provincial Road and the N12 will be permanently closed. This application for environmental authorisation relates to Phase 2 only and is hereafter referred to as the proposed Project.

Table 1-1 provides a summary of the activities and timing relating to the overall TRRP, including Phase 1 and Phase 2. The mining of the additional and strategic coal reserve can only commence, once both Phase 1 and 2 are complete.



**Table 1-1: Summary of Overall Tweefontein Road Realignment Project**

Phase	Activity Description	Authorisations	Project Timeframe
Phase 1	<ul style="list-style-type: none"> <li>▪ Road D2769 will be extended to the west, towards the northern section of the Tweefontein dam.</li> <li>▪ Road P141-1 will be re-aligned to commence at the north eastern portion of the Tweefontein dam, it will continue in a south easterly direction to just beyond the Phoenix dam.</li> <li>▪ A bridge will be constructed over the existing haul road along the proposed D2769 alignment.</li> <li>▪ A culvert will be constructed at the Tweefontein dam outlet.</li> <li>▪ A culvert will be constructed at the Phoenix dam outlet.</li> <li>▪ The P141-1 will be closed from the intersection with the D2769 until just south of the Phoenix dam.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Environmental Authorisation granted by MDEDET on 11 November 2014 (17/2/3N-260).</li> <li>▪ The Amended Environmental Management Programme has been approved by the Department of Mineral Resources (DMR).</li> <li>▪ The Water Use Licence Application has been approved</li> </ul>	Commenced with the construction of the road and to be completed by Q4 2015
Phase 2 (This EIA Report)	<ul style="list-style-type: none"> <li>▪ <b>P141-1 will be re-aligned from the authorised D 2769 intersection, following a north westerly direction for 3.4 km and re-joining the P141-1 road.</b></li> <li>▪ <b>A culvert will be constructed over the tributary to the Tweefontein spruit.</b></li> <li>▪ <b>A bridge will be constructed over the existing mine haul road.</b></li> <li>▪ <b>Closure of a section of the P141-1 Provincial Road and R547 Road.</b></li> </ul>	<p><b>This EIA Report serves to apply for Environmental Authorisation from the DMR.</b></p> <p><b>Furthermore, a Water Use Licence Application will be submitted to the DWS for the water crossing.</b></p>	Still to commence

Glencore holds an approved mining right for the Tweefontein Mine Complex, dated 19 August 2010 with reference MPT 36/2012 MR (MP30/5/1//2/2/ 289 MR). The proposed realignment of the P141-1 Provincial Road Project is ancillary to the current mine activities. To obtain environmental authorisation for the proposed Project, Glencore is required to undertake an EIA process in terms of the EIA Regulations, December 2014 (GN R. 982), promulgated in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended. The Competent Authority (CA) is the Department of Mineral Resources (DMR). The proposed Project also requires a Water Use Licence (WUL) in terms of the National Water Act, 1998 (Act No. 36 of 1998), as amended.

The purpose of the EIA process is to ensure that potential environmental and social impacts including significant risks associated with a Project are identified, assessed and appropriately managed. There are two primary phases of an EIA process, namely the scoping phase and the impact assessment phase. Identification of potential impacts occurs during the scoping phase, whilst the assessment and mitigation of those impacts occurs during the impact assessment phase.

An application for Environmental Authorisation was submitted to the Department of Mineral Resources (DMR) on 31 March 2015, with the Scoping Report submitted on 14 May 2015. This Scoping Report detailed the findings of the scoping phase of the EIA process. It included comments raised by Interested and Affected Parties (I&APs) in relation to the proposed Project activities during the public commenting period held between 10 April and 11 May 2015. The Scoping Report was approved by the DMR on 19 August 2015.

This EIA / EMP Report aims to provide a description of the impacts imposed onto the biophysical and socio-economic environment as a result of the proposed Project activities. The impacts and their significance ratings in accordance with the Digby Wells Impact Assessment Methodology will be detailed in Part A of this EIA / EMP Report and Part B will detail the mitigation or management measures which will be implemented for the identified impacts.

This report considers all those activities associated with the road alignment, activities associated with the removal of Waterpan No 1a dump and its re-deposition as well as the closure requirements associated with the existing roads, and the amendment to the Mine Works Programme (MWP) associated with these activities does not form part of this report and forms part of the TOP.

## **2 Item 3: Project Applicant**

Glencore and other associates of its parent company are major producers and marketers of over 90 commodities worldwide. With reference to coal, Glencore is the world's largest exporter of seaborne thermal coal and one of the largest producers of coking coal. Thermal (energy) coal provides a reliable fuel for baseload electricity generation and coking (metallurgical) coal is an important ingredient in the production of steel. The coal product is exported to global markets and sold to domestic customers such as Eskom in South Africa.



The Project applicant is Glencore Operations South Africa (Pty) Ltd. Glencore's details are provided in the table below.

**Table 2-1: Contact Details of the Project Applicant**

<b>Applicant Name:</b>	Glencore Operations South Africa (Pty) Ltd
<b>Contact Person:</b>	Herman Vlok
<b>Telephone No:</b>	011 772 0680
<b>Fax No:</b>	011 772 0697
<b>Email Address:</b>	<a href="mailto:Herman.Vlok@glencore.co.za">Herman.Vlok@glencore.co.za</a>
<b>Company Registration Number:</b>	1997/017998/07
<b>Postal Address:</b>	Suite 19, Private Bag X1, Melrose Arch, 2076

## 2.1 Item 3(a)(i): Details of EAP

Digby Wells and Associates South Africa (Pty) Ltd has been appointed as the independent Environmental Assessment Practitioner (EAP) to undertake the EIA process and associated WULA. The details of the EAP are provided in Table 2-2 below.

**Table 2-2: Contact Details of the EAP**

<b>Name of Practitioner:</b>	Ms. Kasantha Moodley
<b>Telephone:</b>	+27 11 789 9495
<b>Fax:</b>	+27 11 789 9498
<b>Postal Address</b>	Private Bag X10046, Randburg, 2125, South Africa
<b>Email:</b>	<a href="mailto:Kasantha.Moodley@digbywells.com">Kasantha.Moodley@digbywells.com</a>

## 2.2 Item 3(a)(ii): Expertise of the EAP

### 2.2.1 The Qualifications of the EAP

Kasantha Moodley completed her BSc in Environmental Science at the University of KwaZulu Natal in 2008. In 2011, Kasantha Moodley obtained her BSc (Honours) in Environmental Studies from the University of Witwatersrand. Please see Appendix A for proof of these qualifications.

### 2.2.2 Summary of the EAP's Past Experience

Kasantha Moodley currently holds the position of Senior Environmental Consultant within the Environmental and Legal Services Department at Digby Wells Environmental. Kasantha Moodley has been with Digby Wells for 1 year and is responsible for managing several integrated environmental regulatory processes. Prior to Digby Wells, Kasantha Moodley spent 4 years with Environmental Resources Management Southern Africa (Pty) Ltd as a

Project manager. Kasantha Moodley has also spent 1 year at Arup Consulting Engineers and a further 2 years at GIBB (consulting) as a Project consultant. Kasantha Moodley has a combined professional experience of 8 years in environmental assessment and planning and Project management.

Kasantha Moodley has therefore been involved in several EIAs within various sectors including infrastructure, manufacturing, mining, oil and gas, and energy. Of particular relevance to this proposed Project, Kasantha Moodley has been previously involved in the EIA for the route determination of the proposed Metro Boulevard Road in Roodepoort, Gauteng, amongst other infrastructure Projects including powerlines and bridges.

Refer to Appendix A for Kasantha Moodley’s CV.

### 3 Item 3(b): Description of the Property

This section provides details on the property on which the proposed road is located as well as adjacent properties, including surface right holders and land claims.

The properties which will be directly affected by the proposed Project are listed in Table 3-1 below, and are depicted in Plan 3, Appendix B. These properties are currently licenced for mining activities as they are located within the Tweefontein Mine Complex (owned and operated by Glencore). The section of the existing road servitude will no longer be a proclaimed provincial road, whilst the new proposed realigned road reserve will be proclaimed as a provincial road. It should be noted that the new proposed realigned road will still be located within the Tweefontein Mine Complex. The Mpumalanga Department of Public Works, Roads and Transport (MPWRT) will be custodian of the new road, once constructed.

For the purposes of this EIA Report, the study area referred to is defined as the Tweefontein Optimisation Project (TOP) area which is also defined as the Tweefontein Mine Complex area.

The property details as required are presented below.

**Table 3-1: Property Details**

<b>Farm Name:</b>	<p>The proposed Project is located upon the Remaining Extent and Portion 1 of the Farm Tweefontein 13 IS.</p> <p>The section of the proposed roads to be closed are located on the following properties:</p> <ul style="list-style-type: none"> <li>■ Remaining Extent and Portion 1 of the Farm Tweefontein 13 IS</li> <li>■ Portion 1 of the Farm Vlaklaagte 330 JS</li> <li>■ Portion 2 of the Farm Vlaklaagte 330 JS</li> <li>■ Portion 40 of the Farm Vlaklaagte 330 JS</li> <li>■ Portion 41 of the Farm Vlaklaagte 330 JS</li> </ul>
-------------------	---

	<ul style="list-style-type: none"> <li>■ Portion 2 of the Farm Waterpan 8 IS</li> </ul>
<b>Application Area (Ha):</b>	Linear Activity (road length) – Approximately 3.4 km long. Road reserve proposed to be 40 m wide.
<b>Magisterial District:</b>	Emalahleni Local Municipality within the larger Nkangala District Municipality
<b>Distance and direction from nearest town:</b>	The Project is situated approximately 8 km east of Ogies and 20 km south-west of Witbank in the Mpumalanga Province.
<b>21 digit Surveyor General Code for each farm portion:</b>	Remaining Extent of Farm Tweefontein 13 IS - T0IS00000000001300000 Portion 1 of Farm Tweefontein 13 IS - T0IS00000000001300001 Portion 1 of the Farm Vlaklaagte 330 JS - T0JS000000000033000001 Portion 2 of the Farm Vlaklaagte 330 JS - T0JS000000000033000002 Portion 40 of the Farm Vlaklaagte 330 JS - T0JS000000000033000004 Portion 41 of the Farm Vlaklaagte 330 JS - T0JS000000000033000041 Portion 2 of the Farm Waterpan 8 IS - T0IS00000000000800002

#### 4 Item 3(c) of Appendix 3: Regional and Locality Map

A regional plan and locality plan has been attached as Plan 1 and 2 respectively within Appendix B of this Report. Plan 1 and Plan 2 have a scale of 1: 200 000 and 1: 70 000 respectively. The nearest town is Ogies which lies approximately 8 km west of the proposed Project site. There are no households / communities located in close proximity to the proposed route alignment as the new realigned road will fall within the Tweefontein Mine Complex.

### 5 Description of the Scope of the Proposed Overall Activity

#### 5.1 Item 3(d)(i): Listed and Specified Activities

A plan of the proposed Project site showing the proposed alignment and associated activities to be applied for has been attached as Plan 4 in Appendix B of this document. The Project's activities and extent are listed in Table 5-1. The Table also provides an indication of those activities listed in terms of the EIA Regulations (2014)<sup>2</sup> and those which are not listed.

<sup>2</sup> Listing Notice 1 (GN R983 identifies activities that require a Basic Assessment Report and Listing Notice 2 (GN R984) identifies activities that require a full Scoping and Environmental Impact Assessment

**Table 5-1: Project Activities**

Name of Activity	Aerial Extent of the Activity (Ha or m <sup>2</sup> )	Listed Activity	Applicable Listing Notice
Contractor Camp (temporary structure during construction phase)	Contractor Camp for Phase 1 will be used Approximately 6.4 ha The mine is making use of the existing Makause School building as a contractor camp.	N/A	Not Listed
Site clearance	13.6 ha	X – Activity 27 (i) X – Activity 30 X – Activity 12	GNR 983 GNR 983 GNR 985
Construction of realigned Provincial Road P141-1	3.4 km	X - Activity 27 (ii), (iii) and (iv)	GNR 984
Construction of culvert and bridge	100 m <sup>2</sup>	X – Activity 12 (i),(iii),(xii) X – Activity 19 (i)	GNR 983
Closure of the existing Provincial Road P141-1 alignment and D2770 (R547)	Existing P141-1 - 3.68 km (147.2 m <sup>2</sup> ) R547 - 4.48 km (179.2 m <sup>2</sup> )	X – Activity 31 (i)	GNR 983
Maintenance and upgrade of the realigned road	13.6 ha	N/A	Not Listed
Employment	±250 temporary employment for 1 year	N/A	Not Listed

## 5.2 Item 3(d)(ii): Description of the Activities to be Undertaken

The road will be designed according to the norms and standards published in Geometric Design Guidelines from the South African National Roads Agency.

The road works for the construction of the carriageways will typically entail the following:

- Clear and grubbing: Clearing will consist of the removal of all trees, bush, other vegetation, rubbish, fences and all other obtrusive material, including the disposal thereof. All stumps and roots shall be removed to a depth of 600 mm below the finished road level;



- **Mass earthworks:** The principal earthworks process involves layered excavations of soils in cuttings and transportation of the excavated soil to neighbouring zones where embankments are required. Deposition in the fill areas will be built up by depositing the material and using bulldozers to place it in layers which are compacted by rollers. This earthworks procedure continues until the ground elevation in cuttings is reduced, and embankments are built, to the road formation level;
- **Pavement Layers:** The pavement layers are built up from material on site which was excavated or obtained commercially. The material is deposited on site, pushed in place by means of a grader and compacted by a roller compacter. This is continued until all the pavement layers have been done, up to the base layer, after which the surfacing is done, which normally consists of asphalt; and
- **Roadworks finishes, including safety barriers, Road Signs and Road Markings:** Following pavement construction and surfacing, safety barriers will be installed, typically guardrails at fills along the route higher than 4 m. Road sign installation involves the excavation for the foundations which are concrete and setting the posts. The sign faces are then fixed to the sign posts. Road markings will be sprayed onto the road surface using specialist lorry mounted equipment, after pre-marking of the road markings have been done and approved.

The installation of the major culvert will comprise of the following:

- The permanent culvert works will involve either temporary diversion for the watercourse, or constructing a temporary dam upstream of the works and pumping the water to the downstream side of the works;
- Material, including gravel for bedding and culvert surrounds, and precast concrete culvert sections, will be delivered to the site taking access from the permitted roads and haul road through the works. The line of the culvert will be excavated to bedding level with material taken away by dump truck or wagon for reuse or disposal. The gravel bedding material will be placed followed by the culvert sections. Culvert sections will be treated with a waterproof membrane to faces retaining soil fill – the waterproof membrane will typically be a bitumen coating applied by brush or spray. Following this, the gravel culvert surround will be placed and compacted;
- In-situ box culverts will commence with excavation as above. A thin layer of blinding concrete will be placed to provide an even and clean surface on which to construct the culvert. Construction of the box sections will involve steel fixing, shuttering, transport of concrete to the works and placing concrete within the shuttering. Following the completion of the concrete works, shuttering will be removed, the concrete will receive waterproofing and the culvert backfilled with gravel; and
- The above culvert types will also require construction of a headwall which will be constructed. Headwalls are likely to be in situ concrete although they may have a stone facing or other finish applied following the main headwall works. Headwall

construction will involve excavation, steel fixing, shuttering, concreting and backfilling operations.

### 5.2.1 Proposed Route Alignment

The proposed P141-1 Provincial Road originates from the intersection with the D2769 extension road (currently under construction). The proposed realignment follows a north-westerly direction from the D2769 extension road and crosses over the existing mine haul road over which a proposed bridge will be constructed. The road will then cross over the Waterpan No 1a dump which will be removed prior to construction of the proposed road realignment. The proposed route is slightly curved eastward to avoid an existing graveyard (refer to Plan 4, Appendix B). The proposed route for the road continues in a north-westerly direction, with a golf course to the north-east and an opencast mining area to the south-west. The proposed realignment crosses over an unnamed tributary for which a culvert will be constructed to allow for the continued flow of water within this watercourse. The proposed realignment then proceeds to join the existing P 141-1 Provincial Road at the point where it intersects the mine access road. The proposed realigned P141-1 Provincial Road will be 3.4 km in length with a 40 m wide road reserve. It is important to note that the proposed route described above refers only to phase 2 of the TRRP and that the road realignment will be located entirely within the Tweefontein Mine Complex.

As mentioned in the sections above, this realignment is necessary to enable the exploitation of the coal reserves which lie beneath the existing alignment of the P141-1 Provincial Road.

### 5.2.2 Road Closures

As part of the proposed Project, the P141-1 Provincial Road between the P29-1 (R555) and D2770 (R547) will be permanently closed. Furthermore, the D2770 (R547) Road between the P141-1 Provincial Road and the N12 will be permanently closed off. These road closures will only occur once the construction of the new route alignment is complete, as the realignment which is to be completed in Phase 1 will allow for the successful by-pass of the D2770 (R547). The N12 highway and R555 will operate as per normal and will not be impacted on by the proposed road realignment Project.

It is assumed that the construction of Phase 1 of the proposed road alignment will be complete, prior to commencing with the construction of Phase 2 (proposed Project). During construction of the proposed Project, traffic heading north will therefore be diverted via the Phase 1 realigned P141-1 Provincial Road and D2769 extension road to join the D2770 (R547). Likewise, all vehicles heading south toward Bethal will be diverted via the D2770 (R547) onto the newly constructed D2769 extension road and realigned P141-1 Provincial Road.

It should be noted that the proposed road closures will prevent access to the Tweefontein Golf Club situated within the Glencore Tweefontein Mining Complex. It is therefore anticipated that the Tweefontein Golf Club will be closed prior to the closure of the existing P141-1 road alignment.

*For the purposes of this EIA, the road closure activity refers to taking the affected roads out of active service and will not involve the actual removal of the road infrastructure. The removal of the road infrastructure will be undertaken during the proposed mining activities, covered under the TOP.*

### 5.2.3 Road Design

The road will be a standard width of 8.6 m (a single lane of 3.7 m in each direction with the tarred surface extending 0.6 metres at the road edge). In terms of safety, guardrails will be constructed with a paved shoulder of 3 m on either side with a kerb channel combination where needed. An unpaved shoulder of 2.4 m will also be developed on either side of the proposed road. The total width of the road reserve will be 40 m.

The longitudinal slope is proposed to be a maximum of 7 % and a minimum of 0.5 %. The design speed used is 100 kilometres per hour (km/h) however the operating speed in the area is approximately 80km/h.

The following road pavement structure was used for detail design purposes:

- Surfacing: 40mm asphalt;
- Base: 150mm crushed stone;
- Upper Subbase: 150mm stabilised gravel;
- Lower Subbase: 150mm stabilised gravel;
- Upper Selected: 150mm natural gravel;
- Lower Selected: 150mm natural gravel;
- Upper Subgrade: 150mm natural gravel; and
- Lower Subgrade: 150mm in situ roadbed preparation.

An In-Principle approval of the road design has been granted by the MPWRT on 09 December 2013 (Appendix C).

### 5.2.4 Associated Structures

#### 5.2.4.1 Culvert

One box culvert is proposed to be constructed across the wetland (26° 1' 28.511" S; 29° 9' 19.631" E). The purpose of a culvert is to allow the free flow of a water course. The proposed culvert will be approximately 2.4 m wide and 2.4 m high.

The slope (angle) of the culvert cannot be the same level for the inlet and outlet of the culvert as the retardation in flow will cause the deposition of sediment, and acceleration may result in erosion. Allowance will therefore be made for effective dissipation of energy with the placement of stones (200 mm) to reduce water velocities upstream and downstream of the culvert. Flow velocities through culverts should however not be lower than 1 m/s, and the



slope (angle) of a culvert should accordingly not be less than 1%. A slope (angle) of 1.5% was used for this proposed culvert to minimise the risk of possible sedimentation and to reduce the frequency of maintenance.

The flood frequency for the design of the culvert is 1:25 years.

#### **5.2.4.2 Bridge**

A new bridge is proposed to cross over the existing mine haul road (26° 2' 11.124" S; 29° 10' 19.382" E). The bridge will have a span of 87 m and a clearance of 8.45 m. The bridge will require a fill height of approximately 7.0 m.

An In-Principle approval of the bridge design has been granted by the MPWRT on 09 December 2013 (Appendix C).

### **5.2.5 Waste Management**

The construction and operational phase of the proposed Project will result in the generation of various types of hazardous and general wastes. The likely general wastes that will be generated include rubble, uprooted vegetation, domestic wastes (e.g. plastics and glass). Hazardous wastes will include bitumen and used oils. All wastes will be appropriately separated and stored in clearly marked containers for disposal at a licensed disposal facility.

### **5.2.6 Water Use and Management**

The proposed Project is located entirely within the boundaries of the Tweefontein Mine Complex, which currently holds a Water Use Licence. All potable and process water required for the proposed Project will be sourced from the existing and available water sources from within the Tweefontein Mine Complex.

During the construction phase, potable water will be stored in water tanks at the contractor's camp. Mine process water will also be sourced for construction using water trucks.

### **5.2.7 Project Phases and Associated Activities**

#### **5.2.7.1 Construction Phase**

The contractor camp developed during Phase 1 will remain for the duration of Phase 2. The contractor is currently making use of the old Makause School as site offices. During the construction phase of the proposed Project, the following activities are proposed to be undertaken:

- Site clearance: the proposed route will be cleared of all vegetation and or structures. Stumps and roots will be removed to a depth of 600 mm below the planned road level;
- Earthworks, cut and fill activities: the excavated soil and earth material from the clearing process will be transported to the neighbouring zones where embankments are required. The fill areas on the road reserve will be built up by depositing the earth



material and using bulldozers to place it in layers. The ground will later be compacted using rollers. This process will continue until the ground is levelled;

- Sourcing of materials for the proposed road pavements: these will be sourced from borrow pits already associated with the Tweefontein Mine Complex. No new borrow pits will be constructed as part of the proposed Project;
- Construction of the culvert, at the wetland crossing, which will involve the digging of a trench for the placement of the concrete foundation and box culvert. Stones and gabions will also be placed at the inlet and outlet of the culvert;
- Construction of the bridge over the mine haul road, the purpose of this bridge is to separate mine traffic from public traffic. The bridge will be constructed in phases with the base being placed first, then the piers being erected. The mine traffic on the existing haul road will not be impacted on, as one lane will be closed at a time as construction of the bridge commences and to ensure that traffic can still be accommodated on the haul road;
- Layering of the road foundation and overlying materials: once the road surface has a uniform grade, a machine is used to heat the binder and aggregate and distribute the hot asphalt mixture at an even depth across the surface. Asphalt concrete provides a durable surface on which motor vehicles and pedestrians may travel; and
- Road safety measures: the lanes will be demarcated with paint and the required road markers and signboards will be erected. Furthermore the associated guardrails and fencing will be erected where required.

During the construction phase, traffic will still be allowed to use the existing P141-1 Provincial Road, however where there is work impacting the existing alignment (i.e. the link to proposed new aligned road), vehicles will be diverted through through the link.

#### **5.2.7.2 Operational Phase**

The proposed road alignment, once completed will be handed over to the MPWRT, if the Department is satisfied with the design and condition of the road and associated infrastructure. The design of the road has been approved in principle. The Department will therefore assume responsibility for the maintenance of the proposed road and associated infrastructure.

During the operational phase of the proposed Project, the following activities, as listed below, are foreseen to be undertaken:

- Regular inspection of the culvert and clearing of any debris accumulated at the outlet, inlet and inside the culvert;
- Monitor effectiveness of erosion control measures at the culvert;
- Check for damage to culvert to ensure the structural integrity thereof;
- Resurface the road with an asphalt overlay, as necessary;

- Repaint the lines, replace signage and repair potholes, as necessary; and
- Removal of alien vegetation along the shoulders of the road as well as within the road reserve.

### 5.2.7.3 Decommissioning Phase

Once the construction of the new realigned P141-1 Provincial Road is complete, the responsibility of road maintenance will be handed over to the MPWRT. The realigned P141-1 Provincial Road will therefore remain a permanent activity and no decommissioning phase is applicable to the proposed road realignment.

The P141-1 Provincial Road between the P29-1 (R555) and D2770 (R547) will be permanently closed. In addition, the D2770 (R547) Road between the P141-1 Provincial Road and the N12 will be permanently closed off. It should be noted that these road closures are related to the planned open cast mining activities, which have been approved as part of the TOP. The properties that will be affected as part of the proposed road closures (Table 3-1) will therefore be rehabilitated in accordance with the approved EMP Report for the TOP. The activities applied for as part of TOP were authorised in terms of the NEMA and MPRDA.

For the purposes of this EIA, the road closure activity therefore refers to taking the affected roads out of active service and will not involve the actual removal of the road infrastructure. The removal of the road infrastructure will be undertaken during the proposed mining activities, covered under the TOP as the road infrastructure itself will be mined through.

Table 5-2 provides a list of the proposed Project activities during the phases applicable to this Project, namely the construction and operational phases.

**Table 5-2: List of Activities for the Proposed Project**

Activity	Description
<b>Construction Phase</b>	
1	Site clearance and removal of topsoil
2	Movement of construction vehicles and equipment
3	Storage of materials/fuels at existing contractor camp
4	Construction of new realigned section of the P141-1 and associated bridge
5	Construction of culvert (water crossing)
6	Generation of waste
7	Closure of the existing section of the P141-1 alignment and D2770 (R547)
8	Direct employment and procurement of goods
<b>Operational Phase</b>	
9	Vehicle movement on new P141-1

Activity	Description
10	Maintenance and upgrade of the new P141-1

### 5.2.8 Project Staffing

A number of employment opportunities will be created for the local community during the construction phase of the proposed Project. The jobs created will not be of a permanent nature. It is anticipated that approximately 250 employees will be employed during the construction phase of the proposed Project (approximately 1 year). All maintenance related activities will be conducted by the MPWRT.

A company named Liviero has been appointed to undertake the construction for Phase 1 of the realignment Project and is currently working in close collaboration with the Department of Labour in Ogies to identify potential candidates for employment. Employment opportunities for both skilled and semi-skilled individuals and members of the community will need to register their CVs with the Department of Labour in Ogies. The same process will be applied for procurement for this proposed Project (Phase 2).

### 5.2.9 Project Schedule

The planned construction and road closure timeframes are indicated in Table 5-3, below.

**Table 5-3: Project Schedule**

Phase/Activity	Timeframe
Construction There will be no road closures during construction.	Q4 of 2015 – Q4 of 2016 (1 year)
Permanent road closure and decommissioning of current P141-1 alignment and a section of the R547	Q4 of 2016 (on completion of the Phase 2 of the realignment of the P141-1)

## 6 Item 3(e): Policy and Legislative Context

This section aims to provide a description of the policy and legislative context within which the Project is being proposed. This section has been divided into national, provincial and local legislation and policies, plans, guidelines and development planning frameworks and tools.

**Table 6-1: Relevant National Legislation**

Applicable Legislation and Guidelines used to Compile the Report	Reference where Applied	How does this Development Comply with and Respond to the Policy and Legislative Context
<p><b><u>The Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996)</u></b></p> <p>Under section 24 of the Constitution of the Republic of South Africa, it is clearly stated that:</p> <p><i>Everyone has the right to (a) an environment that is not harmful to their health or well-being; and (b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that -</i></p> <ul style="list-style-type: none"> <li><i>(i) Prevent pollution and ecological degradation;</i></li> <li><i>(ii) Promote conservation; and</i></li> </ul> <p><i>Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.</i></p>	<p>An EIA process has been undertaken to determine the impacts associated with the proposed Project. As part of the EIA process, mitigation measures and monitoring plans are recommended to ensure that any potential impacts are managed to acceptable levels to support the rights as enshrined in the Constitution.</p>	<p>An Application for Environmental Authorisation for the proposed Project was submitted to the Mpumalanga Regional office of the DMR in Witbank on 31 March 2015 detailing the proposed activities and the biophysical and social environments which will be affected. An EIA process was undertaken where the impacts associated with the proposed activities is determined. The proposed measures in which to mitigate and manage the impacts are also detailed as part of this process.</p>

Applicable Legislation and Guidelines used to Compile the Report	Reference where Applied	How does this Development Comply with and Respond to the Policy and Legislative Context
<p><b><u>National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA)</u></b></p> <p>The National Environmental Management Act, 1998 (Act No 107 of 1998) (NEMA), as amended was set in place in accordance with section 24 of the Constitution of the Republic of South Africa. Certain environmental principles under NEMA have to be adhered to, to inform decision making for issues affecting the environment. Section 24 (1)(a) and (b) of NEMA state that:</p> <p><i>The potential impact on the environment and socio-economic conditions of activities that require authorisation or permission by law and which may significantly affect the environment, must be considered, investigated and assessed prior to their implementation and reported to the organ of state charged by law with authorizing, permitting, or otherwise allowing the implementation of an activity.</i></p> <p><b><u>NEMA Guidelines</u></b></p> <p><u>The following applicable guidelines have been published by DEA:</u></p> <ul style="list-style-type: none"> <li>▪ DEA (2010), Guideline on Need and Desirability, Integrated Environmental Management Guideline Series 9</li> </ul> <p>DEA (2010), Public Participation 2010, Integrated Environmental Management Guideline Series 7.</p>	<p>The EIA process was undertaken in accordance with the principles of Section 2 of NEMA as well as with the EIA Regulations (2014), promulgated in terms of NEMA.</p>	<p>An Application for Environmental Authorisation for the proposed Project was submitted to the Witbank DMR on 31 March 2015 detailing the proposed activities and the biophysical and social environments which will be affected. An EIA process has being undertaken where the impacts associated with the proposed activities have been determined. The proposed measures in which to mitigate and manage the impacts are also be detailed as part of this process.</p>

Applicable Legislation and Guidelines used to Compile the Report	Reference where Applied	How does this Development Comply with and Respond to the Policy and Legislative Context
<p><b><u>National Environmental Management Act, 1998 (Act No. 107 of 1998): Environmental Impact Assessment Regulations, 2014 (GN R. 982)</u></b></p> <p>The Environmental Impact Assessment (EIA) Regulations, Government Notice Regulation (GN) R982 was published on 04 December 2014 and came into effect on 08 December 2014. Together with the EIA Regulations, the Minister also published GN R 983 (Listing Notice No. 1), GN 984 (Listing Notice No. 2) and GN R 985 (Listing Notice No. 3) in terms of sections 24(2) and 24D of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA), as amended. These three listing notices set out a list of identified activities which may not commence without an Environmental Authorisation from the relevant Competent Authority through one of the following processes:</p> <p>Regulation GN R. 983 - Listing Notice 1: This listing notice provides a list of various activities which require environmental authorisation and which must follow a basic assessment process.</p> <p>Regulation GN R. 984 – Listing Notice 2: This listing notice provides a list of various activities which require environmental authorisation and which must follow an environmental impact assessment process.</p> <p>Regulation GN R. 985 – Listing Notice 3: This notice provides a list of various environmental activities which if undertaken within the stipulated provincial boundaries will require authorisation. The basic assessment process will need to be followed.</p>	<p>The Listing Notices have been reviewed against the Project activities to determine the likely triggers. The listed activities which are potentially triggered under the Listing Notices are provided in Table 5-1.</p> <p>Based on the activities listed, it has been identified that a full EIA process is required for the Project. An application for the listed activities was submitted to the DMR who is the relevant Competent Authority in terms of this application for Environmental Authorisation.</p>	<p>An Application for Environmental Authorisation for the proposed Project was submitted to the Witbank DMR on 31 March 2015. This application described the listed activities triggered by the proposed Project.</p> <p>Table 5-1 of this report details the listed activities triggered under GNR 983 to GNR 985 of the NEMA. Based on the listed activities triggered as a result of the proposed Project, a full EIA process is required in terms of the NEMA.</p>

Applicable Legislation and Guidelines used to Compile the Report	Reference where Applied	How does this Development Comply with and Respond to the Policy and Legislative Context
<p><b><u>National Water Act, 1998 (Act No. 36 of 1998) (NWA)</u></b></p> <p>The National Water Act (Act No. 36 of 1998) (NWA) provides for the sustainable and equitable use and protection of water resources. It is founded on the principle that the National Government has overall responsibility for and authority over water resource management, including the equitable allocation and beneficial use of water in the public interest, and that a person can only be entitled to use water if the use is permissible under the NWA.</p> <p><b><u>GN R704 National Water Act, 1998 (Act No. 36 of 1998)</u></b></p> <p>Regulations 4 and 5 of the regulation on the use of water for mining and related activities aimed at the protection of water resources, GN R No. 704 provides for exemption from certain provisions.</p> <p><b><u>General Authorisations</u></b></p> <p>Section 39 establishes a procedure to enable a responsible authority to permit the use of water by publishing general authorisations in the Gazette. The use of water under a general authorisation does not require a licence until the general authorisation is revoked, in which case licensing will be necessary. A general authorisation does not replace or limit an entitlement to use water, such as an existing lawful water use or a licence, which a</p>	<p>A Water Use Licence Application (WULA) is required in terms of Section 21 of the National Water Act for the proposed Project. The WULA will be compiled and submitted to the DWS. The water uses which may be triggered under Section 21 of the NWA in relation to the proposed Project are listed below:</p> <ul style="list-style-type: none"> <li>▪ S21(c) – Impeding or diverting the flow of water in a watercourse; and</li> <li>▪ S21(i) – Altering the bed, banks, course or characteristics of a watercourse.<sup>3</sup></li> </ul>	<p>A WULA will be submitted to the DWS for the triggered water uses under Section 21 of the NWA.</p>

<sup>3</sup> The General Authorisation (GA) published in GN. 1199 (2009) sets out conditions under which Section 21(c) and Section 21(i) water uses may be considered to be Generally Authorised. The GN 1199 (2009) clearly states that it does not apply to any water uses in terms of Section 21(c) and Section 21(i), if they occur within a 500 metre (m) radius from the boundary of a wetland.

Applicable Legislation and Guidelines used to Compile the Report	Reference where Applied	How does this Development Comply with and Respond to the Policy and Legislative Context
<p>person may otherwise have under the NWA.</p> <p>The following general authorisations have been published:</p> <ul style="list-style-type: none"> <li>▪ GNR 399 published in GG 26187 of 26 March 2004 replaces the need for a water user to apply for a licence in terms of the NWA for the taking or storage of water from a water resource in terms of section 21(a) and (b), provided that the taking or storage is within the limits and conditions set out in this authorisation.</li> <li>▪ GN R1198 published in GG 32805 of 18 December 2009 relieves a water user from the need to apply for a licence for impeding or diverting the flow of water in a watercourse in terms of section 21(c) or altering the bed, banks, course or characteristics of a watercourse in terms of section 21(i) of the NWA for the purpose of rehabilitating a wetland for conservation purposes (a wetland being regarded as a watercourse under the NWA), provided that the use is within the provisions set out in this Notice, but does not exempt the water user from compliance with any other provision of the Act or from any other applicable legislation, regulation, ordinance or by-law.</li> <li>▪ GN R 1199 published in GG 32805 of 18 December 2009 replaces the need for licence applications for impeding or diverting the flow of water in a watercourse and the altering the bed, banks, course or characteristics of a watercourse in terms of sections 21(c) and (i) of the NWA subject to certain</li> </ul>		



Applicable Legislation and Guidelines used to Compile the Report	Reference where Applied	How does this Development Comply with and Respond to the Policy and Legislative Context
<p>exclusions from the general authorisations and provided that the water use complies with the conditions set out in this general authorisation.</p> <ul style="list-style-type: none"> <li>▪ GN R 665 published in GG 36820 on 6 September 2013 replaces the need for licence applications for the following activities:                             <ul style="list-style-type: none"> <li>▪ irrigation of any land with waste or water containing waste generated through any industrial activity or by a waterwork in terms of section 21(e) of the NWA;</li> <li>▪ for the discharge of waste or water containing waste into a water resource through a pipe, canal, sewer or other conduit, and disposing in any manner of water which contains waste from or which has been heated in, any industrial or power generation process in terms of section 21 (f) and (h) of the NWA</li> <li>▪ for the disposal of waste in a manner which may detrimentally impact on a water resource in terms of section 21(g); and</li> <li>▪ for the removal discharge or disposal of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people in terms of section 21(j) of the NWA</li> </ul> </li> </ul> <p>subject to certain exclusions from the general authorisations and restrictions and conditions attached to the use of water in terms of</p>		

Applicable Legislation and Guidelines used to Compile the Report	Reference where Applied	How does this Development Comply with and Respond to the Policy and Legislative Context
<p>the general authorisations.</p> <p><b><u>Department of Water and Sanitation Guidelines:</u></b></p> <ul style="list-style-type: none"> <li>▪ Water Quality Operational Guideline M.61 May 2000</li> <li>▪ SA Water Quality Guidelines – Acquatic Ecosystems 1996</li> <li>▪ SA Water Quality Guidelines – Domestic Water Use 1996</li> <li>▪ SA Water Quality Guidelines – Industrial Water Use 1996</li> <li>▪ SA Water Quality Guidelines Field Guide 1996</li> <li>▪ Best Practice Guideline: G1 Storm Water Management – August 06</li> <li>▪ Best Practice Guide G3: Series G – General Guidelines: Water Monitoring Systems</li> </ul> <p>Policy and Strategy for Groundwater Quality Management In South Africa First Edition 2000</p>		

Applicable Legislation and Guidelines used to Compile the Report	Reference where Applied	How does this Development Comply with and Respond to the Policy and Legislative Context
<p><b><u>National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA)</u></b></p> <p>The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA) regulates the management and conservation of the biodiversity of South Africa within the framework provided under NEMA. This Act also regulates the protection of species and ecosystems that require national protection and also takes into account the management of alien and invasive species. This Act works in accordance to the framework set under NEMA. The following regulations which have been promulgated in terms of the NEMBA are also of relevance:</p> <p>Alien and Invasive Species Regulations (GN R598 of 2014);                      National Environmental Management: Biodiversity Act, 2004: Threatened or Protected Species Regulations (GN R152 of 2007);                      and                      National List of Ecosystems That are Threatened and in Need of Protection under Section 52(1) (a) of the Biodiversity Act (GN R 1002 of 2012).</p>	<p>A biodiversity assessment has been undertaken for the larger Tweefontein Optimisation Project. The findings of this study have been used to determine the current status of the environment and to any potential ecological sensitivity to be avoided and/or mitigated.</p>	<p>The biological assessment details the areas within the Project areas which are of ecological importance. The findings of the biodiversity assessment in the form of the impacts and the proposed mitigation measures undertaken for the Tweefontein Optimisation Project are detailed in Section 11 and Section 12 of this report.</p> <p>A threatened species assessment has also been undertaken for the Tweefontein Mine Complex which identifies all species considered to be vulnerable or threatened.</p>

Applicable Legislation and Guidelines used to Compile the Report	Reference where Applied	How does this Development Comply with and Respond to the Policy and Legislative Context
<p><b><u>National Environmental Management: Waste Act, 2004 (Act No. 10 of 2004) (NEMWA)</u></b></p> <p>The purpose of the Act is to reform the law regulating waste management to protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development; to provide for institutional arrangements and planning matters; to provide for national norms and standards for regulating the management of waste by all spheres of government; to provide for specific waste management measures; to provide for the licensing and control of waste management activities; to provide for the remediation of contaminated land; to provide for the national waste information system; to provide for compliance and enforcement; and to provide for matters connected therewith.</p>	<p>Waste will be generated during the construction phase which will require management.</p>	<p>GN 921 (2013) (as amended), promulgated in terms of the NEM:WA lists the activities which require a Waste Management Licence (WML) in terms of the requirements of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008). Items listed within this listing notice include the storage of waste, reuse, recycling or recovery of waste, treatment of waste and disposal of waste. No activities in terms of the NEMWA (2008) as listed in GN 921 (2013) will be triggered by this Project and no Waste Licence is applicable to the proposed Project.</p> <p>Glencore adheres to a waste management operating procedure. Glencore will enforce this procedure during the construction phase and will be incorporated into this EMP Report, where applicable.</p>

Applicable Legislation and Guidelines used to Compile the Report	Reference where Applied	How does this Development Comply with and Respond to the Policy and Legislative Context
<p><b><u>National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA)</u></b>  The National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA) is the overarching legislation that protects and regulates the management of heritage resources in South Africa. The Act requires that HRAs, in this case the South African Heritage Resources Agency (SAHRA) be notified as early as possible of any developments that may exceed certain minimum thresholds.</p>	<p>A Heritage Impact Assessment (HIA) has been undertaken for the proposed Project.</p>	<p>All heritage/archaeological resources associated with the proposed Project site has been identified and will be avoided. Any chance finds will be communicated to SAHRA and the Provincial Heritage Resources Agency in Gauteng (PHRA – G).</p>
<p><b><u>National Road Traffic Act, 1993, (Act 93 of 1996)</u></b>  To provide for road traffic matters which shall apply uniformly throughout the Republic and for matters connected therewith.</p>	<p>A Traffic Impact Assessment (TIA) has been undertaken for the proposed Project.</p>	<p>The findings of the TIA can be found in Section 11 and Section 12 of this report. The road designs, which have been granted an In Principle approval by the MPWRT, have also been attached in Appendix C of this report.</p>
<p><b><u>Occupational Health and Safety Act, 1993 (Act No. 85 of 1993)</u></b>  To provide for the health and safety of persons at work and for the health and safety of persons in connection with the use of plant and machinery; the protection of persons other than persons at work against hazards to health and safety arising out of or in connection with the activities of persons at work; to establish an advisory council for occupational health and safety; and to provide for matters connected therewith.</p>	<p>This Act is to be adhered to in respect of the people employed during the construction phase of this proposed Project.</p>	<p>Should the proposed Project proceed, Glencore will appoint a Contractor to undertake the construction of the road and associated infrastructure. As part of the agreement between Glencore and the contractor, this Act will need to be adhered to, along with Glencore’s health and safety policies and procedures, which are in line with this Act.</p>

**Table 6-2: Relevant Provincial Legislation**

Applicable legislation and guidelines used to compile the report	Reference where applied	How does this development comply with and respond to the policy and legislative context
<p><b><u>Mpumalanga Tourism and Parks Agency Act, 2005</u></b></p> <p>The Mpumalanga Tourism and Parks Agency Act, 2005 is purposed to promote and control the conservation of nature through the establishment of the Mpumalanga Tourism and Parks Agency. According to section 3(2) (a) of the Act, the Agency is to provide for the effective management and conservation of bio-diversity and ecosystems within the province and (b) develop and ensure effective management of protected areas.</p>	<p>Specialist studies undertaken for the larger Tweefontein Optimisation Project have been used to determine the current status of the environment and to determine any potential ecological sensitivity to be avoided and/or mitigated.</p>	<p>The specialist assessments undertaken during the Tweefontein Optimisation Project have been used to determine the ecological sensitivity of the area. These are detailed in Section 11 and Section 12 of this report.</p>
<p><b><u>Mpumalanga Road Traffic Act (Act No. 4 of 1998)</u></b></p> <p>The Provincial Road Traffic Acts are an extension to the National Act, however focussing more on the provincial level. It looks to consolidate and amend the provisions relating to road traffic within the province and to provide for matters connected therewith.</p>	<p>A Traffic Impact Assessment (TIA) has been undertaken for the proposed Project.</p>	<p>The findings of the TIA can be found in Section 11 and Section 12 of this report. The road designs, which have been granted an In Principle approval by the MPWRT, have also been attached in Appendix C of this report.</p>
<p><b><u>Mpumalanga Roads Act, 2008 (Act No. 1 of 2008)</u></b></p> <p>To provide for the establishment, transformation, restructuring and control of the Mpumalanga Provincial road network.</p>	<p>A TIA has been undertaken for the proposed Project.</p>	<p>The findings of the TIA can be found in Section 11 and Section 12 of this report. The road designs, which have been granted an In Principle approval by the MPWRT, have also been attached in Appendix C of this report.</p>

**Table 6-3: Local by-laws**

<b>Applicable Legislation and Guidelines used to Compile the Report</b>	<b>Reference where Applied</b>	<b>How does this Development Comply with and Respond to the Policy and Legislative Context</b>
<p><b><u>Emalahleni Local Municipality: Draft Noise Control Bylaw (March 2015)</u></b></p> <p>Emalahleni Local Municipality compiled the Draft Noise Control Bylaws in respect of every person having the right to an environment that is not harmful to his or her health or well-being as stipulated in the South African National Constitution. These bylaws were compiled taking into consideration the various cultures, customs, geographical areas, kinds of property levels of development and communities within the Emalahleni Local Municipality.</p>	<p>During the construction phase of the proposed Project, noise will be generated. These bylaws will be used to guide the construction activities and associated noise emissions. A noise impact assessment was undertaken for the TOP, the findings of which have been considered in this Report.</p>	<p>The noise levels during the construction phase of the Project will be monitored regularly to ensure that they fall within the regulated level for the surrounding environment. The noise levels will be monitored against the By-Law standards.</p>

**Table 6-4: Project Specific Policies and Guidelines**

Applicable Legislation and Guidelines used to Compile the Report	Reference where Applied	How does this Development Comply with and Respond to the Policy and Legislative Context
<p><b><u>Typical Plans for Road Design of the Mpumalanga Department of Public Works, Roads and Transport</u></b></p> <p>These plans provide the design parameters for roads within the Mpumalanga Province.</p>	<p>These design standards have been used to inform the detailed design of the proposed road and has been granted an In Principle approval from the MPWRT.</p>	<p>The design of the proposed road alignment has been described in detail in Section 5.2.3 of this report. The road designs, which have been granted an In Principle approval by the MPWRT, have also been attached in Appendix C of this report.</p>
<p><b><u>Draft Integrated Development Plan (2015-2016)</u></b></p> <p>Integrated Development Planning (IDP) has become a tool for municipal planning and budgeting to enable municipalities to deliberate on developmental issues identified by communities. The introduction of IDP has not only affected municipal management, but also improved services in communities without access to basic infrastructure.</p>	<p>Broad spatial framework guidelines for the Emalahleni Local Municipality. These guidelines need to be adhered to in undertaking the activities of the proposed Project.</p>	<p>The activities to be undertaken for the proposed Project are anticipated to provide employment opportunities during the construction phase only. It is estimated that ±250 employees will be employed over the one year of the construction phase of the proposed Project.</p> <p>A Socio-economic Assessment was undertaken to determine the impacts (positive and negative) imposed onto the socio-economic environment as a result of extending the Tweefontein Mine Complex.</p>



Applicable Legislation and Guidelines used to Compile the Report	Reference where Applied	How does this Development Comply with and Respond to the Policy and Legislative Context
<p><b><u>Controlled Release of Contaminated Water Procedure</u></b></p> <p>This procedure provides a guideline for monitoring and recording water quality and quantity data on water discharged from Glencore property, as defined in the effluent discharge permit allocated by the DWS.</p>	<p>Glencore biomonitoring reports have provided input into water quality and management within the TOP area.</p>	<p>Glencore conducts biomonitoring sampling and surveying on a quarterly basis. Two of the monitoring points, namely TFN US2 and TFN-DS, included in the biomonitoring schedule reflect the upstream and downstream monitoring points of the Tweefontein spruit. This will aid Glencore in ensuring water quality remains steady during the construction phase of this project.</p>
<p><b><u>Environmental Monitoring Procedure</u></b></p> <p>This procedure describes the Environmental Monitoring requirements for all Glencore Mining Complex Operations and should be read together with the Air Quality Management Guideline <b>(HSE E GDL 004)</b> and the Water Management Guideline <b>(HSE E GDL 005)</b>. Glencore updates the Environmental Monitoring procedure every two years.</p>	<p>Environmental monitoring procedures have provided input into monitoring methods which are in place at Glencore.</p>	<p>The construction phase of the Phase 2 road realignment will be included into this procedure before construction may commence.</p>

Applicable Legislation and Guidelines used to Compile the Report	Reference where Applied	How does this Development Comply with and Respond to the Policy and Legislative Context
<p><b><u>Generic Waste Management Procedure</u></b></p> <p>This procedure provides a generic guide regarding the minimum legal, Glencore and other requirements to ensure effective management of wastes generated as a result of the proposed Project. Glencore updates the Generic Waste Management Procedure every two years.</p>	<p>The waste management procedure has provided information specific to the Glencore waste management practices to inform the waste management content in this document.</p>	<p>No activities in terms of the NEMWA (2008) as listed in GN 921 (2013) will be triggered by this Project and no Waste Licence is applicable to the proposed Project.</p> <p>Glencore will enforce this procedure during the construction phase and will be incorporated into this EMP Report, where applicable.</p>

## 7 Item 3(f): Need and Desirability of the Proposed Activities

It is mandated in the White paper on the Local Government (1998) according to the Constitution of South Africa that developmental local governments are to establish a system which enables local communities to find sustainable ways of meeting their needs and improving their quality of life. An Integrated Development Plan (IDP) was developed by the Nkangala District Municipality (NDM) for the period between 2011/2012 to 2015/2016, and the fourth draft thereof, dated 2012, is referenced throughout this section. Local communities are to be aided in economic- as well as social development departments through integrated development planning (NDM IDP, 2012). This planning initiative considers increasing employment opportunities, minimising the level of poverty and establishing a sustainable quality of life within a local community.

