

# IMPACTS THAT MAY RESULT FROM THE PLANNING AND DESIGN, CONSTRUCTION, OPERATIONAL, DECOMMISSIONING AND CLOSURE PHASES AS WELL AS PROPOSED MANAGEMENT OF IDENTIFIED IMPACTS AND PROPOSED MITIGATION MEASURES

List the potential direct, indirect and cumulative property/activity/design/technology/operational alternative related impacts (as appropriate) that are likely to occur as a result of the planning and design phase, construction phase, operational phase, decommissioning and closure phase, including impacts relating to the choice of site/activity/technology alternatives as well as the mitigation measures that may eliminate or reduce the potential impacts listed.

## PLANNING AND DESIGN PHASE

The project involves the improvement, and resurfacing of an existing surfaced road.

There are no technology alternatives to be considered for the road surface to be used as the existing road technology is already bitumen based seals, and this project proposes to resurface the road using the same technology.

Table 1: Evaluation of bitumen based seal road surface technology

Criteria	Bitumen based Seal
Strength	<b>Moderate</b> Can change due to temperature variations.
Thermal Qualities	<b>Low</b> Deformations can occur due to the variation in the viscosity of the asphalt when the temperature changes.
Durability	<b>Moderate</b> Asphalt is made by using bitumen (petroleum based product) as a binder which can soften in warm weather and become brittle in cold weather, thus increasing the chance of cracks and development of potholes. Susceptible to water ingress into cracks and potholes, with damage of base layers. Can last up to 20 years, but resealing may be required more often.
Technical Quality Control during Construction	<b>Difficult</b> Due to onsite preparation of asphalt, and dependency on compaction, quality control measures may vary. Need skilled labour.
Job Creation	<b>Moderate</b> Involves large mechanical equipment, thus limiting the use of small local contractors and unskilled labour.
Accessibility to the traffic after construction	<b>Delayed</b> Some delay due to the compaction process.
Skid resistance and smoothness	<b>Moderate</b> Smoothness can be regulated during construction, but can rut.

Criteria	Bitumen based Seal
Noise Generation	Moderate
Traction	High Grip capabilities can be regulated during construction, but could diminish over time.
Steep Slopes	Difficult to construct Construction on steep slopes is difficult due to the need for access by heavy machinery.
Maintenance	Easy, high cost, ongoing once base layers have been damaged Road highly susceptible to water ingress into cracks. Once this has happened, the base layers could be damaged and there will be an ongoing need for crack sealing and pothole patching. Asphalt provides a seal but is highly dependent on the strength of the base layers.
Costs over the life of the road	Moderate initial costs, high maintenance cost over life of the road

## CONSTRUCTION AND LIFE OF THE ROAD (OPERATION AND MAINTENANCE OF THE ROAD) PHASES

The impacts of the **IMPROVEMENT AND RESURFACING OPTION** is compared with the **NO-GO DEVELOPMENT OPTION** in the table below:

- ROAD UNDERGOES SPECIAL IMPROVEMENT AND IS RESURFACED: The condition of Section 5 of the R67 road is improved to better travelling conditions and road safety.
- NO-GO DEVELOPMENT OPTION: Section 5 of the R67 road remains in its present condition.

Many of the impacts associated with the improvement and resurfacing of the road are experienced during the construction phase.

Overall Impact Significance (mitigated combined impact for construction, operation and maintenance phases)								
High Negative Impact	Medium Negative Impact	Low Negative Impact	Very Low Impact	Neutral	Very Low Positive Impact	Low Positive Impact	Medium Positive Impact	High Positive Impact
Favourable versus Unfavourable option								
Unfavourable					Favourable			

