Annex G.12

Traffic and Transport
Networks Specialist Report
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA)

FOR THE CONSTRUCTION OF THE GAMSBERG ZINC MINE, CONCENTRATOR PLANT AND ASSOCIATED INFRASTRUCTURE, NEAR AGGENEYS, NORTHERN CAPE

TRAFFIC AND TRANSPORTATION SPECIALIST REPORT

APRIL 2013

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE CONSTRUCTION OF THE GAMSBERG ZINC MINE, CONCENTRATOR PLANT AND ASSOCIATED INFRASTRUCTURE, NEAR AGGENEYS, NORTHERN CAPE

1.1 SPECIALIST TRAFFIC AND TRANSPORT IMPACT STUDY

1.2 THE SUMMARY OF THE KEY HIGHLIGHTS AND FINDINGS OF THE STUDY

The Gamsberg zinc mine (described herein as the “Gamsberg mine”) is to be located on top of the Gamsberg Inselberg and will generate significant volumes of predominantly heavy vehicle traffic in the Construction Phase, Operational Phase and during the Decommissioning Phase of the mine life cycle.

- The impact of the heavy traffic will be of minor negative significance and can be mitigated effectively with the upgrading of the access to the mine as well as the surfacing of the Loop 10 road between the N14 and the Transnet railway siding.

- The recommendation to surface Loop 10 is fundamental to the long term sustainability of the project and would need to be implemented by year 5 of operations.

The Gamsberg zinc mine will create substantial numbers of employment opportunities all of which will be taken up and result in an increase in traffic between the town of Aggeneys and the Gamsberg zinc mine which is 10 km east of the town.

- The impact on the road network of the person trips associated with the Gamsberg mine is well documented in the study and was found to be moderately significant. The impact can be mitigated by utilising the various modes of transport and by introducing a bus shuttle service between Aggeneys and Gamsberg Mine.

The background receiving environment or “Study Area” is the N14 National Route (SANRAL) in the vicinity of the Gamsberg Inselberg and the intersection with Loop 10 gravel road. This N14 is a high order road carrying regional long distance and local traffic and will require upgrading of the entrance to the mine to accommodate the increase in turning movements associated with the project.

- Should the upgrading of the entrance with the associated signage and road markings be implemented at the start of the project this will in all probability mitigate the minor negative impacts to a residual slightly negative significance.

The prevailing traffic volumes on the N14 between Springbok and Pofadder are in the order of 600 vehicles per day per direction with the highest volume recorded per direction reaching 100 vehicles per hour. This is a relatively low background
traffic volume for a road of this standard and hence has considerable reserve capacity as detailed in the analysis contained in the study. The project is of such a nature that the construction traffic generated by the construction of the Mine will be best accommodated within a traffic management plan for the access to the site.

- The traffic management plan should include appropriate road traffic signage and road markings to prevent any adverse traffic incidents from occurring at the intersection.

During the operations of the mine, the main traffic component associated with the activities on the Mine will be the transfer of Zinc concentrate material from the Gamsberg zinc mine to the Port of Saldanha for export by ship. This would be predominantly heavy vehicle traffic and have the greatest impact on the road network from a pavement management viewpoint.

- The N14 and N7 are both National Routes managed by SANRAL (Western Region) and have adequate capacity for the number of vehicles and will probably only have a slightly significant impact on the operational characteristics of the Road Network.

The impact will be concentrated on the road and rail infrastructure with a ramp up in Phases over a number of years.

- The limited capacity of the Sishen-Saldanha railway line must be emphasised and although the rail network is the backbone of the transportation system, the number of slots available to the mine are limited at present and are unlikely to increase until such time as the Sishen-Saldanha railway line is dualled.

1.3 STAGING OF THE PROJECT

The project will be implemented in Phases with a ramp up in operations over a 17 year period to meet maximum production of 1,0 Mtpa.

1.3.1. Phase 1 (Year 1 and 2)

Phase 1 could anticipate 0,335 Mtpa being accommodated by Road (N14, N7 & R399) to Saldanha Bay for export.