These objectives could be achieved by the activities described for the proposed Project. It should be noted that the proposed Project is necessary for the expansion of the Tweefontein Mine Complex and ultimately, the continuation of mining activities. The mine expansion and associated activities have been approved by the DMR on 19 August 2010 with reference MP30/5/1//2/2/ 289 MR and the mining right has been registered in the Mineral and Petroleum Titles Registration Office under MPT 36/2012 MR. The proposed Project will thus facilitate the planned mining activities and will have continued benefits in terms of local employment, local economic development and increased government revenue and taxes.

The need and desirability of the proposed Project is further discussed below in terms of the required coal supply, infrastructure development and socio-economic upliftment.

### 7.1 Economic Consideration

Coal mining in South Africa plays a significant role in the country's economy. The Chamber of Mines of South Africa (2014) indicated that over 30 % of the country's liquid fuels are produced within the country from locally mined coal and approximately 95 % of electricity is generated in coal fired power plants. Should this project be approved, Glencore may continue to contribute to the steady supply of coal from Tweefontein Mine Complex to Eskom's power stations (approximately 18 Million tonnes of coal sold to Eskom annually). It is estimated that current coal supplies to Eskom are insufficient and demand for coal is set to increase.

According to the National Department of Energy (DoE), South Africa's energy resource is dominated by coal. Given South Africa's abundant coal resources particularly in the Waterberg basin, South Africa is likely to continue to include coal as a significant part of its energy mix. According to the South African Coal Road Map (July, 2013), the available data suggests that sufficient coal resources are available to supply all required grades of coal to power stations in the Central Basin until the mid-2020s. Many of the existing coal-fired power stations will need a supply of coal well into the 2030's with four power stations needing significant volumes of coal beyond 2040.

The coal resource which is to be mined as part of the TOP will contribute to the availability and steady supply of coal resources for the generation of electricity. The proposed Project will result in a significant increase of the Run of Mine (RoM) coal produced per annum at the Tweefontein Mine Complex (12.5 million tonnes per annum) thus extending the LoM of the Tweefontein Mine Complex and the associated benefits.

## 7.2 Development Consideration

The NDM IDP (2012) identifies the maintenance and improvement of roads and storm water as one of the key priority issues within the District Municipality due to the poor road conditions. It is also mentioned within the NDM IDP (2012) that improving the reliability of infrastructure services, such as local and provincial roads, is made a priority issue to improve the standard of living for the local community.

The current P141-1 Provincial Road has potholes, extensive cracking and road edge breaks. The improved road conditions that will result from the implementation of the proposed road realignment will contribute to improving and extending the road network within the Nkangala District Municipality in terms of the road condition (i.e. life span). Upgrades and maintenance of roads in the area could reduce road accidents, thereby contributing to the IDP objective of providing a safer environment to residents.

## 7.2 Environmental Consideration

Part of the EIA process was to review a range of specialist studies which relates to the physical, biological and socio-economic environmental aspects potentially affected by the proposed Project. The findings of the studies are summarised in part A of this report and the specialist reports are appended to this EIA. The impact assessment quantified the expected impacts of each project activity. Mitigation measures were also identified for each of the expected impacts and are detailed in Part B.

Based on the significance ratings assigned to the anticipated environmental impacts, it is evident from the EIA and associated mitigation that the major concerns with regards to the proposed Project include loss of land capability, loss of vegetation, habitat fragmentation and loss of wetland habitat. These impacts are associated directly with the traversing of a hillslope seepage wetland, which is associated with untransformed grassland, as well as the road traversing through an area which is currently being used for cultivation. These impacts are all considered to be of moderate significance after mitigation is implemented. The key recommendations to reduce/minimise these impacts include:

- Reduce the project footprint by clearing only the vegetation that is within the proposed realigned route;
- Areas to be cleared of vegetation should be walked by a botanist prior to clearing and all SSC should be removed and relocated to similar adjacent habitat; and
- Conserve topsoil material for vegetation of areas around the proposed new realigned road (if needed) or for areas within the Tweefontein Mine Complex.

All other impacts identified were assessed to be minor to negligible after mitigation.

### 7.3 Socio-economic Consideration

The following local and national socio-economic benefits of the continuation of the mining operation (resulting from the proposed Project) are anticipated:

- Local and regional employment opportunities. Although smaller in number than employment creation during the construction phase, these will have a significantly longer duration;
- Increased business opportunities for local entrepreneurs through the supply of goods and services to the mine;
- A positive macro-economic impact at a local, regional and provincial level due to operational expenditure, taxes and royalties; and
- Economic and social benefits associated with Corporate Social Responsibility (CSR) and Local Economic Development (LED) initiatives by the mine.

Unemployment is a major problem within the Nkangala District. Furthermore, there will be an extension of benefits from the extension of LoM: The proposed Project will result in a significant increase of the Run of Mine (RoM) coal produced per annum at the Tweefontein Mine Complex (12.5 million tonnes per annum) thus extending the LoM of the Tweefontein Mine Complex and the associated benefits including:

- Increase of revenue for Glencore and associated government taxes;
- Increased period of employment at the Tweefontein Mine Complex which will impact the families of these employees directly, thereby having an impact on the community;
- Increase of potential income for all contractors associated with the construction of the road, the culverts and associated bridges; and
- An increase in coal production will impact electricity supply from Eskom's coal-fired power stations, as Eskom relies on coal supplied by Glencore.

Clear policy guidelines and careful management of Project implementation will be required to ensure that benefits for the local population and economy are maximised.

## **8 Item 3(g): Motivation for the Preferred Development Footprint within the Approved Site Including a Full Description of the Process Followed to reach the Proposed Development Footprint within the Approved Site**

### **8.1 Item 3(g)(i): Details of the Development Footprint Alternatives Considered**

*A project alternative is defined as a possible course of action, in place of another, that would meet the same purpose and need (DEAT, 2004).*

In an EIA process, project alternatives serve to determine the most effective way of meeting the objectives of that project. This is generally done through either enhancing the benefits of an activity and/or mitigating the negative impacts and risks of an activity.

In terms of the EIA Regulations (2014), project alternatives must be considered during the EIA process. In particular, the EIA Regulations (2014) require that a description be provided in the EIA report of the identified potential alternatives to the proposed activity, including advantages and disadvantages associated with each alternative. According to the Department of Environmental Affairs (DEA) Criteria for Determining Alternatives in EIA Guideline (2004), there are various types or categories of alternatives, including:

- Location alternative – alternative project sites in the same geographic area;
- Process/design alternative – alternative process/design/equipment;
- Activity alternative – consideration of different means to achieve the same project objective;
- Routing alternative – consideration of different routes for linear infrastructure; and
- No-go alternative – the proposed project/activity does not proceed, implying that the current situation or status quo remains.

The scoping phase identified various project alternatives that were considered to be reasonable and feasible in meeting the objectives of the project. The EIA phase aims to assess these identified alternatives in terms of their environmental and social impacts. Each of the above mentioned types or categories of alternatives is described below in relation to the proposed Project.

#### **8.1.1 Location Alternative**

It is recognised that in some cases, an alternative location or site cannot be considered due to the nature of the project. In the case of this proposed Project, the P141-1 Provincial Road is planned to be realigned for the purposes of mining the coal resource beneath the road. Since mining and extraction can only occur at the location of an ore body, it is not feasible to consider alternative locations. It is also recognised that coal resources may occur at several

different locations across the region, however the feasibility of this specific area, located within the Tweefontein Mine Complex has been proved through the TOP, concluded in 2008. The proposed Project will result in a significant increase of the Run of Mine (RoM) coal produced per annum at the Tweefontein Mine Complex (12.5 million tonnes per annum). Hence, no other alternative locations have been identified or assessed in this EIA Report as it would not meet the overall objective of the proposed Project, which is ultimately to allow Glencore to mine the coal resource beneath the P141-1 Provincial Road. The route alternatives are located on the RE and Portion 1 of the Farm Tweefontein 13 IS and are discussed in more detail in 8.1.4.

### 8.1.2 Design Alternative

The minimum design parameters, as informed by the standard requirements of the Department of Public Works, Roads and Transport (DPWRT) were applied to the design of the road, bridge and culvert. The design parameters were included in the report titled, *Detail Design Report for the Realignment of the Provincial Roads P141-1 and D2769 and the Closure of a Portion D2770 and P141-1*, compiled by Jeffares and Green, dated March 2014, attached hereto in Appendix D1. The design parameters associated with the proposed Project include:

- Design Speed: 100 km/h
- Road Reserve width: 40 m
- Minimum Curve Radius: 350 m
- Maximum Superelevation: 6 %
- Minimum Slope Vertical: 0.5 % (achieved: 0.503 %)
- Maximum Slope Vertical: 7 % (achieved: 4.724 %)
- Vertical Curve Length (min): 180 m
- K-value minimum (sag): 37
- K-value minimum (crest): 62
- Sight distance at junctions: 300 m
- Design flood frequency: 1:25 year culverts

Amending the design specifications provided above such as widening or narrowing the proposed realigned road would serve no purpose as the width of the realigned road will need to be relative to the width of the existing road. Furthermore, there is no need to accommodate on ramps or off ramps. This also applies to the design of the proposed bridge; the height of the bridge is dependent on safety aspects for both the traffic beneath the bridge and the traffic crossing the bridge. Therefore, deviation from the design parameters is not possible; as such no design alternatives have been identified or assessed.



### 8.1.3 Activity Alternative

Activity alternatives generally include alternatives where there is a substantive difference in the nature of the proposed activity. During the scoping phase, activity alternatives were considered in relation to the proposed water crossing. In this regard, there were two proposed activity alternatives identified for the water crossing, namely a culvert or a bridge. It was however indicated in the Scoping Report that the culvert is considered the most feasible activity alternative for the proposed water crossing for the reasons listed below:

- In comparison with the costs associated with constructing a bridge, it will cost significantly less to construct a culvert;
- The construction period of the culvert is notably shorter than that of a bridge; therefore there is a shorter direct impact on the watercourse during the construction period in comparison to the construction of a bridge; and
- Maintenance activities that are associated with the culverts such as the clearing of debris or sediment build up will also require less time than maintenance activities than those associated with a bridge.

It is noted that there will be potential negative impacts associated with the construction of the culvert as it would be placed within the watercourse, confining the stream-flow through the structure (as there would be with a bridge). Furthermore, the installation of the culvert may also require trenching in the watercourse which will result in soil and vegetation removal. The design parameters of the culvert does however allow for effective erosion control downstream of the culvert (i.e. sloped) thereby preventing sedimentary deposits or scouring in the case of accelerated water flow. The potential impacts associated with this activity (i.e. construction of a culvert) has been identified and assessed as part of this EIA Report.

### 8.1.4 Routing Alternative

The proposed route alternatives below describe the initial route planned and the subsequently revised route, which was based on the avoidance of an existing graveyard. Each routing alternative is described further below.

The potential negative impacts associated with both the initial route alignment and revised route alignment have been identified and assessed as part of this EIA Report. The removal of vegetation and site clearing will be carried out along the length of the proposed alignment regardless of the chosen route alternative. The loss of vegetation within the road reserve width can therefore not be avoided if the proposed Project is to be implemented.

#### 8.1.4.1 Initial Route Alignment

The proposed P141-1 Provincial Road would commence at the intersection with the D2769 extension road (currently under construction). The initially proposed realignment followed a north-westerly direction from the D2769 extension road crossing over the existing mine haul road. The road would then cross over the Waterpan No 1a dump which will be removed prior



to construction of the proposed road. The initially proposed route would pass through the existing graveyard and continue in a north-westerly direction. The proposed initial realignment would cross a watercourse (unnamed tributary) and then proceed to join the existing P 141-1 Provincial Road at the point where it would intersect the Tweefontein Mine Complex access road (Grootpan). The initial route alignment is illustrated on Plan 5 Appendix B. Based on this initial route alignment, a site sensitivity survey was conducted to identify any sensitive resources and/or receptors along the proposed route. The following sensitivities or constraints were identified as part of the process:

- Existing graveyard; and
- A wetland area.

In view of these sensitivities or constraints, the initial route alignment (Plan 5, Appendix B) has been revised with the following changes (reflected in a revised route alignment in Plan 4 in Appendix B):

- The alignment route, at the proximity of the graveyard, was shifted between Km 1800 and Km 1900 north-east, thus excluding the graveyard from the design; and
- A box culvert will be constructed at the wetland crossing.

These iterations of the route alignment will be presented as a route alternative. The initial and revised route alternative will be assessed further as part of this EIA Report.

#### **8.1.4.2 Revised Route Alternative**

The proposed P141-1 Provincial Road commences at the intersection with the D2769 extension road which is currently under construction. The proposed realignment follows a north-westerly direction from the D2769 extension road and crosses over the existing mine haul road. It will then cross over the Waterpan No 1a dump which will be removed prior to construction of the proposed road. ***The proposed route is slightly curved eastward to avoid the existing graveyard.*** The proposed route continues in a north-westerly direction. Please refer to Plan 4 in Appendix B for the revised route alternative.

This revised route alternative will allow mining to continue within the Tweefontein Mine Complex without the hindrance created by having to apply for grave removal and relocation in terms of the National Heritage Resources Act, 1999 (Act No. 25 in 1999). Not only does Glencore avoid the costs associated with such a process, the graveyard will also be preserved and protected due to its proximity within the Tweefontein Mine Complex. Glencore will continue to ensure safe access of the communities to the graves.

#### **8.1.5 The No-Go Alternative**

This alternative defines the situation which would result should the proposed realignment and subsequent construction of the P141-1 Provincial Road not proceed.

The “no-go” alternative assumes that the proposed Project is not implemented and therefore no changes are made to the existing road alignment of the P141-1 Provincial Road. The no go alternative would mean that the proposed Project would not go ahead and as a result any potential impacts associated with the proposed Project and its alternatives would not occur.

The no go alternative would result in the following potential impacts:

- The road conditions along the stretch of the proposed realigned road (3.8 km) would not be improved;
- The life of mine at the Tweefontein Mine Complex would be reduced as the current P141-1 Provincial Road will continue to sterilise a valuable coal resource. The total effects of this coal reserve being sterilised involve:
  - Loss of revenue for Glencore and associated government taxes;
  - Reduced period of employment at the Tweefontein Mine Complex which will impact the families of these employees directly, thereby having an impact on the community;
  - Loss of potential income for all contractors associated with the construction of the road, the culverts and associated bridges; and
  - A decrease in coal production will impact electricity supply from Eskom’s coal-fired power stations, as Eskom relies on coal supplied by Glencore.

By the proposed Project not proceeding, the negative impacts associated with vegetation removal and disruption to traffic would not occur.

The potential impacts associated with the no-go alternative will be inherently assessed as part of this EIA Report by identifying and assessing the potential impacts associated with the proposed Project.

## **8.2 Item 3(g)(ii): Details of the Public Participation Process Followed**

A Public Participation Process (PPP) has been initiated, which is central to the investigation of environmental and social impacts, as it is important that stakeholders who are affected by the proposed Project are given an opportunity to identify concerns and to ensure that local knowledge, needs and values are understood and taken into consideration as part of the impact assessment process. The comments of stakeholders that have been received to date have been included in the Comments and Responses Report (CRR) (Appendix E6).

### **8.2.1 Stakeholder Identification**

To ensure a proper representation of all stakeholders, the following identification methods were used to develop a stakeholder database:

- Verifying the existing stakeholder database for the Project site; and

- Conducting Windeed searches along the proposed route to verify land ownership and obtain contact details.

Stakeholders are grouped into the following categories:

- Government: National, Provincial, District, Local authorities;
- Landowners: Directly affected and adjacent landowners; and
- Business: small medium enterprises, mines and formal business organisations.

#### **8.2.1.1 Government**

The following government departments have been informed and/or consulted:

- South African National Heritage Resources Agency;
- Department of Mineral Resources;
- Regional Office of the Department of Water and Sanitation;
- Mpumalanga Department of Economic Development, Environment and Tourism;
- Mpumalanga Tourism and Parks Agency;
- Mpumalanga Department of Public Works, Roads and Transport;
- Emalahleni Local Municipality; and
- Nkangala District Municipality.

#### **8.2.1.2 Directly Affected Land Owners**

As set out in Table 8-1, majority of the directly affected land is owned by Glencore, the Applicant. Refer to Plan 3 in Appendix B for the Land Tenure Plan. Adjacent landowners have also been consulted.

**Table 8-1: Landowners and Properties Directly Affected**

	<b>Farm</b>	<b>Portion</b>	<b>Registered landowner</b>
New Road	Tweefontein 13 IS	1	Glencore Operations South Africa (Pty) Ltd
	Tweefontein 13 IS	RE	Glencore Operations South Africa (Pty) Ltd
Road Closures	Tweefontein 13 IS	RE	Glencore Operations South Africa Pty Ltd
	Vlaklaagte 330 JS	1	South African National Roads Agency Ltd
	Vlaklaagte 330 JS	2	Xstrata South Africa Pty Ltd (merged with Glencore in May 2013)



	Farm	Portion	Registered landowner
	Vlaklaagte 330 JS	41	Xstrata South Africa Pty Ltd (merged with Glencore in May 2013)
	Vlaklaagte 330 JS	40	Xstrata South Africa Pty Ltd (merged with Glencore in May 2013)
	Waterpan 8 IS	2	Glencore Operations South Africa Pty Ltd

**Table 8-2: Directly / Adjacent Landowners and Farms**

	Farm	Portion	Registered landowner
New Road	Tweefontein 13 IS	2	Xstrata South Africa Pty Ltd (merged with Glencore in May 2013)
	Tweefontein 13 IS	3	Government Republic Of South Africa
	Boschmansfontein 12 IS	RE	Glencore Operations South Africa Pty Ltd
	Klipplaat 14 IS	1	Xstrata South Africa Pty Ltd 9(merged with Glencore in May 2013)
	Klipplaat 14 IS	7	Glencore Operations South Africa Pty Ltd
	Klipplaat 14 IS	10	Xstrata South Africa Pty Ltd (merged with Glencore in May 2013)
	Klipplaat 14 IS	2	Glencore Operations South Africa Pty Ltd
	Kleinkopje 15 IS	36	Anglo Operations Pty Ltd
	Klippan 332 IS	2	Anglo Operations Pty Ltd
	Groenfontein 331 IS	2	Anglo Operations Pty Ltd
	Vlaklaagte 330 JS	1	South African National Roads Agency Ltd
	Waterpan 8 IS	2	Glencore Operations South Africa Pty Ltd
Road Closures	Klipplaat 14 IS	7	Glencore Operations South Africa Pty Ltd
	Klipplaat 14 IS	1	Xstrata South Africa Pty Ltd (merged with Glencore in May 2013)

	Farm	Portion	Registered landowner
	Tweefontein 13 IS	1	Xstrata South Africa Pty Ltd (merged with Glencore in May 2013)
	Klipplaat 14 IS 14 IS	10	Xstrata South Africa Pty Ltd (merged with Glencore in May 2013)

### 8.2.1.3 Business

The following businesses or business entities have been identified and have been consulted during the process:

- Eskom ( Eskom Holding); and
- Transnet Freight Rail.

### 8.2.2 Consultation with I&APs

Table 8-3 below presents a summary of the PPP activities undertaken during the scoping phase of the proposed Project.

**Table 8-3: Summary of PPP Activities during Scoping Phase**

Activity	Details	Reference in Report
<b>Scoping Phase</b>		
Identification of stakeholders	A stakeholder database was developed which, includes I&APs, from various sectors of society including directly affected and adjacent landowners in and around the Project site.	<b>Appendix E(1)</b> Stakeholder Database
Distribution of proposed Project announcement materials	A Background Information Document (BID), announcement letter with comment and registration sheet was emailed and posted to stakeholders on <b>13 March 2015</b> .  The Background Information Document was also available on <a href="http://www.digbywells.com">www.digbywells.com</a> , on <b>13 March 2015</b> .	<b>Appendix E(2)</b> BID, letter with registration and comment sheet Proof of emails sent
Placing of adverts	An advert was placed in the Witbank News on <b>Friday, 20 March 2015</b> .	<b>Appendix E(3)</b> Adverts

Activity	Details	Reference in Report
Placing of site notices	<p>Site notices (four) were put up at the various places in the proposed Project area on <b>17 March 2015</b>.</p> <p>A site notice map has also been developed which provides location points of the site notices that were put up (Plan 13 in Appendix 5).</p>	<p><b>Appendix E(4)</b></p> <p>Site notice report and site notice map</p>
Placement of Scoping Report	<p>The Scoping Report was placed at the Ogies Public Library, (Emalahleni Local Municipality), Tweefontein Golf Club Reception and at the Glencore Tweefontein Complex Main Office from <b>Friday, 10 April 2015</b> till <b>Monday, 11 May 2015</b> (30 days).</p> <p>The Scoping Report was also available on <a href="http://www.digbywells.com">www.digbywells.com</a>, from <b>Friday, 10 April 2015</b> till <b>Monday, 11 May 2015</b>.</p>	
Announcement of the Scoping Report	<p>A letter was emailed to the full database to announce the availability of the Scoping Report on <b>Wednesday 8 April 2015</b>.</p>	<p><b>Appendix E(5)</b></p> <p>Announcement Letter</p>
Stakeholder Meeting	<p>A Public meeting was held - on <b>Wednesday, 22 April 2015</b>. This meeting included communities, Provincial Authorities, and the general public.</p> <p>All comments received during the meeting- are captured in the Comment and Response Report.</p> <p>The date and venue for the public meeting was distributed on <i>Wednesday 8 April 2015</i>. All stakeholders on the database were invited to attend the public meeting. Information about the proposed Project was shared by means of a formal PowerPoint presentation. Project maps were also displayed at the meeting.</p>	<p><b>Appendix E(6)</b></p> <p>Comment and Response Report</p>
Updated Scoping Report	<p>This updated scoping report was placed on the Digby Wells website <a href="http://www.digbywells.com">www.digbywells.com</a> for I&amp;APs to confirm that all issues raised have been captured and will be taken into account in the EIA phase of the Project. At the same time the updated Scoping report was submitted to the competent authority, the DMR on 14 May 2015.</p>	<p><b>Appendix E(5)</b></p> <p>Announcement Letter of Updated Scoping Report</p>

Table 8-4 and Table 8-5 and



Table 8-6 provide a summary of comments received from I&APs.

## **8.2.3 Particulars of the Public Participation Process with Regard to the Impact Assessment Process that will be Conducted**

### **8.2.3.1 Steps to be Taken to Notify Interested and Affected Parties**

All project stakeholders who were identified during the scoping phase will be informed of the availability of the Draft EIA Report for a public comment period of 30 days (Appendix E7). A public meeting will also be held to present the findings of the EIA Report to the public. To inform the public of these events, all registered stakeholders will receive an announcement letter via mail or email (Appendix E7).

### **8.2.3.2 Details of the Engagement Process to be Followed**

As described above, during the EIA phase of the proposed project, the EIA Report will be made available to all registered I&APs for a comment period of 30 days (**i.e. 14 September to 14 October 2015**). A public meeting will be held on **Thursday, 01 October 2015 at the Tweefontein Golf Club**.

The EIA Report will be made available for comment at the following public venues:

- Ogies Public Library, (Emalahleni Local Municipality);
- Tweefontein Golf Club Reception;
- The Glencore Tweefontein Complex Main Office; and
- On the Digby Wells website at [www.digbywells.com](http://www.digbywells.com).

I&APs will be expected to review the report and provide comments related to the process in the stipulated 30 day period. After which, all comments will be collated into the CRR which will be appended to the updated EIA Report. The updated EIA report will be submitted to the DMR for review and a decision.

### **8.2.3.3 Description of the Information to be Provided to Interested and Affected Parties**

The EIA report will contain the following information for I&APs to comment on:

- Project description and activities;
- Baseline environment;
- Results of the public participation process;
- Potential biophysical and socioeconomic impacts of the proposed activities; and
- Proposed mitigation measures to avoid/reduce the identified impacts.



**Table 8-4: Interested and Affected Parties**

Interested and Affected Parties		Date of Comments Received	Issues Raised	EAPs Response to Issues as Mandated by the Applicant	Section and Paragraph Reference in this Report where the Issues and/or Responses were Incorporated
Name of Individual	Consulted				
<b>Communities</b>					
Nomfundo Phiri - Phola Community Member	Yes	22 April 2015	Will the road that needs to be realigned be closed again at some stage in the future?	The newly realigned Provincial P141-1 road will be a permanent road which will be maintained by the Mpumalanga Department of Public Works, Roads and Transport. The realigned road will therefore not be closed or decommissioned.	Section 5.2
Jane Sambatha - Sukumani Primary School	Yes	22 April 2015	Are there people that will be employed?	During the construction phase, it is anticipated that approximately 250 skilled, semi-skilled and unskilled workers will be required for a period of 1 year. A company named Liviero has been	Section 5.2
Nomfundo Phiri - Phola Community Member	Yes	22 April 2015	How will employment take place? Who is responsible? Do they have employees that they have recently employed?		Section 5.2

Interested and Affected Parties		Date of Comments Received	Issues Raised	EAPs Response to Issues as Mandated by the Applicant	Section and Paragraph Reference in this Report where the Issues and/or Responses were Incorporated
Name of Individual	Consulted				
Arron Mankge - Phola Community	Yes	22 April 2015	To who and where can the CVs be registered?	appointed to undertake the construction for the Phase 1 project, they are currently working in close collaboration with the Department of Labour in Ogies to identify potential candidates for employment. Both skilled and semi-skilled opportunities will be available and members of the community will need to register their CVs with the Department of Labour in Ogies. Already in Phase 1 about 209 people have been employed from Ogies for the current construction activities.	Appendix C6
<b>Other commenting authorities affected</b>					
S A Mbatha - Department of Public Works, Roads and Transport	Yes	22 April 2015	Have measures been taken to minimise the impact of water contamination? Specifically for water resources located adjacent to the road.	A Surface Water Assessment has been undertaken for the Tweefontein Mine Complex to determine the status of the water resources. The Tweefontein spruit wetland system forms the main	Part B – EMP Report (Section 6)

Interested and Affected Parties		Date of Comments Received	Issues Raised	EAPs Response to Issues as Mandated by the Applicant	Section and Paragraph Reference in this Report where the Issues and/or Responses were Incorporated
Name of Individual	Consulted				
				<p>wetland system within the Tweefontein Mine Complex and occupies most of the central region of the study area. The Tweefontein Spruit feeds into the Tweefontein Dam and then drains east, forming a tributary of the Olifants River. The Tweefontein spruit is characterised by a large unchannelled valley-bottom wetland which has been altered due to mining activities within the catchment.</p> <p>The Present Ecological Status (PES) of the Tweefontein spruit is rated as D and E (A being most natural state, E being highly modified). A PES rating D, means the wetland has been largely modified. A large change in ecosystem processes and loss of natural habitat and biota and has occurred. A PES rating E, means that the effects of the change in the</p>	

Interested and Affected Parties		Date of Comments Received	Issues Raised	EAPs Response to Issues as Mandated by the Applicant	Section and Paragraph Reference in this Report where the Issues and/or Responses were Incorporated
Name of Individual	Consulted				
				<p>wetland ecosystem processes and loss of natural habitat and biota is great but some remaining natural habitat features are still recognisable. The potential impacts identified to the water resources during the construction and operational phases include: increase in the sedimentation load of the Tweefontein spruit, flow reduction of the Tweefontein spruit and alteration of the flow regime within the culvert as well as the secondary effects downstream of the culvert. Some of the mitigations include the development of berms and trenches to redirect water away from the construction activities, maintaining stormwater channels and monitoring the water quality of the Tweefontein spruit.</p> <p>A water use licence application will also</p>	

Interested and Affected Parties		Date of Comments Received	Issues Raised	EAPs Response to Issues as Mandated by the Applicant	Section and Paragraph Reference in this Report where the Issues and/or Responses were Incorporated
Name of Individual	Consulted				
				be undertaken as part of this application, The necessary mitigation and management measures to avoid contamination will be identified as part of both the EIA and WULA process. Feedback on these measures has been provided in the EMP. Refer to Part B.	
S A Mbatha - Department of Public Works, Roads and Transport	Yes	22 April 2015	How will the extension of mining take place? Will it not increase the use of the road and cause traffic?	The mine currently uses its own haul roads within the Tweefontein Mine Complex. The P141-1 Provincial Road will cross over these haul roads therefore mine traffic will be separate from public traffic. The surrounding landowners will still have proper access to their farms.	Part B – EMP Report (Section 6)
S A Mbatha - Department of Public Works, Roads and Transport	Yes	22 April 2015	Is the Municipality part of the public participation? In the past they have been complaining that they were not informed.	Yes, the Emalahleni Local Municipality were informed of the proposed project. The municipality also confirmed their attendance at the scheduled public meeting on 22 April 2015.	Section 8.2

Interested and Affected Parties		Date of Comments Received	Issues Raised	EAPs Response to Issues as Mandated by the Applicant	Section and Paragraph Reference in this Report where the Issues and/or Responses were Incorporated
Name of Individual	Consulted				
Ben Viljoen - Department of Public Works, Roads and Transport	Yes	18 May 2015	Comply with approval conditions in the wayleave dated 2014.10.8 (Jeffares and Green) appointed Consulting Engineers Alignment/Deproclaim/Proclaim New Road.	Comment noted	

**Table 8-5: Other Affected Parties**

Other Affected Parties		Date of Comments Received	Issues Raised	EAPs Response to Issues as Mandated by the Applicant	Section and Paragraph Reference in this Report where the Issues and/or Responses were Incorporated
Name of Individual	Consulted				
Andries Mapmpuru - Sukumani Primary School	Yes	22 April 2015	How is it going to affect the N12 and Witbank Ogies road?	<p>The N12 and Witbank/Ogies Road will not be impacted on by the proposed project due to these roads being located some distance away from the proposed mining activities. These roads will operate as normal.</p> <p>A Traffic Impact Assessment has been undertaken to identify the potential impacts as a result of the proposed route alignment and road closures. The current traffic volumes on the major roads associated with the Tweefontein Mine Complex indicate that the N12 National Route, which runs in an east - west direction and is situated towards the north of the mine boundary, experiences the most traffic of all the roads included in the study, with an estimated 13,500 average daily trips. The R547, the D2769 and the R544 which run in a north - south direction along the eastern side of the mine</p>	Appendix D9

Other Affected Parties		Date of Comments Received	Issues Raised	EAPs Response to Issues as Mandated by the Applicant	Section and Paragraph Reference in this Report where the Issues and/or Responses were Incorporated
Name of Individual	Consulted				
				<p>boundary experience between 4700 and 8900 trips daily. The majority of roads situated to the north of the mine boundary are characterised by fewer than 4,500 average daily trips. The P141-1 experiences less than 1,500 trips per day.</p> <p>The following traffic related impacts have been identified: increase in traffic and disruption to traffic flow during the construction phase. During the operational phase, there will be an improved road condition and capacity for road users along the section of the P141-1 road realignment.</p>	



**Table 8-6: Interested Parties**

Interested Parties		Date of Comments Received	Issues Raised	EAPs Response to Issues as Mandated by the Applicant	Section and Paragraph Reference in this Report where the Issues and/or Responses were Incorporated
Name of Individual	Consulted				
Wendy Collison-The Endangered Wildlife Trust	Yes	16 April 2015	Roads are integral to the continued development and prosperity of South Africa's economy. However, roads have the potential to destroy and degrade habitat as well as fragment wildlife populations. Traffic, particularly when speeding and careless driving are involved, can have a direct negative impact on biodiversity with many animal species at risk from wildlife-vehicle-collisions (WVC), often resulting in an animal's death, or 'roadkill'. The same challenges apply to protected areas in South Africa, and with increasing mining activity and traffic volumes populations of many wildlife species are coming under increasing pressure. To date, very little research has been done on the	A threatened species biodiversity assessment has been undertaken for the Tweefontein Mine Complex which indicates that the proposed impact to habitat fragmentation is a major negative and the loss of fauna a minor negative this is mainly due to the loss of untransformed Grassland vegetation unit which provides habitat for five of the seven Red Data List or Orange List plant species recorded within the study area, namely, <i>Boophone disticha</i> , <i>Callilepis leptophylla</i> , <i>Eucomis autumnalis</i> subsp. <i>clavata</i> , <i>Frithia humilis</i> and <i>Hypoxis hemerocallidea</i> . This vegetation unit also provides a habitat for 10 of the 21 protected plant species recorded within the study area, in terms of the	Section 8.5

Interested Parties		Date of Comments Received	Issues Raised	EAPs Response to Issues as Mandated by the Applicant	Section and Paragraph Reference in this Report where the Issues and/or Responses were Incorporated
Name of Individual	Consulted				
			impacts of roads in these areas. Subsequently, there is an urgent need to better quantify and understand the impacts of roads on wildlife in protected areas and to develop methods to manage these.	Mpumalanga Nature Conservation Act (MNCA), 1998 (Act No 10 of 1998), including the Endangered succulent <i>Frithia humilis</i> .	
Wendy Collison-The Endangered Wildlife Trust	Yes	16 April 2015	The data that we have collected through our own research, as well as in collaboration with the public (through social media platforms and a cell phone app), are helping to generate a national database of roadkill information. We are now using this data to identify 'roadkill hotspots' in different parts of the country. Working in partnership with several of South Africa's road agencies, the WRP is designing and implementing measures that reduce wildlife fatalities and improve driver safety.	Comments noted. As part of this EIA process, we are able to provide you with the available information on biodiversity in this area.	Section 8.3

## 8.3 Item 3(g)(iv): The Environmental Attributes Associated with the Development Footprint Alternatives

The EIA Regulations (2014) under the NEMA (1998) require an EIA Report to include a description of the environment that may be affected by the proposed listed activities in terms of Listing Notices R.983 (2014), R.984 (2014) and R.985 (2014). This Section is therefore intended to present the available information regarding the biophysical environment in such a manner as to meet the requirements of the said regulation, as well as to provide baseline information for the purpose of assessing impacts.

**Table 8-7: Summary of Specialist Studies**

List of studies undertaken	Appendix
Soils, Land Capability and Land Use Assessment	Appendix D3
Terrestrial Biodiversity Impact Assessment	Appendix D6
Surface Water Impact Assessment	Appendix D4
Wetlands Impact Assessment	Appendix D7
Air Quality	Appendix D2
Heritage Impact Assessment (updated in June 2015 by Digby Wells)	Appendix D8
Traffic Impact Assessment	Appendix D9

### 8.3.1 Baseline Environment

#### 8.3.1.1 Type of Environment Affected by the Proposed Activity

A range of specialist studies were undertaken during the EIA phase for the Tweefontein Optimisation Amendment Project in 2013. Since the proposed Project falls within the Tweefontein Mine Complex, the information presented below has been obtained from these specialist reports. Furthermore, information has also been obtained from the Phase 1 Tweefontein Road Realignment Project Environmental Impact Assessment (EIA) undertaken by Clean Stream Environmental Consultants (Pty) Ltd in June 2013. To the extent possible or necessary, the points particularly relevant to the road re-alignment have been identified.

For the purposes of this EIA Report, the study area referred to is defined as the Tweefontein Optimisation Project (TOP) area which is also defined as the Tweefontein Mine Complex area.

##### 8.3.1.1.1 Climate

Information included in this section was sourced from the EIA Report compiled by Clean Stream Environmental Consultants (Pty) Ltd, for Phase 1 of the Road Realignment Project, dated June 2014. This section is only generally relevant, and the details are provided for background information.

The Tweefontein Mine Complex is located in the western part of the Mpumalanga Highveld region with a climate that is characterised by warm summers and cold winters. Rainfall in this area is characterised by summer thunderstorms, therefore, most of the rainfall occurs

from November through to February each year.

The highest average maximum daily temperatures occur between November and March ranging from 25.2°C to 27.5°C. The coldest months of the year are June, July and August with the average minimum temperatures ranging between 5°C to 6°C (SAWS, 2006).

The proposed Project is located predominantly within the B1A rainfall zone. The Mean Annual Precipitation (MAP) measured at the Ogies rainfall station situated within the B1A rainfall zone is 748.7 mm (Water Research Council, 1990) with an average Mean Annual Evaporation (MAE) of 1 887 mm.

The average monthly rainfall for the B1A rainfall zone is presented in Table 8-8.

**Table 8-8: Rainfall as a Percentage of MAP per Month for the B1A Rainfall Zone**

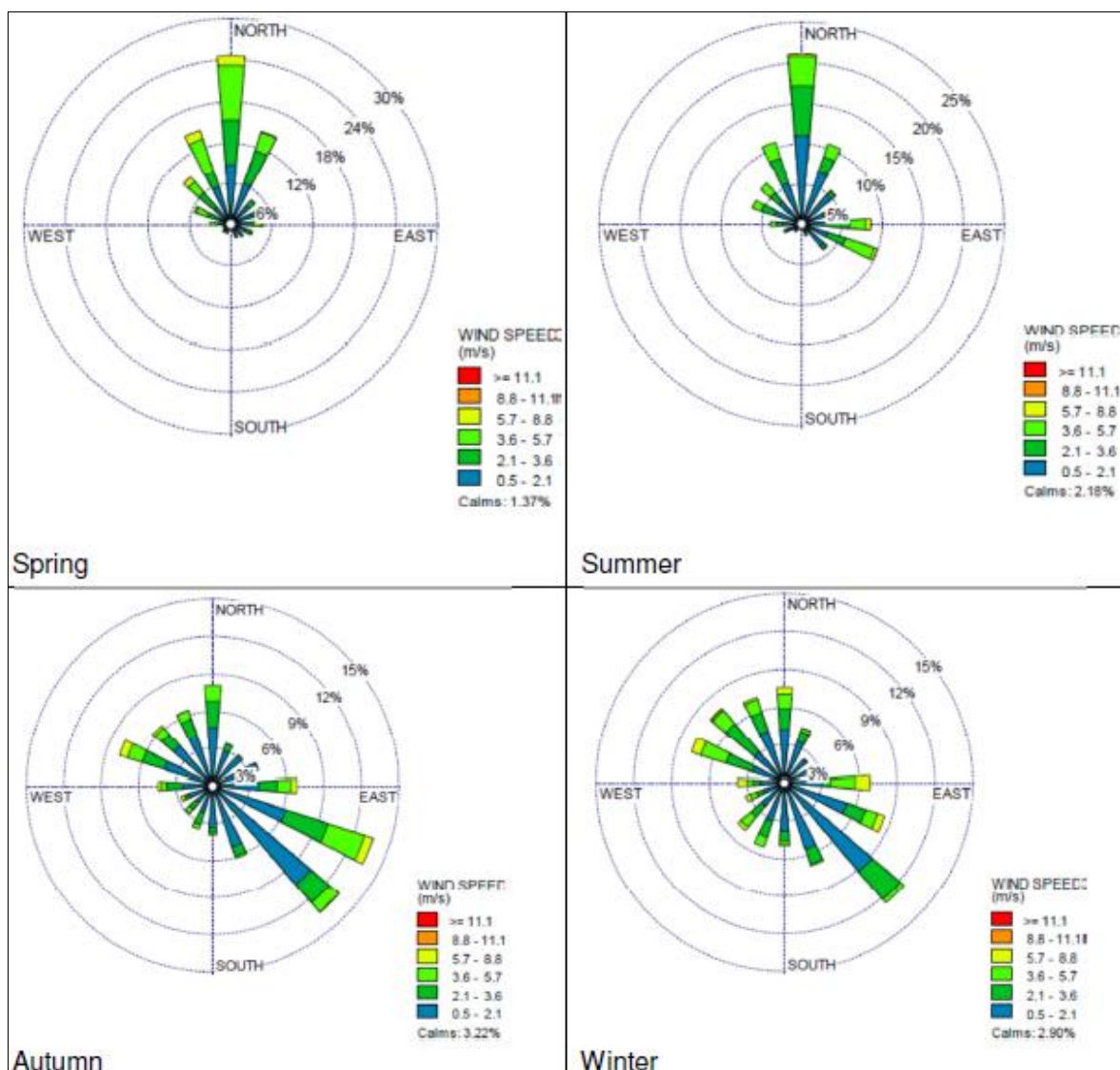
Month	Adjusted average monthly % rainfall	Monthly precipitation in mm
January	17.21	120.5
February	13.06	91.4
March	10.98	76.9
April	6.39	44.7
May	2.62	18.3
June	1.22	8.5
July	1.09	7.6
August	1.14	8.0
September	3.46	24.2
October	10.54	73.8
November	16.63	116.4
December	15.65	109.5

Source: Water Research Council, 1990

Information relating to the local wind field was obtained from the report titled, *Tweefontein Optimisation Project Amendment, Air Quality Specialist Assessment*, compiled by Airshed Planning Professionals (Pty) Ltd., dated August 2013 (attached as Appendix D2). Data was

drawn from the Kendal Eskom meteorological station to inform the wind rose modelling from a period between January 2009 and August 2012.

Wind direction is predominantly west-north-westerly during the day time. Wind speed reduces during the night with easterly winds picking up during this time. During spring and summer, the predominant wind direction is to the north whilst during winter and autumn, the wind direction is predominantly to the south east (Figure 8-1).



Source: South African Weather Service, 2009

**Figure 8-1: Seasonal Wind Rose for Ogies**

The Project site is further located in a region with between 6 and 7 lightning flashes per year. This region also experiences hail events which occur between 1 and 5 times per year.

### **8.3.1.1.2 Topography**

The proposed realigned P141-1 Provincial Road will be less than 4 km in length with a 40 m wide road reserve and will hence impact only marginally on the topography of the TOP.

The topography of the TOP area generally is undulating, with various drainage lines (mostly non-perennial) situated in shallow valleys. Along the Saaiwaterspruit these valleys are somewhat deeper and often descend below the sandstone stratum to expose rocky scarps. The major drainage systems are the Saaiwaterspruit and its tributary the Tweefontein spruit. These systems drain into the Olifants River approximately 2 km to the east of the easternmost boundary of the Tweefontein Mine Complex. The only large dams within the TOP area are the Tweefontein Dam, which is situated on the Tweefontein spruit and the Phoenix Dam situated on the Saaiwaterspruit on the Farm Klipplaat 14 IS.

The elevation ranges from approximately 1510 m above sea level on the eastern boundary of the Tweefontein Mine Complex where the Saaiwaterspruit flows outside of the Complex, to approximately 1610 m above sea level to the north-east near the N12 Highway on the Farm Vlaklaagte 330 JS.

### **8.3.1.1.3 Geology**

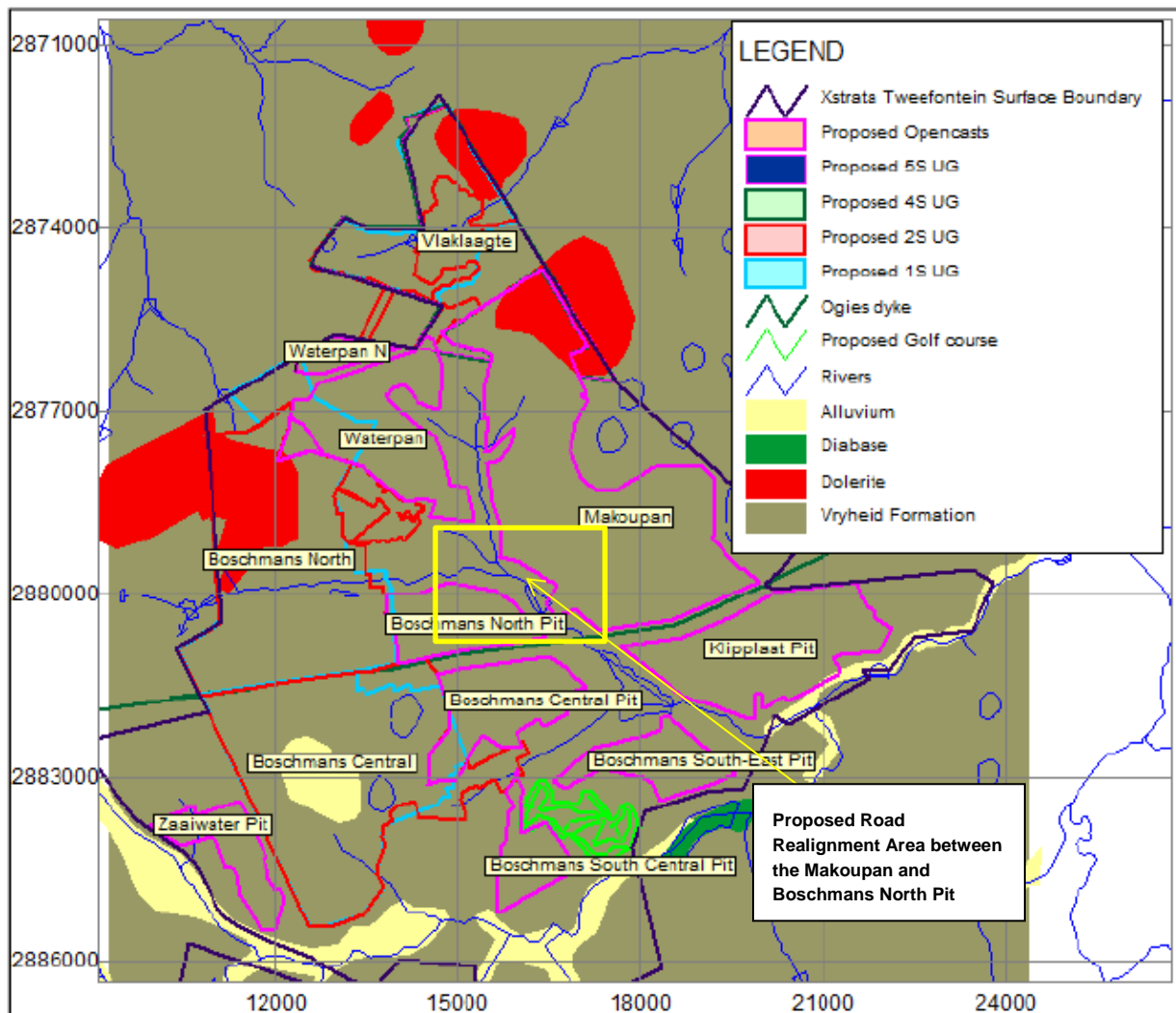
The details of the geology underlying the TOP area are provided for background information only. The proposed re-aligned road is depicted in the yellow block on Figure 8-2.

