CHAPTER 5 CONTENTS

List of Tables

5 IMPACT ASSESSMENT

The over-arching objective of the Impact Assessment component of the project is to identify, record and assess the scale of the changes that may occur within a specific receiving environment, in response to the introduction of new components or the expansion of current components within that receiving environment. In terms of Environmental Impact Assessment as provided for as an Integrated Environmental Management (IEM) tool for assessment in terms of the National Environmental Management Act and its associated Regulations, this refers to a specific site.

This approach enables the EAP to provide the team of specialist with a clearly defined Scope of Work and allows the specialist to focus and highlight pertinent changes as an independent assessor of the changes to the receiving environment[1] in the context of their field of speciality.

The approach therefore provides a framework for the assessment of the impacts that the proposed project will have on the environment, and of the impacts the environment will have on the proposed project. Based on inputs from the project team, stakeholders, I&APs and specialists, the potential environmental (biophysical, social and cultural) impacts have been identified and have accordingly been assessed and their significance summarised as an 'Environmental Impact Statement'.

All key concerns associated with the alternatives for this project, as identified during the Basic Assessment Process, have been investigated by the specialist team and categorised in terms of their biophysical and socio-economic parameters (please refer to **Appendix D of the draft BAR** for their specialist reports). All the impacts for the identified feasible alternatives have accordingly been assessed and their significance summarised in Table 5-1 to Table 5-4 below.

5.1 Detailed Environmental Impact Assessment

All potential impacts associated with the alternatives have been categorised according to the development category, as well as the respective phases (construction, operational, decommissioning) during which they will occur. Impacts associated with each alternative has been outlined below and discussed in terms of their anticipated duration, extent, severity, probability and significance both prior and post mitigation measures being implemented.

Kindly refer to the table below for a summary of the categories of infrastructure development, and their associated alternatives, that were assessed as part of this chapter.

[1] Consideration must be given to the cumulative impact of the project within the receiving environment, but the focus is always on the changes at a specific site.

Table 5-1: Infrastructure development categories and associated alternatives

CATEGORY	ALTERNATIVES
Powerline Route	Alternative/Option 1 (Preferred) Alternative/Option 2 Alternative/Option 3(a) Alternative/Option 3(b)
Access Road	Alternative/Option 0 (use of existing roads) Alternative/Option 1 (Preferred) Alternative/Option 1(c) Alternative/Option 1(d) Alternative/Option 3(b)
Site Layout	Alternative/Option 1 (access alternative 1, 1(c) or 1(d)) Alternative/Option 3 (access alternative 3(b))

It is important to note that there will be no material difference between the two site layout alternative with regards to impacts experienced on the receiving environment. In addition to this, there are no feasible alternatives for the sewer main line development. As previously stated the sewer rising main is proposed to be routed along the western boundary of the KZN ASP site adjacent to the road reserve of the P197 and R603, along the municipal road (Santo Alberto Road) and Longacres Drive to the existing Kingsburgh Wastewater Treatment Works (WWTW).

As such, the impacts associated with these components will form part of the project description and will be assessed as part of the powerline and access road alignment alternatives in the sections to follow.

5.2 Impact Assessment Methodology

GIBB, subsequent to the assessment conducted by the specialist team, have reviewed the impacts identified and assessed the inherent and residual risk posed to the receiving environment pre- and post- the application of mitigation measures. The objective of the assessment of impacts is to identify and assess all the significant impacts that may arise as a result of the proposed development.

For each of the main project phases the existing and potential future impacts and benefits (associated only with the proposed development) were described using the criteria listed in **Table 5-2** below. This was done in accordance with Government Notice R982, promulgated in terms of Section 24 of the NEMA and the criteria drawn from the IEM Guidelines Series, Guideline 5: Assessment of Alternatives and Impacts, published by the DEAT (April 1998).

The assignment of ratings has been undertaken based on past experience of the EIA team, as well as through research. Subsequently, mitigation measures have been identified and considered for each impact and the assessment repeated in order to determine the

significance of the residual impacts (the impact remaining after the mitigation measure has been implemented).

Table 5-2: Proposed Criteria and rating Scales which were used in the Assessment of the Potential Impacts

Criteria	Rating Scales	Notes
Nature	Positive	An evaluation of the effect of the impact related to the proposed development.
	Negative	
Extent	Footprint	The impact only affects the area in which the proposed activity will occur.
	Site	The impact will affect only the development area.
	Local	The impact affects the development area and adjacent properties.
	Regional	The effect of the impact extends beyond municipal boundaries.
	National	The effect of the impact extends beyond more than 2 regional/ provincial boundaries.
	International	The effect of the impact extends beyond country borders.
Duration	Temporary	The duration of the activity associated with the impact will last 0-6 months.
	Short term	The duration of the activity associated with the impact will last 6-18 months.
	Medium term	The duration of the activity associated with the impact will last 18 months-5 years.
	Long term	The duration of the activity associated with the impact will last more than 5 years.
Severity	High negative	The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected.
	Moderate negative	The severity of the impact is rated as

Criteria	Rating Scales	Notes
		Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected
	Low negative	The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected
	Low positive	The severity of the impact is rated as Low positive as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally improved
	Moderate positive	The severity of the impact is rated as Moderate positive as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are positively affected
	High positive	The severity of the impact is rated as High positive as the natural, cultural or social functions and processes are altered to the extent that valued, important, sensitive or vulnerable systems or communities are substantially positively affected.
Potential for impact on irreplaceable resources	No	No irreplaceable resources will be impacted.
	Yes	Irreplaceable resources will be impacted.
Consequence	Extremely detrimental	A combination of extent, duration, intensity and the potential for impact on irreplaceable resources.
	Highly detrimental	
	Moderately detrimental	
	Slightly detrimental	
	Negligible	

Criteria	Rating Scales	Notes
	Slightly beneficial	
	Moderately beneficial	
	Highly beneficial	
	Extremely beneficial	
Probability (the likelihood of the impact occurring)	Unlikely	It is highly unlikely or less than 50 % likely that an impact will occur.
	Likely	It is between 50 and 75 % certain that the impact will occur.
	Definite	It is more than 75 % certain that the impact will occur or it is definite that the impact will occur.
Significance	Very high - negative	A function of Consequence and Probability.
	High - negative	
	Moderate - negative	
	Low - negative	
	Very low	
	Low - positive	
	Moderate - positive	
	High - positive	
	Very high - positive	

Table 5-3 below provides a brief explanation of the criteria that is utilised to assess the overall impacts on the project.

Table 5-3: Explanation of Assessment Criteria

Criteria	Explanation
Nature	This is an evaluation of the type of effect the construction, operation and management of the proposed development would have on the affected environment. Will the impact change in the environment be positive, negative or neutral?
Extent or Scale	This refers to the spatial scale at which the impact will occur. Extent of the impact is described as: footprint (affecting only the footprint of the development), site (limited to the site) and regional (limited to the immediate surroundings and closest towns to the site). Extent or scale refers to the actual physical footprint of the impact, not to the spatial significance. It is acknowledged that some impacts, even though they may be of small extent, are of very high importance, e.g. impacts on species of very restricted range. In order to avoid "double counting, specialists have been requested to indicate spatial significance

Criteria	Explanation
	under “intensity” or “impact on irreplaceable resources” but not under “extent” as well.
Duration	The lifespan of the impact is indicated as temporary, short, medium and long term.
Severity	This is a relative evaluation within the context of all the activities and the other impacts within the framework of the project. Does the activity destroy the impacted environment, alter its functioning, or render it slightly altered?
Impact on irreplaceable resources	This refers to the potential for an environmental resource to be replaced, should it be impacted. A resource could possibly be replaced by natural processes (e.g. by natural colonisation from surrounding areas), through artificial means (e.g. by reseeding disturbed areas or replanting rescued species) or by providing a substitute resource, in certain cases. In natural systems, providing substitute resources is usually not possible, but in social systems substitutes are often possible (e.g. by constructing new social facilities for those that are lost). Should it not be possible to replace a resource, the resource is essentially irreplaceable e.g. red data species that are restricted to a particular site or habitat of very limited extent.
Consequence	The consequence of the potential impacts is a summation of above criteria, namely the extent, duration, intensity and impact on irreplaceable resources.
Probability of occurrence	The probability of the impact actually occurring based on professional experience of the specialist with environments of a similar nature to the site and/or with similar projects. It is important to distinguish between probability of the impact occurring and probability that the activity causing a potential impact will occur. Probability is defined as the probability of the impact occurring, not as the probability of the activities that may result in the impact.
Significance	Impact significance is defined to be a combination of the consequence (as described below) and probability of the impact occurring. The relationship between consequence and probability highlights that the risk (or impact significance) must be evaluated in terms of the seriousness (consequence) of the impact, weighted by the probability of the impact actually occurring. In simple terms, if the consequence and probability of an impact is high, then the impact will have a high significance. The

Criteria	Explanation
	significance defines the level to which the impact will influence the proposed development and/or environment. It determines whether mitigation measures need to be identified and implemented and whether the impact is important for decision-making.
Degree of confidence in predictions	Specialists and the EIR team were required to provide an indication of the degree of confidence (low, medium or high) that there is in the predictions made for each impact, based on the available information and their level of knowledge and expertise. Degree of confidence is not taken into account in the determination of consequence or probability.
Mitigation measures	Mitigation measures are designed to reduce the consequence or probability of an impact, or to reduce both consequence and probability. The significance of impacts has been assessed both with mitigation and without mitigation.

Table 5-4 provides the specific categories under each impact assessment criteria and their associated rating scales.

Table 5-4: Impact Assessment Criteria and Rating Scales

Duration		Extent		Irreplaceable Resources		Severity		Consequence = (Duration+Extent+Irr) x Severity		Likelihood		Significance (consequence x Likelihood)		Confidence
1	Temporary	1	Footprint	1	Yes	-3	High - negative	-25 to -33	Extremely detrimental	1	Unlikely	-73 to -99	Very high - negative	Low
2	Short term	2	Site	0	No	-2	Moderate - negative	-19 to -24	Highly detrimental	2	Likely	-55 to -72	High - negative	Medium
3	Medium term	3	Local			-1	Low -negative	-13 to -18	Moderately detrimental	3	Definite	-37 to -54	Moderate - negative	High
4	Long term	4	Regional					-7 to -12	Slightly detrimental			-19 to -36	Low - negative	
		5	National			1	Low -positive	0 to -6	Negligible			0 to -18	Very low - negative	
		6	International			2	Moderate - positive							
						3	High - positive	0 to 6	Negligible			0 to 18	Very Low - positive	
								7 to 12	Slightly beneficial			19 to 36	Low - positive	
								13 to 18	Moderately beneficial			37 to 54	Moderate - positive	
								19 to 24	Highly beneficial			55 to 72	High - positive	
								25 to 33	Extremely beneficial			73 to 99	Very high - positive	

5.2.1 Ascribing Significance for Decision-Making

The best way of expressing the environmental costs/impacts and the inherent benefit implications for decision-making is to present them as risks. Risk is defined as the consequence (implication) of an event multiplied by the probability (likelihood)[2] of that event. Many risks are accepted or tolerated on a daily basis because even if the consequence of the event is serious, the likelihood that the event will occur is low. A practical example is the consequence of a parachute not opening, is potentially death but the likelihood of such an event happening is so low that parachutists are prepared to take that risk and hurl themselves out of an airplane. The risk is low because the likelihood of the consequence is low even if the consequence is potentially severe.

It is also necessary to distinguish between the event itself (as the cause) and the consequence. Again using the parachute example, the consequence of concern in the event that the parachute does not open is serious injury or death, but it does not necessarily follow that if a parachute does not open that the parachutist will die.

Various contingencies are provided to minimise the likelihood of the consequence (serious injury or death) in the event of the parachute not opening, such as a reserve parachute. In risk terms this means distinguishing between the inherent risk (the risk that a parachutist will die if the parachute does not open) and the residual risk (the risk that the parachutist will die if the parachute does not open but with the contingency of a reserve parachute) i.e. the risk before and after mitigation.

5.2.2 Consequence

The ascription of significance for decision-making becomes then relatively simple. It requires the consequences to be ranked and likelihood to be defined of that consequence. In **Table 5-5** below a scoring system for consequence ranking is shown. Two important features should be noted in the table, namely that the scoring doubles as the risk increases and that there is no equivalent 'high' score in respect of benefits as there is for the costs. This high negative score serves to give expression to the potential for a fatal flaw where a fatal flaw would be defined as an impact that cannot be mitigated effectively and where the associated risk is accordingly untenable. Stated differently, the high score on the costs, which is not matched on the benefits side, highlights that such a fatal flaw cannot be 'traded off' by a benefit and would render the proposed project to be unacceptable.

[2] Because 'probability' has a specific mathematical/empirical connotation the term 'likelihood' is preferred in a qualitative application and is accordingly the term used in this document.

Table 5-5: Ranking of Consequence

Environmental Cost	Inherent risk
Human health – morbidity / mortality, loss of species	High
Material reductions in faunal populations, loss of livelihoods, individual economic loss	Moderate – high
Material reductions in environmental quality – air, soil, water. Loss of habitat, loss of heritage, amenity	Moderate
Nuisance	Moderate – low
Negative change – with no other consequences	Low
Environmental Benefits	**Inherent benefit**
Net improvement in human welfare	Moderate – high
Improved environmental quality – air, soil, water. Improved individual livelihoods	Moderate
Economic Development	Moderate – Low
Positive change – with no other consequences	Low

5.2.3 Likelihood

Although the principle is one of probability, the term 'likelihood' is used to give expression to a qualitative rather than quantitative assessment, because the term 'probability' tends to denote a mathematical/empirical expression. A set of likelihood descriptors that can be used to characterise the likelihood of the costs and benefits occurring, is presented in **Table 5-6.**

Table 5-6: Likelihood categories and definitions

Likelihood Descriptors	Definitions
Highly unlikely	The possibility of the consequence occurring is negligible
Unlikely but possible	The possibility of the consequence occurring is low but cannot be discounted entirely
Likely	The consequence may not occur but a balance of probability suggests it will
Highly likely	The consequence may still not occur but it is most likely that it will
Definite	The consequence will definitely occur

It is very important to recognise that the likelihood question is asked twice. The first time the question is asked is the likelihood of the cause and the second as to the likelihood of the consequence. In the tables that follow the likelihood is presented of the cause and then the likelihood of the consequence is presented. A high likelihood of a cause does not necessarily translate into a high likelihood of the consequence. As such the likelihood of the consequence is not a mathematical or statistical 'average' of the causes but rather a qualitative estimate in its own right.

5.2.4 Residual Risk

The residual risk is then determined by the consequence and the likelihood of that consequence. The residual risk categories are shown in **Table 5-7** where consequence scoring is shown in the rows and likelihood in the columns. The implications for decision-making of the different residual risk categories are shown in **Table 5-8.**

Table 5-7: Residual risk categories

		Residual risk				
Consequence	High	Moderate	High	High	Fatally flawed	
	Moderate – high	Low	Moderate	High	High	High
	Moderate	Low	Moderate	Moderate	Moderate	Moderate
	Moderate – low	Low	Low	Low	Low	Moderate
	Low	Low	Low	Low	Low	Low
		Highly unlikely	Unlikely but possible	Likely	Highly likely	Definite
		Likelihood				

Table 5-8: Implications for decision-making of the different residual risk categories

Rating	Nature of implication for Decision – Making
Low	Project can be authorised with low risk of environmental degradation
Moderate	Project can be authorised but with conditions and routine inspections
High	Project can be authorised but with strict conditions and high levels of compliance and enforcement
Fatally Flawed	The project cannot be authorised

5.3 Impacts associated with the sewer pipeline and layout of the development

It is important to note that there will be no material difference between the two site layout alternative with regards to impacts experienced on the receiving environment. In addition to this, there are no feasible alternatives for the sewer main line development. The sewer rising main is proposed to be routed along the western boundary of the KZN ASP site adjacent to the road reserve of the P197 and R603, along the municipal road (Santo Alberto Road) and Longacres Drive to the existing Kingsburgh Wastewater Treatment Works (WWTW).

Due to the fact that there are certain impacts that are only experienced as a result of the development layout and sewer pipeline, they have been extracted and included in this section up front of the impact assessment chapter. The impacts outlined in this section will therefore form part of the project scope activities, and the alternatives will be assessed in separate sections of this chapter so as to compare the findings and make an informed decision.

(a) **Construction Phase**

(i) Impacts of disturbance by higher levels of noise and light on the iLovu and uMsimbazi Estuary during the construction phase of the ASP

Widespread lighting associated with construction activities can influence the behaviour of animals and may affect estuarine ecosystems. The most significant aspect of this disturbance for this project is the disturbance of the water birds that would use the estuary and ESAs for feeding, breeding and roosting. Birds are a highly visible and frequently diverse component of the fauna of estuaries. Many species form large and dense foraging aggregations and thus have the potential to play key roles in estuarine ecosystem dynamics.

It is established that human disturbance can prevent water birds from gaining access to food supplies, roosting areas and breeding sites and in this respect this can be seen as a net habitat loss to this component of the estuarine community. The use of estuaries by not only resident birds, but migratory waders makes it important to take into account the loss of areas for these birds.

Table 5-9: Impacts of disturbance by higher levels of noise and light on the iLovu and uMsimbazi Estuary during the construction phase of the ASP

Impact Table:				
PROJECT PHASE	*Construction and Operational Phase*			
DIRECT IMPACT	*Disturbance by increased noise and lights to the ecological corridors and the iLovu and uMsimbazi Estuaries (this is an impact influencing predominantly) the water bird component of estuaries*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long-term Term*	*-20*	*3*
EXTENT	*5*	*The extent of the impact is rated as National as it affects extends beyond two regional/provincial boundaries*		
SEVERITY	*-2*	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued,*	***Highly Detrimental***	***Definite***

		important, sensitive or vulnerable systems or communities are negatively affected		
IMPACT ON IRREPLACEABLE RESOURCES	*1*	*Irreplaceable resources will be impacted*		
SIGNIFICANCE	**-60**	**HIGH - NEGATIVE**		
PROPOSED MITIGATION MEASURES				
Further investigation into the waders, waterfowl and other water birds is required. Particularly the cryptic species given the recent sighting of a Corncrake and African finfoot within the EFZ. This would allow further refinement of measures to mitigate disturbance impacts to the bird fauna.				
The construction footprint must be demarcated and construction crew must be made aware at induction that construction activities are not o extend beyond this boundary.				
As far as possible, construction activities must not take place at night. However, in instances where construction at night is required, the use of extensive artificial lighting during the night during construction must be avoided.				
Upward lighting should be avoided to minimise light pollution. Light can be restricted to select areas by fitting shields that direct the light below the horizontal plane, at preferably an angle less than 70 degrees. Limiting the height of lighting columns and directing light at a low level reduces the ecological impact of the light.				
The construction of the development must be phased where one platform is completed before earth works of another begins.				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last 18 months-5 years and as such is rated as Medium term*	*-20*	*2*
EXTENT	5	*The extent of the impact is rated as site as it will affect only the development area*		
SEVERITY	-2	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Highly Detrimental***	***Likely***
IMPACT ON IRREPLACEABLE RESOURCES	1	*Irreplaceable resources will be impacted*		
SIGNIFICANCE	**-40**	**MODERATE - NEGATIVE**		
CONFIDENCE LEVEL				
High				

(ii) Permanent loss of wetland habitat, as a result of construction of the platforms

During the construction phase in which the platforms will be constructed, earthworks will take place. As a result, portions of wetland habitat will be destroyed.

The permanent loss of wetland has been estimated by Eco-Pulse in their Wetland Offset Plan for the KZN ASP project (Eco-Pulse, 2019). Wetland loss was quantified as being 21.9ha in physical extent (roughly 48% of wetland area on the development property) which translates to 20.2 functional equivalents and 13.9 habitat equivalents. This was based on an assessment of wetland condition and functionality that factored an estimated 'Best Practical Rehabilitated State' for the various wetland habitats to be transformed by the development project, which is aligned with Ezemvelo KZN Wildlife's minimum requirements for Biodiversity Offsets (EKZNW, 2018). Whilst the wetlands are considered to be in a degraded state, the significance of loss of wetland areas exceeding 20ha in extent is considered 'high' given the context of the development, being located within eThekwini Municipality and coastal zone where wetland loss has already reached critical and unsustainable levels.

Table 5-10: Impact ratings for the permanent loss of wetland habitat, as a result of construction of platforms

PROJECT PHASE	*Construction Phase*			
DIRECT IMPACT	*Permanent loss of wetland habitat as a result of construction of platforms*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-21*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-3*	*The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important,*	***Highly detrimental***	***Definite***

		sensitive or vulnerable systems or communities are substantially affected.		
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-63**	**High negative**		
PROPOSED MITIGATION MEASURES				
An independent Environmental Control Officer (ECO) must be appointed to oversee construction.				
Whilst there are unlikely to be any significant impacts to wetland species of conservation concern, offsets will be required to compensate for the loss of wetland habitat (Ecosystem Conservation) and the regulating and supporting services provided by wetlands (Water Resources & Ecosystem Services).				
Focal wetland offset receiving areas have been selected offsite for offset mitigation and are associate with the iLovu and uMsimbazi estuarine functional zones. Refer to wetland offset plan compiled by Eco-Pulse (2019).				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-18*	*3*
EXTENT	2	*The extent of the impact is rated as site as it will affect only the development area*		
SEVERITY	-3	*The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected.*	***Moderately Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-54**	**Moderate - negative**		
CONFIDENCE LEVEL				
High				

(iii) Impacts to ecological linkages/corridors between the iLovu and uMsimbazi Estuaries and adjacent or nearby ESAs

The iLovu and uMsimbazi estuaries are connected to other ecological support areas and these are essential to support the processes and flow of fauna and flora between wetlands, streams and the estuary as well as the links between estuaries.

Table 5-11: Linkages between the estuary and other areas / ESAs.

Impact Table:				
PROJECT PHASE	*Construction and Operational Phase*			
DIRECT IMPACT	*Ecological linkages become broken across the site and between the adjacent ESAs and the iLovu and uMsimbazi Estuaries*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long-term Term.*	*-9*	*3*
EXTENT	*3*	*The extent of the impact is rated as Regional as the effects of the impact extends beyond municipal boundaries*		
SEVERITY	*-1*	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Slightly Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*1*	*Irreplaceable resources will be impacted*		
SIGNIFICANCE	**-27**	**LOW - NEGATIVE**		
PROPOSED MITIGATION MEASURES				
Improvement in stream and wetland function and linkage with the estuary increasing habitat, carrying capacity and aquatic migration routes.				
Improvement in the estuary habitats adjacent to the EFZ by rehabilitation of the wetlands and establishment of the offset sites identified in the Eco-Pulse Wetland Offset Report.				

Implementation of a good water quality management programme including monitoring of water quality within the stormwater infrastructure.				
Appropriate environmentally sensitive management rules regarding lights and noise on the site need to be integrated into the environmental management plan.				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long-term Term*	*18*	*3*
EXTENT	4	*The extent of the impact is rated as Regional as the effects of the impact extends beyond municipal boundaries*		
SEVERITY	2	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Moderately beneficial***	***Likely***
IMPACT ON IRREPLACEABLE RESOURCES	1	*Irreplaceable resources will be impacted*		
SIGNIFICANCE	**54**	**MODERATE - POSITIVE**		
CONFIDENCE LEVEL				
High				

(iv) Destruction of plant species of conservation concern and protected plant species as a result of construction of platforms, roads and infrastructure

Certain areas within the study area support populations of plant and animal species of conservation concern as well as provincially protected plant and animal species. Areas include the coastal thicket in the drainage lines and on steep slopes, edges between the sugar cane and the wooded drainage lines. Clearing of vegetation for the construction of the platforms will require the destruction of these species and/or habitat for these species.

Table 5-12: Impact ratings for destruction of plant species of conservation concern and protected plant species as a result of the construction of platforms, roads and infrastructure

PROJECT PHASE	*Construction Phase*			
DIRECT IMPACT	*Destruction of plant species of conservation concern and protected plant species*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**

PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-21*	*3*
EXTENT	*2*	*The extent of the impact is rated as site as it will affect only the development area*		
SEVERITY	*-3*	*The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected*	***Highly detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*1*	*Irreplaceable resources will be impacted*		
SIGNIFICANCE	**-63**	**High negative**		
PROPOSED MITIGATION MEASURES				
As plant species of conservation concern, such as Hypoxis hemerocallidea *were recorded in the grassy areas between the costal thicket and sugar cane, a botanical walk through must be undertaken in the construction footprint prior to construction commencing. If such plants are found, a rescue and relocation plan must be compiled by a suitably qualified botanist, and the plants relocated before construction commences*				
A number of provincially and nationally protected plant species were recorded in the costal thicket in the study area. The construction footprint must be ground-truthed by a suitably qualified botanist prior to construction to identify any individual plants that will be impacted by the construction activities				
Removal or trimming of individuals of species of conservation concern will require a permit that should be accompanied by a rehabilitation plan specifying either re-establishment or rescue and relocation to a suitable site				
A permit from Ezemvelo KZN Wildlife (EKZNW) will be required to destroy or relocate any species of conservation concern or provincially protected plant species. A permit from the national authority (DAFF) will be required to remove, cut or destroy a nationally protected species				

As the proposed platforms will be constructed in close proximity to the edges of the coastal thicket habitat on the site, it is recommended that a walk-through of the habitat edges to search for Bradypodion melanocephalum *(KwaZulu Dwarf Chameleon) be undertaken by a suitably qualified ecologist or herpetologist prior to construction. If the species is detected, a site specific Species Management Plan including Search and Rescue Plan must be written by a suitably qualified herpetologist and implemented prior to construction.*				
The Critically Endangered and Protected Hyperolius pickersgilli *(Pickersgill's Reed Frog) was given a medium likelihood of occurring in the study area. While this rare and localised species was not detected during the field surveys, it does not rule out the possibility of it occurring in the study area. It is therefore recommended that a follow-up survey be conducted by a suitably qualified herpetologist following good spring rains, prior to construction commencing, to confirm the absence/presence of the species.*				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-10*	*3*
EXTENT	1	*The extent of the impact is rated as footprint as it only affects the area in which the proposed activity will occur*		
SEVERITY	-2	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Slightly Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted*		
SIGNIFICANCE	**-30**	**Low - negative**		
CONFIDENCE LEVEL				
High				

(v) Increased informal dwellers as a result of construction activities at the site for development

It is anticipated that there will be an influx of job seekers into the area during construction. Considering the size of the proposed development and the long period over which the

proposed development will take place, it is likely that a large percentage of job seekers will migrate not only from the surrounding rural areas, which are characterised by high levels of poverty, but from throughout KwaZulu-Natal.

Table 5-13: Impact of increased informal dwellers as a result of construction activities

PROJECT PHASE	*Construction Phase*			
DIRECT IMPACT	*Increased informal dwellers as a result of construction activities at the site for development*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-14*	*2*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-2*	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Moderately Detrimental***	***Likely***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-28***	***Low - negative***		
PROPOSED MITIGATION MEASURES				
Prior to construction, the municipality should be informed of the possibility of an increase in informal dwellers and/or destitute people so that the necessary planning can be undertaken.				

In collaboration with the municipality, DTPC should undertake monitoring of the number of informal dwellers and/or destitute people living within the AOI.				
There should be sustained stakeholder engagement sessions with the surrounding communities, tribal authorities, councillors and any other relevant stakeholders to make clear the availability of employment opportunities that may or may not arise as a result of the development of the KZN ASP so as to ensure there are no unrealistic expectations regarding employment opportunities.				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-7*	*2*
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	-1	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Slightly detrimental***	***Likely***
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-14**	**very low negative**		
CONFIDENCE LEVEL				
High				

(vi) Increased criminal activity, as a result of construction activities at the site for development

An increase in criminal activity is often associated with large developments and/or projects where there is likely to be an in-migration of construction workers, job seekers and criminal opportunists.

In the case of the proposed KZN ASP, the possibility of an increase in crime, potentially over an extended period, should not be under-estimated. It is anticipated that there will be a significant movement of people into the area, some of whom are likely to be criminal opportunists as well as job seekers who, through not being able to find work, support themselves and their dependents via criminal activities. While the Kingsburgh and iLovu North areas may be affected by crime it is believed that existing security measures and the police

presence in these areas should be in a position to manage the situation. It is more likely that the most significantly affected areas will be more rural settlements, in particular, the settlements to the west of the study area. It is likely that job seekers and criminal opportunists moving into the area will settle in these rural areas, with criminal opportunists taking advantage of potential 'soft' targets'.

Table 5-14: Impact of increased criminal activity as a result of construction activities

PROJECT PHASE	*Construction Phase*			
DIRECT IMPACT	*Increased criminal activity as a result of construction activity*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-14*	*2*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-2*	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Moderately Detrimental***	***Likely***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-28***	***Low - negative***		
PROPOSED MITIGATION MEASURES				
Construction staff should be clearly identified by wearing uniforms and/or wearing identification cards that should be exhibited in a visible place on their body.				

Disciplinary steps or dismissal of any staff caught in criminal activities.				
Inform local law enforcement agencies of the possibilities of increased criminal activity in the area.				
Inform local Nin-Governmental Organisations (NGOs), and private security companies of the potential for increases in crime especially in the more vulnerable rural areas.				
Monitor crime statistics so as to determine if criminal activity is increasing. In the event that criminal activity is increasing, DTPC should establish, manage and, if necessary, fund a community policing forum in the affected areas.				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-7*	*2*
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	-1	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Slightly detrimental***	***Likely***
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-14**	**very low negative**		
CONFIDENCE LEVEL				

(vii) Foreign direct investment as a result of the proposed KZN ASP development

The nature and scale of the proposed KZN ASP is likely to attract international investors to invest into the local economy, because the automotive industry is SA's leading manufacturing sector and the largest attractor of direct foreign investment in manufacturing.

Table 5-15: Impact ratings for foreign direct investment as a result of the proposed KZN ASP development

PROJECT PHASE	*Construction Phase*
DIRECT IMPACT	*Impact of foreign direct investment as a result of the KZN ASP development*

INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*14*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*2*	*The severity of the impact is rated as Moderate positive as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are positively affected*	***Moderately beneficial***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	***42***	***Moderate positive***		
PROPOSED MITIGATION MEASURES				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*14*	*3*
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		

SEVERITY	2	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Moderately beneficial***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**42**	**Moderate - positive**		
CONFIDENCE LEVEL				
High				

(viii) Impact of urban renewal

The proposed site is currently largely being used for sugarcane farming. The proposed development is likely to bring in renewed investment into the area and is likely to improve the urban environment within which it will be located.

Table 5-16: Impact ratings for foreign direct investment as a result of the proposed KZN ASP development

PROJECT PHASE	*Construction Phase*			
DIRECT IMPACT	*Impact of Urban renewal*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*14*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects*		

		the development area and adjacent properties		
SEVERITY	*2*	*The severity of the impact is rated as Moderate positive as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are positively affected*	***Moderately beneficial***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	***42***	***Moderate positive***		
PROPOSED MITIGATION MEASURES				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*14*	*3*
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	2	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or*	***Moderately beneficial***	***Definite***

		communities are negatively affected		
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**42**	**Moderate - positive**		
CONFIDENCE LEVEL				
High				

(b) **Operational Phase**

(i) Impacts on aquatic taxa sensitive to changes in water quality, due to accidental spillage of sewerage

During the operational phase, there is a risk of accidental leakage or breakage of the sewer pipeline, and the resultant release of sewage into the freshwater environment. This impact may potentially affect not only the development but also adjacent properties, and larger downstream river and estuarine systems that are of greater ecological and biodiversity significance. However, with regular inspections and a scheduled maintenance plan, detections of leakages can be done early and be can be repaired.

Table 5-17: Impact ratings for impacts on aquatic taxa sensitive to changes in water quality

PROJECT PHASE	*Operational Phase*			
DIRECT IMPACT	*Impacts on aquatic taxa sensitive to changes in water quality, due to accidental spillage of sewage*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*3*	*The duration of the activity associated with the impact will last 18 months-5 years and as such is rated as Medium term*	*-18*	*1*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		

SEVERITY	*-3*	*The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected.*	***Moderately detrimental***	***unlikely***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-18***	***Very low - negative***		
PROPOSED MITIGATION MEASURES				
Fail safe measures and early warning systems for pipe failure that would cause leakage must be put in place.				
There must be water quality monitoring of the downstream surface water resources.				
Visual soil assessments must be undertaken for signs of contamination along the sewer pipeline route.				
POST-MITIGATION				
DURATION	3	*The duration of the activity associated with the impact will last 18 months-5 years and as such is rated as Medium term*	*-8*	*1*
EXTENT	1	*The extent of the impact is rated as footprint as it only affects the area in which the proposed activity will occur*		
SEVERITY	-2	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Slightly detrimental***	***Unlikely***
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted*		

SIGNIFICANCE	**-8**	**very low negative**		
CONFIDENCE LEVEL				
Medium				

(ii) Impacts of sewerage spills or contamination on the iLovu Estuary

Contamination of both estuaries from breakages, overflows and power outages from the proposed sewer rising main, within and adjacent to the iLovu EFZ poses the risk of organic pollution entering the estuary. This organic pollution can drive changes in water quality, lowering dissolved oxygen and increasing nutrient enrichment. This can serve to alter estuarine food webs and result in the loss of species and with high levels of contamination repeated fish kills often occur.

Table 5-18: Impact of sewerage spills or contamination on the iLovu estuary during the operational phase of the ASP

Impact Table:				
PROJECT PHASE	*Operational Phase*			
DIRECT IMPACT	Impacts of sewerage spills or contamination on the iLovu and uMsimbazi Estuaries			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*3*	*The duration of the activity associated with the impact will last more 18 months- 5 years and as such is rated as Medium Term*	*-16*	*3*
EXTENT	*4*	*The extent of the impact is rated as Regional as the effects of the impact extends beyond municipal boundaries*		
SEVERITY	*-2*	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Moderately Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*1*	*Irreplaceable resources will be impacted*		

SIGNIFICANCE	**-48**	**MODERATE - NEGATIVE**		
PROPOSED MITIGATION MEASURES				
A comprehensive infrastructure maintenance plan with emergency protocols to deal with sewage spills has to be developed with an estuary scientist. Response time needs to be extremely short if contamination to the estuary is to be avoided.				
POST-MITIGATION				
DURATION	2	*The duration of the activity associated with the impact will last 6-18 months- and as such is rated as short term*	*-7*	*2*
EXTENT	4	*The extent of the impact is rated as Regional as the effects of the impact extends beyond municipal boundaries*		
SEVERITY	-1	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Slightly Detrimental***	***Likely***
IMPACT ON IRREPLACEABLE RESOURCES	1	*Irreplaceable resources will be impacted*		
SIGNIFICANCE	**-14**	**VERY LOW - NEGATIVE**		
CONFIDENCE LEVEL				
High				

(iii) Reduced water quality of wetlands, as a result of sewerage spills

The water quality of surrounding wetlands may be significantly impacted if there is a leak in the sewer pipeline, thereby causing extensive contamination of watercourses downstream.

Table 5-19: Impact ratings for reduced water quality of wetlands and watercourses as a result of sewerage spills

PROJECT PHASE	*Construction Phase*			
DIRECT IMPACT	*Reduced water quality of wetlands as a result of sewerage spills*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-21*	*3*

EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-3*	*The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected.*	***Highly detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-63***	***High - negative***		

PROPOSED MITIGATION MEASURES

Appropriate infrastructure must be designed to reduce risk of leaks, proper maintenance schedules and operational management plans and protocols for pump stations, including contingency measures in the event of mechanical breakdown, spillage, etc.

