

APPENDIX D: DETAILED ASSESSMENT OF POTENTIAL IMPACTS

Potential biophysical and socio-economic impacts were identified by SLR, specialists and stakeholders. The impacts are discussed under issue headings in this section. It should be further noted that cumulative impacts and latent impacts are discussed where relevant. The criteria used to rate each impact is outlined in Section 7.6. Where applicable, impacts have been considered both incrementally and cumulatively in the context of the existing Impala operations.

The potential impacts are rated with the assumption that no management actions (which assume that no consideration is given to the mitigation of environmental and social impacts) are applied and then again with management actions which is the mitigated scenario and represents the residual impact. In addition to this, the section below also provides a discussion on the impact significance of the Proposed project within the context of the existing environment within the Smelter Complex. A summary of the impact assessment is provided in Section 9 of the main report.

Management actions identified to prevent, reduce, control or remedy the assessed impacts are provided under the relevant impact discussions sections below. A summary of the management actions is provided in Section 26 of this report. Where impacts are considered to be insignificant, no management actions have been identified. Where additional management actions are required as a result of the Proposed project to those outlined in the approved EMP are included in *italics*.

GEOLOGY

ISSUE: LOSS AND STERILISATION OF MINERAL RESOURCES

Mineral resources can be sterilized and/or lost through the placement of infrastructure and activities in close proximity to mineral resources. The Proposed project footprint is within an existing Impala Smelting Complex and does not influence current underground mining activities. It follows that the Proposed project will not result in the sterilisation of any mineral reserves. This impact has therefore been rated as being **INSIGNIFICANT** and has not been assessed further.

TOPOGRAPHY

ISSUE: HAZARDOUS EXCAVATIONS AND INFRASTRUCTURE RESULTING IN SAFETY RISKS TO THIRD PARTIES AND ANIMALS

The Proposed project presents hazardous excavations and infrastructure into or off which third parties and animals can fall and be harmed. The Proposed project does not present any new infrastructure/activities that differ from those already approved within the Smelter Complex. Further to this the footprint of the Proposed project is within the access controlled secured Smelter Complex. This impact has therefore been rated as being **INSIGNIFICANT** and has not been assessed further.

SOIL AND LAND CAPABILITY

ISSUE: LOSS OF SOIL RESOURCES AND LAND CAPABILITY THROUGH PHYSICAL DISTURBANCE AND CONTAMINATION

Soil is a valuable resource that supports a variety of ecological functions. Soil is the key to re-establishing post closure land capability. Soil resources can be lost through contamination and through physical disturbance (erosion and compaction). This in turn can result in a loss of soils as an ecological driver because it can create a toxic environment for vegetation and ecosystems that rely on the soil.

Given that the Proposed project footprint is within the concrete lined Smelter Complex, soil resources and associated land capability have already been compromised. It follows that the proposed infrastructure will not have an impact on valuable soil resources or related land capability. This impact has therefore been rated as being **INSIGNIFICANT** and has not been assessed further.

BIODIVERSITY

ISSUE: PHYSICAL DESTRUCTION AND GENERAL DISTURBANCE OF TERRESTRIAL BIODIVERSITY

Areas of ecological sensitivity include functioning biodiversity areas with species diversity and associated intrinsic value. Linkages between these areas have value because of the role they play in allowing the migration or movement of flora and fauna between the areas, which is a key function for a broader ecosystem. The transformation of land for any purpose increases the destruction of the site-specific biodiversity, the fragmentation of habitats, reduces its intrinsic functionality and reduces the linkage role that undeveloped land fulfils between different areas of biodiversity importance.

The Proposed project is located within the concrete lined Smelter Complex and as such all-natural vegetation has been removed. Further to this, the Smelter Complex is an enclosed facility and does not allow for the natural movement of faunal species, while noisy and vibrating equipment scare off faunal species. It follows that the Proposed project will not have an impact on biodiversity. This impact has therefore been rated as being **INSIGNIFICANT** and has not been assessed further.

SURFACE WATER RESOURCES

ISSUE: ALTERATION OF NATURAL DRAINAGE PATTERNS

Surface water resources include drainage lines and paths of preferential flow of stormwater runoff. Mine related activities have the potential to alter the drainage of surface water through the establishment of infrastructure. Rainfall and surface water run-off will be collected in all areas that have been designed with water containment infrastructure. The collected run-off will therefore be lost to the catchment and can result in the alteration of drainage patterns. Collected run-off within the Smelter Complex is already contained within the existing stormwater management system for the Complex. The Proposed project location within the existing Smelter Complex will not alter the collected run-off contribution to the exiting stormwater management area. It follows that the Proposed project will not have an impact on the alteration of natural drainage patterns. This impact has therefore been rated as being **INSIGNIFICANT** and has not been assessed further.