The underlying rocks which are characteristic in the area of the Tweefontein Mine Complex comprise mostly the Karoo Super Group, as well as sub-outcrops of the Transvaal Supergroup rock formation. Refer to Plan 9 for the regional geology.

The geological layers in the area are characterised by near horizontally bedded and wavy successions of shales, sandstones and coal layers. These coal layers form part of the Karoo Sequence of which the Middle Ecca Group contains the coal seams which Glencore currently mines at the Tweefontein Mine Complex. The succession of sedimentary rocks generally overlies the well-consolidated conglomerates / diamictites and tillite of the Dwyka Formation. Figure 8-2 indicates the simplified geology of the Tweefontein Mine Complex.

The coal seams in the Witbank Coalfield, resting on Dwyka tillite, are numbered from the No. 1 Seam at the base, layered to the surface to the No. 5 Seam. All five coal seams are encountered at the Tweefontein Mine Complex, although not all seams are of economic value (the No 2 and No 5 seams are mined).

Within the existing Tweefontein Mine Complex, a monoclinical structure causes all coal seams to dip steeply in the west while the coal seams flatten out towards the northeast. The fold axis of this monocline strikes in a north-east to south-west direction.



Source: Groundwater Complete, 2013

**Figure 8-2: Geology of the Tweefontein Mine Complex**

The most predominant geological intrusion within the Tweefontein Mine Complex is the Ogies Dyke (approximately 30 m thick), which runs in a west-easterly direction, through the centre of the Tweefontein Mine Complex. Numerous faults traverse the Tweefontein Mine Complex and do not have a major effect on the quality of the coal seams.

A graben fault system occurs in the Zaiiwater area (southern portion of the mine boundary area) running in a south-westerly to north-easterly direction. The coal has been displaced by approximately 12 m between the two faults, which are approximately 120 m apart.

A dolerite sill lies along the western boundary of the Tweefontein Mine Complex. The sill is normally 15 m below the surface, however boreholes have indicated that it dips steeply through the coal seam with associated faulting. The coal on either side of the sill has been devolatilised and is generally poor in quality.



### 8.3.1.1.4 Soil, Land Capability and Land Use Assessment

Information contained in this section relates to the entire TOP area and was sourced from the Rehab Green Monitoring Consultants CC report titled, *Soil, Land Capability and Land Use Assessment of the Proposed Opencast and Underground Mining Areas as well as the Footprints of Various Proposed Mining Infrastructure Related to the Tweefontein Optimisation Project Amendment*”, dated October 2013. This full report is attached hereto in Appendix D3. The area of the proposed re-aligned road is depicted by the yellow block on Figure 8-3.

The aforementioned report assessed the soil, land use and land capability of an area totalling 1135.91 ha within the Tweefontein Mine Complex. Generally, soils in the vicinity of the Tweefontein Mine Complex are considered plinthic catena soil with red, yellow and greyish characteristics. The land types associated with the Tweefontein Mine Complex, their land capability and land use as well as agricultural potential is provided in Table 8-9.

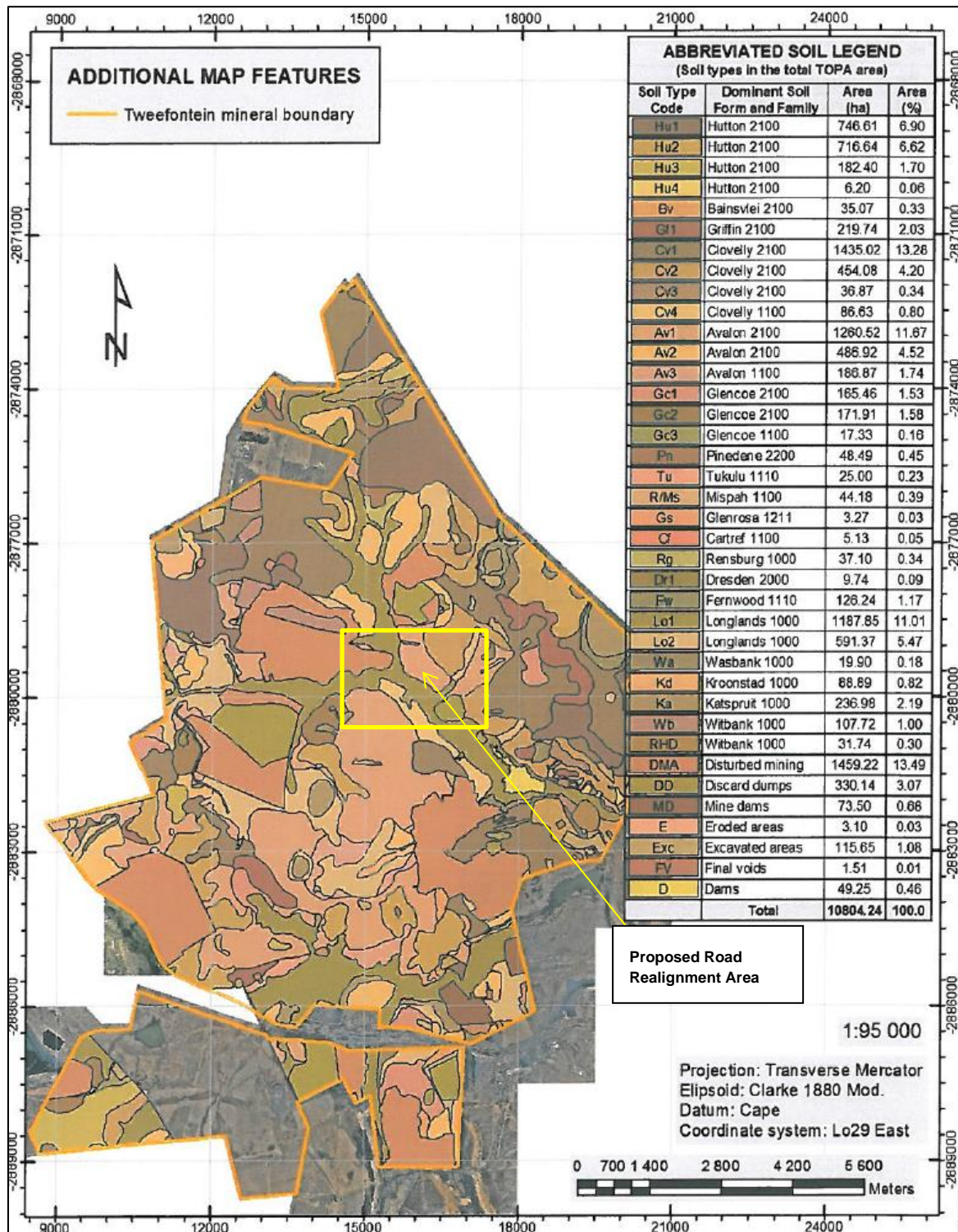
**Table 8-9: Soil Associations for Land Types**

Land Type	Soil	Land Capability and Land Use	Agricultural Potential
Ba4	Plinthic catena dominated by moderately deep to deep red and yellow-brown apedal, dystrophic soils in higher lying areas, and variable depth soils with E-horizons in midslope positions and poorly drained variable depth soils in low-lying areas.	Mainly dryland Agriculture	High to very high except for lower lying areas that constitute wetlands.
Bb5	Plinthic catena dominated by moderately deep yellow-brown apedal, dystrophic soils in higher lying areas, variable depth structured soils in midslope positions and poorly drained structured soils of variable depth in low lying areas.	Mainly dryland Agriculture	Medium to very high except for lower lying areas that constitute wetlands.
Bb13	Plinthic catena dominated by moderately deep to deep yellow-brown apedal, dystrophic soils in higher lying areas, and variable depth soils with Ehorizons in midslope positions and poorly drained variable depth soils in low-lying areas.	Mainly dryland Agriculture	High to very high except for lower lying areas that constitute wetlands.

Source: *Terrasoil Science, 2010*



A total of 31 dominant soil types were identified within the Tweefontein Mine Complex (Figure 8-3). As the proposed Project aligns itself quite closely to the Tweefontein spruit, the soil type of the proposed route alignment is associated with the Longlands 1000 soil type which is generally shallow, grey, leached, imperfectly to poorly drained, underlain by soft plinthite and is considered to have a wetland capability.



Source: Rehab Green (2013)

**Figure 8-3: Soil Types Found Within the Tweefontein Mine Complex**

#### ***8.3.1.1.4.1 Land Capability***

The soils within the Tweefontein Mine Complex appeared to be adequately fertilised for the current land use. The dominant agronomic land use is dryland agriculture in the form of crop production.

The land capability associated with the Tweefontein Mine Complex was derived from the soil properties found within the area. It has been categorised into arable potential, grazing potential, wetland and riparian zones and wilderness as seen in Figure 8-5, below. The soil types which were identified in the relevant study area were mostly arable soils and grazing soils, and a section of wetland. The proposed re-aligned road, due to its alignment in close proximity to the Tweefontein spruit, will be associated with the use of arable land and potential impacts on wetland areas.

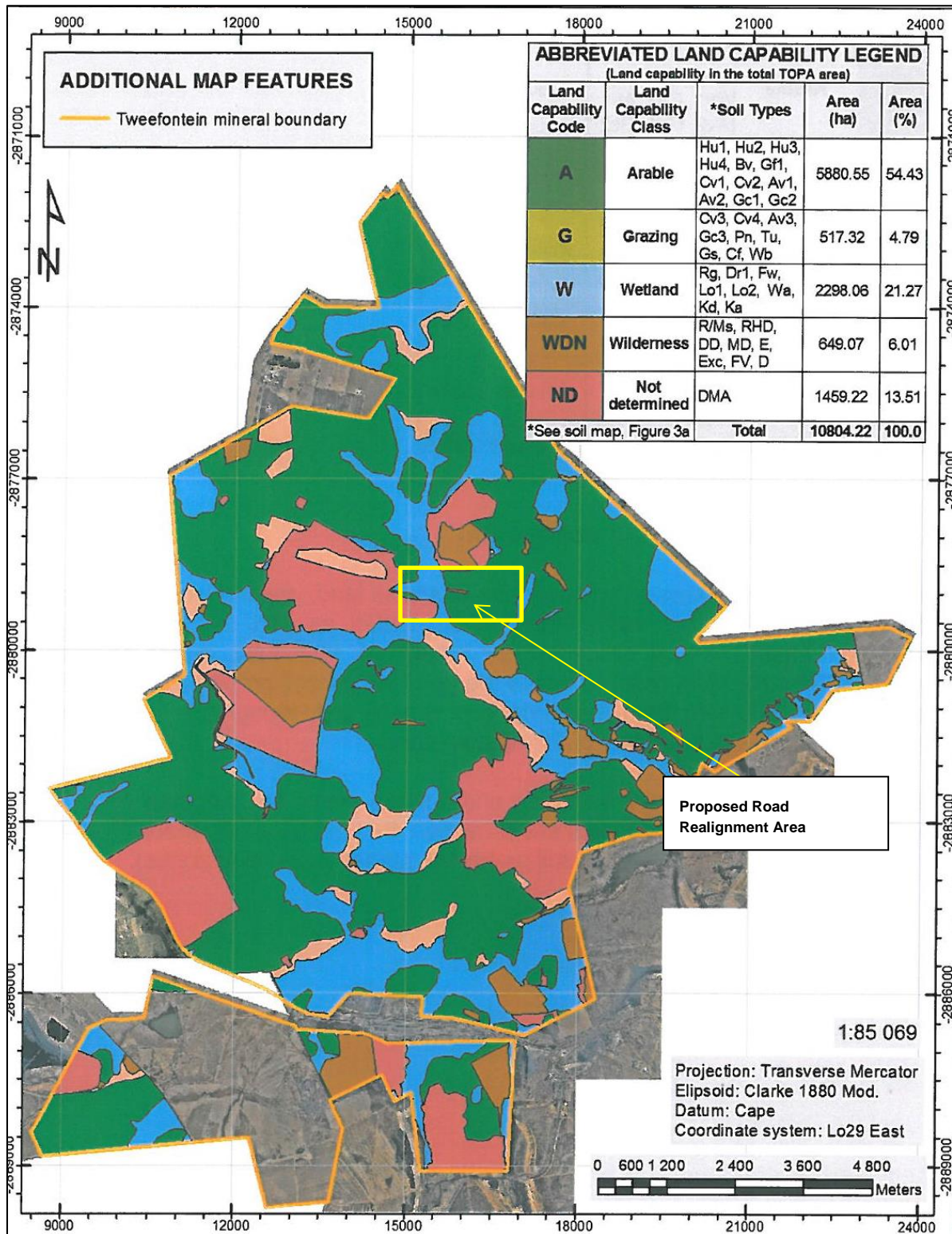
#### ***8.3.1.1.4.2 Land Use***

The proposed re-aligned road will be located on land which is classified as grazing and maize land uses (Figure 8-6). It should however be noted that a large portion of the proposed route alignment currently falls within disturbed mine areas such as through the Waterpan No1a dump (which is to be removed prior to construction). The proposed realignment also follows the alignment of the existing haul road very closely (Figure 8-4).





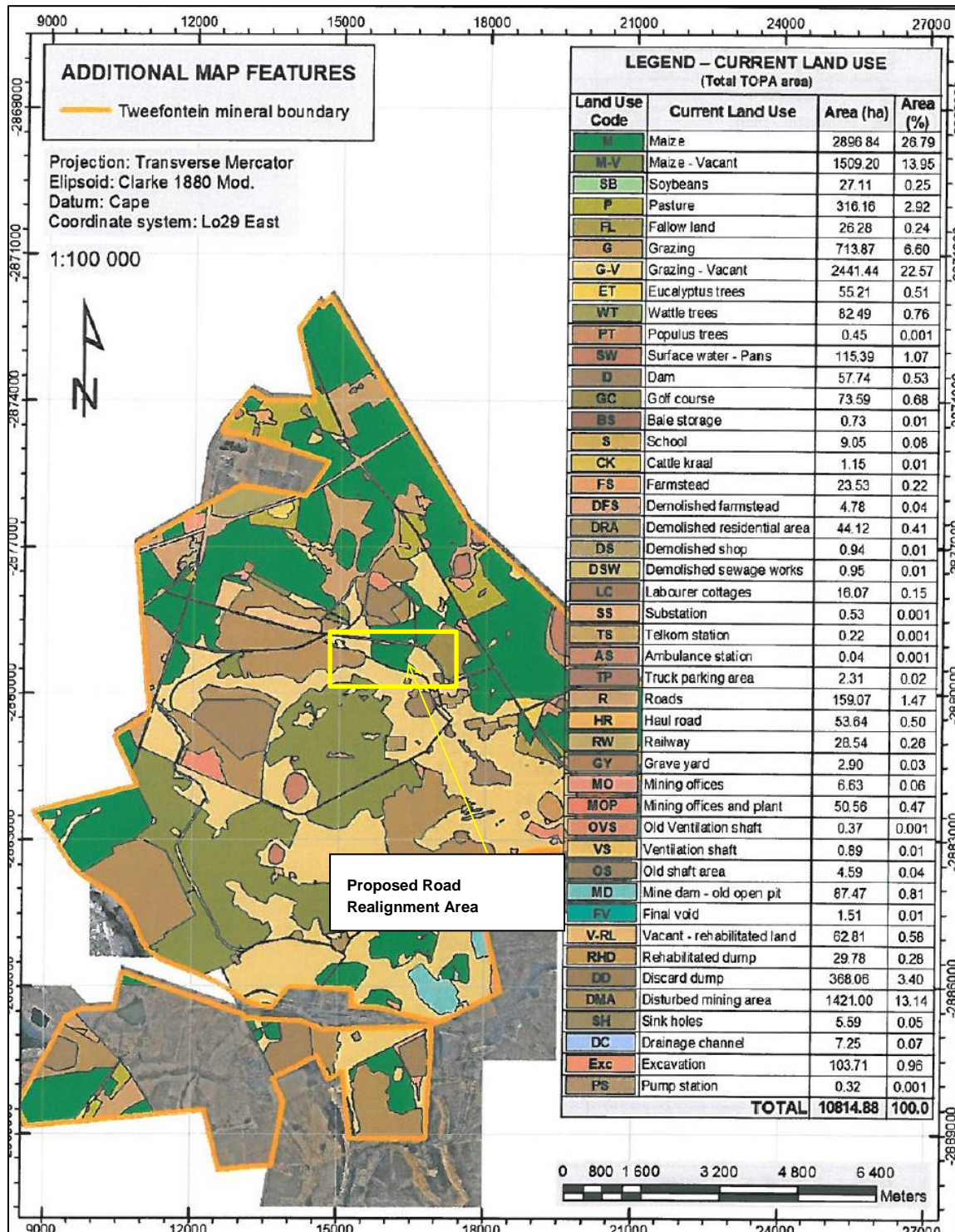
**Figure 8-4: Land-uses from top left to right: Waterpan Dump, View of Proposed Alignment looking West, Grazing and Maize Land (from bottom left to right)**



Source: Rehab Green (2013)

**Figure 8-5: Land Capability within the Tweefontein Mine Complex**





Source: Rehab Green (2013)

Figure 8-6: Land Use within the Tweefontein Mine Complex

### **8.3.1.1.5 Surface Water**

The information contained herein relates to the TOP generally and is sourced from the report titled *Specialist Water Report as Input to the EIA for the Tweefontein Optimisation Project Amendment*, compiled by Jones & Wagener, dated September 2013. This report is attached hereto in Appendix D4. Additionally, the latest biomonitoring report titled, *Aquatic Biomonitoring Programme for the Tweefontein Complex 2015 Post Wet Season Biomonitoring Survey* which was compiled by Clean Stream Biological Services (Pty) Ltd (CSBS) for the April 2015 survey (attached as Appendix D5). Any potential impact from the proposed re-aligned road would be of significance to surface water in the TOP area.

Tweefontein Mine Complex is situated within the Olifants River catchment and falls within quaternary sub catchments B11F and B11G, with a small portion in B20G of the Limpopo-Olifants primary Drainage Region. The Zaaibwaterspruit and Klippoortjiespruit converge to the south west of the mining area and drain the Witcons southern mining area. The Tweefontein spruit drains the northern Waterpan and Boschmans mining area. The Tweefontein spruit and Zaaibwaterspruit converge to the east of the mining area and flow into the Olifants River which feeds the Witbank Dam (considered the main receiving body related to the Tweefontein Mine Complex) and continues north east to the Loskop Dam. Further downstream the Olifants River flows through the central part of the Kruger National Park and into Mozambique where the Olifants and Limpopo rivers merge and discharge into the Indian Ocean.

In terms of the floodline delineation, Jones & Wagner (2013) undertook the delineation of the Tweefontein spruit in 2010. The delineation of this spruit may be referred to in the attached Jones and Wagner report in Appendix D4. The two proposed alternatives for the realignment of the P141-1 will intersect the 100-year floodline, as a river crossing is included in the route designs for both the initial and revised route alignment alternatives. Both alternatives run along the eastern side the Tweefontein spruit thereby resulting in certain sections of each alternative within the 100-year floodline delineation.

The primary surface water uses in the region are irrigation, formal and informal domestic usage, and livestock watering. Downstream of the Tweefontein Mine Complex, surface water use is primarily for agricultural and informal domestic purposes. Witbank Dam is used for both potable and industrial purposes, as well as for recreation (Jones and Wagner, 2010).

The results of the water quality analysis, as sourced from CSBS (2015), for the survey period of April 2015, specific to the Tweefontein spruit monitoring points are summarised in

Table 8-10. Refer to Plan 6 for the surface water monitoring points.



**Table 8-10: Summary of Surface Water Quality Results for the Tweefontein spruit**

Monitoring site	EC (mS/m)	pH	Oxygen saturation	Dissolved oxygen (mg/l)	Water temp (°C)	Turbidity (visual)
TFN-US (upstream)	No flow					
TFN-DS (downstream)	346.0	7.7	94	7.6	17.3	Slight

Source: CSBS (2013)

In terms of the biomonitoring report findings for TFN-DS (downstream monitoring locality), the electro conductivity (EC) is considered very high indicating high salinity at the time of sampling. Due to TFN-US (upstream monitoring locality) experiencing no flow at the time of sampling, CSBS concluded that the high levels of salinity present during the time of sampling most likely originate from the Tweefontein Mine Complex. The pH levels had decreased during the April 2015 sampling period, compared to the April 2014 sampling period, to within the target level for aquatic health, irrigation and human health. Dissolved oxygen levels tested in April 2015 had also dropped to within the guideline value since the April 2014 survey.

#### **8.3.1.1.6 Groundwater**

Groundwater Complete cc compiled a specialist geohydrological report titled *Xstrata South Africa (Pty) Ltd: Report on Geohydrological Investigation as part of the EMP Amendment for the Optimisation Project*, dated September 2013. The report related to the TOP area general and the proposed realigned P141-1 Provincial Road, being less than 4 km in length with a 40 m wide road reserve is not expected to have any significant impact. The following information is accordingly provided for background information.

##### **8.3.1.1.6.1 Groundwater Users**

Groundwater Complete cc (2013) referenced several hydrocensus reports compiled for the Tweefontein Mine Complex, which found that the general groundwater uses in the area consist of domestic water supply and watering, as well as water requirements related to livestock rearing. The groundwater yield within the area was found to be insufficient for crop irrigation for an area larger than one hectare, thereby excluding farming as a groundwater use.

##### **8.3.1.1.6.2 Aquifer Description**

Within the Tweefontein Mine Complex, two interacting aquifer systems were identified, namely, a shallow aquifer and a deeper, fractured rock aquifer. The shallow aquifer system has a yield of less than 0.3 litres per second (l/s) which is considered low, and also results in

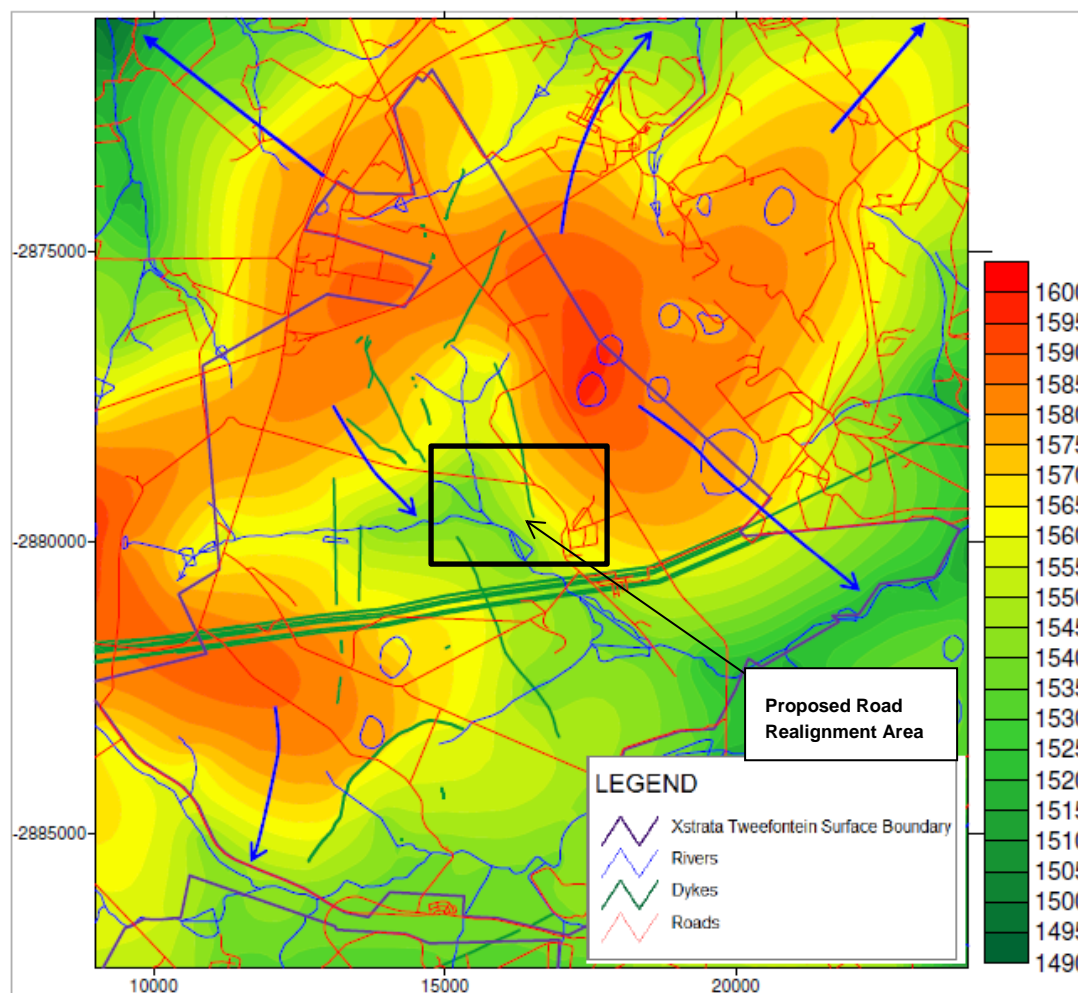
an unsustainable source of water. The second, main aquifer system is the deeper fractured rock aquifer with groundwater yield of between 0 to 2l/s. The deeper aquifer could be sufficient to supply drinking and sanitation water to mining operations as well as for small scale cleaning and dust suppression. This aquifer system usually displays semi-confined or confined characteristics with piezometric heads often significantly higher than the water-bearing fracture position.

Groundwater Complete cc (2013) referenced previous low-rate borehole pump tests conducted for the Tweefontein Mine Complex, and the information from these tests was used to assist in determining storativity and transmissivity parameters of the aquifer systems related to the Complex. Transmissivity for the host rocks relevant to the Tweefontein Mine Complex was calculated at approximately 0.15 square metres per day ( $m^2/day$ ) and the fractured zones have a higher transmissivity of approximately 1.1  $m^2/day$ . Storativity, however, is difficult to calculate accurately with Groundwater Complete cc (2013) stating that, “[Storativity] has been calculated by numerous different methods with the results published widely and a value between 0.001 and 0.01 is taken as representative for the Karoo Supergroup sediments. In the pumping tests conducted within the Tweefontein Mine Complex, the calculated storage coefficient values were at the lower end or even lower than the representative values”.

Aquifer recharge for the general area (Tweefontein Mine Complex) is estimated to be between 1 % and 3 % of the MAP, which translates to approximately 10 000 cubic metres per day ( $m^3/day$ ). The discharge rate for the Tweefontein spruit is estimated to be 900  $m^3/day$ .

#### ***8.3.1.1.6.3 Water Level and Flow***

For the purposes of the Groundwater Complete cc study, groundwater levels in the Tweefontein Mine Complex were referenced from previous studies, the data indicated that the static water level in the mining area can be about 30 meters below surface. Information gathered from the underground mining area borehole data shows that static water levels can be as deep as 100 meters below the surface. The groundwater level contours were calculated by excluding borehole reading from boreholes where disturbance caused by mining was suspected. The general natural flow direction relevant to the proposed P141-1 realignment project is from west to east. Figure 8-7 illustrates the groundwater level contours as well as the natural flow direction of the Tweefontein Mine Complex. (For the sake of completeness, the location of the re-aligned road is depicted on Figure 8-7 in black).



Source: Groundwater Complete (2013)

**Figure 8-7: Groundwater Flow Direction within the Tweefontein Mine Complex**

#### **8.3.1.1.6.4 Groundwater quality**

Ambient groundwater quality information was referenced by Groundwater Complete cc (2013) from groundwater monitoring and hydrocensus boreholes (Refer to Plan 7). A total of 41 groundwater quality data points exist in the Tweefontein Mine Complex and groundwater qualities are measured at these localities as part of the on-going quarterly monitoring programme. The following conclusions were drawn from the groundwater quality assessment:

- Groundwater qualities in the Tweefontein mining area vary from excellent to poor;
- Water quality distribution displays significant variation over short distances;
- Significant impacts occur where groundwater has become unfit for any of the general uses (domestic, irrigation, aquatic eco-systems or livestock watering);

- Impacts are mostly confined to the operations or within a very short distance from the workings;
- Even though the sulphate concentrations in some boreholes are very high, the pH in the groundwater remained within ideal limits for drinking water in most of the boreholes;
- Shallow groundwater in underground areas is mostly unaffected. Only boreholes drilled into underground workings display elevated TDS levels; and
- Plume distance from sources will be less than 100 metres from the source.

#### **8.3.1.1.7 Air Quality**

*Tweefontein Optimisation Project Amendment, Air Quality Specialist Assessment*, compiled by Airshed Planning Professionals (Pty) Ltd., dated August 2013 was used and is attached as Appendix D2. Meteorological data was gathered from the nearest monitoring station to the Tweefontein Mine Complex which is the Kendal monitoring station operated by Eskom.

The proposed re-aligned road, which is expected to impact marginally on the surrounding area during construction and only peripherally during operation, is located within the Highveld Priority Area (HPA). The HPA covers approximately 31,106 km<sup>2</sup>, including parts of Gauteng and Mpumalanga Provinces and comprises a single metropolitan municipality, three district municipalities, and nine local municipalities.

The Emalahleni Local Municipality (ELM) is mostly characterised by rural farmland, dispersed urban settlements, coal mines and power stations. Although the ELM is traditionally known for coal mining and electricity production, other manufacturing industries are also developing, making ELM a prominent industrial node. This can account for the high population density in ELM including Kriel, and Ogies.

Ambient air quality within the Project area is likely to be impacted upon as a result of:

- Use of unpaved gravel roads;
- Agricultural activities; and
- Industrial and mining activities.

In South Africa, the Department of Environmental Affairs (DEA) established the National Ambient Air Quality Standards (NAAQS) in 2009 to provide objectives for air quality management which is used as a guideline to compile air quality impact assessments. The Airshed Report (2013) assessed the baseline which includes a review of the site-specific atmospheric dispersion potential as well as the potential sensitive receptors. The study concluded that particulate matter are the pollutants of most concern. The existing sources of emissions within and surrounding the Tweefontein Mine Complex are discussed in detail below. It is also important to note that the prevailing wind directions in the study area are

from the west-northwest and an increase in the west-north westerly winds occur during day-time conditions with an increase in easterly winds during night time.

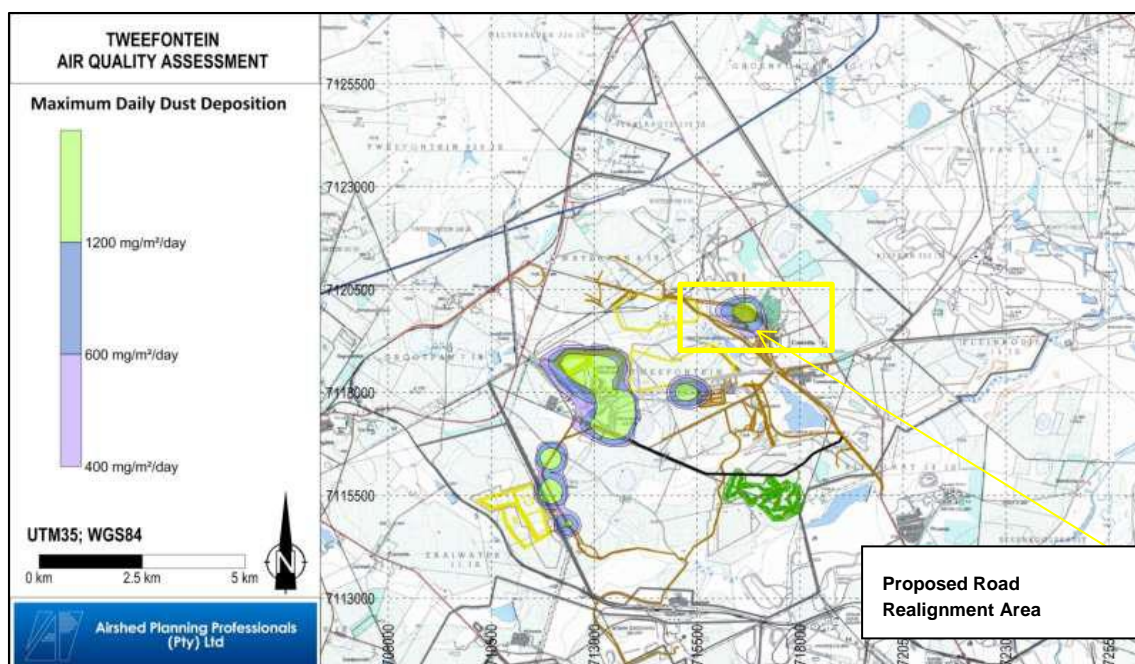
### 8.3.1.1.7.1 Dust

The following information is given as background information since it is applicable to the TOP area as a whole and it would only be during construction of the road that there would be any cumulative dust effect.

Several meteorological factors will directly influence the spread and eventual removal of dust from the atmosphere. These factors include wind speed, wind direction, and the extent to which cross winds effect the transportation of dust particles.

Broadly identified sensitive receptors to the health side effects caused by excess dust are vegetation, animals and human receptors. The closest sensitive receptors, in terms of general mining operations in the vicinity of the Tweefontein Mine Complex include Makoupan, Vlaklaagte, Saaiwater and Ogies.

The 2013 maximum dust deposition baseline within the Tweefontein Mine Complex is illustrated in Figure 8-8 below. This figure depicts the operational dust fallout projections for 2013, for the worst-case scenario. Daily dust deposition rates are generally below the industrial action level of 1 200 mg / m<sup>2</sup> / day within the Tweefontein Mine Complex, with the exception of a few areas (without any mitigation).



Source: Airshed Planning Professionals (2013)

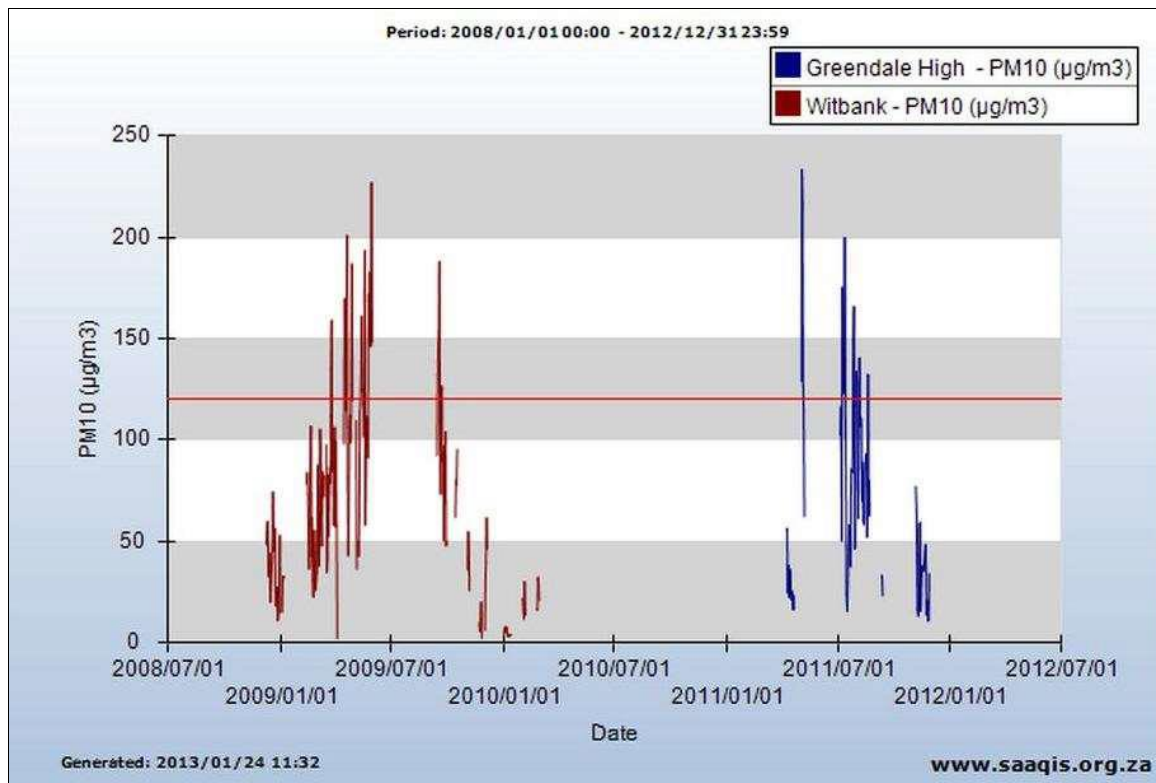
**Figure 8-8: Unmitigated Dust Dispersion Model (2013)**



### 8.3.1.1.7.2 $PM_{10}$

Particulate matter (PM) is the term used to describe a combination of solid particles of different sizes and liquid droplets found in the atmosphere. Particle pollution includes inhalable coarse particles with a diameter larger than 2.5 micrometres ( $PM_{2.5}$ ) and smaller than 10 micrometres ( $PM_{10}$ ). Fine particles have a diameter of 2.5 micrometres and smaller. Linear relationships between fine particulate concentrations and human health risks are published by organisations such as the World Health Organisation (WHO).  $PM_{10}$  concentrations have been associated with various health effects including; increased respiratory hospital admissions, respiratory system exacerbation, cough and in some cases mortality.

Airshed (2013) has established that ELM, which lies less than 30 km from the Tweefontein Mine Complex, has a poor ambient air quality as a result of emissions from surrounding coal mining, electricity generation, metallurgical manufacturing processes and fuel burning. Dispersion modelling was undertaken between 2008 and 2012 for the HPA Air Quality Management Plan to measure the daily  $PM_{10}$  concentration at two localities within ELM. The result of this research is contained in Figure 8-9, and the daily limit is illustrated by the horizontal red line on the graph.



Source: Airshed Planning Professionals (2013)

**Figure 8-9: Daily  $PM_{10}$  Concentrations Monitored at Two Stations in ELM (2008 and 2012)**

The PM<sub>10</sub> concentrations did exceed the NAAQS limits for both areas and hence applies also to the Tweefontein Mine Complex.

#### **8.3.1.1.8 Flora and Fauna**

A detailed baseline survey on Flora and Fauna for the TOP area was conducted by De Castro and Brits Ecological Consultants in August 2013, and the report titled, *Threatened Species Surveys – Tweefontein Optimisation Project Amendment*, is attached hereto in Appendix D6. Details from this report are provided below as general background.

#### **8.3.1.1.9 Flora**

The main type of vegetation occurring throughout Mpumalanga is Eastern Highveld Grassland, although a small section of the eastern parts of Gauteng are also covered by this vegetation type. Eastern Highveld Grassland occurs on plains between Belfast in the east and Johannesburg to the west, extending southwards to Bethal, Ermelo and to the west of Piet Retief. Eastern Highveld Grassland has been nationally listed as endangered, as only a very small fraction is conserved in statutory reserves, namely, Nooitgedacht Dam and Jericho Dam Nature Reserves. At the time of the latest floral baseline investigation, it was estimated that a total of 44 % of Eastern Highveld Grassland had been transformed by agriculture, mining activities, urbanisation and the building of dams. This percentage has been reduced from 61 % coverage in Mpumalanga alone.

The baseline characterises of the landscape is cool and dry. The grassland consists mainly of shallow rooted vegetation such as grasses and small trees. Fire often occurs in the grassland areas and this is important for the survival of the natural vegetation and the prevention of invader establishing in the remaining areas of Eastern Highveld Grassland.

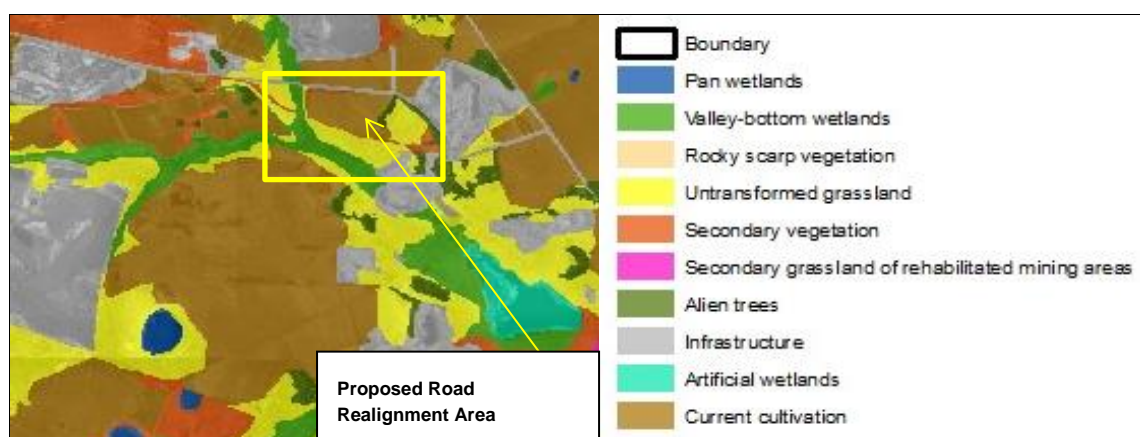
The Eastern Temperate Freshwater Wetlands vegetation unit is represented by eleven endorheic pans and various channelled and un-channelled valley-bottom wetlands within the study area, referenced by De Castro and Brits (2013). Highveld endorheic pans are characteristically shallow topographic depressions which only temporarily hold water, as water is largely lost through evaporation. Vegetation patterning in the form of concentric belts of sedge marsh, hygrophilous grassland, and hygrophilous herbland is often found in these pans.

#### **8.3.1.1.9.1 Vegetation Units**

During the fieldwork undertaken in the north-eastern portion of the Tweefontein Mine Complex, a total of 54 sites were surveyed, and quantitative vegetation sampling with 100 m<sup>2</sup> sampling quadrats/plots was undertaken at twenty of these sites. At the remaining 34 sites, surveys comprised of describing the habitat, recording all species present and visually estimating cover-abundance of each species.

The floristic classification was used only to guide and verify the identification of robust vegetation units and land-cover type units, which are based on qualitative and semi-qualitative floristic, physiognomic and habitat data gathered at the 54 sites surveyed.

Refer to Figure 8-10 below which contains the vegetation units observed in the vicinity of the proposed Project. The predominant vegetation species within the proposed Project area consists of untransformed grassland, valley-bottom wetlands and secondary vegetation. These are described in further detail below.



Source: Modified from De Castro and Brits (2013)

**Figure 8-10: Vegetation Units within the Tweefontein Mine Complex**

#### **8.3.1.1.9.2 Untransformed Grassland**

Untransformed Grassland vegetation unit provides habitat for five of the seven Red Data List or Orange List plant species recorded within the study area, namely, *Boophone disticha*, *Callilepis leptophylla*, *Eucomis autumnalis* subsp. *clavata*, *Frithia humilis* and *Hypoxis hemerocallidea*. This vegetation unit also provides a habitat for 10 of the 21 protected plant species recorded within the study area, in terms of the Mpumalanga Nature Conservation Act (MNCA), 1998 (Act No 10 of 1998), including the Endangered succulent *Frithia humilis*.

#### **8.3.1.1.9.3 Valley-bottom Wetland**

This vegetation unit occurs on hydromorphic and alluvial soils along valley-bottom wetlands that all form part of the Olifants River system. The Tweefontein spruit is classified as a valley-bottom wetland. This vegetation unit also provides the habitat for two (*Crinum bulbispermum* and *Gunnera perpensa*) of the seven Red Data List or Orange List plant species recorded within the study area, and 9 of the 21 protected plant species, in terms of the MNCA (1998), recorded within the study area. This vegetation unit has been rated high in terms of conservation importance.



#### **8.3.1.1.9.4 Secondary Vegetation**

This vegetation unit does not provide suitable habitat for any of the threatened, Near Threatened or Declining plant species or any of the protected plant species, in terms of the MNCA (1998), recorded within the study area. The vegetation of this unit has been rated as a moderate sensitivity and value in terms of botanical biodiversity conservation.

#### **8.3.1.1.10 Fauna**

De Castro and Brits (2013) undertook a faunal survey of the Tweefontein Mine Complex in 2011 and compared the species diversity as observed in 2011 to the diversity observed in 2013. Although the environment of the Tweefontein Mine Complex has undergone significant development, the untransformed areas within the Complex showed species diversity remained quite rich. De Castro and Brits (2013) also found, however, that habitats within the Complex and surrounds had become more fragmented resulting in habitat loss and decreased numbers of each specific species.

##### **8.3.1.1.10.1 Mammals**

De Castro and Brits found that the study area had been transformed through mining activities, encroaching development (urban spread), as well as agricultural practices. This has resulted in a decreased presence of larger mammals and the mammals which remain are smaller and mostly nocturnal and have managed to adapt to transformed habitats (such as crops). Larger mammals which still do occur in the study area consist of:

- Springbok (*Antidorcas marsupialis*),
- Common Duiker (*Sylvicapra grimmia*), and
- Bushpig (*Potamochoerus larvatus*).

One large mammal of conservation concern which was confirmed to be present along the central section of the Tweefontein Mine Complex, is the Serval (*Leptailurus serval*). In addition, several mammals indigenous to the Highveld region likely to occur in the Complex and are of conservation concern include:

- The Spotted-necked Otter (*Lutra maculicollis*) - classified as Near Threatened;
- Brown Hyaena (*Hyaena brunnea*);
- Southern African Hedgehog (*Atelerix frontalis*);
- Honey Badger (*Mellivora capensis*);
- The Highveld Golden Mole (*Amblysomus septentrionalis*); and
- Water Rat (*Dasymys incomtus*).

### **8.3.1.1.10.2 Birds**

High levels of transformation within and around the study area has impacted bird species in various ways. Seed-eating birds, such as Red-billed Quelea and Southern Red Bishop, have adjusted to the constant supply of food being grown in the surrounding crops, and have therefore grown in population size and become less nomadic. The sensitive grassland bird species, however, have reduced in numbers as their habitats have been reduced and these species include, inter alia, the White-bellied Korhaan and Blue Crane.