	No improvement and resurfacing	Improvement and resurfacing
	No Go Option	Applicant's Preferred Option
<b><u>Air Quality</u></b>		
Construction Impacts	Not applicable	Short-term dust generation at active construction areas  Risks to be managed through implementation of mitigation measures in the EMP. Impact significance is medium negative without mitigation, and low negative with mitigation in place.
Life of the Road Impacts (Operations)	Not applicable	As soon as the construction phase runs to completion, dust nuisances will effectively be eliminated.
Life of the Road Impacts (Maintenance)	Not applicable	Not applicable
Overall Impact Significance (All Phases)	<b>Neutral</b>	<b>Neutral</b>  In the long term there will not be a difference between the air quality pre and post the special maintenance and resurfacing
Ranking of Development Options	<b>Unfavourable</b>	<b>Favourable</b>
<b><u>Fuel Use and Carbon Emissions per Vehicle Trip</u></b>		
Construction Impacts	Not applicable	Short-term construction phase impacts associated with transporting materials and people, and use of construction machinery and equipment.  No specific mitigation required. Best practice management measured incorporated into the EMP.
Life of the Road Impacts (Operations)	Higher fuel consumption and carbon emissions per vehicle trip travelled on section 5 of the R67 in its current condition, due to uneven road surface and potholes, more frequent deceleration and acceleration.	Long-term improvement in fuel use and carbon emissions per vehicle trip travelled on specially maintained and resurfaced road.
Life of the Road Impacts (Maintenance)	Not applicable	Less maintenance required
Significance of Overall Impacts (All Phases)	<b>Neutral</b>	<b>Medium positive impact</b>
Ranking of Development Options	<b>Unfavourable</b>	<b>Favourable</b>
<b><u>Risk of Hazardous Spills and Pollution Incidents</u></b>		

Construction Impacts	Not applicable	Short-term use of fuels, lubricants, other chemicals and concrete and/or bitumen during construction. Risks to be managed through implementation of mitigation measures in the EMP. Impact significance is medium negative without mitigation, and low negative with mitigation in place.
Life of the Road Impacts (Operations)	Risk of hazardous spills from vehicles travelling on the road, mainly due to accidents on the road. BUT increased risks for accidents during slippery wet conditions.	Risk of hazardous spills from vehicles travelling on the road, mainly due to accidents on the road. But largely reduced risks due to better drainage and thus less slippery wet roads
Life of the Road Impacts (Maintenance)	Use of fuels and lubricants during general maintenance	More infrequent maintenance; therefore impacts reduced
Overall Impact Significance (All Phases)	<b>Low negative impact</b>	<b>Very low negative impact</b>
Ranking of Development Options	<b>Unfavourable</b>	<b>Favourable</b>

### **Streams and Water Resources**

Construction Impacts	Not applicable	Short-term risks of damage and pollution during construction. Risks to be managed through implementation of mitigation measures in the EMP. Impact significance is medium negative without mitigation, and low negative with mitigation in place.
Life of the Road Impacts (Operations)	Not applicable	Improved drainage means less erosion and better water flow.
Life of the Road Impacts (Maintenance)	Not applicable	More infrequent maintenance; therefore impacts reduced.
Overall Impact Significance (All Phases)	<b>Neutral</b>	<b>Medium positive impact</b> Impact regarded as long term medium positive as short term negative impacts and risks to streams and water resources associated with operation and maintenance will be removed.
Ranking of Development Options	<b>Unfavourable</b>	<b>Favourable</b>

### **Terrestrial Ecology (Fauna and Flora)**

Construction Impacts	Not applicable	Most of the impacts associated with surfacing of the road will occur during construction and may remain over the long-term if appropriate mitigation is not implemented.
Life of the Road Impacts (Operations)	Not applicable	Not applicable
Life of the Road Impacts (Maintenance)	Very low risk of damage and pollution during maintenance.	Very low risk of damage and pollution during maintenance.