1.3.2. Phase 2 (Year 3 and 4)

Phase 2 would be split between Road and Rail with 0,335 Mtpa via Road (N14, N7 & R399) and 0,335 Mtpa via Rail on the Sishen – Saldanha railway line.
1.3.3. **Phase 3 (Year 5 - 17)**

Phase 3 would be split between Road and Rail with 0.500 Mtpa via Road (N14, N7 & R399) and 0.500 Mtpa via Rail on the Sishen – Saldanha railway line.

**Figure 1.1  STICK DIAGRAM – SITE LAYOUT**

The schematic diagram Figure 1.1 (not to scale) illustrates the location of the Gamsberg mine in relation to the Town of Aggeneys. What is significant is the fact that the majority of the travel will take place on the N14 between the Town of Aggeneys and the Gamsberg Mine some 10km to the east.

What is also apparent is the fact that the Sishen-Saldanha railway line is located 147 km south of the mine and is well situated for regional heavy rail transfer of the zinc concentrate to the Port of Saldanha for export.

The diagram also illustrates the rail and road alternatives for transport of the zinc concentrate to the Port of Saldanha.
INTRODUCTION AND BASELINE STUDY

Kantey and Templer Consulting Engineers were appointed by ERM Southern Africa to undertake a specialist traffic and transportation study in respect of the proposed Gamsberg mine as part of the ESIA process.

The project team undertook a two day field assessment on 24 and 25 July 2012 and in particular meet with Mr Kobus Zandberg and Mr Marius Visser at the Black Mountain Mine in Aggeneys.

The Gamsberg mine will rely heavily on Loop 10, which is a gravel road between the N14 and the Transnet Railway siding, which is the transfer point for zinc concentrate from the Gamsberg mine to the Sishen – Saldanha Railway Line and finally to the Port of Saldanha for export.

According to the managers the cost grading is in the order of R500,000 (half a million rand) per month to grade the Loop 10 Gravel Road in order to maintain a suitable riding surface for trucks.

2.1 BASELINE ASSESSMENT

The baseline assessment of the receiving environment consisting of the roads and rail infrastructure in the study area was conducted in loco. The N14 is a SANRAL (Western Region) National Route from Upington to Springbok and carries fairly low volumes of traffic at present.

The traffic flows on the N14 are shown in the following table which highlights the Average Daily Traffic (ADT) at 1,166 vehicles per day with 588 eastbound to Pofadder and 578 westbound to Springbok.

<table>
<thead>
<tr>
<th>N14</th>
<th>To Pofadder</th>
<th>To Springbok</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of vehicles/yr</td>
<td>214,762</td>
<td>210,959</td>
<td>425,721</td>
</tr>
<tr>
<td>Average daily traffic (ADT)</td>
<td>588</td>
<td>578</td>
<td>1166</td>
</tr>
<tr>
<td>Average daily truck traffic</td>
<td>43</td>
<td>41</td>
<td>84</td>
</tr>
<tr>
<td>Percentage of trucks</td>
<td>7.3</td>
<td>7.1</td>
<td>7.2</td>
</tr>
<tr>
<td>Average speed (km/h)</td>
<td>98.5</td>
<td>108.4</td>
<td>103.4</td>
</tr>
<tr>
<td>Average speed – light vehicles</td>
<td>99.7</td>
<td>109.8</td>
<td>104.7</td>
</tr>
<tr>
<td>Average speed – heavy vehicles</td>
<td>82.8</td>
<td>90.2</td>
<td>86.4</td>
</tr>
<tr>
<td>15th centile speed (km/h)</td>
<td>79.8</td>
<td>85.8</td>
<td>81.7</td>
</tr>
<tr>
<td>85th centile speed (km/h)</td>
<td>119.9</td>
<td>132</td>
<td>126</td>
</tr>
<tr>
<td>Total number of heavy vehicles</td>
<td>15,694</td>
<td>14,993</td>
<td>30,687</td>
</tr>
<tr>
<td>Estimate of number of axles</td>
<td>4.3</td>
<td>4.4</td>
<td>4.4</td>
</tr>
<tr>
<td>Estimated truck mass (Ton/truck)</td>
<td>25.1</td>
<td>25.6</td>
<td>25.4</td>
</tr>
<tr>
<td>Estimated Average E80/truck</td>
<td>1.5</td>
<td>1.5</td>
<td>1.5</td>
</tr>
<tr>
<td>Estimated daily E80 on the road</td>
<td></td>
<td></td>
<td>128</td>
</tr>
</tbody>
</table>
2.2 **IMPACT ASSESSMENT CRITERIA**

Traffic and transportation impacts are expressed in terms of measures of effectiveness of the operational characteristics of the traffic and are generally summarised in levels of service (LOS) and delays measured in seconds.