Six bird species of concern were recorded during the 2011 survey, and another species of concern was identified during the 2013 survey. These species include:

- African Marsh Harrier (*Circus ranivorus*) – classified as Vulnerable;
- Southern Bald Ibis (*Geronticus calvus*) - classified as Vulnerable;
- Lesser Kestrel (*Falco naumanni*) - classified as Vulnerable;
- African Grass Owl (*Tyto capensis*) - classified as Vulnerable;
- Greater Flamingo (*Phoenicopterus roseus*) – classified as Near Threatened;
- Lanner Falcons (*Falco biarmicus*) – classified as Near Threatened; and
- Blue Korhaan (*Eupodotis caerulescens*) – classified as Near Threatened.

Bird species of concern which were not recorded during surveys but have a likelihood of occurring include:

- Blue Crane (*Anthropoides paradiseus*) - classified as Vulnerable;
- White-bellied Korhaan (*Eupodotis senegalensis*) - classified as Vulnerable;
- Secretarybird (*Sagittarius serpentarius*) – classified as Near Threatened;
- Lesser Flamingo (*Phoenicopterus minor*) – classified as Near Threatened;
- Chestnutbanded Plover (*Charadrius pallidus*) – classified as Near Threatened; and
- Black-winged Pratincole (*Glareola nordmanni*) – classified as Near Threatened.

### **8.3.1.1.10.3 Frogs and Reptiles**

De Castro and Brits (2013) identified one frog species of concern within the study area, and that is the Giant Bullfrog (*Pyxicephalus adspersus*) which is classified as Near Threatened. The bullfrog's preferred habitat will be within the pans and will most likely breed in the area.

Two reptiles in the Highveld region are considered a species of concern, and have been sighted on nearby properties. These reptiles are Transvaal Grass lizard (*Chamaesaura aenea*) and Striped Harlequin snake (*Homoroselaps dorsalis*). The Transvaal Grass lizard has been given a provincial conservation classification of Vulnerable, and is likely to occur in larger expanses of open grassland. The Striped Harlequin snake has a national classification

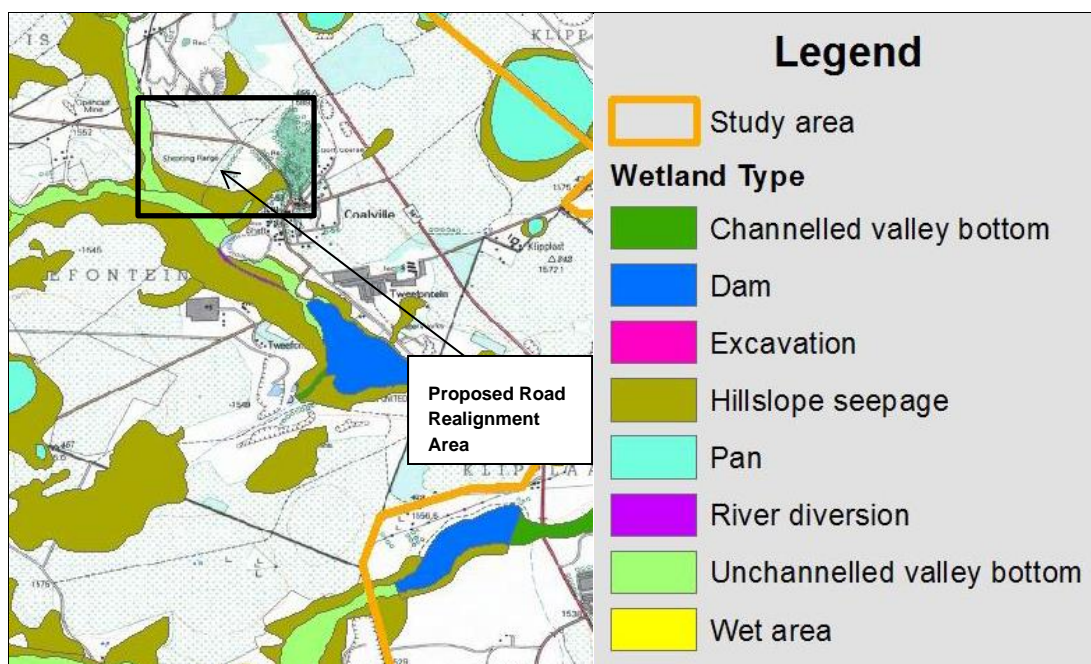
of Near Threatened and spends most of its time underground and therefore, the verification of the snakes occurring within the study area is difficult.

### 8.3.1.1.11 Wetlands

Wetland Consulting Services (Pty) Ltd. compiled the report titled, *Wetland Assessment of the Tweefontein Optimisation Project Amendment (TOPA)*, dated August 2013, for the TOP area generally. This report is attached in Appendix D7. Wetland Consulting Services had also compiled several reports relevant to the Tweefontein Mine Complex from 2009 to 2012 and used this extensive knowledge where relevant in the 2013 study. The proposed realigned road is depicted in black on Figure 8-11.

Wetland Consulting Services (2013) delineated the full extent of the wetlands occurring in and around the Tweefontein Mine Complex, however, the Tweefontein spruit is the most relevant wetland system to the proposed Project, as the realignment will be running nearly in parallel with the Tweefontein spruit.

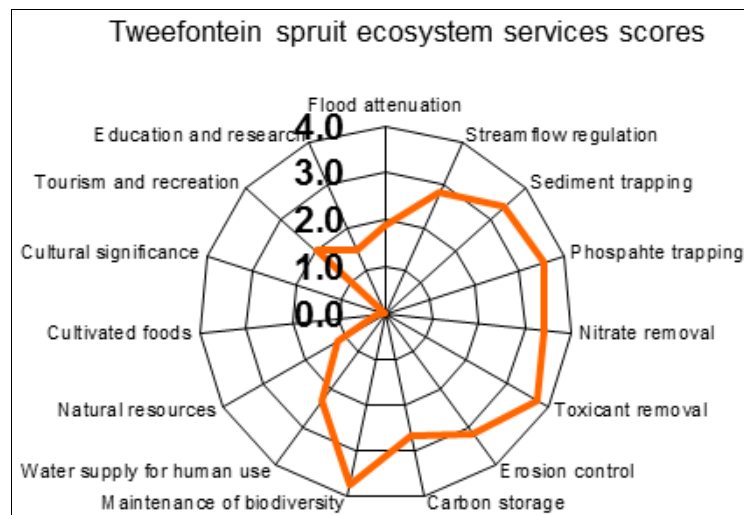
The Tweefontein spruit wetland system forms the main wetland system within the Tweefontein Mine Complex and occupies most of the central region of the study area. The Tweefontein Spruit feeds into the Tweefontein Dam and then drains east, forming a tributary of the Olifants River. The Tweefontein spruit is characterised by a large unchannelled valley-bottom wetland which has been altered due to mining activities within the catchment. In terms of the boundary of the Tweefontein Mine Complex, the Tweefontein spruit which traverses the Complex is entirely situated within the B11F sub-catchment. Figure 8-11 below illustrates the Tweefontein spruit wetland system. Refer also to Plan 8.



Source: Modified from Wetland Consultant Services (2013)

**Figure 8-11: Delineated Wetlands of the Study Area**

The Tweefontein spruit is currently dominated by stands of *Typha capensis* and *Phragmites australis* reeds, likely due to a response to increased water inputs, increased sedimentation and nutrient enrichment within the wetland. Wetland Consulting Services (2013) rated the ecosystem services, which is illustrated in Figure 8-12 below. Maintenance of biodiversity along with toxicant removal is considered to be the most critical services of the Tweefontein spruit.



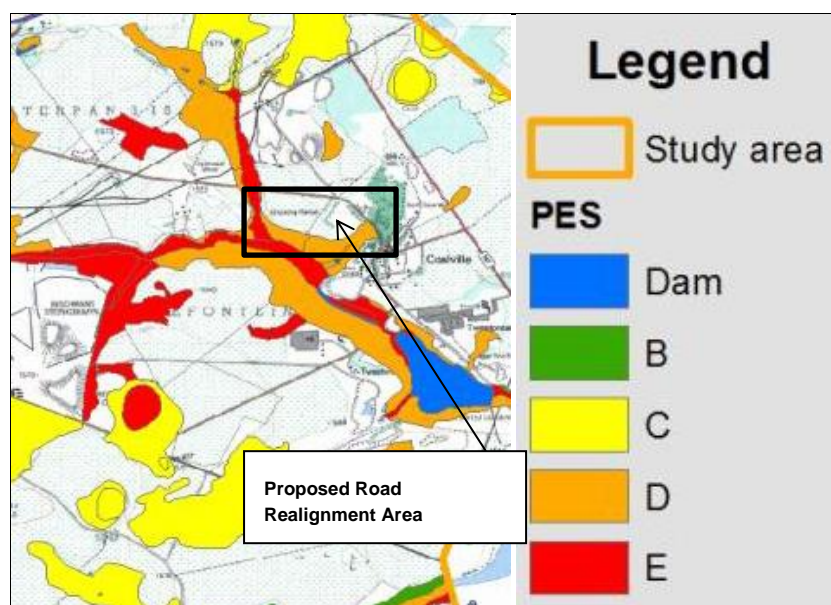
Source: Wetland Consulting Services (2013).

**Figure 8-12: Ecosystem Services Associated with the P141-1 Realignment**

### 8.3.1.11.1 PES and EIS

The Present Ecological State (PES) and Ecological Importance and Sensitivity (EIS) of all wetland ecosystems at the Tweefontein Mine Complex were undertaken using WET-Health and the DWS scoring system respectively.

The PES of the Tweefontein spruit is rated as D and E (A being most natural state, E being highly modified). A PES rating D, indicated in orange in Figure 8-13, means the wetland has been largely modified. A large change in ecosystem processes and loss of natural habitat and biota and has occurred. A PES rating E, indicated in red in Figure 8-13, means that the effects of the change in the wetland ecosystem processes and loss of natural habitat and biota is great but some remaining natural habitat features are still recognisable. Therefore, the wetlands surrounding the proposed Project have already been significantly impacted and modified by the surrounding mining activities.



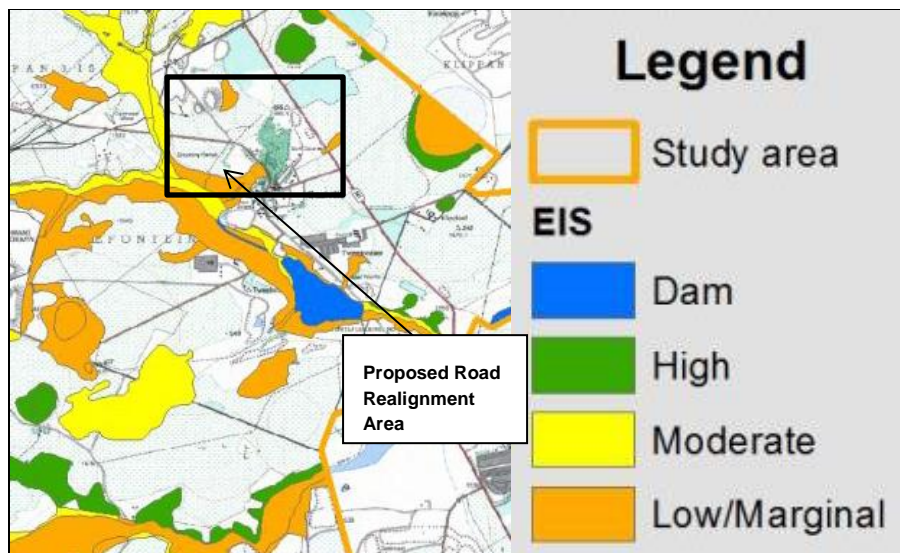
Source: Wetland Consulting Services (2013)

**Figure 8-13: Present Ecological Status of the Tweefontein spruit**

The EIS assesses a wetland in terms of its ecological importance, hydrological functions, and human benefit. The Olifants River and associated catchments have already experienced impacts from surrounding human activities, especially related to water quality in the vicinity. Due to the water quality issues, the least modified wetlands in the area are considered of high importance and have been given a high conservation rating.

As can be seen in Figure 8-14, the section of the Tweefontein spruit relevant to the proposed Project, has received EIS ratings of between moderate and low/marginal. An EIS rating of Moderate (indicated in yellow) means the wetland is considered to be ecologically important and sensitive on a provincial or local scale. The biodiversity of these wetlands is not usually sensitive to flow and habitat modifications. They play a small role in moderating the quantity and quality of water of major rivers. A low/moderate rating (indicated in orange) means the wetland is not ecologically important and sensitive at any scale. The biodiversity of these wetlands is ubiquitous and not sensitive to flow and habitat modifications. They play an insignificant role in moderating the quantity and quality of water of major rivers. Therefore, only certain sections of the Tweefontein spruit are moderately ecologically important.





Source: Wetland Consulting Services (2013).

**Figure 8-14: Ecological Importance and Sensitivity of the Tweefontein spruit**

#### **8.3.1.1.12 Aquatic Ecology**

In terms of species which have been sampled in the past and have the potential to occur within the Tweefontein spruit, CSBS (2015) have listed the following indigenous species:

- *Barbus Anoplus*;
- *Barbus Neefi*;
- *Barbus Palundinosus*;
- *Clarias Gariepinus*;
- *Psuedocrenilabrus Philander*; and
- *Tilapia Sparmanii*.

These species are considered common in terms of their conservation status and therefore do have a high chance of occurring in the Tweefontein spruit, however, CSBS (2015) also noted a high presence of *G. affinis* (mosquito fish) in the general area, and *G. affinis* are known predators of indigenous species' larvae.

A Fish Response Assessment Index (FRAI) was conducted in 2015, which essentially assesses the condition of the fish assemblage in relation to what would be anticipated under natural circumstances. These species also prefer slow-shallow and slow-deep habitats with overhanging and aquatic vegetation to provide cover, and aspects such as migration, flow dependence, water quality and alien species. The results of the FRAI found that all aspects which were assessed were all found to be altered to a certain extent, and the complete absence of fish within the Tweefontein spruit cannot be attributed to a single impact, rather multiple impacts. The Tweefontein dam has impacted water availability which has led to



impacts regarding habitat availability and migration. The increased presence of alien fish species within the Tweefontein spruit has also impacted the indigenous fish population through disrupting breeding patterns and competing for resources within the Tweefontein spruit.

### 8.3.1.1.13 Socio-economic and Political Structure

The ELM (located within Nkangala District Municipality (NDM)) comprises of the towns eMalahleni, Kwa-Guqa, Ga-Nala and Ogies. Emalahleni is the most industrialised municipal area in the NDM and its landscape features mainly underground and open-pit coal mines. This area has the largest concentration of coal fired power stations in the country. Dominant economic contributors include utilities (74.1%), mining (52.8%) and construction (52.5%). The distribution of the relevant industries within the NDM are highlighted in Table 8-11.

**Table 8-11: Industry distribution within the Nkangala district municipality**

Industry	Victor Khanye	eMalahleni	Steve Tshwete	eMakhazeni	Thembisile Hani	Dr JS Moroka	Nkangala
Agriculture	30.8%	13%	42.8%	6.8%	2.0%	4.6%	100%
Mining	2.4%	52.8%	40.6%	3.3%	0.8%	0.0%	100%
Manufacturing	1.4%	19%	74.9%	1.7%	2.4%	0.6%	100%
Utilities	0.3%	74.1%	20.9%	1.2%	1.9%	1.7%	100%
Construction	4.4%	52.5%	27.7%	3.9%	6.7%	4.8%	100%
Trade	5.8%	46.1%	26.0%	3.2%	14.7%	4.3%	100%
Transport	8.5%	48.3%	25.9%	9.9%	4.8%	2.6%	100%
Finance	5.1%	48.9%	39.6%	2.3%	2.3%	1.9%	100%
Community Services	6.6%	34.5%	26.1%	3.6%	14.9%	14.3%	100%
<b>Total</b>	<b>4.5%</b>	<b>45.2%</b>	<b>38.7%</b>	<b>3.5%</b>	<b>4.9%</b>	<b>3.2%</b>	<b>100%</b>

Source: ELM IDP, 2013

### 8.3.1.1.13.1 Demographic and Population Distribution

According to the results of the National Census conducted in 2011, Emalahleni's population was recorded at 395 466 people which is 30 % of the NDM population. The population lives in 119 874 households with an average household size of 3.2 people. This is a relatively low family size, within the district, in which large family structures have not had time to develop. More established towns generally have average family sizes in excess of 4.5, while rural



areas often average 5.5 people or more per household. ELM's population grew by 43.1% between 2001 and 2011 and the annual population growth rate was measured at 3.6 %.

The predominant population groups within Emalahleni are Black Africans (81 %), which correlates with the district municipality's distribution. The White population averages 3 % in the local study area but accounts for 16 % and 10 % in the ELM and NDM respectively.

### **8.3.1.1.13.2 Education**

Educational achievement is a key development indicator of a population. The majority of the population (ages over twenty years) in the local study area, as well as the District, have not completed Matric. Table 8-12 highlights survey findings that show populations for the local study area, the ELM and NDM have very low percentages of people with a tertiary level education. The low tertiary level education has many implications on the economic and social status of the economy, as it implies that the municipality may have a partially unemployable population. The education levels mean that majority of the population is employable in the semi-skilled and skilled labour sectors, but not in the professional sector.

**Table 8-12: Highest Form of Education for the Local Study Area and the Local and District Municipalities**

Highest Level of Schooling	Local Study Area	ELM	NDM
Grade 0 - 7	26%	5.9%	27%
Grade 8 – 10 / Some secondary	19%	32.7%	19%
Grade 11 - 12	30%	16.9%	27%
Diploma with less than Grade 12	2%	4%	2%
Certificate / Diploma with Grade 12	2%	3%	2%
Higher Diploma / Degree / Masters / PhD	1%	2.5%	2%
Other	10%	12%	12%
No schooling	9%	2.9%	8%

Source: Stats SA, 2011

### **8.3.1.1.13.3 Employment**

The employment rate in 2011 for Mpumalanga Province and NDM was 24 % and 27 % respectively (Stats SA, 2011), with a drop in the unemployment rate in the ELM from 38.4 % to 27 % between 2001 and 2011. The unemployment rate within the ELM was recorded at 37.1 % for the female population, 20.8 % for the male population and 36% for the youth population.

The average percentage of people employed within the local study area was 32 %, with 16 % being unemployed. While the unemployment figures for the study area seem low, it needs to be noted that the remaining 52 % of the population falls within the "other" category. This

includes individuals that are not economically active, under the working age of 15, and those individuals that classify themselves as “discouraged work seekers” (9612 people).

The predominant forms of employment in the proposed Project area are mining and construction, with unemployed individuals sustaining themselves predominantly through petty trading. Such petty trading is usually constrained due to increasing competition amongst traders. In addition to the informal trade, there are several small and medium and micro enterprises (SMMEs) operating in the township, such as the transport sector.

#### **8.3.1.1.13.4 Income**

In excess of 40 % of households in Mpumalanga have no form of an income according to Stats SA (2011). Average income figures for the local study area, the ELM and the NDM are in line with the provincial average. The income earning figures are slightly higher for the local study area, however, with more people earning between R 3 201.00 and R 12 800.00 per month.

It can be gathered from Table 8-13 below that the greatest income earning area is within the ELM, having more high-income earners when compared with the provincial average. This could be attributed to the concentration of mining activities in this area (Stats SA, 2011).

**Table 8-13: Household Monthly Income by Wards, Municipalities and Province**

<b>Location</b>	<b>No income</b>	<b>R 1 - R 800</b>	<b>R 801 - R 3 200</b>	<b>R 3 201 - R 12 800</b>	<b>R 12 801 or more</b>	<b>Unspecified /other</b>
Local Study Area	33%	17%	24%	17%	3%	6%
eMalahleni	41%	15%	16%	13%	7%	9%
Nkangala	41%	21%	18%	9%	4%	7%
Mpumalanga	42%	24%	17%	7%	3%	7%

#### **8.3.1.1.13.5 Water and Sanitation**

A large percentage, 80.3 %, of households in ELM have access to piped water either inside their house or within a communal yard, while 5.2 % of the population do not have access to piped water. Of the households with access to piped water, 86.6 % of those households access the municipal water supply whilst 3.3 % have access to water through a borehole.

It is estimated that 68.8 % of households in ELM have access to flush toilets which are connected to the municipal sewerage system, while 2 % have a flush toilet connected to a septic tank. Households still using pit toilets (without ventilation) were calculated at 20.2 % of the population, with only 3.2 % having ventilated toilets (Stats SA, 2011).

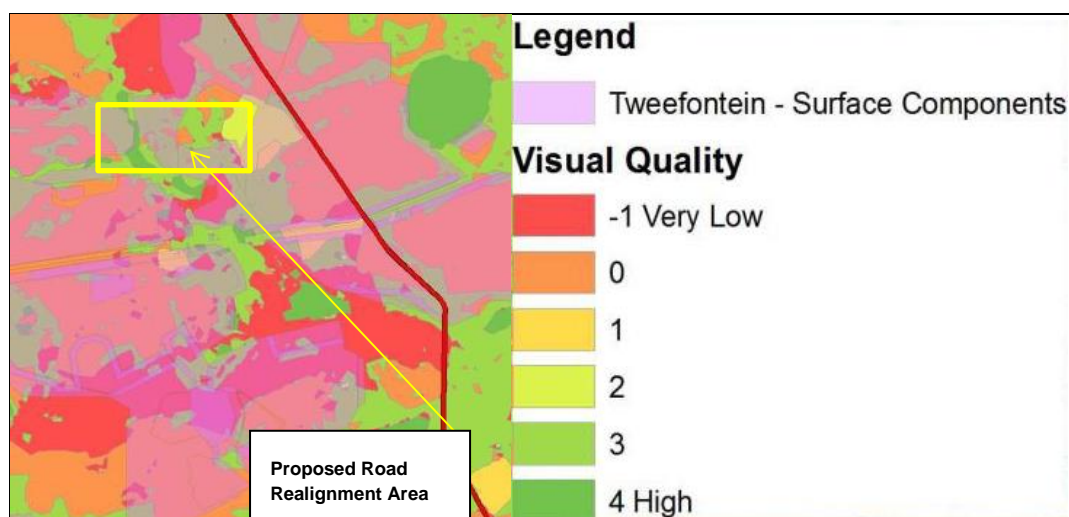
#### **8.3.1.1.14 Visual Resource**

A Visual Impact Assessment (VIA) was undertaken by MetroGIS and the results thereof from their report, titled *Visual Impact Assessment for the Proposed Tweefontein Optimisation Project*, dated August 2013, is summarised below. A VIA is an iterative process of data collection, analysis and representation to describe the quality of the landscape before development and possible visual impacts after development. Visual impacts are however difficult to determine and the findings can never be exact; as these are perceived differently by people, and as a person's view is affected by other environmental factors.

The visible mining activities which have an impact on the sense of place include infrastructure which can be seen over the sky line or are visible at short distances, such as conveyors, silos, draglines and plants. The largest mining related visual impact is associated with the mine dumps which are visible for long distances. The area surrounding the Tweefontein Mine Complex was surveyed (at a desktop level) in a 10 km radius, and 20 % of that area was found to be transformed due to mining activity. This percentage may have expanded since the desktop assessment was conducted in 2007.

The visual impacts associated with agricultural activity vary as crops will be affected by seasonal change and harvesting. Crop harvesting generally takes place during winter which leaves soil exposed, turning the landscape brown. Surrounding veld will also 'grey' during winter, which changes the entire landscape from green in summer to brown tones in winter.

As mining progresses, the dumps, stockpiles and mining equipment also moves in the direction of mining, and agricultural practices in the area are seasonal and cyclical, these factors have varying degrees of visual impacts at different times which were difficult to quantify for the purposes of the baseline. Therefore, it must be kept in mind that the visual impacts in the area are not static or completely predictable. Figure 8-13 gives an overview of the baseline visual quality surrounding the site for the proposed P141-1 road realignment. The area mostly has low to very low visual quality, with higher visual quality associated with the wetland areas (Tweefontein spruit). The low and high visual quality areas often occur alongside one another and therefore the visual impacts of the existing road alignment differ accordingly. The sensitive receptors related to the existing road alignment of the P141-1 are mostly the road users, and their visual quality will vary along the road due to the irregular visual quality pattern shown in Figure 8-13.



Source: MetroGIS (2013)

**Figure 8-13: Ecological Importance and Sensitivity of the Tweefontein spruit**

#### **8.3.1.1.15 Cultural Heritage**

The initial Heritage Impact Assessment (HIA) was conducted by Dr Julius Pistorius in 2013, and Digby Wells Environmental undertook the update in 2015 (Appendix D8). The baseline information related to the cultural heritage is sourced from the Digby Wells HIA Report, titled *Proposed Realignment of the P141-1 Provincial Road, Tweefontein Mine Complex, Mpumalanga Province*, dated 2015.

The 2013 HIA described the study area as “a cultural landscape that is marked by heritage remains dating from the pre-historical to the historical period” (Pistorius 2013: 21). This cultural landscape includes the following elements:

- Stone Age and rock art sites (Pistorius 2013: 21-22) that include regional sites such as:
  - ESA sites at Maleoskop near Groblersdal;
  - The Bushman Rock Shelter MSA site near Orighstad;
  - LSA sites at Bushman Rock Shelter near Orighstad and Höningnestkrans near Badfontein; and
  - San / Bushmen and Khoi rock art near Ermelo and Bantu-speaking Late Farming Community engravings in the northern and eastern parts of the Eastern Highveld.
- Farming Community sites that include regional sites such as:
  - Early Farming Community (Pistorius 2013: 23) material culture have been found at:
    - Höningnestkrans Shelter near Badfontein;

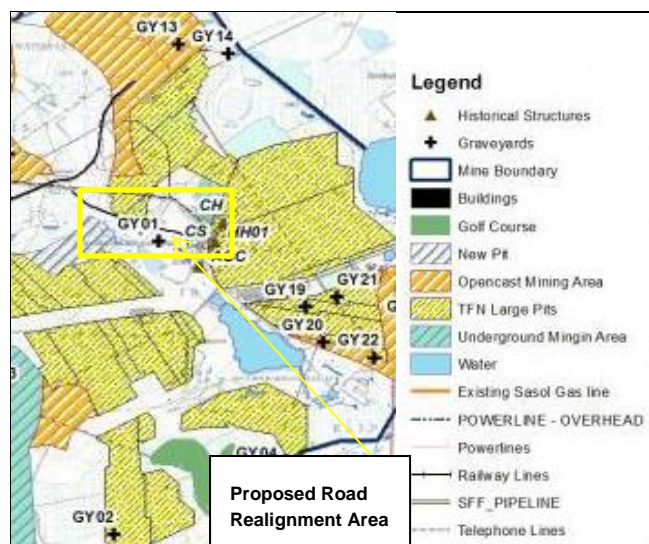
- Welgelegen Shelter on the Vaal River near Ermelo; and
- Sterkspruit and Doornkop near Lydenburg and in Nelspruit.
- Late Farming Community sites (Pistorius 2013: 23-24) are abundant in the region including Bakone sites between Lydenburg, Badfontein and Machadodorp and Eastern Sotho clans such as the Pai, Pulana and Kutswe in the eastern parts of Mpumalanga. Specific, important LFC sites and episodes include:
  - Sites associated with Swazi expansion into the Mpumalanga Highveld and Lowveld from 1815 to 1868);
  - Sites associated with Shangaan clans who entered the region from across the Lebombo Mountains in the east during the second half of the nineteenth century;
  - The Bakgatla (Pedi) chiefdom in the Steelpoort Valley that rose to prominence under Thulare in the early 1800's who maintained an extended sphere of influence across the Limpopo and Mpumalanga Provinces during the nineteenth century;
  - Ndzundza-Ndebele settlements at Kwa Maza and Esikhunjini from the 18<sup>th</sup> century and at Erholweni from 1839 to 1883 where their sphere of influence, known as KoNomthjarhelo, stretched across the Steenkampsberge;
  - The Bakopa settlement at Maleoskop from 1840 to 1864, where they were massacred by the Swazi;
  - Corbelled stone huts are associated with Sotho predecessors on Tafelkop near Davel that date from 1700s into the 19<sup>th</sup> century; and
  - Numerous stonewalled settlements spread out along the eastern edge of the Groot Dwarsrivier Valley served as the early abode for smaller clans such as the Choma and Phetla communities which date from the nineteenth century.
- Historical heritage (Pistorius 2013: 24-27) including:
  - Historical towns surrounding the study area such as Delmas (1907), Ogies (1928) and Witbank (1903);
  - Coal mining heritage dating from the late 19th century and continuing into the present; and
  - Vernacular stone architectural heritage that comprised a unique architectural style established in the Eastern Highveld from the second half of the 19<sup>th</sup> century well into the early 20<sup>th</sup> century that made use of a wider variety of stone types

than elsewhere in South Africa, including sandstone, ferricrete ('ouklip'), dolerite ('blouklip'), granite, shale and slate.

The Eastern Highveld vernacular stone architecture heritage is important for a number of reasons (Pistorius 2013: 26-27):

- In terms of the ecology, the general absence of natural trees prior to active afforestation precluded the use of timber in construction and firing of clay bricks. As a result, stone was the most important building material in the Eastern Highveld; and
- LFCs such as the Sotho, Pedi, Ndebele and Swazi contributed to the Eastern Highveld stonewalled architecture. These indigenous built environment traditions influenced white settlers in the region to utilise the same resources, with the addition of European knowledge and traditions of stone masonry.

The 2013 HIA listed a total of 30 heritage sites: 24 burial grounds and six historical structures within the Tweefontein Mine Complex. The grave sites and historical structures recorded in the previous HIA which surround the proposed realignment of the P141-1 are shown in Figure 8-14.



Source: Pistorius (2013)

**Figure 8-14: Ecological Importance and Sensitivity of the Tweefontein spruit**

During the pre-disturbance survey conducted by Digby Wells, one burial ground was identified / verified. This burial ground was first identified by Pistorius 2013 as site GY 01 (Pistorius 2013: 31). He recommended either exhumation and relocation or *in-situ* management of the burial ground (-26.031611 29.164132). It is a very large burial ground of around 110 m x 140 m or 1.5 ha, located approximately 30 m from the proposed road realignment (Figure 8-15). The burial ground is fenced with an access gate. The site is not well kept. The burial ground contains more than 1000 graves, dressings of which comprise formal granite dressings as well as dressings of stone and cement.





**Figure 8-15: General Views of GY 01**

In terms of the sites identified in the vicinity of the proposed P141-1 road realignment (GY01), the revised route alternative will avoid this grave site entirely. Refer to Plan 10.

#### ***8.3.1.1.16 Palaeontology***

In the area under consideration, the Vryheid Formation overlays directly on the Dwyka Group. The Dwyka Group comprises glacial, interglacial and post-glacial siliciclastic sediments (eg tillites), and has been rated with low palaeontological significance.

The palaeontological potential and sensitivity of the study area was assessed by Prof. Marion Bamford whose study is attached in Appendix D8. The Permian Vryheid Formation is potentially highly sensitive because of the coal reserves and chance of fossil plants occurring. Fossil plants are present in the shales and mudstones between coal seams but seldom within coal seams.

The distribution of such fossils is, however, very sporadic and unpredictable. In addition, coal flora plants are not a rare although it requires time and opportunistic finds to locate any pockets of preserved plants. Within this palaeontological context insect wings are extremely rare and vertebrates are entirely absent.





Palaeontological Sensitivity	Required Action
Very High	Field assessment and protocol for finds are required.
High	Desktop study is required and based on the outcome of the desktop study, a field assessment is likely.
Moderate	Desktop study is required.
Low	No palaeontological studies are required, however, a protocol for finds is required.
Insignificant / Zero	No palaeontological studies are required.
Unknown	These areas will require a minimum of a desktop study.

**Figure 8-16: Palaeo-sensitivity Map with Approximate Location of the Tweefontein Mine Complex in White**

### 8.3.1.1.17 Noise

No different noise will emanate from the re-aligned road as compared to the existing road. The baseline details for the TOP area were evaluated by Enviro Acoustic Research (EAR) which was commissioned to undertake a specialist study to determine the potential noise impact associated with the Tweefontein Optimisation Project. Information contained in this section was sourced from the EAR report, titled *Noise Impact Assessment for Environmental Impact Assessment for the proposed Tweefontein Optimisation Project for the years of 2013 to 2026*”, dated 2013. Cumulative noise associated with the re-aligned road will arise only during the construction phase of the project.

There are various sources of noise which exist within the vicinity of the Tweefontein Mine Complex including:

- Vehicle / traffic noise;
- Industrial noise;
- Noise generated by mining activities;
- Noise associated with agricultural activities (Tractors, pumps, etc.); and

- Residential noise (voices, animals, equipment, etc.).

Site specific sound level measurements were taken at two locations in the vicinity of the Tweefontein Mine Complex, named XT01 and XT02 (refer to the report). The XT01 receptor is closer to the proposed P141-1 realignment and therefore, the measurements taken at this locality will be discussed.

Daytime measurements were taken from 06:00 until 22:00 and overnight from 22:00 to 06:00, and ambient sound measurements were taken at unknown intervals. Measurements were recorded at 10-minute intervals; however, due to the placement of the recording equipment during the site evaluation, recordings were made less frequently for a longer duration at a time to gauge a more accurate assessment of the sound scape.

At XT02, during the daytime (06:00 – 22:00) the equivalent sound level varied from 40.1 dBA to 68.5 dBA. The night-time (22:00 – 06:00) equivalent sound level varied from 35.2 dBA to 52.3 dBA. Based on the daytime measurements taken, the average noise levels was 44.4 dBA, the night time measurements indicated an average noise level of 33.7 dBA.

The soundscape within the vicinity of the Tweefontein Mine Complex is characterised by the existing mining activities. Notable sounds measured originate mostly from road traffic during the night time.

#### ***8.3.1.1.18 Traffic***

A Traffic Impact Study was conducted in February 2014 by Avzcons for the Tweefontein Road Realignment project, and the results thereof are contained in the report attached as Appendix D9. Several National Roads traverse the Mpumalanga Province. The N4, N12 and N17 cross the province in an east - west direction, while the N2 and N11 run through portions of the province in a north – south direction. An extensive network of provincial primary and secondary roads, as well as private roads, mine roads, and farm roads connect the remainder of the province to the national routes. Several National, provincial and secondary roads occur within the vicinity of the Tweefontein Complex. (These routes are indicated on Plan 1, Appendix B). The following major road sections fall within the Tweefontein Mine Complex mine boundary area, and were included in the Traffic Impact assessment:

- National route N12, for an approximate distance of 3,4km;
- Provincial road R555 (P29-1) for an approximate distance of 5,6km;
- Provincial road R547 (D2770) for an approximate distance of 12,1km;
- Provincial road P141-1 for an approximate distance of 6,9km; and
- Provincial road D2769 for an approximate distance of 2,2km.

The current traffic volumes on the major roads associated with the Tweefontein Mine Complex indicate that the N12 National Route, which runs in an east - west direction and is

situated towards the north of the mine boundary, experiences the most traffic of all the roads included in the study, with an estimated 13,500 average daily trips. The R547, the D2769 and the R544 which run in a north - south direction along the eastern side of the mine boundary experience between 4700 and 8900 trips daily. The majority of roads situated to the north of the mine boundary are characterised by fewer than 4,500 average daily trips. The P141-1 experiences less than 1,500 trips per day.

#### **8.3.1.2 Description of the Current Land Uses**

The Remaining Extent and Portion 1 of the Farm Tweefontein 13 IS are currently used primarily for mining activities. The proposed route traverses the existing land uses:

- Existing mine haul road;
- Waterpan No 1a dump (to be removed and re-deposited elsewhere and is dealt with in the TOP);
- Maize;
- Grassland; and
- Wetland.

The land use of the area associated with the proposed project will be re-zoned as a road reserve, this land-use will be permanent.

#### **8.3.1.3 Description of Specific Environmental Features and Infrastructure on the Site**

The following biophysical and social features and/or infrastructure occur on the project site.

#### **8.3.1.4 Sites of Archaeological and Cultural Importance**

During the pre-disturbance survey conducted by Digby Wells, one burial ground was identified / verified. This burial ground was first identified by Pistorius 2013 as site GY 01 (Pistorius 2013: 31). He recommended either exhumation and relocation or *in-situ* management of the burial ground (-26.031611 29.164132). It is a very large burial ground of around 110 m x 140 m or 1.5 ha, located approximately 30 m from the proposed road realignment (Figure 8-15). The burial ground is fenced with an access gate. The site is not well kept. The burial ground contains more than 1000 graves, dressings of which comprise formal granite dressings as well as dressings of stone and cement.

In terms of the sites identified in the vicinity of the proposed P141-1 road realignment, none of these sites will be affected. The initial proposed route realignment would have affected GY01, however, the revised route alternative will avoid that grave site entirely.

### 8.3.1.5 Rivers and Wetlands

There are several wetlands found within the Tweefontein Mine Complex, covering an area of 3 486.4 ha. The wetland system that may be affected by the proposed Project is the Tweefontein spruit which drains the northern portion of the mining area including Waterpan.

### 8.3.1.6 Mine Infrastructure/ Activities

The project site through which the proposed road will traverse is used for Glencore's opencast and underground coal mining activities. Infrastructure includes mine offices, open pits, haul roads, mine shafts, waste rock dumps, and a process plant. The Waterpan No. 1a dump will need to be removed as the proposed route will traverse over this area where the dump is currently positioned.

### 8.3.1.7 Environmental and Current Land Use Map

The environmental and current land use map is shown as Plan 11, Appendix B.

## 8.4 **Item 3(g)(vi): Methodology used in Determining and Ranking the Nature, Significance, Consequence, Extent, Duration and Probability of Potential Environmental Impacts and Risks**

The methodology utilised to assess the significance of potential environmental and social impacts is discussed in detail below. The significance rating formula is as follows:

$$\text{Significance} = \text{Consequence} \times \text{Probability}$$

Where

$$\text{Consequence} = \text{Type of Impact} \times (\text{Intensity} + \text{Spatial Scale} + \text{Duration})$$

And

$$\text{Probability} = \text{Likelihood of an Impact Occurring}$$

In addition, the formula for calculating consequence:

$$\text{Type of Impact} = +1 \text{ (Positive Impact) or } -1 \text{ (Negative Impact)}$$

The matrix calculates the rating out of 147, whereby Intensity, Extent, Duration and Probability are each rated out of seven as indicated in Table 8-8-14. 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/EMPr. The significance of an impact is then determined and categorised into one of eight categories, as indicated in Table 8-8-15, which is extracted from Table 8-8-14. The description of the significance ratings is discussed in Table 8-8-16.

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 8-8-14: Impact Assessment Parameter Ratings**

Rating	Intensity / Replacibility		Extent	Duration/Reversibility	Probability
	Environmental	Social, Cultural and Heritage			
7	<p>Very significant impact on the environment. Irreparable damage to highly valued species, habitat or eco system. Persistent severe damage.</p> <p>The positive impact will result in a significant improvement to the initial/post disturbance environmental status and will benefit ecological and natural resources.</p>	<p>Irreparable damage to highly valued items of great cultural significance or complete breakdown of social order.</p> <p>The positive impact will be of high significance which will result the improvement of the socio-economic status of a greater area beyond the boundary of the directly affected of the community and/or promote archaeological and heritage awareness and contribute towards research and documentation of sites and artefacts through phase two assessments.</p>	<p>International</p> <p>The effect will occur across international borders</p>	<p>Permanent: The impact is irreversible, even with management, and will remain after the life of the project</p>	<p>Definite: There are sound scientific reasons to expect that the impact will definitely occur. &gt;80% probability.</p>

Rating	Intensity / Replacibility		Extent	Duration/Reversibility	Probability
	Environmental	Social, Cultural and Heritage			
6	<p>Significant impact on highly valued species, habitat or ecosystem.</p> <p>The positive impact is of high significance which will result in a vast improvement to the environment such as ecological diversification and/or rehabilitation of endangered species</p>	<p>Irreparable damage to highly valued items of cultural significance or breakdown of social order.</p> <p>The positive impact will be of high significance and will result in the upliftment of the surrounding community and/or contribute towards research and documentation of sites and artefacts through phase two assessments</p>	<p>National</p> <p>Will affect the entire country</p>	<p>Beyond project life: The impact will remain for some time after the life of the project and is potentially irreversible even with management</p>	<p>Almost certain / Highly probable: It is most likely that the impact will occur. &lt;80% probability.</p>



Rating	Intensity / Replacibility		Extent	Duration/Reversibility	Probability
	Environmental	Social, Cultural and Heritage			
5	<p>Very serious, long-term environmental impairment of ecosystem function that may take several years to rehabilitate</p> <p>The positive impact will be moderately high and will have a long term beneficial effect on the natural environment</p>	<p>Very serious widespread social impacts. Irreparable damage to highly valued items</p> <p>The positive impact will be moderately high and will result in visible improvements on the socio-economic environment of the local and regional community, and/or promote archaeological and heritage awareness through mitigation</p>	<p>Cercle/ Region</p> <p>Will affect the entire Cercle or region</p>	<p>Project Life (&gt;15 years): The impact will cease after the operational life span of the project and can be reversed with sufficient management</p>	<p>Likely: The impact may occur. &lt;65% probability.</p>

Rating	Intensity / Replacibility		Extent	Duration/Reversibility	Probability
	Environmental	Social, Cultural and Heritage			
4	<p>Serious medium term environmental effects. Environmental damage can be reversed in less than a year</p> <p>The positive impact on the environment will be moderate with visible improvement to the natural resources and regional biodiversity</p>	<p>On-going serious social issues. Significant damage to structures / items of cultural significance</p> <p>The positive impact on the socio-economic environment will be of a moderate extent and benefits should be experience across the local extent and/or potential benefits for archaeological and heritage conservation</p>	<p>Commune Area</p> <p>Will affect the whole municipal area</p>	<p>Long term: 6-15 years and impact can be reversed with management</p>	<p>Probable: Has occurred here or elsewhere and could therefore occur. &lt;50% probability.</p>

Rating	Intensity / Replacibility		Extent	Duration/Reversibility	Probability
	Environmental	Social, Cultural and Heritage			
3	<p>Moderate, short-term effects but not affecting ecosystem function. Rehabilitation requires intervention of external specialists and can be done in less than a month.</p> <p>The positive impact will be moderately beneficial to the natural environment, but will be short lived.</p>	<p>Ongoing social issues. Damage to items of cultural significance.</p> <p>The positive impact will be moderately beneficial for some community members and/or employees, but will be short lived and/or there will be a moderate possibility for archaeological and heritage conservation</p>	<p>Local</p> <p>Local extending only as far as the development site area</p>	<p>Medium term: 1-5 years and impact can be reversed with minimal management</p>	<p>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. &lt;25% probability.</p>

Rating	Intensity / Replacibility		Extent	Duration/Reversibility	Probability
	Environmental	Social, Cultural and Heritage			
2	<p>Minor effects on biological or physical environment. Environmental damage can be rehabilitated internally with/ without help of external consultants.</p> <p>The positive impacts will be minor and slight environmental improvement will be visible.</p>	<p>Minor medium-term social impacts on local population. Mostly repairable. Cultural functions and processes not affected.</p> <p>Minor positive impacts on the social/cultural and/ or economic environment</p>	<p>Limited</p> <p>Limited to the site and its immediate surroundings</p>	<p>Short term: Less than 1 year and is reversible.</p>	<p>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. &lt;10% probability.</p>

Rating	Intensity / Replacibility		Extent	Duration/Reversibility	Probability
	Environmental	Social, Cultural and Heritage			
1	<p>Limited damage to minimal area of low significance, (e.g. ad hoc spills within plant area). Will have no impact on the environment.</p> <p>The positive impact on the environment will be insignificant and will not result in visible improvements</p>	<p>Low-level repairable damage to commonplace structures.</p> <p>The positive impact on social and cultural aspects will be insignificant</p>	<p>Very limited</p> <p>Limited to specific isolated parts of the site.</p>	<p>Immediate: Less than 1 month and is completely reversible without management.</p>	<p>Highly unlikely / None: Expected never to happen. &lt;1% probability.</p>

**Table 8-8-15: 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 8-8-16: Significance Rating Description**

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	An important positive impact. The impact is insufficient by itself to justify the implementation of the project. 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 but not essential. 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	An important negative impact which 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 serious negative impact which may prevent the implementation of the project. These impacts would be considered by society as constituting a major and usually a long-term change to the (natural and / or social) environment and result in severe effects	Moderate (negative)
-109 to -147	A very serious negative impact which 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	Major (negative)



## 8.5 Item 3(g)(v): Impacts and Risks Identified Including the Nature, Significance, Consequence, Extent, Duration and Probability

The potential impacts are discussed according to each phase of the proposed Project that is the Construction and Operational Phase.

Please refer to the detailed specialist Reports appended to this Report:

- Road Design Report – Appendix D1;
- Air Quality Impact Assessment – Appendix D2;
- Soil, Land Use and Land Capability – Appendix D3;
- Surface water – Appendix D4;
- Biomonitoring – Appendix D5;
- Ecology – Appendix D6;
- Wetland Delineation – Appendix D7;
- Heritage Impact Assessment – Appendix D8; and
- Traffic Impact Study – Appendix D9.

This section also rates the significance of the potential impacts pre-mitigation and post-mitigation. The impacts below are a result of both the environment in which the activity takes place, as well activity itself. The potential impacts are discussed per environmental feature / aspect and according to each phase of the project i.e. the Construction and Operational Phases.

### 8.5.1 Construction Phase

During the construction phase, there may be several potential impacts associated with each of the planned project activities. The potential impacts of those activities on each resource/receptor are therefore discussed below. The project activities during the construction phase are summarised below in

Table 8-17.

**Table 8-17: List of Activities during Construction**

Activity	Description
1	Site clearance and removal of topsoil
2	Movement of construction vehicles and equipment
3	Storage of materials/fuels at existing contractor camp
4	Construction of new realigned section of the P141-1 and associated bridge
5	Construction of culvert (water crossing)
6	Generation of waste
7	Closure of the existing section of the P141-1 alignment and D2770 (R547)
8	Direct employment and procurement of goods

#### **8.5.1.1 Soils, Land Capability and Land Use**

As the proposed Project aligns itself quite closely to the Tweefontein spruit, the soil type of the proposed route alignment is associated with the Longlands 1000 soil type which is generally shallow, grey, leached, imperfectly to poorly drained, underlain by soft plinthite and is considered to have a wetland capability with some arable potential.