Sewer pump stations and pipelines will need to be created with durability in mind and to involve minimal maintenance in order to ensure ideal functioning of such systems. Maintenance of pipelines and pump stations must be carried out as sensitively as possible to avoid negative impacts to the environment during access and repairs. Blockages and manhole overflows must be fixed immediately. Any vegetation clearing and re-excavation of watercourses required to maintain/repair sections of pipeline must adhere to the construction phase impact mitigation measures provided. Ensure that an incident response and contingency plan is prepared to deal with any potential unforeseen impacts that could arise at the pump station during operation.

These may include:

- *Failure of sewer pipeline design/poor construction;*
- *Failure of materials leading to rupture of the sewer pipe and leakage;*
- *Exposure of sewer pipelines and damage through erosion;*
- *Unintentional damage by machinery operating near pipelines; and*
- *The pump station also has the potential to malfunction, overflow or leak raw sewerage into the environment due to electrical failure, poor maintenance, environmental damage (e.g. storms) or systems operating above capacity.*

Pump stations must be fenced off to prevent unauthorized access by humans/wildlife which could cause damage to infrastructure and cause accidental malfunction and/or spillage of untreated wastewater.

Reasonable measures must be taken to provide back-up for mechanical, electrical, operational or process failure and malfunction at pump stations. At a minimum there should be an alarm system to warn of an electrical failure and sufficient standby equipment to provide for reasonable assurance that the pump station can be functional within 24 hours.				
No sewer manholes must be constructed within the flood line of major rivers or the delineated watercourses (wetlands and riparian zones of rivers).				
Construction of new sewer pipelines, manholes and pump stations must be constructed outside of the 1:100 year flood line of perennial rivers wherever practically possible. This does not include upgrades to existing infrastructure already located within the 1: 100yr flood line.				
All sewer manholes must be sealed to guarantee that surcharge events do not occur if there is a blockage				
The pump station must be placed within a lined, impermeable concrete bunded area with the capacity to hold untreated wastewater in an emergency and provide for sufficient time for maintenance staff to address any faults/ problems. This is to limit the risk of untreated wastewater overflowing in the event of any leakage or accidental spillage at the pump station.				
Signage should be provided at a visible location at pump stations to inform local residents in the area of the purpose of the pump station. Emergency telephone contact details should also be provided on the signs so that pump station failure, leakage or electrical power outages affecting the system can be easily reported to the Local Municipality.				
A monitoring and maintenance programme should be prepared for the various pump stations to ensure the on-going performance of infrastructure and prevention of foreseeable faults/problems that could result in leakage/failure. *Pump station monitoring to include:* • *Assessing motor/gearbox problems – replace gearbox oil;* • *Checking for wear and tear;* • *Checking electrical components are working correctly (e.g. electrical board in good operating condition);* • *Looking for any surcharging (blockages);* • *Checking that access to the facility is controlled (no gaps in fencing, etc.); and* • *Checking that any emergency alarms are in working-order.*				
Water quality monitoring and visual assessment must be undertaken regularly.				
Routine inspections of all sewer related infrastructure (hydraulic monitoring) must be undertaken.				
Piezometric seepage boreholes must be installed if pollution is evident.				
A temporary cut off trench must be installed to contain poor quality runoff.				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*-14*	*2*
EXTENT	3	*The extent of the impact is rated as Local as the effects of the*		

		development area and adjacent properties		
SEVERITY	-2	*The severity of the impact is rated as High positive as the natural, cultural or social functions and processes are altered to the extent that valued, important, sensitive or vulnerable systems or communities are substantially positively affected.*	***Moderately Detrimental***	***Likely***
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-28**	**Low-negative**		
CONFIDENCE LEVEL				
Medium				

(iv) Pollution of vadose zone and regional water table / groundwater aquifer due to broken sewer lines

Pollution of the vadose and regional water table/ groundwater aquifer may result as a result poor quality seepage from cracks or broken sewer lines and sewage pump station areas which could percolate to the shallow aquifer.

Table 5-20: Impact ratings for pollution of the vadose and regional water table / groundwater aquifer due to broken sewer lines

PROJECT PHASE	*Operational Phase*			
DIRECT IMPACT	*Pollution of the vadose zone and regional water table / groundwater aquifer, as a result of broken sewer lines*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*2*	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*-5*	*2*

EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-1*	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Negligible***	***Likely***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-10***	***Very low - negative***		
PROPOSED MITIGATION MEASURES				
Undertake visual soil assessment for signs of contamination along the installed sewer line and pump stations.				
Undertake routine sewer hydraulic flow testing.				
POST-MITIGATION				
DURATION	2	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*-5*	*1*
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	-1	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Negligible***	***Unlikely***
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted*		
SIGNIFICANCE	**-5**	**very low negative**		
CONFIDENCE LEVEL				
Medium				

(v) Impacts of water quantity changes on the iLovu and uMsimbazi Estuary during the operational phase of the ASP

The transformed surface of the KZN ASP site that was previously sugar cane would have as little as ten percent of the area of a watershed covered in roads, parking lots, rooftops, and other impervious surfaces. This could lead to the rivers and streams within those watersheds becoming degraded. Streams in watersheds with more than ten percent hard surfaces become physically unstable, causing erosion and sedimentation (Booth, 1991; Booth and Reinelt, 1993). In addition, natural habitats such as pools, woody debris, and the wetted perimeter of the streambed decline (Booth and Reinelt, 1993; Shaver et al., 1995). Overall, habitat quality falls below the level necessary to sustain a broad diversity of aquatic life.

The additional volume created by stormwater, from a development of this size, would increase inflows into the estuary and affect the water balance and the mouth functioning.

Table 5-21: Impacts of water quantity changes on the iLovu and uMsimbazi estuaries during the operation of the ASP

Impact Table: Operation of the ASP				
PROJECT PHASE	*Operational phase*			
DIRECT IMPACT	*Water quantity changes as a result of modification of the local catchment with extensive areas of hardened and impervious surfaces.*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long-term Term*	*-27*	*3*
EXTENT	*4*	*The extent of the impact is rated as Regional as it affects the development area and adjacent properties and influences beyond the municipal boundaries*		
SEVERITY	*-3*	*The severity of the impact is rated as High negative as the natural, cultural and social functions and processes are altered to the extent that natural processes will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities*	***Extremely Detrimental***	***Definite***

		are substantially negatively affected		
IMPACT ON IRREPLACEABLE RESOURCES	*1*	*Irreplaceable resources will be impacted*		
SIGNIFICANCE	**-81**	**VERY HIGH - NEGATIVE**		
PROPOSED MITIGATION MEASURES				
Retention dams and other stormwater infrastructure as per the assessed stormwater management plan as per 541640_GIBB_SWMP_ASP_Final_10Sep19 should be put in place to avoid major changes to runoff volume and velocity into the long term.				
Monitoring and maintenance of these retention facilities needs to be part of a routine environmental management plan.				
Wetland rehabilitation, restoration and management should be carried out as soon as possible during or immediately following construction. This will serve to protect streams and aquatic habitats which feed into or are within the EFZ.				
Following construction, all remaining areas that have been cleared of vegetation must be rehabilitated with appropriate indigenous plant species found in the area. A site specific rehabilitation plan must be compiled by a suitably qualified ecologist and implemented by a suitably qualified rehabilitation specialist				
No material from the cut and fill operation should be dumped or stored in the wetland/stream or estuary areas.				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long-term Term*	*-7*	*2*
EXTENT	2	*The extent of the impact is rated as site as it will affect only the development area*		
SEVERITY	-1	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Slightly Detrimental***	***Likely***
IMPACT ON IRREPLACEABLE RESOURCES	1	*Irreplaceable resources will be impacted*		
SIGNIFICANCE	**-14**	**VERY LOW NEGATIVE**		
CONFIDENCE LEVEL				
High				

(vi) Impacts of water quality changes of the iLovu Estuary during the operational phase of the ASP

Several studies have shown that urban stormwater runoff correlated well with deterioration of the water quality in estuaries. Urbanisation leads to increased stormwater volumes running off paved areas. Consequently, runoff that would previously have percolated through the soil discharges directly into aquatic ecosystems, with the high potential of deteriorating water quality and ecosystem health status more rapidly than diffuse sources. The large area of hardened surfaces combined with a development that will comprise a multi-use industrial park make the possibility of contamination to the feeder streams and wetlands that feed freshwater to the downstream estuaries extremely high. There is a potential for contamination of the iLovu Estuary.

Table 5-22: Impacts of water quality changes on the iLovu estuary during the operational phase of the ASP

Impact Table: Operation of the ASP				
PROJECT PHASE	*Operational phase*			
DIRECT IMPACT	*Water quality changes as a result of pollutants being carried by runoff to the iLovu estuary with highly polluted urban stormwater flushing across hardened surfaces.*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long-term Term*	*-27*	*3*
EXTENT	*4*	*The extent of the impact is rated as Regional as it affects the development area and adjacent properties and influences beyond the municipal boundaries*		
SEVERITY	*-3*	*The severity of the impact is rated as High negative as the natural, cultural and social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Extremely Detrimental***	***Definite***

IMPACT ON IRREPLACEABLE RESOURCES	*1*	*Irreplaceable resources will be impacted*		
SIGNIFICANCE	**-81**	**VERY HIGH - NEGATIVE**		
PROPOSED MITIGATION MEASURES				
Retention dams and other stormwater infrastructure as per the assessed stormwater management plan as per 541640_GIBB_SWMP_ASP_Final_10Sep19 should be put in place to avoid major changes to runoff volume and velocity into the long term. Monitoring of water quality within the stormwater network will need to be incorporated into the management plan to ensure that polluted stormwater is prevented from entering the EFZ.				
Wetland rehabilitation, restoration and management should be carried out as soon as possible during or immediately following construction. This will serve to protect streams and aquatic habitats which feed into or are within the EFZ.				
Following construction, all remaining areas that have been cleared of vegetation must be rehabilitated with appropriate indigenous plant species found in the area. A site specific rehabilitation plan must be compiled by a suitably qualified ecologist and implemented by a suitably qualified rehabilitation specialist				
No material or waste water should be discharged, dumped or stored from individual sites into the wetland/stream or estuary areas.				
Wetland rehabilitation, restoration and management should be carried out as soon as possible during or immediately following construction. This will serve to protect streams and aquatic habitats which feed into or are within the EFZ in the long term				
Following construction, all remaining areas that have been cleared of vegetation must be rehabilitated with appropriate indigenous plant species found in the area. A site specific rehabilitation plan must be compiled by a suitably qualified ecologist and implemented by a suitably qualified rehabilitation specialist				
Monitoring and maintenance of these retention facilities needs to be part of a routine environmental management plan.				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long-term Term*	*-7*	*2*
EXTENT	2	*The extent of the impact is rated as Site as it will affect only the development area*		
SEVERITY	-1	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected.*	***Slightly Detrimental***	***Likely***

IMPACT ON IRREPLACEABLE RESOURCES	1	*Irreplaceable resources will be impacted*		
SIGNIFICANCE	**-14**	**VERY LOW NEGATIVE**		
CONFIDENCE LEVEL				
High				

(vii) Impacts of water quality changes of the uMsimbazi Estuary during the operational phase of the ASP

The potential for contamination of the uMsimbazi Estuary is higher than the iLovu Estuary. This is due to its smaller catchment size, and the larger proportion of the ASP development which sits in its catchment. The uMsimbazi Estuary has the potential for flushing and is also much less than that of the iLovu Estuary.

Table 5-23: Impacts of water quality changes on the uMsimbazi Estuary during the operational phase of the ASP

Impact Table: Operation of the ASP				
PROJECT PHASE	*Operational phase*			
DIRECT IMPACT	*Water quality changes as a result of pollutants being carried by runoff to the uMsimbazi estuary with highly polluted urban stormwater flushing across hardened surfaces.*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-27*	*3*
EXTENT	*4*	*The extent of the impact is rated as Regional as the effects of the impact extends beyond municipal boundaries*		
SEVERITY	*-3*	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important,*	***Extremely Detrimental***	***Likely***

		sensitive or vulnerable systems or communities are negatively affected		
IMPACT ON IRREPLACEABLE RESOURCES	*1*	*Irreplaceable resources will be impacted*		
SIGNIFICANCE	**-81**	**VERY HIGH - NEGATIVE**		
PROPOSED MITIGATION MEASURES				
Retention dams and other stormwater infrastructure as per the assessed stormwater management plan as per 541640_GIBB_SWMP_ASP_Final_10Sep19 should be put in place to avoid major changes to runoff volume and velocity into the long term. Monitoring of water quality within the stormwater network will need to be incorporated into the management plan to ensure that polluted stormwater is prevented from entering the EFZ.				
Wetland rehabilitation, restoration and management should be carried out as soon as possible during or immediately following construction. This will serve to protect streams and aquatic habitats which feed into or are within the EFZ.				
Following construction, all remaining areas that have been cleared of vegetation must be rehabilitated with appropriate indigenous plant species found in the area. A site specific rehabilitation plan must be compiled by a suitably qualified ecologist and implemented by a suitably qualified rehabilitation specialist				
No material or waste water should be discharged, dumped or stored from individual sites into the wetland/stream or estuary areas.				
Wetland rehabilitation, restoration and management should be carried out as soon as possible during or immediately following construction. This will serve to protect streams and aquatic habitats which feed into or are within the EFZ in the long term				
Following construction, all remaining areas that have been cleared of vegetation must be rehabilitated with appropriate indigenous plant species found in the area. A site specific rehabilitation plan must be compiled by a suitably qualified ecologist and implemented by a suitably qualified rehabilitation specialist				
Monitoring and maintenance of these retention facilities needs to be part of a routine environmental management plan.				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long-term Term*	*-8*	*2*
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	-1	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that*	***Slightly Detrimental***	***Likely***

		natural, cultural and social functions and processes are minimally affected.		
IMPACT ON IRREPLACEABLE RESOURCES	1	*Irreplaceable resources will be impacted*		
SIGNIFICANCE	**-16**	**VERY LOW NEGATIVE**		
CONFIDENCE LEVEL				
High				

(viii) Impacts of disturbance by higher levels of noise and light on the iLovu and uMsimbazi Estuaries during the operational phase of the ASP

Widespread lighting associated with operational activities can influence the behaviour of animals and may affect estuarine ecosystems. The most significant aspect of this disturbance for this project is the disturbance of the water birds that would use the estuary and ESAs for feeding, breeding and roosting. Birds are a highly visible and frequently diverse component of the fauna of estuaries. Many species form large and dense foraging aggregations and thus have the potential to play key roles in estuarine ecosystem dynamics.

It is established that human disturbance can prevent water birds from gaining access to food supplies, roosting areas and breeding sites and in this respect this can be seen as a net habitat loss to this component of the estuarine community. The use of estuaries by not only resident birds but migratory waders makes it important to take into account the loss of areas for these birds.

Table 5-24: Impacts of disturbance by higher levels of noise and light on the iLovu estuary during the operational phases of the ASP

Impact Table:				
PROJECT PHASE	*Operational*			
DIRECT IMPACT	*Disturbance by increased noise and lights to the ecological corridors and the iLovu estuary (this is an impact influencing predominantly the water bird component of estuaries)*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long-term Term*	*-20*	*3*

EXTENT	*5*	*The extent of the impact is rated as National as it affects extends beyond two regional/provincial boundaries*		
SEVERITY	*-2*	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Highly Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*1*	*Irreplaceable resources will be impacted*		
SIGNIFICANCE	**-60**	**HIGH - NEGATIVE**		
PROPOSED MITIGATION MEASURES				
Further investigation into the waders, waterfowl and other water birds is required. Particularly the cryptic species given the recent sighting of a Corncrake and African finfoot within the EFZ. This would allow further refinement of measures to mitigate disturbance impacts to the bird fauna.				
In order to fight noise pollution, landowners or businesses with activities generating high level noises should be assessed and required to install absorptive sound barriers. These barriers swallow sound, reducing impact on surrounding areas.				
To reduce light pollution, the main landowner can install lower-wattage bulbs, avoid the use of o glaring neon signs in favour of more subtle choices. Turn off unnecessary lighting during non-operational hours. Environmentally friendly downward cast lighting should be used wherever possible for roads, paths etc.				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last 18 months-5 years and as such is rated as Medium term*	*-20*	*2*
EXTENT	5	*The extent of the impact is rated as site as it will affect only the development area*		
SEVERITY	-2	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Highly Detrimental***	***Likely***

IMPACT ON IRREPLACEABLE RESOURCES	1	*Irreplaceable resources will be impacted*		
SIGNIFICANCE	**-40**	**MODERATE - NEGATIVE**		
CONFIDENCE LEVEL				
High				

(ix) Potential for the decline in the aesthetic value of the iLovu and uMsimbazi Estuaries

The magnitude of an aesthetic impact and whether it can be considered negative or not will depend to some degree of the urbanisation of the area in which the proposed development is situated. The viewsheds on both of these picturesque and highly rated (aesthetically) will be significantly altered. This is evident from the Visual Assessment Report (SVA 2019) which indicates that the view south of the iLovu will be radically altered by the change from agricultural activities to industrial land uses. This is echoed looking north from the uMsimbazi Estuary, where the soft rolling hills backdrop will be significantly changed. This estuary together with the uMgababa is one of our more scenic estuaries within the eThekwini Municipality. This impact is considered negative with very little mitigation possible.

Table 5-25: Impacts to aesthetic value of the iLovu and uMsimbazi Estuaries during the operational phase of the ASP

Impact Table:				
PROJECT PHASE	*Operational Phase*			
DIRECT IMPACT	*Aesthetic impacts on the iLovu and uMsimbazi Estuaries*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long-term Term*	*-16*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-2*	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or*	***Moderately Detrimental***	***Definite***

		vulnerable systems or communities are negatively affected		
IMPACT ON IRREPLACEABLE RESOURCES	*1*	*Irreplaceable resources will be impacted*		
SIGNIFICANCE	**-48**	**MODERATE - NEGATIVE**		
PROPOSED MITIGATION MEASURES				
Colours of all structures should be muted to blend as much as possible.				
Softening with perimeter planting should be an intensive undertaking for the broader site boundary as well as individually for the development of each site.				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long-term Term*	*-14*	*3*
EXTENT	4	*The extent of the impact is rated as site as it will affect only the development area*		
SEVERITY	-2	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Moderately Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	1	*Irreplaceable resources will be impacted*		
SIGNIFICANCE	**-42**	**MODERATE - NEGATIVE**		
CONFIDENCE LEVEL				
High				

(x) Altered hydrology, erosion and / sediment regime of wetlands, as a result of hardened surfaces

The site will be fully platformed and consist primarily of hardened surfaces. The excess or improper management of stormwater may cause higher flows and velocities within watercourses causing erosion and sedimentation. As these proposed developments are largely intended for use of heavy vehicles, such as trucks, there will be movement and disturbance within the site.

Table 5-26: Impact ratings for altered hydrology, erosion and / sediment regime of wetlands

PROJECT PHASE	*Operational Phase*			
DIRECT IMPACT	*Altered hydrology, erosion and / sediment regime of wetlands*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-16*	*3*
EXTENT	*4*	*The extent of the impact is rated as Regional as the effects of the impact extends beyond municipal boundaries*		
SEVERITY	*-2*	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Moderately detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-48**	**Moderate- negative**		
PROPOSED MITIGATION MEASURES				
Storm water management reduces the negative effects of storm water runoff. Management of storm water comprises of controlling flooding, reducing erosion and improving water quality. This can be achieved by implementing measures known as Best Management Practices (BMPs). Such BMPs include the installation of a porous pavement, which are interlocking tiles or bricks that allows storm water runoff to infiltrate the pavement and thereafter enters the soil which removes fine grain pollutants and provides erosion control. In addition there are vegetative BMPs which include a number of landscaping practices. Grassed swales, or ditches, can be placed in residential areas or in highway medians. This BMP helps lessen the peak runoff downstream through processes of infiltration and storage. Filter strips are designed to direct storm water from impervious areas into a stone trench, which evenly distributes the runoff over a grass strip.				

A conceptual-level Storm Water Management Plan (SWMP) has been compiled, post-development flows are to match pre-development flows, with no large increase in floodpeaks or velocities by implementing appropriate storm water management. Retention, detention, attenuation, sustainable and controlled release of storm water runoff into watercourses is to be practiced in order to prevent erosion and/or sedimentation of wetlands and downstream estuaries. SUDS principles are to be implemented whereby the number of outlets to watercourses to reduce concentrated flows at high volumes and velocities are to be maximised, separate 'clean' and 'dirty' storm water management systems are to be developed in accordance with DWS requirements and erosion control measures are to be determined by the engineers.				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-14*	*3*
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	-2	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Moderately Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-42**	**Moderate - negative**		
CONFIDENCE LEVEL				
Medium				

(xi) Impact of permanent change of visual character on the nearby visual receptors

Despite its location within the surrounding landscape the proposed development is not particularly well visible within its immediate and larger context from number of viewpoints. This is primarily due to the undulating nature of existing landscape within the site and immediate surrounding which offers visual concealment from number of sides. However, from a limited number of viewpoints the development would be highly visible i.e. view points 2, 5, 7, 8, 9. 10 and 13.

The proposed development is therefore considered to be moderately visually intrusive and will, despite its maximum height of 15 metres, blend-in to a degree with the existing setting and context.

The site has a medium visual absorption capacity located in a rural context of natural landscape feature such as hills and existing well-established vegetation. The visual absorption capacity is lowest from the south west of the site. There are multiple viewing opportunities of the site from the surrounding areas. There will be medium change of site character and immediate context character due to the proposed scale of the development to its immediate context.

The site and immediate context sense of place will change although this is suggested to be within acceptable parameters. Visual impacts on the surrounding context are assessed as medium considering the site location within the context identified from natural to urban. Light pollution at night would be medium due to its close proximity to Illovo Beach.

Table 5-27: Impact of permanent change of visual character on the nearby receptors

PROJECT PHASE	*Operational Phase*			
DIRECT IMPACT	*Permanent change of visual character on the nearby receptors*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-14*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-2*	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or*	***Moderately Detrimental***	***Definite***

		communities are negatively affected		
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-42***	***Moderate - negative***		

PROPOSED MITIGATION MEASURES

An architectural guidelines document must be compiled during the detailed design stage to give a detailed description of the proposed architectural character.

Examples of mitigation measures to be included in the architectural guideline document:
Massing and Scale

- *Break up the structures on site to avoid large single-mass objects, as far as possible.*
- *Avoid large, flat elevations as far as possible.*
- *Make use of natural, contextually appropriate materials wherever possible.*
- *As far as possible, use low level, unobtrusive and contextually appropriate signage is used.*
- *Ensure that fencing is visually permeable, contextually appropriate and softened with planting to provide visual screening. Use appropriate colours such as dark grey, charcoal and black that are visually recessive.*
- *Design streetscape elements (e.g. paving, street furniture, lighting etc.) in a manner that responds to the local context.*

Colour

- *Use exterior colours that have low reflectivity value and blend with the surroundings and the contextual character of the surrounding environment.*
- *Use a combination of natural and neutral colours as far as possible.*
- *Avoid usage of a single colour on large surfaces. Such surfaces can be visually broken down using different paint colours.*
- *Darker colours tend to recede from view, while lighter colours are much more visually noticeable.*
- *Keep reflective surfaces to a minimum or ensure that these areas are shaded by roof overhangs, where possible.*
- *Ensure that non-reflective paving surfaces are used as far as possible.*

Vegetation

- *Allow for the existing features of the site such as mature vegetation and screening elements to be to be retained, where possible.*
- *Use vegetation to visually 'screen' built structures wherever possible.*
- *Use vegetation and landscaping to soften the hard surfaces on the site.*
- *Make allowance for on-going landscape maintenance to allow site vegetation to mature sufficiently to allow the environment to achieve maximum VAC.*

Lighting

- *Low-lumen lighting should be considered and floodlights should be angled towards the ground where possible.*

• *Avoid neon, spot or up-lighting.* • *Screen and filter lights sources as far as possible.* • *Shield external lights on buildings to cast light only upon the area required to be illuminated.* • *Ensure that naked light sources are not visible from beyond the site.* • *Ensure that no light is emitted into the sky.*				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-8*	*2*
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	-1	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Slightly detrimental***	***Likely***
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-16**	**Very low negative**		
CONFIDENCE LEVEL				

(xii) Impact of loss of agricultural land as a result of the proposed development

The site is currently used for commercial sugar cane farming, and as a result of the clearance of the site for the proposed development, the land use will change to industrial development. Due to difficult terrain and shallow soils, this farm would be marginal if it were commercially owned.

As there are no high yield potential arable soils at the site, and since sugarcane is an industrial crop with a poor level of employment per hectare, there is no apparent reason why favourable consideration should not be given to alternate land use activities. The proposed KZN ASP will generate, amongst other benefits, a higher employment rate per hectare of land. Permanent employment is the most widespread provider of food security.

Table 5-28: Impact ratings for loss of agricultural land as a result of the proposed development

PROJECT PHASE	*Operational Phase*			
DIRECT IMPACT	*Loss of agricultural land as a result of the proposed development*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*21*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*3*	*The severity of the impact is rated as High positive as the natural, cultural or social functions and processes are altered to the extent that valued, important, sensitive or vulnerable systems or communities are substantially positively affected.*	***Highly beneficial***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	***63***	***High - Positive***		
PROPOSED MITIGATION MEASURES				
In the areas where sugarcane can be safely removed and replaced with industrial or commercial development it is strongly recommended that, prior to the commencement of the development, a suitably qualified landscape gardening practice be engaged to ensure that in public open spaces within the development there is the creation of professionally planned and executed new micro-ecosystems.				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last 6-18 months and*	*21*	*3*

		as such is rated as Short term		
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	3	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Highly beneficial***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**63**	**High-positive**		
CONFIDENCE LEVEL				
High				

(xiii) Increased pressure on municipal services and existing community facilities

The proposed development is likely to result in economic impacts, including increased investment and business activity in the area. This increase in business and industry, if not planned, is likely to place increased pressure on existing services such as water and electricity social services, health care services, schools, etc., all resulting from an increase in the number of businesses operating in the area.

Table 5-29: Impact ratings for increased pressure on municipal services and existing community facilities

PROJECT PHASE	*Operational Phase*			
DIRECT IMPACT	*Increased pressure on municipal services and existing community facilities*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				

DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-21*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-3*	*The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected.*	***Highly Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-63***	***High - negative***		
PROPOSED MITIGATION MEASURES				
The relevant municipal service authorities must be consulted regarding future service requirements and provision must be made for the increased demand in planning the KZN ASP development.				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-14*	*2*
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	-2	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social*	***Moderately Detrimental***	***Likely***

		functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected		
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-28**	**Low - negative**		
CONFIDENCE LEVEL				
High				

(xiv) Impact of expanded manufacturing base

The proposed KZN ASP is aimed at leveraging the comparative advantage in the area in terms of vehicle manufacturing, by expanding the manufacturing base within the region. The manufacturing sector is considered to be a key sector for delivering the economic growth required to tackle the triple challenge of poverty, inequality and unemployment, with the automotive industry viewed as having a significant role to play, both as employer and stimulator of economic development. eThekwini South enjoys a comparative advantage over eThekwini Municipality in manufacturing, with a relatively dominant advantage in the transport equipment sub-sector. Toyota SA Motors' presence in the eThekwini South region is likely to be the key driver of the comparative advantage, with many of its supply chain role-players also located in this region to take advantage of this.

Table 5-30: Impact ratings for expanded manufacturing base

PROJECT PHASE	*Operational Phase*			
DIRECT IMPACT	*Expanded manufacturing base*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*16*	*3*
EXTENT	*4*	*The extent of the impact is rated as Regional as the*		

		effects of the impact extends beyond municipal boundaries		
SEVERITY	*2*	*The severity of the impact is rated as Moderate positive as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are positively affected*	***Moderately beneficial***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	***48***	***Moderate positive***		
PROPOSED MITIGATION MEASURES				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*16*	*3*
EXTENT	4	*The extent of the impact is rated as Regional as the effects of the impact extends beyond municipal boundaries*		
SEVERITY	2	*The severity of the impact is rated as Moderate positive as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are positively affected*	***Moderately Beneficial***	***Definite***

IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**48**	**Moderate positive**		
CONFIDENCE LEVEL				
High				

(xv) Increased contribution to municipal rates as a result of the change of land use activities on the site

The site for the proposed development is currently used for agricultural purposes. During the operational phase, the rates contribution to eThekwini Municipality will increase significantly, as the majority of land will be zoned for Industrial and related land uses. Therefore, the municipal rates that the eThekwini Municipality will be able to collect from the proposed land uses within the development will be considerably more than the municipal rates collected from agricultural land.

Table 5-31: Impact ratings for increased contribution to municipal rates as a result of change of land use activities on the site

PROJECT PHASE	*Operational Phase*			
DIRECT IMPACT	*Increased contribution to municipal rates as a result of change of land use activities*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*21*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*3*	*The severity of the impact is rated as High positive as the natural, cultural or social functions and processes are altered to the extent that valued, important, sensitive or vulnerable systems or*	***Highly beneficial***	***Definite***

		communities are substantially positively affected.		
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	***63***	***High - positive***		
PROPOSED MITIGATION MEASURES				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*21*	*3*
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	3	*The severity of the impact is rated as High positive as the natural, cultural or social functions and processes are altered to the extent that valued, important, sensitive or vulnerable systems or communities are substantially positively affected.*	***Highly Beneficial***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**63**	**High - positive**		
CONFIDENCE LEVEL				
High				

5.4 Powerline Route Alternatives – Impact Assessment

There are three (3) powerline route alignments alternatives that were considered for the proposed development. Alternative route Option 1 was selected in consultation with eThekwini Electricity and is the preferred alternative. The Applicant, the DTPC, will be

responsible for the construction of the proposed powerline (*in accordance with eThekwini Electricity (EE) specifications*) after which it will be handed over to the Municipality for operation and maintenance.

Kindly refer to sub-sections 5.3.1 to 5.3.3 for the detailed impact assessment tables associated with each powerline route alternative associated with the proposed development.

5.4.1 Powerline Route Alternative Option 1 (Preferred)

All potential impacts associated with the three powerline route alternatives have been categorised according to the respective phases (pre-construction, construction, operational, decommissioning) during which they will occur. Impacts associated with each alternative has been outlined below and discussed in terms of their anticipated duration, extent, severity, probability and significance both prior and post mitigation measures being implemented.

(a) **Pre-Construction Phase**

The impacts anticipated for the Pre-construction Phase will be minimal and negligible. The site set up and demarcations for the site will be done in conjunction with an appointed independent Environmental Control Officer (ECO).

Prior to the construction phase, preference should be given to sourcing local skilled and unskilled labour. Recruitment of labour should be guided by DTPC's recruitment policies, which should promote the employment of local labour by any appointed contractors.

(b) **Construction Phase**

(i) Disturbance to or destruction of indigenous vegetation and faunal habitat leading to habitat degradation

The pylons of the preferred route (Option 1) are not proposed to be placed in any area supporting natural/indigenous vegetation. *This impact is not applicable for Option 1. – It is applicable for Option 2 and 3 (refer to the impact assessment tables in Section 5.3.2 to follow).*

(ii) Increased potential of invasion by alien vegetation as a result of construction activities

During construction, disturbance to the soil and removal of vegetation will increase the likelihood of invasion by alien plant species. Alien species establish easily and quickly on bare soil by colonisation or from seeds existing in the seed bank of the soil. Infestation by alien and invasive species will lead to degradation of the surrounding natural areas and will increase the potential of spread into the greater landscape due to propagules being released into downstream watercourses by stormwater.

This impact is also relevant to Option 2, 3a and 3b powerline route alignments.

Table 5-32: Impact ratings for increased potential of invasion by alien vegetation as a result of construction activities

PROJECT PHASE	*Construction Phase*			
DIRECT IMPACT	*Increased erosion potential and siltation of downstream watercourses due to construction and associated infrastructure developments (e.g. pipeline, site layout)*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-16*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-2*	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected.*	***Moderately detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*1*	*Irreplaceable resources will be impacted*		
SIGNIFICANCE	***-48***	***Moderate -negative***		
PROPOSED MITIGATION MEASURES				
Construction must be timed for the winter, low flow periods to prevent unnecessary diversion of water flow.				
Streams may not be diverted.				
All development footprint areas must remain as small as possible.				
No vehicles must be allowed to indiscriminately drive through the riparian areas or within the active stream channels. Designated access roads must be determined prior to the commencement of construction and clearly demarcated. Ad hoc access roads must not be permitted.				

During construction all building materials must be kept out of the riparian areas as well as the active stream channels. Building materials, including soil and spoil stock piles, must not be stored within 30m of a drainage line/ stream.				
All waste and remaining building materials must be removed from site on completion of the project, and disposed of at a registered landfill facility.				
The bed profile must be re-instated in such a way as to prevent incision and erosion in all areas that may be disturbed.				
POST-MITIGATION				
DURATION	2	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*-4*	*2*
EXTENT	2	*The extent of the impact is rated as site as it will affect only the development area*		
SEVERITY	-1	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Negligible***	***Likely***
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-8**	**very low negative**		
CONFIDENCE LEVEL				
Medium				

(iii) Changes to stream characteristics as a result of excavation activities and compaction of soil due to construction vehicles movements and associated infrastructure developments (e.g. pipeline, site layout)

This impact is relevant to all powerline route options i.e. Option 1, 2 3a and 3b.

It is foreseen that the proposed construction of the electrical powerline will have an impact on the stream habitat during the construction phase, where excavation activities will take place near watercourses, for the proposed construction of the pylons for the proposed 132kV transmission line, altering the active stream channel as well as the riparian areas. Changes in water flow characteristics will also occur when there is compaction of soil, caused by construction vehicles and potential discharge of silt laden water used during construction. The incorrect rehabilitation and reshaping of the stream bed and banks will alter run off patterns and ultimately stream flow.

Table 5-33: Impact ratings for changes to stream characteristics as a result of excavation activities and compaction of soils due to construction vehicle movements

PROJECT PHASE	*Construction Phase*			
DIRECT IMPACT	*Changes to stream flow characteristics as a result of excavation activities and compaction of soil due to construction vehicle movements and associated infrastructure developments (e.g. pipeline, site layout)*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-12*	*2*
EXTENT	*2*	*The extent of the impact is rated as site as it will affect only the development area.*		
SEVERITY	*-2*	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected.*	***Slightly detrimental***	***Likely***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-24***	***low negative***		
PROPOSED MITIGATION MEASURES				
Construction must be timed for the winter, low flow periods to prevent unnecessary diversion of water flow.				
Streams may not be diverted.				
Development activities may not extend beyond the study area boundary.				
No vehicles must be allowed to indiscriminately drive through the riparian areas or within the active stream channels. Designated access roads must be determined prior to the commencement of construction and clearly demarcated. Ad hoc access roads must not be permitted.				

During construction all building materials must be kept out of the riparian areas as well as the active stream channels. Building materials, including soil and spoil stock piles, must not be stored within 30m of a drainage line/ stream.				
All waste and remaining building materials must be removed from site on completion of the project, and disposed of at a registered landfill facility..				
The bed profile must be re-instated in such a way as to prevent incision and erosion in all areas that may be disturbed.				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-10*	*1*
EXTENT	1	*The extent of the impact is rated as footprint as it only affects the area in which the proposed activity will occur*		
SEVERITY	-2	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Slightly detrimental***	***Unlikely***
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-10**	**very low negative**		
CONFIDENCE LEVEL				
Medium				

(iv) Increase in sedimentation and turbidity due to the clearing of vegetation through or in the vicinity of watercourses

This impact is relevant to all powerline route options i.e. Option 1, 2 3a and 3b.

During the construction phase, this impact would occur in places within stream channels or the placement of the supporting towers for the 132kV powerline within the vicinity of an active stream channel of the iLovu River. This impact would be considered to take place within the footprint of the development at a low intensity. This impact will only have a temporarily effect on the watercourses even though it is highly probable.