Overall Impact Significance (All Phases)	<b>Low Negative Impact</b>	<b>Low Negative Impact</b> Short-term construction phase impacts would be medium without mitigation and low with mitigation. Overall impacts regarded as low negative.
Option Evaluation	<b>No significant difference between development options</b>	
<b><u>Aquatic Ecology and Wetlands</u></b>		
Construction Impacts	Not applicable	Most of the impacts associated with improvement and resurfacing of the road will occur during construction and may remain over the long-term if appropriate mitigation is not implemented; impacts will increase over time if erosion and water flow is not adequately managed.
Life of the Road Impacts (Operations)	Not applicable	Improved stormwater management and runoff control may lead to the re-establishment of more natural aquatic habitats.  This is regarded as a long-term positive impact.
Life of the Road Impacts (Maintenance)	Very low risk of damage and pollution during maintenance.	Very low risk of damage and pollution during maintenance.
Overall Impact Significance (All Phases)	<b>Neutral</b>	<b>Medium positive impact</b> Impact regarded as long term medium positive as the short term negative construction impacts will be removed
Option Evaluation	<b>Unfavourable</b>	<b>Favourable</b>
<b><u>Soil and Land Capability</u></b>		
Construction Impacts	Not applicable	Risks of soil pollution during construction. Risks to be managed through implementation of mitigation measures in the EMP. Impact significance is medium negative without mitigation, and low negative with mitigation in place.
Life of the Road Impacts (Operations)	Current condition of drainage allows for a low degree of soil erosion to take place	With improved drainage systems in place soil erosion will be reduced, leaving soil more fertile.  This is regarded as a long-term positive impact.
Life of the Road Impacts (Maintenance)	Not applicable	Not applicable
Overall Impact Significance (All Phases)	<b>Low negative impact</b>	<b>Medium positive impact</b> Although there will be short-term construction related risks, the overall impacts are regarded as a medium positive impact
Option Evaluation	<b>Unfavourable</b>	<b>Favourable</b>
<b><u>Noise</u></b>		

Construction Impacts	Not applicable	Short-term noise generation during construction.
Life of the Road Impacts (Operations)	Medium noise levels associated with a bitumen based asphalt surface	Medium noise levels associated with a bitumen based asphalt surface
Life of the Road Impacts (Maintenance)	Medium noise generated by general maintenance activities.	Similar noise generated by maintenance activities, but somewhat less frequent maintenance required.
Overall Impact Significance (All Phases)	<b>Very low negative impact</b>	<b>Low negative impact</b>
Option Evaluation	<b>Favourable</b>	<b>Unfavourable</b>

### Level of Service and Accessibility

Construction Impacts	Not applicable	<p>Accessibility should not be compromised during construction as it is an existing tarred road and traffic will be managed during construction either by the use of a service lane or stop-and-go one-direction traffic management. Stop-and-go one-direction traffic management is not an option for Section 5 as traffic volumes are too high there.</p> <p>Travel times will increase during the construction phase.</p> <p>Road closure is not an option as farmers, guest houses and businesses use this road for their businesses and the road must thus be accessible at all times.</p> <p>Significance of construction impacts regarded as high without mitigation, and medium with mitigation in place.</p>
Life of the Road Impacts (Operations)	<p>In its current state the condition of Section 5 of the R67 is poor with localised failures. During heavy rain storms it is slippery and unsafe to travel on.</p> <p>Potholes provide the potential for tyre damage, slower travel times and thus higher running costs of vehicles.</p> <p>As a main route it does not provide a safe and reliable link between Grahamstown and Queenstown at all times.</p> <p>Medium negative long-term impacts of the road will be realised if it remains in its present condition.</p>	<p>If improvement and resurfacing is completed Section 5 of the R67 will provide a more reliable, and safer link between towns, farms and villages.</p> <p>Travel times will decrease along with improved fuel economy and lower amounts of carbon dioxide emissions will be released. Travel conditions will be significantly improved.</p> <p>The road will be less slippery and safer to use when wet</p> <p>Maintenance costs will be reduced in the long-term.</p> <p>Businesses along the road such as Bed and Breakfasts will be more accessible by tourists.</p> <p>High positive long-term impacts over the life of the road will be realised.</p>
Life of the Road Impacts (Maintenance)	Current maintenance levels are adequate, but costly.	Maintenance requirements and costs will be significantly reduced.
Overall Impact Significance (All Phases)	<b>Medium negative impact</b> There would be cumulative negative impacts over the life of the road.	<b>High positive impact</b> There would be cumulative positive impacts over the life of the road.
Option Evaluation	<b>Unfavourable</b>	<b>Favourable</b>