ISSUE: POLLUTION OF SURFACE WATER RESOURCES

There are a number of pollution sources in all project phases that have the potential to pollute surface water, particularly in the unmitigated scenario. In the construction, decommissioning and closure phases these potential pollution sources are temporary in nature. Although these sources may be temporary, the potential pollution may be long term. The operational phase will present more long-term potential sources.

MINE PHASE AND LINK TO PROPOSED PROJECT SPECIFIC ACTIVITIES/INFRASTRUCTURE

Construction	Operational	Decommissioning	Closure
Site preparation Earthworks Civil works Transport systems General site management	Transport systems General site management	Transport systems General site management Demolition	Maintenance and aftercare Rehabilitation

DISCUSSION

Severity/Nature

In the unmitigated scenario, the Proposed project presents additional sources of contaminants that has the potential to pollute surface water resources through accidental spills and leaks from trucks. At elevated pollution concentrations these contaminants can be harmful to humans and livestock if ingested. It is important to note that the Proposed project does not present sources of contaminants that differ from those within the existing Smelter Complex. The related unmitigated severity is medium. In the mitigated scenario, any dirty surface water run-off from the Proposed project areas will be contained within the Smelter Complex within the existing stormwater management infrastructure. Furthermore, the overall objective is to ensure that dirty water is contained and reused rather than discharged into the environment. The mitigated severity is therefore low.

Duration

In the unmitigated scenario, the potential impacts are long term, occurring for periods longer than the life of mine. With mitigation most impacts can be reversed or mitigated within the life of mine.

Spatial scale / extent

The spatial scale of the potential unmitigated impacts is likely to extend beyond the Smelter Complex area because contamination is mobile once it reaches flowing watercourses. This will be more of an issue in the rainy season when the water courses are all flowing. In the mitigated scenario dirty water run-off will be confined to the Smelter Complex, which is a very low extent.

Consequence

The unmitigated consequence is medium and reduces to low with mitigation.

Probability

The probability of the impact occurring relies on a causal chain that comprises three main elements:

- Does contamination reach surface water resources;
- Will people and animals utilise this contaminated water; and
- Is the contamination level harmful?

The first element is that contamination reaches the surface water resources in and adjacent to the surface use area. With mitigation this is unlikely to occur given that dirty water is contained within the Smelter Complex.

Contaminants have been known to reach the Leragane, however this is as a result of discharges from Omnia. The second element is that third parties and and/or livestock use this contaminated water for drinking purposes. There is a possibility for this to occur, albeit limited, because of the fact that most of the villages in the surface use area are provided with reticulated water and the fact that most of the surface water courses only contain surface water in the rainy season which means that livestock are provided with alternative water points. The third element is that the contamination is at a level which is harmful to humans and livestock. This is influenced both by the quality of any discharged effluent and by the diluting effect of any rainwater particularly in the rainy season, which is the season most likely to be associated with some use of the surface water resources. As a combination, the unmitigated probability is conceivable and the mitigated probability is unlikely.

Significance

The unmitigated significance is medium and mitigated significance is very low.

Issue: Pollution of Surface Water Resources		
All Project Phases		
Criteria	Without Mitigation	With Mitigation
Severity	Medium	Low
Duration	High	Low
Extent	Low	Very Low
Consequence	Medium	Low
Probability	Medium	Low
Significance	Medium	Very low
Nature of cumulative impacts	Insignificant contribution to cumulative impacts	
Degree to which impact can be reversed	Likely with mitigation	
Degree to which impact can be avoided	Likely with mitigation	
Degree to which impact may cause irreplaceable loss	Loss where mitigation measures are not correctly implemented.	
Degree to which impact can be mitigated	High	

MANAGEMENT OBJECTIVE

The objective of is to prevent pollution of surface water resources.

MANAGEMENT ACTIONS

During all project phases, Impala will continue:

- to implementation approved management actions pertaining to the containment of dirty water in accordance with Regulation 704 (June 1999),
- to implement the approved waste management procedures;

- to monitor surface water resources in accordance with the approved surface water monitoring programme; and
- where monitoring results indicates that third party water supply has been polluted by Impala, Impala will ensure that an alternative equivalent water supply will be provided.

GROUNDWATER

ISSUE: CONTAMINATION OF GROUNDWATER RESOURCES

Groundwater is a valuable resource and is defined as water which is located beneath the ground surface in soil/rock pore spaces and in the fractures of lithological formations. Activities such as the handling and storage of general and hazardous wastes have the potential to result in the loss of groundwater resources, both to the environment and third-party users, through pollution. The Proposed project is located within the existing Smelter Complex on an impermeable concrete layer. The Proposed project activities/infrastructure is unlikely to contribute to groundwater contamination impacts. This impact has therefore been rated as being **INSIGNIFICANT** and has not been assessed further. In the event of groundwater related compliant, this needs to be investigated by Impala.