Table 5-34: Impact ratings for increase in sedimentation and turbidity

PROJECT PHASE	*Construction Phase*			
DIRECT IMPACT	*Increase in sedimentation and turbidity due to the clearing of vegetation through or in the vicinity of watercourses and associated infrastructure developments (e.g. pipeline, site layout)*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*1*	*The duration of the activity associated with the impact will last 0-6 months and as such is rated as Temporary.*	*-8*	*2*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties.*		
SEVERITY	*-2*	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected.*	***Slightly detrimental***	***Likely***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-16***	***Very low - negative***		
PROPOSED MITIGATION MEASURES				
Adequate storm water management must be implemented on site to prevent erosion and the associated sedimentation of the riparian and instream areas.				
Construction must be timed for the winter, low flow periods to prevent unnecessary diversion of water flow.				
As far as possible no activities, with special mention of access roads, must occur within the riparian zones of stream channels as well as the stream channels themselves.				
The construction crews must be educated in the importance of natural resources and must not litter or pollute areas of bush, wetlands and rivers.				
Adequate disposal and toilet facilities must be provided on site in all areas during construction.				
The duration in which soils are exposed during construction activities must remain as short as possible.				

Concurrent rehabilitation is to take place as far as possible and footprint areas must be minimised as far as possible.				
All areas affected by construction must be rehabilitated upon completion of the construction phase of the development.				
River banks must be appropriately re-profiled and re-vegetated with indigenous grasses and trees with the guidance of a vegetation specialist. Steep banks should be stabilised with hessian sheets.				
During the construction and operational phases of the proposed development, erosion berms must be installed to prevent gully formation and siltation of the riparian resources.				
The following points must serve to guide the placement of erosion berms: *Where the track has slope of less than 2%, berms every 50m should be installed.* *Where the track slopes between 2% and 10%, berms every 25m should be installed.* *Where the track slopes between 10%-15%, berms every 20m should be installed.* *Where the track has slope greater than 15%, berms every 10m should be installed.*				
POST-MITIGATION				
DURATION	1	*The duration of the activity associated with the impact will last 0-6 months and as such is rated as Temporary*	*-2*	*1*
EXTENT	1	*The extent of the impact is rated as footprint as it only affects the area in which the proposed activity will occur*		
SEVERITY	-1	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Negligible***	***Unlikely***
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-2**	**very low negative**		
CONFIDENCE LEVEL				
Medium				

(v) Degradation of water quality of non-perennial and perennial river systems situated downstream of the site as a result of excavation activities and accidental spillage of hydrocarbons

This impact is relevant to all powerline route options i.e. Option 1, 2 3a and 3b.

During the construction phase of the proposed 132kV powerline, water quality may be impacted through the input of sediment and silt to the surrounding stream due to excavation activities, as well as runoff from materials stockpiled in close vicinity of the riverine areas. Furthermore, the accidental leakage of oil, grease and fuel from construction machinery could lead to hydrocarbon contamination of these sensitive areas. However, this impact will be of temporary nature and the macro-invertebrates communities will be able to recover.

Degradation of water quality of non-perennial and perennial river systems situated downstream of the site is likely to occur if equipment and vehicles are washed in the water bodies, and material stockpiles are placed on the banks of the river and streams which occur in the project area. Erosion of stockpiles may occur during wet seasons, leading to siltation of the water bodies (overland runoff).

Table 5-35: Impact ratings for degradation of water quality on non-perennial and perennial river systems

PROJECT PHASE	*Construction Phase*			
DIRECT IMPACT	*Degradation of water quality of non-perennial and perennial river systems situated downstream of the site as a result of excavation activities and accidental spillage of hydrocarbons.*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*3*	*The duration of the activity associated with the impact will last 18 months-5 years and as such is rated as Medium term.*	*-18*	*1*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-3*	*The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected*	***Moderately Detrimental***	***Unlikely***

IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-18***	***Very low - negative***		
PROPOSED MITIGATION MEASURES				
The time in which soils are exposed during construction activities must remain as short as possible.				
As small as possible area must be disturbed as possible.				
During construction, all construction materials must be kept out of the riparian or wetland zones.				
All waste and remaining building materials must be removed from site periodically during construction and on completion of the project.				
No dumping must take place in or near the construction site.				
All spills must be immediately cleaned up and treated in accordance with the spill contingency plan.				
During construction, regular checks of the riparian, wetland and coastal thicket areas must be undertaken. A clean-up operation must be implemented immediately if litter and pollution are found to be present				
All construction vehicles must be checked daily for damage and/or leaks. Repairs must be affected immediately.				
Vehicles used during the construction phase must be parked in a designated area and containers should be used to prevent any oil leaks.				
Appropriate sanitary facilities must be provided for the duration of the proposed development and all waste removed to an appropriate waste facility.				
There must be water quality monitoring of the downstream surface water and visual assessments.				
Material stockpiles must be covered with a temporary liner to prevent contamination.				
Adequate disposal and toilet facilities must be provided on site in all areas during construction. All waste and remaining building materials must be removed from site periodically during construction and on completion of the project.				
No material or waste water from the construction operations should be discharged, dumped or stored in the wetland/estuary areas.				
POST-MITIGATION				
DURATION	3	*The duration of the activity associated with the impact will last 18 months-5 years and as such is rated as Medium term*	*-8*	*1*
EXTENT	1	*The extent of the impact is rated as footprint as it only affects the area in which the proposed activity will occur*		

SEVERITY	-2	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Slightly detrimental***	***Unlikely***
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted*		
SIGNIFICANCE	**-8**	**very low negative**		
CONFIDENCE LEVEL				
Medium				

(vi) Pollution of vadose zone and regional water table / groundwater aquifer during soil excavations / construction activities

This impact is relevant to all powerline route options i.e. Option 1, 2 3a and 3b.

Pollution of the vadose and regional water table/ groundwater aquifer may result as a result of soil excavations/ construction activities. The accidental spillage of hydrocarbons from machinery used to excavate soils and other accidental spillages of oil, grease and fuel leaks could lead to contamination of the vadose zone which could percolate to the shallow aquifer.

Table 5-36: Impact ratings for pollution of the vadose and regional water table / groundwater aquifer during soil excavations / construction activities and associated infrastructure developments (e.g. pipeline, site layout)

PROJECT PHASE	*Construction Phase*			
DIRECT IMPACT	*Pollution of the vadose zone and regional water table / groundwater aquifer, as a result of excavation activities and accidental spillage of hydrocarbons and associated infrastructure developments (e.g. pipeline, site layout)*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*2*	*The duration of the activity associated with the impact will*	*-5*	*2*

		last 6-18 months and as such is rated as Short term		
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-1*	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Negligible***	***Likely***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-10***	***Very low - negative***		
PROPOSED MITIGATION MEASURES				
Only excavate areas applicable to the project area.				
Backfill the material in the same order it was excavated to reduce contamination of deeper soils with shallow oxidised soils.				
Cover excavated soils with a temporary liner to prevent contamination.				
Keep the site clean of all general and domestic wastes.				
Undertake water quality monitoring of the downstream surface water.				
Park heavy machineries in lined areas and place drip trays under vehicles at the site.				
Visual soil assessments for signs of contamination.				
POST-MITIGATION				
DURATION	2	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*-5*	*1*
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	-1	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and*	***Negligible***	***Unlikely***

		processes are minimally affected		
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted*		
SIGNIFICANCE	**-5**	**very low negative**		
CONFIDENCE LEVEL				
Medium				

(vii) Degradation of water quality of non-perennial and perennial river systems situated downstream of the site

This impact is relevant to all powerline route options i.e. Option 1, 2 3a and 3b.

Degradation of water quality of non-perennial and perennial river systems situated downstream of the site is likely to occur if equipment and vehicles are washed in the water bodies, and if material stockpiles are placed on the banks of the river and streams which occur in the project area. Erosion of stockpiles may occur during wet seasons, leading to siltation of the water bodies (overland runoff).

Table 5-37: Impact ratings for degradation of non-perennial and perennial river systems situated downstream of the site

PROJECT PHASE	*Construction Phase*			
DIRECT IMPACT	*Degradation of water quality of non-perennial and perennial river systems situated downstream of the site, as a result of construction activities and associated infrastructure developments (e.g. pipeline, site layout)*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*2*	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*-5*	*2*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		

SEVERITY	*-1*	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Negligible***	***Likely***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-10***	***Very low - negative***		
PROPOSED MITIGATION MEASURES				
Undertake water quality monitoring and visual assessments.				
Install a temporary cut off trench to contain poor quality runoff.				
Undertake routine inspections of all sewer related infrastructure.				
Cover material stockpiles with a temporary liner to prevent contamination of downstream water resources.				
POST-MITIGATION				
DURATION	2	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*-5*	*1*
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	-1	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Negligible***	***Unlikely***
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted*		
SIGNIFICANCE	**-5**	**very low negative**		
CONFIDENCE LEVEL				
Medium				

(viii) Increased potential for soil erosion caused by vegetation clearance and increased surface water runoff

This impact is relevant to all powerline route options i.e. Option 1, 2 3a and 3b.

The movement of construction vehicles and machinery may cause soil compaction. During storm events, less rainfall will infiltrate into the soil and the construction site will generate increased surface runoff thereby increasing the erosive potential of the soil. During the construction phase, the digging of trenches for the proposed pylons may result in the destabilisation of the natural soils and removal of vegetation cover in the study site. This may make soils prone to erosion.

Table 5-38: Impact ratings for increased potential for soil erosion caused by vegetation clearance and increased surface water runoff

PROJECT PHASE	*Construction Phase*			
DIRECT IMPACT	*Increased potential for soil erosion, caused by removal of vegetation during construction and associated infrastructure developments (e.g. pipeline, site layout)*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-14*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-2*	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Moderately Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-42***	***Moderate - negative***		

PROPOSED MITIGATION MEASURES
The construction of the proposed infrastructure should ensure that the footprint is minimised to reduce damage to soils and vegetation which could affect drainage patterns on site and lead to increased erosion.
Stormwater management for the powerline should ensure that towers, particularly any non-standard towers are located on flat terrain with firm foundations. Potential runoff should be diverted away from any foundation footings, preferably by the placement of berms and energy-dissipating structures that reduce the potential for concentrated flow and soil erosion.
No construction can be undertaken until a Water Use License is granted by the Department of Water and Sanitation (DWS), for construction within 500m of a watercourse.
During construction, excavated material should be stockpiled in a manner that prevents runoff into open trenches. Care should be taken to limit any construction footprint, to reduce soil compaction and to avoid concentrating runoff in a manner that might cause soil erosion.
The construction of the proposed infrastructure should ensure that the construction footprint is kept as small as possible to reduce destabilisation of soils and effects on natural drainage patterns that could lead to increased risks of soil erosion.
One defined access route for construction vehicles is normally recommended, to prevent multiple wheels-track and ruts that could concentrate runoff
All areas susceptible to erosion must be protected and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction camp and work areas.
Site management plans should also include measures to rehabilitate soils and vegetation after the construction of the proposed infrastructure.
Surface water or stormwater must not be allowed to concentrate, or flow down cut or fill slopes without erosion protection measures being in place.
The footprint of access routes for construction vehicles should be kept minimal as far as possible to reduce the degree of soil compaction.
Existing road stormwater drains should be protected and maintained as far as possible during the construction phase of the project.
Foundations of towers should be bermed to prevent erosion of footings, but with wide energy dissipating features that reduce erosion potential in surrounding areas.
Erosion protection measures should be implemented to reduce flow velocities at outlet points.
Runoff water should be spread over vegetated surfaces to promote stormwater infiltration.
The construction camp and footprint of the pylons should be rehabilitated to ensure the slopes and vegetation cover resembles the pre-development state. This will ensure that the area has naturalised runoff patterns.
The impact may be reduced if construction takes place in the winter months or outside of the rainy season.
At watercourse crossings, sewer line manholes should be located outside of the 1:100-yr flood lines and crossings should be designed to safely route the pipeline under or over flood-line.
The sewer line should be deep enough to prevent any risk of buoyancy and it should be casted in concrete where it crosses the 1: 100 year flood line to prevent any damage to the flood line.
Pipeline trench sides should be sloped or shored to prevent potential collapse during rain events.
POST-MITIGATION

DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-7*	*2*
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	-1	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Slightly detrimental***	***Likely***
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted*		
SIGNIFICANCE	**-14**	**very low negative**		
CONFIDENCE LEVEL				
Medium				

(ix) Altered hydrology, erosion and / or sediment regime as a result of construction of Option 1 powerline route

It is important to note that this impact will only apply to the development of powerline route Option 1.

During the construction phase in which the pylons will be installed, minor earthworks will take place in order to create a foundation for the pylons. Vegetation will be cleared for the footprint of the pylons. Erosion and sedimentation activities may become more prominent due to the presence of exposed bare surface, which may lead to altered hydrology, erosion and sediment as a result of construction activities.

Table 5-39: Impact ratings for altered hydrology, erosion and / or sediment regime as a result of construction of Option 1 powerline route and associated infrastructure developments (e.g. pipeline, site layout)

PROJECT PHASE	*Construction Phase*
DIRECT IMPACT	*Altered hydrology, erosion, and/sediment regime as a result of construction of Option 1 Powerline route alignment and associated infrastructure developments (e.g. pipeline, site layout)*
INDIRECT IMPACT	--

CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*2*	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*-10*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-2*	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Slightly detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-30***	***Low - negative***		
PROPOSED MITIGATION MEASURES				

The following best practice environmental design considerations should be incorporated into the design of the proposed sewer pipeline and pump station(s) wherever practically possible (Eco-Pulse, 2019):

- *When sewer pipelines cross wetlands/rivers, the general aim would be to align these with existing areas of vegetation/habitat disturbance such as those linked with cultivation and existing road crossings, for example.*
- *Pipelines must intercept all watercourses at right angles (i.e. perpendicular to the general direction of flow through the crossed wetland). Pipeline trenches and sandy bedding material can produce preferential flow paths for water across wetlands that can potentially drain wetland areas. In crossing wetlands perpendicular to the general direction of flows instead of at an angle, the risk is reduced.*
- *Where coarse bedding material is to be used for the pipeline (i.e. such as river sand), it is recommended that clay plugs be at regular (10-20m) intervals within the bedding along the pipeline to reduce preferential water flow along the pipeline length via bedding material where pipelines cross wetlands with saturated soils.*

- *Pipelines crossing wetlands should be concealed at a sufficient depth below ground level in order to ensure that the pipelines do not interfere with surface water movement or create obstructions where flows can cause erosion to commence.*
- *For channelled watercourses (rivers, streams and channelled valley bottom wetlands), the pipeline should be constructed in such a way taking into consideration probable future channel dynamics. Where practically possible, larger stream/river channel crossings are to follow pipe bridges over the river. The pipe bridges will need to be created allowing for pipes to be suspended sufficiently high above the channel bed and above the high water mark in order to prevent interference with natural flow regimes and in order to prevent pipes from acting as traps for debris and sediment transported through the channel. Piers are to be placed on opposite sides of the watercourse for smaller rivers/streams and not to be placed within the channel bed. Piers should be placed a sufficient distance up the bank (preferably on the top of the upper bank) and not below the water mark/bank full level.*

Where needed, construct any necessary erosion protection mechanisms where the pipeline intersects the macro-channel banks of rivers /streams allowing for prevention of scouring or outer-bank erosion. Protection mechanisms to be considered may include gabions, reno-mattresses or other stabilising structures to armour them. It is important to take into consideration that the outside bends of channels are particularly vulnerable to erosion/ bank collapse and should preferably be avoided when detailed crossing positions are fixed.

Sedimentation and erosion control measures must be implemented to prevent slope destabilisation and increased sediment loads entering freshwater systems. Exposed slopes are highly prone to erosion, so drainage control features such as earth dikes, perimeter dikes/swales, and diversions can be used to intercept and convey runoff from above disturbed areas to suitable dispersal areas or drainage systems. This helps to reduce the sedimentation from exposed areas. Sediment traps can be utilised to detain sediments in stormwater runoff to protect receiving water bodies, and the surrounding area. Silt fences cab be used by entrenching them into the ground and stretched between anchoring posts spaced at regular intervals along the lower side of a site. Sediment is filtered out as runoff flows through the fabric. Such fences should be used only where there is sheet. Gullies and other areas of active erosion should be stabilised (using catch water drains, raising headwalls or providing protective measures including grassing, stone pitching, or gabions/ mattresses) and rehabilitated to minimise sediment entering the aquatic resource from these sources.

Soil required for construction purposes must not be derived from the wetlands or rivers/streams. Only approved borrow areas are to be used under the supervision of the ECO. Any soil removed from wetlands should be stockpiled and used in rehabilitation. Soil stockpiles must be established on flat ground at least 20m away from delineated watercourses. Erosion/sediment control measures such as silt fences, low soil berms or wooden shutter boards must be placed around the stockpiles to limit sediment runoff from stockpiles. Subsoil and topsoil is to be stockpiled separately. Stockpiled soil must be replaced in the reverse order as to which it was removed (subsoil first followed by topsoil). Stockpiles of construction materials must be clearly separated from soil stockpiles in order to limit any contamination of soils. The stockpiles may only be placed within demarcated stockpile areas, which must fall within the demarcated construction area. The contractor shall, where possible, avoid stockpiling materials in vegetated areas that will not be cleared. Stockpiles shall be located outside of freshwater habitat (including riparian zones). Stockpiled soils are to be kept free of weeds and are not to be compacted. The stockpiled soil must

be kept moist using some form of spray irrigation on a regular basis as appropriate and according to weather conditions. If soil stockpiles are to be kept for more than 3 months they must be hydro-seeded. The slope and height of stockpiles must be limited to 1.5m and are not be sloped more than 1:2 to avoid collapse.
For watercourses crossings, a maximum construction working servitude of 6m is allowed within wetland units. The watercourse crossing construction servitude must consist of the following features only: • *A maximum 3 metre wide, one-way access and haulage track / running track established across the wetland.* • *Trench corridor / working area (maximum of 1.5m).* *Erosion protection infrastructure upslope of the wetland (1.5m).*
To diminish the requirement to alter the flow of water away from the construction area when crossing watercourses, all construction activities within wet areas should preferably occur in the dry season/winter (May to September). Construction within/across watercourses should advance as quickly as practically possible in order to lessen the risk of surpassing the temporary diversion capacity. Diversions must be temporary in nature and no permanent walls, berms or dams should be installed within a watercourse. Following completion of the construction at the site, the diversions should be removed to restore natural flow patterns. Under no circumstances should the creation of a new channel be considered to divert flows away from the current river channels position. Upon completion of the construction at the site, the diversions shall be removed to restore natural flow patterns. *Options for temporary flow diversion when working within channels may include:* • *diversion of the entire watercourse through use of a bypass large diameter pipe;* • *the installation of removable coffer dams; and* • *use of removable sandbags.*
The topsoil layer must be stripped from the construction footprint and stockpiled separately from overburden (subsoil and rocky material). The thickness of the topsoil for harvesting must be obtaining from the geotechnical report and if not defined in the report, the top 30cm must be harvested. Stockpiled soil is to be kept free of weeds and not to be compacted. The slope and height of stockpiles must be limited to 2m to avoid soil compaction and destruction of soil microbes.
The focus of the rehabilitation of wetlands and watercourse is to ensure the re-establishments of what was the natural hydraulic regime as much as possible. Where the watercourse's hydraulic regime is improved, the vegetation will improve as well for the riparian habitat which can lead to the reintroduction of riparian specific species. It is, however, not possible to completely re-establish the natural hydrological regime at the catchment level as this is what is needed to improve the current state of the wetlands and watercourses. This is due to the comparatively small-scale site-specific construction at the point of the wetland and watercourse crossings. Nevertheless, the wetland areas and watercourses which are affected at the point of construction can be stabilised to make sure that the current functionality of the wetland and watercourse is not reduced, but restored. The main function of rehabilitation efforts must aim to restore the natural function and improve the aesthetic nature of the wetlands and watercourses.
To diminish the requirement to alter the flow of water away from the construction area when crossing watercourses, all construction activities within the wet areas should preferably occur in the dry season/winter (May to September). Construction within/across watercourses should advance as quickly as practically possible in order to lessen the risk of surpassing the temporary diversion capacity. No new roads should be constructed in order to gain access to pylons as this may cause a further disturbance to

the hydrological regime. In order to prevent such a disturbance, only existing roads should be utilised to gain access to the relevant sites. Agreement of temporary access and haulage roads should be upfront and occur prior to construction activities commencing.				
Pylons must be constructed out of the 1: 100 year flood line.				
Ensure that the pylon footprint does not encroach onto the wetland or its 20m buffer zones as determined by the buffer tool (including buffer zones relevant to sensitive fauna species as confirmed by a suitably qualified specialist. Buffers are to be managed as natural, with no erosion or concentrated flow paths and minimal activity to take place within buffers apart from possible recreational use / maintenance, alien plant control to take place in wetlands and buffer zones				
Avoid impacts to wetlands beyond the construction zone / footprint of the development.				
Implement effective rehabilitation to reverse construction related impacts.				
POST-MITIGATION				
DURATION	2	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*-5*	*2*
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	-1	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Negligible***	***Likely***
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted*		
SIGNIFICANCE	**-10**	**very low negative**		
CONFIDENCE LEVEL				
Medium				

(x) Reduced water quality of wetlands and watercourses, as a result of construction activities and associated infrastructure developments (e.g. pipeline, site layout)

This impact is relevant to all powerline route options i.e. Option 1, 2 3a and 3b.

Construction vehicles will be present on site, giving rise to the possibility of fuel/ chemical spills which could impact on the water quality of the downstream wetlands and watercourses.

Table 5-40: Impact ratings for reduced water quality of wetlands and watercourses, as a result of construction activities and associated infrastructure developments (e.g. pipeline, site layout)

PROJECT PHASE	*Construction Phase*			
DIRECT IMPACT	*Reduced water quality of wetlands and watercourses, as a result of construction activities and associated infrastructure developments (e.g. pipeline, site layout)*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*2*	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*-5*	*2*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-1*	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Negligible***	***Likely***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-10***	***Very low - negative***		
PROPOSED MITIGATION MEASURES				
During periods of construction, there should be minimal human disturbances by minimising activities that would lead to excessive pollution and run off into the drainage line (Kotze et al., 2008). Demarcation of no-go areas during construction is critical. The edges of the construction zone within the vicinity of the delineated wetlands and riparian habitats must be clearly demarcated by a surveyor and defined using highly visible material (e.g. danger tape) before construction commencing. Acceptable rubbish bins and waste disposal facilities on-site and at the campsite should be provided in order to prevent any littering and pollution. Litter bins must be equipped with a closing mechanism to prevent their contents from blowing out or wild animals from accessing the contents.				
During the construction phase all measures should be taken in order to prevent contamination of wetland areas by vehicles utilised. If any spills of diesel, petrol, oil, or corrosive fluid occur a spill kit should be kept				

on site to immediately address this. All vehicles and machinery should therefore be kept off site in a bunded, platform location in order to avoid such contamination in the watercourses.
All vehicles should only be allowed to stand overnight and refuelled only on impervious surfaces. An appropriate Contingency-Spill Response Plan is to be compiled and stored on site, for implementation where necessary. Contractors are to be trained in spill response and familiar with spill plan. Contact details for a reputable company to hand large spill events (e.g. SpillTech) must be included in the spill plan and must be available on hand at the site during construction and business operation. Individual operational sites/companies will need to compile their own contingency/spill plans.
No equipment laydown or storage areas must be located within 20m of any watercourse and/or within the 1:100 year flood line of the iLovu River.
The following best practice environmental design considerations should be incorporated into the design of the proposed sewer pipeline and pump station(s) wherever practically possible (Eco-Pulse, 2019): • *When burying sewer pipelines within wetlands it is necessary to ensure that they are protected in order to minimise the risk of damage or leakage into the watercourse. This means enclosing the pipe in concrete or other suitable resistant material.* • *No sewer manholes must be constructed within the flood line of major rivers or the delineated watercourses (wetlands and riparian zones of rivers).* • *All sewer manholes must be sealed to guarantee that surcharge events do not occur if there is a blockage.* *Construction of new sewer pipelines, manholes and pump stations must be constructed outside of the 1:100 year flood line of perennial rivers wherever practically possible. This does not include upgrades to existing infrastructure already located within the 1: 100yr flood line.*
As a consequence of the proposed development, the wetland system will possibly encounter anthropogenic disturbances. Therefore, in order to manage and mitigate these threats faced by the wetland a suitable buffer should be determined. Therefore, during periods of construction there should be minimal human disturbances by minimising activities that would lead to excessive pollution and run off into the drainage line (Kotze et al., 2008). The edges of the construction zone within the vicinity of the delineated wetlands and riparian habitats must be clearly demarcated by a surveyor and defined using highly visible material (e.g. danger tape) before construction commencing. Acceptable rubbish bins and waste disposal facilities on-site and at the campsite should be provided in order to prevent any littering and pollution. Litter bins must be equipped with a closing mechanism to prevent their contents from blowing out or wild animals from accessing the contents.
An appropriate Contingency-Spill Response Plan is to be compiled and stored on site, for implementation where necessary. Contractors are to be trained in spill response and familiar with spill plan. Contact details for a reputable company to hand large spill events (e.g. SpillTech) must be included in the spill plan and must be available on hand at the site during construction and business operation. Individual operational sites/companies will need to compile their own contingency/spill plans.
As a consequence of the proposed development, the wetland system will possibly encounter anthropogenic disturbances. Therefore, in order to manage and mitigate these threats faced by the wetland a suitable buffer should be determined. Therefore, during periods of construction there should be minimal human disturbances by minimising activities that would lead to excessive pollution and run off into the drainage line (Kotze et al., 2008). The edges of the construction zone within the vicinity of the delineated wetlands and riparian habitats must be clearly demarcated by a surveyor and defined using highly visible material

(e.g. danger tape) before construction commencing. Acceptable rubbish bins and waste disposal facilities on-site and at the campsite should be provided in order to prevent any littering and pollution. Litter bins must be equipped with a closing mechanism to prevent their contents from blowing out or wild animals from accessing the contents.				
POST-MITIGATION				
DURATION	2	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*-5*	*1*
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	-1	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Negligible***	***Unlikely***
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted*		
SIGNIFICANCE	**-5**	**very low negative**		
CONFIDENCE LEVEL				
Medium				

(xi) Altered ecological processes and biodiversity of wetland habitat as a result of increased spread of invasive alien plants

This impact is relevant to all powerline route options i.e. Option 1, 2 3a and 3b.

Ecosystem services provided by the assessed wetlands are largely of low importance due to the degree of degradation and loss of wetland functioning as a consequence of wetland transformation by agriculture. The most prominent ecosystem services provided by wetlands assessed along the powerline route included the provision of cultivated foods as most of these wetlands were utilised for sugarcane cultivation. The activity of constructing and installing the powerlines poses and overall low risk to the receiving environment as small portions of vegetation will be removed.

Table 5-41: Impact ratings for altered ecological processes and biodiversity of wetland habitat as a result of increased spread of invasive alien plants and associated infrastructure developments (e.g. pipeline, site layout)

PROJECT PHASE	*Construction Phase*			
DIRECT IMPACT	*Altered ecological processes and biodiversity of wetland habitat as a result of increased spread of invasive alien plant activities and associated infrastructure developments (e.g. pipeline, site layout)*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*2*	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*-5*	*2*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-1*	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Negligible***	***Likely***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-10***	***Very low - negative***		
PROPOSED MITIGATION MEASURES				
Minimal activity is to take place within wetland and 20m buffers apart from possible alien plant control to take place in wetlands and buffer zones.				
Clearing activities must only be undertaken during agreed working times and permitted weather conditions. If heavy rains are expected, clearing activities should be put on hold. In this regard, the contractor must be aware of weather forecasts.				
No clearing of indigenous vegetation outside of the defined working servitudes is permitted for any reason (i.e. for firewood or medicinal use). No persons may remove, damage, deface, paint or disturb of any flora (plants) outside of the demarcated construction areas, unless specifically authorised by the ECO in consultation with the resident engineer. Any indigenous vegetation suitable for rehabilitation should be stored appropriately for later use. Indigenous wetland vegetation removed from the road/pipeline crossing				

footprint and suitable for rehabilitation activities must be carefully removed and stored in an appropriate facility for rehabilitation purposes.				
Implement effective rehabilitation to reverse construction related impacts.				
Following the completion of construction, a mixture of indigenous species should be introduced. The re-establishment of vegetation will enhance these systems' capability to maintain biodiversity.				
When re-vegetation activities are taking place, the following should be adhered to: • *In areas where sugarcane cultivation is to be continued, sugarcane must be planted immediately following reshaping of the wetland surface.* • *In areas where sugarcane cultivation is to be discontinued temporarily or permanently, a mixture of rapid-colonising grasses (such as Cynodon dactylon or Stenotaphrum secundatum) must be planted immediately following reshaping of the wetland surface to bind the soils and prevent erosion. Hydroseeding or broad casting of seed by hand is recommended.* • *The target groundcover of re-vegetated areas shall be no less than 80% of specified vegetation and there must be no bare patches of more than 500 x 500 mm in maximum dimension.* • *No exotic/alien plants are to be used in hydroseeding (e.g. Kikuyu grass, Pennisetum clandestinum, is not recommended).* • *The quantity of seed used will depend on the slope, with a steeper slope requiring a heavier application of seed. For slopes >15º: 25-50 kg/ha, slopes <15º: 15-25 kg/ha.* • *Also, recommend that indigenous wetland species (sedges, bulrushes and reeds) are to be rescued prior to construction and stockpiled and then used in revegetation, supplemented by seeding of disturbed areas.*				
Install protective works (e.g. gabions, reno-mattresses) to stabilise and protect unstable banks immediately upstream and downstream of the pipeline crossing prior to commencing construction.				
No clearing of indigenous vegetation outside of the defined working servitudes is permitted for any reason (i.e. for firewood or medicinal use). No persons may remove, damage, deface, paint or disturb of any flora (plants) outside of the demarcated construction areas, unless specifically authorised by the ECO in consultation with the resident engineer. Any indigenous vegetation suitable for rehabilitation should be stored appropriately for later use. Indigenous wetland vegetation removed from the road/pipeline crossing footprint and suitable for rehabilitation activities must be carefully removed and stored in an appropriate facility for rehabilitation purposes.				
Prior to the stripping, infilling, excavation and re-shaping of any wetland/aquatic habitat within the development footprint/corridor, a search and rescue of indigenous vegetation must be undertaken prior to habitat destruction for use in rehabilitation. Arrangements must be made to store and/or relocate the relevant species into suitable onsite or offsite habitats or in a temporary nursery/storage area. This process should be led by the appointed ECO.				
POST-MITIGATION				
DURATION	2	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*-5*	*1*
EXTENT	3	*The extent of the impact is rated as Local as it affects the*		

		development area and adjacent properties		
SEVERITY	-1	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Negligible***	***Unlikely***
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted*		
SIGNIFICANCE	**-5**	**very low negative**		
CONFIDENCE LEVEL				
Medium				

(xii) Impact on heritage and cultural resources as a result of construction activities and associated infrastructure developments (e.g. pipeline, site layout)

The proposed Option 1 powerline route did not yield any verifiable archaeological sites or material. The affected landscape is heavily degraded from previous and current agricultural land use. This limited the chances of encountering significant *in situ* archaeological sites. There are residential, commercial cane fields, grazing land, bulk water pipelines and pipelines, farm roads and other associated infrastructures across the entire project area. The chances of recovering significant archaeological materials were seriously compromised and limited due to destructive land use patterns such as deep ploughing for sugar cane and infrastructure such as bulk water pipelines, road works and drainage lines that already exist on the project area.

The Heritage Impact Assessment revealed that the receiving environment for the proposed powerline development has low to medium potential to yield previously unidentified archaeological sites during subsurface excavations and construction work associated with the proposed development.

The study did not record any buildings or structures older than 60 years along the proposed powerline route alignment. The field survey did not record any graves or burial grounds along the proposed Alternative 1 powerline route alignment.

The proposed sewer line route runs in the vicinity historical buildings and steel bridge which are currently being renovated. The study confirmed that none of these historical structures and buildings will be affected by the proposed sewer line route. The proposed sewer line route runs in the vicinity of a previously recorded cemetery. The proposed sewer line route will not affect the cemetery in any way.

Table 5-42: Impact ratings for Impact on heritage and archaeological resources

PROJECT PHASE	*Construction Phase*			
DIRECT IMPACT	*Impact on heritage and archaeological resources as a result of construction activities*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*2*	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*-3*	*1*
EXTENT	*1*	*The extent of the impact is rated as site as it will affect only the development area*		
SEVERITY	*-1*	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected.*	***Negligible***	***Unlikely***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-3***	***very low negative***		
PROPOSED MITIGATION MEASURES				
Powerline alternative 1 is the preferred option recommended by the heritage specialist.				
The chance finds process must be implemented when necessary especially when archaeological materials and burials are encountered during subsurface construction activities.				
If archaeological materials are uncovered, work should cease immediately and the Amafa aKwaZulu Natali be notified and activity should not resume until appropriate management provisions are in place.				
If during the construction or operations phases of this project, any person employed by the developer, one of its subsidiaries, contractors and subcontractors, or service provider, finds any artefacts of cultural significance, work must cease at the site of the find and this person must report this find to their immediate supervisor, and through their supervisor to the senior on-site manager.				
The site manager must then make an initial assessment of the extent of the find, and confirm the extent of the work stoppage in that area before informing Amafa aKwaZulu Natali				

If a human grave/burial is encountered, the remains must be left as undisturbed as possible before the local police and Amafa aKwaZulu Natali are informed. If the burial is deemed to be over 60 years old and no foul play is suspected, an emergency rescue permit may be issued by Amafa aKwaZulu Natali for an archaeologist to exhume the remains.				
POST-MITIGATION				
DURATION	1	*The duration of the activity associated with the impact will last 0-6 months and as such is rated as Temporary*	*0*	*1*
EXTENT	1	*The extent of the impact is rated as footprint as it only affects the area in which the proposed activity will occur*		
SEVERITY	0	*Negligible*	***Negligible***	***Unlikely***
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**0**	**very low negative**		
CONFIDENCE LEVEL				
Medium				

(xiii) Impact on sensitive visual receptors in the vicinity of the proposed powerline route and associated infrastructure developments (e.g. pipeline, site layout)

There are several local areas of concern with Option 1. These areas of concern are predominantly residential zones, along Draeger Crescent, where the powerlines extend in close proximity and where views of the majority of the pylons exist. South Illovo residents and businesses in the area of Draeger Crescent will have views that are significantly impacted by Option 1.

Option 1 extends within 300 m of the Nelson Close residents, likely causing slight visual impacts on the residents. The pylons and powerlines are likely to be visible above the skyline for a portion of the view from the receiving environment before dropping below the horizon. Once the pylons are below the horizon, their visual impact is significantly reduced due to the mottled and fragmented backdrop.

The pylons of Option 1 are located at least 100 m from any of the residents on Draeger Crescent and Poss Road, reducing their visual impact slightly. However, the powerlines may still be visible across the horizon for some residents of Draeger Crescent and Poss Road.

Table 5-43: Impact ratings for visual impact on sensitive receptors along Option 1 Powerline route alignment

PROJECT PHASE	*Construction Phase*			
DIRECT IMPACT	--			
INDIRECT IMPACT	*Impact on sensitive visual receptors in the vicinity of the proposed Option 1 powerline route alignment and associated infrastructure developments (e.g. pipeline, site layout)*			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-21*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-3*	*The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected*	***Highly detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-63***	***High negative***		
PROPOSED MITIGATION MEASURES				
The height of the powerlines must be lowered as much as possible in the vicinity of Draeger Street, in order to bring the lines below the tree line, which lies between these residents and the proposed routes. This may be achievable through the use of the non-standard pylons to be situated in this section of the route i.e. Draeger Street, and if placed appropriately may allow the powerlines to be at a suitable height whilst passing in front of the affected homes and businesses.				