<b><u>Scenery and Views</u></b>		
Construction Impacts	Not applicable	Initially, the construction work may not be aesthetically, but in the long term going ahead with the improvement and resurfacing of Section 5 of the R67 will have no influence on the scenery and views offered between Whittlesea and Queenstown.
Life of the Road Impacts (Operations)	Not applicable	By going ahead with the improvement and resurfacing of Section 5 of the R67, the scenery and views offered between Whittlesea and Queenstown will remain unaffected.
Life of the Road Impacts (Maintenance)	Not applicable	Maintenance would have no influence on the scenery and views offered between Whittlesea and Queenstown.
Overall Impact Significance (All Phases)	<b>Neutral</b>	<b>Neutral</b>
Option Evaluation	<b>No difference between development options</b>	
<b><u>Land Use and Land Use Potential</u></b>		
<p>The main land uses along the road are:</p> <ul style="list-style-type: none"> <li>• Cultivation and agriculture occurs adjacent to the various dams and watercourses found between Whittlesea and Queenstown.</li> <li>• Bed and breakfasts.</li> <li>• Other land uses include: farmsteads, housing and infrastructure in towns, villages, townships and settlements such as schools, shops, and churches.</li> </ul>		
Construction Impacts	Not applicable.	<p>Level of service could be compromised during construction, which in turn could affect businesses, schools, and people living along the route over the short term.</p> <p>Significance of construction impacts regarded as high without mitigation, and medium with mitigation in place.</p> <p>It would be important to maintain access to all businesses and residences</p>
Life of the Road Impacts (Operations)	Ease of accessibility and safety is average at present.	Easier and safer access to all land uses along the route.
Life of the Road Impacts (Maintenance)	Not applicable	Fewer and less costly occurrences of maintenance will be required.
Overall Impact Significance (All Phases)	<b>Medium negative impact</b>	<b>High positive impact</b> High positive impact in the long term after the initial construction impacts have run to completion. There could be cumulative positive impacts over the life of the road.
Option Evaluation	<b>Unfavourable</b>	<b>Favourable</b>
<b><u>Sense of Place</u></b>		
Construction Impacts	Not applicable	Disruptions related to presence of construction activities

Life of the Road Impacts (Operations)	Not applicable	No real change except for a generally more positive view of the road due to it being in a better condition.
Life of the Road Impacts (Maintenance)	Not applicable	Not applicable
Overall Impact Significance (All Phases)	<b>Neutral</b>	<b>Neutral</b>
Option Evaluation	<b>Neutral</b>	<b>Neutral</b>
<b><u>Public Safety (Road Accidents)</u></b>		
Construction Impacts	Not applicable	<p>Increased risk of road accidents due to the presence and movement of construction vehicles, equipment and people, and driving along road detours.</p> <p>Short-term high risk near the active construction site, which would be managed through the implementation of construction traffic management measures and appropriate warning signs.</p>
Life of the Road Impacts (Operations)	<p>When wet, the road is slippery and dangerous as water does not drain properly and ponds on the road surface.</p> <p>Poor road conditions are restrictive in terms of access for emergency vehicles to attend to road accident scenes.</p>	People may be inclined to drive faster on a road in a better condition, but generally the road will be regarded as much safer by implementing improvement and resurfacing activities.
Life of the Road Impacts (Maintenance)	Maintenance is adequate	If improvement and resurfacing occurs, less frequent maintenance will be required at lower costs.
Overall Impact Significance (All Phases)	<b>Low negative impact</b>	<b>Medium positive impact</b>
Option Evaluation	<b>Unfavourable</b>	<b>Favourable</b>
<b><u>Public Health Risk Exposure</u></b>		