AIR QUALITY

ISSUE: AIR POLLUTION

INTRODUCTION

There are a number of activities in all phases that have the potential to contribute to the pollution of air that can have a negative impact on ambient air quality and surrounding land uses. One of these emission sources is dust fallout that has the potential to be a nuisance factor to sensitive air quality receptors. Dust fallout represents the coarse fraction $>10\mu\text{m}$ of total suspended particles that can visually be seen by third parties. PM has the potential to contribute to health concerns as particulate matter with an aerodynamic diameter of less than $10\mu\text{m}$ (PM_{10}) and an aerodynamic diameter of less than $2.5\mu\text{m}$ ($\text{PM}_{2.5}$) is the finer inhalable fraction. Gaseous emissions (gaseous material released) include SO_2 , NO_x and CO .

In the construction, decommissioning and closure phases emission sources are usually temporary in nature, usually existing for a few weeks to a few months. The operational phase will present more long-term activities. It is not anticipated that the various construction, decommissioning and closure activities will result in higher $\text{PM}_{2.5}$, PM_{10} , SO_2 , NO_x , CO and dust fallout rates than the operational phase activities. The temporary nature of the construction, decommissioning and closure activities will likely reduce the significance of the potential impacts and the minimal activities during closure will likely result in insignificant potential impacts. It follows that the section below focusses on the assessment of air quality impacts during the operational phase. However for completeness purposes, management actions for all project phases have been identified.

MINE PHASE AND LINK TO PROPOSED PROJECT SPECIFIC ACTIVITIES/INFRASTRUCTURE

Construction	Operational	Decommissioning	Closure
Site preparation Earthworks Civil works Transport systems General site management	Transport systems General site management Demolition	Transport systems General site management Demolition	Maintenance and aftercare Rehabilitation

DISCUSSION

Severity / nature

The sources of emissions associated with the Proposed project include:

- transportation and handling of materials during the construction phase (Dust fallout, PM₁₀ and PM_{2.5}); and
- flash dryer operations and baghouse stack (Dust fallout, PM₁₀, PM_{2.5}, SO₂, NO_x and CO).

In order to determine the potential for health and nuisance impacts the following set of evaluation criteria have been used.

TABLE 32-1: NATIONAL AMBIENT AIR QUALITY STANDARDS

Pollutant	Averaging Period	Concentration (µg/m ³)	Permitted Frequency of Exceedance	Compliance Date
PM ₁₀	24-hour	75	4	Currently enforceable
	1 year	40	-	Currently enforceable
PM _{2.5}	24-hour	40	4	1 January 2016 till 31 December 2029 (currently enforceable)
	24-hour	25	4	1 January 2030
	1 year	20	-	1 January 2016 till 31 December 2029 (currently enforceable)
	1 year	15	-	1 January 2030
SO ₂	10-minutes	500	526	Currently enforceable
	1-hour	350	88	Currently enforceable
	24-hour	125	4	Currently enforceable
	1 year	50	-	Currently enforceable
NO ₂	1-hour	200	88	Currently enforceable
	1 year	40	-	Currently enforceable
CO	1-hour	30 000	88	Currently enforceable
	8-hour	10 000	11	Currently enforceable

TABLE 32-2: ACCEPTABLE DUSTFALL RATES

Restriction Area	Dustfall rate (D) (mg/m ² -day, 30-day average)	Permitted frequency of exceeding dust fall rate
Residential	D < 600	Two within a year, not sequential months
Non-residential	600 < D < 1 200	Two within a year, not sequential months

It is not anticipated that the various construction activities will result in higher PM_{2.5} and PM₁₀ and dust fallout rates than the operational phase activities. Simulation results of operational particulate and gaseous emissions for the proposed second flash dryer only are summarised as follows:

- **PM_{2.5}:**
 - with the proposed second flash dryer PM emitted at the New Plant Minimum National Emission Standards (MES) (50 mg/Nm³) and the measured particle size distribution for the existing flash dryer applied, the simulated annual average PM_{2.5} concentrations do not exceed the current NAAQS of 20 µg/m³ or the future NAAQS of 15 µg/m³ off-site or at any AQSRs; and