In terms of the potential impacts to soil resources and its supporting capabilities, the project activities of site clearance (i.e. removal of vegetation and topsoil), movement of heavy construction vehicles and machinery as well as the construction of the new realigned road and culvert may result in the following:

- **Loss of topsoil material** – when topsoil is removed from a soil profile, the profile loses effective rooting depth, water holding capacity and fertility. The largest volumes of topsoil will be removed in preparation for the road foundation. The removed soil will be stockpiled, although it may still be lost through inappropriate management; and
- **Loss of land capability** - excessive compaction of soil during the construction of the road may result in the degradation, densification and distortion of the soil. This, in turn, may reduce biological activity, porosity and permeability of the soil, and result in a change of the soil structure. This may result in the impacts on soil quality as well as the capability of the soil to support other land uses. Furthermore, the realigned road will be a permanent activity.

These impacts are assessed below and mitigation measures proposed.



Criteria	Details/Discussion				
<b>Potential Impact</b>	<b>Loss of Topsoil Material</b>				
<b>Project Activity</b>	<b>Activity 1: Site clearance and removal of topsoil</b> <b>Activity 2: Movement of construction vehicles and equipment</b> <b>Activity 4: Construction of new realigned section of the P141-1 and associated bridge</b> <b>Activity 5: Construction of culvert (water crossing)</b>				
<b>Description of impact</b>	Loss of soil through removal and stockpiling, as well as through erosion				
<b>Mitigation required</b>	<ul style="list-style-type: none"> <li>▪ Strip and stockpile topsoil based on the soil type (i.e. red soils, yellow brown soils and grey wetland soils) to preserve the soil potential and to conserve it for later rehabilitation purposes.</li> <li>▪ Place stockpiles away from the drainage lines and wetland area.</li> <li>▪ The height of the topsoil stockpile should not exceed 2 m.</li> <li>▪ Implement stormwater management controls around the cleared areas as well as around the stockpile areas.</li> <li>▪ Limit construction activities to those areas affected by the project components thereby limiting the footprint of the activities.</li> </ul>				
<b>Parameters</b>	<b>Severity</b>	<b>Spatial scale</b>	<b>Duration</b>	<b>Probability</b>	<b>Significance</b>
<b>Pre- Mitigation</b>	(-) 5	3	3	4	-44
<b>Post-Mitigation</b>	(-) 3	2	3	4	-32



Criteria	Details/Discussion				
Potential Impact	Loss of Land Capability				
Project Activity	Activity 1: Site clearance and removal of topsoil Activity 4: Construction of new realigned section of the P141-1 and associated bridge				
Description of impact	The proposed road will be a permanent activity; therefore no other land capabilities can be supported on or along the proposed route alignment.				
Mitigation required	<ul style="list-style-type: none"> <li>No land capability mitigation is possible as the proposed Project is a permanent activity.</li> </ul>				
Parameters	Severity	Spatial scale	Duration	Probability	Significance
Pre- Mitigation	(-) 5	1	7	7	-91
Post-Mitigation	(-) 5	1	7	7	-91

#### 8.5.1.2 Terrestrial Biodiversity

The predominant vegetation species within the proposed Project area consists of untransformed grassland and cultivated land. The total surface area to be impacted by the road realignment totals 13.6 ha, however a large portion of this footprint is characterised by mining use including the existing Waterpan No. 1a dump and haul roads etc. The untransformed grassland vegetation unit provides habitat for five of the seven plant species of conservation concern recorded within the Tweefontein Mine Complex, and for ten of the 21 protected (in terms of the Mpumalanga Nature Conservation Act) plant species recorded within the mine complex.

Furthermore, the vegetation of this unit is representative of the Eastern Highveld Grassland vegetation type (Mucina & Rutherford, 2007), which is considered to be endangered at a national level. The fragments of untransformed grassland provide important breeding and / or foraging habitat for several near-threatened mammals, particularly the Southern African Hedgehog, Serval and Honey Badger, and a number of threatened and near-threatened bird species, such as Southern Bald Ibis, Lesser Kestrel and Blue Korhaan, which may potentially occur.

An additional seven bird species of conservation concern potentially occur because of the presence of suitable habitat. This vegetation unit is therefore considered to have a high sensitivity and value in terms of biodiversity conservation (De Castro and Brits, 2013).

The removal of vegetation will be restricted to the areas where the road realignment does traverse through grassland and cultivated land which is about two thirds of the footprint of the proposed Project (9 ha). Due to the nature of the proposed Project (i.e. linear infrastructure), there will be habitat fragmentation which is a division of the natural



habitats/ecosystems into smaller and isolated patches. Habitat fragmentation may also result in isolation of faunal species due to the restriction of movement across the realigned road.

The potential negative impacts to biodiversity are anticipated:

- **Loss of vegetation** – removal of vegetation from the proposed route alignment, particularly grassland and cultivated crops. The removal of vegetation will also result in a potential loss of Species of Special Concern (SSC); and
- **Habitat fragmentation** – resulting from the establishment of the new route alignment, thus creating isolated habitats.

Criteria	Details/Discussion				
Potential Impact	<b>Loss of Vegetation</b>				
Project Activity	<b>Activity 1: Site clearance and removal of topsoil</b> <b>Activity 4: Construction of new realigned section of the P141-1 and associated bridge</b>				
Description of impact	<ul style="list-style-type: none"> <li>▪ The removal of topsoil and vegetation from the proposed route alignment, particularly grassland and cultivated crops will result in a permanent loss of vegetation as the proposed Project is a permanent activity.</li> <li>▪ Potential loss of Species of Special Concern due to vegetation loss.</li> </ul>				
Mitigation required	<ul style="list-style-type: none"> <li>▪ Reduce the project footprint by clearing only the vegetation that is within the proposed realigned route.</li> <li>▪ Areas to be cleared of vegetation should be walked by a botanist prior to clearing and all SSC should be removed and relocated to similar adjacent habitat.</li> <li>▪ Conserve topsoil material for vegetation of areas around the proposed new realigned road (if needed) or for areas within the Tweefontein Mine Complex.</li> </ul>				
<b>Parameters</b>	<b>Severity</b>	<b>Spatial scale</b>	<b>Duration</b>	<b>Probability</b>	<b>Significance</b>
<b>Pre- Mitigation</b>	(-) 5	1	7	7	-91
<b>Post-Mitigation</b>	(-) 4	1	7	7	-84



Criteria	Details/Discussion				
Potential Impact	Habitat Fragmentation				
Project Activity	Activity 1: Site clearance and removal of topsoil Activity 4: Construction of new realigned section of the P141-1 and associated bridge				
Description of impact	<ul style="list-style-type: none"> <li>The proposed realigned road would result in the grassland habitat being divided thus reducing the available habitat for faunal species.</li> </ul>				
Mitigation required	<ul style="list-style-type: none"> <li>Reduce the project footprint by clearing only the vegetation that is within the proposed realigned route.</li> </ul>				
Parameters	Severity	Spatial scale	Duration	Probability	Significance
Pre- Mitigation	(-) 5	3	7	7	-105
Post-Mitigation	(-) 4	3	7	7	-98

### 8.5.1.3 Surface Water

The Tweefontein spruit will likely be impacted on due to the construction phase of the proposed Project due to the crossing. According to the latest biomonitoring results (CSBS, 2015), the electro conductivity (EC) is considered very high indicating high salinity. The pH is within the target level for aquatic health, irrigation and human health. Dissolved oxygen levels tested in April 2015 are also within the guideline levels.

The potential negative impacts to surface water include:

- **Increase in sedimentation load** – the footprint of the realigned route will be exposed, thereby increasing water and wind erosion of soils; and
- **Flow reduction of the Tweefontein spruit** – during construction, water from the tributary will need to be dammed/ diverted to allow for the establishment of the culvert for the water crossing.





Criteria	Details/Discussion				
<b>Potential Impact</b>	<b>Increase in the sedimentation load of the Tweefontein spruit</b>				
<b>Project Activity</b>	<b>Activity 1: Site clearance and topsoil removal</b> <b>Activity 2: Movement of construction vehicles and equipment</b> <b>Activity 4: Construction of new realigned section of the P141-1 and associated bridge</b> <b>Activity 5: Construction of culvert (water crossing)</b>				
<b>Description of impact</b>	Exposed ground surfaces may result in the risk of erosion which may ultimately lead to an increase of the sedimentation load on the Tweefontein spruit thus reducing the overall quality of the water.				
<b>Mitigation required</b>	<ul style="list-style-type: none"> <li>▪ Limit construction activities to those areas affected by the project components thereby limiting the footprint of the activities.</li> <li>▪ Movement of machinery and vehicles should be restricted to designated paths.</li> <li>▪ Place stockpiles away from the drainage lines and wetland area.</li> <li>▪ Clear only the necessary areas at a time.</li> <li>▪ Berms and trenches should be used during the construction phase to redirect water away from the construction activities.</li> </ul>				
<b>Parameters</b>	<b>Severity</b>	<b>Spatial scale</b>	<b>Duration</b>	<b>Probability</b>	<b>Significance</b>
<b>Pre- Mitigation</b>	(-) 4	3	2	5	-45
<b>Post-Mitigation</b>	(-) 3	3	2	4	-32



Criteria	Details/Discussion				
Potential Impact	Flow reduction of the Tweefontein spruit				
Project Activity	Activity 5: Construction of culvert (water crossing)				
Description of impact	The construction of the culvert will require the temporary damming/diversion of water flow in the Tweefontein spruit, which may reduce the flow of water.				
Mitigation required	<ul style="list-style-type: none"> <li>▪ Undertake construction of the culvert during the dry season (June to August).</li> </ul>				
Parameters	Severity	Spatial scale	Duration	Probability	Significance
Pre- Mitigation	(-)4	3	2	6	-54
Post-Mitigation	(-)4	3	2	5	-45

#### 8.5.1.4 Wetland

The proposed P141-1 road will traverse a tributary of the Tweefontein spruit (unchannelled valley-bottom wetland) as well as a section of the hillslope seepage wetland, which is also associated with the Tweefontein spruit. This system has been altered due to mining activities within the catchment. The PES is rated as E for the tributary, whilst the hillslope seepage wetland has a PES of D which indicates that a large change in ecosystem processes and loss of natural habitat and biota and has occurred. In terms of ecological importance, the tributary and the hillslope seepage wetland are rated as low to moderate, meaning that the wetland is not ecologically important and sensitive at any scale. The biodiversity of these wetlands is ubiquitous and not sensitive to flow and habitat modifications.

There may however still be potential negative impacts on these wetlands as a result of the proposed Project activities, these may include:

- **Loss of wetland habitat** – the proposed road will traverse the identified hillslope seepage wetland, thus resulting in the loss of wetland habitat; and
- **Deterioration of wetland through poor water quality** – the wetlands may be affected as a result of site clearance and topsoil removal, movement of vehicles and the construction of the culvert which may lead to an increase in suspended solids, which may reduce water quality of the tributary and ultimately the Tweefontein spruit.

<b>Criteria</b>	<b>Details/Discussion</b>				
<b>Potential Impact</b>	<b>Loss of wetland habitat</b>				
<b>Project Activity</b>	<b>Activity 1: Site clearing and topsoil removal for road construction</b> <b>Activity 4: Construction of new realigned section of the P141-1 and associated bridge</b> <b>Activity 5: Construction of culvert (water crossing)</b>				
<b>Description of impact</b>	The proposed realigned road will traverse the identified hillslope seepage wetland, thus resulting in the loss of wetland habitat. Once vegetation and the topsoil have been removed, the wetland habitat would be significantly altered, however the construction of the proposed road and culvert is considered a permanent activity, thus the wetland habitat would be permanently lost.				
<b>Mitigation required</b>	<ul style="list-style-type: none"> <li>▪ There is no mitigation proposed as the activity would be permanent.</li> <li>▪ The areas disturbed should however be limited to the footprint of the proposed road alignment.</li> </ul>				
<b>Parameters</b>	<b>Severity</b>	<b>Spatial scale</b>	<b>Duration</b>	<b>Probability</b>	<b>Significance</b>
<b>Pre- Mitigation</b>	(-) 6	3	7	7	-112
<b>Post-Mitigation</b>	(-) 6	2	7	6	-90



Criteria	Details/Discussion				
Potential Impact	Deterioration of wetland through poor water quality				
Project Activity	<b>Activity 1: Site clearing and topsoil removal for road construction</b> <b>Activity 2: Movement of construction vehicles and equipment</b> <b>Activity 4: Construction of new realigned section of the P141-1 and associated bridge</b> <b>Activity 5: Construction of culvert (water crossing)</b>				
Description of impact	Once vegetation has been removed, the exposed soils will be exposed to surface water runoff. Furthermore, sediments will be mobilised by the movement of machinery, thereby increasing sediment loads in the receiving water bodies and ultimately degrading wetland habitat.				
Mitigation required	<ul style="list-style-type: none"> <li>▪ Clear the area required for the road reserve only.</li> <li>▪ Construct berms and trenches to reduce stormwater runoff on the site.</li> <li>▪ Ensure all stockpiles and construction materials are stored away from drainage lines and at least 100 m from wetland areas.</li> </ul>				
<b>Parameters</b>	<b>Severity</b>	<b>Spatial scale</b>	<b>Duration</b>	<b>Probability</b>	<b>Significance</b>
<b>Pre- Mitigation</b>	(-) 4	3	2	5	-45
<b>Post-Mitigation</b>	(-) 3	2	2	4	-28

#### 8.5.1.5 Aquatic Ecology

A Fish Response Assessment Index (FRAI), which essentially assesses the condition of the fish assemblage in relation to what would be anticipated under natural circumstances, was conducted in 2015. The results of the FRAI found that all aspects which were assessed were all found to be altered to a certain extent, and the complete absence of fish within the Tweefontein spruit cannot be attributed to a single impact, rather multiple impacts. The Tweefontein dam has impacted water availability which has led to impacts regarding habitat availability and migration. The increased presence of alien fish species within the Tweefontein spruit has also impacted the indigenous fish population through disrupting breeding patterns and competing for resources within the Tweefontein spruit.

<b>Criteria</b>	<b>Details/Discussion</b>				
<b>Potential Impact</b>	<b>Reduction in quality of aquatic habitat due to an increase in sedimentation/contamination of the Tweefontein spruit</b>				
<b>Project Activity</b>	<b>Activity 1: Site clearance and topsoil removal</b> <b>Activity 2: Movement of construction vehicles and equipment</b> <b>Activity 4: Construction of new realigned section of the P141-1 and associated bridge</b> <b>Activity 5: Construction of culvert (water crossing)</b>				
<b>Description of impact</b>	The resulting impacts from the aforementioned activities that may impact the water quality include contaminated run off from construction materials resulting in increased salinity and toxicity and increased dissolved solids from runoff.				
<b>Mitigation required</b>	<ul style="list-style-type: none"> <li>▪ Limit construction activities to those areas affected by the project components thereby limiting the footprint of the activities.</li> <li>▪ Movement of machinery and vehicles should be restricted to designated paths.</li> <li>▪ Place stockpiles away from the drainage lines and wetland area to avoid run-off.</li> <li>▪ Clear only the necessary areas at a time.</li> <li>▪ Berms and trenches should be used during the construction phase to redirect water away from the construction activities.</li> </ul>				
<b>Parameters</b>	<b>Severity</b>	<b>Spatial scale</b>	<b>Duration</b>	<b>Probability</b>	<b>Significance</b>
<b>Pre- Mitigation</b>	(-) 4	3	2	5	-45
<b>Post-Mitigation</b>	(-) 3	3	2	4	-32



Criteria	Details/Discussion				
Potential Impact	<b>Deterioration and disturbance of aquatic habitat due to flow reduction of the Tweefontein spruit</b>				
Project Activity	<b>Activity 5: Construction of culvert (water crossing)</b>				
Description of impact	The construction of the culvert will require the temporary damming/diversion of water flow in the Tweefontein spruit, which may reduce the flow of water.				
Mitigation required	<ul style="list-style-type: none"> <li>▪ Undertake construction of the culvert during the dry season (June to August).</li> <li>▪ Minimise vegetation removal to infrastructure footprint.</li> <li>▪ Ensure the banks of the spruit are stabilised, prior to construction activities.</li> </ul>				
Parameters	Severity	Spatial scale	Duration	Probability	Significance
Pre- Mitigation	(-)4	3	2	6	-54
Post-Mitigation	(-)4	3	2	5	-45

#### 8.5.1.6 Air Quality

The daily dust deposition rates are generally below the industrial action level of 1 200 mg / m<sup>2</sup> / day within the Tweefontein Mine Complex, with the exception of a few areas. In particular, the area of the existing P141-1 Provincial Road does exceed this daily limit. Airshed (2013) has established that the ELM, less than 30 km from the Tweefontein Mine Complex, has a poor ambient air quality as a result of emissions from surrounding coal mining, electricity generation, metallurgical manufacturing processes and fuel burning. The potential air quality impact that may result from the construction of the realigned road is not considered to be significantly different from the current mining activities within the Tweefontein Mine Complex.

The potential impact on air quality is only associated with site clearing and construction activities that may result in fugitive dust emissions such as PM<sub>10</sub> PM<sub>2.5</sub> and Total Suspended Particulates (TSP). The impact of removing the road infrastructure is addressed as part of the TOP, as the affected roads will be removed, once mining commences.



Criteria	Details/Discussion				
Potential Impact	Fugitive dust emissions (i.e. PM <sub>10</sub> , PM <sub>2.5</sub> , TSP)				
Project Activity	<b>Activity 1: Site clearing and topsoil removal for road construction</b> <b>Activity 2: Movement of construction vehicles and equipment</b> <b>Activity 4: Construction of new realigned section of the P141-1 and associated bridge</b> <b>Activity 5: Construction of culvert (water crossing)</b>				
Description of impact	The potential impact on air quality is only associated with site clearing and construction activities that may result in fugitive dust emissions such as PM <sub>10</sub> , PM <sub>2.5</sub> and TSP. This is considered to be a cumulative impact in relation to the existing mining activities and agricultural activities.				
Mitigation required	<ul style="list-style-type: none"> <li>▪ Reduce the speed of the vehicles to 40 km/h or less on site access roads.</li> <li>▪ Apply wetting agents or dust suppressant on exposed areas during site clearance.</li> <li>▪ Minimise the area of disturbance by restricting the movement of machinery/vehicles to designated areas within the project site.</li> <li>▪ Minimise areas exposed to wind erosion by phasing site clearing activities.</li> <li>▪ Avoid excavation and stockpiling activities during windy days.</li> <li>▪ Drop heights should be minimised when loading and offloading construction material.</li> </ul>				
Parameters	<b>Severity</b>	<b>Spatial scale</b>	<b>Duration</b>	<b>Probability</b>	<b>Significance</b>
Pre- Mitigation	(-) 3	3	2	6	-48
Post-Mitigation	(-) 2	2	2	4	-24

#### 8.5.1.7 Social

The average percentage of people employed within the local study area was 32 %, with 16 % being unemployed. While the unemployment figures for the study area seem low, it needs to be noted that the remaining 52 % of the population falls within the “other” category. This includes individuals that are not economically active, under the working age of 15, and those individuals that classify themselves as “discouraged work seekers” (9612 people). Approximately 30 % of people in the local study area have a Grade 12 (Matric) qualification. The proposed Project will extend the following potential positive impacts:

- **Skills development:** due to the creation of new employment opportunities; and
- **Generation of income:** as a result of the employment opportunities.





<b>Criteria</b>	<b>Details/Discussion</b>				
<b>Potential Impact</b>	<b>Skills development due to employment</b>				
<b>Project Activity</b>	<b>Activity 8: Direct employment and procurement of goods</b>				
<b>Description of impact</b>	A number of employment opportunities will be created for the local community during the construction phase of the proposed Project. It is anticipated that approximately 250 employees will be employed during the construction phase of the proposed Project (approximately 1 year). Employment opportunities for both skilled and semi-skilled individuals will be available. The opportunity for employment to work on the proposed Project will result in skills development.				
<b>Enhancement Measures</b>	<ul style="list-style-type: none"> <li>▪ Identify required skills and align and implement training and skills development initiatives accordingly.</li> <li>▪ Provide local employees with reference letters that they can submit to gain further employment. Also, provide certificates of completion for in-house (on-the-job) training provided.</li> <li>▪ Promote labour -intensive construction methods.</li> </ul>				
<b>Parameters</b>	<b>Severity</b>	<b>Spatial scale</b>	<b>Duration</b>	<b>Probability</b>	<b>Significance</b>
<b>Pre-Enhancement</b>	(+)4	1	2	3	21
<b>Post-Enhancement</b>	(+)5	3	2	4	40

Criteria	Details/Discussion				
Potential Impact	<b>Generation of income due to employment</b>				
Project Activity	<b>Activity 8: Direct employment and procurement of goods</b>				
Description of impact	<p>A number of employment opportunities will be created for the local community during the construction phase of the proposed Project. It is anticipated that approximately 250 employees will be employed during the construction phase of the proposed Project (approximately 1 year). A company has been appointed to undertake the construction for Phase 1 of the realignment Project and are currently working in close collaboration with the Department of Labour in Ogies to identify potential candidates for employment. Employment opportunities for both skilled and semi-skilled individuals will be available. The same process will be applied for procurement for this proposed Project (Phase 2). Approximately 70 % of employees appointed for the construction of Phase 1 are employed directly from the local communities. The extension of employment or opportunity for employment to work on the proposed Project will result in the generation of income and spending capacity.</p>				
Enhancement Measures	<ul style="list-style-type: none"> <li>▪ Employment opportunities must be handled through the local Department of Labour.</li> <li>▪ Identify required skills and align and implement training and skills development initiatives accordingly.</li> <li>▪ Provide local employees with reference letters that they can submit to gain further employment. Also, provide certificates of completion for in-house (on-the-job) training provided.</li> <li>▪ Promote labour -intensive construction methods.</li> </ul>				
Parameters	<b>Severity</b>	<b>Spatial scale</b>	<b>Duration</b>	<b>Probability</b>	<b>Significance</b>
Pre-Enhancement	(+) 4	1	2	3	21
Post-Enhancement	(+) 5	3	2	4	40

#### **8.5.1.8** Cultural Heritage

As reported in the 2013 HIA, and verified by the pre-disturbance survey undertaken by Digby Wells, the most numerous type of heritage resource occurring in the study area are burial grounds and graves. Identified / verified burial grounds and graves of relevance to the Phase 2 re-alignment project are GY 01. The potential impacts to this resource are discussed further below.

Heritage impacts can potentially manifest as direct effects on the gravesites, as well as indirectly on the inherent cultural significance of burial grounds and graves and communities associated with the deceased.

Direct impacts on grave sites can include damage to or destruction of surface dressings caused by diverse actions during the construction phase of the project. Direct impacts can also include damage to or destruction of the contents of graves, for example due to accidental or deliberate exposure and erosion of surrounding soils.

Any unmitigated direct impact on a grave must be considered as being significant, and may occur through the expected life of the project. Such impacts will not only affect the physical site, but will inevitably lead to social repercussions amongst descendant communities and public outcry. In addition, the person or parties responsible for any damage will be liable to fines and / or imprisonment in accordance with the NHRA, as well as other national and provincial legislation.

Indirect impacts can include among others loss or restricted access to gravesites, degradation of the intrinsic CS of gravesites associated with living heritage due to loss of access, and health and safety risks to any visitors to gravesites that may be located within mining properties.

In addition to impacts or effects on people associated with the graves and deceased, these effects can also pose a significant social and litigation risks to Glencore, e.g. claims against the company for any loss, injury or death suffered whilst visiting gravesites.



Criteria	Details/Discussion				
<b>Potential Impact</b>	<b>Physical changes to burial grounds and graves</b>				
<b>Project Activity</b>	<b>Activity 1: Site clearing and topsoil removal for road construction</b> <b>Activity 2: Movement of construction vehicles and equipment</b> <b>Activity 4: Construction of new realigned section of the P141-1 and associated bridge</b> <b>Activity 5: Construction of culvert (water crossing)</b>				
<b>Description of impact</b>	Direct impacts on grave sites can include damage to or destruction of surface dressings caused by diverse actions such as construction activities. Direct impacts can also include damage to or destruction of the <i>contents</i> of graves, for example due to accidental or deliberate exposure and erosion of surrounding soils.				
<b>Mitigation required</b>	<ul style="list-style-type: none"> <li>▪ GY 01 must be preserved in situ. Potential direct impacts to the burial ground should be mitigated through the implementation of a CMP (Conservation Management Plan) that includes: <ul style="list-style-type: none"> <li>▪ Establishing a buffer of 25 m around the burial ground and graves;</li> <li>▪ Educating engineers and construction workers of the location of the burial grounds and potential direct impacts; and</li> <li>▪ Monitoring of the burial grounds and graves during the construction phase of the road re-alignment.</li> </ul> </li> </ul>				
<b>Parameters</b>	<b>Severity</b>	<b>Spatial scale</b>	<b>Duration</b>	<b>Probability</b>	<b>Significance</b>
<b>Pre- Mitigation</b>	(-) 7	6	7	5	-100
<b>Post-Mitigation</b>	(-) 6	1	2	3	-27



Criteria	Details/Discussion				
Potential Impact	Effects on communities				
Project Activity	<b>Activity 1: Site clearing and topsoil removal for road construction</b> <b>Activity 2: Movement of construction vehicles and equipment</b> <b>Activity 4: Construction of new realigned section of the P141-1 and associated bridge</b> <b>Activity 5: Construction of culvert (water crossing)</b>				
Description of impact	Indirect impacts can include among others loss or restricted access to gravesites, degradation of the intrinsic CS of gravesites associated with living heritage due to loss of access, and health and safety risks to any visitors to gravesites that may be located within mining properties.				
Mitigation required	<ul style="list-style-type: none"> <li>An extensive Burial Grounds and Graves Consultation process must be implemented in accordance with NHRA Regulations to identify bona fide next of kin and reach agreement regarding the future of the graves. Gravesites should ideally be conserved in situ, and the consultation process must enable a mutually agreed CMP to be developed and approved, allowing for visitation rights by families.</li> </ul>				
Parameters	Severity	Spatial scale	Duration	Probability	Significance
Pre- Mitigation	(-) 7	6	5	5	-90
Post-Mitigation	(+) 6	4	2	5	+75

#### 8.5.1.9 Traffic

The Traffic Impact Assessment identified the following roads which are either linked or directly affected to the proposed Project, these include:

- N12: No impact on this national road;
- Provincial Road R 555 (P29-1): is of major importance to the regional network due to the interchange at the intersection with the N12, there will be no impact to this road;
- Provincial Road R547 (D2770): does not have access via an interchange onto the N12, this section of road from the Provincial Road D2769 to the N12 will be closed for the TOP mining activities;
- Provincial Road P141-1: between the R 555 and the R547 is of minimal importance to the regional road network as the majority of the existing daily trips are made by mine related traffic; and



- Provincial Road D2769: between the R544 and the R 547 experiences a high average daily traffic rate, there will be a short extension link to the realigned Provincial Road P141-1/R547.

Based on the present road network and traffic, the following impact is envisaged during construction as a result of the proposed Project (i.e. Phase 2 of the TRRP):

- **Increase in traffic and disruption of traffic flow** - the construction activities may disrupt the daily movement patterns of road-users. Traffic will need to be diverted during the construction activities. Furthermore, the closure of the affected roads will also result in disruption of traffic flow as road users become more familiar with the new proposed routes. During construction, material and employees will also be transported to the project site thus generating additional traffic on the road network.

Criteria	Details / Discussion				
Potential Impact	Increase in traffic				
Project activity	<b>Activity 2: Movement of construction vehicles and equipment</b> <b>Activity 3: Storage of materials/fuels at existing contractor camp</b> <b>Activity 4: Construction of new realigned section of the P141-1 and associated bridge</b>				
Description of impact	An increase in traffic on the road network can result in time delays / extended journey time for commuters, traffic congestion, and poor road conditions during construction.				
Mitigation required	<ul style="list-style-type: none"> <li>■ On-site contractors must assist in directing traffic during the construction phase, and be conscious of peak traffic times to accommodate smooth flowing traffic as far as practicable.</li> <li>■ Inform communities of planned construction activities that would affect vehicle/ pedestrian traffic.</li> <li>■ Ensure that access to residences and business properties is uninterrupted by providing alternative routes.</li> </ul>				
<b>Parameters</b>	<b>Severity</b>	<b>Spatial scale</b>	<b>Duration</b>	<b>Probability</b>	<b>Significance</b>
Pre-Mitigation	(-)3	3	2	6	-48
Post-Mitigation	(-)2	3	2	5	-35

Criteria	Details / Discussion				
<b>Potential Impact</b>	<b>Disruption to traffic flow</b>				
<b>Project activity</b>	<b>Activity 7: Closure of the existing section of the P141-1 alignment and D2770 (R547)</b>				
<b>Description of impact</b>	The closure of the affected roads will result in a disruption of traffic flow as traffic will need to be diverted thus resulting in time delays / extended journey time for commuters, traffic congestion, and poor road conditions during construction.				
<b>Mitigation required</b>	<ul style="list-style-type: none"> <li>▪ On-site contractors must assist in directing traffic during the construction phase, and be conscious of peak traffic times to accommodate smooth flowing traffic as far as practicable.</li> <li>▪ Inform communities of planned construction activities that would affect vehicle/ pedestrian traffic.</li> <li>▪ Ensure that the appropriate signage has been erected to inform road users of the road closures, prior to the closure.</li> <li>▪ Ensure that access to residences and business properties is uninterrupted by providing alternative routes.</li> </ul>				
<b>Parameters</b>	<b>Severity</b>	<b>Spatial scale</b>	<b>Duration</b>	<b>Probability</b>	<b>Significance</b>
<b>Pre-Mitigation</b>	(-)4	4	7	6	-90
<b>Post-Mitigation</b>	(-)3	4	7	5	-70

## 8.5.2 Operational Phase

During the operational phase, there may be several potential impacts associated with each of the planned project activities. The potential impacts of those activities on each resource/receptor are therefore discussed below. The project activities during the operational phase are summarised below in Table 8-18.

**Table 8-18: List of Activities during Operation**

Activity	Description
9	Vehicle movement on new P141-1
10	Maintenance and upgrade of the new P141-1

### 8.5.2.1 Terrestrial Biodiversity

At this phase of the proposed Project, the new realigned road will be used by road users (primarily public users). The only potential impacts that are envisaged to terrestrial biodiversity include the following:





- **Establishment and spread of alien invasive vegetation** – with stockpiling and earth moving activities being undertaken in the construction activities, the potential for alien invasive plant species to establish itself along the road reserve may exist; and
- **Loss of fauna** – the establishment of the new realigned road with the movement of traffic along this road may result in potential killing of fauna attempting to cross the road.

Criteria	Details/Discussion				
Potential Impact	<b>Establishment and spread of alien invasive vegetation</b>				
Project Activity	<b>Activity 10: Maintenance and upgrade of the new P141-1</b>				
Description of impact	Invasive species will out-compete native plants and erode the natural capital of the area.				
Mitigation required	<ul style="list-style-type: none"> <li>▪ Manage alien invasive species establishment continually through chemical or mechanical removal.</li> <li>▪ Reinstate vegetation cover on and along the road reserve.</li> </ul>				
Parameters	Severity	Spatial scale	Duration	Probability	Significance
Pre- Mitigation	(-) 3	2	5	5	-50
Post-Mitigation	(-) 3	2	4	4	-36

Criteria	Details/Discussion				
Potential Impact	<b>Loss of fauna</b>				
Project Activity	<b>Activity 10: Vehicle movement on new P141-1</b>				
Description of impact	The establishment of the new realigned road with the movement of traffic along this road may result in potential killing of fauna attempting to cross the road.				
Mitigation required	<ul style="list-style-type: none"> <li>▪ Erect signage to alert road users of the potential crossing of faunal species so as to avoid any road accidents.</li> </ul>				
Parameters	Severity	Spatial scale	Duration	Probability	Significance
Pre- Mitigation	(-) 3	2	7	6	-72
Post-Mitigation	(-) 3	2	7	5	-60

### 8.5.2.2 Surface Water

The Tweefontein spruit may likely be impacted on due to:

- An increase in stormwater runoff from the road surface which may lead to an increase in the sedimentation load of the spruit; and
- The culvert structure may alter the flow regime and flow path of water within the unnamed tributary and ultimately the Tweefontein spruit. This potential impact refers to the alteration of the flow regime within the culvert as well as the secondary effects downstream of the culvert.

Criteria	Details/Discussion				
Potential Impact	Increase in the sedimentation load of the Tweefontein spruit				
Project Activity	Activity 10: Maintenance and upgrade of the new P141-1				
Description of impact	The road surface will result in an increase of stormwater runoff which may ultimately lead to an increase of the sedimentation load on the Tweefontein spruit thus reducing the overall water quality.				
Mitigation required	<ul style="list-style-type: none"> <li>■ Maintain stormwater channels and remove all debris from stormwater drains.</li> <li>■ Continue monitoring the water quality of the Tweefontein spruit.</li> </ul>				
Parameters	Severity	Spatial scale	Duration	Probability	Significance
Pre- Mitigation	(-) 3	3	6	6	-72
Post-Mitigation	(-) 3	3	6	5	-60



Criteria	Details/Discussion				
Potential Impact	<b>Alteration of the flow regime within the culvert as well as the secondary effects downstream of the culvert.</b>				
Project Activity	<b>Activity 10: Maintenance and upgrade of the new P141-1</b>				
Description of impact	The culvert structure may alter the flow regime and flow path of water within the unnamed tributary and ultimately the Tweefontein spruit.				
Mitigation required	<ul style="list-style-type: none"> <li>▪ Clear any debris accumulated at the outlet, inlet and inside the culvert.</li> <li>▪ Monitor effectiveness of erosion control measures at the culvert.</li> <li>▪ Check for damage to culvert to ensure the structural integrity thereof.</li> </ul>				
Parameters	<b>Severity</b>	<b>Spatial scale</b>	<b>Duration</b>	<b>Probability</b>	<b>Significance</b>
Pre- Mitigation	(-)4	3	7	6	-84
Post-Mitigation	(-)4	3	7	5	-70

### 8.5.2.3 Traffic

With the purpose of the proposed Project being not only to mine the coal resource beneath the existing the road reserve but also to separate mine traffic from public traffic, an improved road condition can be expected. Furthermore, the road network will be able to accommodate the current and planned trips.

Criteria	Details / Discussion				
Potential Impact	<b>Improved road condition and capacity for road users</b>				
Project activity	<b>Activity 9: Vehicle movement on new P141-1</b> <b>Activity 10: Maintenance and upgrade of the new P141-1</b>				
Description of impact	Mine related traffic will be separated from public traffic, an improved road condition can be expected.				
Enhancement Measures	The following measures can alleviate the impacts during maintenance: <ul style="list-style-type: none"> <li>▪ Ensure appropriate road signage alerting road users to the speed limit and bends etc.</li> <li>▪ Resurface the road with an asphalt overlay, as necessary.</li> <li>▪ Repaint the lines and repair potholes, as necessary.</li> </ul>				
Parameters	<b>Severity</b>	<b>Spatial scale</b>	<b>Duration</b>	<b>Probability</b>	<b>Significance</b>
Pre-Enhancement	(+) 3	3	7	5	65
Post-Enhancement	(+) 4	3	7	6	84

### 8.5.3 Decommissioning/Closure Phase

It should be noted that the proposed realignment of the P141-1 Provincial Road is considered a permanent activity. Furthermore, once constructed and commissioned, the road will be under the jurisdiction of the Mpumalanga Department of Public Works, Roads and Transport. Provision will therefore not be made for closure as the provincial road will remain a key part of Mpumalanga’s road transport network.

As previously mentioned, a section of the existing P141-1 Provincial Road as well as a section of the R547 Provincial Road will be permanently closed to enable Glencore to mine through these existing road reserves as part of the Tweefontein Optimisation Project. A separate Environmental Management Programme Report (EMP) was compiled for the Tweefontein Optimisation Project. As part of that EMP, a closure assessment and rehabilitation plan was compiled for the closure and rehabilitation of these existing sections of the P141-1 and R547 Provincial Roads.

*For the purposes of this EIA, the road closure activity refers to taking the affected roads out of active service and will not involve the actual removal of the road infrastructure. The removal of the road infrastructure will be undertaken during the proposed mining activities, covered under the TOP.*

### 8.5.4 Project Related Risks

The following project risks have been identified for the proposed Project, for which risk avoidance measures have been proposed. These measures shall also be incorporated into the EMP.

**Table 8-19: Associated Project Related Risks**

Potential Project Risk (Unplanned Occurrences)	Aspect Potentially Impacted	Risk Avoidance Measures
Spills and leaks occurring during the construction phase as well as once the road is operational (during maintenance or just use of the road to transport materials in the region).	Potential spillages and leaks could occur as a result of transport of hazardous substances (i.e. bitumen and tar) and hydrocarbon containing fuels and lubricants. These can be mobilised to the unnamed tributary and the Tweefontein spruit resulting in soil, groundwater and surface water contamination.	<ul style="list-style-type: none"> <li>▪ If a spill occurs it is to be cleaned up immediately and reported to the appropriate authorities.</li> <li>▪ All vehicles are to be serviced in a correctly bunded area or at an off-site location.</li> <li>▪ The temporary storage facilities of fuel, lubricants and any wastes must be stored on a hard park, roofed and bunded facility.</li> <li>▪ The culvert and associated drains should be and regularly</li> </ul>



Potential Project Risk (Unplanned Occurrences)	Aspect Potentially Impacted	Risk Avoidance Measures
		maintained.
Risk of flooding due to crossing during the operational phase of the road.	Flooding may occur due to high rainfall events/storm events, thus resulting in an overflow of water that may impact the water crossing and ultimately the road.	<ul style="list-style-type: none"> <li>▪ The flood frequency for the design of the culvert should be 1:25 years.</li> <li>▪ Clear any debris accumulated at the outlet, inlet and inside the culvert.</li> <li>▪ Check for damage to culvert to ensure the structural integrity thereof (to be undertaken by the MDPWRT)</li> </ul>
Safety risk in terms of accidents during construction and operation of the road.	Accidents may occur due to poor driving conditions or other factors thus impacting on other road users as well as pedestrians.	<ul style="list-style-type: none"> <li>▪ Erect signage to control the speed limit along the proposed route as well as warnings relating to pedestrians potentially crossing.</li> <li>▪ Road safety measures should be implemented and maintained: the lanes will be demarcated with paint and the required road markers and signboards will be erected. Furthermore the associated guardrails and fencing will be erected where required (to be undertaken by the MDPWRT).</li> </ul>

## 8.6 Item 3(g)(vii): The Positive and Negative Impacts that the Proposed Activity (in Terms of the Initial Site Layout) and Alternatives Will Have on the Environment and the Community that may be Affected

For the reasons provided above in Section 8.1, no alternative other than the most feasible alternative has been assessed (i.e. road realignment avoiding the graveyard). The potential positive and negative impacts are listed below along with the no-go alternative.

### 8.6.1 Positive Impacts

Positive impacts of the proposed Project can be summarised as follows:



- **Skills development due to employment** in the construction phase – Approximately 250 job opportunities will be created during the construction phase of the road realignment. Seventy percent (70%) of the employment opportunities will be for both skilled and semi-skilled workers which will mostly be sourced from the local Ogies community. . Although the construction phase will be completed within 1 year, the road construction employment opportunity will result in skills development;
- **Generation of income due to employment** in the construction phase - a number of employment opportunities will be created for the local community during the construction phase of the proposed Project. It is anticipated that approximately 250 employees will be employed during the construction phase of the proposed Project (approximately 1 year). Approximately 70 % of employees appointed for the construction of Phase 1 are employed directly from the local communities. The extension of employment or opportunity for employment to work on the proposed Project will result in the generation of income and spending capacity;
- **Extension of benefits from the extension of LoM:** The proposed Project will result in a significant increase of the Run of Mine (RoM) coal produced per annum at the Tweefontein Mine Complex (12.5 million tonnes per annum) thus extending the LoM of the Tweefontein Mine Complex and the associated benefits including:
  - Increase of revenue for Glencore and associated government taxes;
  - Increased period of employment at the Tweefontein Mine Complex which will impact the families of these employees directly, thereby having an impact on the community;
  - Increase of potential income for all contractors associated with the construction of the road, the culverts and associated bridges; and
  - An increase in coal production will impact electricity supply from Eskom's coal-fired power stations, as Eskom relies on coal supplied by Glencore.
- **Improved road condition and capacity for road users** during the operational phase - mine related traffic will be separated from public traffic, an improved road condition can be expected.

Positive impacts of the no-go alternative is summarised below:

- The various negative impacts identified as part of the proposed Project will not occur, including loss of habitat, reduction of surface water flow and quality and dust emissions.

### 8.6.2 Negative Impacts

Negative impacts of the proposed Project can be summarised as follows:



- **Loss of topsoil material** during construction, when topsoil is removed from a soil profile, the profile loses effective rooting depth, water holding capacity and fertility. The largest volumes of topsoil will be removed in preparation for the road foundation. The removed soil will be stockpiled for later rehabilitation purposes, although it can still be lost through inappropriate management;
- **Loss of land capability**, excessive compaction of soil during the construction of the road may result in the degradation, densification and distortion of the soil. This, in turn, may reduce biological activity, porosity and permeability of the soil, and result in a change of the soil structure. This may result in the impacts on soil quality as well as the capability of the soil to support other land uses;
- **Loss of vegetation**, the removal of vegetation from the proposed route alignment, particularly grassland and cultivated crops. The removal of vegetation will also result in a potential loss of Species of Special Concern (SSC);
- **Habitat fragmentation**, resulting from the establishment of the new route alignment, thus creating further isolated habitats;
- **Increase in sedimentation load**, the footprint of the realigned route will be exposed, thereby increasing water and wind erosion of soils;
- **Flow reduction of the Tweefontein spruit** during construction, water from the tributary will need to be dammed/ diverted to allow for the establishment of the culvert for the water crossing;
- **Loss of wetland habitat**, the proposed road will traverse the identified hillslope seepage wetland, thus resulting in the loss of wetland habitat;
- **Deterioration of wetland through poor water quality**, the wetlands may be affected as a result of site clearance and topsoil removal, movement of vehicles and the construction of the culvert which may lead to an increase in suspended solids, which may reduce water quality of the tributary and ultimately the Tweefontein spruit;
- **Reduction in quality of aquatic habitat**, the Tweefontein dam has impacted water availability which has led to impacts regarding habitat availability and migration. The increased presence of alien fish species within the Tweefontein spruit has also impacted the indigenous fish population through disrupting breeding patterns and competing for resources within the Tweefontein spruit;
- **Potential impact on air quality** is only associated with site clearing and construction activities that may result in fugitive dust emissions such as PM<sub>10</sub>, PM<sub>2.5</sub> and TSP. This is considered to be a cumulative impact in relation to the existing mining activities and agricultural activities;
- **Direct and indirect impacts on grave sites** can include damage to or destruction of surface dressings caused by diverse actions such as construction activities. Another



impact includes the loss or restricted access to gravesites, degradation of the intrinsic cultural significance (CS) of gravesites associated with living heritage due to loss of access, and health and safety risks to any visitors to gravesites that may be located within mining properties.

- **Increase in traffic and disruption of traffic flow** - the construction activities may disrupt the daily movement patterns of road-users. Traffic will need to be diverted during the construction activities. Furthermore, the closure of the affected roads will also result in disruption of traffic flow as road users become more familiar with the new proposed routes. During construction, material and employees will also be transported to the project site thus generating additional traffic on the road network;
- **Establishment and spread of alien invasive vegetation**, with stockpiling and earth moving activities being undertaken in the construction activities, the potential for alien invasive plant species to establish itself along the road reserve may exist; and
- **Loss of fauna**, the establishment of the new realigned road with the movement of traffic along this road may result in potential killing of fauna attempting to cross the road.

Negative implications of the No-go Option are summarised below:

- The safety risk associated with poor road condition of the existing alignment will persist;
- The potential regional socio-economic benefits of the proposed Project would be lost; and
- A portion of the proven coal reserves held within the Klipplaat East and Klipplaat West pits will remain in situ and will not be developed, leaving the mineral resource and the associated potential economic benefits untapped.

The following project risks have been identified for the proposed Project:

- Spills and leaks occurring during the construction phase as well as once the road is operational (during maintenance or just use of the road to transport materials in the region);
- Risk of flooding due to crossing during the operational phase of the road; and
- Safety risk in terms of accidents during construction and operation of the road.

## 8.7 Item 3(g)(viii): The Possible Mitigation Measures that could be Applied and the Level of Risk

The mitigation measures as proposed in Section 8.7 are briefly presented below for each identified impact as listed in Section 8.6.