Encourage the growth of vegetation along the south-west boundary of the Mother of Peace Orphanage. Ensure that multiple indigenous plants of form and height (shrubs and trees) are planted.				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-14*	*2*
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	-1	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Moderately Detrimental***	***Likely***
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-14**	**Very low negative**		
CONFIDENCE LEVEL				
Medium				

(xiv) Increase in ambient noise levels on surrounding land owners

Noise may result from the movement of vehicles, trucks and other associated machinery used during the construction phase. The sensitive noise receptors are the residents of Loss Road, Nelson Road and Draegar Crescent and the Illovo Industrial area. However, the noise associated with construction activities will be of short term nature, localised and will only last during the construction phase of the project.

Table 5-44: Impact ratings for nuisance noise on the surrounding community as a result of increased noise generation due to construction activities and the movement of construction vehicles

IMPACT OF NOISE ON SURROUNDING COMMUNITIES	
PROJECT PHASE	*Construction Phase*
DIRECT IMPACT	*Increased noise generation due to construction activities and the movement of construction vehicles and associated infrastructure developments (e.g. pipeline, site layout)*

INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*2*	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*-10*	*2*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-2*	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Slightly Detrimental***	***Likely***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-20***	***low negative***		
PROPOSED MITIGATION MEASURES				
Where reasonable and feasible, the proponent must apply best practice noise mitigation measures including: • *Orienting equipment away from noise sensitive receptors*				
As far as reasonably practicable, sources of significant noise should be enclosed. The extent to which this can be done depends on the nature of the machines to be enclosed and their ventilations requirements.				
Minimise reversing of equipment to prevent nuisance caused by reversing alarms.				
Driver practices when approaching and leaving the site should minimise noise emissions created through activities such as unnecessary acceleration and breaking squeal, especially on the access road to the construction site.				
Site inductions should cover the importance of noise control and available noise reduction measures.				
Contractors should be required to use equipment that is in good working order and that meets current best practice noise emission levels. This should be achieved by making it a component of contractual agreements with the construction contracts.				
The use of noise-producing signals, including horns, whistles, alarms, and bells shall be for safety warning purposes only.				

The on-site construction supervisor shall have the responsibility and authority to receive and resolve noise complaints. A clear appeal process to the Owner shall be established prior to construction commencement that will allow for resolution of noise problems that cannot be immediately solved by the site supervisor.				
Stockpile areas will be decided and approved by the Project Manager and appointed ECO before construction commences on site.				
Construction vehicles, plant and machinery maintained and fitted with silencers.				
Regular maintenance on vehicle and equipment to be done.				
POST-MITIGATION				
DURATION	2	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*-4*	*1*
EXTENT	2	*The extent of the impact is rated as site as it will affect only the development area*		
SEVERITY	-1	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Negligible***	***Unlikely***
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-4**	**very low negative**		
CONFIDENCE LEVEL				
Medium				

(xv) Increase in ambient dust levels and air emissions, as a result of construction activities and associated infrastructure developments (e.g. pipeline, site layout)

The sensitive receptors adjacent to the construction areas (such as Illovo Industrial area, residents of Astra Park, Nelson Close and Poss Road) where trenching and installation of the proposed powerline will occur, may be impacted by dust entrainment caused by excavations of trenches and construction activities. The ambient air quality may be deteriorated by exhaust fumes generated by the increased vehicular movement.

Table 5-45: Impact ratings for increase in ambient dust levels and air emissions, due to construction activities

INCREASE IN AMBIENT DUST LEVELS AND AIR EMISSIONS	
PROJECT PHASE	*Construction Phase*
DIRECT IMPACT	*Increase in ambient dust levels and air emissions, due to construction activities and associated infrastructure developments (e.g. pipeline, site layout)*

INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*2*	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*-10*	*2*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-2*	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Slightly detrimental***	***Likely***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-20***	***low negative***		
PROPOSED MITIGATION MEASURES				
A comments and complaints register, accessible to members of public, should be implemented and maintained. Such a register would provide a formal framework within which to record any comments and complaints received, as well as to identify and action appropriate mitigation and/or remediation measures. The register should also include a means of recording and communicating the close-out of issues.				
The need for dust containment should be assessed on a daily basis to avoid unnecessary wastage of non-potable water used in dust suppression. Site runoff of water or mud should be avoided.				
Bonfires and burning of waste materials must be prohibited.				
Cover should ideally be removed in small areas during work and not all at once.				
Stockpile surface areas to be minimised to reduce area of surfaces exposed to wind pick-up.				
Where appropriate, windbreak netting/screening can be positioned around material stockpiles, as well as exposed excavation and material handling operations, to provide a physical barrier between the works and the surroundings. *Where practicable, stockpiles of soils and materials should be located as far as possible from sensitive properties, taking account of prevailing wind directions and seasonal variations in the prevailing wind.*				
During dry or windy weather, material stockpiles and exposed surfaces could be dampened down using a water spray to minimise the potential for wind pick-up. Re-vegetate earthworks and exposed areas/soil				

stockpiles to stabilise surfaces as soon as practicable. Where it is not possible to re-vegetate or cover with topsoil, the use of hessian, mulches or tackifiers (soil binding agents) should be considered.				
POST-MITIGATION				
DURATION	2	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*-4*	*1*
EXTENT	2	*The extent of the impact is rated as site as it will affect only the development area*		
SEVERITY	-1	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Negligible***	***Unlikely***
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-4**	**very low negative**		
CONFIDENCE LEVEL				
Medium				

(xvi) Increased traffic congestion on surrounding road network, as a result of construction activities and associated infrastructure developments (e.g. pipeline, site layout)

Due to construction activities for excavation of trenches for the foundations of the pylons and the powerline installation, the traffic patterns of the affected roads (R102, N2, P197, P578 and R603) and surrounding roads network may be affected, with increased traffic congestion.

Table 5-46: Impact ratings for traffic congestion on the surrounding road network

IMPACT OF TRAFFIC ON SURROUNDING ROAD NETWORK				
PROJECT PHASE	*Construction Phase*			
DIRECT IMPACT	*Increased traffic caused by construction of the proposed powerline the movement of construction vehicles and associated infrastructure developments (e.g. pipeline, site layout)*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				

DURATION	*2*	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*-10*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties.*		
SEVERITY	*-2*	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Slightly Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-30***	***low negative***		
PROPOSED MITIGATION MEASURES				
Avoid movement of construction vehicles and machinery on main access roads during peak times (7:00 – 9:00) & (16:00 – 18:00).				
If the above is unavoidable – implement traffic control measures such as points men at the intersections.				
Timing of any large-scale vehicle movements to avoid peak hours on the local road network would also be beneficial.				
A Traffic Management Plan must be compiled by a Traffic Engineer for approval by eThekwini Transport Authority (eTA) prior to construction.				
Flagsmen must be on duty to direct traffic flow during congestion and warn motorists of the approaching construction zones.				
For powerline construction, access to the residential properties needs to be maintained at all times.				
POST-MITIGATION				
DURATION	2	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*-5*	*2*
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties.*		
SEVERITY	-1	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Negligible***	***Likely***

IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-10**	**very low negative**		
CONFIDENCE LEVEL				
Medium				

(xvii) Skills transfer and capacitating of local communities during construction

The construction phase will require skilled and unskilled labour. The project will however be used from the start to train people and transfer skills as far as possible. The tender specifications for any construction work on the project will include a compulsory utilisation of a certain percentage of local labour and the compulsory training of local labour.

Other employment opportunities for the duration of the construction period of the specific element of the project will include:

- Erection of shade cloth at the construction sites;
- Excavation of trenches;
- Flags men duties for traffic control; and
- Fencing of construction sites.

Due to the high percentage of unemployment in the area, sufficient unskilled labour is available for the project, as the potential labour force resides in close proximity of the development site.

Table 5-47: Impact ratings for Skills transfer to local employees and capacitating of local communities during construction

PROJECT PHASE	*Construction Phase*			
DIRECT IMPACT	*Skills transfer and capacitating of local communities during construction*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*2*	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*10*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		

SEVERITY	*2*	*The severity of the impact is rated as Moderate positive as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are positively affected*	***Slightly Beneficial***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	***14***	***very low positive***		
PROPOSED MITIGATION MEASURES				
In liaison with the eThekwini Municipality's Extended Public Works Programme, recruit local residents to supply unskilled labour during the construction phase;				
Stakeholders (Appointed Contractor and the Municipality) should be mutually accountable for increased opportunities regarding skills and competency development (general education and technical training);				
Training should be concentrated on skills that can be readily transferred to other employment opportunities;				
Ensure that the employment and training of Historically Disadvantages Individuals (HDI's) from the local communities and women are implemented.				
POST-MITIGATION				
DURATION	2	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*15*	*3*
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	3	*The severity of the impact is rated as High positive as the natural, cultural or social functions and processes are altered to the extent that valued, important, sensitive or vulnerable systems or communities are substantially positively affected.*	***Moderately Beneficial***	***Definite***

IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**45**	**Moderately positive**		
CONFIDENCE LEVEL				
Low				

(c) **Operational Phase**

(i) Increased potential for electrocution of birds as a result of the presence of powerlines

This impact is also relevant for Option 2, 3a and 3b.

Electrocutions of birds may happen in two ways: (1) phase-to-phase electrocution by bridging the air gap between two live conductors, and (2) phase-to-earth electrocution by contact between a live conductor and earth device (pylon or pole), especially when the feathers are wet (Bevanger, 1998). A number of factors determine the likelihood of electrocutions including landscape features such as vegetation and topography, weather conditions, size of the bird, behaviour of the bird, and structure and dimensions of the pylon (Smallie et al., 2009). Most bird electrocutions occur on lower voltage electricity pylons, where the gaps between conductors are small, and which are attractive perching and nesting alternatives to trees in otherwise open, flat areas. More electrocutions occur in rainy and/or misty weather conditions. Bird species that are prone to electrocution are larger perching species such as birds of prey (including vultures, medium and large bodied raptors, and smaller raptors such as falcon), storks and herons.

Table 5-48: Impact ratings for increased potential for electrocution of birds as a result of the presence of the powerlines

PROJECT PHASE	*Operational Phase*			
DIRECT IMPACT	*Increased potential for electrocution of birds, as a result of the presence of powerlines*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-21*	*2*

EXTENT	*2*	*The extent of the impact is rated as site as it will affect only the development area*		
SEVERITY	*-3*	*The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected*	***Moderately Detrimental***	***Likely***
IMPACT ON IRREPLACEABLE RESOURCES	*1*	*Irreplaceable resources will be impacted*		
SIGNIFICANCE	**-42**	**Moderate - negative**		
PROPOSED MITIGATION MEASURES				
Implement Powerline Alternative 1 as the recommended option from the specialist				
To avoid electrocution by large species, the vertical phase-earth clearance should be greater than 1.8m.				
All jumpers at transformers, T-offs and strain structures must be insulated.				
Only pole structures that are approved as bird friendly by Eskom's Proactive Bird Mortality Mitigation Strategy should be used				
Anti-perching devices must be used at the sub-station and on pylons to deter birds from perching and nesting.				
During operation, the sub-station must be monitored for electrocution occurrences and should this pose a problem then site-specific mitigation must be applied in consultation with the Endangered Wildlife Trust (EWT) / Eskom Partnership.				
POST-MITIGATION				
DURATION	1	*The duration of the activity associated with the impact will last 0-6 months and as such is rated as Temporary*	*-3*	*1*
EXTENT	1	*The extent of the impact is rated as footprint as it only affects the area where the proposed development will occur*		

SEVERITY	-1	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Negligible***	***Unlikely***
IMPACT ON IRREPLACEABLE RESOURCES	1	*Irreplaceable resources will be impacted*		
SIGNIFICANCE	**-3**	**Very low - negative**		
CONFIDENCE LEVEL				
Medium				

(ii) Increased potential for collision of birds, as a result of the presence of powerlines

Collisions are the leading threat to birds caused by electrical infrastructure both globally and in southern Africa (Bevanger, 1994; van Rooyen, 2004). The likelihood of collisions with powerlines is determined by factors such as bird flight path/height, bird ocular structure and acuity, bird morphology, acquired knowledge of existing structures, bird behaviours, landscape topography, vegetation and weather conditions (APLIC, 1994; Bevanger, 1994; Hunting 2002; Jenkins et al., 2010). Generally, bird species that are at risk include: large flocking species that commute at low altitudes; large, heavy bodied, less manoeuvrable species with low ocular acuity; individuals that have no acquired knowledge of existing infrastructure such as juveniles of migratory species, and individuals engaging in behaviours such as aerial displays, hunting chases, and flight at night, dusk or dawn. Such species include waterfowl such as ducks, geese, pelicans, flamingos, large herons and waders; gamebirds and rails; cranes and bustards; pigeons; various smaller bodied passerines, and high-speed predators such as falcons.

Collisions are most prevalent in open, flat areas dominated by grassland and wetlands. More collisions occur in rainy and/or misty weather conditions as well as strong winds. However in any landscape, a basic factor for survival requires birds to make regular and direct flights between resource points. In the case of the study area, water birds flying between waterbodies are at risk of collision with powerlines as they are generally large bodied, flocking species with low manoeuvrability, low ocular acuity and tend to fly at powerline height (APLIC, 1994).

In the study area, for both the preferred (Option 1) and alternative routes (Option 2, 3a and 3b), the area of highest sensitivity i.e. where birds will be most susceptible to collision, is at the crossing of the iLovu River floodplain. For both the preferred and alternatives, the impacts in this regard are considered equal and can be mitigated using the same methods.

Table 5-49: Impact ratings for increased potential for collision by birds, as a result of the presence of the powerlines

PROJECT PHASE	*Operational Phase*			
DIRECT IMPACT	*Increased potential for collision of birds, as a result of presence of the powerlines*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-21*	*3*
EXTENT	*2*	*The extent of the impact is rated as site as it will affect only the development area*		
SEVERITY	*-3*	*The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected*	***Highly Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*1*	*Irreplaceable resources will be impacted*		
SIGNIFICANCE	**-63**	**High - negative**		
PROPOSED MITIGATION MEASURES				
The preferred powerline route (Option 1) is recommended over the alternative routes.				
Lines must be routed alongside existing roads and tracks as far as possible.				
The use of anti-collision devices and flight diverters plays an integral role in mitigating the impacts of powerlines on avifauna. It has been found that the majority of collisions happen with the thinner earth wires as they are less visible than the conductors. Lines traversing open areas and sensitive habitats such as the iLovu River floodplain must be marked with anti-collision devices. Due to the fact that the proposed routes do not follow any existing powerline servitudes and they will pose as a new route in the landscape, it is recommended that the entire route be fitted with flight diverters. Bird flight diverters on the earth wires must be installed as per specifications devised by the EWT / Eskom.				

POST-MITIGATION				
DURATION	1	*The duration of the activity associated with the impact will last 0-6 months and as such is rated as Temporary*	*-3*	*1*
EXTENT	1	*The extent of the impact is rated as footprint as it only affects the area where the proposed development will occur*		
SEVERITY	-1	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Negligible***	***Unlikely***
IMPACT ON IRREPLACEABLE RESOURCES	1	*Irreplaceable resources will be impacted*		
SIGNIFICANCE	**-3**	**Very low - negative**		
CONFIDENCE LEVEL				
Medium				

(iii) Altered hydrological processes, erosion and/or sediment regime of the nearby wetlands, as a result of maintenance activities

The operational phase of the proposed powerlines is assumed to pose a low risk to the remaining wetlands due to occasional maintenance required for the pylons and powerlines once installed. The development of new roads to access the maintenance areas may lead to undue erosion and sedimentation, thereby altering the hydrological processes and sediment regime of the nearby wetlands.

Table 5-50: Impact ratings for altered hydrological processes, erosion and/sediment regime as a result of maintenance activities

PROJECT PHASE	*Operational Phase*			
DIRECT IMPACT	*Altered hydrological processes, erosion and/sediment regime of the nearby wetlands, as a result of maintenance activities*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**

PRE-MITIGATION				
DURATION	*1*	*The duration of the activity associated with the impact will last 0-6 months and as such is rated as Temporary*	*-6*	*3*
EXTENT	*2*	*The extent of the impact is rated as site as it will affect only the development area*		
SEVERITY	*-2*	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Negligible***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-18**	**Very low - negative**		
PROPOSED MITIGATION MEASURES				
Soil rehabilitation should be conducted after the placement of the sewer line and power pylons to ensure that soils recover to a condition that is close to their natural state.				
Maintenance of pylons must be carried out as sensitively as possible to avoid negative impacts to the environment during access and repairs. Maintenance tracks and routes need to be formalised to avoid wetlands. No new access roads should be created, only existing roads should be utilised for maintenance purposes.				
POST-MITIGATION				
DURATION	1	*The duration of the activity associated with the impact will last 0-6 months and as such is rated as Temporary*	*-3*	*1*
EXTENT	2	*The extent of the impact is rated as site as it will affect only the development area*		
SEVERITY	-1	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Negligible***	***Unlikely***

IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-6**	**Very low - negative**		
CONFIDENCE LEVEL				
Medium				

(iv) Altered ecological processes and biodiversity, as a result spread of alien invasive plant species

Following the completion of construction, there may be increased spread of alien invasive plant species within the wetland habitats, should there be improper solid waste removal and lack of rehabilitation of the construction site. Movement of people and vehicles during maintenance activities may impact negatively on the wetlands, if equipment and vehicles carrying dirt/soil containing alien invasive plant seeds make their way on site.

Infestation by alien and invasive species will lead to degradation of the surrounding natural areas and will increase the potential of spread into the greater landscape due to propagules being released into downstream watercourses by stormwater.

Table 5-51: Impact ratings for altered ecological processes and biodiversity, as a result of alien invasive plant species

PROJECT PHASE	*Operational Phase*			
DIRECT IMPACT	*Altered ecological processes and biodiversity as a result of spread of alien invasive plant species*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*1*	*The duration of the activity associated with the impact will last 0-6 months and as such is rated as Temporary*	*-6*	*3*
EXTENT	*2*	*The extent of the impact is rated as site as it will affect only the development area*		
SEVERITY	*-2*	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified*	***Negligible***	***Definite***

		way; and valued, important, sensitive or vulnerable systems or communities are negatively affected		
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-18**	**Very low - negative**		
PROPOSED MITIGATION MEASURES				
All vehicles and equipment, as well as maintenance material must be free of plant material before coming on site. Equipment and vehicles must be thoroughly cleaned prior to access to the construction site, especially close to the natural drainage lines and the iLovu River.				
The careful control of the dispersion of alien invasive vegetation within a wetland is imperative due to their degradation causing properties. The key to controlling the dispersion of alien vegetation is through early detection and removal. The removal and management of alien vegetation is essential in maintaining the ecological integrity of a wetland as well as its ability to maintain biodiversity (Richardson et al., 2007). An alien Plant Control Plan should be compiled and implemented. This includes details of removal as well as monitoring to ensure the alien plants are kept in control throughout the life of the activity.				
IAP (Invasive Alien Plant) and weed control must take place within remaining wetland habitats and 20m buffer areas on site post onsite rehabilitation in accordance with an IAP control and management programme aligned with the NEM:BA Invasive Species regulations. Initial control and follow-up maintenance to take place. Integrated control (combination of mechanical and chemical control) to be implemented, with specific controls to be tailored to the species of IAPs to be managed (e.g. Chromolaena odorata, Lantana camara, Psidium guajava, Melia azedarach, Tecoma stans). Herbicide use to be controlled and herbicides or pesticides use to be restricted within delineated wetlands/riparian areas unless herbicides are non-toxic to watercourses and authorised for use in wetlands/rivers.				
No further disturbances should be experienced by the wetland systems on site. Access should be restricted into wetland areas. Furthermore, during the operational phase, when maintaining and utilising existing roads, mitigation measures must be developed and implemented to inhibit further degradation of these wetland systems. In the event of an unexpected damage occurring this should be reported to the relevant authority immediately.				
During the operational phase, the site must be searched for alien vegetation on a regular basis and all alien seedlings and saplings removed as they become evident. This must include the immediate surroundings where natural vegetation prevails.				
POST-MITIGATION				
DURATION	1	*The duration of the activity associated with the impact will last 0-6 months and as such is rated as Temporary*	*-3*	*1*

EXTENT	2	*The extent of the impact is rated as site as it will affect only the development area*		
SEVERITY	-1	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Negligible***	***Unlikely***
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-3**	**Very low - negative**		
CONFIDENCE LEVEL				
Medium				

The following impacts may be experienced during the operational phase of the project, specifically related to the development of the sewer pipeline. These impacts form part of the core project activities, without any alternatives. Therefore, these impacts will form part of the key consequences for decision making, in addition to the alternatives (powerline, site layout and site access).

(d) **Decommissioning Phase**

The proposed 132kV transmission powerline will not be decommissioned in the future, as it will be permanent electrical infrastructure that will be owned and maintained by the eThekwini Municipality. It is also not envisaged that the sewer pipeline will be decommissioned.

5.4.2 Powerline Route Alternative Option 2

(a) **Construction Phase**

The impacts associated with Option 2 powerline route alignment are the same as those outlined for Alternative 1 powerline route (Section 5.3.1), with the slight exception of the following:

(i) Disturbance to or destruction of indigenous vegetation and faunal habitat leading to habitat degradation

Installation of some of the pylons of the alternative Option 2 will require the clearance of indigenous vegetation in certain areas. This may include the destruction of removal of coastal thicket vegetation and/or protected species. The destruction of the edge habitat of coastal bush patches can lead to habitat degradation.

Table 5-52: Disturbance to or destruction of indigenous vegetation and faunal habitat leading to habitat degradation

PROJECT PHASE	*Construction Phase*			
DIRECT IMPACT	*Removal of natural vegetation and faunal habitat and habitat degradation*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-15*	*2*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-2*	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected.*	***Moderately detrimental***	***Likely***
IMPACT ON IRREPLACEABLE RESOURCES	*1*	*Irreplaceable resources will be impacted*		
SIGNIFICANCE	***-32***	***Low- negative***		
PROPOSED MITIGATION MEASURES				
An independent Environmental Control Officer (ECO) should be appointed to oversee all construction activities.				
The preferred powerline route (Option 1) is recommended over the alternative routes.				
Clearance of indigenous woody vegetation, especially in coastal bush must be avoided where possible. Pylons must remain outside of all sensitive areas as delineated in the Ecological Assessment.				
The removal or destruction of any threatened or protected plant species will require a permit from EKZNW or DAFF. Before vegetation clearance begins a suitably qualified botanist must undertake a				

"walkthrough" of all areas during the growing season to account for any such species that may have established.				
Construction and associated activities must remain outside of any buffer specified by the wetland specialist. The position of pylons must remain outside of riparian zones and wetland buffers.				
Construction crew camps must not be located adjacent to any drainage line or wetland.				
A rubble clean-up plan must be implemented throughout the duration of the construction phase.				
The use of construction vehicles and earth-moving equipment in all steep areas must be avoided as far as possible.				
Fires must be prohibited on site.				
Following construction, all remaining areas that have been cleared of indigenous vegetation must be rehabilitated with appropriate indigenous plant species found in the area.				
POST-MITIGATION				
DURATION	2	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*-3*	*1*
EXTENT	1	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	-1	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Negligible***	***Unlikely***
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-3***	**very low negative**		
CONFIDENCE LEVEL				
High				

(ii) Impact on heritage and cultural resources as a result of construction activities and associated infrastructure developments (e.g. pipeline, site layout)

The Heritage Impact Assessment noted that there are historical buildings recorded in the project area, however the historical buildings are located more than 80m from the powerline route. The historical houses are still in use and are not going to be affected should the Alternative 2 powerline route alignment.

There is a formal cemetery and burial site recorded within the Illovo Industrial area. The proposed Alternative 2 powerline route traverses overhead the formal cemetery.

The study did not record any historical monument and memorial plaques along the proposed Alternative 2 powerline route.

Table 5-53: Impact ratings for Impact on heritage and archaeological resources

PROJECT PHASE	*Construction Phase*			
DIRECT IMPACT	*Impact on heritage and archaeological resources as a result of construction activities and associated infrastructure developments (e.g. pipeline, site layout)*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-15*	*3*
EXTENT	*1*	*The extent of the impact is rated as footprint as it only affects the area in which the proposed activity will occur*		
SEVERITY	*-3*	*The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected.*	***Moderately detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-45***	***Moderate- negative***		
PROPOSED MITIGATION MEASURES				

There is no mitigation measures as the proposed powerline route traverses a cemetery and burial site near the Illovo Industrial area.				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*-15*	*3*
EXTENT	1	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	-3	*Negligible*	***Moderately detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-45***	**Moderate- negative**		
CONFIDENCE LEVEL				
Medium				

(iii) Visual impact on sensitive visual receptors in the vicinity of the proposed powerline route Option 2

There are several areas of concern with regards to the routing of the Alternative 2 powerline. There are residential zones with views of the majority of the pylons. South Illovo residents and businesses in the areas of Nelson close, Poss Road and Draeger Crescent will have views that are significantly impacted by Option 2.

Line option 2 extends over parts of the industrial zone and within 200 m of the residential zone of Illovo South. Views from the industrial and commercial zones are immitigable due to the close proximity of the pylons. Views from the Illovo South residential area would be partly mitigatable by use of vegetative screening to block the view of some of the pylons in line option 2. Line option 2 would create the greatest visual impact as it is the closest to Illovo South.

Line option 2 extends within 10 m of the properties on Nelson Close. Most of the houses along Nelson Close have well vegetated boundaries but this is not sufficient to mitigate the visual impact of the proposed development due to their vertical height and close proximity to the houses.

Line option 2 would cause further impact on a proposed residential development along Poss Road. Line option 2 extends directly over the proposed residential development.

Line option 2 is approximately 50 m away from the canoe club and the start of the Eco Trail. The focus of the canoe club is predominantly south and east, away from the path of Line 2. Views are immitigable due to the close proximity of the receiving environment to line 2.

Line 2 extends within 200 m of the boundary of Mother of Peace, potentially causing visual impacts on the residents. This visual impact is likely to be diminished south of this viewpoint as most of the pylons would not be obvious above the horizon. In addition, they would be located alongside existing pylons meaning the nature of the landscape would therefore not be significantly altered.

Line option 2 impacts heavily on residents in Nelson Close, and Poss Road and negatively affect the view from the Illovo Country Club. Option 2 impact residents of Poss Road, Nelson Close and Draeger Crescent as many of their views of the natural river valley landscape would be broken by pylons and powerlines in close proximity.

Table 5-54: Impact ratings for sensitive visual receptors

PROJECT PHASE	*Construction Phase*			
DIRECT IMPACT	*Impact on sensitive visual receptors in the vicinity of the proposed powerline route*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-21*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-3*	*The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or*	***Highly detrimental***	***Definite***

		communities are substantially affected.		
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-63***	***High - negative***		
PROPOSED MITIGATION MEASURES				
To mitigate the impact of residents on Nelson Close, the pylons must be positioned in such a way that they are not directly in front of any houses so as to lessen the visual obstruction of the landscape. Further, effort should be made to move the pylons as far from the houses on Nelson Close.				
To mitigate the impact of residents on Draeger Crescent, the height of the pylons and powerlines must be lowered. The pylons must be positioned such they are not directly in front of the main view of the residents.				
The growth of indigenous vegetation on the south-west boundary of the Mother of Peace Orphanage is encouraged. The plants must include multiple species, of various forms and heights to include shrubs and trees.				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-14*	*2*
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	-2	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Moderately Detrimental***	***Likely***

IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-28**	**Low-negative**		
CONFIDENCE LEVEL				
Medium				

(b) **Decommissioning Phase**

The proposed 132kV transmission powerline will not be decommissioned in the future, as it will be permanent electrical infrastructure that will be owned and maintained by the eThekwini Municipality. It is also not envisaged that the sewer pipeline will be decommissioned.

5.4.3 Powerline Route Alternative Options 3a and 3b

(a) **Construction Phase**

The impacts associated with Alternative Options 3a and 3b powerline route alignment are the same as those outlined for Alternative 1 powerline route, with the slight exception of the following:

(i) Disturbance to or destruction of indigenous vegetation and faunal habitat leading to habitat degradation

Installation of some of the pylons of the alternatives Options 3 will require the clearance of indigenous vegetation in certain areas. This may include the destruction of removal of coastal thicket vegetation and/or protected species. The destruction of the edge habitat of coastal bush patches can lead to habitat degradation.

The impact associated with disturbance to or destruction of indigenous vegetation and faunal habitat is similar to Option 2. Refer to the impact assessment in Section 5.3.2.

(ii) Impact on heritage and cultural resources as a result of construction activities

The Heritage Impact Assessment indicated that he affected landscape is heavily altered from sugar cane production. This limited the chances of encountering significant *in situ* archaeological. The chances of recovering significant archaeological materials are very limited due to destructive land use patterns in the project area.

Based on the field study results and field observations, the proposed development has low to medium potential to yield previously unidentified archaeological sites during subsurface excavations and construction work associated with the proposed powerline development.

There are no known historical sites are on the direct footprint of the proposed powerline route. The field survey did not record any graves or burial grounds along the proposed Options 3a

and 3b powerline routes. The study did not record any historical monument and memorial plaques along Options 3a and 3b powerline routes.

Table 5-55: Impact ratings for Impact on heritage and archaeological resources

PROJECT PHASE	*Construction Phase*			
DIRECT IMPACT	*Impact on heritage and archaeological resources as a result of construction activities*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*2*	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*-3*	*1*
EXTENT	*1*	*The extent of the impact is rated as footprint as it only affects the area in which the proposed activity will occur*		
SEVERITY	*-1*	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Negligible***	***Unlikely***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-3***	***Very low- negative***		
PROPOSED MITIGATION MEASURES				
The chance finds process must be implemented when necessary especially when archaeological materials and burials are encountered during subsurface construction activities.				
If archaeological materials are uncovered, work should cease immediately and the Amafa aKwaZulu Natali be notified and activity should not resume until appropriate management provisions are in place.				
If during the construction or operations phases of this project, any person employed by the developer, one of its subsidiaries, contractors and subcontractors, or service provider, finds any artefacts of cultural significance, work must cease at the site of the find and this person must report this find to their immediate supervisor, and through their supervisor to the senior on-site manager.				

The site manager must then make an initial assessment of the extent of the find, and confirm the extent of the work stoppage in that area before informing Amafa aKwaZulu Natali.				
If a human grave/burial is encountered, the remains must be left as undisturbed as possible before the local police and Amafa aKwaZulu Natali are informed. If the burial is deemed to be over 60 years old and no foul play is suspected, an emergency rescue permit may be issued by Amafa aKwaZulu Natali for an archaeologist to exhume the remains.				
POST-MITIGATION				
DURATION	1	*The duration of the activity associated with the impact will last 0-6 months and as such is rated as Temporary*	*0*	*1*
EXTENT	1	*The extent of the impact is rated as footprint as it only affects the area in which the proposed activity will occur*		
SEVERITY	0	*Negligible*	***Negligible***	***Unlikely***
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	***0***	**very low negative**		
CONFIDENCE LEVEL				
Medium				

(iii) Visual impact on sensitive visual receptors in the vicinity of the proposed powerline route 3

The broader visual impact caused by Option 3a is well contained to the iLovu River valley, with small parts being theoretically visible in areas beyond 2.5 km. Most of the visual impact is contained within 1 km, where most of the pylons are visible. The majority of the powerline is visible from just beyond 1km to high lying areas located in the north-west and east. The local areas of concern with Option3a are with residents in Poss Road and Draeger Crescent still significantly impacted.

The broader visual impact of line option 3b is more widespread when compared with option 3a but in the extended viewshed, not as severe (fewer pylons are visible). Local areas of concern with option 3b are the Nkwali North Residential area and the residential area around Draeger Crescent. These residential areas are highly impacted visually and can see the majority of the pylons. Similarly, Line 3 a & b extends within 400 m of the Nelson Close residents, likely causing slight visual impacts on the residents.

Line options 3 a & b both involve construction to the east and south of the main farm house with pylons being built as close as 150 m. The pylons would likely extend above the horizon with the powerlines draping across the field of view. The impact is significant given the

orientation of the house and close proximity to pylons. Visual impact is only partly mitigatable by vegetative screening.

Part of lines 3 a & b are approximately 50 m away from the canoe club and extends directly over the Eco Trail. Views are not mitigatable due to the close proximity of the receiving environment to line options 1, 3 a & b. Lines 3 a & b extends within 20 m of the boundary of Mother of Peace, potentially causing significant visual impacts on the residents.

Options 3a and 3b heavily impact residents of Poss Road, Nelson Close and Draeger Crescent as many of their views of the natural river valley landscape would be broken by pylons and powerlines in close proximity. The residents in the valley situated north of Nelson Close have limited views that include other residences, roads, light industry, and several existing powerlines. The character of this area is more transformed and the construction of a powerline here is more appropriate from a visual perspective.

The visual impacts associated with lines 3a and 3b are also very high due to their close proximity to the residents of Poss Road, Draeger Crescent and Mother of Peace Children's Home. It is possible to reduce the visual impact of line 3a on Mother of Peace Children's Home by altering the course slightly.

Table 5-56: Impact ratings for visual impact on sensitive visual receptors in the vicinity of Powerline Route Option 3

PROJECT PHASE	*Construction Phase*			
DIRECT IMPACT	*Visual impact on sensitive visual receptors in the vicinity of the proposed powerline route 3*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-21*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		

SEVERITY	*-3*	*The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected.*	***Highly detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-63***	***High - negative***		
PROPOSED MITIGATION MEASURES				
To mitigate the impact on Illovo Farm House, the pylons must be positioned in such a way that they are not directly in front of any houses so as to lessen the visual obstruction of the landscape. Further, effort should be made to move the pylons as far from the house as possible without intruding on the floodplain.				
To mitigate the impact of residents on Draeger Crescent, the height of the pylons and powerlines must be lowered. The pylons must be positioned such they are not directly in front of the main view of the residents				
The mitigate the impact on Mother of Peace Orphanage, the pylon position must be moved as far as possible away from the orphanage, without intruding on the floodplain. The growth of indigenous vegetation on the south-west boundary of the Mother of Peace Orphanage is encouraged. The plants must include multiple species, of various forms and heights to include shrubs and trees.				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-14*	*2*
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	-2	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit*	***Moderately Detrimental***	***Likely***

		in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected		
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-28**	**Low-negative**		
CONFIDENCE LEVEL				
Medium				

(b) **Decommissioning Phase**

The proposed 132kV transmission powerline will not be decommissioned in the future, as it will be permanent electrical infrastructure that will be owned and maintained by the eThekwini Municipality.

5.5 Access Road Alternatives – Impact Assessment

There are five (5) options for access to the site as summarised below. Option 1 is the preferred alternative for the development. Access to the site also includes the P197 on the western side of the proposed development for all options.

Alternative	Description
Option 0	No road upgrades – status quo of the road network remains
Option 1 (Preferred)	New full narrow diamond interchange on the N2
Option 1c	New full narrow diamond interchange on the N2, with the R102 link bridge
Option 1d	New R102 link bridge with no new interchange on N2
Option 3b	New loop off-ramp for south-bound traffic, and new half narrow diamond N2 interchange for north-bound traffic and exit on N2 for north-bound traffic only

It is important to note that there will be no material difference between the two site layout alternative with regards to impacts experienced on the receiving environment. In addition to this, there are no feasible alternatives for the sewer main line development. The sewer rising main is proposed to be routed along the western boundary of the KZN ASP site adjacent to the road reserve of the P197 and R603, along the municipal road (Santo Alberto Road) and Longacres Drive to the existing Kingsburgh Wastewater Treatment Works (WWTW).

5.5.1 Access Road Alternative Option 0

(a) **Construction Phase**

As there are no road upgrades for this access option, the status quo of the existing road network will remain as it is. Therefore, there are no construction-related impacts such as the following for this alternative:

- Increased traffic congestion
- Inconvenience on the community as a result of road upgrades
- Employment opportunities as a result of access road development
- Impact on property values as a result of access road development
- Increased congestion on the R102 as a result of access road development

The impacts associated with this alternative occurs mainly during the operational phase and are discussed below.