- the simulated 24-hour $PM_{2.5}$ concentrations are below the current and future NAAQ limit and thus the current 24-hour NAAQS (4 days of exceedance of $40 \mu\text{g}/\text{m}^3$) and the future 24-hour NAAQS (4 days of exceedance of $25 \mu\text{g}/\text{m}^3$) are not exceeded off-site or at any AQSRs.
- **PM_{10} :**
 - simulated annual average PM_{10} concentrations, as a result of the proposed second flash dryer with PM emitted at the New Plant MES ($50 \text{ mg}/\text{Nm}^3$) and the measured particle size distribution for the existing flash dryer applied, do not exceed the NAAQS of $40 \mu\text{g}/\text{m}^3$ off-site or at any AQSRs; and
 - the simulated 24-hour PM_{10} concentrations are below the 24-hour NAAQ limit and thus the 24-hour NAAQS (4 days of exceedance of $75 \mu\text{g}/\text{m}^3$) are not exceeded off-site or at any AQSRs.
- **SO_2 :**
 - with the proposed Flash Dryer SO_2 emitted at the New Plant MES ($1\,000 \text{ mg}/\text{Nm}^3$), the simulated annual average SO_2 concentrations do not exceed the NAAQS of $50 \mu\text{g}/\text{m}^3$ off-site or at any AQSRs.
 - the simulated 24-hour SO_2 concentrations are below the NAAQ limit and thus the 24-hour NAAQS (4 days of exceedance of $125 \mu\text{g}/\text{m}^3$) is not exceeded off-site or at any AQSRs; and
 - the simulated 1-hour SO_2 concentrations are below the NAAQ limit and thus do not exceed the 1-hour NAAQS (88 hours of exceedance of $350 \mu\text{g}/\text{m}^3$) off-site or at any AQSRs. The simulated annual average SO_2 concentrations are likely to be below the critical levels for all vegetation types across the domain.
- **NO_2 :**
 - the proposed Flash Dryer with NO_x emitted at the New Plant MES ($500 \text{ mg}/\text{Nm}^3$), do not exceed the NO_2 NAAQS of $40 \mu\text{g}/\text{m}^3$ off-site or at any AQSRs; and
 - the simulated 1-hour NO_x concentrations are below the 1-hour NO_2 NAAQ limit and thus the 1-hour NO_2 NAAQS (88 hours of exceedance of $200 \mu\text{g}/\text{m}^3$) are not exceeded off-site or at any AQSRs.
 - the simulated annual average NO_x concentrations are likely to be below the critical levels for all vegetation types across the domain.
- **CO:**
 - with the proposed Flash Dryer CO emitted at the same levels as the existing flash dryer, the simulated 8-hour CO concentrations are below the NAAQ limit and thus the 8-hour NAAQS (11 8-hours of exceedance of $10\,000 \mu\text{g}/\text{m}^3$) is not exceeded off-site or at any AQSRs; and
 - the simulated 1-hour CO concentrations are below the NAAQ limit and thus do not exceed the 1-hour NAAQS (88 hours of exceedance of $30\,000 \mu\text{g}/\text{m}^3$) off-site or at any AQSRs.
- **Fallout Dust:**
 - the simulated daily average dustfall rates as a result of the proposed Flash Dryer with PM emitted at the New Plant MES ($50 \text{ mg}/\text{Nm}^3$) does not exceed the NDCR limit for non-residential areas ($1\,200 \text{ mg}/\text{m}^2\text{-day}$) on-site and does not exceed the NDCR limit for residential areas ($600 \text{ mg}/\text{m}^2\text{-day}$) at any AQSRs and are below $400 \text{ mg}/\text{m}^2\text{-day}$ at all agricultural areas.

Simulation results of operational particulate and gaseous emissions for the proposed second flash dryer together with the existing Smelter Complex is summarised as follows:

- **$PM_{2.5}$:**
 - the simulated annual average $PM_{2.5}$ concentrations do not exceed the current NAAQS of $20 \mu\text{g}/\text{m}^3$ or the future NAAQS of $15 \mu\text{g}/\text{m}^3$ off-site or at any AQSRs; and
 - the simulated 24-hour $PM_{2.5}$ concentrations **are above** the current and future NAAQ limit but the current 24-hour NAAQS (4 days of exceedance of $40 \mu\text{g}/\text{m}^3$) and the future 24-hour NAAQS (4 days of exceedance of $25 \mu\text{g}/\text{m}^3$) are not exceeded off-site or at any AQSRs.