Levels of service decrease from LOS A to LOS F as the delays increase from 0-10 seconds per vehicle on average (LOS A) to >60 seconds on average (LOS F).

For a project of this nature in the context of relatively low background traffic volumes, the LOS and delay is measured on a link basis at the key components of the network with Highway Capacity Manual Software (HICAP) which is an internationally recognized programme for analysing traffic impacts.

2.3 **INTERSECTION OF N14 AND AGGENEYS ACCESS ROAD**

The intersection of N14 and Aggeneys access road has relatively few turning vehicles as per field observation on 24 and 25 July 2012 under typical operating conditions. Turning vehicles at the intersection are defined as low volumes with fewer than 50 vehicles turning per hour. Consequently the levels of service (LOS) are noted to be LOS A with delays of less than 10 seconds on average per vehicle. The intersection is stop controlled on the Aggeneys minor approach to the N14. The access road is surfaced to Aggeneys and the Black Mountain Mine.

2.4 **INTERSECTION OF N14 AND LOOP 10 ROAD**

The intersection of N14 and Loop 10 carries even fewer vehicles with extremely low volumes at present with fewer than 10 turning vehicles per hour. The road is 147 km in length and will need to be graded constantly or reconstructed with an asphalt riding surface to accommodate the additional traffic from the Gamsberg Zinc Mine project.

The baseline output of the Black Mountain Mine is roughly 125,000 tons per annum which is currently carried by road and rail in the following proportions:

- Road 35,000 tons per annum (28%)
- Rail 90,000 tons per annum (72%)

2.5 **ROAD BASED TRANSFER**

Road based transfer to the Port of Saldanha via the N14, N7 and R399.

Given the current proportion of product output transported by road, the current loading on the network is fairly low and hence low frequency of heavy vehicles which is associated with negligible negative traffic impacts.

With 35t trucks this amounts to three (3) truckloads per day at present (35,000t / 350 days / 35t trucks)
2.6 **RAIL BASED TRANSFER**

Rail based transfer to the Port of Saldanha is via the Transnet Sishen – Saldanha railway line.

With 52t wagons this amounts to 38 wagons per week (90,000 t / 45 weeks / 52t wagons). The current slots allocated are in the order of 40 wagons per week and are thus fully utilised at present. There does not appear to be any additional capacity for slots on the Sishen – Saldanha railway line.

2.7 **ISSUES AND CONSTRAINTS**

The main issue is the limited capacity of the Sishen – Saldanha railway line which has a single line and can only offer a certain number of slots per week and approximately 40 wagons are allocated to Black Mountain Mine per week at present which is insufficient for the additional zinc concentrate from the Gamsberg mine.

The secondary issue is the constant grading of the Loop 10 road at considerable cost in the order of R500,000 per month.

Dust associated with gravel roads is also an issue. This affects visibility adversely and makes it difficult for motorists to travel behind trucks and to overtake is fairly hazardous.
3 TRAFFIC AND TRANSPORT MODELLING

Table 2 FORECAST OF THE OPERATIONAL TRAFFIC GENERATION MINING PRODUCT (DURING PHASES 1, 2 &3)