(b) **Operational Phase**

As there will be no upgrades to the existing road network, the status quo of the existing road network will remain and there will be no impacts related to heritage and archaeological resources, visual, terrestrial ecological and freshwater resources.

There are however impacts on the sensitive receptors, due to additional traffic volumes expected as a result of the potential road users accessing the proposed KZN ASP by travelling along the P578, P197 and R603. The impacts on air quality, noise and socio-economic impacts associated with Option 0 are discussed below.

(i) Increased pressure on local roads as a result of access option 0

Increased pressure on local roads is a threat to road safety in general, as it can shorten the life span of the road and lead to higher maintenance and repair costs on local residential roads. In the absence of road upgrades for Option 0, there could be increased potential for degradation of the existing roads such as P578 and P197 that are currently operating at a poor level of service. With the need to accommodate additional traffic flows, the road condition will deteriorate.

Table 5-57: Impact ratings for increased pressure on local roads as a result of road access option 0

PROJECT PHASE	*Operational Phase*			
DIRECT IMPACT	*Increased pressure on local roads as a result of Access Option 0*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				

DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-21*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-3*	*The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected.*	***Highly Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*1*	*Irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-63***	***High - negative***		
PROPOSED MITIGATION MEASURES				
Driver training should be implemented. *Improved traffic management solutions should be implemented.* *Follow recommendations provided in a Traffic Management Plan to be compiled by a Traffic Engineer for approval by eTA.*				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-14*	*3*
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		

SEVERITY	-2	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Moderately Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-42**	**Moderate - negative**		
CONFIDENCE LEVEL				
High				

(ii) Economic opportunities as a result of Option 0 road access

Option 0 has an opportunity to create economic opportunities for the communities along the proposed routes. More especially the communities along Option 0 routes i.e. P197 and P578. The informal traders in these areas may benefit from increased transient traffic. Also, in the long-term, increased traffic in this area has an opportunity to induce road upgrades on P578 and P197 roads to accommodate the increased traffic and the community, which would be a huge benefit to the community. The community may also benefit from the employment opportunities created by the establishment of the KZN ASP.

Table 5-58: Impact ratings for economic opportunities as a result of Option 0 road access

PROJECT PHASE	*Operational Phase*			
DIRECT IMPACT	*Economic opportunities as a result of Access Option 0*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*14*	*3*

EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*2*	*The severity of the impact is rated as Moderate positive as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are positively affected*	***Moderately beneficial***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	***42***	***Moderate - positive***		
PROPOSED MITIGATION MEASURES				
Employ the local labour force for the operation of the KZN ASP. *Consider providing a safe trading area/stall for local traders along the proposed routes or within the KZN ASP to induce the local economy of the community.* *The increased market as a result of the KZN ASP will increase the economy of Illovo beach.* *Rental housing would be in high demand in the area as a result of people that want to stay closer to their place of work. The community can offer rental accommodation.*				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*14*	*3*
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	2	*The severity of the impact is rated as Moderate positive as the affected environment is altered but natural, cultural and social functions and processes*	***Moderately beneficial***	***Definite***

		continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are positively affected		
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**42**	**Moderate - positive**		
CONFIDENCE LEVEL				
High				

(iii) Compromised community road safety on residents along P578, as a result of Option 0 road access

Out of all options identified, option 0 is most likely to impact negatively on the local community along the P578, as there would be no road upgrades associated with Option 0. The increase in traffic on the P578 will thus have a much higher negative of impact on residents who live along the P578, as they obtain direct access of this road, in comparison to the residents who obtain access of the R102, which is a mobility corridor. The P578 is highly trafficked by pedestrians and livestock.

The increase in heavy and light vehicle traffic flows along the P578 may lead to increased levels of inconveniences and dangerous traffic conditions on the local community.

Table 5-59: Impact ratings for compromised road safety, as a result of road access option 0

PROJECT PHASE	*Operational Phase*			
DIRECT IMPACT	*Compromised road safety, as a result of Access Option 0*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-24*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects*		

		the development area and adjacent properties		
SEVERITY	*-3*	*The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected.*	***Highly Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*1*	*Irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-72***	***High - negative***		
PROPOSED MITIGATION MEASURES				
Road maintenance of P578 and P197 must take place to improve the condition of roads in the event of the occurrence of potholes.				
There must be provision of pavements and pedestrian crossing for scholars.				
Road upgrades are required to improve the capacity of the road infrastructure to accommodate increased traffic volumes.				
Increased road signage and speed humps are required, where, to ensure the safety of residents and livestock of the community. This would also reduce accident risks for the residents gaining access from the proposed roads.				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-16*	*3*
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	-2	*The severity of the impact is rated as Moderate negative as the affected environment is altered but*	***Moderately Detrimental***	***Definite***

		natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected		
IMPACT ON IRREPLACEABLE RESOURCES	1	*Irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-48**	**Moderate - negative**		
CONFIDENCE LEVEL				
High				

(iv) Potential health (air quality) impacts as a result of Option 0 access to the KZN ASP development

According to the Air Quality Impact Assessment for the road access options, the impact of key pollutants, selected for their release quantities and toxicity, were determined from the host of air pollutants associated with the operation of vehicles for morning and afternoon scenarios.

The existing air quality along the route was qualified using available monitoring and knowledge of air quality in South African semi-urban conditions.

The main findings from the study for Option 0 includes the following:

- Ground level impacts due to all simulated pollutants (including PM_{10}, $PM_{2.5}$, NO_2, SO_2, CO, Benzene and NMVOCs) did not exceed their respective hourly, daily or annual standard or guideline for Option 0.
- GLCs for SO_2, CO, Benzene and NMVOCs were very low and contribution to ambient levels are expected to be minimal; while GLCs due to PM_{10}, $PM_{2.5}$ and NO_2 were moderate, and may contribute notably to ambient levels in the immediate area.
- Excess lifetime cancer risk due to diesel particulate matter at 100 m from the centre of the road was slightly more than 1 in 10 000 and is considered “moderate risk” (for Option 0); while at 250 m from the middle of the road, excess lifetime cancer risk is ‘moderate’ (the classification only drops to ‘low risk’ at 270m away from the middle of the road).
- According to the study, Option 0 has the highest impacts on air quality based on simulated ground level impacts as well as excess lifetime cancer risk and is therefore the least preferred access option.
- In general, the morning scenarios presented lower impacts than the afternoon scenarios for Option 0.

Table 5-60: Impact ratings for health (air quality) impacts as a result of Option 0 road access

PROJECT PHASE	*Operational Phase*			
DIRECT IMPACT	*Potential health (air quality) impacts as a result of Access Option 0*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-16*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-2*	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Moderately Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*1*	*Irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-48***	***Moderate - negative***		
PROPOSED MITIGATION MEASURES				
Although vehicle-targeted air pollution measures reside with the national government (this may take the form of reformulation of fuels, retrofitting of catalytic converters and the establishment of emission standards to limit the discharge of air pollutants from new motor vehicles), it is may be necessary to implement measures that mitigate emissions from vehicles. This may include: • *The requirement that vehicle suppliers or contractors ensure compliance with appropriate emission standards for their fleets.* • *The requirement that all maintenance and repair of vehicles be carried out as prescribed by manufacturer in order to maximize combustion and reduce gaseous emissions.*				

POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-16*	*3*
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	-2	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Moderately Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	1	*Irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-48**	**Moderate - negative**		
CONFIDENCE LEVEL				
High				

(v) Impact on sensitive noise receptors as a result of traffic flows along the Option 0 access route

Noise levels at the nearest sensitive receptors to Option 0 road access was predicted, (*assuming the peak hour traffic will be the worst case of traffic entering and exiting the ASP area*).

This Option gives access to the western boundary of the KZN ASP via the existing Umgababa interchange (P578) enabling access via on-ramps and off-ramps in both northern and southern directions to existing roads, the Mnini Road and R197. All dwellings along the existing Umgababa Interchange (P578), the Mnini Road and the P197 are considered sensitive receptors for Option 0 road access. These receptors are all placed 10-15 meters from the road centreline. There will be no road upgrades and the status quo of the existing road network will prevail. However, these two-lane country roads are both very narrow and there are adjacent buildings within 15m of the centreline of the road. Option 0 is the least preferred access route in terms of noise impacts on sensitive receptors.

Table 5-61: Impacts of traffic noise on the sensitive receptors along Option 0 access

PROJECT PHASE	*Operational Phase*			
DIRECT IMPACT	*Increased noise impacts as a result of Option 0 road access*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-21*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-3*	*The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected*	***Highly Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted*		
SIGNIFICANCE	***-63***	***High - negative***		
PROPOSED MITIGATION MEASURES				
There are no mitigation measures - n/a.				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-21*	*3*

EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	-3	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Highly Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted*		
SIGNIFICANCE	**-63**	**High - negative**		
CONFIDENCE LEVEL				
High				

5.5.2 Access Road Alternative Option 1 (Preferred)

(a) **Construction Phase**

(i) Increased traffic congestion on the surrounding road network as a result of construction of road access option 1

Construction activities often have negative impacts on the communities surrounding the construction site and motorists. Impacts such as delays and congested traffic conditions caused by the additional traffic volume of construction vehicles and closure of lanes, increased safety hazards and economic losses may be experienced by the community. This impact will be of a short duration during the construction phase.

Table 5-62: Impact ratings for increased traffic congestion on the surrounding road network as a result of the construction of road access option 1

PROJECT PHASE	*Construction Phase*			
DIRECT IMPACT	*Increased traffic congestion as a result of Option 1 road access*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**

PRE-MITIGATION				
DURATION	*2*	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*-10*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-2*	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected.*	***Slightly Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-30***	***Low - negative***		
PROPOSED MITIGATION MEASURES				
A Traffic Management Plan must be developed for implementation during the construction phase.				
Direct traffic flows during congestion and warn motorists of the upcoming construction zone by means of proper road signage.				
Inform neighbouring residential areas and businesses beforehand if excessively high noise generating activities are to be undertaken.				
Avoid construction before sunrise and after sunset. In the event of this not being possible, the information should be provided in the local media to ensure that people are aware that construction will be taking place at night.				
Improve the efficiency of construction operations by minimizing unexpected delays in the movement of materials and equipment to and from the construction site.				
Try to complete the construction process within the stipulated period. To avoid further inconvenience to the community affected.				
Flagsmen must be on duty to direct traffic flow during congestion and warn motorists of the approaching construction zones.				
POST-MITIGATION				

DURATION	2	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*-5*	*3*
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	-1	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Negligible***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-15**	**Very low - negative**		
CONFIDENCE LEVEL				
Medium				

(ii) Nuisance and inconvenience to the local community as a result of road upgrade activities during construction

Inconvenience is one of the negative impacts that could be experienced by the community during construction. Nuisance impacts on the local community such as increased noise and dust pollution as a result of construction vehicles and the use of heavy equipment may occur. Safety hazards and occasional ground vibrations may also cause damage to nearby structures. This makes it imperative that these impacts are reduced to minimize the impact on the community.

Table 5-63: Impact ratings for nuisance and inconvenience to the local community as a result of road upgrade activities as a result of the construction of road access option 1

PROJECT PHASE	*Construction Phase*
DIRECT IMPACT	*Inconvenience and nuisance to the local community, as a result of construction of Option 1 road access*
INDIRECT IMPACT	--
CUMULATIVE IMPACT	--

DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	*2*	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*-10*	*2*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-2*	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected.*	***Slightly Detrimental***	***Likely***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-20***	***Low - negative***		
PROPOSED MITIGATION MEASURES				
Prepare a plan of communication with residents and businesses surrounding the construction site.				
Noise suppression techniques should be used as far as possible.				
Ensure dust suppression is implemented at the construction site.				
Determine alternative routes to divert the traffic.				
Complete the construction within the stipulated period.				
If possible, avoid construction between sunrise and sunset.				
POST-MITIGATION				
DURATION	2	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*-5*	*2*
EXTENT	3	*The extent of the impact is rated as Local as it affects*		

		the development area and adjacent properties		
SEVERITY	-1	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Negligible***	***Likely***
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-10**	**Very low - negative**		
CONFIDENCE LEVEL				
Medium				

(iii) Employment opportunities as a result of construction of the road access

The impact of employment opportunities as a result of the road access option 1 is similar to Options 1c, 1d and 3b and therefore will not be repeated under the Impact Assessments Section for Option 1c, 1d and 3b.

Developments of the KZN ASP road access options are likely to positively impact the socio-economic environment through the creation of employment opportunities. It should be noted that these opportunities will be created only for the duration of construction (which could span 6 to 18 months) and, therefore, should be considered temporary in nature. Also, it should be noted that the geographic spread of these employment opportunities will be a function of the location of the companies appointed as service providers to undertake the required construction work. While a project of this nature is anticipated to create employment opportunities in the local area (AOI) and surrounding communities, the supply chains of the service providers will determine the localisation of these opportunities.

Table 5-64: Impact ratings for employment opportunities as a result of road access options 1, 1c, 1d and 3b

PROJECT PHASE	*Construction Phase*			
DIRECT IMPACT	*Employment opportunities as a result of construction of Options 1, 1c, 1d and 3b road accesses*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				

DURATION	*2*	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*12*	*3*
EXTENT	*4*	*The extent of the impact is rated as Regional as the effects of the impact extends beyond municipal boundaries*		
SEVERITY	*2*	*The severity of the impact is rated as Moderate positive as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are positively affected*	***Slightly Beneficial***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	***36***	***Low - positive***		
PROPOSED MITIGATION MEASURES				
Labour intensive construction techniques must be used.				
Local community members must be employed and this must be stipulated in the tender documents for Contractors.				
Skills training and capacity building must be implemented by the Contractor.				
Liaise with local labour organisations to improve sustainability.				
POST-MITIGATION				
DURATION	2	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*18*	*3*
EXTENT	4	*The extent of the impact is rated as Regional as the effects of the impact extends beyond municipal boundaries*		
SEVERITY	3	*The severity of the impact is rated as High positive as the*	***Moderately beneficial***	***Definite***

		natural, cultural or social functions and processes are altered to the extent that valued, important, sensitive or vulnerable systems or communities are substantially positively affected.		
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**54**	**Moderate - positive**		
CONFIDENCE LEVEL				
Medium				

(iv) Decline in property values as a result of construction of the road access option 1

Short-term impacts on property values may be expected during the construction phase of the access road. Communities such as Panorama Park, Karridene, and Illovo beach are most likely to be impacted the most by this development. While new road developments are beneficial for commuters, they are not as great for those whose homes are impacted by traffic and noise pollution. The resulting noise, smog, and traffic that comes with a highway/ new road construction have a major impact on property values and quality of life. Although the expected impact on property values during construction is expected to be short term, mitigation measures are still required to reduce the significance of these impacts.

Table 5-65: Impact ratings for decline in property values as a result of construction of road access option 1

PROJECT PHASE	*Construction Phase*			
DIRECT IMPACT	*Decline in property values as a result of Option 1 road access development*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*2*	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*-5*	*3*

EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-1*	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Negligible***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-15***	***Very low - negative***		
PROPOSED MITIGATION MEASURES				
Noise suppression techniques should be used as far as possible.				
Avoid construction before sunrise and after sunset. In the event of this not being possible, the information should be provided in the local media to ensure that people are aware that construction will be taking place at night.				
Inform neighbouring residential areas and businesses beforehand if excessively high noise-generating activities are to be undertaken.				
Try to complete the construction process within the pre-determined period to avoid further inconvenience to the community affected.				
POST-MITIGATION				
DURATION	2	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*0*	*3*
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	0	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and*	***Negligible***	***Definite***

		processes are minimally affected		
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**0**	**Very low - negative**		
CONFIDENCE LEVEL				
Medium				

(v) Increased congestion on the R102 as a result of the proposed options that include R102

As Option 1 road access does not entail construction of the R102 link road, there is no effect on the R102, and this impact is therefore, not applicable. However, it is applicable for Options 1c and 1d. Refer to the assessment of this impact in Sections 5.4.3 and 5.4.4

(vi) Impact on heritage resources as a result of the construction of the proposed Option 1 road access

The Heritage Impact Assessment did not record any graves or burial grounds along the proposed access routes to the proposed KZN ASP. However, the possibility of encountering human remains during subsurface earth moving works along all four access routes (Options 1, 1c, 1d and 3b) is considered to be very low because the entire landscape has been altered.

Although the possibility of encountering previously unidentified burial sites is low, should such sites be exposed during subsurface construction work, they are still protected by applicable legislations and they should be protected.

Table 5-66: Impact ratings for impact on heritage resources as a result of the construction of the proposed development

PROJECT PHASE	*Construction Phase*			
DIRECT IMPACT	*Impact on heritage resources as a result of the proposed construction activities*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years*	*-14*	*2*

		and as such is rated as Long Term		
EXTENT	*2*	*The extent of the impact is rated as site as it will affect only the development area*		
SEVERITY	*-2*	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected.*	***Moderately Detrimental***	***Likely***
IMPACT ON IRREPLACEABLE RESOURCES	*1*	*Irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-28***	***Low - negative***		
PROPOSED MITIGATION MEASURES				
The footprint impact of the proposed development should be kept to minimal to limit the possibility of encountering chance finds.				
A detailed heritage monitoring procedures are included in the project EMPr for the construction phase, include chance archaeological finds mitigation procedure in the project EMPr.				
The chance finds process will be implemented when necessary especially when archaeological materials and burials are encountered during subsurface construction activities.				
If archaeological materials are uncovered, work should cease immediately and the Amafa aKwaZulu Natali be notified and activity should not resume until appropriate management provisions are in place.				
If during the construction or operations phases of this project, any person employed by the developer, one of its subsidiaries, contractors and subcontractors, or service provider, finds any artefacts of cultural significance, work must cease at the site of the find and this person must report this find to their immediate supervisor, and through their supervisor to the senior on-site manager.				
The site manager must then make an initial assessment of the extent of the find, and confirm the extent of the work stoppage in that area before informing Amafa aKwaZulu Natali				
If a human grave/burial is encountered, the remains must be left as undisturbed as possible before the local police and Amafa aKkwaZulu Natali are informed. If the burial is deemed to be over 60 years old and no foul play is suspected, an emergency rescue permit may be issued by Amafa aKwaZulu Natali for an archaeologist to exhume the remains.				

POST-MITIGATION				
DURATION	2	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-4*	*1*
EXTENT	2	*The extent of the impact is rated as site as it will affect only the development area*		
SEVERITY	-1	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Negligible***	***Unlikely***
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-4**	**Very low - negative**		
CONFIDENCE LEVEL				
High				

(vii) Destruction of indigenous vegetation and faunal habitat as a result of construction of road access options

Option 1 will impact directly on the UCVB wetland habitat situated in the north-eastern corner of the study area, which is considered highly sensitive. This wetland provides essential ecosystem services, such as flood attenuation to the landscape, and serves as an ecological corridor to the iLovu Estuary downstream.

Table 5-67: Impact ratings for destruction of indigenous vegetation and faunal habitat as a result of the construction of road access option 1

Construction of site access Option 1				
PROJECT PHASE	*Construction Phase*			
DIRECT IMPACT	*Destruction of indigenous vegetation and faunal habitat*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				

DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-24*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-3*	*The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected*	***Highly detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*1*	*Irreplaceable resources will be impacted*		
SIGNIFICANCE	**-72**	**High negative**		
PROPOSED MITIGATION MEASURES				
An independent Environmental Control Officer (ECO) must be appointed to oversee construction.				
The development layout has undergone a number of iterations in an attempt to avoid and minimise the impacts to the UCVB wetland and coastal forest as much as possible. The support pillars for the narrow diamond ramps and bridge structures will still impact on the wetland and the forest to a degree. To reduce impacts further the construction footprint must be confined to a small an area as possible and should not extend beyond the development footprint into the surrounding natural areas. If this is not feasible then an alternative that does not affect this parcel of land must be considered, such as Option 3b.				
The remaining and unaffected natural areas must be demarcated no-go areas for construction workers and vehicles.				
For the construction of Option 1, all support pillars and ramp structures must stay as far out of the UCVB wetland as possible. Construction activities including service roads, construction camps, stock piles etc. must stay out of all surrounding areas containing natural vegetation and areas marked medium-high and highly sensitive.				
For construction in the wetland, construction methods must be designed in consultation with a suitably qualified wetland rehabilitation engineer. A wetland rehabilitation plan must be compiled by a suitably qualified wetland engineer and wetland ecologist prior to construction commencing. The wetland rehabilitation plan must cover the entire wetland.				

For the impacted forest area, a forest rehabilitation and restoration plan must be compiled by a suitably qualified forest restoration specialist prior to construction commencing. This vegetation rehabilitation and restoration must cover the entire parcel of land. Either the entire parcel of land must be expropriated by the Applicant or consent from the land owners must be obtained for the rehabilitation activities to take place.				
No fires must be permitted on site, especially during the dry season.				
No wild animal may under any circumstance be handled, removed or be interfered with by construction workers.				
No wild animal may under any circumstance be hunted, snared, captured, injured or killed. Regular checks of the surrounding natural areas for snares and traps must be undertaken by the ECO.				
No wild animal may be fed on site and all food stuffs must be contained and not left unattended so that fauna are not attracted to the site during construction.				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-16*	*3*
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	-2	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Moderately Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	1	*Irreplaceable resources will be impacted*		
SIGNIFICANCE	**-48**	**Moderate - negative**		
CONFIDENCE LEVEL				
High				

(viii) Destruction of plant species of conservation concern and protected plant species as a result of construction of road access option 1

Certain areas within the study area support populations of plant and animal species of conservation concern as well as provincially protected plant and animal species. Areas include

the coastal forest and road verges. Clearing of vegetation may require the destruction of these species and/or habitat for these species.

Table 5-68: Impact ratings for destruction of plant species of conservation concern and protected plant species as a result of the construction of road access option 1

Impact Table: Construction of road access option 1				
PROJECT PHASE	*Construction Phase*			
DIRECT IMPACT	*Destruction of plant species of conservation concern and protected plant species*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-21*	*3*
EXTENT	*2*	*The extent of the impact is rated as site as it will affect only the development area*		
SEVERITY	*-3*	*The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected*	***Highly detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*1*	*Irreplaceable resources will be impacted*		
SIGNIFICANCE	**-63**	**High negative**		
PROPOSED MITIGATION MEASURES				
The construction footprint must be ground-truthed by a suitably qualified botanist prior to construction to identify any individual plants that will be impacted by the construction activities.				
Removal or trimming of individuals of species of conservation concern will require a permit that should be accompanied by a rehabilitation plan specifying either re-establishment or rescue and relocation to a suitable site.				

A permit from Ezemvelo KZN Wildlife (EKZNW) will be required to destroy or relocate any species of conservation concern or provincially protected plant species. A permit from the national authority (DAFF) will be required to remove, cut or destroy a nationally protected species.				
As part of the development layout (proposed N2 interchange) affects the forest habitat in the north-eastern corner of the study area, it is recommended that a walk-through of the habitat edges to search for Bradypodion melanocephalum *(KwaZulu Dwarf Chameleon) be undertaken by a suitably qualified ecologist or herpetologist prior to construction. If the species is detected, a site specific Species Management Plan including Search and Rescue Plan must be written by a suitably qualified herpetologist and implemented prior to construction.*				
The Critically Endangered and Protected Hyperolius pickersgilli *(Pickersgill's Reed Frog) was given a medium likelihood of occurring in the study area. While this rare and localised species was not detected during the field surveys, it does not rule out the possibility of it occurring in the study area. It is therefore recommended that a follow-up survey be conducted by a suitably qualified herpetologist following good spring rains, prior to construction commencing, to confirm the absence/presence of the species.*				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-10*	*3*
EXTENT	1	*The extent of the impact is rated as footprint as it only affects the area in which the proposed activity will occur*		
SEVERITY	-2	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Slightly Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted*		
SIGNIFICANCE	**-30**	**Low - negative**		
CONFIDENCE LEVEL				
High				

(ix) Increase in spread of alien invasive plant species as a result of construction of access option 1

During construction, vegetation will be removed and soil disturbed through for the construction of the support pillars for the interchange. The seed of alien invasive species that occur on and in the vicinity of the construction area could spread into the disturbed and stockpiled soil and into adjacent natural areas. In addition, the construction vehicles and equipment were likely used on various other sites and could introduce alien invasive plant seeds through dirt in tyres etc.

Table 5-69: Impact ratings for the spread of invasive alien plant species as a result of road access option 1

Impact Table Construction of road access option 1				
PROJECT PHASE	*Construction Phase*			
DIRECT IMPACT	*Increase and spread of invasive alien vegetation*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-24*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-3*	*The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected*	***Highly detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*1*	*Irreplaceable resources will be impacted*		
SIGNIFICANCE	**-72**	**High negative**		
PROPOSED MITIGATION MEASURES				

Construction activities must remain within the footprint of the resulting layout plan. No additional natural vegetation must be removed or disturbed to minimise chances of invasion by alien vegetation				
An invasive alien plant species management and monitoring plan must be compiled by a suitably qualified botanist and implemented whereby all emergent invasive species are removed during construction. All alien seedlings and saplings must be removed as they become evident for the duration of construction. Manual or mechanical removal is required, the use of chemical and herbicides must be prohibited due to the sensitive environments downstream				
All construction vehicles and equipment, as well as construction material must be free of plant material. Equipment and vehicles must be thoroughly cleaned prior to access on to the construction site				
Following construction, all remaining areas that have been cleared of vegetation must be rehabilitated with appropriate indigenous plant species found in the area				
An invasive alien plant species management and monitoring plan must be compiled by a suitably qualified botanist / rehabilitation specialist and implemented whereby the large alien plant infestations occurring in the valleys and natural areas around the platforms and infrastructure are eradicated and controlled				
All areas cleared of alien vegetation must be rehabilitated with appropriate indigenous plant species found in the area				
POST-MITIGATION				
DURATION	3	*The duration of the activity associated with the impact will last 18 months-5 years and as such is rated as Medium term*	*-7*	*3*
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	-1	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Slightly Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	1	*Irreplaceable resources will be impacted*		
SIGNIFICANCE	**-21**	**Low - negative**		
CONFIDENCE LEVEL				
Medium				

(x) Erosion and siltation of drainage lines, wetlands and downstream estuaries as a result of construction of road access option 1

During the construction phase, vegetation will be removed, and cut and fill slopes will be exposed. This coupled with the steep slopes within the study area will result in erosion during rainfall, and will cause siltation and clogging of the lower lying wetlands and wooded drainage lines, and eventual siltation of the estuaries downstream.

Table 5-70: Impact ratings for the erosion and siltation of drainage lines, wetlands, and downstream estuaries as a result of road access option 1

Impact Table: Construction of road access 1				
PROJECT PHASE	*Construction Phase*			
DIRECT IMPACT	*Erosion and siltation of drainage lines, wetlands, and downstream estuaries*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-27*	*3*
EXTENT	*4*	*The extent of the impact is rated as Regional as the effects of the impact extends beyond municipal boundaries*		
SEVERITY	*-3*	*The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected*	***Extremely Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*1*	*Irreplaceable resources will be impacted*		
SIGNIFICANCE	***-81***	**Very High negative**		
PROPOSED MITIGATION MEASURES				

A detailed, ecologically sound stormwater management plan must be compiled by a suitably qualified stormwater engineer in consultation with the Wetland Specialist, Estuarine Ecologist and Biodiversity Specialist, to ensure storm water is managed in a way that does not cause erosion and siltation of downstream habitats, especially the sensitive estuaries				
During construction, the exposed cut and fill slopes and stock piles must be protected from erosion during rainfall events and high winds. This must be implemented strictly otherwise the impacts on the downstream habitats will be very high				
During construction and operation, erosion must not be allowed to develop on a large scale before effecting repairs. A strict monitoring plan for erosion must be put in place during construction and operation				
Following construction, all remaining areas that have been cleared of vegetation must be rehabilitated with appropriate indigenous plant species found in the area. Grass species are recommended to limit erosion potential				
The stormwater design must include energy dissipaters and silt traps for water entering the natural areas				
POST-MITIGATION				
DURATION	3	*The duration of the activity associated with the impact will last 18 months-5 years and as such is rated as Medium term*	*-12*	*3*
EXTENT	2	*The extent of the impact is rated as site as it will affect only the development area*		
SEVERITY	-2	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Slightly Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	1	*Irreplaceable resources will be impacted*		
SIGNIFICANCE	**-36**	**Low - negative**		
CONFIDENCE LEVEL				
Medium				

(xi) Pollution of drainage lines, wetlands, and downstream estuaries as a result of construction of road access option 1

During the construction phase, potential spills from construction vehicles, general litter discarded by construction crews, and general construction waste have the potential to contaminate the natural areas. Hydrocarbons from construction vehicles, litter, and general construction waste will be washed into the soil and lower lying drainage lines and wetlands during rainfall. These will pollute the natural areas and the downstream estuaries.

Table 5-71: Impact ratings for the pollution of drainage lines, wetlands, and downstream estuaries as a result of road access option 1

Impact Table: Construction of road access 1				
PROJECT PHASE	*Construction Phase*			
DIRECT IMPACT	*Pollution of surrounding natural areas, downstream watercourses and estuaries*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-27*	*3*
EXTENT	*4*	*The extent of the impact is rated as Regional as the effects of the impact extends beyond municipal boundaries*		
SEVERITY	*-3*	*The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected*	***Extremely Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*1*	*Irreplaceable resources will be impacted*		
SIGNIFICANCE	***-81***	**Very high negative**		
PROPOSED MITIGATION MEASURES				

The construction crews must be educated in the importance of natural resources and must not litter or pollute such areas.				
Adequate disposal and toilet facilities must be provided on site during construction. All refuse generated by construction workers on site must be disposed of in an appropriate manner and removed form site in a regular basis.				
During construction, oil and fuel spills must be avoided with daily vehicle checks. Any spills must be attended to immediately.				
Stormwater channels / outlets must be fitted with litter traps, or litter screens at kerb inlets, which must be inspected and cleared on a regular basis.				
No effluent must be allowed to enter the natural areas.				
Dumping of any form of waste in natural areas by construction workers. Penalties such as fines for non-adherence to this condition should be implemented.				
The development must be fenced to limit human access to the natural areas.				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-7*	*3*
EXTENT	2	*The extent of the impact is rated as site as it will affect only the development area*		
SEVERITY	-1	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Slightly Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	1	*Irreplaceable resources will be impacted*		
SIGNIFICANCE	**-21**	**Low - negative**		
CONFIDENCE LEVEL				
Medium				

(xii) Loss of ecosystem services and ecological corridors

The natural areas within the study area provide essential ecosystem services such as filtering of water in the wetlands before it is transported through the landscape to lower lying areas, especially the estuaries. UCVB wetlands provide essential flood attenuating services and support storm water infrastructure for roads and development. The natural areas on site provide high habitat diversity for flora and fauna and therefore have high biodiversity value. The wooded habitat in the study area (including the coastal forest) support plant species of conservation concern and provincially protected species. The natural areas within the study

area also provide essential ecological corridors for movement of fauna and flora through the landscape and between the two estuaries. These essential ecosystem services will be lost or diminished if the natural areas in the study area are destroyed.

Table 5-72: Loss of ecosystem services and ecological corridors as a result of road access option 1

Impact Table: Construction of road access option 1				
PROJECT PHASE	*Construction Phase*			
DIRECT IMPACT	--			
INDIRECT IMPACT	*Loss of ecosystem services and ecological corridors*			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-24*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-3*	*The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected*	***Highly detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*1*	*Irreplaceable resources will be impacted*		
SIGNIFICANCE	**-72**	**High negative**		
PROPOSED MITIGATION MEASURES				
Construction activities must remain within the footprint of the area required for the N2 interchange (including construction camps, stock piles etc.).				
The development layout for site access Option 1 has undergone a number of iterations to minimise the impacts to the UCVB wetland and forest as much as possible. The outcome of this process was the design of a narrow diamond interchange. This option still however impacts on the UCVB wetland.				

All mitigation measures that have been prescribed to prevent erosion, siltation, pollution, the spread of invasive alien plant species, and any other impact that will result in habitat degradation and depletion of ecosystem services must be adhered to.				
POST-MITIGATION				
DURATION	3	*The duration of the activity associated with the impact will last 18 months-5 years and as such is rated as Medium term*	*-21*	*2*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-3*	*The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected*	***Highly detrimental***	***Likely***
IMPACT ON IRREPLACEABLE RESOURCES	1	*Irreplaceable resources will be impacted*		
SIGNIFICANCE	**-42**	**Moderate - negative**		
CONFIDENCE LEVEL				
High				

(xiii) Permanent loss of wetland habitat, as a result of construction of the access option 1

During the construction phase in which the additional lanes for the interchange will be constructed, earthworks will take place. As a result, portions of wetland habitat will be destroyed.

The narrow diamond design in Access Option 1 does attempt to minimise the impact as far as possible by keeping the ramps and pillars as far out of the wetland as possible. This is the preferred option over Access Options 1c and 1d.

However, the support pillar for the bridge will have a higher negative impact on the wetland habitat as it will need to support a bridge deck in both directions.

Table 5-73: Impact ratings for the permanent loss of wetland habitat, as a result of construction of access option 1

PROJECT PHASE	*Construction Phase*			
DIRECT IMPACT	*Permanent loss of wetland habitat as a result of construction of access option 1*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*2*	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*-15*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-3*	*The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected.*	***Moderately Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-45***	***Moderate - negative***		
PROPOSED MITIGATION MEASURES				
An independent Environmental Control Officer (ECO) must be appointed to oversee construction.				
Implement effective rehabilitation to reverse construction related impacts.				
Avoid impacts to wetlands beyond the construction zone / footprint of the development.				
Include wetland losses in Wetland Offset Plan				
POST-MITIGATION				

DURATION	2	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*-12*	*3*
EXTENT	2	*The extent of the impact is rated as site as it will affect only the development area*		
SEVERITY	-3	*The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected.*	***Slightly detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-36**	**Low - negative**		
CONFIDENCE LEVEL				
High				

(xiv) Altered hydrology, erosion and/sediment regime of wetlands as a result of vegetation clearance

Vegetation will be cleared for construction of the loop ramp for the N2 interchange, and bare surfaces will be exposed. As a result, portions of wetland habitat may be destroyed, erosion and sedimentation activities may become more prominent due to the presence of exposed bare surfaces and the resultant stormwater runoff entering the wetlands.

Table 5-74: Impact ratings for altered hydrology, erosion and sediment/regime of wetlands as a result of vegetation clearance

PROJECT PHASE	*Construction Phase*
DIRECT IMPACT	*Altered hydrology, erosion and sediment/regime of wetlands as a result of vegetation clearance at option 1*
INDIRECT IMPACT	--

CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*2*	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*-15*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-3*	*The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected.*	***Moderately Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-45***	***Moderate - negative***		
PROPOSED MITIGATION MEASURES				
An independent Environmental Control Officer (ECO) must be appointed to oversee construction.				
Implement effective rehabilitation to reverse construction related impacts.				
Avoid impacts to wetlands beyond the construction zone / footprint of the development.				
POST-MITIGATION				
DURATION	2	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*-12*	*3*
EXTENT	2	*The extent of the impact is rated as site as it will affect only the development area*		

SEVERITY	-3	*The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected.*	***Slightly detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-36**	**Low - negative**		
CONFIDENCE LEVEL				
High				

(xv) Reduced water quality of wetlands and downstream watercourses, as a result of accidental spillage of hydrocarbons

Construction vehicles will be present giving rise to the possibility of potential fuel / chemical spills, and water pollution may occur from vehicle oil spills. Surface water pollution of the nearby wetlands and watercourses may occur from vehicle oil spills.