- **PM₁₀:**
 - simulated annual average PM₁₀ concentrations do not exceed the NAAQS of 40 µg/m³ off-site or at any AQSRs; and
 - the simulated 24-hour PM₁₀ concentrations are below the 24-hour NAAQ limit and thus the 24-hour NAAQS (4 days of exceedance of 75 µg/m³) are not exceeded off-site or at any AQSRs.
- **SO₂:**
 - the simulated annual average SO₂ concentrations do not exceed the NAAQS of 50 µg/m³ off-site or at any AQSRs;
 - the simulated 24-hour SO₂ concentrations are above the NAAQ limit but the 24-hour NAAQS (4 days of exceedance of 125 µg/m³) is not exceeded off-site or at any AQSRs;
 - the simulated 1-hour SO₂ concentrations are above the NAAQ limit but do not exceed the 1-hour NAAQS (88 hours of exceedance of 350 µg/m³) off-site or at any AQSRs; and
 - the simulated annual average SO₂ concentrations are likely to be below the critical levels for all vegetation types across the domain.
- **NO₂:**
 - simulated annual average NO_x concentrations, do not exceed the NO₂ NAAQS of 40 µg/m³ off-site or at any AQSRs;
 - the simulated 1-hour NO_x concentrations are below the 1-hour NO₂ NAAQ limit and thus the 1-hour NAAQS (88 hours of exceedance of 200 µg/m³) are not exceeded off-site or at any AQSRs; and
 - the simulated annual average NO_x concentrations are likely to be below the critical levels for all vegetation types across the domain.
- **CO:**
 - the simulated 8-hour CO concentrations are below the NAAQ limit and thus the 8-hour NAAQS (11 8-hours of exceedance of 10 000 µg/m³) is not exceeded off-site or at any AQSRs. The simulated 1-hour CO concentrations are below the NAAQ limit and thus do not exceed the 1-hour NAAQS (88 hours of exceedance of 30 000 µg/m³) off-site or at any AQSRs.
- **Fallout Dust:**
 - the simulated daily average dustfall rates do not exceed the NDCR limit for non-residential areas (1 200 mg/m²-day) on-site and does not exceed the NDCR limit for residential areas (600 mg/m²-day) at any AQSRs and are below 400 mg/m²-day at all agricultural areas.

The simulation results of particulate and gaseous emissions for the existing Impala mining operations inclusive of the Proposed project is summarised as follows:

- **PM_{2.5}:**
 - the simulated PM_{2.5} **exceeds** the future annual NAAQS (15 µg/m³) at Impala Platinum Hospital. The simulated PM_{2.5} exceeds the future 24-hour NAAQS (4 days of exceedance of 25 µg/m³) at Kelekitso Early Learning Centre and Impala Platinum Hospital;
 - the source group with the greatest contribution to the simulated concentrations at Kelekitso Early Learning Centre is crushing and screening; and
 - the source group with the greatest contribution to the simulated concentrations at Impala Platinum Hospital is vehicles travelling on paved roads.
- **PM₁₀:**

- the simulated PM₁₀ **exceeds** the annual NAAQS (40 µg/m³) and 24-hour NAAQS (4 days of exceedance of 25 µg/m³) at Impala Platinum Hospital; and
- the source group with the greatest contribution to the simulated concentrations at Impala Platinum Hospital is vehicles travelling on paved roads.
- **SO₂:**
 - the simulated SO₂ does not exceed the annual NAAQS (50 µg/m³), 24-hour NAAQS (4 days of exceedance of 125 µg/m³) or 1-hour NAAQS (88 hours of exceedance of 300 µg/m³) at any AQSRs; and
 - the simulated annual average SO₂ concentrations are below the critical levels for all vegetation types at all AQSRs except Kelekitso Early Learning Centre. At Kelekitso Early Learning Centre there is a potential for impacts on cyanobacterial lichens.
- **NO_x:**
 - the simulated NO_x **exceeds** the 1-hour NO₂ NAAQS (88 hours of exceedance of 200 µg/m³) at Impala Platinum Hospital. The simulated annual average NO_x concentrations are below the critical levels for all vegetation types at all AQSRs except Impala Platinum Hospital; and
 - the source group with the greatest contribution to the simulated concentrations at Impala Platinum Hospital is vehicle exhausts.
- **Dust fallout:**
 - the simulated daily average dust fallout rate exceeds the NDCR limit for non-residential areas (1 200 mg/m²-day) on-site and limit for residential areas (600 mg/m²-day) at the Platinum Village. However, it is believed that this sample was contaminated or tampered with. SGS stated the following in the November 2018 report: “During the sample changes it was reported that at Site 24 (Platinum Village) there were construction activities in the vicinity; hence a possibility of sample contamination/tampering. Therefore, the result is flagged and cannot be used for compliance but for information purposes only” (Naidoo, 2018).

Non-compliance of PM_{2.5}, PM₁₀, SO₂ or NO_x concentrations with the relevant NAAQS could result in human health impacts.

Based on modelled results, when considered incrementally, without mitigation the Proposed project is unlikely to exceed the current and proposed PM_{2.5} NAAQS limits, but does not exceed the 24-hour NAAQS limits at AQSR's. This is considered to be a low sensitivity. The severity reduces to very low with mitigation given that neither the NAAQS nor the dust fallout limits will be exceeded.