Construction Impacts	Not applicable	<p>Construction projects where large numbers of construction workers are brought into the area and where there is an influx of job seekers from outside areas are widely recognised as a catalyst for the spread of communicable diseases such as tuberculosis and sexually transmitted diseases, including HIV/AIDS.</p> <p>The establishment of a construction camp where people are housed on a single quarter basis often lead to the arrival of informal traders and shebeens, which are often, associated with the presence of sex workers.</p> <p>It is highly likely that there will be contact between the construction workers and people living and working on farms and at business along the route.</p> <p>The best possible mitigation measure would be to maximise employing local people that would be able to live at home and commute between home and the construction site on a daily basis and to restrict the housing of people at the site to essential staff such as security personnel.</p> <p>There could be very high negative impacts if people are brought in from outside the local area and if these people are housed in construction camps on a single quarter basis. Public health impacts are regarded as long-term impacts since the newly infected people's long-term health and well-being are affected, and these newly infected people will remain within the community, thus exposing the local community over the long term.</p> <p>Utilising local employment, with people commuting between home and the construction site on a daily basis would mitigate the impact, with the residual risks regarded as medium high negative.</p>
Life of the Road Impacts (Operations)	Poor road conditions are restrictive in terms of access for emergency vehicles to attend to medical emergencies at farms and business along the road.	If the road undergoes special maintenance, resurfacing and partial reconstruction it would provide easier access for emergency vehicles to attend to medical emergencies along the road, including farms, business and local communities.
Life of the Road Impacts (Maintenance)	Much lower, but similar risks compared to the construction phase of special maintenance and resurfacing.	Much lower, but similar risks compared to the construction phase and occurring less frequently.
Overall Impact Significance (All Phases)	<b>Low negative impact</b>	<b>Medium negative impact</b> Construction impacts
Option Evaluation	<b>Favourable</b>	<b>Unfavourable</b>
<b>Public Security and Crime Levels</b>		
Construction Impacts	Not applicable	The presence of a construction work-force could be regarded as a risk to security since more people have access to the area.
Life of the Road Impacts (Operations)	Security a concern if fences are left in current poor condition	Same as current.
Life of the Road Impacts (Maintenance)	Not applicable	Not applicable

Overall Impact Significance (All Phases)	<b>Neutral</b>	<b>Neutral</b>
Option Evaluation	<b>No notable difference between development options</b>	
<b><u>Paleontological Heritage</u></b>		
Construction Impacts	Not applicable	Potential exposure of paleontological features in Section 5 while construction work is done on bridges and in the road reserve.  Positive impacts if paleontological material is studied and paleontological finds are recorded. Negative impacts if significant paleontological finds are destroyed.
Life of the Road Impacts (Operations)	Erosion could result in paleontological material being exposed at stream crossings.	Reduced levels of erosion would result in fewer paleontological features being exposed. Positive impacts if paleontological material is studied and paleontological finds are recorded. Recording, analysis and documentation of paleontological finds could contribute positively to the heritage knowledge base and a better understanding of the area's paleontological history. Negative impacts if significant paleontological finds are destroyed.
Life of the Road Impacts (Maintenance)	Positive impacts if paleontological material is studied and paleontological finds are recorded. Negative impacts if significant paleontological finds are destroyed.	Positive impacts if paleontological material is studied and paleontological finds are recorded. Negative impacts if significant paleontological finds are destroyed.
Overall Impact Significance (All Phases)	<b>Neutral</b>	<b>Neutral</b>
Option Evaluation	<b>No notable difference between development options</b>	
<b><u>Archaeological Heritage</u></b>		
Construction Impacts	Not applicable	It is unlikely that any archaeological features will be discovered with the nature of the work being done to the road.
Life of the Road Impacts (Operations)	No impacts during operational life of the road.	
Life of the Road Impacts (Maintenance)	It is highly unlikely that any archaeological features will be discovered during construction activities.	It is highly unlikely that any archaeological features will be discovered during construction activities.
Overall Impact Significance (All Phases)	<b>Neutral</b>	<b>Neutral</b>
Option Evaluation	<b>No notable difference between development options</b>	
<b><u>Historical Heritage</u></b>		
Construction Impacts	Not applicable	Not applicable
Life of the Road Impacts (Operations)	Not applicable	Not applicable