Table 5-75: Impact ratings for reduced water quality of wetlands and downstream watercourses

PROJECT PHASE	*Construction Phase*			
DIRECT IMPACT	*Reduced water quality of wetlands and downstream watercourses*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*2*	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*-15*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects*		

		the development area and adjacent properties		
SEVERITY	*-3*	*The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected.*	***Moderately Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-45***	***Moderate - negative***		
PROPOSED MITIGATION MEASURES				
An independent Environmental Control Officer (ECO) must be appointed to oversee construction.				
As a consequence of the proposed development, the wetland system will possibly encounter anthropogenic disturbances. Therefore, in order to manage and mitigate these threats faced by the wetland a suitable buffer should be determined. Therefore, during periods of construction there should be minimal human disturbances by minimising activities that would lead to excessive pollution and run off into the drainage line (Kotze et al., 2008). During the construction phase the recommended wetland buffer is 30m.				
During the construction phase all measures should be taken in order to prevent contamination of wetland areas by vehicles utilised. If any spills of diesel, petrol, oil, or corrosive fluid occur a spill kit should be kept on site to immediately address this. All vehicles and machinery should therefore be kept off site in a bunded, platformed location in order to avoid such contamination in the watercourses.				
Implement best-practice measures to control water pollution risks, including the handling and dispensing of fuels and chemicals.				
All vehicles should only be allowed to stand overnight and refuelled only on impervious surfaces. Additionally, materials not to be stockpiled within the buffer area; all materials should strictly be kept 30 m away from the watercourses on site. Furthermore, during the operational phase, when maintaining and utilising the road, mitigation measures must be developed and implemented to inhibit further degradation of these wetland systems. In the event of an unexpected damage occurring this should be reported to the relevant authority immediately.				
An appropriate Contingency-Spill Response Plan is to be compiled and stored on site, for implementation where necessary. Contractors are to be trained in spill response and familiar with spill plan. Contact details for a reputable company to hand large spill events (e.g. SpillTech) must be				

included in the spill plan and must be available on hand at the site during construction and business operation. Individual operational sites/companies will need to compile their own contingency/spill plans.				
No equipment laydown or storage areas must be located within 20m of any watercourse and/or within the 1:100 year flood line of the iLovu and uMsimbazi Rivers.				
POST-MITIGATION				
DURATION	2	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*-12*	*3*
EXTENT	2	*The extent of the impact is rated as site as it will affect only the development area*		
SEVERITY	-3	*The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected*	***Slightly detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted*		
SIGNIFICANCE	**-36**	**Low - negative**		
CONFIDENCE LEVEL				
High				

(xvi) Altered ecological processes and biodiversity of wetland habitat, as a result of alien invasive plant establishment

During construction, there may be altered ecological processes and biodiversity caused by construction activity and the introduction of invasive alien plant species carried by construction vehicles and the lack of proper rehabilitation on site.

Table 5-76: Impact ratings for altered ecological processes and biodiversity of wetland habitat, as a result of invasive alien plant establishment

PROJECT PHASE	*Construction Phase*			
DIRECT IMPACT	*Altered ecological processes and biodiversity of wetland habitat*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*2*	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*-15*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*	***Moderately Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-45***	***Moderate - negative***		
PROPOSED MITIGATION MEASURES				
An independent Environmental Control Officer (ECO) must be appointed to oversee construction.				
The tyres of construction vehicles must be inspected before entering the site to ensure no soil material with alien invasive seeds are carried with it.				
The focus of the rehabilitation of wetlands and watercourse is to ensure the re-establishments of what was the natural hydraulic regime as much as possible. Where the watercourse's hydraulic regime is improved, the vegetation will improve as well for the riparian habitat which can lead to the reintroduction of riparian specific species. It is, however, not possible to completely re-establish the natural hydrological regime at the catchment level as this is what is needed to improve the current state of the wetlands and watercourses. This is due to the comparatively small-scale site-specific construction at the point of the wetland and watercourse crossings. Nevertheless, the wetland areas and watercourses which are affected at the point of construction can be stabilised to make sure that the current functionality of the wetland and watercourse is not reduced, but restored. The main function of rehabilitation efforts must aim to restore the natural function and improve the aesthetic nature of the wetlands and watercourses.				

On site rehabilitation measures to be implemented on site must be in accordance with those stipulated in the Onsite Wetland Rehabilitation Plan compiled by Eco-Pulse (2019).				
POST-MITIGATION				
DURATION	2	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*-10*	*3*
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	-3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*	***Slightly detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-36**	**Low - negative**		
CONFIDENCE LEVEL				
High				

(b) **Operational Phase**

(i) Increased pressure on local roads as a result of access option 1

Increased pressure on local roads is a threat to road safety in general, as it can shorten the life span of the road and lead to higher maintenance and repair costs on local residential roads. During the operation phase, road vehicle traffic is expected to increase, and this will lead to increased pressure on the existing road infrastructure. If this is not well planned and managed, negative impacts including reduced road safety can be expected.

Table 5-77: Impact ratings for increased pressure on local roads as a result of road access option 1

PROJECT PHASE	*Operational Phase*			
DIRECT IMPACT	*Increased pressure on local roads as a result of Access Option 1*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				

DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*0*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*0*	*Negligible*	***Negligible***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*1*	*Irreplaceable resources will be impacted.*		
SIGNIFICANCE	***0***	***Very low - negative***		
PROPOSED MITIGATION MEASURES				
Driver training should be implemented. *Improved traffic management solutions should be implemented.* *Follow recommendations provided in the Traffic Management Plan to be compiled by a Traffic Engineer and approved by eTA.*				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*0*	*3*
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	0	*Negligible*	***Negligible***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	1	*Irreplaceable resources will be impacted.*		
SIGNIFICANCE	**0**	**Very low - negative**		
CONFIDENCE LEVEL				
High				

(ii) Decline in property values as a result of access Option 1

Undesirable facilities such as highways, manufacturing plants and landfills in an area can reduce property values. Conversely, disamenities, like the presence of industrial land and highway nearness, affect the prices negatively. Facilities such as highways and interchanges in an area may reduce the property values of the surrounding owners. According to the same

theory, major improvements to existing transportation infrastructure should also have a strong, positive effect on nearby real estate values. The residents of Larnaco will be most affected by the decline in property values as this access option is situated closest to them.

Table 5-78: Impact ratings for a decline in property values as a result of access Option 1

PROJECT PHASE	*Operational Phase*			
DIRECT IMPACT	*Decline in property values as a result of Access Option 1*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-14*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-2*	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Moderately Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-42***	***Moderate - negative***		
PROPOSED MITIGATION MEASURES				
Full disclosure of information must be provided to the affected communities.				
Give effect to landscaping and project design measures to reduce the noise and visual impacts of the new interchanges to the Larnaco residents.				
POST-MITIGATION				

DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-7*	*3*
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	-1	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Slightly Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-21**	**Low - negative**		
CONFIDENCE LEVEL				
High				

(iii) Economic opportunities as a result of Option 1 road access

Option 1 has an opportunity to create economic opportunities for the communities along the proposed routes. The informal traders in these areas may benefit from increased transient traffic. Also, increased traffic in this area has an opportunity to induce road upgrades on P578 and P197 roads to accommodate the increased traffic and the community, which would be a huge benefit to the community. The community may also benefit from the employment opportunities created by the establishment of the KZN ASP.

Table 5-79: Impact ratings for economic opportunities as a result of Option 1 road access

PROJECT PHASE	*Operational Phase*			
DIRECT IMPACT	*Economic opportunities as a result of Access Option 1*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				

DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*7*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*1*	*The severity of the impact is rated as Low positive as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally improved*	***Slightly beneficial***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	***21***	***Low - positive***		
PROPOSED MITIGATION MEASURES				
Employ the local labour force for the operation of the KZN ASP.				
Consider providing a safe trading area/stall for local traders along the proposed routes or within the KZN ASP to induce the local economy of the community.				
The increased market as a result of the KZN ASP will increase the economy of Illovo beach.				
Rental housing would be in high demand in the area as a result of people that want to stay closer to their place of work. The community can offer rental accommodation.				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*14*	*3*
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		

SEVERITY	2	*The severity of the impact is rated as Moderate positive as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are positively affected*	***Moderately beneficial***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**42**	**Moderate - positive**		
CONFIDENCE LEVEL				
High				

(iv) Potential health (air quality) impacts as a result of Option 1 access to the KZN ASP development

The main findings of the Air Quality Impact Assessment were similar to Option 0 road access.

- Excess lifetime cancer risk due to diesel particulate matter at 100 m from the centre of the road was slightly more than 1 in 10 000 and is considered "moderate risk" (for all scenarios), while at 250 m from the middle of the road, excess lifetime cancer risk was less than 1 in 10 000 and is considered "low risk".
- According to the study, Option 1 has low impacts on air quality based on simulated ground level impacts as well as excess lifetime cancer risk and is the second preferred access option.

Table 5-80: Impact ratings for health (air quality) impacts as a result of Option 1 road access

PROJECT PHASE	*Operational Phase*			
DIRECT IMPACT	*Potential health (air quality) impacts as a result of Access Option 1*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more*	*-8*	*3*

		than 5 years and as such is rated as Long Term		
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-1*	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Slightly Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*1*	*Irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-24***	***Low - negative***		
PROPOSED MITIGATION MEASURES				
Although vehicle-targeted air pollution measures reside with the national government (this may take the form of reformulation of fuels, retrofitting of catalytic converters and the establishment of emission standards to limit the discharge of air pollutants from new motor vehicles), it is may be necessary to implement measures that mitigate emissions from vehicles. This may include: • *The requirement that vehicle suppliers or contractors ensure compliance with appropriate emission standards for their fleets.* • *The requirement that all maintenance and repair of vehicles be carried out as prescribed by manufacturer in order to maximize combustion and reduce gaseous emissions.*				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-8*	*3*
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	-1	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and*	***Slightly Detrimental***	***Definite***

		processes are minimally affected		
IMPACT ON IRREPLACEABLE RESOURCES	1	*Irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-24**	**Low - negative**		
CONFIDENCE LEVEL				
High				

(v) Impact on sensitive noise receptors as a result of traffic flows along the Option 1 access route

Noise levels at the nearest sensitive receptors to Option 1 road access was predicted, (*assuming the peak hour traffic will be the worst case of traffic entering and exiting the ASP area*).

The nearest sensitive receptors are the residents at Larnaco and Panorama Park east of the N2 and are 80m from the centreline of the nearest carriageway. The projected rise in noise levels in the adjacent residential areas of Panorama Park and Larnaco is due to a combination of the reduced distance of the nearest sensitive receptors to the southern-going on and off- ramps and the doubling of the peak hour traffic flow.

Table 5-81: Impacts of traffic noise on the sensitive receptors along Option 1 access road

PROJECT PHASE	*Operational Phase*			
DIRECT IMPACT	*Increased noise impacts as a result of Option 1 road access*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-14*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		

SEVERITY	*-2*	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Moderately Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted*		
SIGNIFICANCE	***-42***	***Moderate - negative***		
PROPOSED MITIGATION MEASURES				
There are no mitigation measures - n/a.				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-14*	*3*
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	-2	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Moderately Detrimental***	***Definite***

IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted*		
SIGNIFICANCE	**-42**	**Moderate - negative**		
CONFIDENCE LEVEL				
High				

(vi) Impact on sensitive visual receptors as a result of construction of the narrow diamond interchange for Option 1 access route

The sensitive receptors affected by the Option 1 road access are residents of Larnaco as well as those travelling along the N2. Due to the existing undulating topography, the narrow diamond interchange is placed between two hills, helping to visually screen it from the neighbouring area. Therefore, it is deemed not as visually imposing as the other options. This road access option has a high Visual Absorption Capacity (VAC) due to existing similar structures along the N2 in immediate vicinity[3].

Table 5-82: Impact ratings for increased visual impact on sensitive receptors as a result of construction of the narrow diamond interchange for Option 1 access route

PROJECT PHASE	*Operational Phase*			
DIRECT IMPACT	*Increased visual impacts as a result of Option 1 road access*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-7*	*3*
EXTENT	*2*	*The extent of the impact is rated as site as it will affect only the development area*		

[3] The VAC is the capacity of the receiving environment to absorb the potential visual impact of the proposed building. The VAC is determined with the existing environment i.e. surrounding buildings and infrastructure, and topography (O'Donoghue, 2017).

SEVERITY	*-1*	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Slightly Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*1*	*Irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-21***	***Low - negative***		
PROPOSED MITIGATION MEASURES				
There are no mitigation measures - n/a.				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-7*	*3*
EXTENT	2	*The extent of the impact is rated as site as it will affect only the development area*		
SEVERITY	-1	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Slightly detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	1	*Irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-21**	**Low - negative**		
CONFIDENCE LEVEL				
High				

(vii) Ecosystem enhancement and decrease in alien plant infestations

In order to enhance ecological infrastructure and strengthen ecosystem services in the landscape, the natural areas that fall within the development site can be rehabilitated and habitat restored to structurally sound forest and wetland. This restoration process must include the removal of all existing alien plant infestations from the wooded drainage lines, coastal thicket, and wetland areas, and include planting of appropriate indigenous species. This can become a positive impact, should the proposed development be authorised, and could help compensate for negative impacts.

Table 5-83: Loss of ecosystem services and ecological corridors as a result of road access option 1

Impact Table: Construction of road access option 1				
PROJECT PHASE	*Operational Phase*			
POSITIVE IMPACT	*Ecosystem enhancement and decrease in alien plant infestations*			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-24*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-3*	*The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected*	***Highly detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*1*	*Irreplaceable resources will be impacted*		
SIGNIFICANCE	**-81**	**High - negative**		
PROPOSED MITIGATION MEASURES				
In order to help compensate for negative impacts resulting from the proposed development, a rehabilitation and restoration plan must be written by a suitably qualified restoration ecologist and implemented by a suitably qualified rehabilitation specialist, for the natural areas that fall within the development site, and immediately adjacent. This restoration process must include the removal of all				

existing alien plant infestations from the wooded drainage lines, coastal thicket, and wetland areas, and include planting of appropriate indigenous species to restore the habitat to structurally intact forest and wetland. This rehabilitation and restoration plan must include long-term follow-up, monitoring and evaluation.				
For the entire operational phase of the development, the natural areas in the development site must be monitored for invasive alien plant species, and immediately controlled by ecologically accepted techniques. The use of herbicides must be strictly prohibited to avoid impacting on sensitive habitats downstream				
The applicant must ensure financial provision is planned for and secured for these activities.				
The existing P491 road on the southern border of the site, especially the section on eastern side of the N2, must be decommissioned and the area rehabilitated back into the estuary.				
An Advisory Forum comprised of conservation authorities including the EPCPD, EKZNW, EDTEA, DWS, DEA and DAFF (DEFF) should be established to guide the rehabilitation and restoration process.				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*24*	*2*
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	3	*The severity of the impact is rated as High positive as the natural, cultural or social functions and processes are altered to the extent that valued, important, sensitive or vulnerable systems or communities are substantially positively affected*	***Highly beneficial***	***Likely***
IMPACT ON IRREPLACEABLE RESOURCES	1	*Irreplaceable resources will be impacted*		
SIGNIFICANCE	**48**	**Moderate positive**		
CONFIDENCE LEVEL				
High				

(viii) Increased protection of Critical Biodiversity Areas

The areas that support natural vegetation and habitat in the study area are all classified as CBA: Irreplaceable according to the KZNBSP (Escott et al., 2016). This includes the parcel of land in the north-eastern corner of the study area, where the Option 1 (*and its variations – Option 1c and 1d*) for access to the site are proposed. This parcel of land is under severe

pressure from impacts of the construction of the N2 and the R102, run-off from the sugar cane fields upstream, and intense alien plant infestations. In an attempt to minimise the area of forest to be impacted on, the proposed development layout was re-aligned to be as close to the southern boundary of the land parcel as possible, and also to be aligned through a very disturbed area of the forest. If development were to occur within this parcel of land, it would require the applicant to purchase the land, and this would provide an opportunity to rehabilitate and restore the remaining vegetation to healthy wetland and forest habitat. This restoration process would include the removal of all existing alien plant infestations as required by NEMBA, as well as planting of appropriate indigenous species. In addition, this CBA along with the other rehabilitated areas in the study area (including wetlands) could then be proclaimed as formally protected conservation servitudes through D'MOSS. This can become a positive impact, should the proposed development be authorised, and could help compensate for negative impacts.

Table 5-84: Increased protection for Critical Biodiversity Areas as a result of the construction of road access option 1

Impact Table: Construction of road access option 1				
PROJECT PHASE	*Operational Phase*			
POSITIVE IMPACT	*Increased protection for CBAs*			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-24*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-3*	*The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected*	***Highly detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*1*	*Irreplaceable resources will be impacted*		
SIGNIFICANCE	***-72***	**High negative**		
PROPOSED MITIGATION MEASURES				

All natural areas in the development area that are designated as CBAs, as well as areas proposed for rehabilitation such as wetlands currently under sugar cane, should be proclaimed as formally protected conservation servitudes through D'MOSS.				
If site access Option 1 is authorised for development, then the applicant should acquire the remaining land on the affected land parcel and rehabilitate and restore the remaining vegetation to healthy wetland and forest habitat. This CBA should then be proclaimed as a formally protected conservation servitude through D'MOSS.				
A rehabilitation and restoration plan must be written by a suitably qualified restoration ecologist and implemented by a suitably qualified rehabilitation specialist. This restoration process must include the removal and control of all existing alien plant infestations as required by NEMBA, and include planting of appropriate indigenous species to restore the habitat to structurally intact forest and wetland. The plan must include long-term follow-up, monitoring and evaluation.				
For the entire operational phase of the development, the natural areas must be monitored for invasive alien plant species, and immediately controlled by ecologically accepted techniques. The use of herbicides must be strictly prohibited to avoid impacting on sensitive downstream habitats.				
The applicant must ensure financial provision is planned for and secured for these activities.				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*24*	*2*
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	3	*The severity of the impact is rated as High positive as the natural, cultural or social functions and processes are altered to the extent that valued, important, sensitive or vulnerable systems or communities are substantially positively affected*	***Highly Beneficial***	***Likely***
IMPACT ON IRREPLACEABLE RESOURCES	1	*Irreplaceable resources will be impacted*		
SIGNIFICANCE	**48**	**Moderate positive**		
CONFIDENCE LEVEL				
High				

(ix) Altered hydrology, erosion and/or sediment regime, as a result of Access Option 1

During the operational phase of the proposed access options, there will be increased hardened surfaces along the N2. The excess or improper management of stormwater may cause higher flows and velocities within watercourses causing erosion and sedimentation.

Table 5-85: Altered hydrology, erosion and/or sediment regime, as a result of Access Option 1

Impact Table: Construction of road access option 1				
PROJECT PHASE	*Operational Phase*			
POSITIVE IMPACT	*Altered hydrology, erosion and/sediment regime*			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-14*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-2*	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Moderately detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-42***	**Moderate - negative**		
PROPOSED MITIGATION MEASURES				
Use the principles of Sustainable Urban Drainage Systems (SUDS) to inform storm water management design and implementation.				
Storm water will need to be managed appropriately during operation to ensure flows to downstream wetlands and estuaries mimic natural or pre-development levels.				
Gullies and other areas of active erosion should be stabilised (using catch water drains, raising headwalls or providing protective measures including grassing, stone pitching, concrete paving or gabions/ mattresses) and rehabilitated to minimise sediment entering the aquatic resource from these sources.				
POST-MITIGATION				

DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-7*	*3*
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	-1	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Slightly detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-21**	**Low -negative**		
CONFIDENCE LEVEL				
High				

(x) Reduced water quality of wetlands as a result of the access option 1

The presence of vehicles in the vicinity of watercourses may lead to oil spills. Furthermore, the water quality of surrounding wetlands may be significantly impacted if there is a leak in a vehicle, thereby causing extensive contamination of watercourses downstream. This can however be mitigated through appropriate infrastructure design to reduce risk of leaks, proper maintenance schedules and operational management plans, including contingency measures in the event of mechanical breakdown, spillage, etc.

Table 5-86: Reduced water quality of wetlands as a result of access option 1

Impact Table: Construction of road access option 1				
PROJECT PHASE	*Operational Phase*			
POSITIVE IMPACT	*Reduced water quality of wetlands as a result of access option 1*			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-14*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		

SEVERITY	*-2*	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Moderately detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-42***	**Moderate - negative**		
PROPOSED MITIGATION MEASURES				
An independent Environmental Control Officer (ECO) must be appointed to oversee construction.				
As a consequence of the proposed development, the wetland system will possibly encounter anthropogenic disturbances. Therefore, in order to manage and mitigate these threats faced by the wetland a suitable buffer should be determined. Therefore, during periods of construction there should be minimal human disturbances by minimising activities that would lead to excessive pollution and run off into the drainage line (Kotze et al., 2008). During the construction phase the recommended wetland buffer is 30m.				
During the construction phase all measures should be taken in order to prevent contamination of wetland areas by vehicles utilised. If any spills of diesel, petrol, oil, or corrosive fluid occur a spill kit should be kept on site to immediately address this. All vehicles and machinery should therefore be kept off site in a bunded, platformed location in order to avoid such contamination in the watercourses.				
Implement best-practice measures to control water pollution risks, including the handling and dispensing of fuels and chemicals.				
All vehicles should only be allowed to stand overnight and refuelled only on impervious surfaces. Additionally, materials not to be stockpiled within the buffer area; all materials should strictly be kept 30 m away from the watercourses on site. Furthermore, during the operational phase, when maintaining and utilising the road, mitigation measures must be developed and implemented to inhibit further degradation of these wetland systems. In the event of an unexpected damage occurring this should be reported to the relevant authority immediately.				
An appropriate Contingency-Spill Response Plan is to be compiled and stored on site, for implementation where necessary. Contractors are to be trained in spill response and familiar with spill plan. Contact details for a reputable company to hand large spill events (e.g. SpillTech) must be included in the spill plan and must be available on hand at the site during construction and business operation. Individual operational sites/companies will need to compile their own contingency/spill plans.				
No equipment laydown or storage areas must be located within 20m of any watercourse and/or within the 1:100 year flood line of the iLovu and uMsimbazi Rivers.				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last*	*-7*	*3*

		more than 5 years and as such is rated as Long Term		
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	-1	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Slightly detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-21**	**Low -negative**		
CONFIDENCE LEVEL				
High				

(xi) Altered ecological processes and biodiversity of wetland habitat, as a result of alien invasive plant establishment

There will be movement and disturbance within the site. Such a disturbance may give rise to the colonisation of invasive alien plants.

Shading impact on wetland vegetation associated with road bridges across wetlands may also occur. Whilst shading may result in reduced photosynthetic activity and favour shade-loving plants in some instances, the impact is likely to be relatively low given the degraded nature of the wetland vegetation present.

Table 5-87: Altered ecological processes and biodiversity of wetland habitat, as a result of alien invasive plant establishment

Impact Table: Construction of road access option 1				
PROJECT PHASE	*Operational Phase*			
POSITIVE IMPACT	*Altered ecological processes and biodiversity of wetland habitat, as a result of invasive alien plant establishment*			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-14*	*3*

EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-2*	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Moderately detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-42***	**Moderate - negative**		
PROPOSED MITIGATION MEASURES				
In cases where natural vegetation will be cleared as a result of the movement of people or stockpiling of building materials, re-vegetation should take place. Preceding re-vegetation efforts occurring in cleared and degraded wetlands, it is essential that all solid wastes are removed from the HGM unit, as well as their immediate surroundings. Following the removal of solid waste, a mixture of indigenous species should be introduced (Peters and Clarkson 2012). The re-establishment of vegetation will enhance these systems' capability to maintain biodiversity, it will aid in reducing the velocity and quantity of runoff waters into wetlands, the retardation of water movement though a wetland which will in turn assist with trapping sediment and improving the overall quality of water (Mullins, 2012). Where possible, vegetation should be cut to ground level rather than removing completely so as to assist with binding/stabilising the soil during land-clearing operations.				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-7*	*3*
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	-1	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Slightly detrimental***	***Definite***

IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-21**	**Low -negative**		
CONFIDENCE LEVEL				
High				

5.5.3 Access Road Alternative Option 1c

Impacts associated with this alternative is similar to those outlined and discussed for Access Road Option 1 (preferred) in Section 5.4.2, with the exception of the following:

(a) **Construction Phase**

(i) Increased traffic congestion on the surrounding road network as a result of construction of road access option 1c

Construction activities often have negative impacts on the communities surrounding the construction site and motorists. Impacts such as delays and congested traffic conditions caused by the additional traffic volume of construction vehicles and closure of lanes; increased safety hazards and economic losses may be experienced by the community.

Table 5-88: Impact ratings for increased traffic congestion on the surrounding road network as a result of the construction of road access option 1c

PROJECT PHASE	*Construction Phase*			
DIRECT IMPACT	*Increased traffic congestion as a result of Option 1c road access*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*2*	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*-15*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		

SEVERITY	*-3*	*The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected.*	***Moderately Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-45***	***Moderate - negative***		
PROPOSED MITIGATION MEASURES				
A Traffic Management Plan must be developed for implementation during the construction phase.				
Direct traffic flows during congestion and warn motorists of the upcoming construction zone by means of proper road signage.				
Inform neighbouring residential areas and businesses beforehand if excessively high noise generating activities are to be undertaken.				
Avoid construction before sunrise and after sunset. In the event of this not being possible, the information should be provided in the local media to ensure that people are aware that construction will be taking place at night.				
Improve the efficiency of construction operations by minimizing unexpected delays in the movement of materials and equipment to and from the construction site.				
Try to complete the construction process within the stipulated period. To avoid further inconvenience to the community affected.				
Flagsmen must be on duty to direct traffic flow during congestion and warn motorists of the approaching construction zones.				
POST-MITIGATION				
DURATION	2	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*-10*	*3*
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		

SEVERITY	-2	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Slightly detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-30**	**Low - negative**		
CONFIDENCE LEVEL				
Medium				

(ii) Decline in property values as a result of construction of the road access option 1c

Short-term impacts on property values may be expected during the construction phase of the access road. Communities such as Panorama Park, Larnaco, Karridene, and Illovo Beach are most likely to be impacted the most by this development. While new road developments are beneficial for commuters, they are not as great for those whose homes are impacted by traffic and noise pollution. The resulting noise, smog, and traffic that comes with a highway/ new road construction have a major impact on property values and quality of life.

Although the expected impact on property values during construction is expected to be short term, mitigation measures are still required to reduce the significance of these impacts.

Table 5-89: Impact ratings for decline in property values as a result of construction of road access option 1c

PROJECT PHASE	*Construction Phase*			
DIRECT IMPACT	*Decline in property values as a result of Option 1c road access development*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				

DURATION	*2*	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*-15*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-3*	*The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected.*	***Moderately detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-45***	***Moderate - negative***		
PROPOSED MITIGATION MEASURES				
Noise suppression techniques should be used as far as possible.				
Avoid construction before sunrise and after sunset. In the event of this not being possible, the information should be provided in the local media to ensure that people are aware that construction will be taking place at night.				
Inform neighbouring residential areas and businesses beforehand if excessively high noise-generating activities are to be undertaken.				
Try to complete the construction process within the pre-determined period to avoid further inconvenience to the community affected.				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-7*	*3*
EXTENT	3	*The extent of the impact is rated as Local as it affects*		

		the development area and adjacent properties		
SEVERITY	-1	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Slightly detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-21**	**Low - negative**		
CONFIDENCE LEVEL				
Medium				

(iii) Increased congestion on the R102 as a result of the proposed options that include R102

As Option 1 c road access option will involve construction of the proposed R102 link road within the forested area adjacent to the existing Larnaco development from the R102 and over the N2 to the proposed central boulevard on the KZN ASP site, there could be the potential for increased traffic congestion along the R102 to gain access to the construction area.

Table 5-90: Impact ratings for traffic congestion on the R102 as a result of construction of Option 1c

PROJECT PHASE	*Construction Phase*			
DIRECT IMPACT	*Impact of traffic congestion on the R102, as a result of Option 1c road access development*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*2*	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*-10*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		

SEVERITY	*-2*	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Slightly detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-30***	***Low - negative***		
PROPOSED MITIGATION MEASURES				
Implement traffic warning measures and improve the road signage for temporary construction work along the R102 and the N2.				
Develop a Traffic Management Plan for the construction phase.				
If possible, avoid construction during sunset and sunrise.				
Flagsmen must be on duty to direct traffic flow during congestion and warn motorists of the approaching construction zones.				
POST-MITIGATION				
DURATION	2	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-10*	*3*
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	-2	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Slightly detrimental***	***Definite***

IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-30**	**Low - negative**		
CONFIDENCE LEVEL				
Medium				

(iv) Destruction of indigenous vegetation and faunal habitat as a result of construction of road access option 1c

Options 1c will impact directly on the UCVB wetland habitat (highly sensitive) and the natural forest and forest edge further up the slope, which is considered high to medium-high sensitivity. Although secondary in nature, these wooded areas comprise high species richness and support provincially protected plant species. It is estimated that the total area of natural vegetation that will be destroyed or disturbed during construction is approximately 1.1ha. This includes 0.46ha of wetland habitat and 0.64ha of wooded habitat.

Table 5-91: Impact ratings for destruction of indigenous vegetation and faunal habitat as a result of the construction of road access option 1c

Impact Table: Construction of site access Option 1				
PROJECT PHASE	*Construction Phase*			
DIRECT IMPACT	*Destruction of indigenous vegetation and faunal habitat*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-24*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-3*	*The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or*	***Highly detrimental***	***Definite***

		communities are substantially affected		
IMPACT ON IRREPLACEABLE RESOURCES	*1*	*Irreplaceable resources will be impacted*		
SIGNIFICANCE	**-72**	**High negative**		
PROPOSED MITIGATION MEASURES				
An independent Environmental Control Officer (ECO) must be appointed to oversee construction.				
The development layout has undergone a number of iterations in an attempt to avoid and minimise the impacts to the UCVB wetland and coastal forest as much as possible. The support pillars for the narrow diamond ramps and bridge structures will still impact on the wetland and the forest to a degree. To reduce impacts further the construction footprint must be confined to a small an area as possible and should not extend beyond the development footprint into the surrounding natural areas. If this is not feasible then an alternative that does not affect this parcel of land must be considered, such as Option 3b.				
The remaining and unaffected natural areas must be demarcated no-go areas for construction workers and vehicles.				
For the construction of Option 1c, all support pillars and ramp structures must stay as far out of the UCVB wetland as possible. Construction activities including service roads, construction camps, stock piles etc. must stay out of all surrounding areas containing natural vegetation and areas marked medium-high and highly sensitive.				
For the construction of Options 1c, the bridge to the R102 must be constructed using incremental growth methods, where the bridge deck is extended in stages over the UCVB wetland, and not constructed through the wetland. The support pillars must stay as far out of the UCVB wetland as possible, and no additional support pillars must be permitted in the wetland. The support pillars for the entire length of the bridge must be as wide apart as possible and the minimum number of support pillars as possible must be utilised for the bridge design. The bridge alignment must remain in the current proposed footprint (through the most disturbed portion of the forest). If this is not feasible for any reason, another alternative, such as Option 3b, must be considered. The construction footprint and access roads must remain within the footprint of the bridge deck. Construction activities including service roads, construction camps, stock piles etc. must stay out of all surrounding areas containing natural vegetation and areas marked medium-high and highly sensitive.				
For construction in the wetland, construction methods must be designed in consultation with a suitably qualified wetland rehabilitation engineer. A wetland rehabilitation plan must be compiled by a suitably qualified wetland engineer and wetland ecologist prior to construction commencing. The wetland rehabilitation plan must cover the entire wetland.				
For the impacted forest area, a forest rehabilitation and restoration plan must be compiled by a suitably qualified forest restoration specialist prior to construction commencing. This vegetation rehabilitation and restoration must cover the entire parcel of land. Either the entire parcel of land must be expropriated by the Applicant or consent from the land owners must be obtained for the rehabilitation activities to take place.				
No fires must be permitted on site, especially during the dry season.				

No wild animal may under any circumstance be handled, removed or be interfered with by construction workers.				
No wild animal may under any circumstance be hunted, snared, captured, injured or killed. Regular checks of the surrounding natural areas for snares and traps must be undertaken by the ECO.				
No wild animal may be fed on site and all food stuffs must be contained and not left unattended so that fauna are not attracted to the site during construction.				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-16*	*3*
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	-2	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Moderately Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	1	*Irreplaceable resources will be impacted*		
SIGNIFICANCE	**-48**	**Moderate - negative**		
CONFIDENCE LEVEL				
High				

(b) **Operational Phase**

(i) Increased pressure on local roads as a result of access option 1c

Increased pressure on local roads is a threat to road safety in general, as it can shorten the life span of the road and lead to higher maintenance and repair costs on local residential roads. During the operation phase, road vehicle traffic is expected to increase, and this will lead to increased pressure on the existing road infrastructure. If this is not well planned and managed, negative impacts including reduced road safety can be expected.

Table 5-92: Impact ratings for increased pressure on local roads as a result of road access option 1c

PROJECT PHASE	*Operational Phase*			
DIRECT IMPACT	*Increased pressure on local roads as a result of Access Option 1c*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-8*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-1*	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Slightly detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*1*	*Irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-24***	***Low - negative***		
PROPOSED MITIGATION MEASURES				
Driver training should be implemented.				
Improved traffic management solutions should be implemented.				
Follow recommendations provided in the Traffic Management Plan to be compiled by a Traffic Engineer and approved by eTA.				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-8*	*3*

EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	-1	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Slightly detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	1	*Irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-24**	**Low - negative**		
CONFIDENCE LEVEL				
High				

(ii) Decline in property values as a result of access Option 1c

Undesirable facilities such as highways, manufacturing plants and landfills in an area can reduce property values. Conversely, disamenities, like the presence of industrial land and highway nearness, affect the prices negatively. Facilities such as highways and interchanges in an area may reduce the property values of the surrounding owners. According to the same theory, major improvements to existing transportation infrastructure should also have a strong, positive effect on nearby real estate values. With the introduction of the R102 link adjacent to the Larnaco residential area, there could potentially be a decline in their property values.

Table 5-93: Impact ratings for a decline in property values as a result of access Option 1c

PROJECT PHASE	*Operational Phase*			
DIRECT IMPACT	*Decline in property values as a result of Access Option 1c*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more*	*-16*	*3*

		than 5 years and as such is rated as Long Term		
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-2*	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Moderately Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*1*	*Irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-48***	***Moderate - negative***		
PROPOSED MITIGATION MEASURES				
Full disclosure of information must be provided to the affected communities.				
Give effect to landscaping and project design measures to reduce the noise and visual impacts of the new interchanges to the Larnaco residents.				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-8*	*3*
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	-1	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and*	***Slightly Detrimental***	***Definite***

		social functions and processes are minimally affected		
IMPACT ON IRREPLACEABLE RESOURCES	1	*Irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-24**	**Low - negative**		
CONFIDENCE LEVEL				
High				

(iii) Economic opportunities as a result of Option 1c road access

Option 1c has an opportunity to create economic opportunities for the communities along the proposed routes. The informal traders in these areas may benefit from increased transient traffic. Also, increased traffic in this area has an opportunity to induce road upgrades on P578 and P197 roads to accommodate the increased traffic and the community, which would be a huge benefit to the community. The community may also benefit from the employment opportunities created by the establishment of the KZN ASP.