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Phase 1 (Year 1 &amp; 2)</th>
<th>Phase 2 (Year 3 &amp; 4)</th>
<th>Phase 3 (Year 5-17)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mode</td>
<td>Trucks, Wagon (Rail)</td>
<td>Trucks, Wagon (Rail)</td>
<td>Trucks, Wagon (Rail)</td>
</tr>
<tr>
<td>Size (tons)</td>
<td>35</td>
<td>35</td>
<td>35</td>
</tr>
<tr>
<td>Output (tons/year)</td>
<td>335,000</td>
<td>335,000</td>
<td>500,000</td>
</tr>
<tr>
<td>Days/Year</td>
<td>350</td>
<td>315</td>
<td>350</td>
</tr>
<tr>
<td>Weeks/year</td>
<td>50</td>
<td>45</td>
<td>50</td>
</tr>
<tr>
<td>Trucks/day</td>
<td>27</td>
<td>27</td>
<td>41</td>
</tr>
<tr>
<td>Wagons/day</td>
<td>-</td>
<td>20</td>
<td>31</td>
</tr>
<tr>
<td>Trucks/week</td>
<td>191</td>
<td>191</td>
<td>286</td>
</tr>
<tr>
<td>Wagons/week</td>
<td>-</td>
<td>143</td>
<td>214</td>
</tr>
<tr>
<td>Tons/day</td>
<td>957</td>
<td>957</td>
<td>1,063</td>
</tr>
<tr>
<td>Tons/week</td>
<td>6,700</td>
<td>6,700</td>
<td>7,444</td>
</tr>
</tbody>
</table>

The modelling of traffic generation is based on first principles from assumptions provided by the project team. It can be seen that the trip generation of the construction phase is estimated at 507 person trips per day resulting in 155 vehicles per day (3 buses, 25 minibus-taxis and 127 cars).
It can be seen that the trip generation of the construction phase is estimated at 630 person trips per day resulting in 40 vehicles per day (11 buses, 8 minibus-taxis and 21 cars). It should be noted that during operations of the mine, there are three shifts per day and the trips are thus likely to be distributed evenly throughout the day with approximately 27 trips per shift change.

Calculations

\[
\begin{align*}
\text{Trips per day} &= 40 \text{ vehicles} \\
\text{Shifts per day} &= 3 \text{ shifts} \\
\text{Trips per shift} &= 13.3 \text{ trips} \\
\text{Trips per shift change} &= 26.7 \text{ trips (say 27 trips)}
\end{align*}
\]

Table 5  MODELLING OF THE PERSON TRIP TRAFFIC GENERATION DURING OPERATIONS (YEAR 5)
It can be seen that the trip generation of the construction phase is estimated at 630 person trips per day resulting 79 vehicles per day (22 buses, 16 minibus-taxis and 41 cars). It should be noted that during operations of the mine, there are three shifts per day and the trips are thus likely to be distributed evenly throughout the day with approximately 53 trips per shift change.

**Calculations**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Trips per day</td>
<td>= 79 vehicles</td>
</tr>
<tr>
<td>Shifts per day</td>
<td>= 3 shifts</td>
</tr>
<tr>
<td>Trips per shift</td>
<td>= 26.3 trips</td>
</tr>
<tr>
<td>Trips per shift change</td>
<td>= 52.3 trips (say 53 trips)</td>
</tr>
</tbody>
</table>

Traffic volumes of 53 trips per hour are not significant in the context of the background traffic on the N14 which is fairly low.

There may, however, be some localised short-lived congestion at the intersection of the N14 and the Aggeneys access road and at the intersection of the N14 and Gamsberg mine entrance, with minor delays of >20 seconds per vehicle for a brief period – during the shift changes.
4 IMPACT ON THE TRAFFIC AND TRANSPORTATION NETWORK

4.1 IMPACT DESCRIPTION AND ASSESSMENT

Traffic and transportation impacts are expressed in terms of measures of effectiveness of the operational characteristics of the traffic and are generally summarised in levels of service (LOS) and delays measured in seconds.

Levels of service decrease from LOS A to LOS F as the delays increase from <10 seconds per vehicle on average (LOS A) to >60 seconds on average (LOS F).

For a project of this nature in the context of relatively low background traffic volumes, the LOS and delay is measured on a link basis at the key components of the network with Highway Capacity Manual (HCM) software which is an internationally recognized programme for analysing traffic impacts.