Based on modelled results, when considering cumulatively with the Impala operations it is likely that the long-term and short-term NAAQS will be exceeded at Impala Platinum Hospital (with and without mitigation); and the long-term and short-term NAAQS are also expected to be exceeded in other areas in which they are applicable (off-site). It is however important to note, that current baseline monitoring indicates exceedances of the NAAQS limits at AQSRs. In the unmitigated scenario this is a high severity and reduces to medium with the implementation of mitigation measures. The NDCR limit for residential areas will not be exceeded at AQSRs with mitigation when considered cumulatively. It follows this is a medium severity in the unmitigated scenario and reduces to low with mitigation for dust fallout.

Duration

Health impacts are long term in nature, existing for longer than the life of mine in both the mitigated and unmitigated scenarios. This is a high duration. This applies when considered incrementally and cumulatively when considered in the context of the existing Impala operations.

Spatial scale / extent

In the unmitigated scenario, impacts will extend beyond the site boundary to AQSR's, which is a medium spatial scale, when considered incrementally and cumulatively. When considered incrementally, with the implementation of mitigation measures, the NAAQS and the dust fallout limits will not be exceeded and as such the potential impact will be limited to the site boundary. This is a very low spatial scale in the mitigated scenario. When considered cumulatively the mitigated spatial scale remains medium.

Consequence

The incremental unmitigated consequence associated with the Proposed project is medium. In the mitigated scenario, the incremental consequence is low. When considered cumulatively, the unmitigated consequence is high and reduces to medium with mitigation for NAAQS impacts. The consequence for the cumulative NDCR impact is medium in the unmitigated and mitigated scenarios.

Probability

The probability of health impacts occurring relates to the probability that third parties will be exposed to harmful concentrations in terms of the NAAQS and nuisance levels in terms of dust fallout. When considered incrementally, in the unmitigated scenario this is possible, which is a medium spatial scale. With mitigation, exceedances of the NAAQS and dust fallout limits are unlikely, which reduces probability to low. When considered cumulatively, the probability of exceedances is probable and reduces to possible with the implementation of mitigation measures for both NAAS and dust fallout.

Significance

When considered incrementally, the unmitigated significance associated with the Proposed project is **LOW**. The mitigated significance reduces to **VERY LOW**. When considered cumulatively, the unmitigated significance is **HIGH** and reduces to **MEDIUM** for NAAQS with the implementation of mitigation measures. When considered cumulatively, the unmitigated significance is **MEDIUM** and reduces to **LOW** for dust fallout with the implementation of mitigation measures.

Issue: Air Pollution		
Operation phase – Proposed project (incrementally)		
Criteria	Without Mitigation	With Mitigation
Severity	Low	Very Low
Duration	High	High
Extent	Medium	Very Low
Consequence	Medium	Low
Probability	Medium	Low
Significance	Low	Very Low
Operational phase – Proposed project with the Impala operations (cumulatively)		
Criteria	Without Mitigation	With Mitigation
Severity	High - NAAQS Medium - dust fallout	Medium Low -dust fallout
Duration	High – NAAQS and dust fallout	High - NAAQS and dust fallout
Extent	Medium - NAAQS and dust fallout	Medium - NAAQS and dust fallout
Consequence	High - NAAQS	Medium - NAAQS and dust fallout

	Medium – dust fallout	
Probability	High - NAAQS and dust fallout	Medium - NAAQS and dust fallout
Significance	High Medium – dust fallout	Medium Low – dust fallout
Nature of cumulative impacts	Proposed project has the potential to contribute the air emissions associated with the entire Impala operation.	
Degree to which impact can be reversed	Health impacts cannot be easily reversed.	
Degree to which impact can be avoided	Possible with mitigation.	
Degree to which impact may cause irreplaceable loss	Possible where health impacts are concerned.	
Degree to which impact can be mitigated	Possible.	

MANAGEMENT OBJECTIVE

The objective is to prevent air pollution health impacts.

MANAGEMENT ACTION

Management actions to be implemented during all Proposed project phases include:

- reductions of vehicle exhaust emissions through the use of better-quality diesel; and inspection and maintenance programs;
- continued implementation of the Impala air quality monitoring programme (see section 28); and
- record keeping.

NOISE

ISSUES: INCREASE IN DISTURBING NOISE LEVELS

Mining activities and infrastructure have the potential to cause an increase in ambient noise levels that may cause a disturbance to nearby sensitive receptors. It is however important to note that, the noise contributions associated with the Proposed project are unlikely to be noticeable in the context of the existing noise environment within the Smelter Complex. This impact has therefore been rated as being **INSIGNIFICANT** and has not been assessed further. In the unlikely event of noise related complaint, this needs to be investigated by Impala.