Potential Impact	Proposed Mitigation/Enhancement Measure
Loss of Topsoil Material	<ul style="list-style-type: none"> <li>▪ Strip and stockpile topsoil based on the soil type (i.e. red soils, yellow brown soils and grey wetland soils) to preserve the soil potential.</li> <li>▪ Place stockpiles away from the drainage lines and wetland area.</li> <li>▪ The height of the topsoil stockpile should not exceed 2 m.</li> <li>▪ Implement stormwater management controls around the cleared areas as well as around the stockpile areas.</li> <li>▪ Limit construction activities to those areas affected by the project components thereby limiting the footprint of the activities.</li> </ul>
Loss of Land Capability	<ul style="list-style-type: none"> <li>▪ No land capability mitigation is possible as the proposed Project is a permanent activity.</li> </ul>
Loss of Vegetation	<ul style="list-style-type: none"> <li>▪ Reduce the project footprint by clearing only the vegetation that is within the proposed realigned route.</li> <li>▪ Areas to be cleared of vegetation should be walked by a botanist prior to clearing and all SSC should be removed and relocated to similar adjacent habitat.</li> <li>▪ Conserve topsoil material for vegetation of areas around the proposed new realigned road (if needed) or for areas within the Tweefontein Mine Complex.</li> </ul>
Habitat Fragmentation	<ul style="list-style-type: none"> <li>▪ Reduce the project footprint by clearing only the vegetation that is within the proposed realigned route.</li> </ul>
Increase in the sedimentation load of the Tweefontein spruit	<ul style="list-style-type: none"> <li>▪ Limit construction activities to those areas affected by the project components thereby limiting the footprint of the activities.</li> <li>▪ Movement of machinery and vehicles should be restricted to designated paths.</li> <li>▪ Place stockpiles away from the drainage lines and wetland area.</li> <li>▪ Clear only the necessary areas at a time.</li> <li>▪ Berms and trenches should be used during the construction phase to redirect water away from the construction activities.</li> </ul>
Flow reduction of the Tweefontein spruit	<ul style="list-style-type: none"> <li>▪ Undertake construction of the culvert during the dry season (June to August).</li> </ul>
Loss of wetland habitat	<ul style="list-style-type: none"> <li>▪ There is no mitigation proposed as the activity would be permanent.</li> <li>▪ The areas disturbed should however be limited to the footprint of the proposed road alignment.</li> </ul>



Potential Impact	Proposed Mitigation/Enhancement Measure
Deterioration of wetland through poor water quality	<ul style="list-style-type: none"> <li>▪ Clear the area required for the road reserve only.</li> <li>▪ Construct berms and trenches to reduce stormwater runoff on the site.</li> <li>▪ Ensure all stockpiles and construction materials are stored away from drainage lines and at least 100 m from wetland areas.</li> </ul>
Reduction in quality of aquatic habitat due to an increase in sedimentation/contamination of the Tweefontein spruit	<ul style="list-style-type: none"> <li>▪ Limit construction activities to those areas affected by the project components thereby limiting the footprint of the activities.</li> <li>▪ Movement of machinery and vehicles should be restricted to designated paths.</li> <li>▪ Place stockpiles away from the drainage lines and wetland area to avoid run-off.</li> <li>▪ Clear only the necessary areas at a time.</li> <li>▪ Berms and trenches should be used during the construction phase to redirect water away from the construction activities.</li> </ul>
Deterioration and disturbance of aquatic habitat due to flow reduction of the Tweefontein spruit	<ul style="list-style-type: none"> <li>▪ Undertake construction of the culvert during the dry season (June to August).</li> <li>▪ Minimise vegetation removal to infrastructure footprint.</li> <li>▪ Ensure the banks of the spruit are stabilised, prior to construction activities.</li> </ul>
Fugitive dust emissions (i.e. PM <sub>10</sub> , PM <sub>2.5</sub> , TSP)	<ul style="list-style-type: none"> <li>▪ Reduce the speed of the vehicles to 40 km/h or less on site roads.</li> <li>▪ Apply wetting agents or dust suppressant on the dirt road and exposed areas during site clearance.</li> <li>▪ Minimise the area of disturbance by restricting the movement of machinery/vehicles to specific tracks and designated areas within the project site.</li> <li>▪ Minimise areas exposed to wind erosion by phasing site clearing activities.</li> <li>▪ Avoid excavation and stockpiling activities during windy days.</li> <li>▪ Drop heights should be minimised when loading and offloading material.</li> </ul>
Skills development due to employment	<ul style="list-style-type: none"> <li>▪ Identify required skills and align and implement training and skills development initiatives accordingly.</li> <li>▪ Provide local employees with reference letters that they can submit to gain further employment. Also, provide certificates of completion for in-house (on-the-job) training provided.</li> <li>▪ Promote labour -intensive construction methods.</li> </ul>



Potential Impact	Proposed Mitigation/Enhancement Measure
Generation of income due to employment	<ul style="list-style-type: none"> <li>▪ Employment opportunities must be handled through the local Department of Labour.</li> <li>▪ Identify required skills and align and implement training and skills development initiatives accordingly.</li> <li>▪ Provide local employees with reference letters that they can submit to gain further employment. Also, provide certificates of completion for in-house (on-the-job) training provided.</li> <li>▪ Promote labour -intensive construction methods.</li> </ul>
Physical changes to burial sites	<ul style="list-style-type: none"> <li>▪ Gravesites should ideally be conserved in situ, and the consultation process must enable a mutually agreed CMP to be developed and approved, allowing for visitation rights by families.</li> </ul>
Increase in traffic	<ul style="list-style-type: none"> <li>▪ On-site contractors must assist in directing traffic during the construction phase, and be conscious of peak traffic times to accommodate smooth flowing traffic as far as practicable.</li> <li>▪ Inform communities of planned construction activities that would affect vehicle/ pedestrian traffic</li> <li>▪ Ensure that access to residences and business properties is uninterrupted by providing alternative routes.</li> </ul>
Disruption to traffic flow	<ul style="list-style-type: none"> <li>▪ On-site contractors must assist in directing traffic during the construction phase, and be conscious of peak traffic times to accommodate smooth flowing traffic as far as practicable.</li> <li>▪ Inform communities of planned construction activities that would affect vehicle/ pedestrian traffic.</li> <li>▪ Ensure that the appropriate signage has been erected to inform road users of the road closures, prior to the closure.</li> <li>▪ Ensure that access to residences and business properties is uninterrupted by providing alternative routes.</li> </ul>
Establishment and spread of alien invasive vegetation	<ul style="list-style-type: none"> <li>▪ Manage alien invasive species establishment continually through chemical or mechanical removal.</li> <li>▪ Reinstate vegetation cover on and along the road reserve.</li> </ul>
Loss of fauna	<ul style="list-style-type: none"> <li>▪ Erect signage to control the speed limit along the proposed route.</li> </ul>
Increase in the sedimentation load of the Tweefontein spruit	<ul style="list-style-type: none"> <li>▪ Maintain stormwater channels and remove all debris from sormwater drains.</li> <li>▪ Continue monitoring the water quality of the Tweefontein spruit.</li> </ul>



Potential Impact	Proposed Mitigation/Enhancement Measure
Alteration of the flow regime within the culvert as well as the secondary effects downstream of the culvert.	<ul style="list-style-type: none"> <li>▪ Clear any debris accumulated at the outlet, inlet and inside the culvert.</li> <li>▪ Monitor effectiveness of erosion control measures at the culvert.</li> <li>▪ Check for damage to culvert to ensure the structural integrity thereof.</li> </ul>
Improved road condition and capacity for road users	<ul style="list-style-type: none"> <li>▪ Ensure appropriate road signage alerting road users to the speed limit and bends etc.</li> <li>▪ Resurface the road with an asphalt overlay, as necessary.</li> <li>▪ Repaint the lines and repair potholes, as necessary.</li> </ul>
Spills and leaks occurring during the construction phase as well as once the road is operational (during maintenance or just use of the road to transport materials in the region).	<ul style="list-style-type: none"> <li>▪ If a spill occurs it is to be cleaned up immediately and reported to the appropriate authorities.</li> <li>▪ All vehicles are to be serviced in a correctly bunded area or at an off-site location.</li> <li>▪ The temporary storage facilities of fuel, lubricants and any wastes must be stored on a hard park, roofed and bunded facility.</li> <li>▪ The culvert and associated drains should be and regularly maintained.</li> </ul>
Risk of flooding due to crossing during the operational phase of the road.	<ul style="list-style-type: none"> <li>▪ The flood frequency for the design of the culvert should be 1:25 years.</li> <li>▪ Clear any debris accumulated at the outlet, inlet and inside the culvert.</li> <li>▪ Check for damage to culvert to ensure the structural integrity thereof.</li> </ul>
Safety risk in terms of accidents during construction and operation of the road.	<ul style="list-style-type: none"> <li>▪ Erect signage to control the speed limit along the proposed route as well as warnings relating to pedestrians potentially crossing.</li> <li>▪ Road safety measures should be implemented and maintained: the lanes will be demarcated with paint and the required road markers and signboards will be erected. Furthermore the associated guardrails and fencing will be erected where required.</li> <li>▪ All contractors are to ensure the necessary Personal Protective Equipment (PPE) is worn by all employees at all times whilst on site including a hard hat and a reflective vest.</li> </ul>

## **8.6 Item 3(g)(ix): Motivation where no Alternative Sites were Considered**

It is recognised that in some cases, an alternative location or site cannot be considered due to the nature of the project. In the case of this proposed Project, the P141-1 Provincial Road is planned to be realigned for the purposes of mining the coal resource beneath the road. Since mining and extraction can only occur at the location of an ore body, it is not feasible to consider alternative locations. It is also recognised that coal resources may occur at several different locations across the region, however the feasibility of this specific area, located within the Tweefontein Mine Complex has been proved through the TOP, concluded in 2008. The proposed Project will result in a significant increase of the Run of Mine (RoM) coal produced per annum at the Tweefontein Mine Complex (12.5 million tonnes per annum).

Hence, no other alternative locations have been identified or assessed in this EIA Report as it would not meet the overall objective of the proposed Project, which is ultimately to allow Glencore to mine the coal resource beneath the P141-1 Provincial Road. The route alternatives are located on the RE and Portion 1 of the Farm Tweefontein 13 IS and are discussed in more detail in 8.1.4.

## **8.7 Item 3(g)(x): Statement Motivating the Alternative Development Location within the Overall Site**

The revised route for the road realignment has been selected, firstly, due to its avoidance of a culturally significant site, that is, the graveyard which holds  $\pm 1000$  graves. A buffer will be maintained around this graveyard to ensure controlled access to the site. This revised route also allows for the following positive impacts related to the proposed Project:

- Continued mining at the Tweefontein Mine Complex and associated economic benefits thereof;
- Continued employment for existing mine employees; and
- Potentially improved road conditions for public use for the section of the P141-1 that will be realigned.

Although there will be impacts related to the revised route alternative in respect to vegetation and soil, a large extent of the area to be impacted by the realignment has already been impacted upon due to its location within the Tweefontein Mine Complex.

---

## **9 Item 3(h): Full Description of the Process Undertaken to Identify, Assess and Rank the Impacts and Risks the Activity will Impose on the Preferred Site (In Respect of the Final Site Layout Plan) Through the Life of the Activity**

Refer to Section 8.4 for a description of the process undertaken to identify, assess and rank the impacts, the proposed Project will impose on the preferred site.

Refer to Section 10 below for a description of all environmental issues and risks that were identified during the environmental impact assessment process.



## 10 Item 3(i): Assessment of Each Identified Potentially Significant Impact and Risk

Table 10-1: Impact Assessment Summary

Project Activity/s	Potential Impact	Aspects Affected	Phase	Significance (Pre-Mitigation)	Mitigation Type	Significance (Post-Mitigation)
Activity 1: Site clearance and removal of topsoil Activity 2: Movement of construction vehicles and equipment Activity 4: Construction of new realigned section of the P141-1 and associated bridge Activity 5: Construction of culvert (water crossing)	Loss of topsoil material	Soils, land capability and land-use	Construction	Minor negative (-44)	<ul style="list-style-type: none"> <li>Strip and stockpile topsoil based on the soil type (i.e. red soils, yellow brown soils and grey wetland soils) to preserve the soil potential.</li> <li>Place stockpiles away from the drainage lines and wetland area.</li> <li>The height of the topsoil stockpile should not exceed 2 m.</li> <li>Implement stormwater management controls around the cleared areas as well as around the stockpile areas.</li> <li>Limit construction activities to those areas affected by the project components thereby limiting the footprint of the activities.</li> </ul>	Negligible negative (-32)
Activity 1: Site clearance and removal of topsoil Activity 4: Construction of new realigned section of the P141-1 and associated bridge	Loss of land capability	Soils, land capability and land-use	Construction	Moderate negative (-91)	<ul style="list-style-type: none"> <li>No land capability mitigation is possible as the proposed Project is a permanent activity.</li> </ul>	Moderate negative (-91)
Activity 1: Site clearance and removal of topsoil Activity 4: Construction of new realigned section of the P141-1 and associated bridge	Loss of Vegetation	Terrestrial biodiversity	Construction	Moderate negative (-91)	<ul style="list-style-type: none"> <li>Reduce the project footprint by clearing only the vegetation that is within the proposed realigned route.</li> <li>Areas to be cleared of vegetation should be walked by a botanist prior to clearing and all SSC should be removed and relocated to similar adjacent habitat.</li> <li>Conserve topsoil material for vegetation of areas around the proposed new realigned road (if needed) or for areas within the Tweefontein Mine Complex.</li> </ul>	Moderate negative (-84)
Activity 1: Site clearance and removal of topsoil Activity 4: Construction of new realigned section of the P141-1 and associated bridge	Habitat Fragmentation	Terrestrial biodiversity	Construction	Major negative (-105)	<ul style="list-style-type: none"> <li>Reduce the project footprint by clearing only the vegetation that is within the proposed realigned route.</li> </ul>	Moderate negative (-98)

Project Activity/s	Potential Impact	Aspects Affected	Phase	Significance (Pre-Mitigation)	Mitigation Type	Significance (Post-Mitigation)
Activity 10: Maintenance and upgrade of the new P141-1	Establishment and spread of alien invasive vegetation	Terrestrial biodiversity	Operation	Minor negative (-50)	<ul style="list-style-type: none"> <li>Manage alien invasive species establishment continually through chemical or mechanical removal.</li> <li>Reinstate vegetation cover on and along the road reserve.</li> </ul>	Minor negative (-36)
Activity 10: Vehicle movement on new P141-1	Loss of fauna	Terrestrial biodiversity	Operation	Minor negative (-72)	<ul style="list-style-type: none"> <li>Erect signage to alert road users of the potential crossing of faunal species.</li> </ul>	Minor negative (-60)
Activity 1: Site clearance and topsoil removal Activity 2: Movement of construction vehicles and equipment Activity 4: Construction of new realigned section of the P141-1 and associated bridge Activity 5: Construction of culvert (water crossing)	Increase in the sedimentation load of the Tweefontein spruit	Surface water	Construction	Minor negative (-45)	<ul style="list-style-type: none"> <li>Limit construction activities to those areas affected by the project components thereby limiting the footprint of the activities.</li> <li>Movement of machinery and vehicles should be restricted to designated paths.</li> <li>Place stockpiles away from the drainage lines and wetland area.</li> <li>Clear only the necessary areas at a time.</li> <li>Berms and trenches should be used during the construction phase to redirect water away from the construction activities.</li> </ul>	Negligible negative (-32)
Activity 5: Construction of culvert (water crossing)	Flow reduction of the Tweefontein spruit	Surface water	Construction	Minor negative (-54)	<ul style="list-style-type: none"> <li>Undertake construction of the culvert during the dry season (June to August).</li> </ul>	Minor negative (-45)
Activity 10: Maintenance and upgrade of the new P141-1	Increase in the sedimentation load of the Tweefontein spruit	Surface water	Operation	Minor negative (-72)	<ul style="list-style-type: none"> <li>Maintain stormwater channels and remove all debris from stormwater drains.</li> <li>Continue monitoring the water quality of the Tweefontein spruit.</li> </ul>	Minor negative (-60)
Activity 10: Maintenance and upgrade of the new P141-1	Alteration of the flow regime within the culvert as well as the secondary effects downstream of the culvert	Surface water	Operation	Moderate negative (-84)	<ul style="list-style-type: none"> <li>Clear any debris accumulated at the outlet, inlet and inside the culvert.</li> <li>Monitor effectiveness of erosion control measures at the culvert.</li> <li>Check for damage to culvert to ensure the structural integrity thereof.</li> </ul>	Minor negative (-70)
Activity 1: Site clearing and topsoil removal for road construction Activity 4: Construction of new realigned section of the P141-1 and associated bridge Activity 5: Construction of culvert (water crossing)	Loss of wetland habitat	Wetland	Construction	Major negative (-112)	<ul style="list-style-type: none"> <li>There is no mitigation proposed as the activity would be permanent.</li> <li>The areas disturbed should however be limited to the footprint of the proposed road alignment.</li> </ul>	Moderate negative (-90)

Project Activity/s	Potential Impact	Aspects Affected	Phase	Significance (Pre-Mitigation)	Mitigation Type	Significance (Post-Mitigation)
<p>Activity 1: Site clearing and topsoil removal for road construction</p> <p>Activity 2: Movement of construction vehicles and equipment</p> <p>Activity 4: Construction of new realigned section of the P141-1 and associated bridge</p> <p>Activity 5: Construction of culvert (water crossing)</p>	Deterioration of wetland through poor water quality	Wetland	Construction	Minor negative (-45)	<ul style="list-style-type: none"> <li>Clear the area required for the road reserve only.</li> <li>Construct berms and trenches to reduce stormwater runoff on the site.</li> <li>Ensure all stockpiles and construction materials are stored away from drainage lines and at least 100 m from wetland areas.</li> </ul>	Negligible negative (-28)
<p>Activity 1: Site clearance and topsoil removal</p> <p>Activity 2: Movement of construction vehicles and equipment</p> <p>Activity 4: Construction of new realigned section of the P141-1 and associated bridge</p> <p>Activity 5: Construction of culvert (water crossing)</p>	Reduction in quality of aquatic habitat due to an increase in sedimentation/contamination of the Tweefontein spruit	Aquatic ecology	Construction	Minor negative (-45)	<ul style="list-style-type: none"> <li>Limit construction activities to those areas affected by the project components thereby limiting the footprint of the activities.</li> <li>Movement of machinery and vehicles should be restricted to designated paths.</li> <li>Place stockpiles away from the drainage lines and wetland area to avoid run-off.</li> <li>Clear only the necessary areas at a time.</li> <li>Berms and trenches should be used during the construction phase to redirect water away from the construction activities.</li> </ul>	Negligible negative (-32)
<p>Activity 5: Construction of culvert (water crossing)</p>	Deterioration and disturbance of aquatic habitat due to flow reduction of the Tweefontein spruit	Aquatic ecology	Construction	Minor negative (-54)	<ul style="list-style-type: none"> <li>Undertake construction of the culvert during the dry season (June to August).</li> <li>Minimise vegetation removal to infrastructure footprint.</li> <li>Ensure the banks of the spruit are stabilised, prior to construction activities.</li> </ul>	Minor negative (-45)
<p>Activity 1: Site clearing and topsoil removal for road construction</p> <p>Activity 2: Movement of construction vehicles and equipment</p> <p>Activity 4: Construction of new realigned section of the P141-1 and associated bridge</p> <p>Activity 5: Construction of culvert (water crossing)</p>	Fugitive dust emissions (i.e. PM <sub>10</sub> , PM <sub>2.5</sub> , TSP)	Air quality	Construction	Minor negative (-48)	<ul style="list-style-type: none"> <li>Reduce the speed of the vehicles to 40 km/h or less on site roads.</li> <li>Apply wetting agents or dust suppressant on the dirt road and exposed areas during site clearance.</li> <li>Minimise the area of disturbance by restricting the movement of machinery/vehicles to specific tracks and designated areas within the project site.</li> <li>Minimise areas exposed to wind erosion by phasing site clearing activities.</li> <li>Avoid excavation and stockpiling activities during windy days.</li> <li>Drop heights should be minimised when loading and offloading material.</li> </ul>	Negligible negative (-24)

Project Activity/s	Potential Impact	Aspects Affected	Phase	Significance (Pre-Mitigation)	Mitigation Type	Significance (Post-Mitigation)
Activity 8: Direct employment and procurement of goods	Skills development due to employment	Community	Construction	Negligible positive (+21)	<ul style="list-style-type: none"> <li>Identify required skills and align and implement training and skills development initiatives accordingly.</li> <li>Provide local employees with reference letters that they can submit to gain further employment. Also, provide certificates of completion for in-house (on-the-job) training provided.</li> <li>Promote labour -intensive construction methods.</li> </ul>	Minor positive (+40)
Activity 8: Direct employment and procurement of goods	Generation of income due to employment	Community	Construction	Negligible positive (+21)	<ul style="list-style-type: none"> <li>Employment opportunities must be handled through the local Department of Labour.</li> <li>Identify required skills and align and implement training and skills development initiatives accordingly.</li> <li>Provide local employees with reference letters that they can submit to gain further employment. Also, provide certificates of completion for in-house (on-the-job) training provided.</li> <li>Promote labour -intensive construction methods.</li> </ul>	Minor positive (+40)
<p>Activity 1: Site clearing and topsoil removal for road construction</p> <p>Activity 2: Movement of construction vehicles and equipment</p> <p>Activity 4: Construction of new realigned section of the P141-1 and associated bridge</p> <p>Activity 5: Construction of culvert (water crossing)</p>	Physical changes to burial grounds and graves	Cultural heritage	Construction	Moderate negative (-100)	<ul style="list-style-type: none"> <li>GY 01 must be preserved in situ. Potential direct impacts to the burial ground should be mitigated through the implementation of a CMP that includes: <ul style="list-style-type: none"> <li>Establishing a buffer of 25 m around the burial ground and graves;</li> <li>Educating engineers and construction workers of the location of the burial grounds and potential direct impacts; and</li> </ul> </li> <li>Monitoring of the burial grounds and graves during the construction phase of the road re-alignment.</li> </ul>	Negligible negative (-27)
<p>Activity 1: Site clearing and topsoil removal for road construction</p> <p>Activity 2: Movement of construction vehicles and equipment</p> <p>Activity 4: Construction of new realigned section of the P141-1 and associated bridge</p> <p>Activity 5: Construction of culvert (water crossing)</p>	Effects on communities	Cultural heritage	Construction	Moderate negative (-90)	<ul style="list-style-type: none"> <li>An extensive Burial Grounds and Graves Consultation process must be implemented in accordance with NHRA Regulations to identify bona fide next of kin and reach agreement regarding the future of the graves. Gravesites should ideally be conserved in situ, and the consultation process must enable a mutually agreed CMP to be developed and approved, allowing for visitation rights by families.</li> </ul>	Moderate positive (+75)

Project Activity/s	Potential Impact	Aspects Affected	Phase	Significance (Pre-Mitigation)	Mitigation Type	Significance (Post-Mitigation)
<p>Activity 2: Movement of construction vehicles and equipment</p> <p>Activity 3: Storage of materials/fuels at existing contractor camp</p> <p>Activity 4: Construction of new realigned section of the P141-1 and associated bridge</p>	Increase in traffic	Traffic	Construction	Minor negative (-48)	<ul style="list-style-type: none"> <li>On-site contractors must assist in directing traffic during the construction phase, and be conscious of peak traffic times to accommodate smooth flowing traffic as far as practicable.</li> <li>Inform communities of planned construction activities that would affect vehicle/ pedestrian traffic.</li> <li>Ensure that access to residences and business properties is uninterrupted by providing alternative routes.</li> </ul>	Negligible negative (-35)
<p>Activity 7: Closure of the existing section of the P141-1 alignment and D2770 (R547)</p>	Disruption to traffic flow	Traffic	Construction	Moderate negative (-90)	<ul style="list-style-type: none"> <li>On-site contractors must assist in directing traffic during the construction phase, and be conscious of peak traffic times to accommodate smooth flowing traffic as far as practicable.</li> <li>Inform communities of planned construction activities that would affect vehicle/ pedestrian traffic.</li> <li>Ensure that the appropriate signage has been erected to inform road users of the road closures, prior to the closure.</li> <li>Ensure that access to residences and business properties is uninterrupted by providing alternative routes.</li> </ul>	Minor negative (-35)
<p>Activity 9: Vehicle movement on new P141-1</p> <p>Activity 10: Maintenance and upgrade of the new P141-1</p>	Improved road condition and capacity for road users	Traffic	Operation	Minor positive (+65)	<ul style="list-style-type: none"> <li>Ensure appropriate road signage alerting road users to the speed limit and bends etc.</li> <li>Resurface the road with an asphalt overlay, as necessary.</li> <li>Repaint the lines and repair potholes, as necessary.</li> </ul>	Moderate positive (+84)

## 11 Item 3(j): Summary of Specialist Reports

Table 11-1 details the specialist studies undertaken for the TOP that were utilised in undertaking the assessment for the proposed Project.



**Table 11-1: Summary of Specialist Studies**

List of Studies Undertaken	Recommendations of Specialist Reports	Specialist Recommendations that have been included in the EIA Report	Reference to Applicable Section of Report where Specialist Recommendations have been Included
Soils, Land Capability and Land Use Assessment	<ul style="list-style-type: none"> <li>▪ Stripping of soils within wetland areas must be authorised by the relevant government authorities.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Strip and stockpile topsoil based on the soil type (i.e. red soils, yellow brown soils and grey wetland soils) to preserve the soil potential.</li> <li>▪ The height of the topsoil stockpile should not exceed 2 m.</li> <li>▪ If a spill occurs it is to be cleaned up immediately and reported to the appropriate authorities.</li> </ul>	The Soils, Land Capability and Land Use Report is included in Appendix D3
Terrestrial Biodiversity Impact Assessment	<ul style="list-style-type: none"> <li>▪ Ensure activities do not affect areas of high sensitivity.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Areas to be cleared of vegetation should be walked by a botanist prior to clearing and individuals of these species should be removed and relocated to similar adjacent habitat.</li> <li>▪ Areas of bare soil need to be regularly monitored by a team trained in the recognition of invasive alien plants and the use of appropriate herbicides. This team should be responsible for the control of populations of alien plants that attempt to establish.</li> <li>▪ Enforce speed restrictions on roads and limit road access at night.</li> <li>▪ Control access of people into area and only have minimal staff needed on site.</li> <li>▪ The biodiversity management plan must be updated to include the road realignment areas that fall within the Tweefontein Mine Complex.</li> </ul>	The Biodiversity Impact Assessment for the proposed Project is included in Appendix D6.
Surface Water Impact Assessment	<ul style="list-style-type: none"> <li>▪ Implement surface water monitoring programme</li> </ul>	<ul style="list-style-type: none"> <li>▪ Water monitoring procedures must be adhered to, especially of the upstream and downstream Tweefontein spruit. The monitoring programme reporting schedule which must be adhered to is as follows: <ul style="list-style-type: none"> <li>▪ Monthly internal report;</li> <li>▪ Quarterly report submitted to the DMR/DWS; and</li> <li>▪ An annual monitoring report, as well as an annual audit (performance assessment) to ensure the efficacy of the water management systems which are in place.</li> </ul> </li> <li>▪ Appropriate stormwater management measures must be in place for the duration of the construction and operational phases.</li> <li>▪ Disturbed areas must be kept to a minimum.</li> <li>▪ Hydrocarbon spill must be cleaned up immediately.</li> </ul>	The Surface Water Impact Assessment Report is included in Appendix D4.
Wetlands Impact Assessment	<ul style="list-style-type: none"> <li>▪ Ensure activities do not affect areas of wetlands.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Undertake construction during the dry season as far as possible. Use existing tracks and roads to access the required construction sites. Locate all laydown areas and temporary construction infrastructure at least 100m from delineated wetland habitat, preferably on already disturbed land. Clearly demarcate identified laydown areas.</li> <li>▪ Rehabilitate disturbed areas immediately following completion of construction activities.</li> <li>▪ Develop and submit detailed method statements of all required wetland crossings to the DWA for approval.</li> <li>▪ Limit the extent of exposed bare soils surfaces at any one time by phasing clearing activities. Clear areas only in the week prior to commencement of construction activities.</li> <li>▪ Implement a construction stormwater management plan that aims to limit sediment movement of site and prevents the concentrated discharge of flows and high velocity discharges off site.</li> </ul>	The Wetland Delineation Report is included in Appendix D7.



List of Studies Undertaken	Recommendations of Specialist Reports	Specialist Recommendations that have been included in the EIA Report	Reference to Applicable Section of Report where Specialist Recommendations have been Included
Air Quality	<ul style="list-style-type: none"> <li>▪ In light of the findings and the elevated particulate baseline ambient air quality levels, it was recommended that air quality management measures be implemented to ensure the lowest possible impacts on the surrounding environment from proposed operation</li> </ul>	<ul style="list-style-type: none"> <li>▪ Reduce the speed of the vehicles to 40 km/h or less on site roads.</li> <li>▪ Apply wetting agents or dust suppressant on the dirt road and exposed areas during site clearance.</li> <li>▪ Minimise the area of disturbance by restricting the movement of machinery/vehicles to specific tracks and designated areas within the project site.</li> <li>▪ Minimise areas exposed to wind erosion by phasing site clearing activities.</li> <li>▪ Avoid excavation and stockpiling activities during windy days.</li> <li>▪ Drop heights should be minimised when loading and offloading material.</li> </ul>	The Air Quality Impact Assessment Report is included in Appendix D2.
Heritage Impact Assessment	<ul style="list-style-type: none"> <li>▪ Avoid any direct/indirect impact to burial grounds/graves.</li> </ul>	<ul style="list-style-type: none"> <li>▪ An extensive BGGC process must be implemented in accordance with NHRA: Regulations to identify bona fide next of kin and reach agreement regarding the relocation of graves.</li> <li>▪ Glencore will be responsible for all costs associated with the GRP (should it be found to be necessary) ensure that identified next of kin provide informed consent, and implement the permit application process as per the NHRA: Regulations.</li> </ul>	The Heritage Impact Assessment Report is included in Appendix D8.
Traffic Impact Assessment	<ul style="list-style-type: none"> <li>▪ To minimise the impact to road users and improve the road condition.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Design and construction of the new P141-1 realignment must adhere to the standards of the provincial roads authority and final designs submitted to the Department.</li> <li>▪ Minimum road improvements, as set out in the TIA, be adhered to.</li> </ul>	The Traffic Impact Assessment Report is included in Appendix D9.

## 12 Item 3(k): Environmental Impact Statement

### 12.1 Item 3(k)(i): Summary of the Key Findings of the Environmental Impact Assessment

Based on the significance ratings assigned to the anticipated environmental impacts, it is evident from the EIA and associated mitigation that the major concerns with regards to the proposed Project include impacts on flora, fauna, wetlands, surface water and I&APs.

#### 12.1.1 Terrestrial Biodiversity

It is likely that there will be significant impacts to fauna and flora as a result of the proposed Project. These impacts include the reduction and fragmentation of habitat for fauna as well as the alteration of habitat by the establishment of alien invasive vegetation.

#### 12.1.2 Aquatic Ecology

The watercourse crossing and the construction of the box cut culvert will result in a permanent modification of the watercourse morphology. The box cut culvert will also alter the movement of aquatic biota, water quality and flow of the watercourse. Impacts relating to continuous erosion and sedimentation will impact on the health of the watercourse. Hydrocarbon spillages during both the construction and operational phase may also have a minimal impact on the watercourse. Toxins that are absorbed by the aquatic biota may have long impacts on the biota within the watercourse.

#### 12.1.3 Surface Water:

It is likely that the proposed Project will result in the following surface water impacts:

- Increase in surface water runoff due to increased impermeable surface areas;
- Alteration in flow paths and flow regime of surface water along the route alignment of the proposed road;
- Alteration in flow paths and flow regime, as culverts will be constructed, the side walls of individual culvert boxes will be placed within the river bed. Backwater effects will be felt ahead of the culvert and downstream of the culvert, the water flow is also likely to be altered;
- Damming of water flow for the construction of the culverts, resulting in reduced downstream water flow; and
- Decreased water quality as a result of increased erosion (suspended solids).

#### 12.1.4 Wetlands

It is likely that the proposed Project will result in the following impacts to wetlands:

- Alteration in the structure and functioning of the wetland systems (channelled valley bottom wetlands and hillslope seepage wetlands);
- Destruction of wetland habitat for aquatic fauna and flora; and
- Increase in erosion ahead of and beyond the box cut culverts, increasing suspended solids, and affecting water quality which may lead to impacts to riparian vegetation as a result of increased erosion, increased surface runoff, and potential of establishment of alien invasive species.

### 12.1.5 Community/Traffic

The proposed Project will result in the following positive impacts to the communities and road users, these are:

- **Skills development due to employment** in the construction phase – Approximately 250 job opportunities will be created during the construction phase of the road re-alignment. Seventy percent (70%) of the employment opportunities will be for both skilled and semi-skilled workers which will mostly be sourced from the local Ogies community. . Although the construction phase will be completed within 1 year, the road construction employment opportunity will result in skills development;
- **Generation of income due to employment** in the construction phase - a number of employment opportunities will be created for the local community during the construction phase of the proposed Project. It is anticipated that approximately 250 employees will be employed during the construction phase of the proposed Project (approximately 1 year). Approximately 70 % of employees appointed for the construction of Phase 1 are employed directly from the local communities. The extension of employment or opportunity for employment to work on the proposed Project will result in the generation of income and spending capacity;
- **Extension of benefits from the extension of LoM:** The proposed Project will result in a significant increase of the Run of Mine (RoM) coal produced per annum at the Tweefontein Mine Complex (12.5 million tonnes per annum) thus extending the LoM of the Tweefontein Mine Complex and the associated benefits including:
  - Increase of revenue for Glencore and associated government taxes;
  - Increased period of employment at the Tweefontein Mine Complex which will impact the families of these employees directly, thereby having an impact on the community;
  - Increase of potential income for all contractors associated with the construction of the road, the culverts and associated bridges; and
  - An increase in coal production will impact electricity supply from Eskom's coal-fired power stations, as Eskom relies on coal supplied by Glencore.

- **Improved road condition and capacity for road users** during the operational phase - mine related traffic will be separated from public traffic, an improved road condition can be expected.

## 12.2 Item 3(k)(ii): Final Site Map

The composite plan for the Project area, indicating sensitive areas such as heritage resources and watercourse buffers, is included as Plan 12, Appendix B.

## 12.3 Item 3(k)(iii): Summary of the Positive and Negative Implications and Risks of the Proposed Activity and Identified Alternatives

The positive and negative implications and risks associated with the proposed Project have been set out in Section 8.6 of this EIA report.

## 13 Item 3(l): Proposed Impact Management Objectives and the Impact Management Outcomes for Inclusion in the EMPR

The EMP Report seeks to achieve a required end state and describes how activities that have, or could have, an adverse impact on the environment will be mitigated, controlled and monitored.

This EMP Report addresses the environmental impacts during the construction and operational phases of the proposed Project. The proposed Project is considered a permanent activity; therefore the decommissioning phase is not applicable to the proposed road realignment. Due regard must be given to environmental protection during the entire Project. A number of environmental recommendations are therefore made to achieve environmental protection.

### 13.1 Environmental Objectives and Goals

The environmental objectives for the construction and operational phases are to:

- Protect the biophysical environment from any impacts that cannot be mitigated and that will negatively impact on biodiversity on a regional scale;
- Preserve the water resources in line with the objectives of the integrated catchment management and thereby ensure that the limited available resources are utilised to the maximum benefit of the country and its inhabitants; and
- Ensure a safe environment for people to live in as is stipulated in the constitution.

### 13.2 Socio-economic Objectives and Goals

The following socio-economic objectives should be attained during the construction and operation phases of the proposed Project:

- Adhere to an open and transparent communication procedure with stakeholders at all times;
- Ensure that accurate and regular information is communicated to I&APs in a manner which is understandable and accessible;
- Mitigate negative social impacts;
- Enhance Project benefits and minimise negative impacts through intensive consultation with stakeholders;
- Assemble adequate, accurate, appropriate, and relevant socio-economic information relating to the context of the operation;
- Ensure that recruitment strategies for the mine, prioritise the sourcing of local labour, and share in gender equality;
- Ensure an atmosphere of equality and non-discrimination among the workforce;
- Contribute to the development of functional literacy and numeracy among employees;
- Empower the workforce to develop skills that will equip them to obtain employment in other sectors of the economy;
- Contribute to the development of a self-reliant (not dependent on the mine) community surrounding the area of operation; and
- Ensure that decommissioning and retrenchments take place in a legally compliant and humane manner.

## 14 Item 3(m): Final Proposed Alternatives

The proposed P141-1 Provincial Road commences from the intersection with the D2769 extension road (currently under construction as part of Phase 1). The proposed realignment follows a northwest direction from the D2769 extension road and crosses over the existing mine haul road. It will then cross over the Waterpan No 1a dump which will be removed prior to construction of the proposed road. The proposed route is curved slightly eastward to avoid the existing graveyard. The proposed route continues in a northwest direction through grassland (undisturbed area) and extends over a wetland. The proposed realignment then proceeds to join the existing P 141-1 Provincial Road at the point where it intersects the mine access road. Refer to Plan 4 in Appendix B for the final proposed route alignment.

## 15 Item 3(n): Aspects for Inclusion as Conditions of Authorisation<sup>4</sup>

The authorisation should be subject to the following conditions:

---

<sup>4</sup> This section corresponds with Item 3(m) of the EIA Regulations, 2014

- An external environmental audit must be carried out on completion of the construction Phase of the project to ensure that the mitigation measures have been suitably implemented and to recommend any alterations to be made to ensure maximum compliance with the approved EIR, EMP and ROD;
- The proposed Project should remain in full compliance with the requirements of the EMP and with all regulatory requirements;
- The EMP should be implemented by one or more senior and qualified environmental practitioners who have competence and credibility to interpret the requirements of the EIA and the EMP, and who must be issued with a written mandate by Glencore to provide guidance and instructions to the contractors;
- Stakeholder engagement should be maintained during the construction and operational phases of the Project, with the emphasis on on-going provision of information pertaining to the Project, and with the goal of maintaining constructive and mutually respectful stakeholder relations;
- A detailed record of all activities related to environmental and social management, as well as stakeholder engagement, should be retained for review and audit by independent parties for all phases of the Project. The audit findings should be made available to the relevant environmental and local authorities;
- Should any material of archaeological or cultural significance be encountered during construction, all activities must cease immediately and SAHRA be informed;
- No alterations may be made to the route alignment, without the required Environmental Authorisations granted by all authorising authorities;
- No additional listed activities may be undertaken by the proponent without first obtaining the relevant approvals thereto; and
- Any substantive changes to the Project configuration should be the subject of environmental assessments and should result in amendments to the EMP. Information related to any such changes should be made available to the authorities as well as for public review.

## 16 Item 3(o): Description of any Assumptions, Uncertainties and Gaps in Knowledge

The following knowledge gap has been identified for the proposed Project:

- It is not clear whether or not any portions of the road will be constructed on previously mined land, and if so what additional safety measures have been put in place to ensure the stability of the road.

The following limitation was identified with the specialist studies that were utilised for the compilation of the proposed Project. This is discussed below.

- The specialist studies that were used to compile this EIA Report were obtained from the EIA and EMP undertaken for the Tweefontein Optimisation Project which considered a study area of the entire Tweefontein Mine Complex. It should be noted that whilst a comprehensive baseline is provided for the entire complex, this EIA considered only those aspects which were of relevance to the proposed realigned road. Where possible, the most recent and up to date monitoring reports were obtained to determine the recent status of environment. For the purposes of this EIA report, the specialist reports referred to in this EIA Report were considered adequate.

Refer to the separate specialist reports for the limitations/gaps in each.

## **17 Item 3(p): Reasoned Opinion as to Whether the Proposed Activity should or should not be Authorised**

### **17.1 Item 3(p)(i): Reasons why the Activity should be Authorised or not**

The authorisation of this Project will allow Glencore to continue with their mining operations.

As stated in the MPRDA (2002), the Government's objective is to maximise the benefit of the nation's mineral resources for the benefit of all South Africans. By continuing the production of coal from the mining area this objective can be accomplished.

The findings of the impact assessment have shown that the proposed Project may result in certain negative impacts to the environment, however, adequate mitigation measures have been included into this EIA and EMP Report to reduce the significance of all the identified negative impacts. Most negative impacts can be reduced through the implementation of mitigation measures.

The positive impacts associated with the proposed Project include the continued (and potentially improved) economic benefit associated with the construction of the road, as well as an improved road condition.

### **17.2 Item 3(p)(ii): Conditions that must be Included in the Authorisation**

#### **17.2.1 Specific Conditions to be Included into the Compilation and Approval of EMPR**

To ensure that the impact of the proposed Project does not result cause irreversible damage to the receiving environment, the following conditions of the EMP Report must be adhered to:

- In general, where mitigation measures have been suggested, these measures must be implemented and adhered to throughout the life of the project;
- Monitoring procedures must be carried out and the results thereof be made available to the relevant authorities;



- The Water Use Licence associated with the proposed construction of the road must be granted before construction of the culvert may commence, or the construction of the road encroaches on the wetland; and
- No deviations from the approved realignment route, or additional Listed Activities may be undertaken without prior consultation and consent from the Competent Authority.

Refer also to Section 15.

### **17.2.2 Rehabilitation Requirements**

The realigned and upgraded provincial road is seen as a permanent linear structure therefore no decommissioning and rehabilitation will take place. However, during the construction phase and the operational phase, rehabilitation of certain aspects of the environment may need to occur should any associated impacts be identified. Refer to Section B of this report, subsection 7.1.3, for a detailed discussion of potential rehabilitation requirements during the construction and operation phases of the **proposed** Project.

## **18 Item 3(q): Period for which Environmental Authorisation is Required**

As the activity is a permanent activity, the period for which an environmental authorisation is required is on-going.

## **19 Item 3(r): Undertaking**

The undertaking required to meet the requirements of this section is provided at the end of the EMP Report in Part B, Section 12.

## **20 Item 3(s): Financial Provision**

### **20.1 Item 3(s)(i): Explain how the Aforesaid Amount was Derived**

Not applicable. The realigned and upgraded provincial road is seen as a permanent linear structure therefore no decommissioning and rehabilitation will take place. Furthermore, the roads which are to be decommissioned will be mined through, therefore the provision for closure has been made under Glencore's existing Mining Right for the Tweefontein Optimisation Project. As part of the Tweefontein Optimisation Project, I&APs were provided the opportunity to review the rehabilitation and closure plan.

### **20.2 Item 3(s)(ii): Confirm that this Amount can be Provided for from Operating Expenditure**

Not applicable. The realigned and upgraded provincial road is seen as a permanent linear structure therefore no decommissioning and rehabilitation will take place. The determination

of the financial provision (closure costing) has therefore not been undertaken for this proposed Project, however, closure costs associated with the Tweefontein Optimisation Project may be obtained from Glencore.

## 21 Item 3(t): Deviations from the Approved Scoping Report and Plan of Study

### 21.1 Item 3(t)(i): Deviations from the Methodology used in Determining the Significance of Potential Environmental Impacts and Risks

No deviations were undertaken from the approved Scoping Report submitted to the DMR on 14 May 2015.

### 21.2 Item 3(t)(ii): Motivation for the Deviation

No deviations were undertaken from the approved Scoping Report submitted to the DMR on 14 May 2015.

## 22 Item 3(u): Other Information Required by the Competent Authority

### 22.1 Item 3(u)(i)(1): Impact on the Socio-economic Conditions of any Directly Affected Person

**Skills development due to employment** in the construction phase - a number of employment opportunities will be created for the local community during the construction phase of the proposed Project. It is anticipated that approximately 250 employees will be employed during the construction phase of the proposed Project (approximately 1 year). Employment opportunities for both skilled and semi-skilled individuals will be available. The opportunity for employment to work on the proposed Project will result in skills development;

**Generation of income due to employment** in the construction phase - a number of employment opportunities will be created for the local community during the construction phase of the proposed Project. It is anticipated that approximately 250 employees will be employed during the construction phase of the proposed Project (approximately 1 year). A company has been appointed to undertake the construction for Phase 1 of the realignment Project and are currently working in close collaboration with the Department of Labour in Ogies to identify potential candidates for employment. Employment opportunities for both skilled and semi-skilled individuals will be available. The same process will be applied for procurement for this proposed Project (Phase 2). Approximately 70 % of employees appointed for the construction of Phase 1 are employed directly from the local communities. The extension of employment or

opportunity for employment to work on the proposed Project will result in the generation of income and spending capacity; and

**Improved road condition and capacity for road users** during the operational phase - mine related traffic will be separated from public traffic, an improved road condition can be expected.

## **22.2 Item 3(u)(i)(2): Impact on any National Estate Referred to in Section 3(2) of the National Heritage Resources Act.**

The construction of a road is associated with various impacts on both the biophysical and socio-economic environment. This section describes environmental impacts assessed in relation to the Cultural Heritage aspect. This section is based on the 2013 HIA, updated and amended to include the CS of heritage resources identified in the 2013 HIA and through a pre-disturbance survey conducted by Digby Wells of the proposed road re-alignment.

This section considers the potential direct and indirect impacts on heritage resources identified within the development footprint of the Phase 2 road re-alignment.

### **22.2.1 Impacts on Burial Grounds and Graves**

As reported in the 2013 HIA, and verified by the pre-disturbance survey undertaken by Digby Wells, the most numerous type of heritage resource occurring in the study area are burial grounds and graves. Identified / verified burial grounds and graves of relevance to the Phase 2 re-alignment project are GY 01. The potential impacts to this resource are discussed further below.

Heritage impacts can potentially manifest as direct effects on the gravesites, as well as indirectly on the inherent cultural significance of burial grounds and graves and communities associated with the deceased.

#### **22.2.1.1 Direct Impacts on Burial Grounds and Graves (GY01)**

Direct impacts on grave sites can include damage to or destruction of surface dressings caused by diverse actions during the construction phase of the project. Direct impacts can also include damage to or destruction of the contents of graves, for example due to accidental or deliberate exposure and erosion of surrounding soils.

Any unmitigated direct impact on a grave must be considered as being significant, and may occur through the expected life of the project. Such impacts will not only affect the physical site, but will inevitably lead to social repercussions amongst descendant communities and public outcry. In addition, the person or parties responsible for any damage will be liable to fines and / or imprisonment in accordance with the NHRA, as well as other national and provincial legislation.

To avoid these negative, direct impacts on gravesites it will be necessary to implement feasible mitigation measures to promote the preservation of the burial ground and maintain the status quo.

### **22.2.1.2 Indirect Impacts on Burial Grounds and Graves**

Indirect impacts can include among others loss or restricted access to gravesites, degradation of the intrinsic CS of gravesites associated with living heritage due to loss of access, and health and safety risks to any visitors to gravesites that may be located within mining properties.

In addition to impacts or effects on people associated with the graves and deceased, these effects can also pose a significant social and litigation risks to Glencore, e.g. claims against the company for any loss, injury or death suffered whilst visiting gravesites.

To reduce such impacts and risks, a CMP must be developed, integrated into the EMP and implemented whenever required.

A CMP is fundamentally a consultative process. To ensure that the CMP is developed according to best practice, it is highly recommended that the process to identify and consult affected stakeholders outlined in the NHRA: Regulations is complied with, irrespective of whether graves are older or younger than 60 years. This would entail an extensive Burial Grounds and Graves Consultation (BGGC) process that must aim to identify bona fide next of kin and reach agreement regarding continued conservation and management of gravesites.

The CMP will need to include entitlements to which affected parties are entitled, and clearly define any restrictions and limitations to rights that may apply, e.g. due to health and safety risks. The CMP should, ideally, be submitted to the SAHRA Burial Grounds and Graves unit for record purposes.

### **22.2.2 Heritage Impacts vs Sustainable Socio-Economic Benefits**

Based on the socio-economic baseline, it is evident that unemployment and housing are major concerns within the study area and wider region. The mining sector was shown to be largest direct employer, as well the largest indirect contributor to other employment opportunities who rely on providing products and services to the mining sector.

The following local and national socio-economic benefits of the continuation of mining operations from the proposed project are anticipated:

- Local and regional employment opportunities. Although smaller in number than employment creation during the construction phase, these will have a significantly longer duration;
- Increased business opportunities for local entrepreneurs through the supply of goods and services to the mine;
- A positive macro-economic impact at a local, regional and provincial level due to operational expenditure, taxes and royalties; and
- Economic and social benefits associated with Corporate Social Responsibility (CSR) and Local Economic Development (LED) initiatives by the mine.

These sustainable socio-economic benefits to the surrounding communities that could derive from the Tweefontein Project and Phase 2 road re-alignment arguably outweigh the significance of heritage impacts. This assumption is based on the following:

- The identified heritage resources are not unique;
- The historical structures are of low cultural significance;
- Although burial grounds and graves are highly significant, all potential impacts these sites can be managed through appropriate mitigation plans; and
- Coal mining heritage has over the years already become an aspect of the cultural environment.

### **23 Item 3(v): Other Matters Required in terms of Sections 24(4)(a) and (b) of the Act**

Not applicable.

## Part B: Environmental Management Programme Report

The purpose of the EMP Report is to ensure that social and environmental impacts, risks and liabilities identified during the EIA process are effectively managed during the construction, operation and decommissioning/ of the Project. The EMP Report specifies the mitigation and management measures to which Glencore is committed, and shows how the Project will mobilise organizational capacity and resources to implement these measures. The EMP Report also shows how mitigation and management measures will be scheduled.