**TABLE 6  HICAP 2000 ANALYSIS: N14 (SPRINGBOK TO POFADDER)**

<table>
<thead>
<tr>
<th>Measures of Effectiveness</th>
<th>Phase 1</th>
<th>Phase 2</th>
<th>Phase 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two way hourly volume (vph)</td>
<td>228</td>
<td>228</td>
<td>242</td>
</tr>
<tr>
<td>Levels of Service (LOS)</td>
<td>A</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>Average Travel Speed (km/h)</td>
<td>105.5</td>
<td>105.5</td>
<td>105.3</td>
</tr>
<tr>
<td>V/C Ratio</td>
<td>0.079</td>
<td>0.079</td>
<td>0.084</td>
</tr>
</tbody>
</table>

**TABLE 7  HICAP 2000 ANALYSIS: N7 (GARIES TO SPRINGBOK)**

<table>
<thead>
<tr>
<th>Measures of Effectiveness</th>
<th>Phase 1</th>
<th>Phase 2</th>
<th>Phase 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two way hourly volume (vph)</td>
<td>245</td>
<td>245</td>
<td>259</td>
</tr>
<tr>
<td>Levels of Service (LOS)</td>
<td>A</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>Average Travel Speed (km/h)</td>
<td>99.5</td>
<td>99.5</td>
<td>99.3</td>
</tr>
<tr>
<td>V/C Ratio</td>
<td>0.095</td>
<td>0.095</td>
<td>0.100</td>
</tr>
</tbody>
</table>

It can be seen from Table 9 above that the operations on the N7 are not adversely affected by the Gamsberg mine.
### Table 8  IMPACT CHARACTERISTICS: TRAFFIC AND TRANSPORTATION

<table>
<thead>
<tr>
<th>Summary</th>
<th>Construction</th>
<th>Operation</th>
<th>Decommissioning/Post Closure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Aspect/activity</td>
<td>Increase in traffic at the access to the site and intersection with the N14 associated with the construction vehicles in establishing the mine.</td>
<td>Transfer of Zinc Concentrate to the Port of Saldanha via the N14 &amp; N7 and via Loop 10 and the Sishen Railway Line.</td>
<td>Increase in traffic associated with the decommissioning of the mine.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Impact Type</th>
<th>Construction</th>
<th>Operation</th>
<th>Decommissioning/Post Closure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stakeholders/Receptors Affected</td>
<td>SANRAL (N14)</td>
<td>SANRAL (N14 &amp; N7) NC (Loop 10) TRANSNET (Sishen-Saldanha Railway Line.</td>
<td>SANRAL (N14)</td>
</tr>
</tbody>
</table>

### 4.2 CONSTRUCTION PHASE IMPACTS

The construction phase impacts are of a temporary nature and will abate on completion of the construction phase of establishing the Gamsberg zinc mine.

During the construction phase, activities to be carried out will include:

- site clearance and establishment;
- delivery of construction materials to site,
- construction of access roadways to the top of the Gamsberg inselberg;
- construction of the mining plant and processing components;

Construction activities will lead to an increase in traffic of heavy construction vehicles which will have a direct impact on the road network and will be especially apparent at the intersection of the N14 and the access to the site.

The duration of the construction activities and impacts are possible and are likely to be temporary and hence negligible as the impact can be mitigated with appropriate warning signage and enhanced road markings.

The extent of the impact is likely to be localised and within the sphere of influence of the intersection of the N14 and the access to the site.

The scale of the impact will depend on the construction programme and rate of construction of the new mine. The road traffic activity in the N14 will be notably altered as the turning vehicles would increase and consequently safety would be compromised without appropriate temporary construction road signage and markings. The impact would not be there without the construction phase of the Gamsberg zinc mine.