VISUAL

ISSUE: NEGATIVE VISUAL VIEWS

Mining infrastructure has the potential to alter the landscape character of an area through the establishment of infrastructure. It is however important to note, that the establishment of infrastructure as a result of the Proposed project will be absorbed within the Smelter Complex. The Proposed project is unlikely to generate additional negative views that will be noticeable from Ga-Luka, located approximately 2 km away from the Proposed project location. This impact has therefore been rated as being **INSIGNIFICANT** and has not been assessed further.

TRAFFIC

ISSUE: ROAD DISTURBANCE INFLUENCE ON THE LEVEL OF SERVICE

Existing traffic volumes comprising public traffic and traffic from the Impala Smelter operations utilise several roads intersections. With reference to Section 7.4.3.3, the existing road network of relevance to the Proposed project (Lefaragatlha Road, Luka Road and R565) are considered to have an acceptable level of service. The Proposed project is not anticipated to generate a significance increase in the number of additional trucks (additional 26 trucks per day, transporting toll) and would therefore have an insignificant impact on the condition of the existing road network. This impact has therefore been rated as being **INSIGNIFICANT** and has not been assessed further.

ISSUE: ROAD SAFETY IMPACTS

INTRODUCTION

Traffic from mining projects has the potential to result in public road safety issues in all Proposed project phases prior to closure.

MINE PHASE AND LINK TO PROPOSED PROJECT SPECIFIC ACTIVITIES/INFRASTRUCTURE

Construction	Operational	Decommissioning	Closure
Transport systems	Transport systems	Transport systems	N/A

DISCUSSION

Severity/Nature

Safety risks associated with the use of public road infrastructure for the Proposed project include pedestrian accidents and vehicle accidents. The Proposed project presents additional traffic volumes, particularly during the operational phase through the increase in additional trucks (approximately 26 trucks per day) transporting toll material. It is however important to note that the use of the Lefaragatlha Road, Luka Road and Road R565 as part of the existing Impala operations already presents potential traffic safety risks.

With reference to Section 7.4.3.3 of the Lefaragatlha Road and Luka Road are deemed to have a medium sensitivity given that these roads run through communities. The Lefaragatlha and Luka Roads requires geometric upgrade in the context of the existing public infrastructure as these roads are considered to have a medium sensitivity. Traffic accidents have the potential to injure people and animals. In the unmitigated scenario the severity is high, particularly where the geometric upgrades are not implemented. In the mitigated scenario the severity reduces to medium because the frequency of accidents is expected to reduce. In addition to this, the implementation of the geometric upgrades will be sufficient to cater for the increase in the number of trucks as a result of the Proposed project.

Duration

Any serious injury or death is a long-term impact in both the unmitigated and mitigated scenarios.

Spatial scale / extent

Possible accident sites could be located within or outside the Smelter Complex and the indirect impacts associated with any injuries or fatalities will extend to the local residents to which the injured people/animals belong. This is a medium spatial scale.

Consequence

The road related impact from a road safety perspective is high in the unmitigated scenario and reduces to medium in the mitigated scenario.

Probability

In the unmitigated scenario the probability of traffic accidents is medium because although there are records of traffic accidents these do not occur on a continuous basis. With mitigation this reduces to low.

Significance

The unmitigated significance is high and reduces to medium with mitigation.

Issue: Road Safety Impacts		
Construction, operation and decommissioning		
Criteria	Without Mitigation	With Mitigation
Severity	High	Medium
Duration	High	High
Extent	Medium	Medium
Consequence	High	Medium
Probability	Medium	Low
Significance	High	Medium
Nature of cumulative impacts	Insignificant contribution to cumulative impacts provided geometric upgrades of existing Lefaragatlha Road and Luka Road is implemented.	
Degree to which impact can be reversed	Unlikely in the event of injury of people or animals	
Degree to which impact can be avoided	Possible with mitigation	
Degree to which impact may cause irreplaceable loss	High in the event of injury of people or animals	
Degree to which impact can be mitigated	High	

MANAGEMENT OBJECTIVE

The objective of the mitigation measures is to prevent transport related accidents and/or injury to people and livestock.

MANAGEMENT ACTIONS

During all project phases, Impala will::

- undertake a road safety assessment on roads adjacent the Impala Smelter Complex including Intersections A, B, C and F to determine the need for the following:
 - reflective studs at the relevant intersections and roadways in between intersections
 - updating and maintaining road markings which are fading; and
 - provision of relevant road traffic signs where required.
- *provide Impala Smelter Complex workers and contractor workers with training on road safety; and*
- *Run road safety and awareness campaigns at the mine.*

Emergency situations

If a person or animal is injured by mine-related transport activities this must be handled in accordance with the Impala emergency response procedure (section 29.5.2).