The key objectives of the EMP Report are to:

- Formalise and disclose the programme for environmental and social management;
- Provide a framework for the implementation of environmental and social management initiatives;
- Present guiding principles and generic measures for the detailed development of the final EMP Report, which will include detailed method statements;
- Provide mitigation measures; and
- Specify roles and responsibilities for implementing the EMP Report.

Best practice principles require that every reasonable effort be made to reduce and preferably to prevent negative impacts, while enhancing positive impacts/benefits. These principles have guided the EIA process. Some potential negative impacts have been avoided through careful design and location of infrastructure. Specialists have also identified measures whereby impacts can be avoided/ mitigated.

Work underpinning the EMP Report has complied with EIA Regulation requirements, and has included a PPP. The EIA has listed potential impacts associated with the proposed Project identified mitigation measures for potential negative environmental and social impacts and formulation of the EMP Report against the negative impacts.

The EMP Report covers information on the management and/or mitigation measures that will be taken into consideration to address impacts in respect of:

- Construction activities; and
- Operation.

It is necessary to highlight that the EMP Report is a living document that must be periodically reviewed and updated. This EMP Report will also be publicly disclosed during the public participation process, and an opportunity will be offered to participating stakeholders to comment on it.



## 1 Item 1(a): Details of the EAP

Digby Wells and Associates South Africa (Pty) Ltd has been appointed as the independent Environmental Assessment Practitioner (EAP) to undertake the EIA process and associated WULA. The details of the EAP are provided in below.

**Table 1-1: Contact Details of the EAP**

<b>Name of Practitioner:</b>	Ms. Kasantha Moodley
<b>Telephone:</b>	+27 11 789 9495
<b>Fax:</b>	+27 11 789 9498
<b>Postal Address</b>	Private Bag X10046, Randburg, 2125, South Africa
<b>Email:</b>	<a href="mailto:Kasantha.Moodley@digbywells.com">Kasantha.Moodley@digbywells.com</a>

## 2 Item 1(b): Description of the Aspects of the Activity

Refer to Part A: Section 10 for the list of aspects.

## 3 Item 1(c): Composite Map

The composite plan can be found in Appendix B, Plan 12 - Composite Plan.

## 4 Item 1(d): Description of Impact Management Objectives including Management Statements

### 4.1 Item 1(d)(i): Determination of Closure Objectives

Not applicable. The realigned and upgraded provincial road is seen as a permanent linear structure therefore no decommissioning and rehabilitation will take place.

### 4.2 Item 1(d)(ii): The Process for Managing any Environmental Damage, Pollution, Pumping and Treatment of Extraneous Water or Ecological Degradation as a Result of Undertaking a Listed Activity

The Tweefontein Mine Complex emergency preparedness and response plan will be extended to include the construction of the road. The response plan is a process to respond rapidly and effectively to and manage emergency situations that may arise at the Tweefontein Mine Complex. The Environmental Response Plan has the following objectives:

- To categorise emergency situations through hazard identification and to define procedures for responses to the situations;

- To assign responsibilities for responding to emergency situations;
- To implement an effective system to receive, record and communicate reports of environmental incidents and emergencies; and
- To ensure that all environmental incidents or emergencies are investigated and the necessary procedures are in place to implement corrective and preventative actions to prevent a recurrence of the incident.

In this Emergency Procedure the following incidents are covered, which are relevant to the proposed Project:

- Rescue procedures;
- Environmental emergency; and
- Emergencies on surface (Fires, Gas from the plants).

The nature and extent of every emergency may differ and minor adaptations/changes/additions will have to be made, as the situation dictates.

#### **4.2.1 Communication of Environmental Emergencies**

Each emergency incident has its own communication route, however, the general communication systems to be implemented are:

- Two way radios that are situated at the control room and all supervisor vehicles; and
- Telephones, as well as, cell phones that are situated in designated areas.

In general, during an emergency all persons should attempt to stay calm and communicate clearly and objectively. The safety of others should be considered. Individuals should group together, ascertain whether anyone is missing, be reassuring, and withdraw to a place of safety. It should be ensured that telephone lines are kept open for priority communication.

Operational procedures and emergency procedures specific to the road realignment will be utilised to alleviate potentially significant environmental impacts such as:

- Surface fires;
- Flooding;
- Hazardous leakage;
- Pollution;
- Contamination of ground and surface water bodies;
- Damage to property;
- Vehicle accidents; and
- Death and injury.

#### **4.3 Item 1(d)(iii): Potential Risk of Acid Mine Drainage**

Not applicable due to the nature of the project.

#### **4.4 Item 1(d)(iv): Steps taken to Investigate, Assess, and Evaluate the Impact of Acid Mine Drainage**

Not applicable due to the nature of the project.

#### **4.5 Item i(d)(v): Engineering or Mine Design Solutions to be Implemented to Avoid or Remedy Acid Mine Drainage**

Not applicable due to the nature of the project.

#### **4.6 Item 1(d)(vi): Measures that will be put in place to Remedy any Residual or Cumulative Impact that may Result from Acid Mine Drainage**

Not applicable due to the nature of the project.

#### **4.7 Item 1(d)(vii): Volumes and Rate of Water Use Required for the Mining, Trenching or Bulk Sampling Operation**

Not applicable. Water will not be abstracted for the purpose of this proposed Project.

#### **4.8 Item 1(d)(viii): Has a Water Use Licence been Applied for**

The proposed Project also requires a Water Use Licence (WUL) in terms of the National Water Act, 1998 (Act No. 36 of 1998), as amended (NWA). According to the NWA, authorisation for a water use must be applied for prior to commencement of such a water use. Glencore requires authorisation from the Department of Water and Sanitation (DWS) for the water uses triggered in terms of Section 21 of the NWA. These water uses are as follows:

- Section 21 (c): Impeding or diverting the flow of water in a watercourse; and
- Section 21 (i): Altering the bed, banks, course or characteristics of a watercourse.

The WULA will be made available for public review at the same time as this EIA and EMP Report.

#### 4.9 Item 1(d)(ix): Impacts to be Mitigated in their Respective Phases

Project Activities	Aspects Affected	Phase	Size and Scale of Disturbance	Mitigation Measure	Compliance with Standards	Time Period for Implementation
<p>Activity 1: Site clearance and removal of topsoil</p> <p>Activity 2: Movement of construction vehicles and equipment</p> <p>Activity 4: Construction of new realigned section of the P141-1 and associated bridge</p> <p>Activity 5: Construction of culvert (water crossing)</p>	Soil	Construction	Approximately 13,6ha	<ul style="list-style-type: none"> <li>Strip and stockpile topsoil based on the soil type (i.e. red soils, yellow brown soils and grey wetland soils) to preserve the soil potential.</li> <li>Place stockpiles away from the drainage lines and wetland area.</li> <li>The height of the topsoil stockpile should not exceed 2 m.</li> <li>Implement stormwater management controls around the cleared areas as well as around the stockpile areas.</li> <li>Limit construction activities to those areas affected by the project components thereby limiting the footprint of the activities.</li> </ul>	Best Practice Guideline, G3 – Water Monitoring Systems.	Ongoing during construction (1 year).
<p>Activity 1: Site clearance and removal of topsoil</p> <p>Activity 4: Construction of new realigned section of the P141-1 and associated bridge</p>	Land capability	Construction	Approximately 4,5ha	<ul style="list-style-type: none"> <li>No land capability mitigation is possible as the proposed Project is a permanent activity.</li> </ul>	N/A	N/A
<p>Activity 1: Site clearance and removal of topsoil.</p> <p>Activity 4: Construction of new realigned section of the P141-1 and associated bridge</p>	Terrestrial Biodiversity	Construction	Approximately 4,5ha	<ul style="list-style-type: none"> <li>An ecologist must walk the extent of the site to identify the presence of any Red or Orange Data flora species. If Red or Orange Data species are found, these species must be removed and relocated before construction may commence.</li> <li>Reduce the project footprint by clearing only the vegetation that is within the proposed realigned route.</li> <li>Conserve topsoil material for vegetation of areas around the proposed new realigned road (if needed) or for areas within the Tweefontein Mine Complex.</li> <li>Reduce the project footprint by clearing only the vegetation that is within the proposed realigned route.</li> </ul>	<p>National Environmental Management Biodiversity Act, 2004 (Act no 10 of 2004).</p> <p>Guideline for Involving Biodiversity Specialists in the EIA Process, CSIR, June 2005</p>	<p>A site inspection must be arranged during the height of the flowering season (October / November) to identify potential species.</p> <p>Ongoing during construction (1 year).</p>
Activity 10: Vehicle movement on new P141-1	Terrestrial Biodiversity	Operation	Approximately 13,6ha	<ul style="list-style-type: none"> <li>Manage alien invasive species establishment continually through chemical or mechanical removal.</li> <li>Reinstate vegetation cover on and along the road reserve.</li> <li>Erect signage to alert road users of the potential crossing of faunal species.</li> <li>The establishment of alien floral species must be monitored throughout the operational phase.</li> </ul>	<p>National Environmental Management Biodiversity Act, 2004 (Act no 10 of 2004).</p> <p>Alien Invasive Species Control Regulations</p>	During maintenance activities.

Project Activities	Aspects Affected	Phase	Size and Scale of Disturbance	Mitigation Measure	Compliance with Standards	Time Period for Implementation
<p>Activity 1: Site clearance and topsoil removal</p> <p>Activity 2: Movement of construction vehicles and equipment</p> <p>Activity 4: Construction of new realigned section of the P141-1 and associated bridge</p> <p>Activity 5: Construction of culvert (water crossing)</p>	Surface Water	Construction	Approximately 13,6ha	<ul style="list-style-type: none"> <li>▪ Limit construction activities to those areas affected by the project components thereby limiting the footprint of the activities.</li> <li>▪ Movement of machinery and vehicles should be restricted to designated paths.</li> <li>▪ Place stockpiles away from the drainage lines and wetland area.</li> <li>▪ Clear only the necessary areas at a time.</li> <li>▪ Berms and trenches should be used during the construction phase to redirect water away from the construction activities.</li> <li>▪ Undertake construction of the culvert during the dry season (June to August).</li> </ul>	<p>National Water Act, 1998, (Act No 38 of 1998).</p> <p>Best Practice Guideline, G3 – Water Monitoring Systems.</p>	Ongoing during construction (1 year).
<p>Activity 10: Maintenance and upgrade of the new P141-1</p>	Surface Water	Operation	Approximately 13,6ha	<ul style="list-style-type: none"> <li>▪ Maintain stormwater channels and remove all debris from stormwater drains.</li> <li>▪ Continue monitoring the water quality of the Tweefontein spruit.</li> <li>▪ Clear any debris accumulated at the outlet, inlet and inside the culvert.</li> <li>▪ Monitor effectiveness of erosion control measures at the culvert.</li> <li>▪ Check for damage to culvert to ensure the structural integrity thereof.</li> </ul>	<p>National Water Act, 1998, (Act No 38 of 1998).</p> <p>Best Practice Guideline, G3 – Water Monitoring Systems.</p>	During maintenance activities.
<p>Activity 1: Site clearing and topsoil removal for road construction</p> <p>Activity 2: Movement of construction vehicles and equipment</p> <p>Activity 4: Construction of new realigned section of the P141-1 and associated bridge</p> <p>Activity 5: Construction of culvert (water crossing)</p>	Wetland	Construction	Approximately 13,6ha	<ul style="list-style-type: none"> <li>▪ The areas disturbed should however be limited to the footprint of the proposed road alignment.</li> <li>▪ Clear the area required for the road reserve only.</li> <li>▪ Construct berms and trenches to reduce stormwater runoff on the site.</li> <li>▪ Ensure all stockpiles and construction materials are stored away from drainage lines and at least 100 m from wetland areas.</li> </ul>	<p>National Water Act, 1998, (Act No 38 of 1998).</p> <p>Best Practice Guideline, G3 – Water Monitoring Systems.</p>	Ongoing during construction (1 year).

Project Activities	Aspects Affected	Phase	Size and Scale of Disturbance	Mitigation Measure	Compliance with Standards	Time Period for Implementation
<p>Activity 1: Site clearance and topsoil removal</p> <p>Activity 2: Movement of construction vehicles and equipment</p> <p>Activity 4: Construction of new realigned section of the P141-1 and associated bridge</p> <p>Activity 5: Construction of culvert (water crossing)</p>	Aquatic Ecology	Construction	Approximately 13,6ha	<ul style="list-style-type: none"> <li>Limit construction activities to those areas affected by the project components thereby limiting the footprint of the activities.</li> <li>Movement of machinery and vehicles should be restricted to designated paths.</li> <li>Place stockpiles away from the drainage lines and wetland area to avoid run-off.</li> <li>Clear only the necessary areas at a time.</li> <li>Berms and trenches should be used during the construction phase to redirect water away from the construction activities.</li> <li>Undertake construction of the culvert during the dry season (June to August).</li> <li>Minimise vegetation removal to infrastructure footprint.</li> <li>Ensure the banks of the spruit are stabilised, prior to construction activities.</li> </ul>	<p>National Water Act, 1998, (Act No 38 of 1998).</p> <p>Best Practice Guideline, G3 – Water Monitoring Systems.</p>	Ongoing during construction (1 year).
<p>Activity 1: Site clearing and topsoil removal for road construction</p> <p>Activity 2: Movement of construction vehicles and equipment</p> <p>Activity 4: Construction of new realigned section of the P141-1 and associated bridge</p> <p>Activity 5: Construction of culvert (water crossing)</p>	Air Quality	Construction	Within the Tweefontein Mine Complex	<ul style="list-style-type: none"> <li>Reduce the speed of the vehicles to 40 km/h or less on site roads.</li> <li>Apply wetting agents or dust suppressant on exposed areas during site clearance.</li> <li>Minimise the area of disturbance by restricting the movement of machinery/vehicles to designated areas within the project site.</li> <li>Minimise areas exposed to wind erosion by phasing site clearing activities.</li> <li>Avoid excavation and stockpiling activities during windy days.</li> <li>Drop heights should be minimised when loading and offloading construction material.</li> </ul>	<p>National Environmental Management Air Quality Act, 2004 (Act No 39 of 2004)</p>	Ongoing during construction (1 year).
<p>Activity 8: Direct employment and procurement of goods</p>	Community	Construction	Local Municipal area	<ul style="list-style-type: none"> <li>Identify required skills and align and implement training and skills development initiatives accordingly.</li> <li>Provide local employees with reference letters that they can submit to gain further employment. Also, provide certificates of completion for in-house (on-the-job) training provided.</li> <li>Promote labour -intensive construction methods.</li> <li>Employment opportunities must be handled through the local Department of Labour.</li> <li>Identify required skills and align and implement training and skills development initiatives accordingly.</li> <li>Provide local employees with reference letters that they can submit to gain further employment. Also, provide certificates of completion for in-house (on-the-job) training provided.</li> <li>Promote labour -intensive construction methods.</li> </ul>	<p>Glencore Social and Labour Plan</p> <p>Glencore Procurement Policy</p>	Ongoing during construction (1 year).



Project Activities	Aspects Affected	Phase	Size and Scale of Disturbance	Mitigation Measure	Compliance with Standards	Time Period for Implementation
<p>Activity 1: Site clearing and topsoil removal for road construction</p> <p>Activity 2: Movement of construction vehicles and equipment</p> <p>Activity 4: Construction of new realigned section of the P141-1 and associated bridge</p> <p>Activity 5: Construction of culvert (water crossing)</p>	Cultural Heritage	Construction	Approximately 13,6ha	<ul style="list-style-type: none"> <li>▪ GY 01 must be preserved in situ. Potential direct impacts to the burial ground should be mitigated through the implementation of a CMP that includes: <ul style="list-style-type: none"> <li>▪ Establishing a buffer of 25 m around the burial ground and graves;</li> <li>▪ Educating engineers and construction workers of the location of the burial grounds and potential direct impacts; and</li> </ul> </li> <li>▪ Monitoring of the burial grounds and graves during the construction phase of the road re-alignment.</li> <li>▪ An extensive Burial Grounds and Graves Consultation process must be implemented in accordance with NHRA Regulations to identify bona fide next of kin and reach agreement regarding the future of the graves. Gravesites should ideally be conserved in situ, and the consultation process must enable a mutually agreed CMP to be developed and approved, allowing for visitation rights by families.</li> </ul>	National Heritage Resources Act, 1999 (Act No. 25 of 1999)	Only should relocation of graves be necessary.
<p>Activity 2: Movement of construction vehicles and equipment</p> <p>Activity 3: Storage of materials/fuels at existing contractor camp</p> <p>Activity 4: Construction of new realigned section of the P141-1 and associated bridge</p> <p>Activity 7: Closure of the existing section of the P141-1 alignment and D2770 (R547)</p>	Traffic	Construction	Approximately 13,6ha	<ul style="list-style-type: none"> <li>▪ On-site contractors must assist in directing traffic during the construction phase, and be conscious of peak traffic times to accommodate smooth flowing traffic as far as practicable.</li> <li>▪ Inform communities of planned construction activities that would affect vehicle/ pedestrian traffic.</li> <li>▪ Ensure that access to residences and business properties is uninterrupted by providing alternative routes.</li> <li>▪ On-site contractors must assist in directing traffic during the construction phase, and be conscious of peak traffic times to accommodate smooth flowing traffic as far as practicable.</li> <li>▪ Inform communities of planned construction activities that would affect vehicle/ pedestrian traffic.</li> <li>▪ Ensure that the appropriate signage has been erected to inform road users of the road closures, prior to the closure.</li> <li>▪ Ensure that access to residences and business properties is uninterrupted by providing alternative routes.</li> <li>▪ Erect signage to control the speed limit along the proposed route as well as warnings relating to pedestrians potentially crossing.</li> <li>▪ Road safety measures should be implemented and maintained: the lanes will be demarcated with paint and the required road markers and signboards will be erected. Furthermore the associated guardrails and fencing will be erected where required.</li> <li>▪ All contractors are to ensure the necessary Personal Protective Equipment (PPE) is worn by all employees at all times whilst on site including a hard hat and a reflective vest.</li> </ul>	National Road Traffic Act, 1996 (Act No 93 of 1996)	Ongoing during construction (1 year).



Project Activities	Aspects Affected	Phase	Size and Scale of Disturbance	Mitigation Measure	Compliance with Standards	Time Period for Implementation
Activity 9: Vehicle movement on new P141-1 Activity 10: Maintenance and upgrade of the new P141-1	Traffic	Operation	Approximately 13,6ha	<ul style="list-style-type: none"> <li>Ensure appropriate road signage alerting road users to the speed limit and bends etc.</li> <li>Resurface the road with an asphalt overlay, as necessary.</li> <li>Repaint the lines and repair potholes, as necessary.</li> <li>Road safety measures should be implemented and maintained: the lanes will be demarcated with paint and the required road markers and signboards will be erected. Furthermore the associated guardrails and fencing will be erected where required.</li> <li>All contractors are to ensure the necessary Personal Protective Equipment (PPE) is worn by all employees at all times whilst on site including a hard hat and a reflective vest.</li> </ul>	National Road Traffic Act, 1996 (Act No 93 of 1996)	During maintenance activities.
Activity 3: Storage of materials/fuels at existing contractor camp	Soil, surface water, wetlands	Construction and Operation	The extent of the Project area (approximately 13,6ha)	<ul style="list-style-type: none"> <li>If a spill occurs it is to be cleaned up immediately and reported to the appropriate authorities.</li> <li>All vehicles are to be serviced in a correctly bunded area or at an off-site location.</li> <li>The temporary storage facilities of fuel, lubricants and any wastes must be stored on a hard park, roofed and bunded facility.</li> <li>The culvert and associated drains should be and regularly maintained.</li> </ul>	National Environmental Management: Waste Act (Act No. 59 of 2008), as amended National Water Act, 1998, (Act No 38 of 1998).	Throughout the construction and maintenance phase.
Activity 9: Vehicle movement on new P141-1 Activity 10: Maintenance and upgrade of the new P141-1	Road infrastructure	Construction and Operation	The extent of the Project area (approximately 13,6ha)	<ul style="list-style-type: none"> <li>The flood frequency for the design of the culvert should be 1:25 years.</li> <li>Clear any debris accumulated at the outlet, inlet and inside the culvert.</li> <li>Check for damage to culvert to ensure the structural integrity thereof.</li> </ul>	Typical Plans for Road Design of the Mpumalanga Department of Public Works, Roads and Transport	During the design phase Throughout the construction and maintenance phase

## 5 Item 1(e): Impact Management Outcomes

Project Activity/s	Potential Impact	Aspects Affected	Phase	Mitigation Type	Standards to be Achieved
<p>Activity 1: Site clearance and removal of topsoil</p> <p>Activity 2: Movement of construction vehicles and equipment</p> <p>Activity 4: Construction of new realigned section of the P141-1 and associated bridge</p> <p>Activity 5: Construction of culvert (water crossing)</p>	Loss of topsoil material	Soils, land capability and land-use	Construction	<ul style="list-style-type: none"> <li>Strip and stockpile topsoil based on the soil type (i.e. red soils, yellow brown soils and grey wetland soils) to preserve the soil potential.</li> <li>Place stockpiles away from the drainage lines and wetland area.</li> <li>The height of the topsoil stockpile should not exceed 2 m.</li> <li>Implement stormwater management controls around the cleared areas as well as around the stockpile areas.</li> <li>Limit construction activities to those areas affected by the project components thereby limiting the footprint of the activities.</li> </ul>	Best Practice Guideline, G3 – Water Monitoring Systems.
<p>Activity 1: Site clearance and removal of topsoil</p> <p>Activity 4: Construction of new realigned section of the P141-1 and associated bridge</p>	Loss of land capability	Soils, land capability and land-use	Construction	<ul style="list-style-type: none"> <li>No land capability mitigation is possible as the proposed Project is a permanent activity.</li> </ul>	Best Practice Guideline, G3 – Water Monitoring Systems.
<p>Activity 1: Site clearance and removal of topsoil</p> <p>Activity 4: Construction of new realigned section of the P141-1 and associated bridge</p>	Loss of Vegetation	Terrestrial biodiversity	Construction	<ul style="list-style-type: none"> <li>Reduce the project footprint by clearing only the vegetation that is within the proposed realigned route.</li> <li>Areas to be cleared of vegetation should be walked by a botanist prior to clearing and all SSC should be removed and relocated to similar adjacent habitat.</li> <li>Conserve topsoil material for vegetation of areas around the proposed new realigned road (if needed) or for areas within the Tweefontein Mine Complex.</li> </ul>	National Environmental Management Biodiversity Act, 2004 (Act no 10 of 2004). Guideline for Involving Biodiversity Specialists in the EIA Process, CSIR, June 2005
<p>Activity 1: Site clearance and removal of topsoil</p> <p>Activity 4: Construction of new realigned section of the P141-1 and associated bridge</p>	Habitat Fragmentation	Terrestrial biodiversity	Construction	<ul style="list-style-type: none"> <li>Reduce the project footprint by clearing only the vegetation that is within the proposed realigned route.</li> </ul>	National Environmental Management Biodiversity Act, 2004 (Act no 10 of 2004)

Project Activity/s	Potential Impact	Aspects Affected	Phase	Mitigation Type	Standards to be Achieved
Activity 10: Maintenance and upgrade of the new P141-1	Establishment and spread of alien invasive vegetation	Terrestrial biodiversity	Operation	<ul style="list-style-type: none"> <li>Manage alien invasive species establishment continually through chemical or mechanical removal.</li> <li>Reinstate vegetation cover on and along the road reserve.</li> </ul>	Alien Invasive Species Control Regulations
Activity 10: Vehicle movement on new P141-1	Loss of fauna	Terrestrial biodiversity	Operation	<ul style="list-style-type: none"> <li>Erect signage to alert road users of the potential crossing of faunal species.</li> </ul>	National Environmental Management Biodiversity Act, 2004 (Act no 10 of 2004)
Activity 1: Site clearance and topsoil removal Activity 2: Movement of construction vehicles and equipment Activity 4: Construction of new realigned section of the P141-1 and associated bridge Activity 5: Construction of culvert (water crossing)	Increase in the sedimentation load of the Tweefontein spruit	Surface water	Construction	<ul style="list-style-type: none"> <li>Limit construction activities to those areas affected by the project components thereby limiting the footprint of the activities.</li> <li>Movement of machinery and vehicles should be restricted to designated paths.</li> <li>Place stockpiles away from the drainage lines and wetland area.</li> <li>Clear only the necessary areas at a time.</li> <li>Berms and trenches should be used during the construction phase to redirect water away from the construction activities.</li> </ul>	National Water Act, 1998, (Act No 38 of 1998). Best Practice Guideline, G3 – Water Monitoring Systems.
Activity 5: Construction of culvert (water crossing)	Flow reduction of the Tweefontein spruit	Surface water	Construction	<ul style="list-style-type: none"> <li>Undertake construction of the culvert during the dry season (June to August).</li> </ul>	National Water Act, 1998, (Act No 38 of 1998). Best Practice Guideline, G3 – Water Monitoring Systems.
Activity 10: Maintenance and upgrade of the new P141-1	Increase in the sedimentation load of the Tweefontein spruit	Surface water	Operation	<ul style="list-style-type: none"> <li>Maintain stormwater channels and remove all debris from stormwater drains.</li> <li>Continue monitoring the water quality of the Tweefontein spruit.</li> </ul>	National Water Act, 1998, (Act No 38 of 1998). Best Practice Guideline, G3 – Water Monitoring Systems.
Activity 10: Maintenance and upgrade of the new P141-1	Alteration of the flow regime within the culvert as well as the secondary effects downstream of the culvert	Surface water	Operation	<ul style="list-style-type: none"> <li>Clear any debris accumulated at the outlet, inlet and inside the culvert.</li> <li>Monitor effectiveness of erosion control measures at the culvert.</li> <li>Check for damage to culvert to ensure the structural integrity thereof.</li> </ul>	National Water Act, 1998, (Act No 38 of 1998). Best Practice Guideline, G3 – Water Monitoring Systems.
Activity 1: Site clearing and topsoil removal for road construction Activity 4: Construction of new realigned section of the P141-1 and associated bridge Activity 5: Construction of culvert (water crossing)	Loss of wetland habitat	Wetland	Construction	<ul style="list-style-type: none"> <li>There is no mitigation proposed as the activity would be permanent.</li> <li>The areas disturbed should however be limited to the footprint of the proposed road alignment.</li> </ul>	National Water Act, 1998, (Act No 38 of 1998). Best Practice Guideline, G3 – Water Monitoring Systems.

Project Activity/s	Potential Impact	Aspects Affected	Phase	Mitigation Type	Standards to be Achieved
<p>Activity 1: Site clearing and topsoil removal for road construction</p> <p>Activity 2: Movement of construction vehicles and equipment</p> <p>Activity 4: Construction of new realigned section of the P141-1 and associated bridge</p> <p>Activity 5: Construction of culvert (water crossing)</p>	Deterioration of wetland through poor water quality	Wetland	Construction	<ul style="list-style-type: none"> <li>Clear the area required for the road reserve only.</li> <li>Construct berms and trenches to reduce stormwater runoff on the site.</li> <li>Ensure all stockpiles and construction materials are stored away from drainage lines and at least 100 m from wetland areas.</li> </ul>	<p>National Water Act, 1998, (Act No 38 of 1998).</p> <p>Best Practice Guideline, G3 – Water Monitoring Systems.</p>
<p>Activity 1: Site clearance and topsoil removal</p> <p>Activity 2: Movement of construction vehicles and equipment</p> <p>Activity 4: Construction of new realigned section of the P141-1 and associated bridge</p> <p>Activity 5: Construction of culvert (water crossing)</p>	Reduction in quality of aquatic habitat due to an increase in sedimentation/contamination of the Tweefontein spruit	Aquatic ecology	Construction	<ul style="list-style-type: none"> <li>Limit construction activities to those areas affected by the project components thereby limiting the footprint of the activities.</li> <li>Movement of machinery and vehicles should be restricted to designated paths.</li> <li>Place stockpiles away from the drainage lines and wetland area to avoid run-off.</li> <li>Clear only the necessary areas at a time.</li> <li>Berms and trenches should be used during the construction phase to redirect water away from the construction activities.</li> </ul>	<p>National Water Act, 1998, (Act No 38 of 1998).</p> <p>Best Practice Guideline, G3 – Water Monitoring Systems.</p>
<p>Activity 5: Construction of culvert (water crossing)</p>	Deterioration and disturbance of aquatic habitat due to flow reduction of the Tweefontein spruit	Aquatic ecology	Construction	<ul style="list-style-type: none"> <li>Undertake construction of the culvert during the dry season (June to August).</li> <li>Minimise vegetation removal to infrastructure footprint.</li> <li>Ensure the banks of the spruit are stabilised, prior to construction activities.</li> </ul>	<p>National Water Act, 1998, (Act No 38 of 1998).</p> <p>Best Practice Guideline, G3 – Water Monitoring Systems.</p>
<p>Activity 1: Site clearing and topsoil removal for road construction</p> <p>Activity 2: Movement of construction vehicles and equipment</p> <p>Activity 4: Construction of new realigned section of the P141-1 and associated bridge</p> <p>Activity 5: Construction of culvert (water crossing)</p>	Fugitive dust emissions (i.e. PM <sub>10</sub> , PM <sub>2.5</sub> , TSP)	Air quality	Construction	<ul style="list-style-type: none"> <li>Reduce the speed of the vehicles to 40 km/h or less on site roads.</li> <li>Apply wetting agents or dust suppressant on the dirt road and exposed areas during site clearance.</li> <li>Minimise the area of disturbance by restricting the movement of machinery/vehicles to specific tracks and designated areas within the project site.</li> <li>Minimise areas exposed to wind erosion by phasing site clearing activities.</li> <li>Avoid excavation and stockpiling activities during windy days.</li> <li>Drop heights should be minimised when loading and offloading material.</li> </ul>	<p>National Environmental Management Air Quality Act, 2004 (Act No 39 of 2004)</p>
<p>Activity 8: Direct employment and procurement of goods</p>	Skills development due to employment	Community	Construction	<ul style="list-style-type: none"> <li>Identify required skills and align and implement training and skills development initiatives accordingly.</li> <li>Provide local employees with reference letters that they can submit to gain further employment. Also, provide certificates of completion for in-house (on-the-job) training provided.</li> <li>Promote labour -intensive construction methods.</li> </ul>	<p>Glencore Social and Labour Plan</p> <p>Glencore Procurement Policy</p>

Project Activity/s	Potential Impact	Aspects Affected	Phase	Mitigation Type	Standards to be Achieved
Activity 8: Direct employment and procurement of goods	Generation of income due to employment	Community	Construction	<ul style="list-style-type: none"> <li>Employment opportunities must be handled through the local Department of Labour.</li> <li>Identify required skills and align and implement training and skills development initiatives accordingly.</li> <li>Provide local employees with reference letters that they can submit to gain further employment. Also, provide certificates of completion for in-house (on-the-job) training provided.</li> <li>Promote labour -intensive construction methods.</li> </ul>	Glencore Social and Labour Plan Glencore Procurement Policy
<p>Activity 1: Site clearing and topsoil removal for road construction</p> <p>Activity 2: Movement of construction vehicles and equipment</p> <p>Activity 4: Construction of new realigned section of the P141-1 and associated bridge</p> <p>Activity 5: Construction of culvert (water crossing)</p>	Physical changes to burial grounds and graves	Cultural heritage	Construction	<ul style="list-style-type: none"> <li>GY 01 must be preserved in situ. Potential direct impacts to the burial ground should be mitigated through the implementation of a CMP that includes: <ul style="list-style-type: none"> <li>Establishing a buffer of 25 m around the burial ground and graves;</li> <li>Educating engineers and construction workers of the location of the burial grounds and potential direct impacts; and</li> </ul> </li> <li>Monitoring of the burial grounds and graves during the construction phase of the road re-alignment.</li> <li>An extensive Burial Grounds and Graves Consultation process must be implemented in accordance with NHRA Regulations to identify bona fide next of kin and reach agreement regarding the future of the graves. Gravesites should ideally be conserved in situ, and the consultation process must enable a mutually agreed CMP to be developed and approved, allowing for visitation rights by families.</li> </ul>	National Heritage Resources Act, 1999 (Act No. 25 of 1999)
<p>Activity 2: Movement of construction vehicles and equipment</p> <p>Activity 3: Storage of materials/fuels at existing contractor camp</p> <p>Activity 4: Construction of new realigned section of the P141-1 and associated bridge</p>	Increase in traffic	Traffic	Construction	<ul style="list-style-type: none"> <li>On-site contractors must assist in directing traffic during the construction phase, and be conscious of peak traffic times to accommodate smooth flowing traffic as far as practicable.</li> <li>Inform communities of planned construction activities that would affect vehicle/ pedestrian traffic.</li> <li>Ensure that access to residences and business properties is uninterrupted by providing alternative routes.</li> </ul>	National Road Traffic Act, 1996 (Act No 93 of 1996)
Activity 7: Closure of the existing section of the P141-1 alignment and D2770 (R547)	Disruption to traffic flow	Traffic	Construction	<ul style="list-style-type: none"> <li>On-site contractors must assist in directing traffic during the construction phase, and be conscious of peak traffic times to accommodate smooth flowing traffic as far as practicable.</li> <li>Inform communities of planned construction activities that would affect vehicle/ pedestrian traffic.</li> <li>Ensure that the appropriate signage has been erected to inform road users of the road closures, prior to the closure.</li> <li>Ensure that access to residences and business properties is uninterrupted by providing alternative routes.</li> </ul>	National Road Traffic Act, 1996 (Act No 93 of 1996)



Project Activity/s	Potential Impact	Aspects Affected	Phase	Mitigation Type	Standards to be Achieved
Activity 9: Vehicle movement on new P141-1 Activity 10: Maintenance and upgrade of the new P141-1	Improved road condition and capacity for road users	Traffic	Operation	<ul style="list-style-type: none"> <li>Ensure appropriate road signage alerting road users to the speed limit and bends etc.</li> <li>Resurface the road with an asphalt overlay, as necessary.</li> <li>Repaint the lines and repair potholes, as necessary.</li> </ul>	National Road Traffic Act, 1996 (Act No 93 of 1996)
Activity 3: Storage of materials/fuels at existing contractor camp	Risk of spills and leaks of hazardous materials resulting in contamination	Soil, surface water, wetlands	Construction and Operation	<ul style="list-style-type: none"> <li>If a spill occurs it is to be cleaned up immediately and reported to the appropriate authorities.</li> <li>All vehicles are to be serviced in a correctly bunded area or at an off-site location.</li> <li>The temporary storage facilities of fuel, lubricants and any wastes must be stored on a hard park, roofed and bunded facility.</li> <li>The culvert and associated drains should be and regularly maintained.</li> </ul>	National Environmental Management: Waste Act (Act No. 59 of 2008), as amended National Water Act, 1998, (Act No 38 of 1998).
Activity 9: Vehicle movement on new P141-1 Activity 10: Maintenance and upgrade of the new P141-1	Risk of flooding	Road infrastructure	Construction and Operation	<ul style="list-style-type: none"> <li>The flood frequency for the design of the culvert should be 1:25 years.</li> <li>Clear any debris accumulated at the outlet, inlet and inside the culvert.</li> <li>Check for damage to culvert to ensure the structural integrity thereof.</li> </ul>	Typical Plans for Road Design of the Mpumalanga Department of Public Works, Roads and Transport

## 6 Item 1(f): Impact Management Actions

Project Activity/s	Potential Impact	Aspects Affected	Mitigation Type	Time Period for Implementation	Standards to be Achieved
<p>Activity 1: Site clearance and removal of topsoil</p> <p>Activity 2: Movement of construction vehicles and equipment</p> <p>Activity 4: Construction of new realigned section of the P141-1 and associated bridge</p> <p>Activity 5: Construction of culvert (water crossing)</p>	Loss of topsoil material	Soils, land capability and land-use	<ul style="list-style-type: none"> <li>Strip and stockpile topsoil based on the soil type (i.e. red soils, yellow brown soils and grey wetland soils) to preserve the soil potential.</li> <li>Place stockpiles away from the drainage lines and wetland area.</li> <li>The height of the topsoil stockpile should not exceed 2 m.</li> <li>Implement stormwater management controls around the cleared areas as well as around the stockpile areas.</li> <li>Limit construction activities to those areas affected by the project components thereby limiting the footprint of the activities.</li> </ul>	Ongoing during construction (1 year).	Best Practice Guideline, G3 – Water Monitoring Systems.
<p>Activity 1: Site clearance and removal of topsoil</p> <p>Activity 4: Construction of new realigned section of the P141-1 and associated bridge</p>	Loss of land capability	Soils, land capability and land-use	<ul style="list-style-type: none"> <li>No land capability mitigation is possible as the proposed Project is a permanent activity.</li> </ul>	N/A	Best Practice Guideline, G3 – Water Monitoring Systems.
<p>Activity 1: Site clearance and removal of topsoil</p> <p>Activity 4: Construction of new realigned section of the P141-1 and associated bridge</p>	Loss of Vegetation	Terrestrial biodiversity	<ul style="list-style-type: none"> <li>Reduce the project footprint by clearing only the vegetation that is within the proposed realigned route.</li> <li>Areas to be cleared of vegetation should be walked by a botanist prior to clearing and all SSC should be removed and relocated to similar adjacent habitat.</li> <li>Conserve topsoil material for vegetation of areas around the proposed new realigned road (if needed) or for areas within the Tweefontein Mine Complex.</li> </ul>	<p>A site inspection must be arranged during the height of the flowering season (October / November) to identify potential species.</p> <p>Ongoing during construction (1 year).</p>	<p>National Environmental Management Biodiversity Act, 2004 (Act no 10 of 2004).</p> <p>Guideline for Involving Biodiversity Specialists in the EIA Process, CSIR, June 2005</p>
<p>Activity 1: Site clearance and removal of topsoil</p> <p>Activity 4: Construction of new realigned section of the P141-1 and associated bridge</p>	Habitat Fragmentation	Terrestrial biodiversity	<ul style="list-style-type: none"> <li>Reduce the project footprint by clearing only the vegetation that is within the proposed realigned route.</li> </ul>	Once-off	National Environmental Management Biodiversity Act, 2004 (Act no 10 of 2004)



Project Activity/s	Potential Impact	Aspects Affected	Mitigation Type	Time Period for Implementation	Standards to be Achieved
Activity 10: Maintenance and upgrade of the new P141-1	Establishment and spread of alien invasive vegetation	Terrestrial biodiversity	<ul style="list-style-type: none"> <li>Manage alien invasive species establishment continually through chemical or mechanical removal.</li> <li>Reinstate vegetation cover on and along the road reserve.</li> </ul>	Ongoing during maintenance activities	Alien Invasive Species Control Regulations
Activity 10: Vehicle movement on new P141-1	Loss of fauna	Terrestrial biodiversity	<ul style="list-style-type: none"> <li>Erect signage to alert road users of the potential crossing of faunal species.</li> </ul>	Once-off	National Environmental Management Biodiversity Act, 2004 (Act no 10 of 2004)
Activity 1: Site clearance and topsoil removal Activity 2: Movement of construction vehicles and equipment Activity 4: Construction of new realigned section of the P141-1 and associated bridge Activity 5: Construction of culvert (water crossing)	Increase in the sedimentation load of the Tweefontein spruit	Surface water	<ul style="list-style-type: none"> <li>Limit construction activities to those areas affected by the project components thereby limiting the footprint of the activities.</li> <li>Movement of machinery and vehicles should be restricted to designated paths.</li> <li>Place stockpiles away from the drainage lines and wetland area.</li> <li>Clear only the necessary areas at a time.</li> <li>Berms and trenches should be used during the construction phase to redirect water away from the construction activities.</li> </ul>	Ongoing during construction (1 year).	National Water Act, 1998, (Act No 38 of 1998). Best Practice Guideline, G3 – Water Monitoring Systems.
Activity 5: Construction of culvert (water crossing)	Flow reduction of the Tweefontein spruit	Surface water	<ul style="list-style-type: none"> <li>Undertake construction of the culvert during the dry season (June to August).</li> </ul>	Once-off	National Water Act, 1998, (Act No 38 of 1998). Best Practice Guideline, G3 – Water Monitoring Systems.
Activity 10: Maintenance and upgrade of the new P141-1	Increase in the sedimentation load of the Tweefontein spruit	Surface water	<ul style="list-style-type: none"> <li>Maintain stormwater channels and remove all debris from stormwater drains.</li> <li>Continue monitoring the water quality of the Tweefontein spruit.</li> </ul>	Ongoing during maintenance activities	National Water Act, 1998, (Act No 38 of 1998). Best Practice Guideline, G3 – Water Monitoring Systems.
Activity 10: Maintenance and upgrade of the new P141-1	Alteration of the flow regime within the culvert as well as the secondary effects downstream of the culvert	Surface water	<ul style="list-style-type: none"> <li>Clear any debris accumulated at the outlet, inlet and inside the culvert.</li> <li>Monitor effectiveness of erosion control measures at the culvert.</li> <li>Check for damage to culvert to ensure the structural integrity thereof.</li> </ul>	Ongoing during maintenance activities	National Water Act, 1998, (Act No 38 of 1998). Best Practice Guideline, G3 – Water Monitoring Systems.
Activity 1: Site clearing and topsoil removal for road construction Activity 4: Construction of new realigned section of the P141-1 and associated bridge Activity 5: Construction of culvert (water crossing)	Loss of wetland habitat	Wetland	<ul style="list-style-type: none"> <li>There is no mitigation proposed as the activity would be permanent.</li> <li>The areas disturbed should however be limited to the footprint of the proposed road alignment.</li> </ul>	Once-off	National Water Act, 1998, (Act No 38 of 1998). Best Practice Guideline, G3 – Water Monitoring Systems.

Project Activity/s	Potential Impact	Aspects Affected	Mitigation Type	Time Period for Implementation	Standards to be Achieved
<p>Activity 1: Site clearing and topsoil removal for road construction</p> <p>Activity 2: Movement of construction vehicles and equipment</p> <p>Activity 4: Construction of new realigned section of the P141-1 and associated bridge</p> <p>Activity 5: Construction of culvert (water crossing)</p>	Deterioration of wetland through poor water quality	Wetland	<ul style="list-style-type: none"> <li>Clear the area required for the road reserve only.</li> <li>Construct berms and trenches to reduce stormwater runoff on the site.</li> <li>Ensure all stockpiles and construction materials are stored away from drainage lines and at least 100 m from wetland areas.</li> </ul>	Ongoing during construction (1 year).	<p>National Water Act, 1998, (Act No 38 of 1998).</p> <p>Best Practice Guideline, G3 – Water Monitoring Systems.</p>
<p>Activity 1: Site clearance and topsoil removal</p> <p>Activity 2: Movement of construction vehicles and equipment</p> <p>Activity 4: Construction of new realigned section of the P141-1 and associated bridge</p> <p>Activity 5: Construction of culvert (water crossing)</p>	Reduction in quality of aquatic habitat due to an increase in sedimentation/contamination of the Tweefontein spruit	Aquatic ecology	<ul style="list-style-type: none"> <li>Limit construction activities to those areas affected by the project components thereby limiting the footprint of the activities.</li> <li>Movement of machinery and vehicles should be restricted to designated paths.</li> <li>Place stockpiles away from the drainage lines and wetland area to avoid run-off.</li> <li>Clear only the necessary areas at a time.</li> <li>Berms and trenches should be used during the construction phase to redirect water away from the construction activities.</li> </ul>	Ongoing during construction (1 year).	<p>National Water Act, 1998, (Act No 38 of 1998).</p> <p>Best Practice Guideline, G3 – Water Monitoring Systems.</p>
<p>Activity 5: Construction of culvert (water crossing)</p>	Deterioration and disturbance of aquatic habitat due to flow reduction of the Tweefontein spruit	Aquatic ecology	<ul style="list-style-type: none"> <li>Undertake construction of the culvert during the dry season (June to August).</li> <li>Minimise vegetation removal to infrastructure footprint.</li> <li>Ensure the banks of the spruit are stabilised, prior to construction activities.</li> </ul>	Ongoing during construction (1 year).	<p>National Water Act, 1998, (Act No 38 of 1998).</p> <p>Best Practice Guideline, G3 – Water Monitoring Systems.</p>
<p>Activity 1: Site clearing and topsoil removal for road construction</p> <p>Activity 2: Movement of construction vehicles and equipment</p> <p>Activity 4: Construction of new realigned section of the P141-1 and associated bridge</p> <p>Activity 5: Construction of culvert (water crossing)</p>	Fugitive dust emissions (i.e. PM <sub>10</sub> , PM <sub>2.5</sub> , TSP)	Air quality	<ul style="list-style-type: none"> <li>Reduce the speed of the vehicles to 40 km/h or less on site roads.</li> <li>Apply wetting agents or dust suppressant on the dirt road and exposed areas during site clearance.</li> <li>Minimise the area of disturbance by restricting the movement of machinery/vehicles to specific tracks and designated areas within the project site.</li> <li>Minimise areas exposed to wind erosion by phasing site clearing activities.</li> <li>Avoid excavation and stockpiling activities during windy days.</li> <li>Drop heights should be minimised when loading and offloading material.</li> </ul>	Ongoing during construction (1 year).	<p>National Environmental Management Air Quality Act, 2004 (Act No 39 of 2004)</p>

Project Activity/s	Potential Impact	Aspects Affected	Mitigation Type	Time Period for Implementation	Standards to be Achieved
Activity 8: Direct employment and procurement of goods	Skills development due to employment	Community	<ul style="list-style-type: none"> <li>Identify required skills and align and implement training and skills development initiatives accordingly.</li> <li>Provide local employees with reference letters that they can submit to gain further employment. Also, provide certificates of completion for in-house (on-the-job) training provided.</li> <li>Promote labour -intensive construction methods.</li> </ul>	Ongoing during construction (1 year).	Glencore Social and Labour Plan Glencore Procurement Policy
Activity 8: Direct employment and procurement of goods	Generation of income due to employment	Community	<ul style="list-style-type: none"> <li>Employment opportunities must be handled through the local Department of Labour.</li> <li>Identify required skills and align and implement training and skills development initiatives accordingly.</li> <li>Provide local employees with reference letters that they can submit to gain further employment. Also, provide certificates of completion for in-house (on-the-job) training provided.</li> <li>Promote labour -intensive construction methods.</li> </ul>	Ongoing during construction (1 year).	Glencore Social and Labour Plan Glencore Procurement Policy
<p>Activity 1: Site clearing and topsoil removal for road construction</p> <p>Activity 2: Movement of construction vehicles and equipment</p> <p>Activity 4: Construction of new realigned section of the P141-1 and associated bridge</p> <p>Activity 5: Construction of culvert (water crossing)</p>	Physical changes to burial grounds and graves	Cultural heritage	<ul style="list-style-type: none"> <li>GY 01 must be preserved in situ. Potential direct impacts to the burial ground should be mitigated through the implementation of a CMP that includes: <ul style="list-style-type: none"> <li>Establishing a buffer of 25 m around the burial ground and graves;</li> <li>Educating engineers and construction workers of the location of the burial grounds and potential direct impacts; and</li> </ul> </li> <li>Monitoring of the burial grounds and graves during the construction phase of the road re-alignment.</li> <li>An extensive Burial Grounds and Graves Consultation process must be implemented in accordance with NHRA Regulations to identify bona fide next of kin and reach agreement regarding the future of the graves. Gravesites should ideally be conserved in situ, and the consultation process must enable a mutually agreed CMP to be developed and approved, allowing for visitation rights by families.</li> </ul>	Ongoing	National Heritage Resources Act, 1999 (Act No. 25 of 1999)
<p>Activity 2: Movement of construction vehicles and equipment</p> <p>Activity 3: Storage of materials/fuels at existing contractor camp</p> <p>Activity 4: Construction of new realigned section of the P141-1 and associated bridge</p>	Increase in traffic	Traffic	<ul style="list-style-type: none"> <li>On-site contractors must assist in directing traffic during the construction phase, and be conscious of peak traffic times to accommodate smooth flowing traffic as far as practicable.</li> <li>Inform communities of planned construction activities that would affect vehicle/ pedestrian traffic.</li> <li>Ensure that access to residences and business properties is uninterrupted by providing alternative routes.</li> </ul>	Ongoing during construction (1 year).	National Road Traffic Act, 1996 (Act No 93 of 1996)

Project Activity/s	Potential Impact	Aspects Affected	Mitigation Type	Time Period for Implementation	Standards to be Achieved
Activity 7: Closure of the existing section of the P141-1 alignment and D2770 (R547)	Disruption to traffic flow	Traffic	<ul style="list-style-type: none"> <li>On-site contractors must assist in directing traffic during the construction phase, and be conscious of peak traffic times to accommodate smooth flowing traffic as far as practicable.</li> <li>Inform communities of planned construction activities that would affect vehicle/ pedestrian traffic.</li> <li>Ensure that the appropriate signage has been erected to inform road users of the road closures, prior to the closure.</li> <li>Ensure that access to residences and business properties is uninterrupted by providing alternative routes.</li> </ul>	Ongoing during construction (1 year).	National Road Traffic Act, 1996 (Act No 93 of 1996)
Activity 9: Vehicle movement on new P141-1 Activity 10: Maintenance and upgrade of the new P141-1	Improved road condition and capacity for road users	Traffic	<ul style="list-style-type: none"> <li>Ensure appropriate road signage alerting road users to the speed limit and bends etc.</li> <li>Resurface the road with an asphalt overlay, as necessary.</li> <li>Repaint the lines and repair potholes, as necessary.</li> </ul>	Ongoing during maintenance activities	National Road Traffic Act, 1996 (Act No 93 of 1996)
Activity 3: Storage of materials/fuels at existing contractor camp	Risk of spills and leaks of hazardous materials resulting in contamination	Soil, surface water, wetlands	<ul style="list-style-type: none"> <li>If a spill occurs it is to be cleaned up immediately and reported to the appropriate authorities.</li> <li>All vehicles are to be serviced in a correctly bunded area or at an off-site location.</li> <li>The temporary storage facilities of fuel, lubricants and any wastes must be stored on a hard park, roofed and bunded facility.</li> <li>The culvert and associated drains should be and regularly maintained.</li> </ul>	Ongoing during construction (1 year).	National Environmental Management: Waste Act (Act No. 59 of 2008), as amended National Water Act, 1998, (Act No 38 of 1998).
Activity 9: Vehicle movement on new P141-1 Activity 10: Maintenance and upgrade of the new P141-1	Risk of flooding	Road infrastructure	<ul style="list-style-type: none"> <li>The flood frequency for the design of the culvert should be 1:25 years.</li> <li>Clear any debris accumulated at the outlet, inlet and inside the culvert.</li> <li>Check for damage to culvert to ensure the structural integrity thereof.</li> </ul>	During the design phase Throughout the construction and maintenance phase	Typical Plans for Road Design of the Mpumalanga Department of Public Works, Roads and Transport

## 7 Financial Provision

South Africa's legislation places the responsibility of mitigating environmental damage as a result of mining operations on mining companies. The liability exists throughout the life of the mine, and beyond in terms of residual impacts. The broad rehabilitation objectives are to restore the mined area to its predetermined state; to restore the land to the previous land capability and to ensure there is no net loss of biodiversity.