It is likely that the disruption to traffic on the N14 would be periodic and for the duration of the construction period.
**Box 2.1  SUMMARY OF CONSTRUCTION IMPACT: TRAFFIC AND TRANSPORTATION**

<table>
<thead>
<tr>
<th>Nature:</th>
<th>Construction activities would result in a negative direct impact on the road network at the intersection of the N14 and the access to the site.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensitivity/Vulnerability/Importance of Resource/Receptor – Medium</td>
<td>Irreplaceability: The activity will not result in the loss of irreplaceable resources as the N14 will be able to accommodate the additional traffic associated with the construction phase, especially with the contractors accommodated on site in temporary housing.</td>
</tr>
<tr>
<td>Impact Magnitude – Small</td>
<td>Extent: The extent of the impact is local to the intersection of the N14 and the access road. Duration: The expected impact will be temporary. Scale: The impact will result in notably altered condition of the N14 in the vicinity of the access to the site with shoulder breaks and damage to the road edge. Frequency: The frequency of the impact will be once off. Likelihood: Localised damage to the N14 road edge is most likely to occur.</td>
</tr>
<tr>
<td>IMPACT SIGNIFICANCE (PRE-MITIGATION) – MINOR</td>
<td></td>
</tr>
<tr>
<td>Degree of Confidence:</td>
<td>The degree of confidence is high.</td>
</tr>
</tbody>
</table>

### 4.3 CONSTRUCTION PHASE MITIGATION

- Prepare the intersection of the N14 and the access to the site with the appropriated construction warning signs and road markings.

- Prepare the carriageway crossing at the intersection with a concrete edge beam or construct an asphalt bell-mouth.

- Restrict all construction activities to designated working areas with all work areas and access areas clearly marked and signposted.

- Ensure that a Traffic and Transportation Management Plan (TMP) is in place for the construction phase of the project.

This TMP outlines the strategies that will be implemented to minimize impacts to the traveling public during construction phase of this project. This TMP also lays out the roles and responsibilities of the project stakeholders prior to and during construction.

The purpose of the TMP is to minimize motorist delays associated with project construction without compromising public or worker safety, or the quality of the work.
TMPs attempt to achieve this goal by the effective application of traditional traffic mitigation strategies, with a combination of public and motorist information, corridor/network management, incident management, alternate route strategies, construction strategies, and public outreach.

4.4 OPERATIONAL PHASE IMPACTS

During the operation phase, the activity will ramp up in the medium term over a period of several years. The activities that may negatively impact on the traffic and transport network will be the output of the mine in the form of Zinc concentrate.

The output is summarised as follows:

**TABLE 9 RAMP-UP OF PRODUCTION IN PHASES**

<table>
<thead>
<tr>
<th>Phase 1 (Year 1 and 2)</th>
<th>Phase 2 (Year 3 and 4)</th>
<th>Phase 3 (Year 5 – 17)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transport Option 1: Road (ie via N14, N7 and R399)</td>
<td>0.335 Mtpa</td>
<td>0.335 Mtpa</td>
</tr>
<tr>
<td>Transport Option 2: Rail (via Loop 10 gravel road)</td>
<td>0 Mtpa</td>
<td>0.335 Mtpa</td>
</tr>
</tbody>
</table>

- The potential impact on the surrounding road network including the N14, N7 and R399 to Saldanha Bay;
- The potential impact on the Loop 10 gravel road;
- The potential impact on the TRANSNET Sishen-Saldanha Railway Line.

These activities may further impact on the Port of Saldanha where the Zinc concentrate is transferred to ship for export.

The impact can be assessed by ascertaining the rate of traffic on the network as a result of the output of the Zinc concentrate from the Gamsberg mine.

**TABLE 10 ROAD TRAFFIC GENERATION BASED ON RAMP-UP**

<table>
<thead>
<tr>
<th>Road based</th>
<th>Phase 1 (Year 1 and 2)</th>
<th>Phase 2 (Year 3 and 4)</th>
<th>Phase 3 (Year 5 – 17)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transport Option 1: Road (ie via N14, N7 and R399)</td>
<td>0.335 Mtpa/350 days/35t trucks = 27 trucks per day</td>
<td>0.335 Mtpa/350 days/35t trucks = 27 trucks per day</td>
<td>0.500 Mtpa/350 days/35t trucks = 41 trucks per day</td>
</tr>
<tr>
<td>Transport Option 2: Rail (via Loop 10 gravel road)</td>
<td>0 Mtpa</td>
<td>0.335 Mtpa/45 weeks /52t wagons = 143 wagons per week.</td>
<td>0.500 Mtpa/45 weeks /52t wagons = 214 wagons per week.</td>
</tr>
<tr>
<td>Combined Effect on Loop 10</td>
<td>0 trucks per day</td>
<td>27 trucks per day</td>
<td>41 trucks per day</td>
</tr>
</tbody>
</table>
The three phases of operation are likely to generate significant volumes of heavy vehicle traffic on the road network as Zinc concentrate is transferred to the Port of Saldanha.