HERITAGE/CULTURAL AND PALEONTOLOGICAL RESOURCES

ISSUE: LOSS OF HERITAGE/CULTURAL AND PALAEOLOGICAL RESOURCES

In general, the Proposed project area is situated in the Central Bankeveld which has a rich archaeological heritage dating from prehistoric and historic (or colonial) periods, which form a record of cultural heritage of most groups living in South Africa. However, none of the identified heritage resources lies within the Proposed project footprint. The palaeontological studies conducted indicated that the surface use areas are situated on underlying igneous rocks of the Precambrian Rustenburg Layered Suite of the Bushveld Igneous Complex and as such palaeontological resources are not associated with this underlying geology. In addition, the site is located within the disturbed footprint of the Smelter Complex. This impact has therefore been rated as being **INSIGNIFICANT** and has not been assessed further.

SOCIO-ECONOMIC

ISSUE: INWARD MIGRATION

Mines tend to bring with them an expectation of employment in all Proposed project phases prior to closure. This expectation can lead to the influx of job seekers to an area which in turn increases pressure on existing communities, housing, basic service delivery and raises concerns around safety and security.

The Proposed project is located within an existing Smelter Complex and will result in limited short-term employment opportunities through usage of registered community vendors during construction, therefore negative project-related socio-economic impacts including inward migration, which could place additional pressure on housing and municipal services, are not expected to occur. This impact has therefore been rated as being **INSIGNIFICANT** and has not been assessed further.

ISSUE: ECONOMIC IMPACT

INTRODUCTION

In the broadest sense, all activities associated with the Proposed project contribute towards a positive economic impact in all phases. Mining has a positive net economic impact on the national, local and regional economy. Direct benefits are derived from wages, taxes and profits. Indirect benefits are derived through the procurement of goods and services, and the increased spending power of employees.

MINE PHASE AND LINK TO PROPOSED PROJECT SPECIFIC ACTIVITIES/INFRASTRUCTURE

Construction	Operational	Decommissioning	Closure
Site preparation Earthworks Civil works Transport systems General site management	Transport systems General site management Demolition	Transport systems General site management Demolition	Maintenance and aftercare Rehabilitation

DISCUSSION

Severity / nature

The Proposed project will allow for the creation of limited short-term employment for communities during the construction phase primarily. During the operation, decommission and closure phases, the Proposed project allows for the continuation of the current employment opportunities. This is considered to be a very low and positive severity as the limited job opportunities are not anticipated to result in noticeable change to that of the current situation at the Smelter Complex.

Duration

The limited positive economic benefits associated with the Proposed project will occur for the life of mine which is a high duration in both the mitigated and unmitigated scenarios.

Spatial scale / extent

In both the mitigated and unmitigated scenarios, the spatial scale of the impact is medium because it will extend beyond the Smelter Complex on a local and regional scale.

Consequence

The unmitigated and unmitigated consequence is low during all Proposed project phases.

Probability

In the unmitigated scenario the probability of the impact to contribute to a noticeable change to the current situation given the limited and temporary nature of the job opportunities. With mitigation, the probability is possible with mitigation measures focussed on enhancing the positive economic impacts at Impala.

Significance

The unmitigated significance is **INSIGNIFICANT** and is **VERY LOW** and positive with mitigation.

Issue: Socio-Economic		
Phase: Construction and Decommissioning		
Criteria	Without Mitigation	With Mitigation
Severity	Very Low (positive)	Very Low (positive)

Duration	High	High
Extent	Medium	Medium
Consequence	Low (positive)	Low (positive)
Probability	Very Low	Low
Significance	Insignificant	Very Low (positive)
Nature of cumulative impacts	No cumulative impacts expected.	
Degree to which impact can be reversed	With adequate communication structures positive impacts can be enhanced.	
Degree to which impact can be avoided	Likely with mitigation	
Degree to which impact may cause irreplaceable loss	Not applicable	
Degree to which impact can be mitigated	Possible	

MANAGEMENT OBJECTIVE

The objective of is to enhance economic benefits.

MANAGEMENT ACTIONS

During all project phases, Impala will continue to implement existing Impala management actions pertaining to the procurement of local people (where possible) and procurement of local good.

MANAGEMENT OBJECTIVE

The objective is to enhance economic benefits of the Proposed project.

LAND USE

ISSUE: CHANGE IN LAND USES

There are a number of land uses in the surrounding Proposed project area which may be influenced by the Proposed project and associated potential environmental impacts. Given that the Land use within the Proposed project is limited to mining as a result of the existing smelter operations, the Proposed project will not result in changes to the current land use. This impact has therefore been rated as being **INSIGNIFICANT** and has not been assessed further.