Table 5-94: Impact ratings for economic opportunities as a result of Option 1c road access

PROJECT PHASE	*Operational Phase*			
DIRECT IMPACT	*Economic opportunities as a result of Access Option 1c*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*7*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		

SEVERITY	*1*	*The severity of the impact is rated as Low positive as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally improved*	***Slightly beneficial***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	***21***	***Low - positive***		
PROPOSED MITIGATION MEASURES				
Employ the local labour force for the operation of the KZN ASP.				
Consider providing a safe trading area/stall for local traders along the proposed routes or within the KZN ASP to induce the local economy of the community.				
The increased market as a result of the KZN ASP will increase the economy of Illovo beach.				
Rental housing would be in high demand in the area as a result of people that want to stay closer to their place of work. The community can offer rental accommodation.				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*14*	*3*
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	2	*The severity of the impact is rated as Moderate positive as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are positively affected*	***Moderately beneficial***	***Definite***

IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**42**	**Moderate - positive**		
CONFIDENCE LEVEL				
High				

(iv) Potential health (air quality) impacts as a result of Option 1c access to the KZN ASP development

The main findings of the Air Quality Impact Assessment were similar to Option 0 and Option 1 road access.

- Excess lifetime cancer risk due to diesel particulate matter at 100 m from the centre of the road was slightly more than 1 in 10 000 and is considered "moderate risk" (for all scenarios), while at 250 m from the middle of the road, excess lifetime cancer risk was less than 1 in 10 000 and is considered "low risk".
- According to the study, Option 1 has low impacts on air quality based on simulated ground level impacts as well as excess lifetime cancer risk and is the third preferred access option.

Table 5-95: Impact ratings for health (air quality) impacts as a result of Option 1c road access

PROJECT PHASE	*Operational Phase*			
DIRECT IMPACT	*Potential health (air quality) impacts as a result of Access Option 1c*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-8*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-1*	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and*	***Slightly Detrimental***	***Definite***

		processes are minimally affected		
IMPACT ON IRREPLACEABLE RESOURCES	*1*	*Irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-24***	***Low - negative***		
PROPOSED MITIGATION MEASURES				
Although vehicle-targeted air pollution measures reside with the national government (this may take the form of reformulation of fuels, retrofitting of catalytic converters and the establishment of emission standards to limit the discharge of air pollutants from new motor vehicles), it is may be necessary to implement measures that mitigate emissions from vehicles. This may include: • *The requirement that vehicle suppliers or contractors ensure compliance with appropriate emission standards for their fleets.* • *The requirement that all maintenance and repair of vehicles be carried out as prescribed by manufacturer in order to maximize combustion and reduce gaseous emissions.*				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-8*	*3*
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	-1	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Slightly Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	1	*Irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-24**	**Low - negative**		
CONFIDENCE LEVEL				
High				

(v) Impact on sensitive noise receptors as a result of traffic flows along the Option 1c access route

Noise levels at the nearest sensitive receptors to Option 1c road access was predicted, (*assuming the peak hour traffic will be the worst case of traffic entering and exiting the ASP area*).

The nearest sensitive receptor (residents of Larnaco near the northern boundary wall is 35m from the centreline of the proposed link road to the R102. The nearest sensitive receptor to the N2 (residents of Larnaco east of the N2) is 80m from the centreline of the nearest carriageway of the N2. The projected rise in noise levels in the northern part of the adjacent residential area of Larnaco residential area is due to a combination of the reduced distance of the nearest sensitive receptors to the southern-going on and off- ramps and the doubling of the peak hour traffic flow on the N2. It has been assumed that the majority of the peak hour traffic will use the N2 highway leaving the link to the R102 to provide a secondary access route for local or overflow traffic comprising an assumed 10% of the total traffic flow into the proposed ASP.

Table 5-96: Impacts of traffic noise on the sensitive receptors along Option 1c access road

PROJECT PHASE	*Operational Phase*			
DIRECT IMPACT	*Increased noise impacts as a result of Option 1c road access*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-21*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-3*	*The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important,*	***Highly Detrimental***	***Definite***

		sensitive or vulnerable systems or communities are substantially affected		
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted*		
SIGNIFICANCE	***-63***	***High - negative***		
PROPOSED MITIGATION MEASURES				
There are no mitigation measures - n/a.				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-21*	*3*
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	-3	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Highly Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted*		
SIGNIFICANCE	**-63**	**High - negative**		
CONFIDENCE LEVEL				
High				

(vi) Impact of increased visual impact on sensitive receptors as a result of construction of the narrow diamond interchange with the R102 link for Option 1c access route

Larnaco residents are the sensitive visual receptors, as this R102 link is directly in their line of sight. The narrow diamond structure is also visible. Existing undulating topography means that the R102 link will be visible from surrounding high viewpoints and residents. The addition of the narrow diamond structure is a further visual imposition.

Table 5-97: Impact ratings for increased visual impact on sensitive receptors as a result of construction of the narrow diamond interchange for Option 1c access route

PROJECT PHASE	*Operational Phase*			
DIRECT IMPACT	*Increased visual impacts as a result of Option 1c road access*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-16*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-2*	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Moderately Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*1*	*Irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-48***	***Moderate - negative***		

PROPOSED MITIGATION MEASURES				
There are no mitigation measures - n/a.				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-16*	*3*
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	-2	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Moderately Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	1	*Irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-48**	**Moderate - negative**		
CONFIDENCE LEVEL				
High				

5.5.4 Access Road Alternative Option 1d

Impacts associated with this alternative is similar to those outlined and discussed for Access Road Option 1 (preferred) in Section 5.4.2, with the exception of the following:

(a) **Construction Phase**

(i) Increased traffic congestion on the surrounding road network as a result of construction of road access option 1d

Construction activities often have negative impacts on the communities surrounding the construction site and motorists. Impacts such as delays and congested traffic conditions caused by the additional traffic volume of construction vehicles and closure of lanes; increased safety hazards and economic losses may be experienced by the community.

Table 5-98: Impact ratings for increased traffic congestion on the surrounding road network as a result of the construction of road access option 1d

PROJECT PHASE	*Construction Phase*			
DIRECT IMPACT	*Increased traffic congestion as a result of Option 1d road access*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*2*	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*-15*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-3*	*The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected.*	***Moderately Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-45***	***Moderate - negative***		
PROPOSED MITIGATION MEASURES				
A Traffic Management Plan must be developed for implementation during the construction phase.				
Direct traffic flows during congestion and warn motorists of the upcoming construction zone by means of proper road signage.				
Inform neighbouring residential areas and businesses beforehand if excessively high noise generating activities are to be undertaken.				

Avoid construction before sunrise and after sunset. In the event of this not being possible, the information should be provided in the local media to ensure that people are aware that construction will be taking place at night.				
Improve the efficiency of construction operations by minimizing unexpected delays in the movement of materials and equipment to and from the construction site.				
Try to complete the construction process within the stipulated period. To avoid further inconvenience to the community affected.				
Flagsmen must be on duty to direct traffic flow during congestion and warn motorists of the approaching construction zones.				
POST-MITIGATION				
DURATION	2	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*-10*	*3*
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	-2	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Slightly detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-30**	**Low - negative**		
CONFIDENCE LEVEL				
Medium				

(ii) Nuisance and inconvenience to the local community as a result of road upgrade activities during construction

Inconvenience is one of the negative impacts that could be experienced by the community during construction. Nuisance impacts on the local community such as increased noise and

dust pollution as a result of construction vehicles and the use of heavy equipment may occur. Safety hazards and occasional ground vibrations may also cause damage to nearby structures. This makes it imperative that these impacts are reduced to minimize the impact on the community.

Table 5-99: Impact ratings for nuisance and inconvenience to the local community as a result of road upgrade activities as a result of the construction of road access option 1d

PROJECT PHASE	*Construction Phase*			
DIRECT IMPACT	*Inconvenience and nuisance to the local community, as a result of construction of Option 1d road access*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*2*	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*-10*	*2*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-2*	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected.*	***Slightly Detrimental***	***Likely***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-20***	***Low - negative***		
PROPOSED MITIGATION MEASURES				
Prepare a plan of communication with residents and businesses surrounding the construction site.				

Noise suppression techniques should be used as far as possible.				
Determine alternative routes to divert the traffic.				
Complete the construction within the stipulated period.				
If possible, avoid construction between sunrise and sunset.				
POST-MITIGATION				
DURATION	2	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*-5*	*2*
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	-1	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Negligible***	***Likely***
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-10**	**Very low - negative**		
CONFIDENCE LEVEL				
Medium				

(iii) Decline in property values as a result of construction of the road access option 1d

Short-term impacts on property values may be expected during the construction phase of the access road. Communities such as Panorama Park, Larnaco, Karridene, and Illovo beach are most likely to be impacted the most by this development. While new road developments are beneficial for commuters, they are not as great for those whose homes are impacted by traffic and noise pollution. The resulting noise, smog, and traffic that comes with a highway/ new road construction have a major impact on property values and quality of life.

Although the expected impact on property values during construction is expected to be short term, mitigation measures are still required to reduce the significance of these impacts.

Table 5-100: Impact ratings for impact on property values as a result of construction of road access option 1d

PROJECT PHASE	*Construction Phase*			
DIRECT IMPACT	*Decline in property values as a result of Option 1d road access development*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*2*	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*-15*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-3*	*The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected.*	***Moderately detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-45***	***Moderate - negative***		
PROPOSED MITIGATION MEASURES				
Noise suppression techniques should be used as far as possible.				
Avoid construction before sunrise and after sunset. In the event of this not being possible, the information should be provided in the local media to ensure that people are aware that construction will be taking place at night.				
Inform neighbouring residential areas and businesses beforehand if excessively high noise-generating activities are to be undertaken.				

Try to complete the construction process within the pre-determined period to avoid further inconvenience to the community affected.				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-14*	*3*
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	-2	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Moderately detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-42**	**Moderate - negative**		
CONFIDENCE LEVEL				
Medium				

(iv) Increased congestion on the R102 as a result of the proposed options that include R102

As Option 1d road access option will involve construction of the proposed R102 link road within the forested area adjacent to the existing Larnaco development from the R102 and over the N2 to the proposed central boulevard on the KZN ASP site, there could be the potential for increased traffic congestion along the R102 to gain access to the construction area.

Table 5-101: Impact ratings for traffic congestion on the R102 as a result of construction of Option 1d

PROJECT PHASE	*Construction Phase*			
DIRECT IMPACT	*Impact of traffic congestion on the R102, as a result of Option 1d road access development*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*2*	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*-10*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-2*	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Slightly detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-30***	***Low - negative***		
PROPOSED MITIGATION MEASURES				
Implement traffic warning measures and improve the road signage for temporary construction work along the R102 and the N2.				
Develop a Traffic Management Plan for the construction phase.				
If possible, avoid construction during sunset and sunrise.				
POST-MITIGATION				

DURATION	2	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-10*	*3*
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	-2	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Slightly detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-30**	**Low - negative**		
CONFIDENCE LEVEL				
Medium				

(v) Destruction of indigenous vegetation and faunal habitat as a result of construction of road access option 1d

Options 1d will impact directly on the UCVB wetland habitat (highly sensitive) and the natural forest and forest edge further up the slope, which is considered high to medium-high sensitivity. Although secondary in nature, these wooded areas comprise high species richness and support provincially protected plant species. It is estimated that the total area of natural vegetation that will be destroyed or disturbed during construction is approximately 1.1ha. This includes 0.46ha of wetland habitat and 0.64ha of wooded habitat.

Table 5-102: Impact ratings for destruction of indigenous vegetation and faunal habitat as a result of the construction of road access option 1d

Impact Table: Construction of site access Option 1d				
PROJECT PHASE	*Construction Phase*			
DIRECT IMPACT	*Destruction of indigenous vegetation and faunal habitat*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**

PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-24*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-3*	*The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected*	***Highly detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*1*	*Irreplaceable resources will be impacted*		
SIGNIFICANCE	**-72**	**High negative**		
PROPOSED MITIGATION MEASURES				
An independent Environmental Control Officer (ECO) must be appointed to oversee construction.				
The development layout has undergone a number of iterations in an attempt to avoid and minimise the impacts to the UCVB wetland and coastal forest as much as possible. The support pillars for the narrow diamond ramps and bridge structures will still impact on the wetland and the forest to a degree. To reduce impacts further the construction footprint must be confined to a small an area as possible and should not extend beyond the development footprint into the surrounding natural areas. If this is not feasible then an alternative that does not affect this parcel of land must be considered, such as Option 3b.				
The remaining and unaffected natural areas must be demarcated no-go areas for construction workers and vehicles.				
For the construction of Option 1d, the bridge to the R102 must be constructed using incremental growth methods, where the bridge deck is extended in stages over the UCVB wetland, and not constructed through the wetland. The support pillars must stay as far out of the UCVB wetland as possible, and no additional support pillars must be permitted in the wetland. The support pillars for the entire length of the bridge must be as wide apart as possible and the minimum number of support pillars as possible must be utilised for the bridge design. The bridge alignment must remain in the current proposed footprint (through the most disturbed portion of the forest). If this is not feasible for any reason, another alternative, such as Option 3b, must be considered. The construction footprint and access roads must remain within the footprint of the bridge deck. Construction activities including service roads, construction camps, stock piles etc. must stay out of all surrounding areas containing natural vegetation and areas marked medium-high and highly sensitive.				

For construction in the wetland, construction methods must be designed in consultation with a suitably qualified wetland rehabilitation engineer. A wetland rehabilitation plan must be compiled by a suitably qualified wetland engineer and wetland ecologist prior to construction commencing. The wetland rehabilitation plan must cover the entire wetland.				
For the impacted forest area, a forest rehabilitation and restoration plan must be compiled by a suitably qualified forest restoration specialist prior to construction commencing. This vegetation rehabilitation and restoration must cover the entire parcel of land. Either the entire parcel of land must be expropriated by the Applicant or consent from the land owners must be obtained for the rehabilitation activities to take place.				
No fires must be permitted on site, especially during the dry season.				
No wild animal may under any circumstance be handled, removed or be interfered with by construction workers.				
No wild animal may under any circumstance be hunted, snared, captured, injured or killed. Regular checks of the surrounding natural areas for snares and traps must be undertaken by the ECO.				
No wild animal may be fed on site and all food stuffs must be contained and not left unattended so that fauna are not attracted to the site during construction.				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-16*	*3*
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	-2	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Moderately Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	1	*Irreplaceable resources will be impacted*		
SIGNIFICANCE	**-48**	**Moderate - negative**		
CONFIDENCE LEVEL				
High				

(b) **Operational Phase**

(i) Increased pressure on local roads as a result of access option 1d

Increased pressure on the R102 may result as majority of the traffic to the proposed development will access the site via the R102. This is a threat to road safety in general, as it can shorten the life span of the road and lead to higher maintenance and repair costs on the R102. If this access is not well planned and managed, negative impacts including reduced road safety can be expected.

Table 5-103: Impact ratings for increased pressure on local roads as a result of road access option 1d

PROJECT PHASE	*Operational Phase*			
DIRECT IMPACT	*Increased pressure on local roads as a result of Access Option 1d*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-16*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-2*	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Moderately detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*1*	*Irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-48***	***Moderate - negative***		

PROPOSED MITIGATION MEASURES				
Driver training should be implemented.				
Improved traffic management solutions should be implemented.				
Follow recommendations provided in the traffic management plan.				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-8*	*3*
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	-1	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Slightly detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	1	*Irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-24**	**Low - negative**		
CONFIDENCE LEVEL				
High				

(ii) Decline in property values as a result of access Option 1d

Undesirable facilities such as highways, manufacturing plants and landfills in an area can reduce property values. Conversely, disamenities, like the presence of industrial land and highway nearness, affect the prices negatively. Facilities such as highways and interchanges in an area may reduce the property values of the surrounding owners. According to the same theory, major improvements to existing transportation infrastructure should also have a strong, positive effect on nearby real estate values. As the Larnaco residential area is located close to the R102 link, there is a potential for decline in property values.

Table 5-104: Impact ratings for a decline in property values as a result of access Option 1d

PROJECT PHASE	*Operational Phase*

DIRECT IMPACT	*Decline in property values as a result of Access Option 1d*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-24*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-3*	*The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected*	***Highly Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*1*	*Irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-72***	***High - negative***		
PROPOSED MITIGATION MEASURES				
Full disclosure of information must be provided to the affected communities.				
Give effect to landscaping and project design measures to reduce the noise and visual impacts of the new interchanges to the Larnaco residents.				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-16*	*3*
EXTENT	3	*The extent of the impact is rated as Local as it affects*		

		the development area and adjacent properties		
SEVERITY	-2	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Moderately Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	1	*Irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-48**	**Moderate - negative**		
CONFIDENCE LEVEL				
High				

(iii) Economic opportunities as a result of Option 1d road access

Option 1d has an opportunity to create economic opportunities for the communities along the proposed routes. The informal traders in these areas may benefit from increased transient traffic. Also, increased traffic in this area has an opportunity to induce road upgrades on P578 and P197 roads to accommodate the increased traffic and the community, which would be a huge benefit to the community. The community may also benefit from the employment opportunities created by the establishment of the KZN ASP.

Table 5-105: Impact ratings for economic opportunities as a result of Option 1d road access

PROJECT PHASE	*Operational Phase*			
DIRECT IMPACT	*Economic opportunities as a result of Access Option 1d*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years*	*7*	*3*

		and as such is rated as Long Term		
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*1*	*The severity of the impact is rated as Low positive as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally improved*	***Slightly beneficial***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	***21***	***Low - positive***		
PROPOSED MITIGATION MEASURES				
Employ the local labour force for the operation of the KZN ASP.				
Consider providing a safe trading area/stall for local traders along the proposed routes or within the KZN ASP to induce the local economy of the community.				
The increased market as a result of the KZN ASP will increase the economy of Illovo beach.				
Rental housing would be in high demand in the area as a result of people that want to stay closer to their place of work. The community can offer rental accommodation.				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*14*	*3*
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	2	*The severity of the impact is rated as Moderate positive as the affected environment is altered but natural, cultural and social functions and processes*	***Moderately beneficial***	***Definite***

		continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are positively affected		
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**42**	**Moderate - positive**		
CONFIDENCE LEVEL				
High				

(iv) Potential health (air quality) impacts as a result of Option 1d access to the KZN ASP development

The main findings of the Air Quality Impact Assessment were similar to Option 0, Option 1 and Option 1c road access.

- Excess lifetime cancer risk due to diesel particulate matter at 100 m from the centre of the road was slightly more than 1 in 10 000 and is considered "moderate risk" (for all scenarios), while at 250 m from the middle of the road, excess lifetime cancer risk was less than 1 in 10 000 and is considered "low risk".
- According to the study, Option 1d has low impacts on air quality based on simulated ground level impacts as well as excess lifetime cancer risk and is the most preferred access option.

Table 5-106: Impact ratings for health (air quality) impacts as a result of Option 1d road access

PROJECT PHASE	*Operational Phase*			
DIRECT IMPACT	*Potential health (air quality) impacts as a result of Access Option 1d*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*0*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects*		

		the development area and adjacent properties		
SEVERITY	*0*	*Negligible*	***Negligible***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*1*	*Irreplaceable resources will be impacted.*		
SIGNIFICANCE	***0***	***Very Low - negative***		
PROPOSED MITIGATION MEASURES				
Although vehicle-targeted air pollution measures reside with the national government (this may take the form of reformulation of fuels, retrofitting of catalytic converters and the establishment of emission standards to limit the discharge of air pollutants from new motor vehicles), it is may be necessary to implement measures that mitigate emissions from vehicles. This may include: • *The requirement that vehicle suppliers or contractors ensure compliance with appropriate emission standards for their fleets.* • *The requirement that all maintenance and repair of vehicles be carried out as prescribed by manufacturer in order to maximize combustion and reduce gaseous emissions.*				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*0*	*3*
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	0	*Negligible*	***Negligible***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	1	*Irreplaceable resources will be impacted.*		
SIGNIFICANCE	**0**	**Very Low - negative**		
CONFIDENCE LEVEL				
High				

(v) Impact on sensitive noise receptors as a result of traffic flows along the Option 1d access route

Noise levels at the nearest sensitive receptors to Option 1d road access was predicted, (*assuming the peak hour traffic will be the worst case of traffic entering and exiting the ASP area*).

Option 1d interchange design gives access to the eastern boundary of the proposed ASP via a new elevated link road to the existing R102, and a bridge over the N2, without any direct access to the N2. The nearest sensitive receptor (Illovo Beach area along the R102) is 22m from the centreline of the R102. The other nearest sensitive receptor (Larnaco residents on the northern boundary wall) is 35m from the centreline of the link road to the R102. Noise levels from the N2 will remain substantially unchanged whereas those at the north of the adjacent residential area of Larnaco residential development will be significant. The absence of a link to the N2 means that all the peak hour traffic to the proposed KZN ASP will use the link to the R102, leading to a very high noise level at all positions along this road.

Table 5-107: Impacts of traffic noise on the sensitive receptors along Option 1d access road

PROJECT PHASE	*Operational Phase*			
DIRECT IMPACT	*Increased noise impacts as a result of Option 1d road access*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-21*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-3*	*The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected*	***Highly Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted*		
SIGNIFICANCE	***-63***	***High - negative***		

PROPOSED MITIGATION MEASURES				
There are no mitigation measures - n/a.				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-21*	*3*
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	-3	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Highly Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted*		
SIGNIFICANCE	**-63**	**High - negative**		
CONFIDENCE LEVEL				
High				

(vi) Impact of increased visual impact on sensitive receptors as a result of construction of the Option 1d access route

Larnaco residents are the sensitive visual receptors, as this R102 link is directly in their line of sight. Existing undulating topography means the R102 link will be visible from surrounding high viewpoints and residents. This access option has medium VAC. Similar structures already exist along the N2, but would be more imposing on the existing landscape.

Table 5-108: Impact ratings for increased visual impact on sensitive receptors as a result of construction of the Option 1d access route

PROJECT PHASE	*Operational Phase*			
DIRECT IMPACT	*Increased visual impacts as a result of Option 1d road access*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-16*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-2*	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Moderately Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*1*	*Irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-48***	***Moderate - negative***		
PROPOSED MITIGATION MEASURES				
There are no mitigation measures - n/a.				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-16*	*3*

EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	-2	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Moderately Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	1	*Irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-48**	**Moderate - negative**		
CONFIDENCE LEVEL				
High				

5.5.5 Access Road Alternative Option 3b

Impacts associated with this alternative is similar to those outlined and discussed for Access Road Option 1 (preferred) in Section 5.4.2, with the exception of the following:

(a) **Construction Phase**

(i) Nuisance and inconvenience to the local community as a result of road upgrade activities during construction

Inconvenience is one of the negative impacts that could be experienced by the community during construction. Nuisance impacts on the local community such as increased noise and dust pollution as a result of construction vehicles and the use of heavy equipment may occur. Affected communities are those living at Panorama Park. Safety hazards and occasional ground vibrations may also cause damage to nearby structures. This makes it imperative that these impacts are reduced to minimize the impact on the community.

Table 5-109: Impact ratings for nuisance and inconvenience to the local community as a result of road upgrade activities as a result of the construction of road access option 3b

PROJECT PHASE	*Construction Phase*

DIRECT IMPACT	*Inconvenience and nuisance to the local community, as a result of construction of Option 3b road access*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*2*	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*-10*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-2*	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected.*	***Slightly Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-30***	***Low - negative***		
PROPOSED MITIGATION MEASURES				
Prepare a plan of communication with residents and businesses surrounding the construction site.				
Noise suppression techniques should be used as far as possible.				
Determine alternative routes to divert the traffic.				
Complete the construction within the stipulated period.				
If possible, avoid construction between sunrise and sunset.				
POST-MITIGATION				
DURATION	2	*The duration of the activity associated with the impact will last 6-18*	*-5*	*2*

		months and as such is rated as Short term		
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	-1	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Negligible***	***Likely***
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-10**	**Very low - negative**		
CONFIDENCE LEVEL				
Medium				

(ii) Decline in property values as a result of construction of the road access option 3b

Short-term impacts on property values may be expected during the construction phase of the access road. Communities such as Panorama Park, Karridene, and Illovo beach are most likely to be impacted the most by this development. While new road developments are beneficial for commuters, they are not as great for those whose homes are impacted by traffic and noise pollution. The resulting noise, smog, and traffic that comes with a highway/ new road construction have a major impact on property values and quality of life.

Although the expected impact on property values during construction is expected to be short term, mitigation measures are still required to reduce the significance of these impacts.

Table 5-110: Impact ratings for impact on property values as a result of construction of road access option 3b

PROJECT PHASE	*Construction Phase*			
DIRECT IMPACT	*Impact on property values as a result of Option 3b road access development*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				

DURATION	*2*	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*-10*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-2*	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Slightly detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-30***	***Low - negative***		
PROPOSED MITIGATION MEASURES				
Noise suppression techniques should be used as far as possible.				
Avoid construction before sunrise and after sunset. In the event of this not being possible, the information should be provided in the local media to ensure that people are aware that construction will be taking place at night.				
Inform neighbouring residential areas and businesses beforehand if excessively high noise-generating activities are to be undertaken.				
Try to complete the construction process within the pre-determined period to avoid further inconvenience to the community affected.				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-7*	*3*
EXTENT	3	*The extent of the impact is rated as Local as it affects*		

		the development area and adjacent properties		
SEVERITY	-1	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Slightly detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-21**	**Low - negative**		
CONFIDENCE LEVEL				
Medium				

(iii) Destruction of indigenous vegetation and faunal habitat as a result of construction of road access option 3b

Option 3b will avoid the highly sensitive parcel of land in the north-eastern corner of the study area, however the new loop ramp situated further south will impact on the upper reaches of a drainage line as well as an area of coastal scrub/thicket. These areas were highly infested with alien vegetation and considered of medium sensitivity.

Table 5-111: Impact ratings for the destruction of indigenous vegetation and faunal habitat as a result of the construction of road access option 3b

Impact Table: Construction of site access Option 3b				
PROJECT PHASE	*Construction Phase*			
DIRECT IMPACT	*Destruction of indigenous vegetation and faunal habitat*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-14*	*3*
EXTENT	*2*	*The extent of the impact is rated as site as it will affect only the development area*		

SEVERITY	*-2*	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Moderately Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*1*	*Irreplaceable resources will be impacted*		
SIGNIFICANCE	**-42**	**Moderate - negative**		
PROPOSED MITIGATION MEASURES				
An independent Environmental Control Officer (ECO) must be appointed to oversee construction				
The remaining and unaffected natural areas must be demarcated no-go areas for construction workers and vehicles. Construction activities including service roads, construction camps, stock piles etc. must stay out of all surrounding areas containing natural vegetation and areas marked medium-high and highly sensitives				
For construction at the top of the drainage line, construction methods must be designed in consultation with a suitably qualified wetland rehabilitation engineer. A wetland rehabilitation plan must be compiled by a suitably qualified wetland engineer and wetland ecologist prior to construction commencing. The wetland rehabilitation plan must cover the entire wetland and riparian drainage line				
Following construction, all remaining areas that have been cleared of vegetation must be rehabilitated with appropriate indigenous plant species found in the area. A site specific rehabilitation plan must be compiled by a suitably qualified ecologist and implemented by a suitably qualified rehabilitation specialist				
No fires must be permitted on site, especially during the dry season				
No wild animal may under any circumstance be handled, removed or be interfered with by construction workers				
No wild animal may under any circumstance be hunted, snared, captured, injured or killed. Regular checks of the surrounding natural areas for snares and traps must be undertaken by the ECO				
No wild animal may be fed on site and all food stuffs must be contained and not left unattended so that fauna are not attracted to the site during construction				
POST-MITIGATION				
DURATION	3	*The duration of the activity associated with the impact will last 18 months-5 years and as such is rated as Medium term*	*-14*	*2*

EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	-2	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Moderately Detrimental***	***Likely***
IMPACT ON IRREPLACEABLE RESOURCES	1	*Irreplaceable resources will be impacted*		
SIGNIFICANCE	**-28**	**Low - negative**		
CONFIDENCE LEVEL				
High				

(iv) Destruction of plant species of conservation concern and protected plant species as a result of access option 3b

Although there is no sensitive vegetation along access option 3b, there is the possibility that some plant species of conservation concern and/or protected plant species may occur within the development footprint.

Table 5-112: Impact ratings for destruction of indigenous vegetation and faunal habitat as a result of the construction of road access option 3b

Impact Table				
PROJECT PHASE	*Construction Phase*			
DIRECT IMPACT	*Destruction of plant species of conservation concern and protected plant species*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will*	*-14*	*2*

		last more than 5 years and as such is rated as Long Term		
EXTENT	*2*	*The extent of the impact is rated as site as it will affect only the development area*		
SEVERITY	*-2*	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Moderately Detrimental***	***Likely***
IMPACT ON IRREPLACEABLE RESOURCES	*1*	*Irreplaceable resources will be impacted*		
SIGNIFICANCE	**-28**	**low - negative**		
PROPOSED MITIGATION MEASURES				
As plant species of conservation concern, such as Hypoxis hemerocallidea *were recorded in modified grassy areas, e.g. between the costal thicket and sugar cane, a botanical walk through must be undertaken in the development footprint prior to construction commencing. If such plants are found, a rescue and relocation plan must be compiled by a suitably qualified botanist, and the plants relocated before construction commences*				
A permit from Ezemvelo KZN Wildlife (EKZNW) will be required to destroy or relocate any species of conservation concern or provincially protected plant species. A permit from the national authority (DAFF) will be required to remove, cut or destroy a nationally protected species				
POST-MITIGATION				
DURATION	2	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*-6*	*3*
EXTENT	1	*The extent of the impact is rated as footprint as it only affects the area in which the proposed activity will occur*		
SEVERITY	-2	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue*	***Negligible***	***Definite***

		albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected		
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted*		
SIGNIFICANCE	**-18**	**very low negative**		
CONFIDENCE LEVEL				
High				

(v) Loss of ecosystem services and ecological corridors, as a result of construction of road access option 3b

As the infrastructure is proposed to be placed in mostly modified areas, the impacts related to the loss of ecosystem services and ecological corridors will be low. Refer to below for the associated impact assessment ratings and significance.

Table 5-113: Loss of ecosystem services and ecological corridors as a result of road access option 3b

Impact Table: Construction of road access option 3b				
PROJECT PHASE	*Construction Phase*			
DIRECT IMPACT	--			
INDIRECT IMPACT	*Loss of ecosystem services and ecological corridors*			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-16*	*2*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-3*	*The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important,*	***Moderately Detrimental***	***Likely***

		sensitive or vulnerable systems or communities are substantially affected		
IMPACT ON IRREPLACEABLE RESOURCES	*1*	*Irreplaceable resources will be impacted*		
SIGNIFICANCE	**-72**	**Low negative**		
PROPOSED MITIGATION MEASURES				
Construction activities must remain within the footprint of the area required for the N2 interchange (including construction camps, stock piles etc.).				
All mitigation measures that have been prescribed to prevent erosion, siltation, pollution, the spread of invasive alien plant species, and any other impact that will result in habitat degradation and depletion of ecosystem services must be adhered to.				
POST-MITIGATION				
DURATION	2	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*-6*	*2*
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	-2	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Negligible***	***Likely***
IMPACT ON IRREPLACEABLE RESOURCES	1	*Irreplaceable resources will be impacted*		
SIGNIFICANCE	**-12**	**very low negative**		
CONFIDENCE LEVEL				
High				

(vi) Permanent loss of wetland habitat, as a result of construction of the access option 3b

Access option 3b has been identified as being the most feasible access option, as it has the least impact on the surrounding wetlands. The loop ramp will have a low negative impact on the upper reaches of a drainage line and a small portion of coastal thicket. Impacts caused by the construction of Option 3b can easily be mitigated.

Table 5-114: Impact ratings for permanent loss of wetland habitat as a result of access option 3b

Impact Table: Construction of site access Option 3b				
PROJECT PHASE	*Construction Phase*			
DIRECT IMPACT	*Permanent loss of wetland habitat as a result of access option 3b*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*2*	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*-14*	*3*
EXTENT	*2*	*The extent of the impact is rated as site as it will affect only the development area*		
SEVERITY	*-2*	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Slightly Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-24**	**Low - negative**		
PROPOSED MITIGATION MEASURES				
An independent Environmental Control Officer (ECO) must be appointed to oversee construction				
The development footprint must be demarcated and the surrounding areas must be demarcated no-go areas for construction workers and vehicles. Construction activities including service roads, construction camps, stock piles etc. must stay out of all surrounding areas.				

For construction at the top of the drainage line, construction methods must be designed in consultation with a suitably qualified wetland rehabilitation engineer. A wetland rehabilitation plan must be compiled by a suitably qualified wetland engineer and wetland ecologist prior to construction commencing. The wetland rehabilitation plan must cover the entire wetland and riparian drainage line				
Following construction, all remaining areas that have been cleared of vegetation must be rehabilitated with appropriate indigenous plant species found in the area. A site specific rehabilitation plan must be compiled by a suitably qualified ecologist and implemented by a suitably qualified rehabilitation specialist.				
No fires must be permitted on site, especially during the dry season.				
No wild animal may under any circumstance be handled, removed or be interfered with by construction workers.				
No wild animal may under any circumstance be hunted, snared, captured, injured or killed. Regular checks of the surrounding natural areas for snares and traps must be undertaken by the ECO.				
No wild animal may be fed on site and all food stuffs must be contained and not left unattended so that fauna are not attracted to the site during construction.				
POST-MITIGATION				
DURATION	2	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*-3*	*3*
EXTENT	1	*The extent of the impact is rated as footprint as it only affects the area in which the proposed activity will occur*		
SEVERITY	-1	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Negligible***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-9**	**Very low - negative**		
CONFIDENCE LEVEL				
High				

(vii) Reduced water quality of wetlands and watercourses, as a result of the proposed access option 3b

The impacts related to reduced water quality of wetlands and watercourses the same as that of road access option 1. Therefore, impact significance before and after mitigation is the same. Refer below for the impact assessment ratings and significance.

Table 5-115: Impact ratings for reduced water quality of wetlands and watercourses, as a result of proposed access option 3b

Impact Table: Construction of site access Option 3b				
PROJECT PHASE	*Construction Phase*			
DIRECT IMPACT	*Reduced water quality of wetlands and watercourses, as a result of the proposed access option 3b*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*2*	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*-14*	*3*
EXTENT	*2*	*The extent of the impact is rated as site as it will affect only the development area*		
SEVERITY	*-2*	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Slightly Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-24**	**Low - negative**		
PROPOSED MITIGATION MEASURES				
An independent Environmental Control Officer (ECO) must be appointed to oversee construction.				
As a consequence of the proposed development, the wetland system will possibly encounter anthropogenic disturbances. Therefore, in order to manage and mitigate these threats faced by the				

wetland a suitable buffer should be determined. Therefore, during periods of construction there should be minimal human disturbances by minimising activities that would lead to excessive pollution and run off into the drainage line (Kotze et al., 2008). During the construction phase, the recommended wetland buffer is 30m.				
During the construction phase all measures should be taken in order to prevent contamination of wetland areas by vehicles utilised. If any spills of diesel, petrol, oil, or corrosive fluid occur a spill kit should be kept on site to immediately address this. All vehicles and machinery should therefore be kept off site in a bunded, platformed location in order to avoid such contamination in the watercourses.				
Implement best-practice measures to control water pollution risks, including the handling and dispensing of fuels and chemicals.				
All vehicles should only be allowed to stand overnight and refuelled only on impervious surfaces. Additionally, materials not to be stockpiled within the buffer area; all materials should strictly be kept 30 m away from the watercourses on site. Furthermore, during the operational phase, when maintaining and utilising the road, mitigation measures must be developed and implemented to inhibit further degradation of these wetland systems. In the event of an unexpected damage occurring this should be reported to the relevant authority immediately.				
An appropriate Contingency-Spill Response Plan is to be compiled and stored on site, for implementation where necessary. Contractors are to be trained in spill response and familiar with spill plan. Contact details for a reputable company to hand large spill events (e.g. SpillTech) must be included in the spill plan and must be available on hand at the site during construction and business operation. Individual operational sites/companies will need to compile their own contingency/spill plans.				
No equipment laydown or storage areas must be located within 20m of any watercourse and/or within the 1:100 year flood line of the uMsimbazi Rivers.				
POST-MITIGATION				
DURATION	2	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*-3*	*3*
EXTENT	1	*The extent of the impact is rated as footprint as it only affects the area in which the proposed activity will occur*		
SEVERITY	-1	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Negligible***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-9**	**Very low - negative**		

CONFIDENCE LEVEL
High

(viii) Altered ecological processes and biodiversity of wetland habitat, as a result of alien invasive plant establishment, as a result of access option 3b

During construction, there may be altered ecological processes and biodiversity caused by construction activity and the introduction of invasive alien plant species carried by construction vehicles and the lack of proper rehabilitation on site.