Traffic loading on Loop 10 can be summarised as follows:

- The Phase 1 traffic associated with the production of 0.335 Mtpa is thus likely to be in the order of zero (0) trucks per day per direction on Loop 10.

- The Phase 2 traffic associated with the production of 0.670 Mtpa is thus likely to be in the order of 27 trucks per day per direction on Loop 10.

- The Phase 3 traffic associated with the production of 1.0 Mtpa is thus likely to be in the order of 41 trucks per day per direction on Loop 10.

Traffic loading on the N14 and the N7 via road can be summarised as follows:

- The Phase 1 traffic associated with the production of 0.335 Mtpa is thus likely to be in the order of 27 trucks per day per direction on the National Route.

- The Phase 2 traffic associated with the production of 0.670 Mtpa is thus likely to be in the order of 27 trucks per day per direction on the National Route.

- The Phase 3 traffic associated with the production of 0.670 Mtpa is thus likely to be in the order of 41 trucks per day per direction on the National Route.

The traffic loading on the N14 and N7 was analysed with HICAP software and the results are found to be satisfactory with the additional traffic resulting from the project. The prevailing level of service was found to be LOS A with average delays of <10 seconds per vehicle.
**BOX 2.2 SUMMARY OF OPERATIONAL IMPACT: TRAFFIC AND TRANSPORTATION**

<table>
<thead>
<tr>
<th>Nature:</th>
<th>Operational activities would result in a negative direct impact on the traffic and transportation network in the region.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensitivity/Vulnerability/Importance of Resource/Receptor – Medium</td>
<td>Irreplaceability: The activity will not result in the loss of irreplaceable resources, however will consume valuable capacity on the TRANSNET Sishen-Saldanha Railway Line</td>
</tr>
<tr>
<td>Impact Magnitude – Medium</td>
<td>Extent: The extent of the impact is regional</td>
</tr>
<tr>
<td></td>
<td>Duration: The expected impact will be permanent (ie irreversible)</td>
</tr>
<tr>
<td></td>
<td>Scale: The impact will result in notable changes to the resource/receptor</td>
</tr>
<tr>
<td></td>
<td>Frequency: The frequency of the impact will be once off</td>
</tr>
<tr>
<td></td>
<td>Likelihood: Traffic and transportation will unlikely be affected</td>
</tr>
<tr>
<td>IMPACT SIGNIFICANCE (PRE-MITIGATION) – MODERATE</td>
<td></td>
</tr>
<tr>
<td>Degree of Confidence:</td>
<td>The degree of confidence is high.</td>
</tr>
</tbody>
</table>

### 4.5 OPERATIONAL PHASE MITIGATION

The objective of mitigation is to: minimise impacts on the Road Traffic Network and Rail Transportation network.

Specific measures include:

- Balance the transport of Zinc concentrate between the two transportation modes ie. road and rail. Rail being the backbone of the long haul network, however, with limited slots on the Sishen-Saldanha Railway Line at present.

- The long term plan is to dual the Sishen Saldanha Railway line to double tracks and hence increase capacity considerably with simultaneous two way freight operations.

- Upgrade Loop 10 to a surfaced road to eliminate the dust and cost of grading the gravel road on a continuous basis. This recommendation is fundamental to the long term sustainability of the project and would need to be implemented by year 5 of operations.

- Ensure that a traffic and transportation management plan (TMP) is in place for the operational phase of the project.

This Transportation Management Plan (TMP) outlines the strategies that will be implemented to minimize impacts to the traveling public during operational...
phase of this project. This TMP also lays out the roles and responsibilities of the project stakeholders prior to and during operations.