The key legislation governing the requirements for legislation for rehabilitation is contained in the following acts:

- The National Environmental Management Act (Act 107 of 1998, NEMA);
- The Mineral and Petroleum Resources Development Act (Act 28 of 2002, MPRDA);  
and
- The National Water Act (Act of 1998, NWA).

### 7.1 Item (i)(1): Determination of the Amount of Financial Provision

#### 7.1.1 Item (i)(1)(a): Describe the Closure Objectives and the Extent to which they have been Aligned to the Baseline Environment Described under Regulation 22 (2) (d) as described in 2.4 herein

The realigned and upgraded provincial road is seen as a permanent linear structure therefore no decommissioning and rehabilitation will take place. The determination of the financial provision (closure costing) has therefore not been undertaken. Furthermore, the roads which are to be decommissioned will be mined through; therefore the provision for closure has been made under Glencore's existing Mining Right for the Tweefontein Optimisation Project.

#### 7.1.2 Item (i)(1)(b): Confirm Specifically that the Environmental Objectives in Relation to Closure have been Consulted with Landowner and Interested and Affected Parties

The realigned and upgraded provincial road is seen as a permanent linear structure therefore no decommissioning and rehabilitation will take place. As part of the public participation process, this was presented and discussed with landowners and I&APs. Furthermore, the roads which are to be decommissioned will be mined through, therefore the provision for closure has been made under Glencore's existing Mining Right for the Tweefontein Optimisation Project. As part of the Tweefontein Optimisation Project, the rehabilitation and closure plan was released to I&APs for consideration.



### **7.1.3 Item (i)(1)(c): Provide a Rehabilitation Plan that Describes and Shows the Scale and Aerial Extent of the Main Mining Activities, Including the Anticipated Mining Area at the Time of Closure**

The realigned and upgraded provincial road is seen as a permanent linear structure therefore no decommissioning and rehabilitation will take place. However, during the life cycle phases, namely the construction phase and the operational phase, rehabilitation of certain aspect of the environment may need to occur should any associated impacts be identified. The rehabilitation activities which may occur through the two lifecycles have been further discussed below.

#### ***7.1.3.1 Construction of New Road Sections***

##### ***7.1.3.1.1 Construction Phase***

During the construction phase, certain activities (including the removal of vegetation, disturbance of topsoil and placing of culverts) will be conducted. These construction activities may result in impacts on certain aspects (surface water and watercourses, soil and vegetation) of the environment which may require rehabilitation.

##### ***7.1.3.1.1.1 Surface water and Watercourses***

A culvert is to be placed within a water course, this thus requires trenching and excavation activities to be conducted within the watercourse which may have a negative impact on the quality of the water within the watercourse, over the short term. The riparian habitat of the watercourse may also be negatively impacted upon through the construction activities. However should it be identified that these construction activities result in continual erosion of the watercourse beds and / or banks and / or the degradation of the riparian habitat, remedial measures must be taken. Visual inspection will be conducted throughout the construction phase to identify whether or not these possible negative impacts occur.

##### ***7.1.3.1.1.2 Vegetation***

The removal of vegetation is necessary for the construction of the proposed Project. However should it be identified that the construction activities result in significant impacts to the vegetation of the area, rehabilitation of the vegetation must take place. The monitoring and rehabilitation of sites will include a visual assessment of the following:

- Establishment of locally indigenous vegetation;
- Presence of weeds and alien invader species; and
- Effectiveness of fertiliser application (if required).

##### ***7.1.3.1.1.3 Soil***

The clearing of vegetation and stripping of soil within specific areas is necessary for the construction of the proposed Project, thus exposing the soil to the elements. However,

should it be identified that the construction activities as well as exposure of soil to the elements results in significant impacts to the surrounding soil, remedial measures must be implemented. The area will be monitored for possible erosion, and action will be taken, where appropriate. Rehabilitation of the soil depends on the rehabilitation of the vegetation, and as such must be monitored simultaneously to the vegetation monitoring.

#### **7.1.3.2 Operational (maintenance) Phase**

During the operational phase the Mpumalanga Provincial Government Department of Public Works, Roads and Transport (MPDPWRT) will be responsible for the operation and maintenance of the new road, after they have assumed responsibility thereof. Certain aspect within the reserve of the provincial road may be negatively impacted upon and may require rehabilitation and remedial measure to take place, as indicated below.

##### **7.1.3.2.1 Surface Water**

As previously mentioned, a culvert is to be placed within a watercourse. Negative impacts on the surface water and watercourse that may occur and include (but not limited to):

- Erosion of the watercourse bed and banks may occur as a result of a change in the watercourse dynamics as a result of the culvert;
- Sedimentation as well as floating debris may block the culvert altering the flow of the watercourses;
- The riparian habitat of the watercourses may also be negatively impacted upon; and
- Should it be identified that these construction activities are resulting in the continual erosion of the watercourse beds and banks and / or the degradation of the riparian habitat, remedial measures will be taken. Visual inspection will be conducted throughout the operational phase to identify these possible areas of negative impacts.

##### **7.1.3.2.2 Vegetation**

The vegetation within the reserve of the provincial road may be negatively impacted upon as a result of outside influences (road users) as well as the establishment of invader species. The monitoring of sites will include a visual assessment of the following:

- Protection of indigenous vegetation; and
- Presence of weeds and alien invader species.

As per the SANRAL routine maintenance manual the clearance and trimming back of vegetation may be required for the safe use of the provincial road. In the absence of policies, procedures or manuals, the MPDPWRT may use the SANRAL routine maintenance manual to advise in the clearance and trimming back of vegetation.

Should any invader species or declared weeds be identified within the reserve areas that are listed in the Conservation of Agricultural Resources Act (Act 43 of 1983), as amended in



2001, they will be dealt with as specified in GN 2485 of 1999 or as per Departmental policies and procedures.

#### **7.1.3.2.3 Soil**

The clearing and trimming back of vegetation is necessary for the safe use of the provincial road, however, this may expose the soil to the elements. Should it be identified that the soils exposure to the elements results in significant impacts to the surrounding soil (such as erosion), remedial measures should be taken if found necessary, until the plant population becomes self-sustaining.

The area will be monitored for possible erosion, and action will be taken where appropriate. Rehabilitation of the soil depends on the establishment of the vegetation, and as such must be monitored simultaneously.

#### **7.1.3.3 Roads to be Closed**

The sections of the road that will be closed will be progressively removed as mining advances. Therefore rehabilitation of these closed roads falls under ambit of rehabilitation activities described as part of the Tweefontein Mine Complex Mining Right for the Tweefontein Optimisation Project. Glencore will therefore remain responsible for the rehabilitation of these areas along with other mining areas until Closure of the Tweefontein Mine Complex.

#### **7.1.4 Item (i)(1)(d): Explain why it can be Confirmed that the Rehabilitation Plan is Compatible with the Closure Objectives**

Not applicable. The realigned and upgraded provincial road is seen as a permanent linear structure therefor no decommissioning and rehabilitation will take place. Furthermore, the roads which are to be decommissioned will be mined through, therefore the provision for closure has been made under Glencore's existing Mining Right for the Tweefontein Optimisation Project.

#### **7.1.5 Item (i)(1)(e): Calculate and State the Quantum of the Financial Provision Required to Manage and Rehabilitate the Environment in Accordance with the Applicable Guideline**

Not applicable. The realigned and upgraded provincial road is seen as a permanent linear structure therefor no decommissioning and rehabilitation will take place. Furthermore, the roads which are to be decommissioned will be mined through, therefore the provision for closure has been made under Glencore's existing Mining Right for the Tweefontein Optimisation Project.

### **7.1.6 Item (i)(1)(f): Confirm that the Financial Provision will be Provided as Determined**

Not applicable. The realigned and upgraded provincial road is seen as a permanent linear structure therefore no decommissioning and rehabilitation will take place. Furthermore, the roads which are to be decommissioned will be mined through, therefore the provision for closure has been made under Glencore's existing Mining Right for the Tweefontein Optimisation Project.

## **8 Monitoring Compliance with and Performance Assessment**

The key to the success of environmental management lies in the effective implementation of the proposed mitigation and management measures. Monitoring provides information as to the possible impacts of the development on the environment, and enables the effectiveness of the environmental management implemented on-site to be measured both qualitatively and quantitatively.

The standard practise document developed by the applicant in order to deal with Environmental Monitoring Data entitled "Environmental Monitoring" with reference number HSE E PROC 014 and dated April 2012 will be implemented during the construction phase of the proposed Project, and will be updated on a regular basis in line with legal requirements.

### **8.1 Item 1(g): Monitoring of Impact Management Actions**

On-going monitoring and management measures need to be implemented to provide the early warning systems necessary to avoid environmental emergencies. The relevant weekly, monthly and quarterly monitoring programmes of respective environmental aspects will indicate whether mitigation or intervention is required. Should circumstances lead to unacceptable risks, emergency systems and procedures have been designed and will be implemented in the case of an emergency to prevent or minimise the consequential environmental damage.

The most crucial aspect of the emergency system is the identification and communication of the emergency to the appropriate persons. Consequently, the names of the appropriate contact person, together with their contact numbers will be prominently displayed around the facility. The contact details will be updated on a regular basis. First-party employees, such as security, safety superintendents, mine overseers and environmental officers, will be trained to respond to the responsible personnel in the event of an emergency.

### **8.2 Item 1(h): Monitoring and Reporting Frequency**

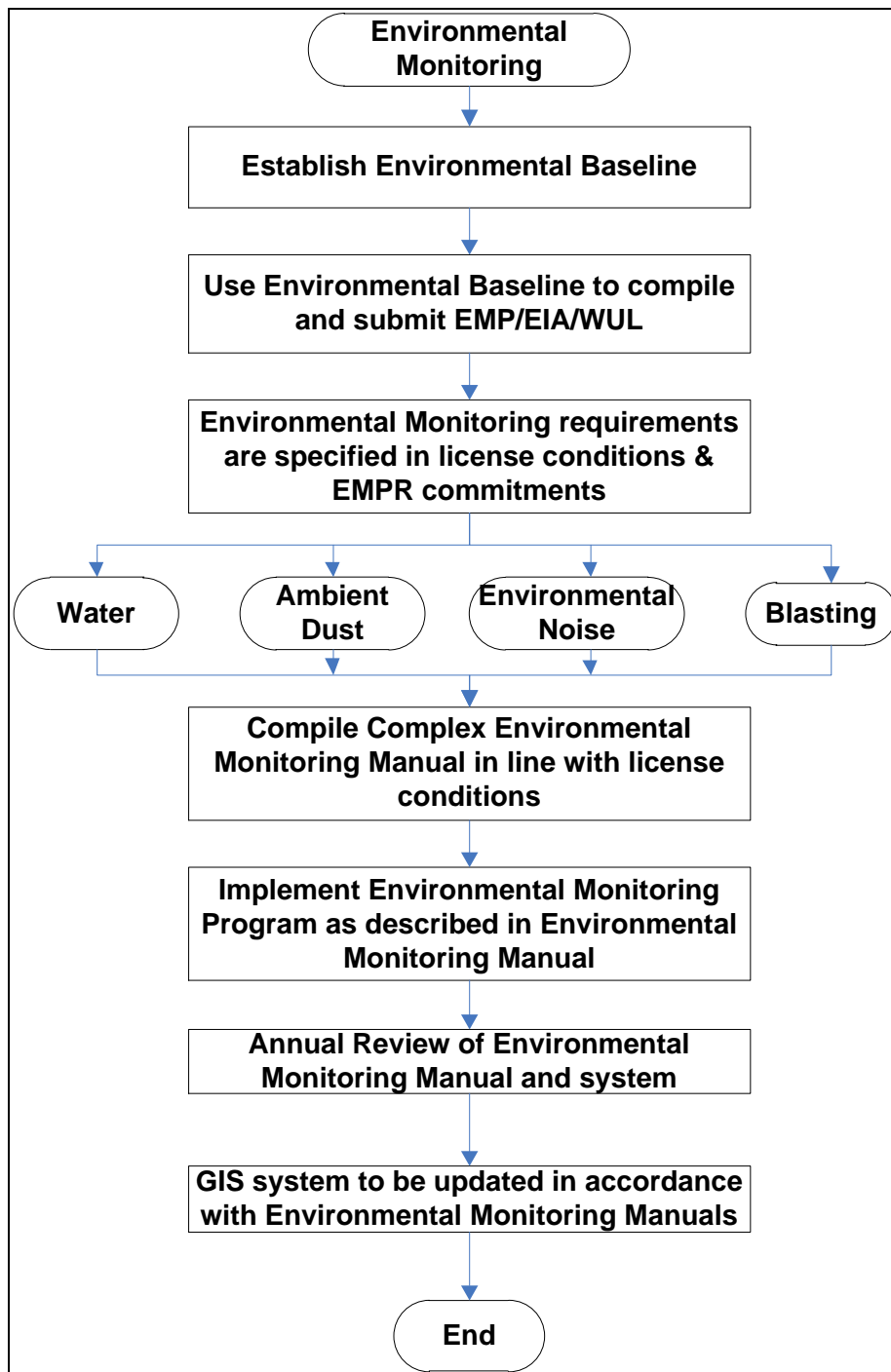
During the Construction Phase, the Environmental Authorisation audit / assessment will be conducted every second month internally and annually by a suitably qualified external, independent person. During the Operational Phase, the Environmental Authorisation audit / assessment should be conducted every second year. In addition, an Environmental

Authorisation assessment to confirm compliance with the Environmental Authorisation must be conducted at the end of the Construction Phase to ensure that all mitigation measures proposed have been successfully implemented. While the MPDPWRT is not responsible for the Construction Phase, they should be involved in the audit at the end of the Construction Phase. The MPDPWRT should acknowledge with the findings of the audit. The MPDPWRT should then advise Glencore which additional corrective actions (if any) they must complete prior to the MPDPWRT assuming responsibility for the road.

The Environmental Superintendent (ES) will appoint an Environmental Specialist to establish the Environmental Baseline for the Complex as per EIA/ EMP requirements. The environmental baseline will inform the EMP which will be submitted to authorities for approval as per the Environmental Authorisations procedure (HSE E PROC 012). Environmental monitoring requirements will be set out in license conditions and EMPR commitments.

The Environmental Specialist or ES will compile an Environmental Monitoring Manual in line with the Air Quality Management guideline (HSE E GDL 004) and Water Management Guideline (HSE E GDL 005). The Environmental Monitoring Manual will include the monitoring program for the Tweefontein Complex. The ES must ensure that the monitoring program is implemented as per Monitoring Manual. It is the responsibility of the ES to perform annual review and update (if required) of Monitoring Manual. The ES must then ensure that the updated Monitoring Manual is submitted to Group HSE as to update the GIS system.

Figure 8-1 illustrates Glencore's environmental monitoring process flow.



**Figure 8-1: Environmental Monitoring Process Flow**

Table 8-1 discusses the monitoring and reporting frequency.

### **8.3 Item 1(i): Responsible Persons**

Glencore will establish and appoint all necessary resources to carry out the monitoring and management of all environmental aspects of the proposed Project, for example:

- Operations Manager:
  - Ensure compliance of this procedure in area of responsibility.
- HSE Manager:
  - Ensure environmental monitoring program is implemented at the Tweefontein Mine Complex.
- Environmental Superintendent (ES):
  - Ensure Environmental Monitoring Manual (EMM) is compiled and in line with the Glencore requirements;
  - Update the EMM annually or when a change to the monitoring system occurs;
  - Submit update EMM to Manager Environment annually;
  - Oversee implementation of the monitoring program; and
  - Investigate trend deviations and report on the outcomes as per Incident reporting procedure (HSE PROC 011).
- Environmental Officer (EO):
  - Accompany external samplers on the monthly sampling run if required;
  - Do ad hoc samples if and when required; and
  - Report trend deviations to ES accurately and timeously.
- Manager: Environment:
  - Ensure GIS system is updated as per Complex Environmental Monitoring Manuals.

Table 8-1 sets out roles and responsibilities with respecting to the monitoring programme.

## 8.4 Item 1(j): Time Period for Implementing Impact Management Actions

Table 8-1 captures the time period for implementing impact management actions.

## 8.5 Item 1(k): Mechanism for Monitoring Compliance

### 8.5.1 Performance Assessments

Performance assessment and monitoring of the EMPR is compulsory in terms of Regulation 55 of the MPRDA. The objective of this procedure is to ensure that the monitoring of the effectiveness and appropriateness of the EMPR is undertaken in terms of this Regulation.

All Glencore Mining Complex Operations in possession of a Prospecting Right, or Mining Right must conduct performance assessments of the EMP on an annual basis as per HSEC

E GDL 001: Environmental Authorisations. The EMP assessment is conducted annually by a second party assessor and every third year by an Independent Environmental Assessment Practitioner. The process followed for internal and external assessments is the same. The Manager Environmental: Group (MEG) is responsible for appointing a second party assessor/ an independent EAP to conduct the Performance Assessment (PA) and compile the Performance Assessment Report (PAR).

Before commencing with the performance assessment, the appointed independent EAP must provide the ES with a copy of the proposed Audit Plan to comply with DMR requirements for approval. An Audit Plan is not required for internal assessments.

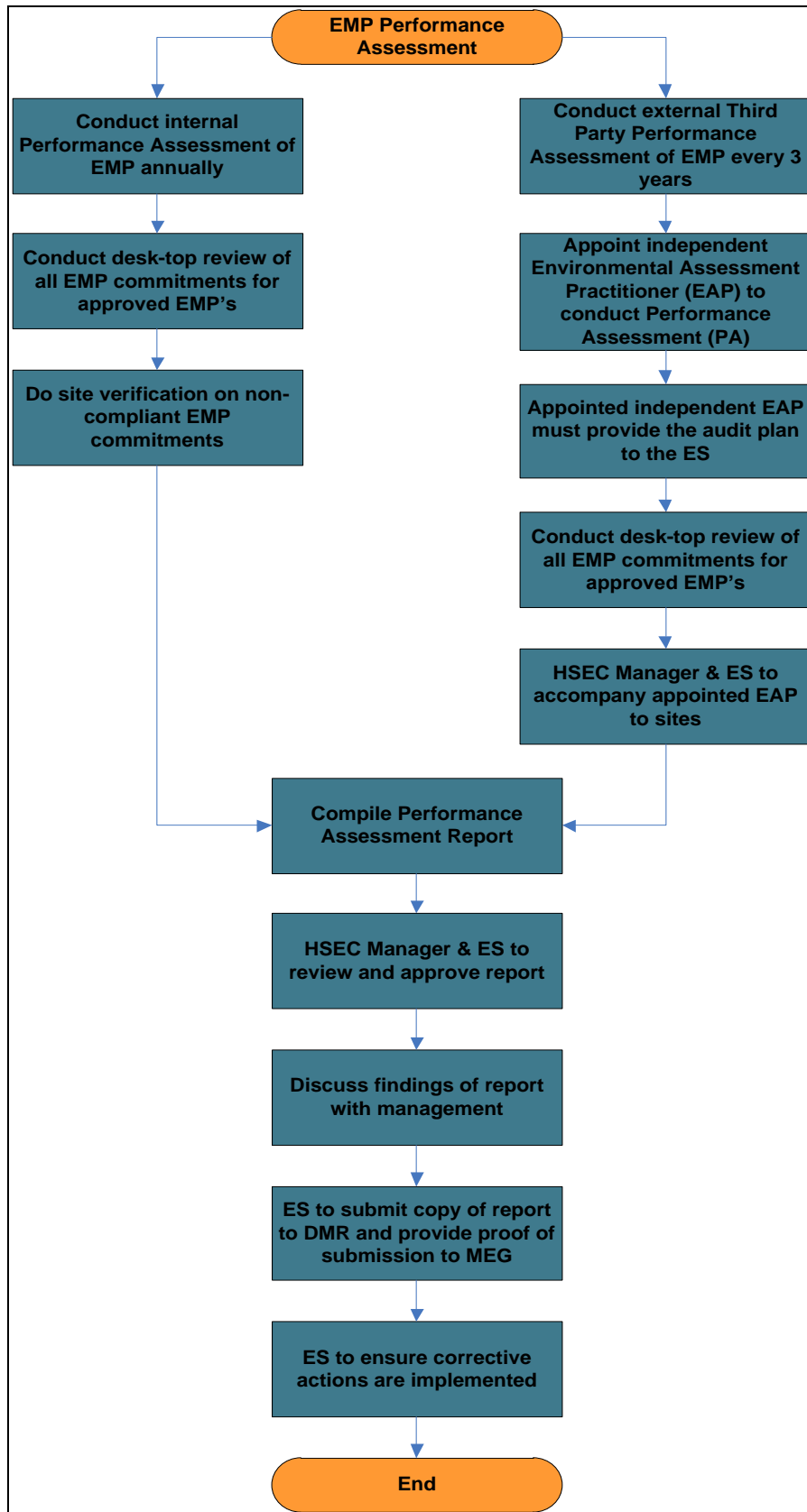
The Performance Assessment must include:

- A desktop evaluation of the relevance of the impact assessment and the systematic listing of all commitments;
- A field audit of the particular Glencore Mining Complex Operation in order to verify as many EMPR commitments as is practically possible over a 3-day period;
- The commitments are rated in terms of compliance and scored:
  - 1 point for compliance
  - 0 point for non-compliance
- The scores are tallied for each section within the EMP and expressed as a percentage/section. The overall score of all the sections is also tallied and expressed as a percentage to indicate the overall performance of the Complex;
- Field verification against EMP rehabilitation commitments; and
- Assess the overall effectiveness and appropriateness of the EMP.

The appointed second party assessor/ EAP will be accompanied to site by the relevant site personnel for the particular Glencore Complex operation. It is also the role of the appointed second party assessor or EAP to compile the Performance Assessment Report in accordance with Regulation 55(3) of the MPRDA. A copy of the completed Performance Assessment Report will then be provided to the HSE Manager and the ES for review and approval prior to submission to the DMR.

The appointed second party assessor/ EAP will then arrange a meeting with the HSE Manager and the ES to discuss the findings of the report. Upon approval of the Performance Assessment Report, the ES will submit a copy of the Performance Assessment Report to DMR and receive a proof of submission. It is the responsibility of the ES to ensure that corrective actions are implemented in order to rectify non-compliances.

Figure 8-2 summarises Glencore's Performance Assessment procedure.



**Figure 8-2: Performance Assessment Process Flow**



The functional requirements for the above monitoring programmes are described below:

- Removal of vegetation: Only the necessary vegetation, required for the establishment of the road, will be cleared;
- Soil erosion: Daily site inspection by the site manager will take place to ensure that all soil erosion mitigation measures are in place and implemented;
- Dust: Roads should be sprayed with water to suppress dust;
- Machinery: Cleaning of machinery and equipment will be performed in a dedicated area to avoid the spread of alien invasive floral species to other areas and will take place before leaving the mining site;
- Access roads: Machinery operators and drivers should be made aware of the possible safety hazards that they could pose;
- Heritage landscape: A Watching Brief should be implemented during road construction in the event that Heritage Resources are discovered;
- Use of hydrocarbons: During construction, a spill tray will be placed under the machinery to collect any hydrocarbon leaks and spillages. Should spillages occur, the soil will be removed and treated as hazardous waste using bioremediation techniques. Should the soil not be adequately treated on-site, the soil should be removed from the site and disposed of at a waste handling facility;
- Ablution facilities: The contents of chemical toilets should be emptied on a regular basis, at least weekly, to prevent spillages (as an alternative french drains may be used);
- Domestic waste: Bins will be placed at each site to collect the domestic waste and will be disposed of at a registered waste handling facility. The waste in the rubbish bins will be removed on a daily basis by the contractor;
- Wetlands (if applicable) will be avoided; and
- No open fires are permitted in the proposed Project area.

Table 8-1 sets out the method of monitoring the implementation of the impact management actions, the frequency of monitoring the implementation of the impact management actions, an indication of the persons who will be responsible for the implementation of the impact management actions, the time periods within which the impact management actions must be implemented and the mechanism for monitoring compliance with the identified impact management actions.

**Table 8-1: Monitoring and Management of Environmental Impacts**

Activities	Impacts Requiring Monitoring Programmes	Functional Requirements for Monitoring	Roles And Responsibilities (For the Execution of the Monitoring Programmes)	Monitoring and Reporting Frequency and Time Periods for Implementing Impact Management Actions
All project activities (Activities 1-10)	Dust generation	<ul style="list-style-type: none"> <li>▪ It is required to collect and record dust deposition data to create a historical baseline for the site.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Environmental Manager;</li> <li>▪ Environmental Control Officer; and</li> <li>▪ Air Quality Specialist.</li> </ul>	Continue with dust fallout monitoring being undertaken at the Tweefontein Mine Complex, every month. Monthly report
	Loss of biodiversity	<ul style="list-style-type: none"> <li>▪ Floral and faunal Species of Special Concern (SSC) must be rescued and relocated, should they occur within the disturbed areas to be disturbed;</li> <li>▪ An active list with a key (identification pictures) of the latest threatened Red Data flora species expected to occur in the Project area, is to be compiled, reviewed and regularly updated to assist the ES with the task of monitoring the area for possible threatened Red Data flora species which were not observed/ recorded during the latest ecological assessment undertaken for the Project; and</li> <li>▪ Alien invasive vegetation must be removed.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Environmental Manager; and</li> <li>▪ Environmental Control Officer</li> </ul>	Monitoring must take place at least on an annual basis and especially during the wet season. Results of the monitoring must be recorded and compared to the previous years' results to keep track of the populations of the faunal and floral species. Monthly monitoring for alien invasive vegetation must take place and managed according to the NEM:BA requirements. Annual Report
	Contamination to surface water resources/wetlands	<ul style="list-style-type: none"> <li>▪ The monitoring of water will assist in the early detection of issues on site and enable the site to remediate or mitigate where possible. The following constituents must be tested for: <ul style="list-style-type: none"> <li>○ Aluminium and iron;</li> <li>○ Sodium, calcium, sulfate, chloride and potassium</li> <li>○ Manganese, magnesium and fluoride;</li> <li>○ Nitrate and ammonium; and</li> <li>○ pH, electrical conductivity and TDS.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪ Environmental Manager; and</li> <li>▪ Environmental Control Officer</li> </ul>	Continue with surface water monitoring being undertaken at the Tweefontein Mine Complex, every month. Monthly report
	Traffic	<ul style="list-style-type: none"> <li>▪ Assess the condition of the road after construction and during operation.</li> </ul>	<ul style="list-style-type: none"> <li>▪ MPWRT</li> </ul>	Regular maintenance as and when required.

## 9 Item 1(l): Indicate the Frequency of the Submission of the Performance Assessment Report

The environmental manager will conduct internal management audits against the commitments in the EMPR. These audits will be conducted on an on-going basis. The audit findings will be documented for both record keeping purposes and for informing continual improvement. In addition, and in accordance with mining regulation R527, an independent professional will conduct an EMP performance assessment every two years. The site's compliance with the provisions of the EMPR and the adequacy of the EMPR relative to the on-site activities will be assessed in the performance assessment.

The effectiveness of environmental management training and awareness building interventions will be gauged by:

- The performance of annual audits aimed at testing the environmental awareness of employees directly; and
- Analysing the root causes of environmental incidents, including non-conformance to legal requirements, to determine which incidents were caused by a lack of environmental awareness and training.

## 10 Item 1(m): Environmental Awareness Plan

The purpose of an Environmental Awareness Plan is to outline the methodology that will be used to inform the mine's employees of any environmental risks which may result from their work and the manner in which the risks must be dealt with to avoid contamination or the degradation of the environment. The environmental awareness plan is primarily a tool to introduce and describe the requirements of the range of environmental and social plans for the Project during the life of the Project.

The environmental awareness plan ensures that training needs are identified and appropriate training is provided. The environmental awareness plan should communicate:

- Importance of conformance with the environmental policy, procedures and other requirements of good environmental management;
- The significant environmental impacts and risks of an individual's work activities and the environmental benefits of improved performance;
- Individual's roles and responsibilities in achieving the aims and objectives of the environmental policy; and
- The potential consequences of not complying with environmental procedures.

Glencore currently has an Environmental Awareness Plan in place for the Tweefontein Mine Complex. As Glencore is the proponent for the construction phase of the proposed Project, the Tweefontein Mine Complex Environmental Awareness Plan will be applied for the construction phase of this proposed Project.

This Environmental Awareness Plan titled “Environmental Induction” includes all elements in terms of induction and environmental awareness, as well as the requirements of Glencore’s international standards and obligations. In addition, a more basic video titled “Environmental and Community Awareness DVD” has been developed and is available from the mine upon request. This DVD is shown to all employees and contractors at induction. The subject of Environmental Awareness is also addressed at weekly orientation sessions held at Tweefontein Complex.

The objective of this Environmental Awareness Plan is to:

- Inform employees and contractors of any environmental risks which may result from their work; and
- Inform employees and contractors of the manner in which the identified possible risks must be dealt with in order to prevent degradation of the environment.

In general, the purpose of implementing an Environmental Awareness Plan is to optimise the awareness of those partaking in the mining and related activities which have the potential to impact negatively on the environment and in doing so, promote the global goal of sustainable development.

The awareness training of employees, supervisors, sub-contractors, contractors and visitors will ensure that co-operation in terms of environmental management will occur. This will contribute to the successful implementation of the conditions set out in the EMPR and Environmental Authorisation, and thus to the environmental sustainability of the project. In addition, it will ensure the success of the Project regarding compliance with legislation, and avoid possible future liabilities and legal action due to a lack of environmental awareness.

### **10.1 Item 1(m)(1): Manner in which the Applicant Intends to Inform his or her Employees of any Environmental Risk which may Result from their Work**

For the environmental awareness plan to be effective, the issues raised through it need to be communicated through meetings, consultations and progress reviews. The following are the minimum steps that will be taken to ensure communication is effective:

- The agendas of all company board meetings will have an item where environmental related issues and risks are discussed and feedback is given;
- Provide progress reports on the achievement of policy objectives and level of compliance with the approved EMPR, to the DMR;
- Ensure environmental issues are realised at monthly committee meetings and at all relevant meetings, at all levels; and
- Ensure environmental issues are discussed at all general liaison meetings with local communities and other I&APs.

The Emergency Response Plan for the Tweefontein Mine Complex addresses any reasonably anticipated failures for the entire mining area and focuses on incidents that could result in environmental emergencies. This plan will be adopted for the construction of the proposed Project. The most common process that is adopted in case of emergencies is as follows:

- The discoverer will notify his/her immediate supervisor who will in turn notify the Operations Manager;
- The area where the emergency has taken place will be secured to prevent further movements or entry into the area as well as to contain potential hazards from spreading to other areas;
- The Operations Manager or any Glencore representative at the time will then notify all relevant stakeholders including the owners of adjoining properties of any emergencies likely to affect their interest;
- The appointed Glencore representative will be responsible to form team that will be responsible to deal with the emergency situation;
- The team will be informed of the modus operandi to be followed during the process and will be allocated with resources to systematically redress the situation as quickly as possible;
- An appointed investigation team will ascertain the root cause of the emergency and derive plans of actions to prevent recurrence of the situation; and
- Subsequent to and accord of the investigations, a report will be then be forwarded to all relevant stakeholders for their perusal.

Please note that the procedures for every probable or potential event that might negatively impact on Glencore's performance have been generated and are available on request.

In addition, environmental principles will be communicated effectively to newly appointed employees, employees returning from annual leave, as well as to contractors and visitors upon entering the mining area. This will be done as part of the standard induction procedure as per Glencore's existing induction procedures.

## **10.2 Item 1(m)(2): Manner in which Risks will be Dealt with in Order to Avoid Pollution or the Degradation of the Environment**

An Emergency Response Plan is detailed in Section 4.2, Part B and will be the approach used by Glencore to respond to potential risks that may pollute or degrade the environment during the construction phase. In terms of the operational phase of the new realigned road, the MPWRT will undertake maintenance activities according to their own procedures.

It should be noted that the Emergency Response Plan is in addition to the EMPR presented in Section 5 and Section 6, Part B.

## 11 Item 1(n): Specific information Required by the Competent Authority

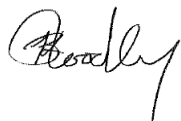
The financial provision for the environmental rehabilitation and closure requirements of mining operations is governed by Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) and National Environmental Management Act, 1998, Act 107 of 1998), as amended, (NEMA) which provides in Section 24P that the holder of a mining right must make financial provision for rehabilitation of negative environmental impacts.

The realigned and upgraded provincial road is seen as a permanent linear structure therefore no decommissioning and rehabilitation will take place. However, during the life cycle phases, namely the construction and operational phase, rehabilitation of certain aspect of the environment may need to occur should any associated impacts be identified.

## 12 Item 2: 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.

<b>Signature of the Environmental Assessment Practitioner:</b>	
<b>Name of Company:</b>	Digby Wells and Associates (South Africa) (Pty) Ltd
<b>Date:</b>	11 September 2015

## 13 References

- Airshed Planning Professionals (2013), Tweefontein Optimisation project amendment: Air Quality specialist assessment.
- Avzcons (2013), Tweefontein expansion project proposed closure / realignment of sections of roads D2770 & P141-1 (R547) revised Traffic Impact Study.
- Avzcons (2014), Tweefontein Road Realignment Project proposed closure/realignment of sections of roads D2770 & P141-1 (R547) revised Traffic Impact Study.
- Clean Stream Biological Services (2010), Aquatic fauna assessment for the Tweefontein Optimization Project.
- Clean Stream Biological Services (2013), Aquatic Biomonitoring program for Xstrata Coal South Africa: Tweefontein Complex, February 2013 wet season Biomonitoring survey.
- Clean Stream Environmental Consultants (2010), Duiker Mining (Pty) Ltd, Tweefontein Complex, Environmental Management Programme including Environmental Impact Assessment under the MPDRA (2002) and the NEMA (1998).
- Clean Stream Environmental Consultants (2011), Duiker Mining (Pty) Ltd: Tweefontein Complex Tweefontein Optimisation Project Amplified EMP (including EIA) under the MPDRA (2002) and the NEMA (1998).
- Clean Stream Environmental Consultants (2014), Glencore Operations South Africa (Pty) Ltd. Environmental Impact Assessment Report for the Tweefontein Road Realignment Project.
- Clean Stream Environmental Services (2006) Xstrata Coal South Africa (Pty) Ltd. Tweefontein Division. Environmental Impact Assessment and Environmental Management Programme, reference number XCSA/TFNDIV/11/2006.
- De Castro and Brits Ecological Consultants (2010), Biodiversity assessment of Vertebrates at the Tweefontein Colliery, Mpumalanga.
- De Castro and Brits Ecological Consultants (2010), Floristic baseline survey for the Tweefontein Optimisation Project study area (Ogies, Mpumalanga).
- De Castro and Brits Ecological Consultants (2013) Threatened species surveys – Tweefontein Optimisation Project Amendment (Ogies, Mpumalanga).
- Department of Environmental Affairs (2010), Companion to the EIA Regulations 2010, Integrated Environmental Management Guideline Series 5, Department of Environmental Affairs, Pretoria.
- Department of Environmental Affairs (2010), Public Participation 2010, Integrated Environmental Management Guideline Series 7, Department of Environmental Affairs, Pretoria.



- Department of Environmental Affairs and Tourism (2002) Impact Significance, Integrated Environmental Management, Information Series 5, Department of Environmental Affairs and Tourism (DEAT), Pretoria.
- Department of Environmental Affairs and Tourism (2004) Criteria for determining Alternatives in EIA, Integrated Environmental Management, Information Series 11, Department of Environmental Affairs and Tourism, Pretoria.
- Emalahleni Local Municipality (2013), Draft Integrated Development Plan for 2013 / 2014, Emalahleni Local Municipality, Emalahleni.
- Enviro Acoustic Research (2013) Noise impact study for Environmental Impact Assessment Proposed Tweefontein Optimisation Amendment Project for the years of 2013 to 2026.
- Environmental and Health Risk Consulting (2010), Ambient air quality impact study in support of the proposed Tweefontein Optimisation Project.
- Environmental and Health Risk Consulting (2010), Environmental noise impact report in support of the Proposed Tweefontein Optimisation Project.
- Environmental and Health Risk Consulting (Pty) Ltd (2010), Ambient air quality impact study in support of the proposed Tweefontein Optimisation Project.
- Ferrara & Lötter (2007), Mpumalanga Biodiversity Conservation Plan Handbook, Mpumalanga Provincial Government, Nelspruit.
- Groundwater Complete (2010), Duiker Mining (Pty) Ltd.: Report on geohydrological investigation as part of the EMP for the Tweefontein Optimisation Project.
- Groundwater Complete (2013), Report on Geohydrological Investigation as part of the EMP amendment for the Tweefontein Optimisation Project.
- Jeffares & Green (Pty) Ltd (2014), Detail Design Report for the Re-Alignment of Provincial Roads P141-1 and D2769 and the Closure of a portion of D2770 and P141-1.
- Jones and Wagener Consulting Civil Engineers (2010), Surface water specialist report for The Tweefontein Optimisation Project.
- Jones and Wagener Consulting Civil Engineers (2013), Specialist Surface Water report as input to the EIA for the Tweefontein Optimisation Project Amendment.
- Metrogis (2010), Visual impact assessment for the proposed Tweefontein Optimisation Project.
- Metrogis (2013), Tweefontein Optimisation Project Amendment Visual impact assessment.
- Midgley, D. C., Pitman W. V., and Middleton, B. J. (1990). Surface Water Resources of South Africa, 1990. (1st Ed., 1994). Water Research Commission, 1, Drainage Regions A, B, Limpopo-Olifants. WRC Report No. 298/1.1/94.

- Mpumalanga Department of Agriculture, Conservation and Environment. (2003). 2003 Mpumalanga State of the Environment Report. Mpumalanga Department of Agriculture, Conservation and Environment, Nelspruit.
- Mpumalanga Department of Agriculture, Rural Development and Land Administration (2010). <http://www.mpu.agric.za/SOER/Mpumalanga%20Publikat%20Web%20Version%20SoER%20%282003%29/issues/land/index.htm> [Accessed 2010/01/22]
- Mpumalanga Parks Board (2003), State of Biodiversity in Mpumalanga, Mpumalanga Parks Board, Nelspruit.
- Mucina, L. & Rutherford, C. (2006). The Vegetation of South Africa, Lesotho and Swaziland. Strelitzia 19. Pretoria: National Biodiversity Institute.
- Nemai consulting (2010), Socio-economic study Tweefontein Optimisation Project.
- Parsons Brinkerhoff (2009). Tweefontein Optimisation Project Pre-feasibility Report. October 2009.
- Pistorius (2010), A Phase I Heritage Impact Assessment study for Duiker Mining (Pty) Ltd's proposed Tweefontein Optimization Project on the eastern Highveld in the Mpumalanga province of South Africa.
- Pistorius (2013), A Phase I Heritage Impact Assessment study for XSA's proposed Tweefontein Optimization Project Amendment on the eastern Highveld in the Mpumalanga province of South Africa.
- Rehab Green Monitoring Consultants CC (2013), Soil, land capability and land use assessment of proposed opencast and underground mining areas as well as the footprints of various proposed mining infrastructure related to the Tweefontein Optimization Project Amendment. Revision 3/2008.
- SAWS: South African Weather Service (2009). Climate information office: Wind and extreme rainfall event information.
- South African National Road Agency Limited (2002) Code of Procedure for the Planning and Design of Highway and Road Structures.
- South African National Road Agency Limited (2008) Land Acquisition Guideline Manual
- South African National Road Agency Limited (2009) Routine Road Maintenance Manual.
- Statistics South Africa (2001). Census 2001. Pretoria.
- Statistics South Africa (2007). Community Survey 2007. Pretoria.
- Terrasoil Science (2010) EIA / EMP Phase soil, land use and land capability survey: Tweefontein Optimization Project.
- Wetland Consulting Services (2010), Wetland delineation and impact assessment report for the Tweefontein Optimisation Project.
- Wetland Consulting Services (2013), Wetland Assessment of the TOPA.

Xstrata Coal South Africa (2009), Community Management System, Group HSEC Procedure no HSEC C PROC 007.

Xstrata Coal South Africa (2009), Motivation for funding: Corporate Social Investment, Group HSEC Procedure no HSEC C PROC 005.

Xstrata Coal South Africa (2012), Emergency Preparedness Document.

Xstrata Coal South Africa (2012), Environmental Management Programme Performance Assessment, Group HSEC Procedure no HSEC E PROC 006.

Xstrata Coal South Africa (2012), Environmental Monitoring, Group HSEC Procedure no HSEC E PROC 014.

Environmental Impact Assessment and Environmental Management Programme Report

Proposed Realignment of the P141-1 Provincial Road, Tweefontein Mine Complex,  
Mpumalanga Province

GLE3075



**DIGBY WELLS**  
ENVIRONMENTAL

---

## **Appendix A: EAP CV and Qualifications**



## Appendix B: Project Plans



## Appendix C: Authority Correspondence



## Appendix D: Specialist Studies



Environmental Impact Assessment and Environmental Management Programme Report

Proposed Realignment of the P141-1 Provincial Road, Tweefontein Mine Complex,  
Mpumalanga Province

GLE3075



DIGBY WELLS  
ENVIRONMENTAL

## Appendix D1: Road Design Report



## Appendix D2: Air Quality Assessment



## Appendix D3: Soils Assessment



## Appendix D4: Surface Water Assessment



## Appendix D5: BioMonitoring



## Appendix D6: Ecology



## Appendix D7: Wetland Delineation





## Appendix D8: Heritage Assessment



## Appendix D9: Traffic Assessment



## Appendix E: Public Participation Documentation



## Appendix E1: Stakeholder Database



## **Appendix E2: Background Information Document, Registration Letter and Comment Sheet**



## Appendix E3: Advertisements

Environmental Impact Assessment and Environmental Management Programme Report

Proposed Realignment of the P141-1 Provincial Road, Tweefontein Mine Complex,  
Mpumalanga Province

GLE3075



**DIGBY WELLS**  
ENVIRONMENTAL

## **Appendix E4: Site Notice and Map**





## **Appendix E5: Scoping Report Announcement Letter**

Environmental Impact Assessment and Environmental Management Programme Report

Proposed Realignment of the P141-1 Provincial Road, Tweefontein Mine Complex,  
Mpumalanga Province

GLE3075



**DIGBY WELLS**  
ENVIRONMENTAL

---

## **Appendix E6: Comment and Response Report**

Environmental Impact Assessment and Environmental Management Programme Report

Proposed Realignment of the P141-1 Provincial Road, Tweefontein Mine Complex,  
Mpumalanga Province

GLE3075



**DIGBY WELLS**  
ENVIRONMENTAL

---

## **Appendix E7: DEIA Announcement Letter**