Table 5-116: Impact ratings for altered ecological processes and biodiversity of wetland habitat, as a result of proposed access option 3b

Impact Table: Construction of site access Option 3b				
PROJECT PHASE	*Construction Phase*			
DIRECT IMPACT	*Altered ecological processes and biodiversity of wetland habitat as a result of proposed access option 3b*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*2*	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*-14*	*3*
EXTENT	*2*	*The extent of the impact is rated as site as it will affect only the development are*		
SEVERITY	*-2*	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Slightly Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-24**	**Low - negative**		
PROPOSED MITIGATION MEASURES				

An independent Environmental Control Officer (ECO) must be appointed to oversee construction.				
The tyres of construction vehicles must be inspected before entering the site to ensure no soil material with alien invasive seeds are carried with it.				
Following the completion of construction, there must be rehabilitation of wetlands and watercourses to ensure the re-establishments of what was the natural hydraulic regime as much as possible. Where the watercourse's hydraulic regime is improved, the vegetation will improve as well for the riparian habitat which can lead to the reintroduction of riparian specific species. It is, however, not possible to completely re-establish the natural hydrological regime at the catchment level as this is what is needed to improve the current state of the wetlands and watercourses. This is due to the comparatively small-scale site-specific construction at the point of the wetland and watercourse crossings. Nevertheless, the wetland areas and watercourses which are affected at the point of construction can be stabilised to make sure that the current functionality of the wetland and watercourse is not reduced, but restored. The main function of rehabilitation efforts must aim to restore the natural function and improve the aesthetic nature of the wetlands and watercourses.				
POST-MITIGATION				
DURATION	2	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*-3*	*3*
EXTENT	1	*The extent of the impact is rated as footprint as it only affects the area in which the proposed activity will occur*		
SEVERITY	-1	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Negligible***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-9**	**Very low - negative**		
CONFIDENCE LEVEL				
High				

(b) **Operational Phase**

(i) Increased pressure on local roads as a result of access option 3b

Increased pressure on local roads is a threat to road safety in general, as it can shorten the life span of the road and lead to higher maintenance and repair costs on local residential roads. During the operation phase, road vehicle traffic is expected to increase, and this will lead to

increased pressure on the existing road infrastructure. If this is not well planned and managed, negative impacts including reduced road safety can be expected.

Table 5-117: Impact ratings for increased pressure on local roads as a result of road access option 3b

PROJECT PHASE	*Operational Phase*			
DIRECT IMPACT	*Increased pressure on local roads as a result of Access Option 3b*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*0*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*0*	*Negligible*	***Negligible***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*1*	*Irreplaceable resources will be impacted.*		
SIGNIFICANCE	***0***	***Very low - negative***		
PROPOSED MITIGATION MEASURES				
Driver training should be implemented.				
Improved traffic management solutions should be implemented.				
Follow recommendations provided in the traffic management plan.				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*0*	*3*
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	0	*Negligible*	***Negligible***	***Definite***

IMPACT ON IRREPLACEABLE RESOURCES	1	*Irreplaceable resources will be impacted.*		
SIGNIFICANCE	**0**	**Very low - negative**		
CONFIDENCE LEVEL				
High				

(ii) Decline in property values as a result of access Option 3b

Undesirable facilities such as highways, manufacturing plants and landfills in an area can reduce property values. Conversely, disamenities, like the presence of industrial land and highway nearness, affect the prices negatively. Facilities such as highways and interchanges in an area may reduce the property values of the surrounding owners. According to the same theory, major improvements to existing transportation infrastructure should also have a strong, positive effect on nearby real estate values. The loop ramp of Option 3b will be located in direct view of the residents of Panorama Park and therefore could potentially result in a decline in property values.

Table 5-118: Impact ratings for a decline in property values as a result of access Option 3b

PROJECT PHASE	*Operational Phase*			
DIRECT IMPACT	*Decline in property values as a result of Access Option 3b*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-24*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-3*	*The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or*	***Highly Detrimental***	***Definite***

		permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected		
IMPACT ON IRREPLACEABLE RESOURCES	*1*	*Irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-72***	***High - negative***		
PROPOSED MITIGATION MEASURES				
Full disclosure of information must be provided to the affected communities.				
Give effect to landscaping and project design measures to reduce the noise and visual impacts of the new interchanges to the Panorama residents.				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-16*	*3*
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	-2	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Moderately Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	1	*Irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-48**	**Moderate - negative**		
CONFIDENCE LEVEL				
High				

(iii) Economic opportunities as a result of Option 3b road access

Option 3b has an opportunity to create economic opportunities for the communities along the proposed routes. The informal traders in these areas may benefit from increased transient traffic. Also, increased traffic in this area has an opportunity to induce road upgrades on P578 and P197 roads to accommodate the increased traffic and the community, which would be a huge benefit to the community. The community may also benefit from the employment opportunities created by the establishment of the KZN ASP.

Table 5-119: Impact ratings for economic opportunities as a result of Option 1 road access

PROJECT PHASE	*Operational Phase*			
DIRECT IMPACT	*Economic opportunities as a result of Access Option 3b*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*7*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*1*	*The severity of the impact is rated as Low positive as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally improved*	***Slightly beneficial***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	***21***	***Low - positive***		
PROPOSED MITIGATION MEASURES				
Employ the local labour force for the operation of the KZN ASP.				
Consider providing a safe trading area/stall for local traders along the proposed routes or within the KZN ASP to induce the local economy of the community.				

The increased market as a result of the KZN ASP will increase the economy of Illovo beach.				
Rental housing would be in high demand in the area as a result of people that want to stay closer to their place of work. The community can offer rental accommodation.				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*14*	*3*
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	2	*The severity of the impact is rated as Moderate positive as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are positively affected*	***Moderately beneficial***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted.*		
SIGNIFICANCE	**42**	**Moderate - positive**		
CONFIDENCE LEVEL				
High				

(iv) Potential health (air quality) impacts as a result of Option 3b access to the KZN ASP development

The main findings of the Air Quality Impact Assessment were similar to Option 0, Option 1, Option 1c and 1d road access.

- Excess lifetime cancer risk due to diesel particulate matter at 100 m from the centre of the road was slightly more than 1 in 10 000 and is considered “moderate risk” (for all scenarios), while at 250 m from the middle of the road, excess lifetime cancer risk was less than 1 in 10 000 and is considered “low risk”.

- According to the study, Option 1 has high impacts on air quality based on simulated ground level impacts as well as excess lifetime cancer risk and is the fourth preferred access option.

Table 5-120: Impact ratings for health (air quality) impacts as a result of Option 3b road access

PROJECT PHASE	*Operational Phase*			
DIRECT IMPACT	*Potential health (air quality) impacts as a result of Access Option 3b*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-16*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-2*	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Moderately Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*1*	*Irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-48***	***Moderate - negative***		
PROPOSED MITIGATION MEASURES				
Although vehicle-targeted air pollution measures reside with the national government (this may take the form of reformulation of fuels, retrofitting of catalytic converters and the establishment of emission standards to limit the discharge of air pollutants from new motor vehicles), it is may be necessary to implement measures that mitigate emissions from vehicles. This may include:				

• *The requirement that vehicle suppliers or contractors ensure compliance with appropriate emission standards for their fleets.* • *The requirement that all maintenance and repair of vehicles be carried out as prescribed by manufacturer in order to maximize combustion and reduce gaseous emissions.*				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-16*	*3*
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	-2	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Moderately Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	1	*Irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-48**	**Moderate - negative**		
CONFIDENCE LEVEL				
High				

(v) Impact on sensitive noise receptors as a result of traffic flows along the Option 3b access route

Noise levels at the nearest sensitive receptors to Option 3b road access was predicted, (*assuming the peak hour traffic will be the worst case of traffic entering and exiting the ASP area*).

Option 3b interchange design gives access to the eastern boundary of the proposed KZN ASP via a new interchange, enabling access via on-ramps and off-ramps beside the existing N2 in the northern direction only. South-going access to the ASP is via a new off-ramp and elevated bridge over the N2. There is no south-going on-ramp to the N2 planned. The nearest sensitive

receptor (residents of Panorama Park east of the N2) is 30m from the centreline of the loop to the KZN ASP.

The projected rise in noise levels in the southern part of the adjacent residential area of Panorama Park is due to a combination of the reduced distance of the nearest sensitive receptors to this south-going off-ramp and the doubling of the peak hour traffic flow on the N2.

Table 5-121: Impacts of traffic noise on the sensitive receptors along Option 3b access road

PROJECT PHASE	*Operational Phase*			
DIRECT IMPACT	*Increased noise impacts as a result of Option 3b road access*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-21*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-3*	*The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected*	***Highly Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*0*	*No irreplaceable resources will be impacted*		
SIGNIFICANCE	***-63***	***High - negative***		
PROPOSED MITIGATION MEASURES				

There are no mitigation measures - n/a.				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-21*	*3*
EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	-3	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Highly Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	0	*No irreplaceable resources will be impacted*		
SIGNIFICANCE	**-63**	**High - negative**		
CONFIDENCE LEVEL				
High				

(vi) Impact of increased visual impact on sensitive receptors as a result of construction of the circular loop ramp for Option 3b access route

Panorama Park residents are the sensitive receptors as well as those travelling on the N2.

The proposed loop is a larger structure and is more visually imposing on the existing landscape. The access option has a low VAC, as there are no similar loop interchanges in the immediate vicinity. This creates a higher level of a visual disturbance.

Table 5-122: Impact ratings for increased visual impact on sensitive receptors as a result of construction of the Option 3b access route

PROJECT PHASE	*Operational Phase*			
DIRECT IMPACT	*Increased visual impacts as a result of Option 3b road access*			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	--			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-24*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-3*	*The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected.*	***Highly Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*1*	*Irreplaceable resources will be impacted.*		
SIGNIFICANCE	***-72***	***High - negative***		
PROPOSED MITIGATION MEASURES				
There are no mitigation measures - n/a.				
POST-MITIGATION				
DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-24*	*3*

EXTENT	3	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	-3	*The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected.*	***Highly Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	1	*Irreplaceable resources will be impacted.*		
SIGNIFICANCE	**-72**	**High - negative**		
CONFIDENCE LEVEL				
High				

5.6 Cumulative Impacts

5.6.1 Natural habitat and landscape degradation

The landscape of the study area is mostly transformed and modified by anthropogenic activities such as large scale sugar cane production, roads, settlement, light industry, and a landfill site. The N2 highway borders the site on the east side and the major route P197 on the west side. The existing P491 municipal road is constructed within the uMsimbazi Estuary on the southern border of the site. This small road is in disrepair and is used for illegal dumping of refuse, building rubble, garden refuse, and other waste, especially on the section on eastern side of the N2. These activities and structures have placed immense pressure on the surrounding natural areas in the landscape.

As discussed, the natural areas within the study area provide essential ecosystem services such as water filtration, flood attenuation, ecological corridors and habitat for biodiversity. Further impacts caused by the proposed development will add cumulatively to existing impacts, and will lead to habitat degradation and erosion of the ecological infrastructure that provides the ecosystem services, at a landscape scale.

Table 5-123: Impact ratings for the cumulative impacts of natural habitat and landscape degradation

Impact Table				
PROJECT PHASE	*Construction and Operational Phase*			
DIRECT IMPACT	--			
INDIRECT IMPACT	--			
CUMULATIVE IMPACT	*Natural habitat and landscape degradation*			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-27*	*3*
EXTENT	*4*	*The extent of the impact is rated as Regional as the effects of the impact extends beyond municipal boundaries*		
SEVERITY	*-3*	*The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected*	***Extremely Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*1*	*Irreplaceable resources will be impacted*		
SIGNIFICANCE	**-81**	**very high negative**		
PROPOSED MITIGATION MEASURES				
The current development layout and features of the layout designed to minimise impacts on the surrounding natural areas must not be altered for habitat and landscape degradation to be prevented				
Construction activities must remain within the footprint of the current layout and the construction footprint including service roads, construction camps, stock piles etc. must stay out of all areas containing natural vegetation and areas marked medium-high and highly sensitive				
Impact on the UCVB wetland and forest in the north-eastern corner of the study area can be avoided by opting for Option 3b for access to the site				

All mitigation measures that have been prescribed to prevent erosion, siltation, pollution, the spread of invasive alien plant species, loss of ecological corridors, and any other impact that will result in habitat degradation and depletion of ecosystem services must be adhered to				
The existing P491 road on the southern border of the site, especially the section on eastern side of the N2, should be decommissioned and the area rehabilitated back into the estuary				
POST-MITIGATION				
DURATION	3	*The duration of the activity associated with the impact will last 18 months-5 years and as such is rated as Medium term*	*-12*	*2*
EXTENT	2	*The extent of the impact is rated as site as it will affect only the development area*		
SEVERITY	-2	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Slightly Detrimental***	***Likely***
IMPACT ON IRREPLACEABLE RESOURCES	1	*Irreplaceable resources will be impacted*		
SIGNIFICANCE	**-24**	**Low - negative**		
CONFIDENCE LEVEL				
High				

5.6.2 Material reduction in estuarine biodiversity on the iLovu and uMsimbazi Estuaries during the construction and operational phase of the ASP

The direct impacts of changes in the quantity and quality of water reaching estuaries and mouth dynamics changes together with the impacts that may arise from light and noise disturbance and will have a cumulative negative effect on overall estuarine biodiversity.

Table 5-124:Impacts to the estuarine biodiversity on the iLovu Estuary during the construction phase of the ASP

Impact Table:	
PROJECT PHASE	*Construction Phase and Operational phases*
DIRECT IMPACT	

INDIRECT IMPACT				
CUMULATIVE IMPACT	*Changes to water quality, quantity, mouth function and disturbance on the iLovu and uMsimbazi Estuaries are all direct impacts which result from the construction and operation of the ASP*			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long-term Term*	*-20*	*3*
EXTENT	*5*	*The extent of the impact is rated as National as it affects extends beyond two regional/provincial boundaries*		
SEVERITY	*-2*	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected*	***Highly Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*1*	*Irreplaceable resources will be impacted*		
SIGNIFICANCE	**-60**	**HIGH - NEGATIVE**		
PROPOSED MITIGATION MEASURES				
Mitigation of the water quantity changes by implementation of the stormwater plan as per 541640_GIBB_SWMP_ASP_Final_10Sep19				
Improvement in the estuary habitats within the EFZ by rehabilitation of the 56 ha wetland offset site identified in the Eco-Pulse Wetland Offset Report				
Implementation of a good water quality management programme including monitoring of water quality within the stormwater infrastructure				
Retention dams and other stormwater infrastructure should be put in place to avoid major changes to runoff volume and velocity.				
Wetland rehabilitation, restoration and management should be carried out as soon as possible during or immediately following construction. This will serve to protect streams and aquatic habitats which feed into or are within the EFZ.				
Appropriate environmentally sensitive management rules regarding lights and noise on the site need to be integrated into the environmental management plan				
No material from the cut and fill operation should be dumped or stored in the wetland/estuary areas.				
POST-MITIGATION				

DURATION	4	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long-term Term*	*30*	*3*
EXTENT	5	*The effect of the impact extends beyond two regional boundaries*		
SEVERITY	3	*The severity of the impact is rated as High positive as the natural, cultural or social functions and processes are altered to the extent that valued, important, sensitive or vulnerable systems or communities are substantially positively affected.*	***Extremely Beneficial***	***Likely***
IMPACT ON IRREPLACEABLE RESOURCES	1	*Irreplaceable resources will be impacted*		
SIGNIFICANCE	**90**	**VERY HIGH - POSITIVE**		
CONFIDENCE LEVEL				
High				

5.7 No-Go Alternative

The "No-Go" alternative refers to the alternative of not embarking on the proposed project. This alternative would imply that the current biophysical and socio-economic environment will prevail.

Without the proposed establishment of the industrial township for the proposed ASP and associated land uses, the status quo as it currently exists, would remain. Thus, in the absence of the proposed development, there would be no provision to realise the goals of the South African Automotive Masterplan (SAAM) to 2035. This Masterplan is intended to develop a clear, strategic roadmap for the development of the South African automotive industry through to 2035 (Barnes & Black, 2017). The SAAM's 2035 vision is the achievement of "a globally competitive and transformed industry that actively contributes to the sustainable development of South Africa's productive economy, creating prosperity for industry stakeholders and broader society."

The four components of global competitiveness, industry transformation, sustainable development, and societal contribution represent the aspirational heart of the SAAM vision (Barnes & Black, 2017). Firstly, should the no-go alternative be implemented, there will be no initiative for the South African automotive industry to be globally competitive (relative to leading international automotive producers). The second component relates to the industry's contribution to the transformation of the South African economy. This encompasses multiple elements, from employment equity to the greater inclusion of Black-owned firms within the

automotive value chain. The no-go alternative will not lead to an impetus for this to be realised.

The third component relates to the sustainable development of the South African economy. The critical elements encompassed within this component relate to the growth of the industry, employment provided, skills developed, and the improved environmental impact of products and production processes. The final component relates to the shared prosperity created by the industry, with the critical elements here comprising the financial health and wellbeing of firms within the value chain, fair employee remuneration, and the broader contribution of the value chain to the South African fiscus. In light of the vision of SAAM, the no-go option is therefore not feasible at this stage.

The Automotive industry plays a significant role in social and economic development and therefore the Government has recognised that vehicle production and component manufacturing are important in creating new sustainable employment opportunities across the automotive value chain and enhancing the trade balance of SA. Should the proposed development not be approved, these objectives would not be attained.

5.8 Environmental Impact Statement

Upon consideration of the impacts associated with the development a number of aspects need to be kept in mind:

- Impacts are associated separately in terms of the proposed layout, sewer pipeline alignment, powerline alignment and access options and the table below are presented accordingly;
- The site is currently utilised for sugar cane cultivation which has historically had an impact on the wetland areas on and abutting the site;
- The proposed development will in itself further impact on environmentally sensitive areas however extensive rehabilitation plans are proposed as part of this Application for Environmental Authorisation as well as the associated application for a Water Use License. The EAP recognises however that an environmental benefit cannot be counterbalanced against an environmental cost;
- The EAP acknowledges the benefits of job creation throughout the construction and operational phases of the develop; and
- The EAP further recognises the impact on local traffic patterns and the sense of place.

The tables to follow is thus a summary of all impacts identified as part of the impact assessment process and through specialist studies. Chapter 6 will consolidate the impacts in a discussion around the residuals risks of the project and the consequences to be considered for decision making.

Table 5-125: Summary of Potential Impacts and their associated significance for the sewer pipeline and layout of the development (stand-alone)

Sewer pipeline and layout impacts		
Impact	**Significance before mitigation**	**Significance after mitigation**
Construction Phase		
Disturbance by increased noise and lights to the ecological corridors and the iLovu and uMsimbazi Estuaries (this is an impact influencing predominantly) the water bird component of estuaries	High negative	Moderate negative
Permanent loss of wetland habitat as a result of construction of platforms	High negative	Moderate negative
Ecological linkages become broken across the site and between the adjacent ESAs and the iLovu and uMsimbazi Estuaries	Low negative	Moderate Positive
Destruction of plant species of conservation concern and protected plant species	High negative	Low negative
Increased informal dwellers as a result of construction activities at the site for development	Low negative	Very low negative
Increased criminal activity as a result of construction activity	Low negative	Very low negative
Impact of foreign direct investment as a result of the KZN ASP development	Moderate Positive	Moderate Positive
Impact of Urban renewal	Moderate Positive	Moderate Positive
Operational Phase		
Impacts on aquatic taxa sensitive to changes in water quality, due to accidental spillage of sewage	Very low negative	Very low negative
Impacts of sewerage spills or contamination on the iLovu and uMsimbazi Estuaries	Moderate negative	Very low negative
Reduced water quality of wetlands as a result of sewerage spills	High negative	Low negative
Pollution of the vadose zone and regional water table / groundwater aquifer, as a result of broken sewer lines	Very low negative	Very low negative
Water quantity changes as a result of modification of the local catchment with extensive areas of hardened and impervious surfaces.	Very high negative	Very low negative
Water quality changes as a result of pollutants being carried by runoff to the iLovu estuary with highly polluted urban stormwater flushing across hardened surfaces.	Very high negative	Very low negative

Sewer pipeline and layout impacts		
Impact	**Significance before mitigation**	**Significance after mitigation**
Water quality changes as a result of pollutants being carried by runoff to the uMsimbazi estuary with highly polluted urban stormwater flushing across hardened surfaces.	Very high negative	Very low negative
Disturbance by increased noise and lights to the ecological corridors and the iLovu estuary (this is an impact influencing predominantly the water bird component of estuaries)	High negative	Moderate negative
Aesthetic impacts on the iLovu and uMsimbazi Estuaries	Moderate negative	Moderate negative
Altered hydrology, erosion and / sediment regime of wetlands	Moderate negative	Moderate negative
Permanent change of visual character on the nearby receptors	Moderate negative	Very low negative
Loss of agricultural land as a result of the proposed development	High positive	High positive
Increased pressure on municipal services and existing community facilities	High negative	Low negative
Expanded manufacturing base	Moderate positive	Moderate positive
Increased contribution to municipal rates as a result of change of land use activities	High positive	High positive

Table 5-126: Summary of Potential Impacts and their associated significance for 132kV Powerline alternatives

132kV Powerline Development	Alternative/Option 1		Alternative/Option 2		Alternative/Option 3	
Impact	**Significance before mitigation**	**Significance after mitigation**	**Significance before mitigation**	**Significance after mitigation**	**Significance before mitigation**	**Significance after mitigation**
CONSTRUCTION PHASE						
Disturbance to, or destruction of indigenous vegetation including Protect species	--	--	Low negative	Very low negative	SAME AS ALTERNATIVE/OPTION 2	SAME AS ALTERNATIVE/OPTION 2
Increased erosion potential and siltation of downstream watercourses due to construction and associated infrastructure developments (e.g. pipeline, site layout)	Moderate negative	Very low negative	SAME AS ALTERNATIVE/OPTON 1	SAME AS ALTERNATIVE/OPTON 1	SAME AS ALTERNATIVE/OPTON 1	SAME AS ALTERNATIVE/OPTON 1
Changes to stream flow characteristics as a result of excavation activities and compaction of soil due to construction vehicle movements and associated infrastructure developments (e.g. pipeline, site layout)	Low negative	Very low negative	SAME AS ALTERNATIVE/OPTON 1	SAME AS ALTERNATIVE/OPTON 1	SAME AS ALTERNATIVE/OPTON 1	SAME AS ALTERNATIVE/OPTON 1
Increase in sedimentation and turbidity due to the clearing of vegetation through or in the vicinity of watercourses and associated infrastructure developments (e.g. pipeline, site layout)	Very low negative	Very low negative	SAME AS ALTERNATIVE/OPTON 1	SAME AS ALTERNATIVE/OPTON 1	SAME AS ALTERNATIVE/OPTON 1	SAME AS ALTERNATIVE/OPTON 1
Pollution of the vadose zone and regional water table / groundwater aquifer, as a result of excavation activities and accidental spillage of hydrocarbons and associated infrastructure developments (e.g. pipeline, site layout)	Very low negative	Very low negative	SAME AS ALTERNATIVE/OPTON 1	SAME AS ALTERNATIVE/OPTON 1	SAME AS ALTERNATIVE/OPTON 1	SAME AS ALTERNATIVE/OPTON 1
Pollution of vadose zone and regional water table/groundwater aquifer during excavations	Very low negative	Very low negative	SAME AS ALTERNATIVE/OPTON 1	SAME AS ALTERNATIVE/OPTON 1	SAME AS ALTERNATIVE/OPTON 1	SAME AS ALTERNATIVE/OPTON 1
Degradation of water quality of non-perennial and perennial river systems situated downstream of the site, as a result of construction activities and associated infrastructure developments (e.g. pipeline, site layout)	Very low negative	Very low negative	SAME AS ALTERNATIVE/OPTON 1	SAME AS ALTERNATIVE/OPTON 1	SAME AS ALTERNATIVE/OPTON 1	SAME AS ALTERNATIVE/OPTON 1
Increased potential for soil erosion, caused by removal of vegetation during construction and associated infrastructure developments (e.g. pipeline, site layout)	Moderate negative	Very low negative	SAME AS ALTERNATIVE/OPTON 1	SAME AS ALTERNATIVE/OPTON 1	SAME AS ALTERNATIVE/OPTON 1	SAME AS ALTERNATIVE/OPTON 1
Altered hydrology, erosion, and/sediment regime as a result of construction of the powerline and associated infrastructure developments (e.g. pipeline, site layout)	Low negative	Very low negative	SAME AS ALTERNATIVE/OPTON 1	SAME AS ALTERNATIVE/OPTON 1	SAME AS ALTERNATIVE/OPTON 1	SAME AS ALTERNATIVE/OPTON 1
Reduced water quality of wetlands and watercourses, as a result of construction activities and associated infrastructure developments (e.g. pipeline, site layout)	Very low negative	Very low negative	SAME AS ALTERNATIVE/OPTON 1	SAME AS ALTERNATIVE/OPTON 1	SAME AS ALTERNATIVE/OPTON 1	SAME AS ALTERNATIVE/OPTON 1
Altered ecological processes and biodiversity of wetland habitat as a result of increased spread of invasive alien plant activities and associated infrastructure developments (e.g. pipeline, site layout)	Very low negative	Very low negative	SAME AS ALTERNATIVE/OPTON 1	SAME AS ALTERNATIVE/OPTON 1	SAME AS ALTERNATIVE/OPTON 1	SAME AS ALTERNATIVE/OPTON 1
Impact on heritage and archaeological resources as a result of construction activities	Very low negative	Very low negative	Moderate negative	Moderate negative	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1
Impact on sensitive visual receptors in the vicinity of the proposed Option 1 powerline route alignment and associated infrastructure developments (e.g. pipeline, site layout)	High negative	Very low negative	High negative	Low negative	High negative	Low negative

132kV Powerline Development	Alternative/Option 1		Alternative/Option 2		Alternative/Option 3	
Impact	**Significance before mitigation**	**Significance after mitigation**	**Significance before mitigation**	**Significance after mitigation**	**Significance before mitigation**	**Significance after mitigation**
Increased noise generation due to construction activities and the movement of construction vehicles and associated infrastructure developments (e.g. pipeline, site layout)	Low negative	Very low negative	SAME AS ALTERNATIVE/OPTON 1	SAME AS ALTERNATIVE/OPTON 1	SAME AS ALTERNATIVE/OPTON 1	SAME AS ALTERNATIVE/OPTON 1
Increase in ambient dust levels and air emissions, due to construction activities and associated infrastructure developments (e.g. pipeline, site layout)	Low negative	Very low negative	SAME AS ALTERNATIVE/OPTON 1	SAME AS ALTERNATIVE/OPTON 1	SAME AS ALTERNATIVE/OPTON 1	SAME AS ALTERNATIVE/OPTON 1
Increased traffic caused by construction of the proposed powerline the movement of construction vehicles and associated infrastructure developments (e.g. pipeline, site layout)	Low negative	Very low negative	SAME AS ALTERNATIVE/OPTON 1	SAME AS ALTERNATIVE/OPTON 1	SAME AS ALTERNATIVE/OPTON 1	SAME AS ALTERNATIVE/OPTON 1
Skills transfer and capacitating of local communities during construction	Very low positive	Moderately positive	SAME AS ALTERNATIVE/OPTON 1	SAME AS ALTERNATIVE/OPTON 1	SAME AS ALTERNATIVE/OPTON 1	SAME AS ALTERNATIVE/OPTON 1
OPERATIONAL PHASE						
Increased potential for electrocution of birds, as a result of the presence of powerlines	Moderate negative	Very low negative	SAME AS ALTERNATIVE/OPTON 1	SAME AS ALTERNATIVE/OPTON 1	SAME AS ALTERNATIVE/OPTON 1	SAME AS ALTERNATIVE/OPTON 1
Increased potential for collision of birds, as a result of presence of the powerlines	High negative	Very low negative	SAME AS ALTERNATIVE/OPTON 1	SAME AS ALTERNATIVE/OPTON 1	SAME AS ALTERNATIVE/OPTON 1	SAME AS ALTERNATIVE/OPTON 1
Altered hydrological processes, erosion and/sediment regime of the nearby wetlands, as a result of maintenance activities	Very low negative	Very low negative	SAME AS ALTERNATIVE/OPTON 1	SAME AS ALTERNATIVE/OPTON 1	SAME AS ALTERNATIVE/OPTON 1	SAME AS ALTERNATIVE/OPTON 1
Altered ecological processes and biodiversity as a result of spread of alien invasive plant species	Very low negative	Very low negative	SAME AS ALTERNATIVE/OPTON 1	SAME AS ALTERNATIVE/OPTON 1	SAME AS ALTERNATIVE/OPTON 1	SAME AS ALTERNATIVE/OPTON 1
DECOMISSIONING PHASE						
The proposed 132kV transmission powerline will not be decommissioned in the future, as it will be permanent electrical infrastructure that will be owned and maintained by the eThekwini Municipality. It is also not envisaged that the sewer pipeline will be decommissioned.			SAME AS ALTERNATIVE/OPTION 1		SAME AS ALTERNATIVE/OPTION 1	

Table 5-127: Summary of Potential Impacts and their associated significance for Access Road Alternatives

Access Road Alternatives	Alternative/Option 0		Alternative/Option 1 (Preferred)		Alternative/Option 1 (c)		Alternative/Option 1 (d)		Alternative/Option 3 (b)	
Impact	***Significance before mitigation***	***Significance after mitigation***	***Significance before mitigation***	***Significance after mitigation***	***Significance before mitigation***	***Significance after mitigation***	***Significance before mitigation***	***Significance after mitigation***	***Significance before mitigation***	***Significance after mitigation***
CONSTRUCTION PHASE										
Increased pressure on local roads as a result of Access Option 0	High negative	Moderate negative	--	--	--	--	--	--	--	--
Economic opportunities as a result of Access Option 0	Moderate positive	Moderate positive	--	--	--	--	--	--	--	--
Compromised road safety, as a result of Access Option 0	High negative	Moderate negative	--	--	--	--	--	--	--	--
Potential health (air quality) impacts	Moderate negative	Moderate negative	--	--	--	--	--	--	--	--
Increased noise impacts	High negative	High negative	--	--	--	--	--	--	--	--
Increased traffic congestion	--	--	Low negative	Very low negative	Moderate negative	Low negative	Moderate negative	Low negative	Low negative	Very low negative
Inconvenience and nuisance to the local community	--	--	Low negative	Very low negative	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1	Low negative	Very low negative	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1
Employment opportunities	--	--	Low positive	Moderate positive	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1
Decline in property values	--	--	Very low negative	Very low negative	Moderate negative	Low negative	Moderate negative	Moderate negative	Low negative	Low negative
Impact on heritage resources as a result of the proposed construction activities	--	--	Low Negative	Very low negative	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1
Increased congestion on the R102	--	--	--	--	Low negative	Low negative	SAME AS ALTERNATIVE 1	SAME AS ALTERNATIVE 1	SAME AS ALTERNATIVE 1	SAME AS ALTERNATIVE 1
Destruction of indigenous vegetation and faunal habitat	--	--	High negative	Moderate negative	High negative	Moderate negative	High negative	Moderate negative	Moderate negative	Low negative
Destruction of plant species of conservation concern and protected plant species	--	--	High negative	Low negative	SAME AS ALTERNATIVE 1	SAME AS ALTERNATIVE 1	SAME AS ALTERNATIVE 1	SAME AS ALTERNATIVE 1	Low negative	Very low negative
Increase and spread of invasive alien vegetation	--	--	High negative	Low negative	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1
Erosion and siltation of drainage lines, wetlands, and downstream estuaries	--	--	Very high negative	Low negative	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1

Access Road Alternatives	Alternative/Option 0		Alternative/Option 1 (Preferred)		Alternative/Option 1 (c)		Alternative/Option 1 (d)		Alternative/Option 3 (b)	
Impact	***Significance before mitigation***	***Significance after mitigation***	***Significance before mitigation***	***Significance after mitigation***	***Significance before mitigation***	***Significance after mitigation***	***Significance before mitigation***	***Significance after mitigation***	***Significance before mitigation***	***Significance after mitigation***
Pollution of surrounding natural areas, downstream watercourses and estuaries	--	--	Very high negative	Low negative	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1
Loss of ecosystem services and ecological corridors	--	--	High negative	Moderate negative	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1	Low negative	Very low negative
Permanent loss of wetland habitat as a result of construction of access option 1	--	--	Moderate negative	Low negative	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1	Low negative	Very low negative
Altered hydrology, erosion and sediment/regime of wetlands as a result of vegetation clearance at option 1	--	--	Moderate negative	Low negative	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1
Reduced water quality of wetlands and downstream watercourses	--	--	Moderate negative	Low negative	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1	Low negative	Very low negative
Altered ecological processes and biodiversity of wetland habitat	--	--	Moderate negative	Low negative	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1	Low negative	Very low negative
OPERATIONAL PHASE										
Increased pressure on local roads as a result of Access Option 1	--	--	*Very low negative*	*Very low negative*	Low negative	Low negative	Moderate positive	Low negative	Very low negative	Very low negative
Decline in property values as a result of Access Option 1	--	--	*Moderate negative*	*Low negative*	SAME AS ALTERNATIVE 1	SAME AS ALTERNATIVE 1	*High negative*	*Moderate negative*	*High negative*	*Moderate negative*
Economic opportunities as a result of Access Option 1	--	--	*Low positive*	*Moderate positive*	Low positive	Moderate positive	Low positive	Moderate positive	*Low positive*	Moderate positive
Potential health (air quality) impacts as a result of Access Option 1	--	--	*Low negative*	*Low negative*	SAME AS ALTERNATIVE 1	SAME AS ALTERNATIVE 1	*Very low negative*	*Very low negative*	*Moderate negative*	*Moderate negative*
Increased noise impacts as a result of Option 1 road access	--	--	*Moderate negative*	*Moderate negative*	High negative	High negative	High negative	High negative	*High negative*	*High negative*
Increased visual impacts as a result of Option 1 road access	--	--	*Low negative*	*Low negative*	Moderate negative	Moderate negative	Moderate negative	Moderate negative	*High negative*	*High negative*
Ecosystem enhancement and decrease in alien plant infestations	--	--	*High negative*	*Moderate positive*	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1

Access Road Alternatives	**Alternative/Option 0**		**Alternative/Option 1 (Preferred)**		**Alternative/Option 1 (c)**		**Alternative/Option 1 (d)**		**Alternative/Option 3 (b)**	
Impact	***Significance before mitigation***	***Significance after mitigation***	***Significance before mitigation***	***Significance after mitigation***	***Significance before mitigation***	***Significance after mitigation***	***Significance before mitigation***	***Significance after mitigation***	***Significance before mitigation***	***Significance after mitigation***
Increased protection for CBAs	--	--	*High negative*	*Moderate positive*	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1
Altered hydrology, erosion and/sediment regime	--	--	*Moderate negative*	*Low negative*	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1
Reduced water quality of wetlands as a result of access option 1	--	--	*Moderate negative*	*Low negative*	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1
Altered ecological processes and biodiversity of wetland habitat, as a result of invasive alien plant establishment	--	--	*Moderate negative*	*Low negative*	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1	SAME AS ALTERNATIVE/OPTION 1