Life of the Road Impacts (Maintenance)	Not applicable	Not applicable
Overall Impact Significance (All Phases)	<b>Neutral</b>	<b>Neutral</b>
Option Evaluation	<b>Neutral</b>	<b>Neutral</b>
<b><u>Social and Economic Factors</u></b>		
Construction Impacts	No capital investment required.	<p><u>Negative impacts</u></p> <p>Accessibility to farms and business along the route may be compromised or perceived to be compromised.</p> <p>There may be an influx of job-seekers to the area, with potential for conflict between the different groups of job-seekers.</p> <p>There could be interaction between construction workforce and workers on farms and at businesses along the road.</p> <p>Farm workers may be attracted to more appealing employment as part of the construction workforce, resulting in local farmers losing their workforce. This could be avoided through the implementation of an appropriate and fair recruitment process.</p> <p><u>Positive impacts</u></p> <p>Job creation and skills development during road construction over period of 24 months.</p> <p>If preference is given to labour intensive construction methods, the majority of the benefits associated with job creation would be for the local workforce from the Lukhanji Local Municipalities.</p>
Life of the Road Impacts (Operations)	<p>Current condition of the road is fair with localised failures.</p> <p>Poor travel conditions and road safety, high risk of damage to vehicles and high vehicle maintenance costs and fuel consumption will remain.</p> <p>Potential for wider economic development and benefits in the area not realised.</p>	<p>For people working or living on farms or at businesses along the route, there will be improved access to shops, schools, banks, clinics, and other social services. The surfaced road will improve travel conditions, limit damage to vehicles and reduce vehicle maintenance costs and fuel consumption.</p> <p>Roads are generally regarded as the lifeblood of a successful economy. Roads facilitate trade and commerce, and complement social service delivery.</p> <p>Improved road access can bolster the upliftment of marginalised communities by providing safe access and mobility, which in turn leads to cultural and economic well-being.</p> <p>The exact extent and nature of the secondary economic developments is not known, but are linked to the economic conditions and growth within the province and the country.</p> <p>The full economic benefits will only be realised when the special maintenance, resurfacing and partial reconstruction of section 5 of the R67 has been completed.</p>
Life of the Road Impacts (Maintenance)	Moderate maintenance costs persist.	Costs and frequency of maintenance will be reduced.

Overall Impact Significance (All Phases)	<b>Low Negative Impact</b>	<b>Medium positive impact</b> Medium positive long-term impacts will be realised once the whole of section 5 of the R67 has undergone special maintenance and resurfacing.
Option Evaluation	<b>Unfavourable</b>	<b>Favourable</b>
<b>SYNTHESIS AND RECOMMENDATIONS</b>	<b>Unfavourable</b>	<b>Favourable</b>
	<b>NOT RECOMMENDED</b>	<b>RECOMMENDED</b>

### DECOMMISSIONING AND CLOSURE PHASES

There are no plans for decommissioning or closure of the road.

### PROPOSED MITIGATION MEASURES FOR IDENTIFIED IMPACTS

All mitigation measures have been incorporated into a draft EMPr, which is attached as Appendix G – Draft EMPr:

Recommendations made in the various specialist studies have been synthesised and incorporated into the draft EMPr as relevant.