4.6 **DECOMMISSIONING AND POST CLOSURE PHASE IMPACTS**

The decommissioning phase of the activity would result in the removal of all operational equipment. The process of removal will result in further impacts to the surrounding road network as the mining equipment is removed from site. The actual details of the decommissioning phase are not available and cannot be assessed comprehensively. The receiving environment of the N14 is considered to be sufficiently robust to accommodate the decommissioning of the Gamsberg Zinc Mine in a similar way to the construction phase.

**BOX 2.3  SUMMARY OF DECOMMISSIONING IMPACT: TRAFFIC AND TRANSPORTATION**

**Nature**: Decommissioning activities would result in a slightly negative direct impact on the traffic and transport infrastructure.

**Sensitivity/Vulnerability/Importance of Resource/Receptor – Low**

**Irreplaceability**: The activity will not result in the loss of irreplaceable resources

**Impact Magnitude – Negligible**

**Extent**: The extent of the impact is local

**Duration**: The expected impact will be temporary

**Scale**: The impact will result in unaltered functions and processes

**Frequency**: The frequency of the impact will be once off

**Likelihood**: Traffic and transportation will unlikely be affected

**IMPACT SIGNIFICANCE (PRE-MITIGATION) – MINOR**

**Degree of Confidence**: The degree of confidence is high.

4.7 **DECOMMISSIONING AND POST CLOSURE PHASE MITIGATION**

Ensure that a traffic and transportation management plan is in place for the decommissioning phase of the project.

This Transportation Management Plan (TMP) outlines the strategies that will be implemented to minimize impacts to the traveling public during operational phase of this project.

This TMP also lays out the roles and responsibilities of the project stakeholders prior to and during decommissioning.
4.8 RESIDUAL IMPACT

The implementation of the above mitigation measures would reduce the construction impacts from Minor to Negligible significance and the operation impacts remain Minor negative. The implementation of the decommissioning phase mitigation measures would reduce the significance rating from Minor to Negligible. The pre- and post-mitigation impacts are compared in Table 3 below.

**TABLE 11 PRE- AND POST- MITIGATION SIGNIFICANCE: TRAFFIC AND TRANSPORTATION - GAMSBERG MINE**

<table>
<thead>
<tr>
<th>Phase</th>
<th>Significance (Pre-mitigation)</th>
<th>Residual Significance (Post-mitigation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction</td>
<td>MINOR (-ve)</td>
<td>NEGLIGIBLE (-ve)</td>
</tr>
<tr>
<td>Operation</td>
<td>MINOR (-ve)</td>
<td>MINOR (-ve)</td>
</tr>
<tr>
<td>Decommissioning and Post Closure</td>
<td>MINOR (-ve)</td>
<td>NEGLIGIBLE (-ve)</td>
</tr>
</tbody>
</table>
I, Bertie Phillips, as the appointed independent specialist hereby declare that I:

- act/ed as the independent specialist in this application;
- regard the information contained in this report as it relates to my specialist input/study to be true and correct; and
- do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the NEMA, the Environmental Impact Assessment Regulations, 2010 and any specific environmental management Act;
- have and will not have no vested interest in the proposed activity proceeding;
- have disclosed, to the applicant, EAP and competent authority, any material information that have or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the NEMA, the Environmental Impact Assessment Regulations, 2010 and any specific environmental management Act;
- am fully aware of and meet the responsibilities in terms of NEMA, the Environmental Impact Assessment Regulations, 2010 (specifically in terms of regulation 17 of GN No. R. 543) and any specific environmental management Act, and that failure to comply with these requirements may constitute and result in disqualification;
- have ensured that information containing all relevant facts in respect of the specialist input/study was distributed or made available to interested and affected parties and the public and that participation by interested and affected parties was facilitated in such a manner that all interested and affected parties were provided with a reasonable opportunity to participate and to provide comments on the specialist input/study;
- have ensured that the comments of all interested and affected parties on the specialist input/study were considered, recorded and submitted to the competent authority in respect of the application;
- have ensured that the names of all interested and affected parties that participated in terms of the specialist input/study were recorded in the register of interested and affected parties who participated in the public participation process;
- have provided the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not; and
- am aware that a false declaration is an offence in terms of regulation 71 of GN No. R. 543.

Signature of the specialist:

Kantey & Templer (Pty) Ltd

Name of company:

16 April 2013

Date: